norelem

THE BIG GREEN BOOK

MY CUSTOMER NUMBER

Enter your customer number here to have it always at hand.
You receive it with your first order.

CONTENT

New Products	p. 18 – 19
Main Product Groups at a Glance	p. 20 – 21
Visual Directory of all Components	p. 22 – 70
Technical Information	p. 1423 – 1437
Index	p. 1438 – 1449
DIN Directory	p. 1450 – 1452

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Our goal at norelem is to optimally support you in implementing your ideas. We are always working to expand our selection of high quality components, providing even faster and more flexible delivery. That is why you will find all the standard parts for your ideas in our catalogue.

THE BIG GREEN BOOK

You have the ideas, we make it happen.

FIND WHAT YOU NEED FASTER: OUR PRODUCT GROUPS

Flexible Standard Part System.

Systems and Components for Transmitting Power in Mechanical Engineering and Plant Construction.

Devices, Fixtures and Standard Elements for Measuring and Testing.

Conveyor, Movement Technology and Kinetics: wheels, rollers and ball rollers.

Accessories: from Adhesives to Cylinder Cleaners.

30,0

98%

00

a big deal:
our wide assortment.

HIGHEST QUALITY
30,000 PARTS
98 % AVAILABLE
EX STOCK

NO RE-TYPING –
OUR INTEGRATED SHOPPING CART

You can save your shopping cart locally, load and add to an existing cart, as well as import into your current ERP system or export a list from there and load into the shopping cart. These formats provide an easy overview:

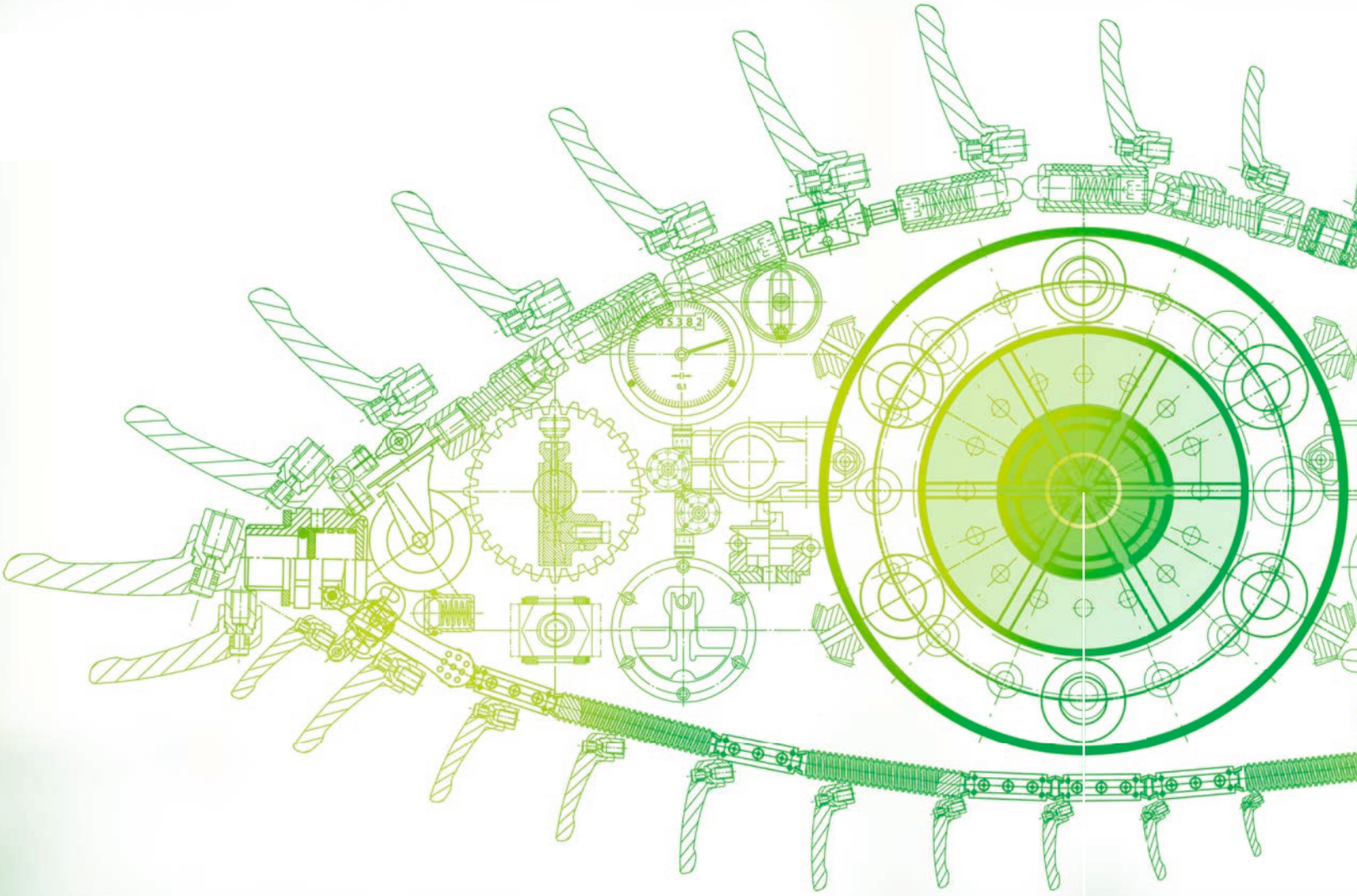
- CSV
- Excel (xls)
- Excel (xlsx)
- IDS 1.3
- openTRANS 1.0
- openTRANS 2.0
- openTRANS 2.1

if you need speedy delivery – our online shop.

We stand for reliable delivery. You decide how fast you need a part. Find out more about our different delivery options under **www.norelem.com**

WITHOUT CLICKING YOUR WAY THROUGH – SPEED ORDERING

Do you already know what you need? Then simply enter the order number and quantity into our speed order form.
You do not have to put every part into the shopping cart separately.

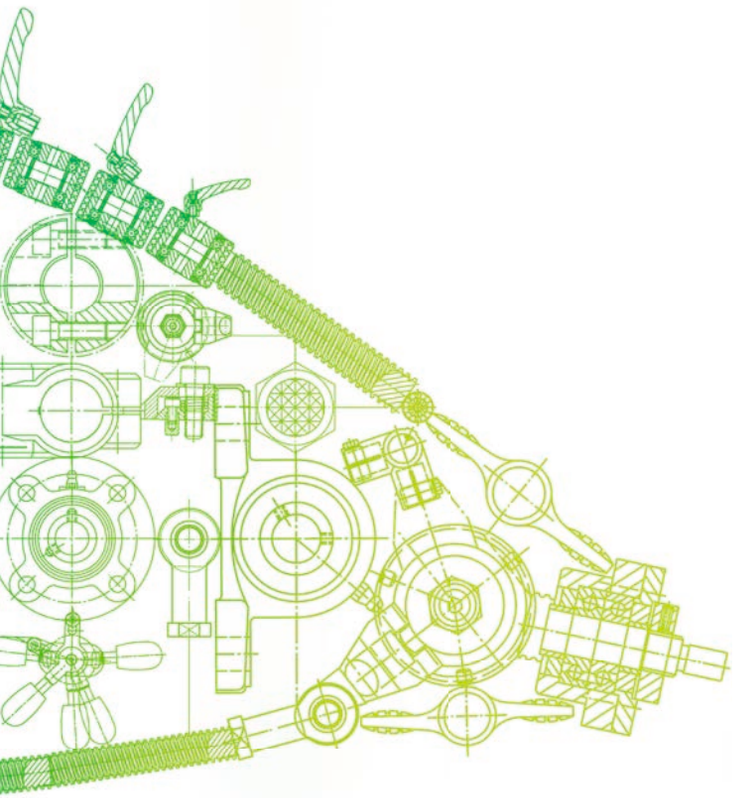


WWW

You can access all CAD data in our online shop.

APP

You can also access the CAD Data using our norelem CAD app available for free download in Apple App Store and on Google Play.



CAD data:
everything is just one click away.

WE SEE EVERYTHING WE DO WITH THE EYES OF A DESIGN ENGINEER

Saving you time and money during design: You can find the DVD with all the CAD data at the very front of the catalogue. The library contains all relevant technical and geometric data of the components. Additionally, the CAD files are available in different formats so that they can be integrated into your system.

norelem
posi-
tions.

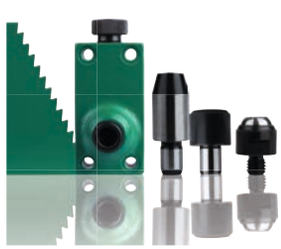
FLEXIBLE STANDARD PART SYSTEM

You are building a device where workpieces need positioning and machining? You can find all the standard parts you need in the main group “norelem positions”. The order of the subgroups corresponds to the construction sequence: base, connecting, positioning, clamping, operating and accessories.

01000

Basic elements
Subplates
Washers
Profiles
Angle plates
Cube tombstones

02000



Toggle locators
Feet
Step blocks
Support elements

03000

Spring
plungers
Indexing plungers
Stops
Centring
and positioning units
Fasteners
Slot keys

04000

Clap straps
Clamping elements

YOU DESIGN — NORELEM HELPS

BASE	01000
CONNECTING	02000
POSITIONING	03000
CLAMPING	04000
	05000
OPERATING	06000
ACCESSORIES	07000
	08000
	09000

05000

Toggle clamps
Pneumatic clamps
Accessories for clamps
Latches

06000

Operating parts

07000

Connecting elements
Ball-end thrust screws and baseplates
Grub screws and thrust pads
torque bolts and threaded inserts
Lifting eye bolts
Hoist rings/Lifting bolts

08000

Drilling jig elements
Drilling jigs
Drill bushes

09000

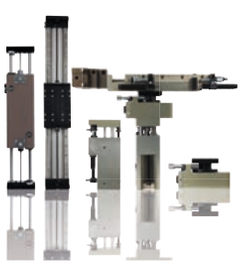
Magnets

norelem
moves.

SYSTEMS AND COMPONENTS FOR MECHANICAL ENGINEERING AND PLANT CONSTRUCTION

When it comes to standard parts for transmitting power in a machine or plant, you will find them here. In the main group "norelem moves" parts are categorised according to their use: base, positioning, transmitting power, braking and damping as well as accessories.

20000



Linear modules
Lift units
Rotary modules
Grip modules
Inductive proximity switches
Connector

21000

Dovetail slides
Guide rails
Positioning tables
Miniature slide guides
Position indicators

22000

Drive technology

23000

Couplings
Rigid couplings
Keyless locking coupling
Cardan joints
Quick plug couplings
Pivot pin

YOU DESIGN — NORELEM HELPS

BASE POSITIONING
20000
21000

TRANSMITTING POWER
22000
23000
24000

BRAKING AND DAMPING
26000

ACCESSORIES
27000
28000
29000

24000

Trapezoidal thread spindles
Ball screws
Pivot pin units

26000

Rubber-metal buffer
Shock absorber
Gas springs

27000

Fork joints
Rod ends
Angle joints
Axial joints
Height adjustment elements
Hinged feet/Levelling feet
Screw-in plugs
Equipment feet
Hinges

28000

Oil level gauges
Screw-in plugs
Screw plugs
Vent screws
Dipsticks
Filler necks

29000

Pipe connectors
Clamps
Clamping elements
Tubes
Column superstructures

norelem measures.

31000

Inspection tables
Gauge stands
Joints

32500

Concentricity gauges
Universal measuring fixtures
dial gauges

33000

Standard elements for
inspection and
testing devices

BECAUSE PERFECTION IS YOUR STANDARD

To help you optimally implement your ideas and designs, we offer a full range of standard parts. The main group "norelem measures" includes devices for measuring and testing. Under "norelem transports" you will find conveyor and movement technology. The technoshop offers all additional accessories.

norelem transports.

norelem technoshop.

95000

Conveyor and movement technology

96000

Gauge strips
Magnetic signs and magnetic envelopes safety nets
Supercraft soft-face hammers mallet inserts
Taper and cylinder cleaner coolant hoses

97000

Lubricants
Adhesives

EXACT POSITIONING FOR A VARIETY OF REQUIREMENTS

The variety of possible combinations makes our positioning tables a cost-effective solution for almost any adjustment and positioning task. The short and long versions in sizes 8 and 12 respectively are available in the following variations:

- manual positioning
- with stepper motor
- with stepper motor and integrated positioning control

Our modular system lets you combine positioning tables with all other components of the same size. High levels of accuracy can be achieved with long service life even in continuous operation.

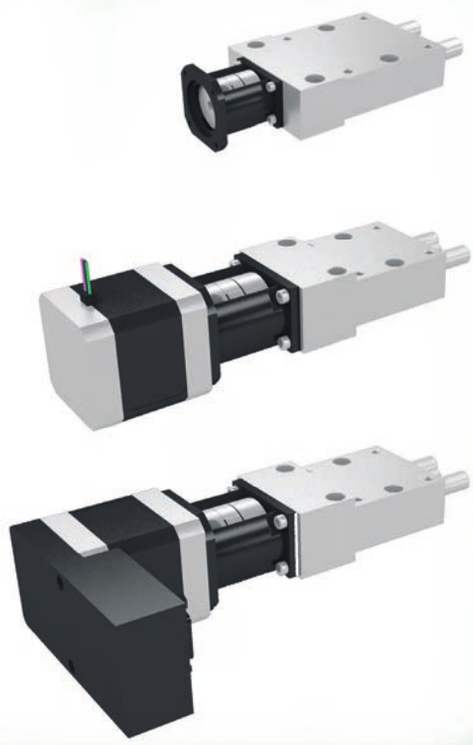
Our wide selection of positioning tables allows you the flexibility to develop your own design.

NEW

ONLINE CONFIGURATOR FOR MOTORISED POSITIONING TABLES

Put together your own selection step by step in our online configurator. Every stage of your configuration is depicted as a graphic image. You can order the result exactly as configured.

precision in perfection:
our motorised positioning table.



Each step of the configuration lets you see the exact current state of your positioning table.

norelem positions.

01000

Basic elements
Plates
Washers
Profiles
Tombstone
Cube tombstone

02000

Toggle locators
Feet
Step blocks
Support elements

03000

Spring plungers
Indexing plunger
Centring and positioning units
Stops
Fasteners
Slot keys

04000

Clamp strap
Clamping elements

05000

Toggle clamp
Pneumatic clamp
Latches
Accessories for clamps

06000

Operating parts

07000

Connecting elements
Ball-end thrust screws and baseplates
Ring bolts
grub screws and
Thrust pads
Torque bolts and threaded inserts
Hoist rings/Lifting bolt

08000

Drilling jig elements
Drilling jigs
Drill bushes

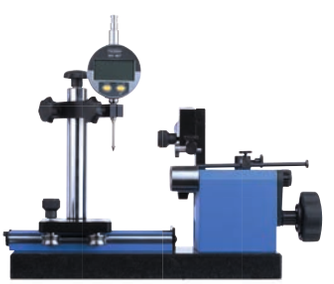
09000

Magnets

norelem measures.

31000

Inspection tables
Gauge stands
Joints



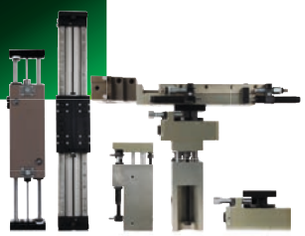
32000

Concentricity gauges
Dial gauges
Universal measuring fixtures

33000

Standard parts for Inspection and testing devices

norelem moves.

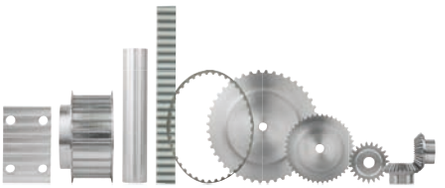


20000

- Linear modules
- Lift units
- Rotary modules
- Grip modules
- Inductive proximity switches
- Connector

21000

- Dovetail slides
- Guide rails
- Positioning tables
- Miniature slide guides
- Position indicators

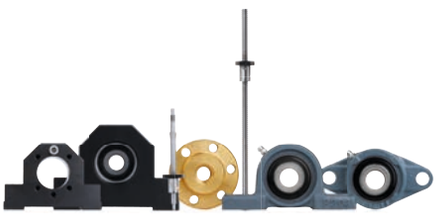


22000

- Drive technology

23000

- Couplings
- Rigid couplings
- Keyless locking coupling
- Cardan joints
- Quick plug couplings
- Pivot pin



24000

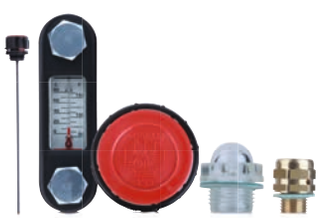
- Trapezoidal thread spindles
- Ball screws
- Pivot pin units

26000

- Rubber-metal buffer
- Shock absorber
- Gas springs

27000

- Knuckle/Angle joints
- Rod ends
- Axial joints
- Height adjustment elements
- Hinged feet/ Levelling feet
- Screw-in plugs
- Equipment feet
- Hinges



28000

- Oil level gauges
- Screw-in plugs
- Screw plugs
- Vent screws
- Dipsticks
- Filler necks

29000

- Pipe connectors
- Clamps
- Clamping elements
- Tubes
- Column superstructures

norelem transports.

95000

- Conveyor and movement technology

norelem techno shop.

96000

- Gauge strips
- Magnetic signs
- Magnetic sleeves
- Safety nets
- Supercraft soft-face hammers
- Mallet inserts
- Taper cleaner
- Cylinder cleaners

97000

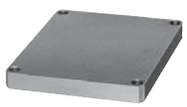
- Lubricants
- Adhesives

Basic elements
Subplates
Discs
Profiles
Angle plates
Tombstones

01040
Page 72

Base plate with T-slots
grey cast iron

01060
Page 73



Base plates steel

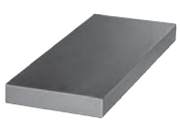
01127
Page 74

Base plates

01130
Page 74

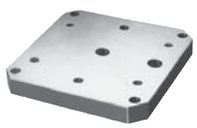
Rectangular plates
precision steel

01140
Page 75



Plates
grey cast iron or aluminium

01148
Page 76-77

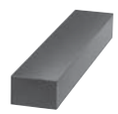


Subplates

01150
Page 78

Subplates machined all sides
grey cast iron

01160
Page 79



Block machined all sides
grey cast iron or aluminium

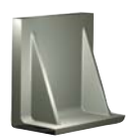
01180
Page 79

Base plate with flanges
grey cast iron

01250
Page 80

Angle plates
with or without T-slots
cast iron

01252
Page 81



Angle plates
aluminium

01263
Page 82-83

Tombstones single-sided

01265
Page 84-85

Tombstones double-sided

01267
Page 86

Tombstones window frame

01270
Page 87

Tombstones double-sided
grey cast iron

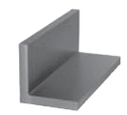
01280
Page 88

Circular plates
steel

01320
Page 88

Circular plates
grey cast iron and aluminium

01380
Page 89

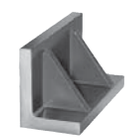


L-profiles
grey cast iron or aluminium

01440
Page 90

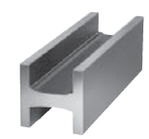
L-profiles unequal legs
grey cast iron or aluminium

01520
Page 90



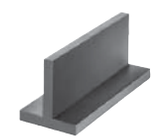
L profile with reinforcing ribs
grey cast iron

01560
Page 91



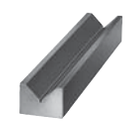
H-profiles
grey cast iron and aluminium

01580
Page 91



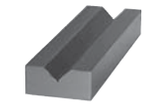
T-profiles machined all sides
grey cast iron or aluminium

01640
Page 92



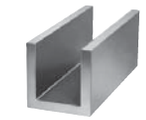
V-block machined all sides
grey cast iron or aluminium

01660
Page 92



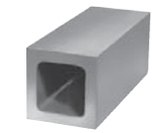
V-block machined all sides
extra wide, grey cast iron

01680
Page 93



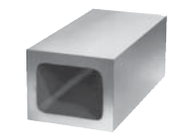
U-profiles machined all sides
grey cast iron or aluminium

01740
Page 94



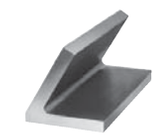
Square hollow profiles
grey cast iron

01760
Page 94



Rectangular hollow profiles
grey cast iron

01780
Page 95



Angle profiles 60°
grey cast iron

01820
Page 95

Angle profiles 45°
grey cast iron

01850
Page 96-97

Tombstones cube

01852
Page 98

Tombstones cube
grey cast iron

Article new/expanded

Self-aligning pads
Fixture feet
Clamp rests
Support elements

02000
Page 100-101

Self-aligning pads

02001
Page 103

Self-aligning pads
swivel angle 14° and 20°

02002
Page 104-105

Self-aligning pads
with o-ring

02003
Page 106-107

Self-aligning pads
with O-ring and exchangeable inserts

02004
Page 108

Self-aligning pads
self-righting

02005
Page 109

Self-aligning pads
adjustable

02006
Page 110-111

Self-aligning pads
adjustable with O-ring

02007
Page 112-115

Self-aligning pads
adjustable with O-ring and
exchangeable inserts

02008
Page 116-117

Self-aligning pads adjustable
with O-ring and hexagon socket

02009
Page 118-119

Self-aligning pads adjustable
with O-ring, exchangeable inserts and
hexagon socket

02010
Page 120, 785

Rest pads

02020
Page 121

Locating pins and rest pads
DIN 6321 (Issue 1973)

02028
Page 122

Rest pads

02029
Page 123

Rest pads
with positioning pin

02030
Page 124

Feet
with threaded pin,
DIN 6320 (Edition 1971)

02035
Page 124

Extension pieces

02037
Page 125

Support bolts

02040
Page 126

Positioning feet

02041
Page 127

Positioning feet

02050
Page 128

Fixture feet
with external thread

02070
Page 129

Fixture feet
with internal thread

02080
Page 130

Self-aligning pads
swivel 12°

02090
Page 131

Locating feet

02110
Page 131

Swivel pads

02130
Page 132

Rest pad

02150
Page 132

Rest pads adjustable
with locknut

02153
Page 133

Rest pads

02155
Page 134

Jack screws

02160
Page 135

Stop, adjustable
with end position feedback

02170
Page 136

Screw rest
with flat face, steel

02180
Page 136

Screw rest
with flat face, aluminium

02182
Page 137

Screw rest
with flat face and magnetic foot,
aluminium

Article new/expanded

02190
Page 137

Atlas jack
with locknut

02210
Page 138

Screw rest inserts
spherical, centring disc, prism,
locating pin, revolving ball

02240
Page 139

Support blocks compact

02270
Page 140

Step blocks

02310
Page 140

Step block sets

02320
Page 141

Wedge supports

02330
Page 141

Support elements cylindrical

02333
Page 142

Workpiece supports
adjustable

02334
Page 143

Workpiece supports

02335
Page 144

Workpiece support cylinders

02340
Page 145

Support element

02350
Page 146

Rectangular support elements

02360
Page 146

Workpiece supports

02380
Page 147

Workpiece supports

02385
Page 148

Jack screws

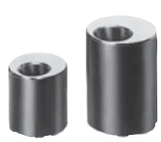
02387
Page 148

Inserts

02388
Page 149

Jack screws extended

02390
Page 150



Eccentric supports

Article new/expanded

Spring plungers
Indexing plungers
Stops
Centring and positioning components
Locking pins
T-slot nuts

03000
Page 154

Spring plungers
with slot and ball, steel

03001
Page 155

Spring plungers
with slot and ball,
LONG-LOK secured, steel

03004
Page 156

Spring plungers
with slot and POM ball

03008
Page 156

Spring plungers
with slot and ceramic ball,
stainless steel

03010
Page 157

Spring plungers
with slot and ball, stainless steel

03011
Page 158

Spring plungers
with slot and ball, LONG-LOK secured,
stainless steel

03014
Page 159

Spring plungers
with slot and stainless steel ball

03020
Page 160

Spring plungers
with slot and thrust pin, steel

03020
Page 161

Spring plungers
with end position feedback

03021
Page 162

Spring plungers
with slot and thrust pin,
LONG-LOK secured, steel

03025
Page 163

Spring plungers
with slot and thrust pin, stainless steel

03026
Page 164

Spring plungers
with slot and thrust pin,
LONG-LOK secured, stainless steel

03030
Page 165

Spring plungers
with hexagon socket and ball, steel

03031
Page 166

Spring plungers
with hexagon socket and ball,
LONG-LOK secured, steel

03033
Page 167

Spring plungers
with hexagon socket and ceramic ball

03035
Page 168

Spring plungers
with hexagon socket and ball,
stainless steel

03036
Page 169

Spring plungers
with hexagon socket and ball,
LONG-LOK secured stainless steel

03040
Page 170

Spring plungers
with hexagon socket and thrust pin,
long version

03040
Page 171

Spring plungers
with hexagon socket and thrust pin,
steel

03041
Page 172

Spring plungers
with hexagon socket and thrust pin,
LONG-LOK secured, steel

03050
Page 173

Spring plungers
with hexagon socket and
POM thrust pin, steel

03051
Page 174

Spring plungers
with hexagon socket and POM thrust pin,
LONG-LOK secured, steel

03055
Page 175

Spring plungers
with hexagon socket and thrust pin,
stainless steel

03056
Page 176

Spring plungers
with hexagon socket and thrust pin,
LONG-LOK secured, stainless steel

03058
Page 177

Spring plungers
with hexagon socket and POM thrust pin,
stainless steel

03059
Page 178

Spring plungers
with hexagon socket and POM thrust pin,
LONG-LOK secured, stainless steel

03060
Page 179

Spring plungers
with head

03065
Page 180

Spring plungers
with detent ring

03069
Page 181

Locators

03070
Page 181

Spring plungers
smooth version, extended,
stainless steel

03070
Page 182

Spring plungers
smooth version, stainless steel

03071
Page 183

Spring plungers
smooth version, plastic

Article new/expanded

03072
Page 184

Spring plungers
smooth version without collar, stainless steel

03073
Page 184

Spring plungers
with head

03074
Page 185

Spring plungers
smooth version, double-sided

03075
Page 186

Double ball catch

03080
Page 187

Eccentric stops

03083
Page 188

Adjustable stops

03084
Page 188

Adjustable stops

03085
Page 189

Adjustable mini stops

03086
Page 189

Stop screw

03088
Page 190

5D workpiece stops

03089
Page 192-193

Indexing plungers

03089
Page 194-195

Indexing plungers
with extended indexing pin

03089
Page 196-197

Indexing plungers
short version

03089
Page 198

Indexing plungers stainless steel

03089
Page 199

Indexing plungers
for thin-walled parts

03089
Page 200-201

Indexing plungers - Premium
with cylindrical pin

03089
Page 201

Bushes cylindrical

03089
Page 203

Indexing plungers - Premium
with tapered pin

03089
Page 203

Bushes tapered

03089
Page 205

Spacer rings

03090
Page 206-207

Indexing plungers

03091
Page 209

Indexing plungers

03092
Page 210-211

Indexing plungers

03092
Page 212-213

Indexing plungers

03093
Page 214-215

Indexing plungers
without collar

03093
Page 216-217

Indexing plungers
without collar with extended indexing pin

03093
Page 218-219

Indexing plungers stainless steel
without collar

03094
Page 220-221

Indexing plungers
without collar

03096
Page 222-223

Indexing plungers
without collar

03096
Page 224-225

Indexing plungers
without collar

03097
Page 226-227

Indexing plungers
without collar

03098
Page 228-229

Indexing plungers
without collar

03098
Page 230

Indexing plungers
without collar

03099
Page 231

Cam-action indexing plungers

03099
Page 232

Cam-action indexing plungers
stainless steel

03099
Page 233

Mounting brackets

Article new/expanded

03099
Page 234-235

Mounting brackets aluminium

03099
Page 236

Cam-action indexing plungers

03099
Page 237

Cam-action indexing plungers
stainless steel

03102
Page 238

Barrel slide bolts

03105
Page 239

Locating pins removable
Form A and C

03106
Page 239

Locating pins removeable
Form B and D

03107
Page 240

Locating pins
with ball-end Form A

03107
Page 240

Locating pins
with flattened ball-end Form C

03108
Page 241

Locating pins
with ball-end Form B

03108
Page 241

Locating pins
with flattened ball-end Form D

03110
Page 242

Centring pins
for central hole

03112
Page 242

Centring pins
for aligning hole

03114
Page 243

Centring pins
for aligning hole

03120
Page 244

Positioning pins cylindrical
ground

03130
Page 244

Positioning pins cylindrical
not ground

03140
Page 245

Positioning pins free-milled
ground

03150
Page 245

Positioning pins free-milled
not ground

03151
Page 246

Locating pins expanding

03153
Page 248

Locating cylinders

03154
Page 249

Centring bushes

03155
Page 250

Receiver bushes
Form A (pressed in from rear)

03156
Page 250

Receiver bushes
Form B (screwed down from front)

03157
Page 251

Mandrel collets

03157
Page 252

Mandrel collets
with side lock

03158
Page 253

Centring clamps
with ball or hexagon segments

03158
Page 254

Centring clamps
with ball or hexagon segments

03159
Page 255

Ball-end locking screw
with rotating ball

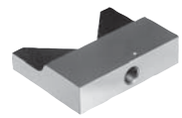
03160
Page 256

Centring V

03165
Page 257

Centring clamps

03180
Page 258



Centring V-plate

03182
Page 259

Indexing plungers - Precision
with tapered pin

03184
Page 259

Bushes tapered

03186
Page 260

Indexing plungers - Precision
with cylindrical pin

03188
Page 260

Bushes cylindrical

03190
Page 262

Indexing and clamp grips

03193
Page 263

Ball lock pins
self-locking

Article new/expanded

03194
Page 264

Ball lock pins
self-locking stainless steel

03195
Page 265

Locking pins

03195
Page 266

Locking pins with key ring

03196
Page 267

Ball lock pins
with T-grip, self-locking

03196
Page 268

Ball lock pins
with L-grip, self-locking

03197
Page 269

Bushing for ball lock pins

03197
Page 270

Bushing for ball lock pins
with LONG-LOK thread lock

03198
Page 271

Safety band

03199
Page 272

Retaining cables
with loop

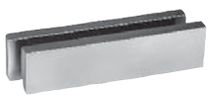
03199
Page 271

Safety spiral cable

03199
Page 272

Key rings

03200
Page 273

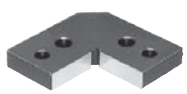


Parallel blocks pair
DIN 6346

03212
Page 274

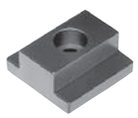
Parallel block sets

03220
Page 274



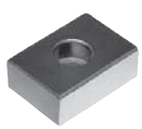
Positioning brackets

03240
Page 275



T-slot keys

03250
Page 275

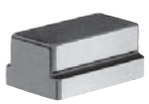


Slot keys

03252
Page 276

Elastic slot keys
Pat. No. 4200676

03260
Page 277



Slot keys loose
DIN 6323

03270
Page 277

Slot keys
with locating pin

03288
Page 278

Parallel keys
DIN 6885 A

03289
Page 278

Woodruff keys
DIN 6888

03290
Page 279

Carrier keys
DIN 2079

03320
Page 280

Cylindrical pins
DIN 6325

03325
Page 280

Cylindrical pins with internal thread
DIN 7979

03328
Page 281

Extractor

03330
Page 282-283

Lateral spring plungers

03330
Page 284

Eccentric bushes and assembly tools
for lateral spring plungers

03332
Page 285

Lateral spring plungers
without thrust pin

03334
Page 286-287

Lateral spring plungers
with threaded sleeve

03336
Page 288

Lateral spring plungers
with threaded sleeve, without thrust pin

03338
Page 289

Push-Pull spring plungers

03339
Page 290

Push-Pull spring plunger
with rotation lock

03340
Page 291

Lateral spring plungers

03350
Page 292

Shaft clamping units

03400
Page 293

Locking pins with folding latch

03410
Page 294

Locking pins with axial locking

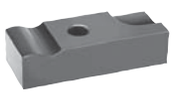
Article new/expanded

Clamp straps
Clamping devices

04010
Page 296

Clamp straps
slotted heel

04030
Page 297



Clamp straps
swivel-heel

04050
Page 297

Clamp straps
tapped-heel

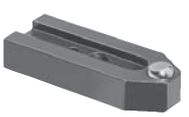
04070
Page 298

Clamp straps
stepped-heel, steel or aluminium

04080
Page 299

Clamp straps
DIN 6314 straight, steel or aluminium

04081
Page 300



Clamp straps
with flattened ball

04088
Page 301

Clamp straps gooseneck
narrow, steel

04090
Page 302

Clamp straps gooseneck
DIN 6316 wide, steel or aluminium

04100
Page 303

Clamp straps
assorted, long slot

04110
Page 304

Clamp straps open U
DIN 6315, steel or aluminium

04130
Page 305

Clamp straps open U
flat pin, steel or aluminium

04140
Page 306

Clamp straps pivot
strap only or assembly

04150
Page 307

Clamp straps open U
DIN 6315 C, round pin,
steel or aluminium

04170
Page 308

Clamp straps
hinge heel

04185
Page 308

Clamp straps mini
double sided

04190
Page 309

Clamp straps double sided

04191
Page 310

Clamp straps, double-sided
90° swivelling

04192
Page 311

Clamp strap assemblies

04193
Page 312

Clamp strap assemblies
goose-neck

04195
Page 312

Clamp springs

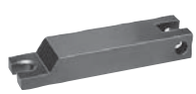
04200
Page 313

Clamp strap modules
compact

04205
Page 314

Clamp straps pivot
steel

04210
Page 314



Clamp straps hinge heel
with bolt slot

04232
Page 316-317

Cam levers
internal and external thread,
steel or stainless steel

04232
Page 318

Cam levers
internal and external thread,
stainless steel

04232
Page 319

Cam levers with plastic handle
internal and external thread,
steel or stainless steel

04233
Page 320

Cam levers adjustable
external thread, steel or
stainless steel

04233
Page 321

Cam levers adjustable
external thread, stainless steel

04233
Page 322

Cam levers adjustable
with plastic handle external thread,
steel or stainless steel

04250
Page 323

Hinge pins

04270
Page 323

Spacer bolts

04290
Page 324

Cam levers single

Article new/expanded

04310
Page 324

Cam levers double

04330
Page 325

Cam clamps
with end lock

04350
Page 325

Cam clamps
with middle lock

04360
Page 326

Spiral cams

04362
Page 326

Door latch

04363
Page 327

Swing clamps
mini, with cam lever

04364
Page 328

Swing clamps mini

04366
Page 329

Swing clamps

04370
Page 330

Hook clamps

04371
Page 331

Hook clamps
with collar

04372
Page 332

Hook clamps ground
Form A/B/C

04373
Page 333

Hook clamps
with collar

04374
Page 334

Hook clamps
with mounting bracket

04375
Page 335

Hook clamp holders

04378
Page 336

Riser bars

04380
Page 337

Hook clamps precision

04390
Page 337

Swing clamps

04395
Page 338

Clamping bolts

04400
Page 339

Clamping pins

04400
Page 339

Clamping pins (high force)

04400
Page 340

Clamping screws

04400
Page 340

Clamping screws (high force)

04400
Page 342

Pull clamps

04400
Page 343

Pull clamps (high force)

04410
Page 344-345

Clamping element „actima“

04420
Page 346

Floating clamp

04421
Page 347

Floating clamp
with separate workpiece clamp and
interlock

04422
Page 348

Clamping jaws
for floating clamps

04430
Page 350-351

Clamping element „arness“

04431
Page 352

Fixture clamps machinable

04432
Page 352

Fixture clamps unequal hexagon

04433
Page 353

Spiral cam screws

04434
Page 354

Cam screws
with knife edge washer

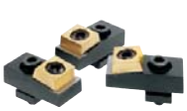
04435
Page 354

Cam screws
with hexagon washer

04436
Page 355

Cam screws
with hexagon washer, for T-slots

04437
Page 356



Cam clamps
with riser

Article new/expanded

04439
Page 356

Toe clamps for T-slots

04440
Page 357

Talon grips

04440
Page 358

Talon grips round

04441
Page 359

Chock clamps

04444
Page 360

Cam clamps adjustable
with riser

04445
Page 361

Riser stops

04450
Page 362

Low-profile clamps

04470
Page 362

T-slot clamps

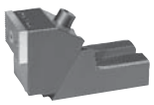
04480
Page 363

Side clamps

04485
Page 364

Side clamps
with rest pad

04500
Page 365



Side clamps robust

04509
Page 365

Side clamps

04512
Page 366

Seating blocks adjustable

04516
Page 367

Side clamps

04518
Page 368

Side clamps

04520
Page 369

Side clamps

04521
Page 370

Toe clamps compact

04522
Page 371

Wedge clamps

04523
Page 372

Wedge clamps
machinable

04524
Page 373

Wedge clamps
jaw face smooth or serrated

04524
Page 374

Wedge clamps
machinable

04525
Page 375

Wedge clamps
jaw faces serrated

04526
Page 376

Wedge clamps
machinable

04527
Page 377

Wedge clamps double
jaw faces serrated

04530
Page 379

Side clamps

04540
Page 380

Side stops

04562
Page 381

Side clamps

04565
Page 382

Side clamps

04570
Page 383

Toe clamps

04575
Page 384

Side clamps

04578
Page 385

Side clamps

04610
Page 386

Swivel hold-down clamps
mini, with cam lever

04620
Page 387

Down-thrust clamps

04625
Page 388

Compact clamps

04626
Page 389

Riser blocks
with draw bolt

04750
Page 390

Clamp nuts

Article new/expanded

04751
Page 391

Clamp nuts
with star or T-grip

04752
Page 392

Tightening screws

Toggle clamps
Pneumatic clamps
Clamp accessories
Latches

05020
Page 395

Toggle clamps vertical
with horizontal foot

05020
Page 396

Toggle clamps vertical
with horizontal foot and
full clamping lever

05020
Page 397

Toggle clamps vertical
with horizontal foot, large version

05040
Page 398

Toggle clamps vertical
with straight foot

05040
Page 399

Toggle clamps vertical
with straight foot and
full clamping lever

05060
Page 400

Toggle clamps vertical
with angled foot

05080
Page 401

Toggle hook clamps
and catch plate

05120
Page 402

Toggle clamps horizontal
with horizontal foot

05120
Page 402

Toggle clamps horizontal
large version

05130
Page 403

Toggle clamps horizontal
with straight foot

05140
Page 403

Toggle mini clamps

05160
Page 404

Toggle clamps horizontal
with push rod

05170
Page 405

Toggle clamps with push rod
push-pull operation, bracket mounting

05200
Page 406

Plastic grips

05220
Page 406

Thrust spindles spring mounted

05240
Page 407

Thrust screws
with thrust pad

05241
Page 407

Thrust screws
with thrust pad

05260
Page 408

Thrust screws neoprene

05280
Page 408

Protective caps

05330
Page 410-411

Pneumatic clamps

05340
Page 412

Pneumatic clamps push-rod

05350
Page 413

Pneumatic clamps vertical
heavy-duty version

05360
Page 414

Pneumatic clamps vertical
with vertical mounted cylinder

05400
Page 415

Toggle clamps heavy duty
vertical

05420
Page 416

Toggle clamps heavy duty version
straight foot

05520
Page 416

Plastic grips

05526
Page 417

Latches
with spring clip

05531
Page 418

Latches
with draw bail

05536
Page 419

Latches
with draw bail

05550
Page 420

Latches adjustable
with swing bail

05552
Page 421

Latches adjustable

05560
Page 422

Adjustable latches
heavy-duty version

Article new/expanded

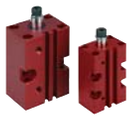
norelem positions

Flexible standard component system

05600
Page 423

C-clamp

05610
Page 424-425



Swing clamps
pneumatic

05620
Page 426

Clamping arm
for swing clamp

05625
Page 426

Adapters
for swing clamp

05650
Page 428-429

Mini clamps
Tünkers system

05660
Page 430

Swing screws

05840
Page 431

Push-pull clamps
heavy-duty version with handle

05880
Page 432

Angle bracket

05882
Page 432

Plastic grips

05900
Page 434-435

Toggle clamps horizontal
with flat foot and adjustable
clamping spindle

05900
Page 436

Toggle clamps horizontal
with flat foot and adjustable clamping
spindle, stainless steel

05900
Page 437

Toggle clamps horizontal
with safety interlock
with flat foot and adjustable
clamping spindle

05900
Page 438

Toggle clamps horizontal
with safety interlock
with flat foot and adjustable
clamping spindle, stainless steel

05904
Page 439

Toggle clamps horizontal
with straight foot and adjustable
clamping spindle

05904
Page 440

Toggle clamps horizontal
with straight foot and adjustable
clamping spindle, stainless steel

05904
Page 441

Toggle clamps horizontal
with safety interlock
with straight foot and adjustable
clamping spindle

05904
Page 442

Toggle clamps horizontal
with safety interlock
with straight foot and adjustable
clamping spindle, stainless steel

05908
Page 443

Toggle clamps vertical
with flat foot and adjustable
clamping spindle

05908
Page 444

Toggle clamps vertical
with flat foot and adjustable clamping
spindle, stainless steel

05908
Page 445

Toggle clamps vertical
with safety interlock
with flat foot and adjustable
clamping spindle

05908
Page 446

Toggle clamps vertical
with safety interlock
with flat foot and adjustable
clamping spindle, stainless steel

05912
Page 447

Toggle clamps vertical
with straight foot and adjustable
clamping spindle

05912
Page 448

Toggle clamps vertical
with straight foot and adjustable
clamping spindle, stainless steel

05912
Page 449

Toggle clamps vertical
with safety interlock
with straight foot and
adjustable clamping spindle

05912
Page 450

Toggle clamps vertical
with safety interlock
with straight foot and adjustable
clamping spindle, stainless steel

05990
Page 451

Spherical seating nuts

Article new/expanded

Operating parts

06010
Page 454

Knurled nuts
steel and stainless steel, DIN 6303

06013
Page 455

Knurled nuts
plastic

06030
Page 455

Knurled nuts quick-acting

06070
Page 456

Knurled nuts

06090
Page 457

Knurled screws high
steel and stainless steel DIN 464

06091
Page 457

Knurled thumb screws
plastic

06092
Page 458

Knurled knobs

06094
Page 459

Knurled knobs

06100
Page 460

Control knobs

06105
Page 461

Control knobs

06110
Page 462

Knurled nuts high
steel and stainless steel, DIN 466

06120
Page 462

Knurled nuts flat
steel and stainless steel, DIN 467

06130
Page 463

Knurled screws

06132
Page 463

Knurled heads
for hexagon socket screw

06133
Page 464

Wing grips
for hexagon socket screws

06134
Page 464

Disc grips
for hex sockets screw

06140
Page 465

Tommy bars
with fixed or sliding T-bar,
DIN 6305 or DIN 6307

06150
Page 466

T-thrust screws
with fixed or sliding T-bar,
DIN 6304 or DIN 6306

06156
Page 467

Palm grips
aluminium, similar to DIN 6335

06158
Page 468

Palm grips
stainless steel, similar to DIN 6335

06160
Page 469

Palm grips
grey cast iron DIN 6335

06161
Page 470

Palm grips
plastic coated grey cast iron,
DIN 6335

06170
Page 470

Palm grips
with threaded spindle

06180
Page 471

Palm grips
similar to DIN 6335

06190
Page 472

Palm grips quick-acting
grey cast iron

06192
Page 473

Star grips
aluminium, similar to DIN 6336

06194
Page 474

Star grips
stainless steel, similar to DIN 6336

06200
Page 475

Star grips
grey cast iron, DIN 6336

06208
Page 476

Star grips
similar to DIN 6336

06210
Page 477

Star grips
with projecting steel bush

06212
Page 478

Star grips
metal parts stainless steel,
similar to DIN 6336

06212
Page 479

Star grips with safety band
metal parts stainless steel,
similar to DIN 6336

Article new/expanded

06220
Page 480-481

Star grips
similar to DIN 6336

06220
Page 482-483

Star grips with safety band
similar to DIN 6336

06222
Page 484

Star grips quick-acting

06230
Page 484

Four-spoked nuts

06235
Page 485

Capstan wheel

06237
Page 486

Knobs flat

06240
Page 487

Mushroom knobs
internal thread, steel or stainless steel

06241
Page 487

Mushroom knobs
internal thread

06242
Page 488

Mushroom knobs
external thread

06245
Page 489

Spherical knobs

06246
Page 490

Spherical knobs
revolving

06247
Page 491

Ball knobs
thermoplastic DIN 319 enhanced

06247
Page 492

Ball knobs
stainless steel or aluminium DIN 319

06250
Page 494-495

Ball knobs smooth
DIN 319 enhanced

06251
Page 496

Tapered knobs

06252
Page 496

Conical knobs

06253
Page 497

Clamp grips

06255
Page 498

Handwheels 2-spoke
plastic

06255
Page 499-500

Handwheels 2-spoke
plastic, with revolving grip

06255
Page 500

Handwheels 2-spoke
plastic, with folding grip

06262
Page 502-503

Handwheels

06263
Page 504-505

Handwheels
with revolving grip

06264
Page 506-507

Handwheels
with fold-away grip

06265
Page 508-509

Handwheels
with safety grip

06266
Page 510-511

Knurled knobs

06267
Page 512

Knurled knobs
metal parts stainless steel

06268
Page 513

Positioning wheels

06271
Page 514-515

Handwheels
DIN 950, grey cast iron

06273
Page 516-517

Handwheels
DIN 950, aluminium

06275
Page 518-519

Handwheels disc
aluminium

06277
Page 520-521

Handwheels 2-spoke
aluminium, flat wheel rim

06279
Page 522

Handwheels disc
similar to DIN 950, aluminium

06287
Page 523

Handwheels disc
with revolving grip

06288
Page 524

Handwheels disc
without grip

06290
Page 525

Machine handles fixed
steel, similar to DIN 39

06291
Page 525

Machine handles fixed
steel, DIN 39 Form E

Article new/expanded

06292
Page 526

Machine handles fixed
aluminium, DIN 39 Form E

06308
Page 526

Machine handles revolving
steel, DIN 98 Form E

06309
Page 527

Machine handles revolving
aluminium, DIN 98 Form E

06310
Page 527

Machine handles revolving
steel, similar to DIN 98

06311
Page 528

Machine handles fixed
straight form, similar to DIN 39

06312
Page 528

Machine handles revolving
straight form, similar to DIN 98

06313
Page 529

Machine handles revolving

06314
Page 529

Conical grip
revolving

06316
Page 530

Taper grips
revolving

06316
Page 530

Taper grips
revolving

06320
Page 531

Taper grips

06321
Page 532

Cylindrical grips revolving
with hexagon socket

06322
Page 532

Cylindrical grips revolving

06323
Page 533

Cylindrical grips fold-down

06325
Page 533

Cylindrical grips revolving

06326
Page 534

Cylindrical grips fold-down

06328
Page 535

Cylindrical grips
safety automatic return

06330
Page 536

Levers 20°
DIN 99

06340
Page 537

Control handles

06342
Page 538

Control handles flat

06349
Page 539

Lock grips

06350
Page 539

Tension levers

06353
Page 540

Ball grips revolving

06355
Page 541

Handles screw-in

06357
Page 541

Handles screw-in
with torque limit

06360
Page 542

Handles

06362
Page 544

Clamp hubs

06370
Page 545

Tension levers
internal thread

06371
Page 546

Tension levers
internal thread, stainless steel

06380
Page 547

Tension levers
external thread

06381
Page 548

Tension levers
external thread, stainless steel

06382
Page 549

Tension levers safety
internal thread

06383
Page 550

Tension levers safety
external thread

06390
Page 551

Tension levers flat
internal thread

06391
Page 552

Tension levers flat
internal thread, stainless steel

06400
Page 553

Tension levers flat
external thread

Article new/expanded

06401
Page 554

Tension levers flat
external thread, stainless steel

06410
Page 555

Clamping levers
internal thread

06411
Page 556

Clamping levers
internal thread,
metal parts stainless steel

06420
Page 557

Ball handles
DIN 6337

06430
Page 557

Clamping levers

06430
Page 558

Clamping levers
external thread

06431
Page 559

Clamping levers
external thread,
metal parts stainless steel

06440
Page 560

Clamping levers
internal thread, steel

06440
Page 561

Clamping levers
internal thread, stainless steel

06441
Page 562

Clamping levers
external thread

06441
Page 563

Clamping levers
external thread, stainless steel

06442
Page 564

Clamping levers
internal thread, steel

06443
Page 565

Clamping levers
external thread, steel

06448
Page 566

Clamping levers flat
internal thread

06449
Page 567

Clamping levers flat
internal thread,
metal parts stainless steel

06450
Page 568

Clamping levers
internal thread

06450
Page 569

Clamping levers with protective cap
internal thread

06451
Page 570

Clamping levers
internal thread,
metal parts stainless steel

06451
Page 571

Clamping levers
with protective cap internal thread,
metal parts stainless steel

06454
Page 572

Clamping levers
with internal thread, stainless steel

06454
Page 573

Clamping levers with protective cap
with internal thread, stainless steel

06458
Page 574

Clamping levers flat
external thread

06459
Page 575

Clamping levers flat
external thread,
metal parts stainless steel

06460
Page 576

Clamping levers
external thread

06460
Page 577

Clamping levers with protective cap
external thread

06461
Page 578

Clamping levers
external thread,
metal parts stainless steel

06461
Page 579

Clamping levers with protective cap
external thread,
metal parts stainless steel

06464
Page 580

Clamping levers
with external thread, stainless steel

06464
Page 581

Clamping levers with protective cap
with external thread, stainless steel

06470
Page 582-583

Ratchet levers

06480
Page 584

Crank handles offset
similar to DIN 468

06490
Page 585

Crank handles straight
similar to DIN 469

06492
Page 586

Crank handles
aluminium

06500
Page 587

Crank handles
with fold-away grip

06500
Page 588

Crank handles
with revolving grip

06502
Page 589

Crank handles
with safety grip

Article new/expanded

06510
Page 590

Crank handles balanced

06550
Page 590

Bar knobs

06600
Page 592

Clamping levers with plastic handle
internal thread

06601
Page 593

Clamping levers
with plastic handle internal thread,
metal parts stainless steel

06610
Page 594

Clamping levers with plastic handle
external thread

06611
Page 595

Clamping levers
with plastic handle external thread,
metal parts stainless steel

06612
Page 596

Clamping lever with thrust pin
and external thread

06620
Page 597

Clamping joints

06621
Page 598

Clamping joints
individually adjustable

06622
Page 599

Multiple connectors

06649
Page 600

T-grips

06650
Page 601

T-grips

06651
Page 602

Wing grips
internal thread, stainless steel

06652
Page 603

Wing grips

06652
Page 604

Wing grips
with tapped through bush

06652
Page 605

Wing grips „Miniwing“

06652
Page 606

Wing grips „Miniwing“
with tapped through bush

06660
Page 607

Wing grips one-sided

06665
Page 608

Wing grips

06702
Page 609

Clamping grips tristar
with high collar

06830
Page 610

Handwheels

06850
Page 611

Five lobe grips

06853
Page 612

Ribbed grips

06895
Page 613

Pull handles

06900
Page 613

Pull handles

06900
Page 614

Pull handles

06901
Page 614

Pull handles

06902
Page 615

Pull handles

06903
Page 616

Pull handles

06904
Page 617

Pull handles

06909
Page 618

Pull handles arch

06910
Page 618

Pull handles

06911
Page 619

Pull handles arch

06912
Page 619

Pull handles
oblique

06913
Page 620

Pull handles
with soft inner face

06914
Page 621

Pull handles stainless steel

Article new/expanded

06915
Page 621

Pull handles

06916
Page 622

Pull handles

06917
Page 623

Pull handles round

06918
Page 624

Pull handles oval

06919
Page 624

Pull handles round

06920
Page 625

Pull handles oval

06920
Page 625

Pull handles oval

06920
Page 626-627

Pull handles oval
detachable

06921
Page 628

Pull handles

06922
Page 628

Pull handles
stainless steel

06923
Page 629

Pull handles angled

06924
Page 629

Pull handles
stainless steel

06925
Page 630

Pull handles tubular

06926
Page 630

Pull handles tubular

06927
Page 631

Pull handles tubular

06928
Page 632

Pull handles tubular
oblique

06929
Page 633

Pull handles

06930
Page 634

Pull handles
high-gloss chromed

06931
Page 635

Pull handles
stainless steel

06932
Page 636

Pull handles

06933
Page 637

Pull handles

06934
Page 637

Pull handles fold-down

06935
Page 638

Pull handles angled

06936
Page 638

Pull handles tubular angled

06937
Page 639

Pull handles tubular

06938
Page 639

Pull handles tubular

06939
Page 640

Pull handles tubular

06940
Page 641

Pull handles tubular

06941
Page 642

Pull handles tubular

06942
Page 643

Pull handles tubular

06943
Page 644

Pull handles tubular stainless steel

06944
Page 645

Pull handles

06945
Page 645

Pull handles angled

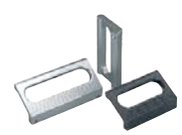
06946
Page 646

Pull handles

06951
Page 647

Ledge handles stainless steel

06952
Page 648



Ledge handles

Article new/expanded

06956
Page 649

Tubular handles angled

06958
Page 650

Tubular handles

06959
Page 651

Pull handles
open-ended screw on

06960
Page 652

Recessed handles

06961
Page 653

Recessed handles fold-down

06962
Page 654

Recessed handles fold-down

06965
Page 655

Recessed handles

06970
Page 656

Recessed handles fold-down
stainless steel

06975
Page 657

Pull handles angled

Fasteners
Ball-end thrust screws and grippers
Thrust screws and thrust pads
Torque bolts and threaded inserts
Lifting bolts
Swivel bales
Ring bolts

07020
Page 661

Studs

07030
Page 662-663

Studs
DIN 6379

07040
Page 664-665

T-slot bolts
DIN 787

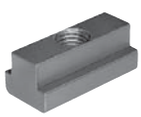
07040
Page 666

T-slot bolts
DIN 787, 12.9

07060
Page 667

Nuts for T-slots
DIN 508 enhanced

07061
Page 668



Nuts for T-slots
long

07070
Page 668

Nuts for T-slots
blanks

07080
Page 669

Nuts for T-slots
rhombic form

07100
Page 670-671

Ball-end thrust screws with head ⊞

07101
Page 672

Ball-end thrust screws with head
stainless steel ⊞

07105
Page 673

Ball-end thrust screws without head
with full ball, LONG-LOK secured

07105
Page 674

Ball-end thrust screws without head
with flattened ball LONG-LOK secured

07109
Page 675

Ball-end thrust screws without head
short version

07110
Page 676-677

Ball-end thrust screws without head
with full ball

07110
Page 678-679

Ball-end thrust screws without head
with flattened ball

07110
Page 680

Ball-end thrust screws without head
with flattened ball and rotation lock

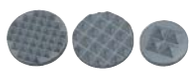
07111
Page 681

Ball-end thrust screws without head
stainless steel with full ball

07111
Page 682

Ball-end thrust screws without head
stainless steel with flattened ball

07112
Page 683



Gripper pads round
carbide

07113
Page 686-687

Round grippers and inserts

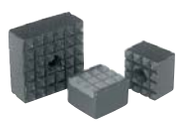
07113
Page 688

Grippers and inserts round
with counterbore

07114
Page 689

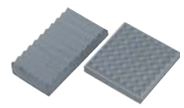
Hexagonal grippers

07115
Page 690



Grippers square

07116
Page 691



Gripper pads square
carbide

07117
Page 692

Grippers adjustable

07119
Page 693

Thrust screws

07119
Page 694

Thrust screws stainless steel

07119
Page 695

Thrust screws
LONG-LOK secured

07120
Page 696

Grub screws
with thrust point DIN 6332

07121
Page 696

Grub screws
with ball thrust point

07122
Page 697

Thrust screws
with point

07123
Page 698

Thrust screws
with radiused half-dog point

⊞ Article new/expanded

07125
Page 699

Knurled torque knobs

07130
Page 700

Torque screws
with thrust point

07131
Page 700

Torque screws
with slot coupling

07132
Page 701

Torque screws
with support pin

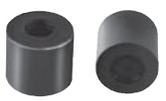
07133
Page 701

Torque grips

07134
Page 702

Torque screws
with ball thrust points

07138
Page 702



Thrust pads

07140
Page 703

Thrust pads
DIN 6311 enhanced

07141
Page 703

Thrust pads
with retaining pin

07142
Page 704

Thrust pads

07143
Page 705

Thrust spindles

07144
Page 706

Swivel feet

07160
Page 707

Socket head screws
DIN 912 / DIN EN ISO 4762,
steel or stainless steel

07160
Page 707

Socket head screws
DIN 912/DIN EN ISO 4762

07161
Page 708

Socket head screws with low head
DIN 6912

07165
Page 709

Grub screws with flat point
hexagon socket DIN 913 +

07166
Page 710

Grub screw
with hexagon socket and pointed end
DIN 914 / DIN EN ISO 4027

07170
Page 711

Hexagon head bolts
DIN 931/DIN EN ISO 4014/DIN EN 24014

07175
Page 711

Screws with countersunk head
hexagon socket DIN 7991

07180
Page 712

Eye bolts
DIN 444, Form B

07210
Page 713

Hexagon nuts
DIN 934/DIN EN ISO 4032/DIN EN 24032

07212
Page 714

Hexagon nuts thin
DIN 439

07220
Page 715

Extension nuts
height 3xD

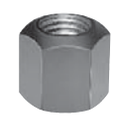
07240
Page 716

Hexagon nuts with collar
height 1.5xD, DIN 6331 enhanced

07242
Page 717

Hexagon nut
with no-loss washer

07260
Page 718



Hexagon nuts Form B
height 1.5xD, DIN 6330 enhanced

07280
Page 719

Hexagon domed cap nuts
similar to DIN 1587

07300
Page 719

Washers
medium DIN 125 Form A

07310
Page 720

Lock washer self-locking
DIN 25201

07320
Page 721

Washers for clamps
steel or aluminium DIN 6340

07330
Page 722

Circlips for shafts
DIN 471

07331
Page 723

Circlips for holes
DIN 472

07360
Page 724

Spring washers
DIN 2093

07375
Page 725

Handwheel washers

07380
Page 726

C-washers
DIN 6372 enhanced

07415
Page 727

Clamping force intensifiers

+ Article new/expanded

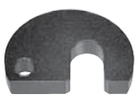
07420
Page 728-729

Spherical washers
DIN 6319, edition 10/01

07460
Page 730

Spherical levelling washers

07520
Page 730



C-washers captive
DIN 6371

07523
Page 731

Spacing washers ground

07530
Page 731

Shoulder screws with slotted flat head
DIN 923

07533
Page 732

Shoulder screws Form B

07534
Page 732

Shoulder screws
similar to DIN ISO 7379 ✚

07535
Page 733

Shoulder screws
with hexagon head DIN 609

07540
Page 734

Shoulder screws
with slotted domed head

07560
Page 734

Hinged fastener
DIN 6310

07570
Page 735

Quarter-turn screws

07590
Page 736

Slotted round nuts
DIN 1804

07595
Page 737

Slotted nuts
with elastic lock

07598
Page 738-739

Adjustment nuts

07620
Page 740

Clevis
with external thread

07630
Page 740

Grub screws
DIN 551

07640
Page 741

Threaded rods
steel and stainless steel DIN 976-1

07650
Page 741

Springs

07645
Page 743

HeliCoil®plus threaded inserts

07652
Page 745

Threaded inserts self-tapping
with cutting slot

07652
Page 746

Assembly tools
for self-tapping threaded inserts

07653
Page 747

Threaded inserts self-tapping
with cutting bores

07660
Page 748

Threaded inserts

07661
Page 749

Threaded inserts reinforced

07662
Page 750

Threaded inserts solid body

07663
Page 751

Threaded inserts
with internal thread, self-locking

07664
Page 752

Threaded inserts reinforced
internal thread, self-locking

07666
Page 753

Repair kit

07670
Page 755

Studs
with screw-in stop for gluing in

07680
Page 757

Ring bolts
DIN 580 / stainless steel similar to
DIN 580

07690
Page 757

Ring nuts DIN 582
stainless steel similar to DIN 582

07695
Page 758

Ring bolts rotatable
high-strength grade 10 ✚

07710
Page 759

Ring bolts
swivel and 360° rotatable, grade 8

07720
Page 760

Weld-on D-ring

07725
Page 761

Hoist rings 360° rotation
grade 10

07730
Page 762

Hoist ring

✚ Article new/expanded

07735
Page 763

Hoist ring with Envirolox® coating

07750
Page 763

Lifting ring

07752
Page 764

Swivel bale
with axial ring

07770
Page 765

Hoist ring

07772
Page 766

Flip Flop hoist ring

07774
Page 767

Swivel eye bolts

07775
Page 768

Swivel bale

07780
Page 769

Lifting pins
self-locking

07782
Page 770

Lifting pins, stainless steel,
self-locking

07784
Page 771

Receiver bush, stainless steel,
for lifting pins

07790
Page 772

Lifting bolt with ring lock

07800
Page 773

Shaft collars set screw
DIN 705, steel

07800
Page 774

Shaft collars set screw
DIN 705, stainless steel

07810
Page 775

Shaft collars one-piece

07811
Page 776

Shaft collars one-piece
wide

07812
Page 777

Shaft collars two-piece

07813
Page 778

Shaft collars two-piece
wide

07814
Page 779

Shaft collars
with thread

Article new/expanded

Drilling jigs
Drill bushes
Jig elements

08000
Page 782, 786-787

Drilling plates

08050
Page 782, 787

Hinge blocks, long

08100
Page 783, 786

Hinge blocks, short

08150
Page 784

Latch

02010
Page 120, 785

Rest pads

08180
Page 786

Thrust washers

08270
Page 786

Drilling plates
with short hinge block

08280
Page 787

Drilling plates
with long hinge block

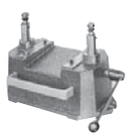
08300
Page 787

Handle
for drilling jigs

08550
Page 790-791

Drilling jigs size 0 to 3 S
DIN 6348 enhanced

08550
Page 792-793



Drilling jigs size 3 to 5
DIN 6348

08570
Page 794

Drilling plates
DIN 6348 enhanced

08580
Page 795

Base plates
DIN 6348

08600
Page 796

Extension columns
short

08610
Page 796

Extension columns
long

08630
Page 798

Drilling jigs for cylindrical parts

08640
Page 799

Index drilling discs
for drilling jig for cylindrical parts

08650
Page 800

Drill bush holder plates
for drilling jig for cylindrical parts

08710
Page 801

V-blocks
with stop

08900
Page 802

Cylindrical drill bushes
DIN 179

08910
Page 803

Drill bushes with collar
DIN 172

08920
Page 804

Drill bushes push-in
DIN 173

08920
Page 805

Drill bushes push-in
DIN 173-1

08926
Page 806

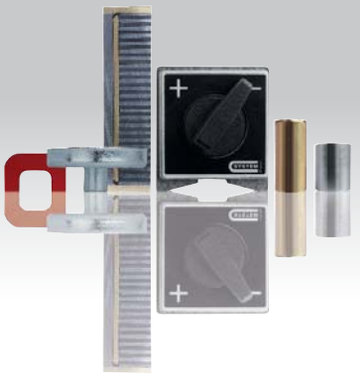
Clamping bushes
DIN 173-1

08927
Page 806

Shoulder screws flathead
for DIN 173 drill bushes

Article new/expanded

Magnets



09060
Page 808

Magnets permanent for workholding with fine pole division

09060
Page 810

Round magnets (deep pot magnets) in AlNiCo with fitting tolerance

09061
Page 810

Round magnets (deep pot magnets) in AlNiCo without fitting tolerance

09063
Page 811

Round magnets with pin (deep pot magnets) in AlNiCo

09064
Page 811

Magnets (shallow pot magnets) in hard ferrite

09065
Page 812

Magnets with thread (shallow pot magnets) in hard ferrite

09066
Page 812

Magnets (shallow pot magnets) in SmCo

09067
Page 813

Round magnets (deep pot magnets) in SmCo

09068
Page 813

Round magnets with internal thread (deep pot magnets) in NdFeB

09069
Page 814

Magnets (shallow pot magnets) in NdFeB

09070
Page 815

Magnets with counterbore (shallow pot magnets) hard ferrite

09071
Page 815

Magnets with countersunk hole (shallow pot magnets) hard ferrite

09072
Page 816

Magnets with internal thread (shallow pot magnets) in NdFeB

09094
Page 816

Round magnets (pot magnets)

09096
Page 817

Magnets (shallow pot magnets)

09098
Page 817

Magnets (button magnets)

09100
Page 818

Magnets (U-magnet)

09110
Page 818

Protective rubber caps for shallow pot magnets

09112
Page 819

Magnets shallow pot with internal thread NdFeB, with rubber protective jacket

09114
Page 819

Magnets shallow pot with tapped pin NdFeB, with rubber protective jacket

09116
Page 820

Magnets shallow pot with threaded pin NdFeB, with rubber protective jacket

09118
Page 820

Magnets shallow pot with through hole NdFeB, with rubber protective jacket

09150
Page 821

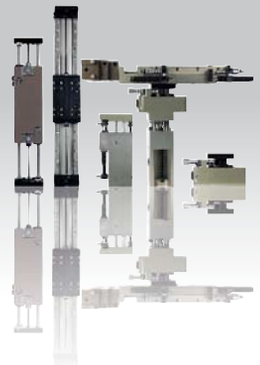
Magnets pickup

09210
Page 821

Magnetic base permanent

Article new/expanded

Linear modules
Lifting units
Rotary modules
Grip modules
Inductive proximity switches
Plug connectors



20000
Page 826-827

Pneumatic linear modules
with two round guides

20000
Page 828-829

Linear modules pneumatic
with three round guides

20010
Page 830

Stop screws

20030
Page 832-833

Linear modules pneumatic
with rail guide

20032
Page 834-835

Linear modules pneumatic
with rail guide

20034
Page 836-837

Linear modules pneumatic
with rail guide

20036
Page 838-839

Linear modules pneumatic
with rail guide

20050
Page 842-843

Lifting units, pneumatic
with rail guide

20054
Page 844-845

Lifting units, pneumatic
with round guides

20056
Page 846-847

Lifting units, pneumatic
with round guides

20060
Page 849

Rotary module, pneumatic

20060
Page 850

Rotary module, pneumatic

20062
Page 851

Rotary module, pneumatic

20062
Page 852

Rotary module, pneumatic
heavy duty version

20064
Page 853

Rotary module pneumatic

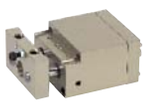
20064
Page 854

Rotary module, pneumatic
heavy duty version

20080
Page 855

Intermediate position
for rotary module 20060-024

20082
Page 856



Intermediate position
for rotary module 20062-016

20082
Page 857

Intermediate position
for rotary module 20062-026

20084
Page 858

Intermediate position
for rotary module 20064-019

20084
Page 859

Intermediate position
for rotary module 20064-029

20100
Page 862-863

Grip module
parallel grippers

20200
Page 866-867

Portal modules, pneumatic
with rail guides

20200
Page 868-869

Portal modules, pneumatic
with round guides

20240
Page 870

Centring rings

20900
Page 871

Inductive proximity switches
round housing

20905
Page 872

Inductive proximity switches
rectangular housing

20910
Page 873

Inductive proximity switches
threaded housing

20950
Page 874

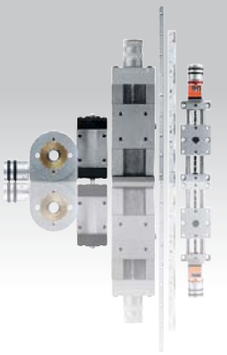
Plug connectors
with screw fitting

20955
Page 875

Plug connectors
self-assembly with screw fitting

Article new/expanded

Slides
Guide rails
Positioning tables
Linear guide systems
Position indicators



21000
Page 878-879

Dovetail slides
with micrometer spindle

21000
Page 880

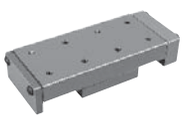
Straps

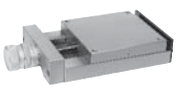
21000
Page 880

Fastening screws
for cross table mounting

21030
Page 881

Dovetail slides

21031
Page 882

Dovetail slides
with end plates

21032
Page 883

Dovetail slides
with micrometer spindle

21033
Page 884

Dovetail slides
with micrometer spindle and handwheel

21034
Page 885

Precision slides
roller mounted

21035
Page 886

Slides mini
roller mounted

21038
Page 887

Precision slides
roller mounted with end plates

21040
Page 888

Precision slides
roller mounted with micrometer
spindle

21050
Page 889

Cross roller guide rails

21052
Page 890

Roller cages

21080
Page 892-893

Positioning tables short
with coaxial electric drive

21081
Page 894-895

Positioning tables short
with lateral electric drive

21082
Page 896-897

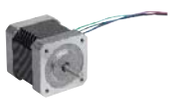
Positioning tables long
with coaxial electric drive

21083
Page 898-899

Positioning tables long
with lateral electric drive

21085
Page 900-901

Positioning tables rotary
with coaxial electric drive

21086
Page 903

Stepper motor

21088
Page 904-905

Stepper motor
with integrated positioning control

21090
Page 907

Mounting plates horizontal

21091
Page 908-909

Mounting plates vertical

21093
Page 910

Sensor holder

21094
Page 911

Sensor holder

21100
Page 912

Positioning tables short

21102
Page 913

Positioning tables short
with position indicator

21120
Page 914

Positioning tables long

21122
Page 915

Positioning tables long
with position indicator

21140
Page 916

Lift tables

21150
Page 917

Rotary discs

21160
Page 918

Rotary positioning tables

21161
Page 919

Rotary positioning tables
with position indicators

Article new/expanded

21162
Page 920

Swivel angles

21170
Page 921

Pivot heads
swivel angle 30°

21180
Page 922

Base plates

21190
Page 922

Angle plates

21200
Page 926

Carriages DryLin® T

21200
Page 927

Guide rails DryLin® T

21210
Page 928-929

Miniature linear guides DryLin® T

21230
Page 930

Miniature slide guides DryLin® N

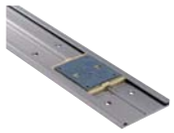
21230
Page 931

Miniature slide guides DryLin® N

21230
Page 932

Miniature slide guides DryLin® N

21230
Page 933



Flat guides DryLin® N

21240
Page 934

Carriages DryLin® W

21240
Page 935

Slide carriages DryLin® W

21240
Page 936

Guide rails DryLin® W
single

21240
Page 937

Guide rails DryLin® W
double

21320
Page 938

Roller carriages
compact and heavy-duty version

21320
Page 939

Roller guide rails

21322
Page 940

Roller carriages
steel

21322
Page 941

Roller carriages
aluminium

21322
Page 942

Roller guide rails

21340
Page 943

Telescope rails

21342
Page 944

Telescope rails
S-form

21400
Page 946

Carriages

21402
Page 947

Carriages
with flange

21404
Page 948

Carriages
compact

21406
Page 949

Carriages
compact, short

21410
Page 950

Profile guide rails

21420
Page 951

Miniature carriages
stainless steel

21425
Page 952

Miniature profile guide rails
stainless steel

21500
Page 953

Linear ball bearings
with plastic cage

21505
Page 954

Linear ball bearings
with steel cage

21510
Page 955

Linear ball bearings
self-aligning

21515
Page 956

Linear ball bearings
self-aligning, high load rating

21518
Page 957

Linear ball bearings
with flange

21520
Page 958

Linear ball bearings
with flange, double bearing

21522
Page 959

Linear housing units
with flange

Article new/expanded

21524
Page 960

Linear housing units
with flange, tandem

21530
Page 961

Linear housing units
single, closed

21535
Page 962

Linear housing units
single, open

21540
Page 963

Linear housing units
tandem, closed

21545
Page 964

Linear housing units
tandem, open

21550
Page 965

Linear housing units
quadro, closed

21555
Page 966

Linear housing units
quadro, open

21560
Page 967

End seals
double-lip sealing rings

21565
Page 968

Shaft supports

21575
Page 969

Traverses fixed

21577
Page 970

Traverses moveable

21580
Page 971

Shaft supports

21582
Page 972

Shaft supports
standard

21585
Page 973

Shaft supports
flanged

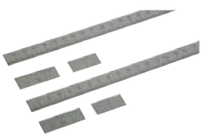
21590
Page 974

Precision guide shafts
with fastening holes

21595
Page 975

Precision guide shafts

21880
Page 976



Linear scales
self-adhesive, stainless steel

21882
Page 977

Linear scales
self adhesive or with screw holes,
aluminium

21884
Page 978

Linear scales
self-adhesive or with screw holes,
aluminium

21901
Page 979

Position indicators

21902
Page 980

Position indicators

21904
Page 981

Position indicators

21922
Page 982

Position indicators
freely programmable

21923
Page 983

Position indicators
freely programmable

21940
Page 985

Reducing bushings

21942
Page 985

Intermediate plates

21944
Page 986

Mounting brackets

21952
Page 987

Adjusting knobs with position indicator
digital display

21962
Page 988

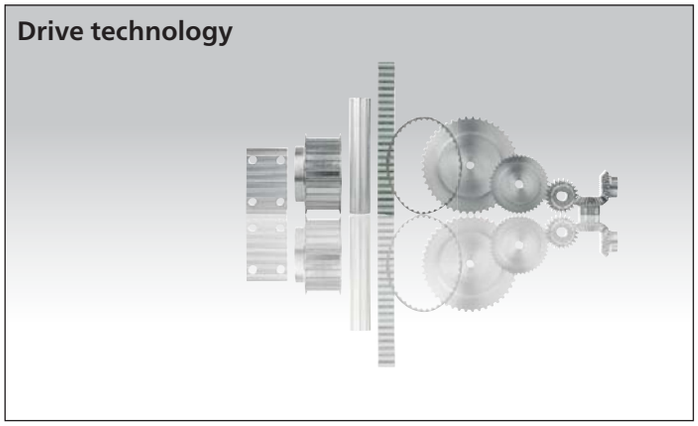
Position indicators for handwheels
analogue-digital display

21972
Page 989

Handwheels for position indicators

Article new/expanded

Drive technology



22002
Page 996-997

Toothed belt pulleys,
T profile

22003
Page 998-999

Toothed belt pulleys,
AT profile

22007
Page 1000

Splined shafts
T profile

22008
Page 1001

Splined shafts
AT profile

22012
Page 1002

Clamp plates for toothed belts
profile T and AT

22052
Page 1003-1005

Toothed belts
T profile

22054
Page 1006-1007

Toothed belts by the metre
T profile

22057
Page 1008-1009

Toothed belts
AT profile

22059
Page 1010-1011

Toothed belts by the meter
AT profile

22400
Page 1012-1013

Spur gears in steel,
module 1
toothing milled, straight teeth,
engagement angle 20°

22400
Page 1014-1015

Spur gears in steel,
module 1.5
toothing milled, straight teeth,
engagement angle 20°

22400
Page 1016-1017

Spur gears in steel,
module 2
toothing milled, straight teeth,
engagement angle 20°

22400
Page 1018-1019

Spur gears in steel,
module 2.5
toothing milled, straight teeth,
engagement angle 20°

22400
Page 1020-1021

Spur gears in steel,
module 3
toothing milled, straight teeth,
engagement angle 20°

22420
Page 1022

Gear racks in steel
toothing milled, straight teeth,
engagement angle 20°

22425
Page 1023

Gear racks in steel
toothing milled, straight teeth,
engagement angle 20°

22430
Page 1024

Bevel gears in steel,
ratio 1:1
toothing milled, straight teeth,
engagement angle 20°

22430
Page 1025

Bevel gears in steel,
ratio 1:2
toothing milled, straight teeth,
engagement angle 20°

22430
Page 1026

Bevel gears in steel,
ratio 1:3
toothing milled, straight teeth,
engagement angle 20°

22430
Page 1027

Bevel gears in steel,
ratio 1:4
toothing milled, straight teeth,
engagement angle 20°

Article new/expanded

Couplings
Rigid couplings
Conical clamping rings
Cardan joints
Quick-fit couplings
Bearings

23000
Page 1031

Metal bellows couplings
with radial clamping hub

23002
Page 1032

Metal bellows couplings
clamping with grub screw

23010
Page 1033

Beam couplings
with radial clamping hub, aluminium

23010
Page 1034

Beam couplings
with radial clamping hub, stainless steel

23012
Page 1035

Beam couplings
with removable clamping hub, aluminium

23012
Page 1036

Beam couplings
with removable clamping hub, stainless steel

23021
Page 1037

Elastomer dog couplings
with conical hub and clamping ring
(similar to DIN 69002)

23022
Page 1038

Elastomer dog couplings
with radial clamping hub

23023
Page 1039

Elastomer dog couplings
clamping with grub screw

23025
Page 1040

Elastomer dog couplings
with radial clamping hub and
intermediate tube

23030
Page 1041

Oldham-type couplings
with radial clamping hub

23032
Page 1042

Oldham-type couplings
clamping with grub screw

23050
Page 1043

Rigid couplings
one-piece

23052
Page 1044

Rigid couplings
two-piece

23350
Page 1046-1047

Keyless locking couplings Form A
for thin walled hubs

23351
Page 1048-1049

Keyless locking couplings Form B

23352
Page 1050-1051

Keyless locking couplings Form C
with axial ring

23354
Page 1052-1053

Keyless locking couplings Form D
compact design

23356
Page 1054-1055

Keyless locking couplings Form E
short version

23358
Page 1056-1057

Keyless locking couplings Form F
short version with axial ring

23360
Page 1058-1059

Keyless locking couplings Form G
increased tolerance range

23362
Page 1060-1061

Keyless locking couplings Form H
for high torques

23368
Page 1062-1063

Keyless locking couplings
with central nut

23370
Page 1064

Shaft-hub clamping sets
stainless steel

23380
Page 1066-1067

Shrink discs Form A

23382
Page 1068-1069

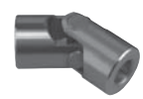
Shrink discs Form B

23403
Page 1073

Universal joints single
with plain bearing
DIN 808

23404
Page 1074

Universal joints double
with plain bearing
DIN 808

23406
Page 1075

Universal joints single
with needle bearing
DIN 808

23407
Page 1076

Universal joints double
with needle bearing
DIN 808

23409
Page 1077

Universal joints single
with plain bearing
robust version DIN 808

23410
Page 1078

Universal joints double
with plain bearing
robust version DIN 808

Article new/expanded

23412
Page 1079

Cardan shafts telescopic

23414
Page 1080

Rubber sleeves
for ball and socket or single universal joints

23415
Page 1080

Rubber sleeves
for ball and socket or double universal joints

23450
Page 1082-1083

Quick-fit couplings
with radial offset compensation

23452
Page 1084-1085

Quick-fit couplings
with radial offset compensation and mounting flange

23454
Page 1086

Quick-fit couplings
with angular and radial offset compensation

23500
Page 1087

igubal® pillow block bearings

23710
Page 1088-1089

Plain bearings plastic

23715
Page 1091

Thrust washers, plastic

23730
Page 1092-1093

Plain bearing
cylindrical

23731
Page 1094

Plain bearing
with collar

23732
Page 1095

Thrust washers

23760
Page 1096-1097

Plain bearing sintered bronze
cylindrical

23761
Page 1098-1099

Plain bearing sintered bronze
with collar

23800
Page 1100-1102

Deep groove ball bearing
FAG single row

23805
Page 1103

Angular contact ball bearing FAG
single-row

23815
Page 1104

Spherical roller bearing FAG
cylindrical bore

23820
Page 1105

Cylinder roller bearing FAG
with cage

23825
Page 1106

Tapered roller bearing FAG
single row

23830
Page 1107

Axial ball bearing FAG single direction.

Article new/expanded

Trapezoidal thread spindles
Ball screw linear actuators
Pillow block bearings

24000
Page 1110

Trapezoidal rolled thread spindles
RH thread, single-start

24003
Page 1111

Trapezoidal thread round nuts
RH thread, single-start

24005
Page 1111

Trapezoidal thread flange nuts
RH thread, single-start

24055
Page 1113

Ball screw linear actuators
rolled, with flange nut DIN 69051
Part 5

24060
Page 1114

Ball screw linear actuators
rolled, with screw-in cylinder nut

24070
Page 1115

Housings
for flange nuts

24072
Page 1116

Fixed bearing units

24074
Page 1117

Floating bearing units

24076
Page 1118

Fixed bearing units
block version

24078
Page 1119

Floating bearing units
block version

24080
Page 1120

Fixed bearing units
flange version

24082
Page 1121

Floating bearing units
flange version

24100
Page 1122-1123

Miniature ball screw linear actuators
ground, with flange nut

24105
Page 1124-1125

Miniature ball screw linear actuators
ground, with screw-in cylinder nut

24200
Page 1126

Pillow block bearing pedestal type
UCP

24210
Page 1127

Pillow block bearing flange type UCF

24212
Page 1128

Pillow block bearing flange type UCFC
with centring hub

24215
Page 1129

Pillow block bearing flange type UCFL
2-hole

24225
Page 1130

Pillow block bearing pedestal type
BPP

24230
Page 1131

Insert bearing UC

24235
Page 1132

Insert bearing B

24240
Page 1133

Pillow block bearing pedestal type MUCP
stainless steel

24242
Page 1134

Pillow block bearing flange type MUCF
stainless steel

24244
Page 1135

Pillow block bearing flange type MUCF
2-hole stainless steel

24248
Page 1136

Insert bearing MUC
stainless steel

Article new/expanded

Rubber-metal buffers
Shock absorbers
Gas springs

26100
Page 1139

Rubber-metal buffers
type A

26101
Page 1140

Rubber-metal buffers
type AT tapered

26102
Page 1141

Rubber-metal buffers
type B

26103
Page 1142

Rubber-metal buffers
type E

26104
Page 1143

Rubber-metal buffers
type C

26105
Page 1144

Rubber-metal buffers
type CT tapered

26106
Page 1145

Rubber-metal buffers
type D

26107
Page 1146

Rubber-metal buffers
type DS suction base

26108
Page 1146

Rubber impact buffers
type TP door buffer

26110
Page 1147

Rubber impact buffers
parabolic

26112
Page 1148

Rubber impact buffers
conical

26115
Page 1148

Rubber impact buffers
spherical

26120
Page 1149

Rubber-metal impact buffer rails

26130
Page 1150

O-shaped mounts

26200
Page 1152-1153

Gas springs

26300
Page 1154

Industrial shock absorbers
adjustable

26320
Page 1155

Mounting flange

Article new/expanded

Clevis joints
Rod ends
Ball joints
Axial joints
Height adjusting elements
Swivel feet
Levelling feet
Tube-end plugs
Equipment feet
Hinges

27614
Page 1158

Clevis joints for rod ends

27615
Page 1159

Clevis joints for rod ends
stainless steel

27616
Page 1160

Hinge plates

27618
Page 1160

Rod-end eyes

27620
Page 1161

Clevis joints with snap-in pin
DIN 71752

27622
Page 1162

Clevis joints stainless steel
DIN 71752

27624
Page 1163

Clevis joints
DIN 71752

27625
Page 1164

Rod ends with ball bearing
external thread

27626
Page 1165

Rod ends with ball bearing
internal thread

27627
Page 1166

Rod ends with plain bearing
external thread

27627
Page 1167

Rod ends igubal® with plain bearing
external thread

27628
Page 1168

Rod ends with plain bearing
internal thread

27628
Page 1169

Rod ends igubal® with plain bearing
internal thread

27629
Page 1170

Rod ends with plain bearing
external thread, stainless steel

27630
Page 1171

Rod ends with plain bearing
internal thread, stainless steel

27631
Page 1172

Rod ends with plain bearing
external thread, narrow version

27632
Page 1173

Rod ends with plain bearing
internal thread, narrow version

27650
Page 1174

Ball joints
DIN 71802

27655
Page 1175

Ball seats for ball joints
DIN 71805

27656
Page 1176

Ball studs for ball joints
DIN 71803

27657
Page 1177

Angle brackets

27658
Page 1177

Side brackets

27659
Page 1178

Round brackets

27660
Page 1178

Circlips for ball seats
DIN 71805

27665
Page 1179

Axial joints
similar to DIN 71802

27700
Page 1180

Levelling sets
high version

27701
Page 1181

Levelling sets
with locknut

27702
Page 1182

Levelling sets
low version

27703
Page 1183

Levelling sets
with locknut

27705
Page 1184

Levelling sets
spherical washer

27706
Page 1185

Levelling sets
spherical washer with locknut

27707
Page 1186

Levelling sets
spherical washer

Article new/expanded

27708
Page 1187

Levelling sets
spherical washer with locknut

27750
Page 1188

Cap elements
type H2

27760
Page 1189

Machine feet

27800
Page 1191

Swivel feet plates
plastic

27801
Page 1192-1193

Swivel feet plates
die-cast zinc or stainless steel

27802
Page 1194

Swivel feet plates extended
die-cast zinc

27803
Page 1195

Swivel feet plates
stainless steel

27804
Page 1197

Swivel feet plates
with vibration absorption

27806
Page 1198

Swivel feet
with vibration absorption

27808
Page 1199

Machine feet
with vibration absorption

27810
Page 1200

Swivel feet threaded spindles
steel or stainless steel

27811
Page 1201

Swivel feet ball joints
with internal thread

27815
Page 1203

Levelling feet plates
plastic

27816
Page 1204

Levelling feet plates
plastic, heavy-duty version

27817
Page 1206-1207

Levelling feet plates
die-cast zinc or stainless steel

27818
Page 1208

Levelling feet plates extended
die-cast zinc

27828
Page 1209

Levelling feet threaded spindles
steel or stainless steel

27830
Page 1211

Levelling feet plates ECO-Line
die-cast zinc, stainless steel or plastic

27832
Page 1212

Levelling feet ECO-Line threaded spindles
steel or stainless steel

27833
Page 1213

Ducks feet

27835
Page 1214

Tube inserts square
with tapped bush

27836
Page 1215

Tube inserts round
with tapped bush

27840
Page 1216

Levelling feet
for aluminium profiles

27841
Page 1217

Levelling feet

27850
Page 1219

Hinges
plastic, lift-off, left

27850
Page 1220

Hinges
plastic, lift-off, right

27852
Page 1221

Hinges
plastic

27853
Page 1222

Hinges
plastic, with locking lever

27854
Page 1223

Hinges
plastic, with elongated holes

27855
Page 1224

Hinges plastic
with fastening holes

27856
Page 1225

Hinges
plastic, lift-off, with guide tabs

27857
Page 1226

Hinges
plastic, detent

27858
Page 1227

Hinges
plastic, with adjustable friction

27865
Page 1228

Hinges
die-cast zinc, with elongated holes

27868
Page 1229

Hinges
die-cast zinc, with locking lever

27870
Page 1230

Hinges
aluminium, lift-off, left

Article new/expanded

27870
Page 1231

Hinges
aluminium, lift-off, right

27872
Page 1232

Hinges
aluminium

27880
Page 1233

Hinges
plastic with bushes

27882
Page 1234

Hinges
plastic with fastening screws

27884
Page 1235

Hinges
plastic with bushes and fastening screws

27885
Page 1236

Hinges
weldable

27886
Page 1237

Hinges
weldable, stainless steel

Oil level gauges
Caps
Plugs
Vent screws
Dipsticks
Filler necks

28000
Page 1240

Oil level gauges

28000
Page 1241

Oil level gauges

28004
Page 1242

Oil level sight glasses

28006
Page 1243

Oil level sight glasses
press-in

28008
Page 1243

Oil level sight glasses
domed

28010
Page 1244

Oil level sight glasses
aluminium

28012
Page 1244

Oil level sight glasses
aluminium, glass window

28018
Page 1245

Plugs
screw-in

28020
Page 1245

Plugs
screw-in

28022
Page 1246

Plugs
press-in

28024
Page 1247

Plugs magnetic
plastic

28026
Page 1247

Plugs magnetic
aluminium

28028
Page 1248

Plugs fill and drain
hexagon cap

28030
Page 1249

Plugs fill only
knurled cap

28032
Page 1250

Caps for filler necks

28034
Page 1250

Vent screws

28036
Page 1251

Vent screws
with splash guard

28038
Page 1252

Vent screws
with check valve

28040
Page 1253

Vent screws brass

28042
Page 1253

Vent screws brass
with check valve

28048
Page 1254

Plugs to press-in
with dipstick

28054
Page 1255

Vent screws
with dipstick

28058
Page 1256

Vent screws
with check valve and dipstick

28060
Page 1257

Dipsticks

28070
Page 1258

Filler necks

28071
Page 1259

Filler necks

Article new/expanded

Tube connectors
Tube clamps
Tube joints
Tubes
Columns

29000
Page 1263

Tube clamps
cross, plastic

29000
Page 1263

Tube clamps
cross, aluminium

29000
Page 1264

Tube clamps
cross, aluminium

29002
Page 1265

Tube clamps
cross, plastic

29002
Page 1265

Tube clamps cross,
aluminium

29004
Page 1267

Tube clamps
cross, plastic

29004
Page 1267

Tube clamps
cross, aluminium

29006
Page 1268

Tube clamps
T-angle, plastic

29006
Page 1269

Tube clamps
T-angle, aluminium

29008
Page 1270

Tube clamps
T-angle, plastic

29008
Page 1271

Tube clamps
T-angle, aluminium

29008
Page 1271

Tube clamps
right-angle, aluminium

29010
Page 1272

Tube clamps
base, plastic

29010
Page 1273

Tube clamps
base, aluminium

29012
Page 1274

Tube clamps
base, plastic

29012
Page 1274

Tube clamps
base, aluminium

29014
Page 1275

Tube clamps
flange, plastic

29014
Page 1276

Tube clamps
flange, aluminium

29014
Page 1277

Tube clamps
flange, aluminium

29016
Page 1278

Tube clamps
flange, plastic

29016
Page 1278

Tube clamps
flange, aluminium

29022
Page 1279

Tube clamps
straight, plastic

29024
Page 1280

Tube clamps
swivel half, sunken teeth, plastic

29026
Page 1281

Tube clamps
swivel half, raised teeth, plastic

29028
Page 1282

Tube clamps
swivel half, sunken teeth, plastic

29030
Page 1283

Tube clamps
swivel base, sunken teeth, plastic

29032
Page 1284

Tube clamps
swivel, plastic

29032
Page 1285

Tube clamps
swivel, aluminium

29034
Page 1286

Tube clamps
swivel, plastic

29034
Page 1287

Tube clamps
swivel, aluminium

29036
Page 1288

Tube clamps
swivel base, plastic

29036
Page 1289

Tube clamps
swivel base, aluminium

Article new/expanded

29040
Page 1291

Reducer sleeves
square

29042
Page 1291

Reducer sleeves
round

29050
Page 1292

Round and square tubes

29056
Page 1293

Tube end plugs

29105
Page 1295

Linear actuators

29120
Page 1296

Linear actuator connector clamps
cross

29125
Page 1297

Linear actuator connector clamps
cross

29130
Page 1298

Linear actuator connector clamps
flange

29135
Page 1299

Linear actuator connector clamps
base

29200
Page 1300

Column bases single

29205
Page 1301

Column bases double

29207
Page 1302

Column clamps double

29210
Page 1303

Adjustment units

29215
Page 1304

Column shaft collars

29240
Page 1305

Columns stainless steel

Article new/expanded

Inspection tables
Gauge stands
Gauge joints

31000
Page 1308

Inspection tables

31020
Page 1308

Inspection blocks
with column

31090
Page 1309

Support cylinders
for workpieces with collar

31100
Page 1309

Gauge holders articulated arm
with central hydraulic lock

31102
Page 1310

Gauge stands magnetic

31120
Page 1310

Magnetic stands

31125
Page 1311

Magnetic stands

31130
Page 1311

Dial gauge arm

31140
Page 1312

Dial gauge holders

31141
Page 1312

Dial gauge holders
with fine adjustment

31150
Page 1313

Joint blocks

31152
Page 1313

Joint blocks

31154
Page 1314

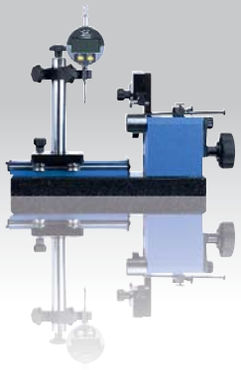
Joint blocks

31156
Page 1315

Clamping joints

Article new/expanded

Concentricity gauges
Dial gauges



32501
Page 1320

Concentricity gauges
max. Ø 35 mm

32501
Page 1321

Accessories
for concentricity gauge max. Ø 35 mm

32506
Page 1322

Concentricity gauge
max. Ø 80 mm

32501
Page 1323

Accessories
for concentricity gauge,
max. Ø 80 mm

32540
Page 1326

Dial gauges
DIN 878

32542
Page 1327

Dial gauges digital

Article new/expanded

Inspection tables
Gauge stands
Gauge joints

33000
Page 1330

Dial gauge collets
for Ø8 shafts

33010
Page 1331

Dial gauge holders
sliding

33012
Page 1331

Dial gauge holders
short version with thread

33014
Page 1332

Dial gauge holders
long version with thread

33016
Page 1332

Dial gauge holders
short version with smooth shaft

33018
Page 1333

Dial gauge holders
for measuring frame

33020
Page 1334

Probe
with flat face

33022
Page 1334

Probe
with flat point

33024
Page 1335

Probe
with reduced flat face

33026
Page 1335

Probe
with reduced domed point

33028
Page 1336

Probe knife point

33029
Page 1336

Probe knife point
offset

33032
Page 1337

Extension
for probe inserts

33035
Page 1337

Probe knife point
offset, for fixed stop

33040
Page 1338

Probe inserts
with domed point

33042
Page 1338

Probe inserts
with ball point

33044
Page 1339

Probe inserts
knife point

33046
Page 1339

Probe inserts
with flat face

33048
Page 1340

Probe inserts
with domed point

33050
Page 1340

Probe inserts
with enlarged flat face

33052
Page 1341

Extensions
for probe inserts

33058
Page 1341

Probe insert set
10-piece

33058
Page 1342

Probe inserts hardened steel
thread M2.5

33058
Page 1343

Probe inserts carbide
thread M2.5

33060
Page 1344

Protection frames
for dial gauges

33070
Page 1346

Deflection dial gauge holders 90°

33072
Page 1346

Deflection dial gauge holders 90°
probe lever with thread

33074
Page 1347

Deflection dial gauge holders 90°
probe lever with hole

33076
Page 1347

Deflection dial gauge holders 180°
probe lever with hole

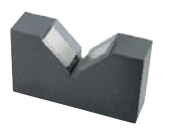
33078
Page 1348

Deflection dial gauge holders 90°
probe lever with thread

33080
Page 1348

Deflection dial gauge holders 180°
probe lever with thread

33090
Page 1349



Prism attachments

Article new/expanded

33092
Page 1349

Spacers
for prisms attachments

33105
Page 1350

Slotted round nuts

33110
Page 1351

Pivoting columns

33115
Page 1352

Pivoting systems

33140
Page 1353

Measuring fixtures

33150
Page 1355

Measuring arms

33180
Page 1356

Spring mounted centre sleeves
with tension lever

33182
Page 1357

Spring mounted centre sleeves
with lifting cam

33184
Page 1358

Adjustable holder
for fixed centres

33190
Page 1358

Fixed centres

33202
Page 1360

Measuring element
for gear wheels

33205
Page 1361

Ball holders

33225
Page 1362-1363

Precision vice

33250
Page 1364

Clamping component set

33260
Page 1365

Spring fingers

33262
Page 1366

Columns
for spring fingers

Article new/expanded

Material handling and transport

95010
Page 1368

Swivel and fixed castors
appliance, standard version

95012
Page 1369

Swivel and fixed castors
heavy-duty version

95016
Page 1370

Swivel and fixed castors
standard version

95018
Page 1371

Swivel and fixed castors
standard version

95020
Page 1372

Swivel and fixed castors
heavy-duty version

95024
Page 1373

Swivel and fixed castors
standard version

95028
Page 1374

Swivel and fixed castors
medium-duty version

95030
Page 1375

Swivel and fixed castors
heavy-duty version

95032
Page 1376

Swivel and fixed castors
welded steel heavy-duty version

95034
Page 1377

Swivel and fixed castors
standard version

95036
Page 1378

Swivel and fixed castors
heavy-duty version

95040
Page 1379

Swivel and fixed castors
heavy-duty version

95045
Page 1380

Swivel castors
compact version

95050
Page 1381

Wheels
rubber tyres on steel plate rims

95053
Page 1382

Wheels
rubber tyres on die-cast aluminium rims

95056
Page 1382

Wheels
polyamide with injection-moulded tread

95057
Page 1383

Guide rollers

95058
Page 1384

Wheels
aluminium rims with injection-moulded tread

95059
Page 1384

Rollers heavy-load

95060
Page 1385

Wheels heavy-load
wheel body welded

95062
Page 1385

Wheels polyamide

95064
Page 1386

Wheels polyamide
heavy-duty version

95090
Page 1387

Elevating castors with foot
with bolt hole or mounting plate

95092
Page 1388

Elevating castors
with integrated machine foot

95150
Page 1390

Ball transfer units
with steel housing

95152
Page 1391

Ball transfer units
with steel housing and plastic ball

95154
Page 1392

Ball transfer units
undersprung

95156
Page 1393

Ball transfer units
with solid steel housing

95158
Page 1393

Ball transfer units
with fastening holes, without housing

95160
Page 1394

Ball transfer units
with spring clips

95164
Page 1394

Tolerance rings

95180
Page 1395

Mini ball transfer units

Article new/expanded

Feeler gauge strips
Magnetic labels and envelopes
Protective nets
Supercraft mallets and inserts
Taper and cylinder cleaners
Coolant hoses

96200
Page 1398-1400

Coolant hose LOC-LINE® Flexi

96382
Page 1401

Feeler gauge strips

96390
Page 1401

Ball chains
with ring clip

96450
Page 1402

Magnetic labels
on a roll, perforated

96455
Page 1402

Magnetic labels

96460
Page 1403

Magnetic tape rolls

96465
Page 1403

Magnetic C profiles

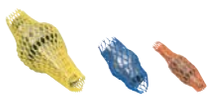
96470
Page 1404

Magnetic envelopes

96471
Page 1404

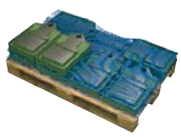
Magnetic envelopes
with strong magnetics

96500
Page 1405



Net sleeves

96510
Page 1405



Net mats

96610
Page 1406

Plastic hammer Supercraft
recoilless

96614
Page 1406

Hammer inserts
for Supercraft hammers

96630
Page 1407

Taper cleaners
for Morse tapers

96632
Page 1407

Taper cleaners
for short tapers

96634
Page 1408

Taper cleaners
for hollow shank tapers

96636
Page 1409

Cylinder cleaners

96638
Page 1409

Cylinder cleaners
two-part

96650
Page 1410

Hook wrench with lug
DIN 1810A enhanced

Article new/expanded

Lubricants Adhesives

97900
Page 1412

Klüber „Quietsch-Ex“

97901
Page 1412

Klüber lubricating paste

97903
Page 1413

Klüber copper paste lead-free

97905
Page 1413

Klüber safety lubricating grease

97907
Page 1414

Klüber molybdenum disulphide lubricant

97909
Page 1414

Klüber liquid chain grease

97920
Page 1415

Klüber bonded coating UNIMOLY C 220

97930
Page 1416

Ballistol all-purpose oil in food industry quality

97990
Page 1417

LOCTITE liquid epoxy metals

97990
Page 1417

LOCTITE liquid epoxy metals

97990
Page 1418

LOCTITE screw lock

97990
Page 1419

LOCTITE universal adhesive

97990
Page 1419

LOCTITE thread sealant

97990
Page 1420

LOCTITE surface sealant

97990
Page 1420

LOCTITE adhesive and sealant

97990
Page 1421

LOCTITE retaining compound

97990
Page 1421

LOCTITE cleaner

97990
Page 1422

LOCTITE activators

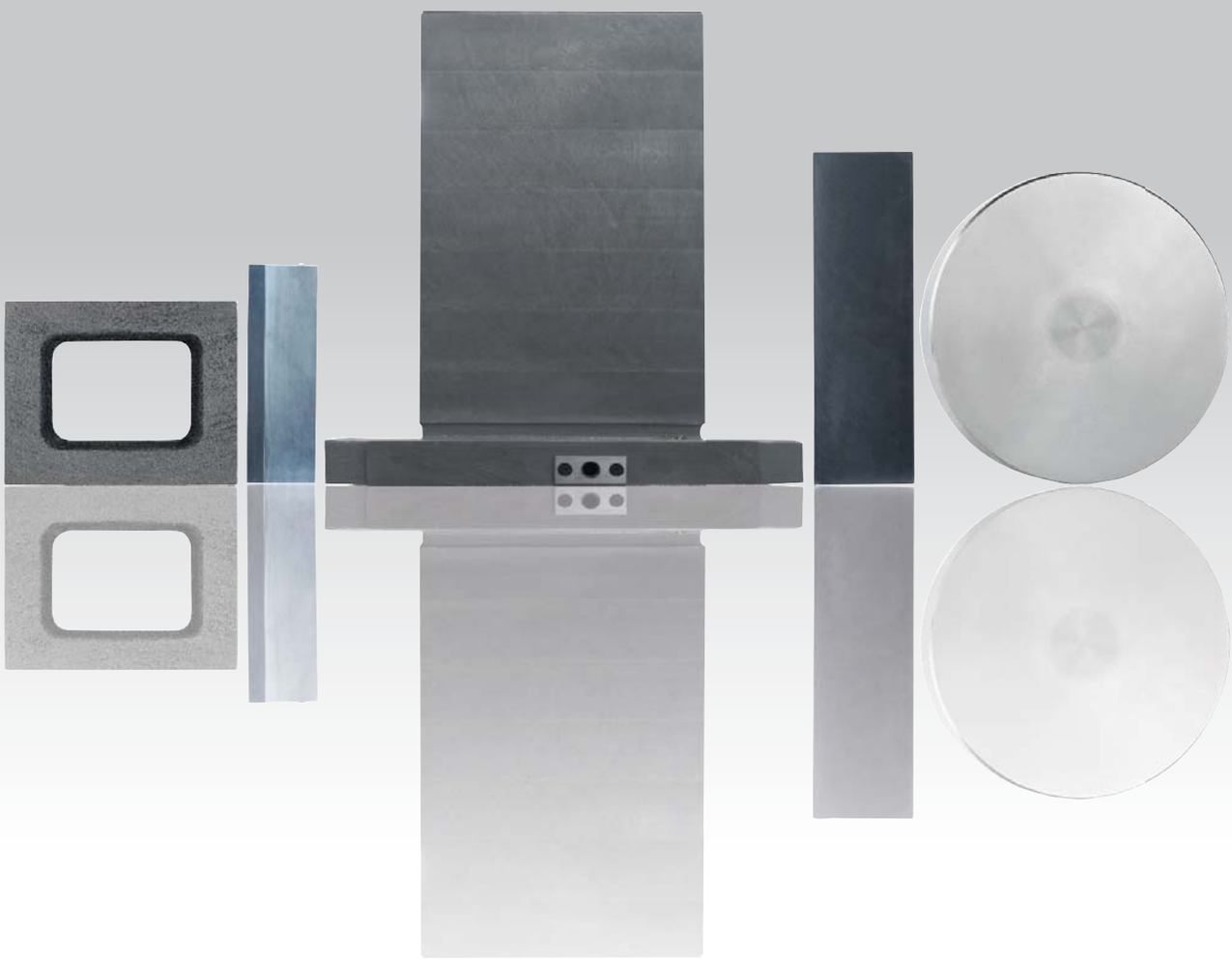
97990
Page 1422

Application equipment

Article new/expanded

01000

Basic elements
Subplates
Discs
Profiles
Angle plates
Tombstones

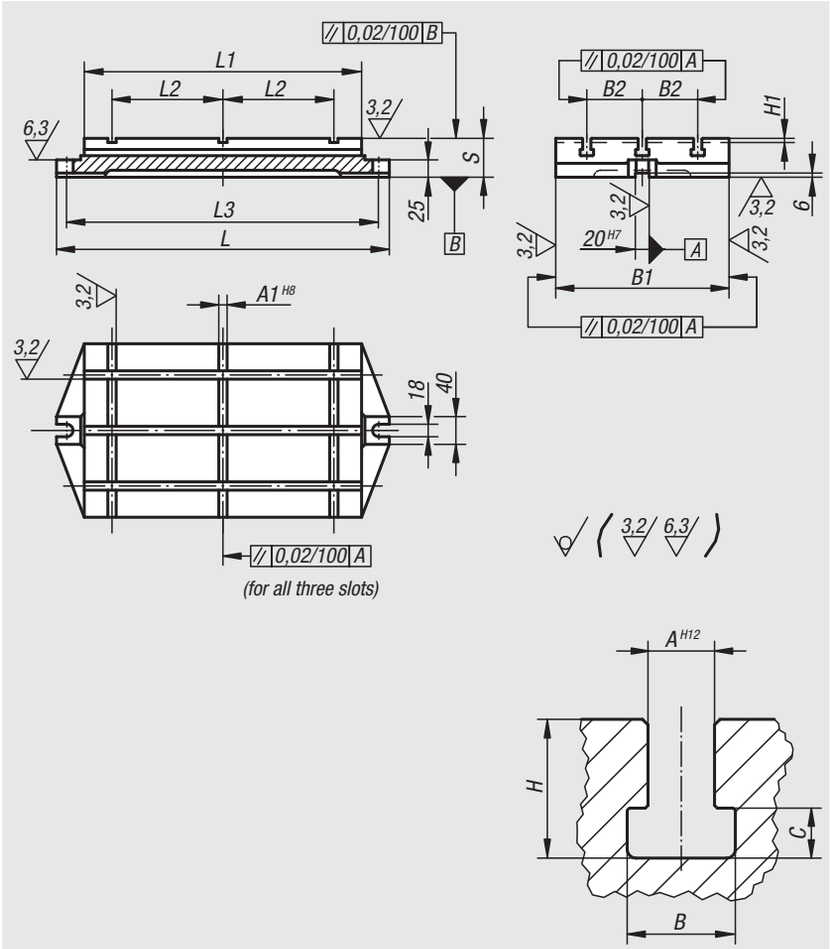


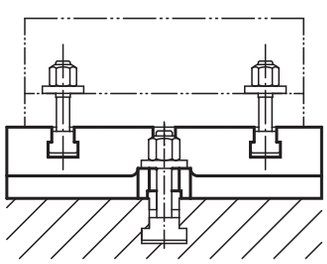
Base plate with T-slots

grey cast iron

Material:
GJL 250 annealed.

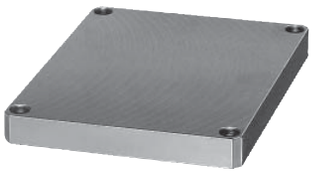
Sample order:
nlm 01040-04





Order No.	L	L1	L2	L3	B1	B2	H1	S	A1	A	B	C	H
01040-01	280	200	70	250	125	40	4	50	6	10	16,5	7	21
01040-02	330	250	100	300	160	50	4	50	8	10	16,5	7	21
01040-03	395	315	125	365	200	63	4	56	10	12	19,5	8	25
01040-04	480	400	160	450	250	80	6	56	12	12	19,5	8	25
01040-05	580	500	220	550	315	100	6	63	14	14	23	9	28
01040-06	710	630	280	680	400	125	6	63	18	14	23	9	28

Base plates steel

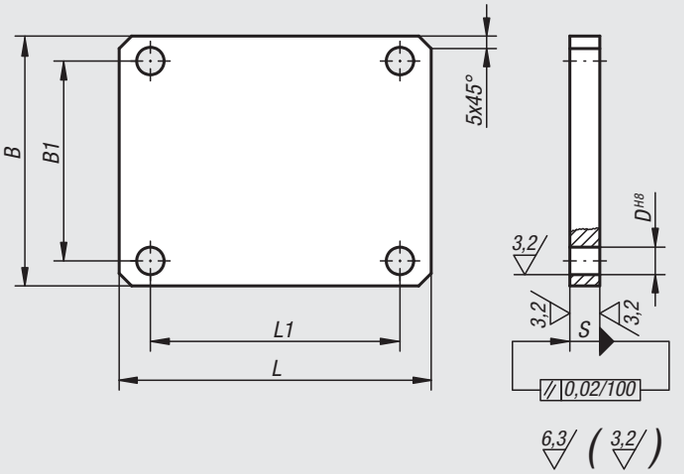


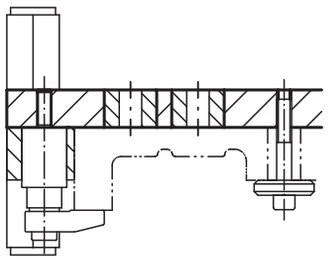
Material:
Carbon steel 1.1181.

Version:
Bright.

Sample order:
nlm 01060-01

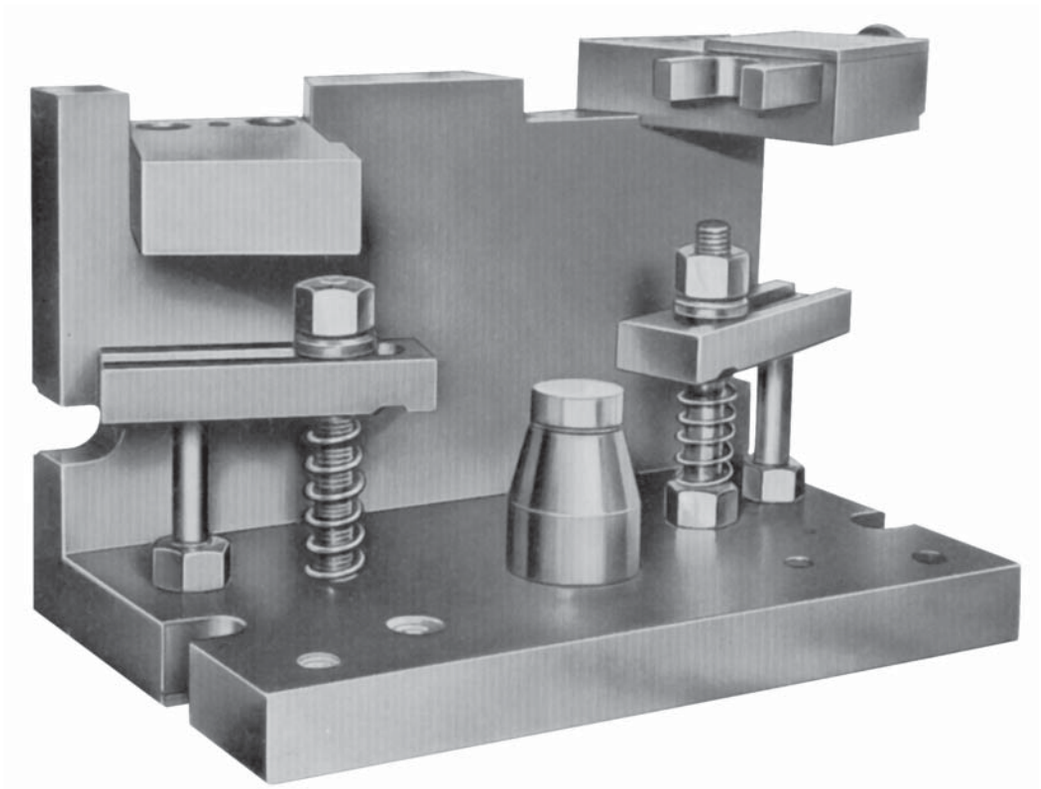
machined surfaces:
±0.25 mm
thickness: +0/-0.5 mm
raw surfaces:
±2 mm





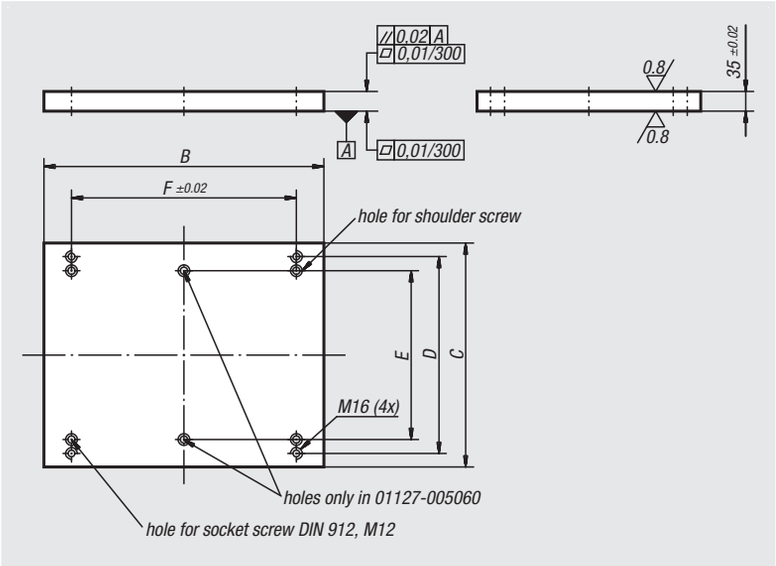
Order No.	L	L1	B	B1	S	D
01060-01	125	100	100	80	12	11
01060-02	160	140	125	100	16	11
01060-03	200	180	160	140	20	13
01060-04	250	220	200	180	20	13
01060-05	315	280	250	220	20	13

Example of a fixture using almost exclusively norelem parts:



01127

Base plates



Material:
Grey cast iron GJL 250

Version:
Mounting surfaces ground

Sample order:
nlm 01127-005060

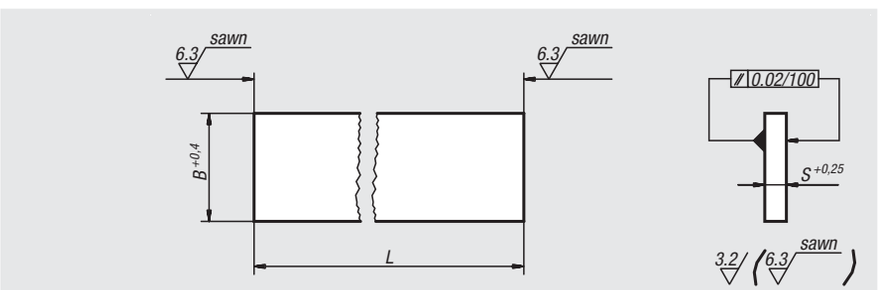
Note:
The base plates are positioned using shoulder screws 07533-12055, which are placed in the fastening holes. The through holes for DIN 912 cylinder screws are used for additional fastening.

Order No.	B	C	D	E	F	Suitable shoulder screw
01127-003040	398	298	250	200	300	07533-12055
01127-004050	498	398	350	300	400	07533-12055
01127-005060	598	498	450	400	500	07533-12055

01130

Rectangular plates

precision steel



Order No.	L = length	B	S
01130-01X	250/500/750/1000	40	8
01130-02X	250/500/750/1000	50	10
01130-03X	250/500/750/1000	63	12
01130-04X	250/500/750/1000	80	16
01130-05X	250/500/750/1000	100	16
01130-06X	250/500/750/1000	100	20
01130-07X	250/500/750/1000	125	25
01130-08X	250/500/750/1000	150	25
01130-09X	250/500/750/1000	160	32
01130-10X	250/500/750/1000	200	32
01130-11X	250/500/750/1000	300	40

Material:
Steel 1.1730

Version:
Bright.

Sample order:
nlm 01130-04X500 (include length L)

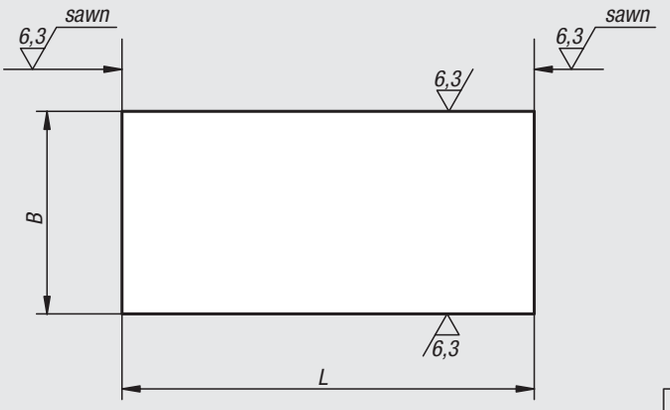
Note:
These precision steel plates are suitable for use as base plates in machine, tool and fixture construction. The dimension L is sawn to length and is always supplied oversized.

Plates

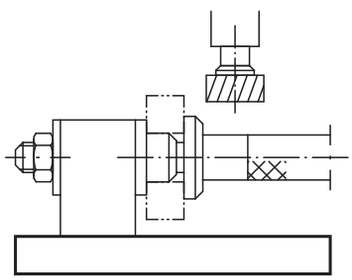
grey cast iron or aluminium

Material:
GJL 250 annealed or EN AW-7075

Sample order:
nlm 01140-07X300 (include length L)

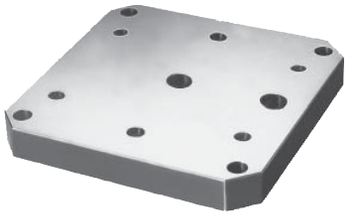


machined surfaces:
grey cast iron: +0.2 mm / +0.5 mm
aluminium: ± 0.1 mm
tolerances of lengths:
≤ 200 mm: +1/+5
from 201 mm to 400 mm: +4/+15
> 400 mm: +13/+40



Order No. grey cast iron	Order No. Aluminium	L = length	B	S
01140-01X	**01140-201X**	300	40	10
01140-02X	**01140-202X**	300	50	12
01140-03X	**01140-203X**	300	63	16
01140-04X	**01140-204X**	200/300/400/600/800	80	20
01140-05X	**01140-205X**	200/300/400/600/800	100	20
01140-06X	**01140-206X**	200/300/400/600/800	160	20
01140-061X	**01140-2061X**	200/300/400/600/800	200	20
01140-062X	**01140-2062X**	200/300/400/600/800	250	20
01140-07X	**01140-207X**	200/300/400/600/800/1200	125	25
01140-08X	**01140-208X**	200/300/400/600/800/1200	200	25
01140-081X	**01140-2081X**	200/300/400/600/800/1200	250	25
01140-082X	**01140-2082X**	200/300/400/600/800/1200	315	25
01140-09X	**01140-209X**	200/300/400/600/800/1200	160	32
01140-10X	**01140-210X**	200/300/400/600/800/1200	250	32
01140-101X	**01140-2101X**	200/400/600/800/1200	315	32
01140-102X	**01140-2102X**	200/300/400/600/800/1200	400	32
01140-11X	**01140-211X**	200/400/600/800/1200	200	40
01140-12X	**01140-212X**	200/400/600/800/1200	250	40
01140-120X	-	200/400/600/800/1200	315	40
01140-121X	-	200/300/400/600/800/1200	400	40
01140-13X	-	200/400/600/800/1200	315	50
01140-131X	-	200/300/400/600/800/1200	500	50

Subplates

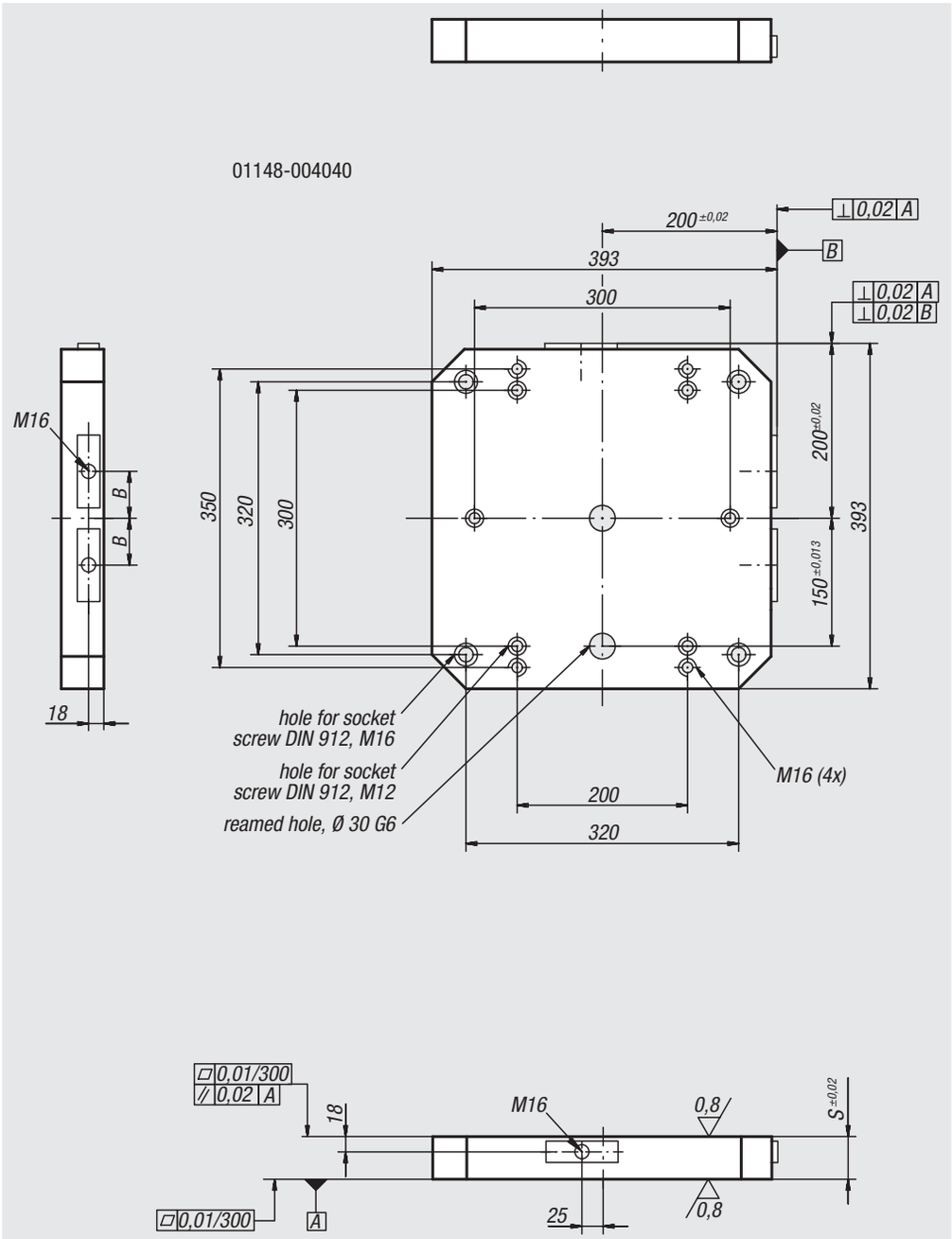


Material:
Grey cast iron GJL 250

Version:
Mounting surfaces ground

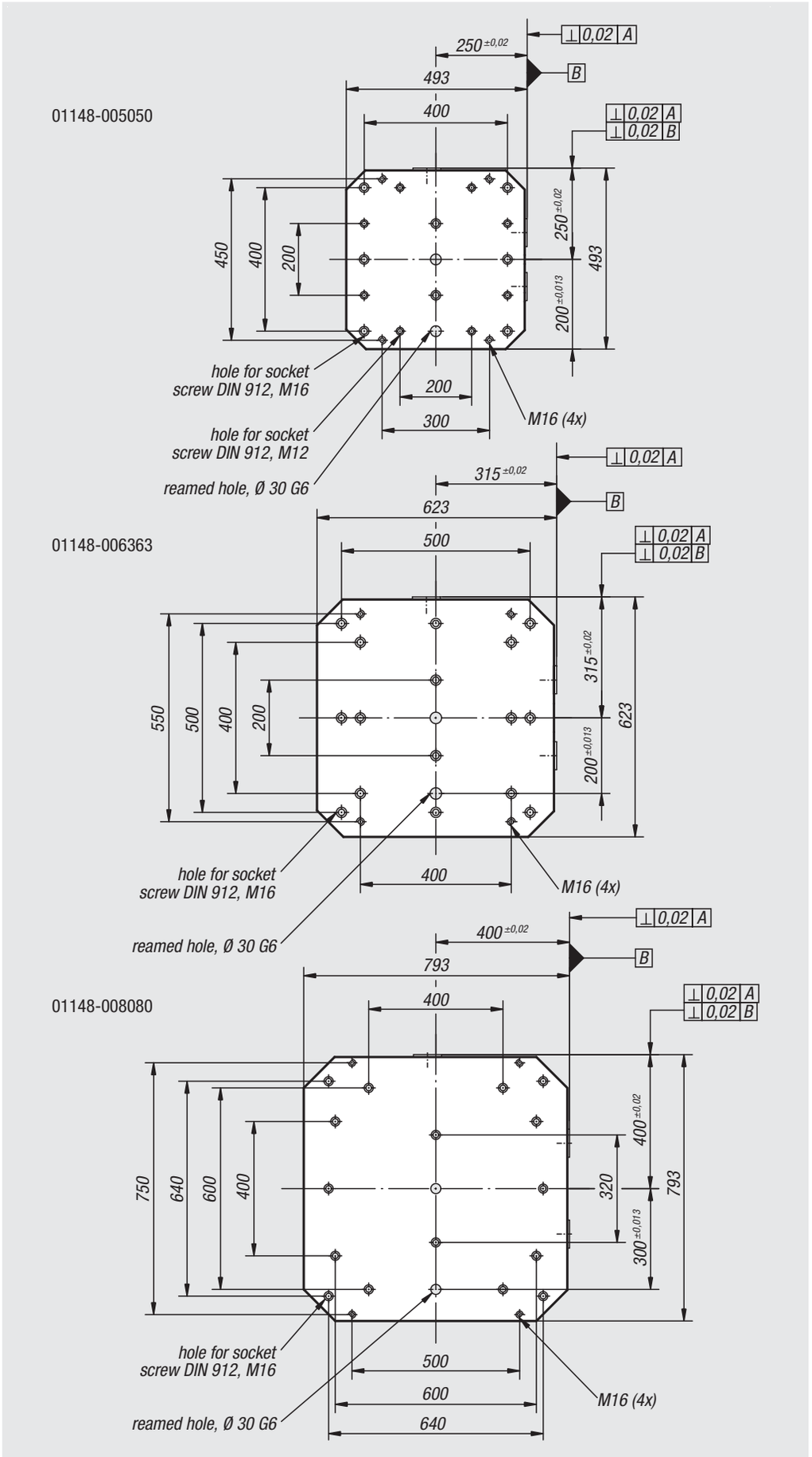
Sample order:
nlm 01148-005050

Note:
The subplate positioning and fastening holes conform to subplates for machine tools acc. to DIN 55 201 and JIS 6337-1980.



Order No.	B	S
01148-004040	55	50
01148-005050	75	50
01148-006363	100	50
01148-008080	135	60

Subplates


01148-005050
250 ±0,02
493
400
⊥ 0,02 A
B
⊥ 0,02 A
⊥ 0,02 B
450
400
200
250 ±0,02
493
200 ±0,013
hole for socket screw DIN 912, M16
hole for socket screw DIN 912, M12
reamed hole, Ø 30 G6
200
300
M16 (4x)
01148-006363
315 ±0,02
623
500
⊥ 0,02 A
B
⊥ 0,02 A
⊥ 0,02 B
550
500
400
200
315 ±0,02
623
200 ±0,013
hole for socket screw DIN 912, M16
reamed hole, Ø 30 G6
400
M16 (4x)
01148-008080
400 ±0,02
793
400
⊥ 0,02 A
B
⊥ 0,02 A
⊥ 0,02 B
750
640
600
400
400 ±0,02
320
793
300 ±0,013
hole for socket screw DIN 912, M16
reamed hole, Ø 30 G6
500
600
640
M16 (4x)

Subplates machined all sides

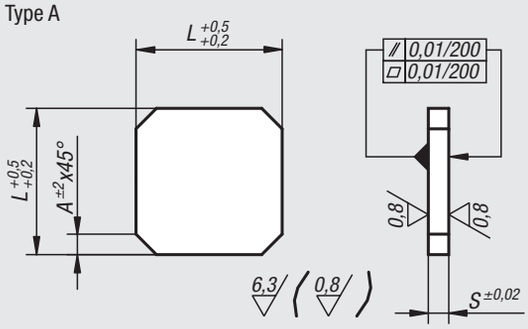
grey cast iron

Material:
GJL 250 annealed.

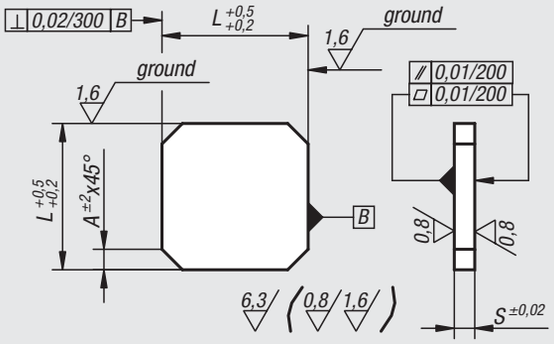
Sample order:
nlm 01150-002

Note:
The plates are also available with slots.
Type A:
ground supporting faces (Ra 0.8).
Type B:
ground supporting faces (Ra 0.8) and sides (Ra 1.6).
Type C:
milled supporting faces and sides (Ra 3.2).

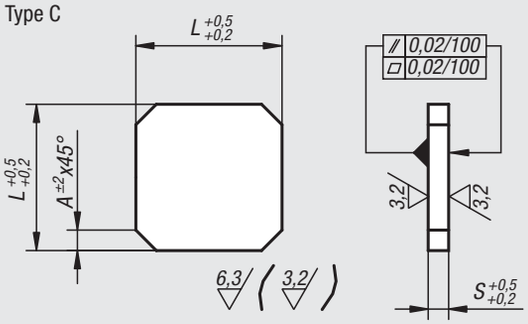
Type A

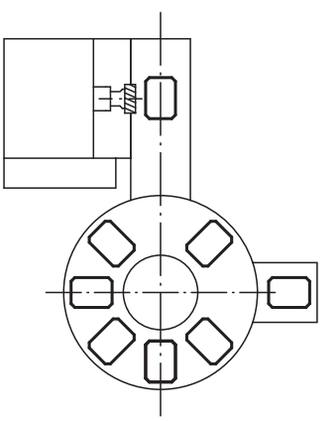


Type B



Type C





Order No. Type A	Order No. Type B	Order No. Type C	L	S	A
01150-001	**01150-0011**	**01150-00111**	200	25	25
01150-002	**01150-0021**	**01150-00211**	250	35	35
01150-004	**01150-0041**	**01150-00411**	320	40	40
01150-006	**01150-0061**	**01150-00611**	400	45	50
01150-008	**01150-0081**	**01150-00811**	500	50	60
01150-010	**01150-0101**	**01150-01011**	630	63	70
01150-012	**01150-0121**	**01150-01211**	800	70	100

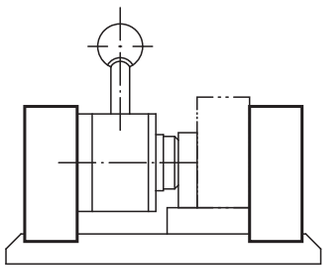
01160

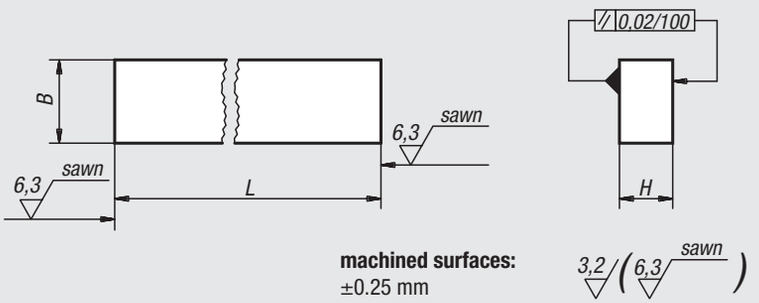
Block machined all sides

grey cast iron or aluminium

Material:
GJL 250 annealed or EN AW-7075

Sample order:
nlm 01160-05X300 (include length L)





machined surfaces:
±0.25 mm
tolerances of lengths:
≤ 200 mm: +1/+5
from 201 mm to 400 mm: +4/+15
> 400 mm: +13/+40

Order No. grey cast iron	Order No. Aluminium	L = length	B	H
01160-02X	**01160-202X**	300	32	20
01160-03X	**01160-203X**	300	40	25
01160-04X	**01160-204X**	300/600/800	50	32
01160-05X	**01160-205X**	300/600/800	63	40
01160-06X	**01160-206X**	300/600/1000	80	50
01160-07X	**01160-207X**	300/600/1000	100	63
01160-08X	**01160-208X**	300/600	125	80

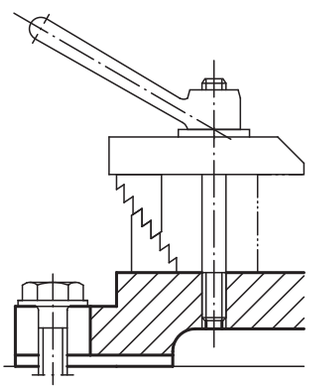
01180

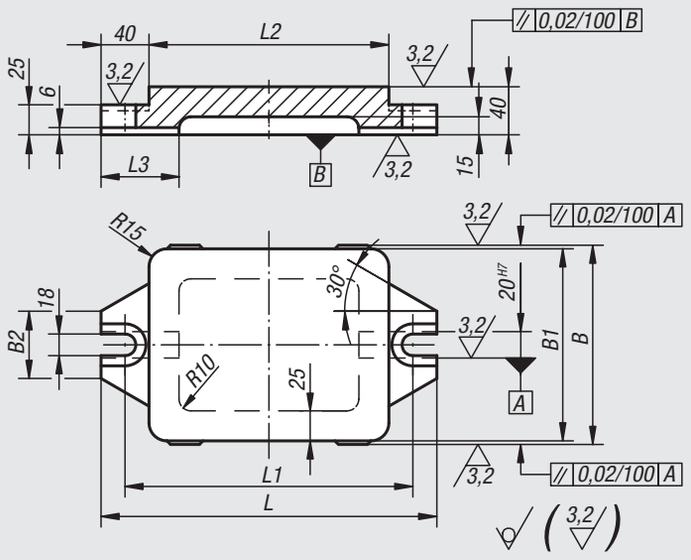
Base plate with flanges

grey cast iron

Material:
GJL 250 annealed.

Sample order:
nlm 01180-03



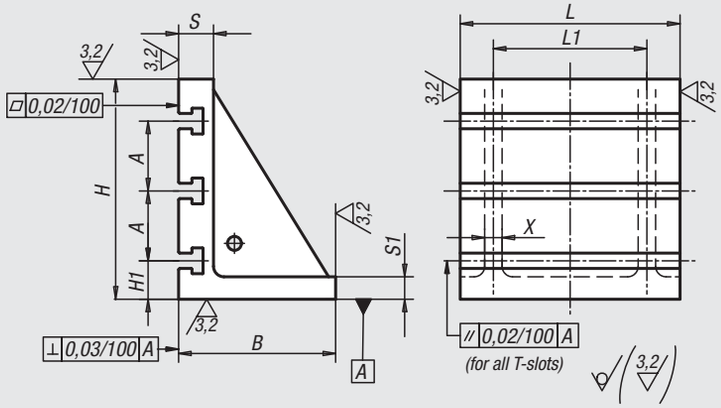


Order No.	L	L1	L2	L3	B	B1	B2
01180-01	240	200	160	65	166	160	56
01180-02	280	240	200	65	166	160	56
01180-03	330	290	250	70	206	200	74
01180-04	395	355	315	75	256	250	74

Angle plates

with or without T-slots cast iron

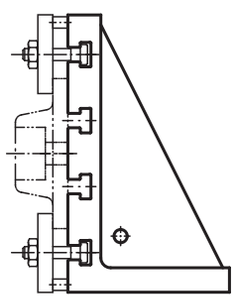
machined surfaces:
+0.2 mm/ +0.5 mm
raw surfaces:
±2 mm



Material:
GJL 250 annealed.

Sample order:
nlm 01250-3203701

On request:
Other slot widths.



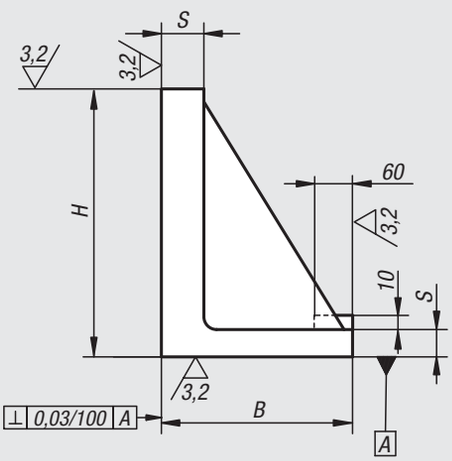
Order No. without T-slots	Order No. with T-slots	L	L1	B	H	H1	S	S1	A	X	T-slot
01250-100125	-	100	40	100	125	-	20	10	-	10	-
01250-125160	-	125	100	100	160	-	20	10	-	10	-
01250-200250	-	200	120	125	250	-	30	15	-	15	-
01250-250300	-	250	200	150	300	-	40	20	-	20	-
01250-320370	**01250-3203701**	320	280	200	370	-/65	50	25	-/80	25	-/14
01250-400450	**01250-4004501**	400	280	265	450	-/75	60	30	-/100	30	-/18
01250-500550	**01250-5005501**	500	360	315	550	-/75	70	35	-/100	35	-/18
01250-630640	**01250-6306401**	630	520	350	640	-/80	80	40	-/160	35	-/22
01250-700750	**01250-7007501**	700	600	400	750	-/135	80	40	-/160	40	-/22

Angle plates

aluminium

Material:
Aluminium (Rm 330 N/mm², 110 HB).

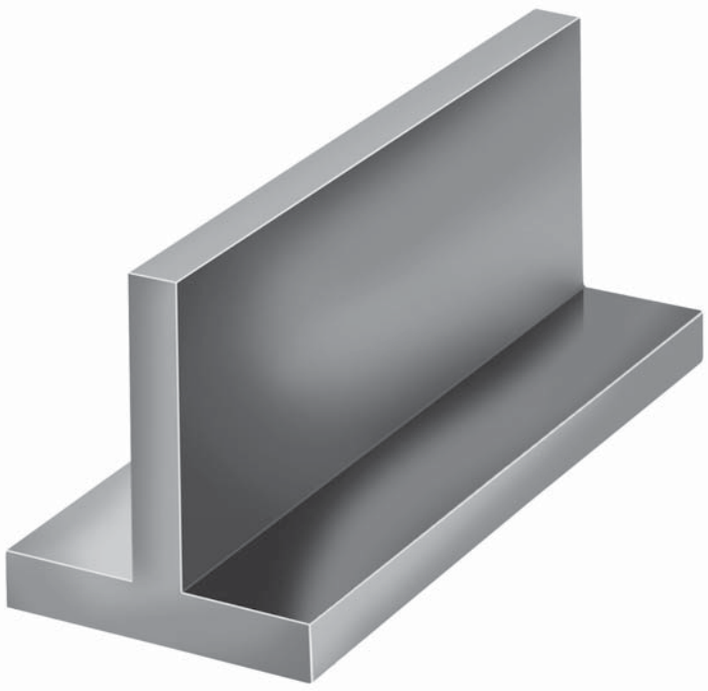
Sample order:
nlm 01252-260250



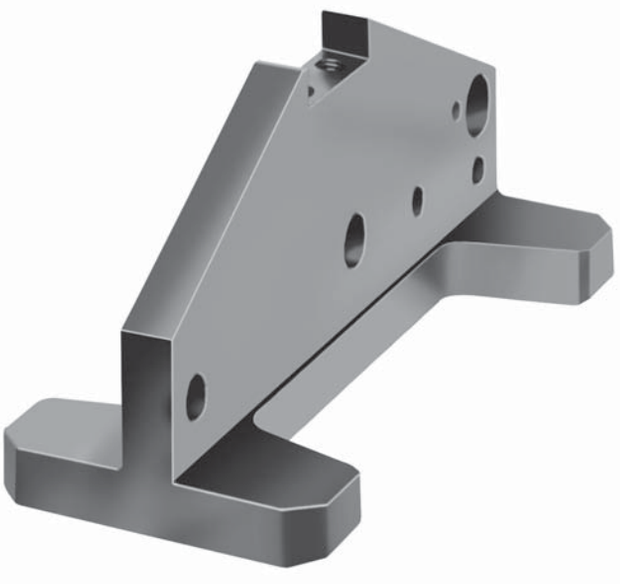
machined surfaces:
+0.2 mm/ +0.5 mm
raw surfaces:
±2 mm

Order No.	B	H	L	L1	S	X
01252-260250	150	250	260	155	20	15
01252-335355	225	355	335	200	25	20
01252-410450	270	450	410	245	30	15

Cost-effective designing and machining with norelem:



norelem basic element: T-profile



Finished product

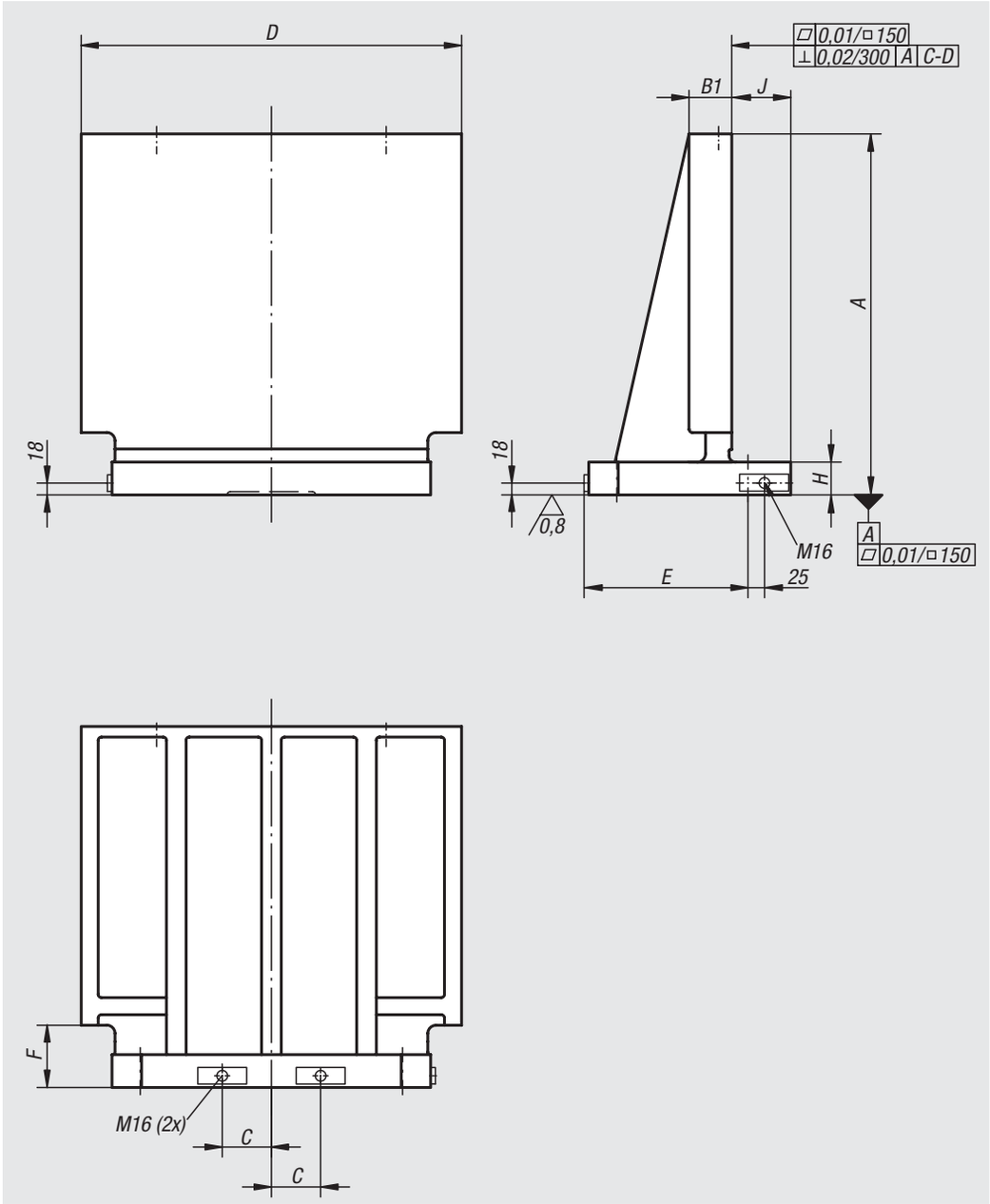
Tombstones single-sided

Material:
GJL 300

Version:
Reference surfaces precision machined. The clamping surface has 1 mm allowance.

Sample order:
nlm 01263-006376

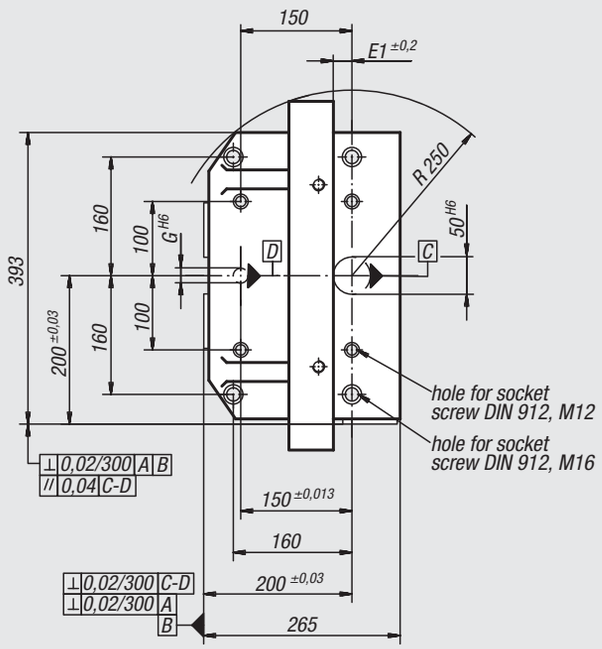
Note:
The single-sided tombstones are matched to subplates for machine tools acc. to DIN 55201 and JIS 6337-1980. Ring bolts for lifting are supplied.



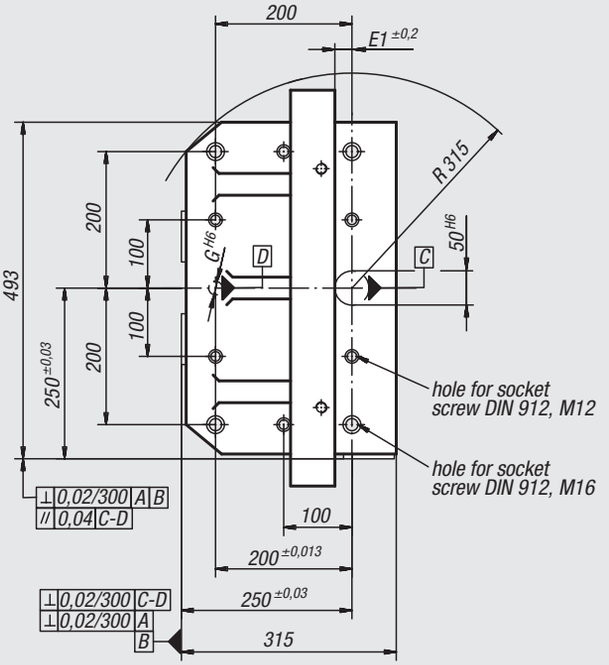
Order No.	A	B1	C	D	E	E1	F	G	H	J
01263-004047	450	61	55	470	200	24±0,2	85	20	45	89
01263-005058	550	66	75	580	250	24±0,2	95	20	50	89
01263-006376	700	76	100	760	315	49±0,2	100	25	55	114
01263-008090	800	81	135	900	400	49±0,2	100	25	60	114

Tombstones single-sided

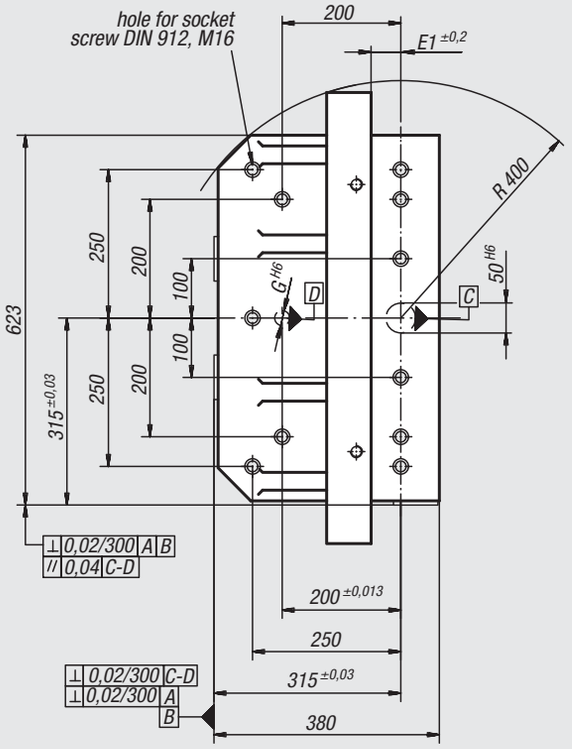
01263-004047



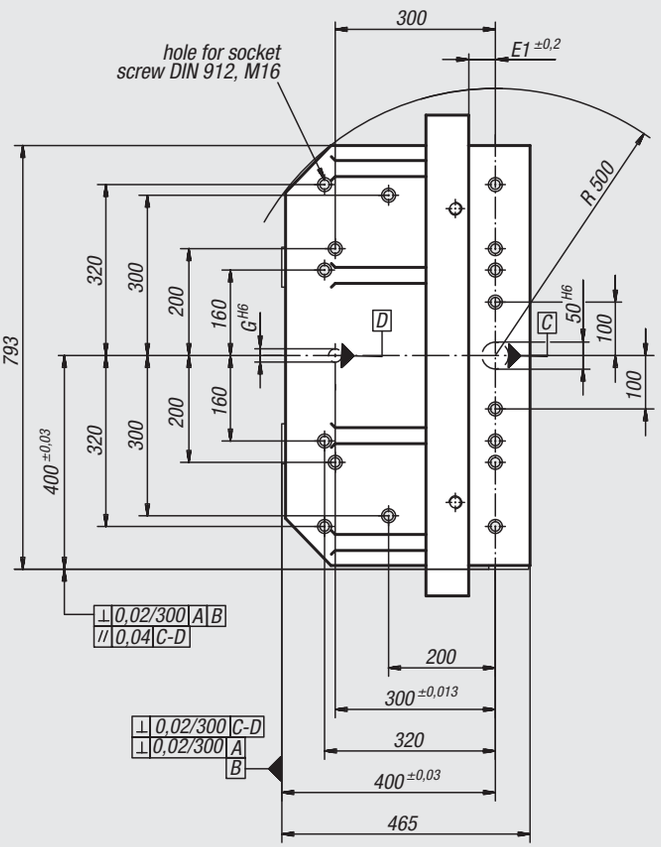
01263-005058



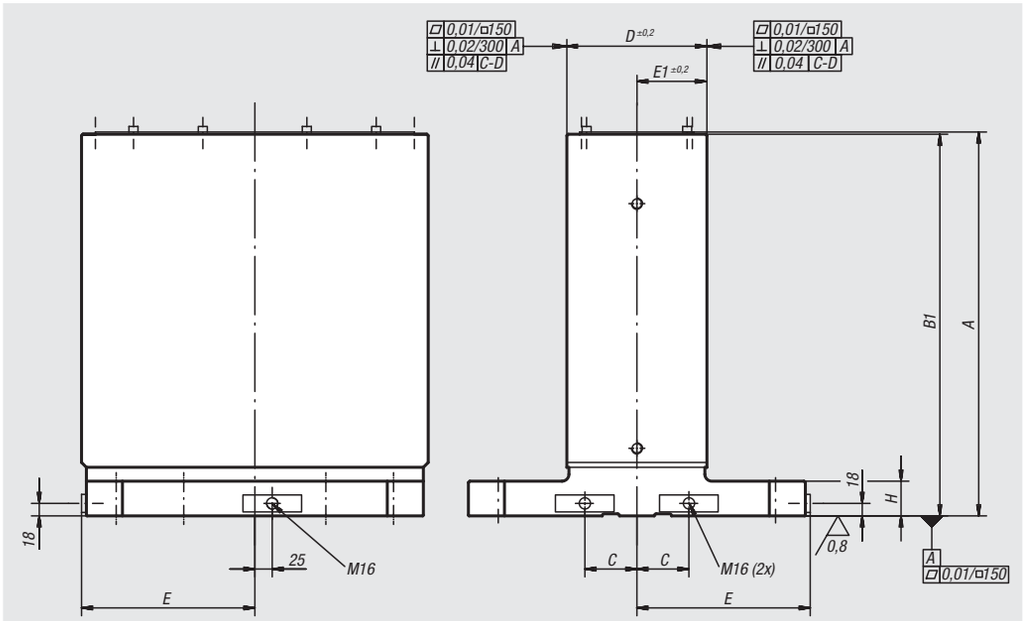
01263-006376



01263-008090



Tombstones double-sided



Material:
GJL 300

Version:
Reference surfaces precision machined. The clamping surfaces have 0.5 mm allowance.

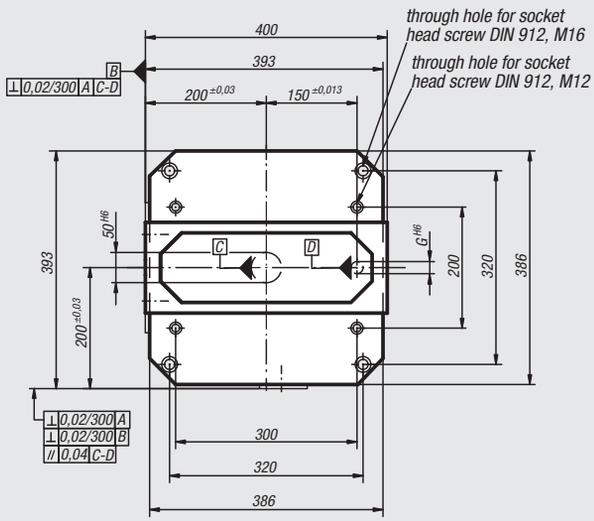
Sample order:
nlm 01265-005020

Note:
The double-sided tombstones are matched to subplates for machine tools acc. to DIN 55201 and JIS 6337-1980.
Ring bolts for lifting are supplied. A cover prevents the cavity of the tombstone filling up with swarf.

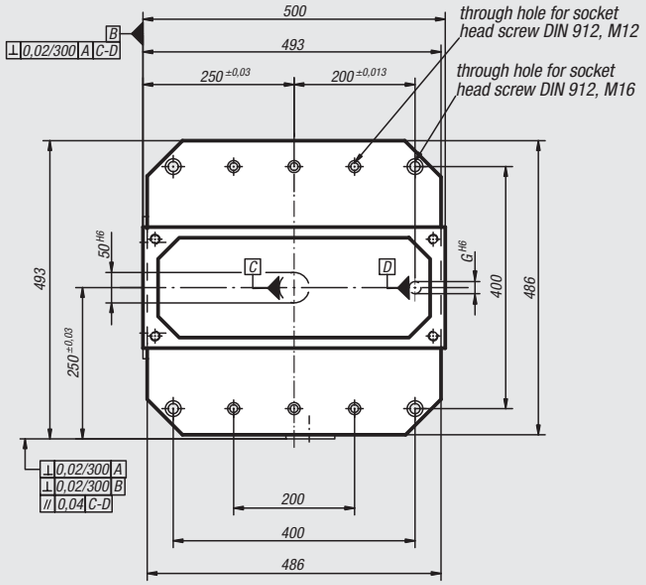
Order No.	A	B1	C	D	E	E1	G	H
01265-005020	553	550	75	201±0,2	250	101,5±0,2	20	50
01265-006325	703	700	100	251±0,2	315	125,5±0,2	25	55
01265-008030	803	800	135	301±0,2	400	150,5±0,2	25	60
01265-0040151	553	550	55	151±0,2	200	75,5±0,2	20	50
01265-0050201	653	650	75	201±0,2	250	101,5±0,2	20	50
01265-0063251	803	800	100	251±0,2	315	125,5±0,2	25	55

Tombstones double-sided

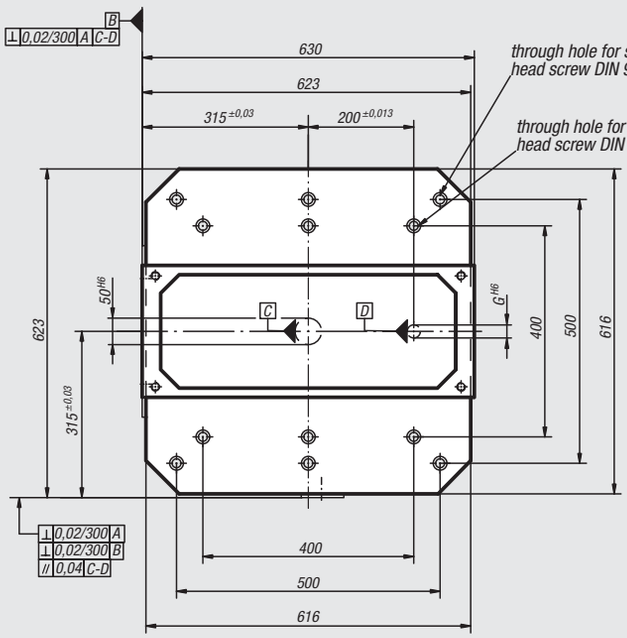
01265-0040151



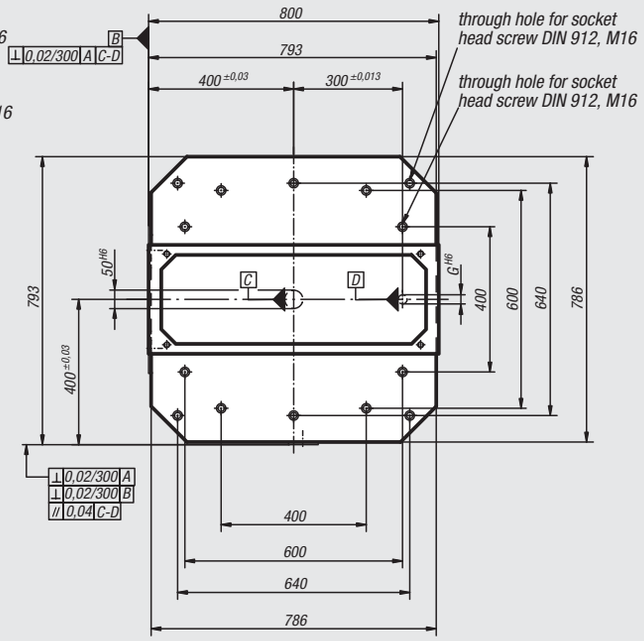
01265-005020
01265-0050201



01265-006325
01265-0063251



01265-008030



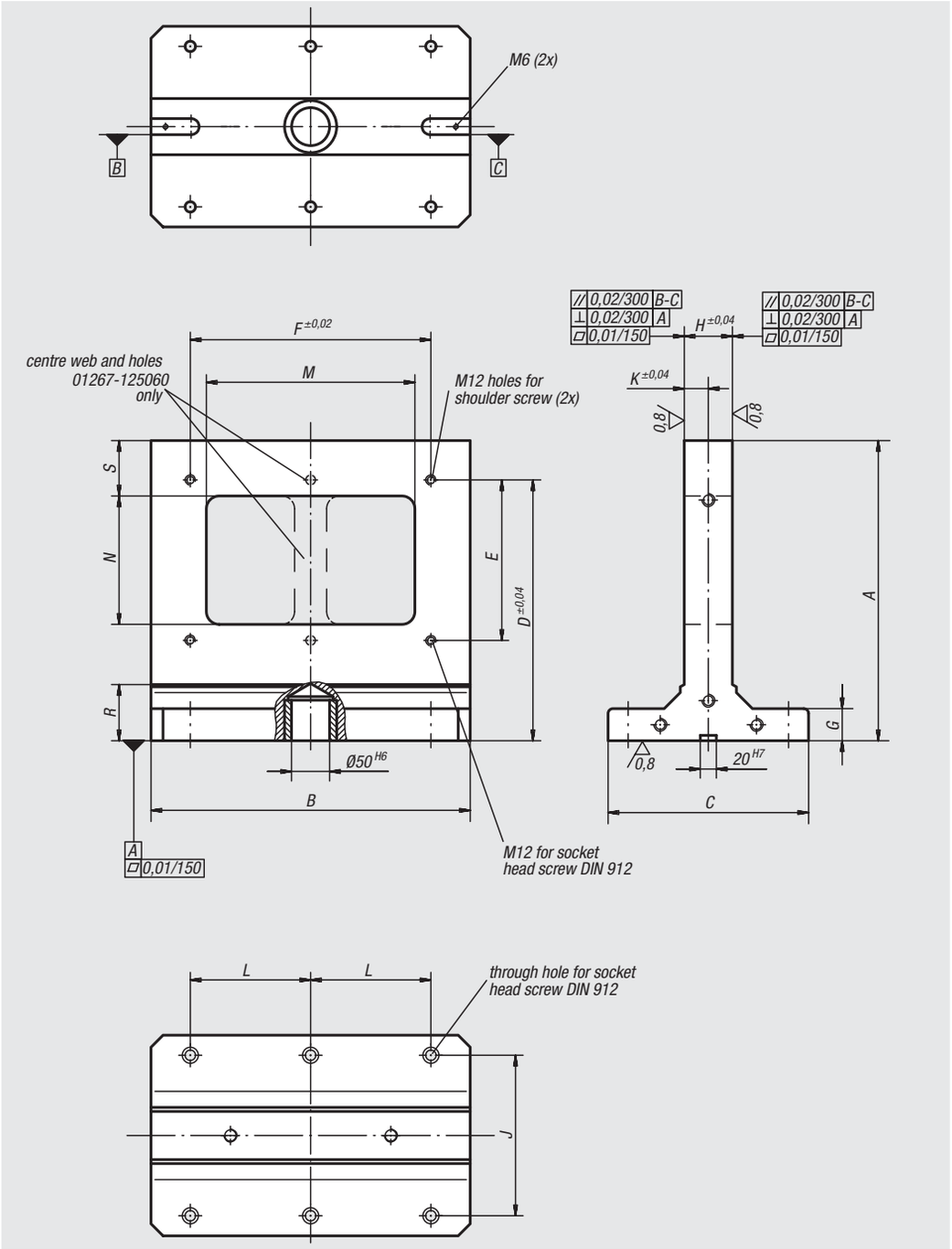
Tombstones window frame

Material:
GJL 300

Version:
Reference surfaces precision machined

Sample order:
nlm 01267-123040

Note:
Subplates 01127 can be positioned and fastened to both sides of the window frame, permitting economical fixture exchanges. The window frames are positioned using centring bolts 03110 and slot guide nuts 03240. Ring bolts for lifting are supplied.

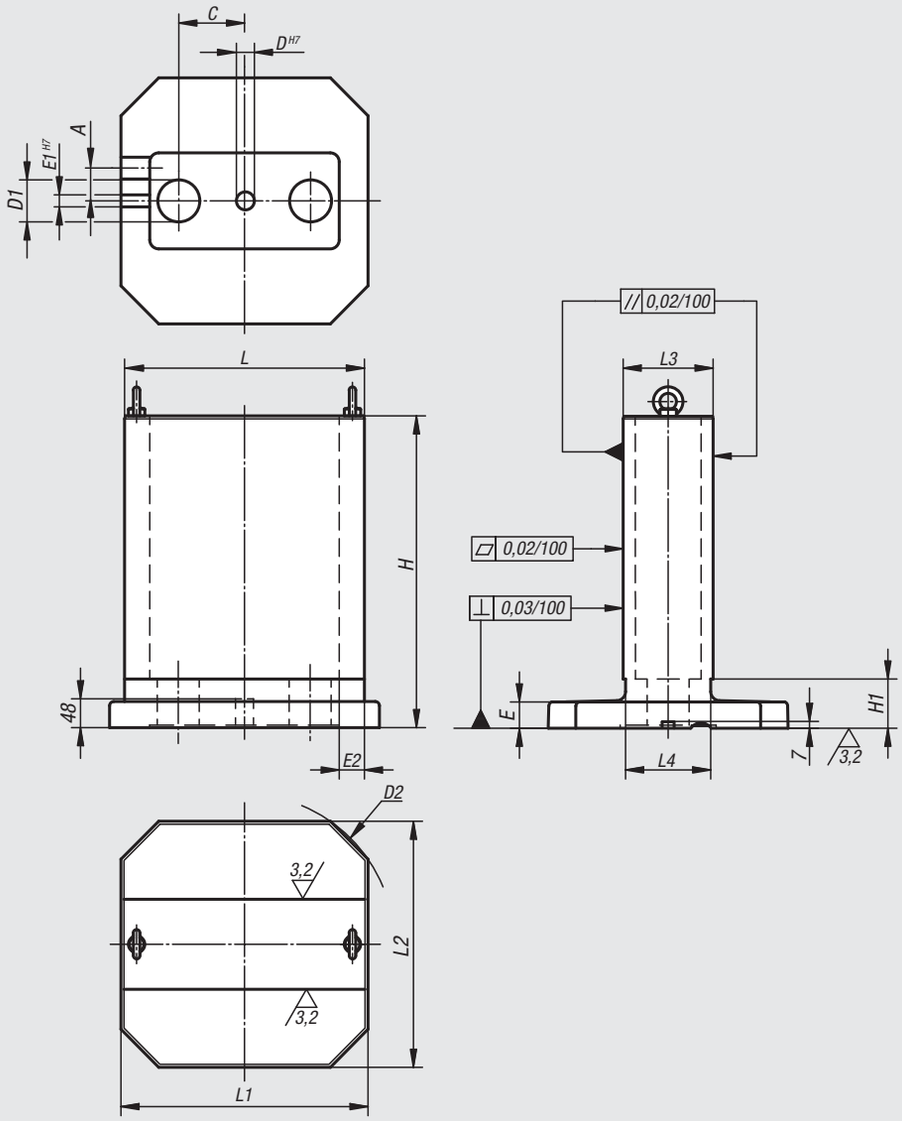


Order No.	A	B	C	D	E	F	G	H	J	K	L	M	N	R	S	T
01267-123040	374	398	250	325	200	300	40	60	200	30	150	260	160	70	69	M12
01267-124050	474	498	250	425	300	400	40	70	200	35	200	360	260	70	69	M12
01267-125060	574	598	300	525	400	500	50	70	200	35	200	458	360	75	70	M16

Tombstones double-sided

grey cast iron

machined surfaces:
+0.2 mm/ +0.5 mm
raw surfaces:
±2 mm



Material:
GJL 250

Version:
Reference surfaces precision machined.

Sample order:
nlm 01270-320125

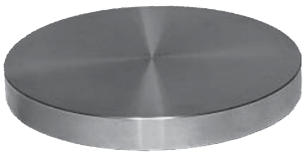
Note:
Ring bolts for lifting are supplied. A cover prevents the cavities filling up with swarf.

Order No.	A	C	D	D1	D2	E	E1	E2	H	H1	L	L1	L2	L3	L4
01270-320125	32,5	75	30	50	400	40	20	40	378	65	320	332	330	125	115
01270-400150	50	120	30	70	500	40	20	42	485	80	400	412	410	150	142
01270-500200	55	150	30	100	630	40	20	53	603	90	500	512	510	200	190
01270-630250	70	180	30	140	800	50	20	57	753	100	630	642	640	250	240

01280

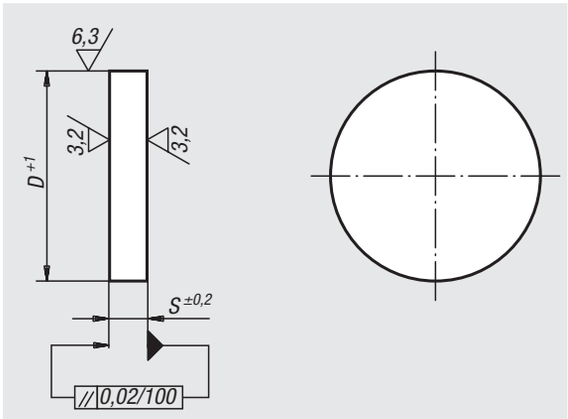
Circular plates

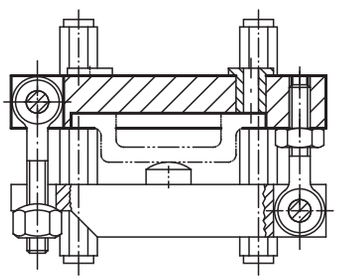
steel



Material:
Carbon steel 1.1181.

Sample order:
nlm 01280-06X25
(include dimension S)



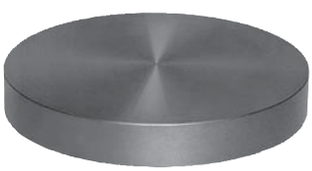


Order No.	S	D
01280-01X	16/20/25	140
01280-02X	16/20/25	180
01280-03X	16/20/25	220
01280-04X	16/20/25	280
01280-05X	20/25/32	355
01280-06X	25/32	400
01280-07X	25/32	450
01280-08X	36	500

01320

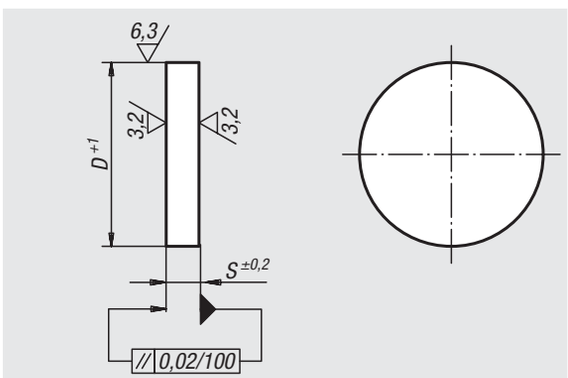
Circular plates

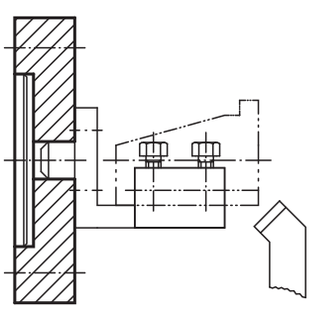
grey cast iron and aluminium



Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01320-208

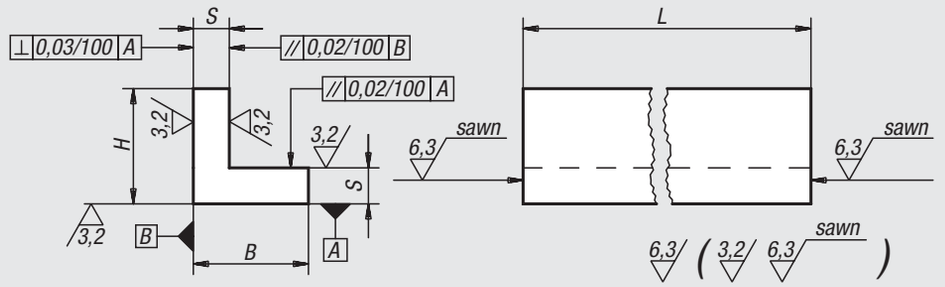




Order No. grey cast iron	Order No. Aluminium	D	S
01320-01	**01320-201**	63	14
01320-02	**01320-202**	80	20
01320-03	**01320-203**	100	20
01320-04	**01320-204**	125	25
01320-05	**01320-205**	160	32
01320-06	**01320-206**	200	32
01320-07	**01320-207**	250	36
01320-08	**01320-208**	315	40
01320-09	**01320-209**	400	45
01320-10	**01320-210**	500	50

L-profiles

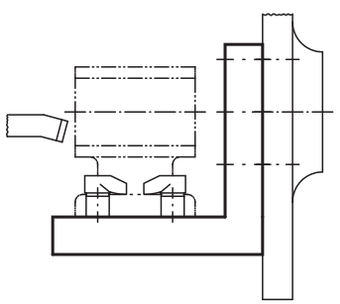
grey cast iron or aluminium



Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01380-04X300
(include length L)

machined surfaces:
±0.25 mm
tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50



Order No. grey cast iron	Order No. Aluminium	L = length	B	H	S
01380-01X	**01380-201X**	150/300	32	32	10
01380-02X	**01380-202X**	150/300	40	40	12
01380-03X	**01380-203X**	150/300	50	50	12
01380-04X	**01380-204X**	150/300	63	63	12
01380-05X	**01380-205X**	200/300/600/800	80	80	16
01380-06X	**01380-206X**	200/300/600/1000	100	100	20
01380-07X	**01380-207X**	200/300/600/1000	125	125	20
01380-08X	**01380-208X**	200/300/600	160	160	25
01380-09X	**01380-209X**	200/300/600	200	200	32
01380-10X	**01380-210X**	300/600	250	250	36
01380-11X	-	300/600	315	315	36

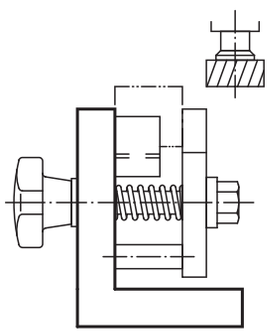
01440

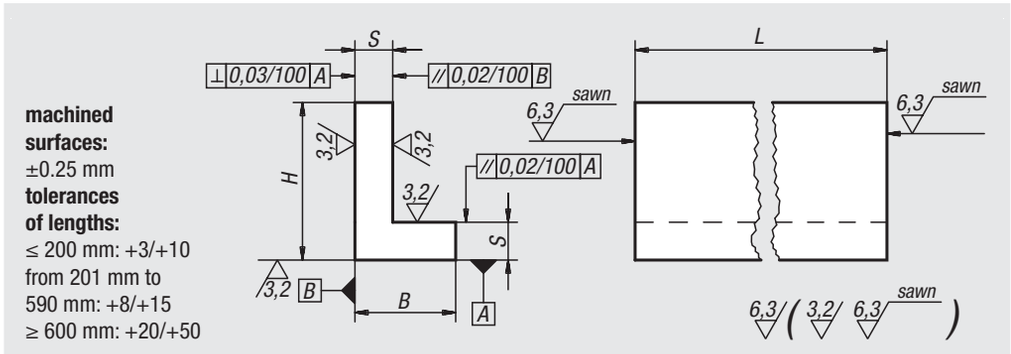
L-profiles unequal legs

grey cast iron or aluminium

Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01440-03X600
(include length L)





machined surfaces:
±0.25 mm
tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50

Order No. grey cast iron	Order No. Aluminium	L = length	B	H	S
01440-01X	**01440-201X**	150/300	32	50	12
01440-02X	**01440-202X**	150/300	40	63	12
01440-03X	**01440-203X**	200/300/600/800	63	80	16
01440-04X	**01440-204X**	200/300/600/1000	80	100	20
01440-05X	**01440-205X**	200/300/600/1000	100	125	20
01440-06X	**01440-206X**	200/300/600	125	160	25
01440-07X	**01440-207X**	200/300/600	160	200	32
01440-08X	**01440-208X**	300/600	200	250	36
01440-09X	**01440-209X**	300/600	250	315	36

01520

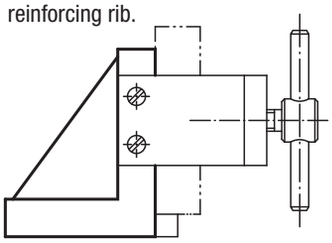
L profile with reinforcing ribs

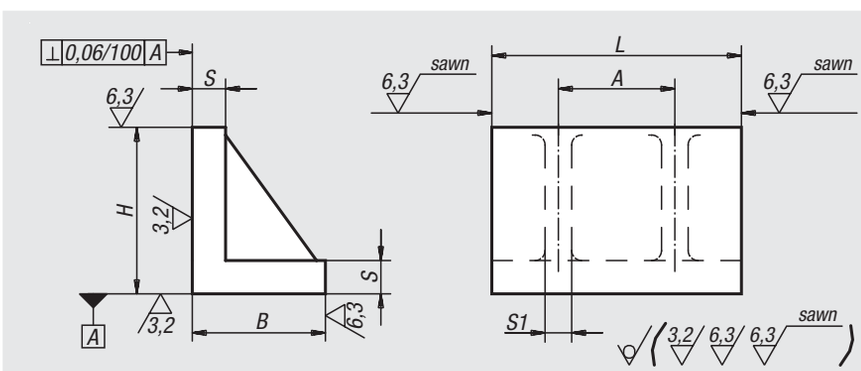
grey cast iron

Material:
GJL 250 annealed.

Sample order:
nlm 01520-04X400
(include length L)

Note:
Angle plates with lengths 150 mm and 200 mm have only one reinforcing rib.





machined surfaces:
±0.25 mm
raw surfaces:
±2 mm

tolerances of lengths:
≤ 200 mm: +2/+5
> 200 mm: +10/+20

Order No.	L = length	B	H	S	S1	A
01520-01X	150/300	80	100	20	16	160
01520-02X	150/300	100	125	22	18	160
01520-03X	150/300	125	160	25	20	160
01520-04X	200/400	160	200	32	22	200
01520-05X	200/400	200	250	36	25	200

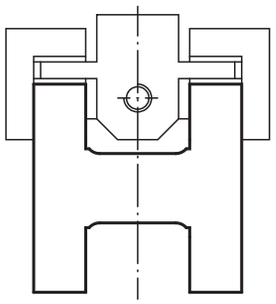
01560

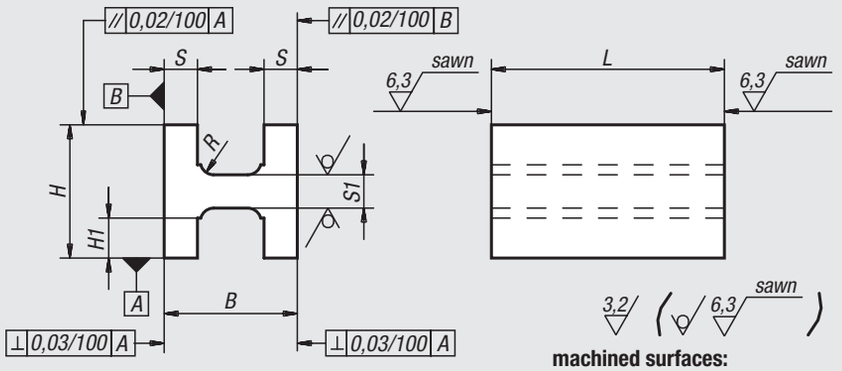
H-profiles

grey cast iron and aluminium

Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01560-04X300
(include length L)





machined surfaces:
±0.25 mm
raw surfaces:
±2 mm
tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50

Order No. grey cast iron	Order No. Aluminium	L = length	B	H	H1	S	S1	R
01560-03X	01560-203X	600	80	80	25	16	21	6
01560-04X	01560-204X	300/600	100	100	32	20	26	8
01560-05X	01560-205X	200/300/600	125	125	45	20	26	8

01580

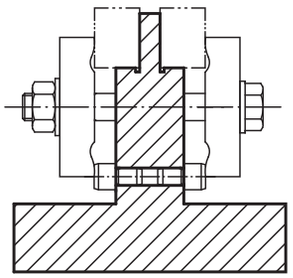
T-profiles machined all sides

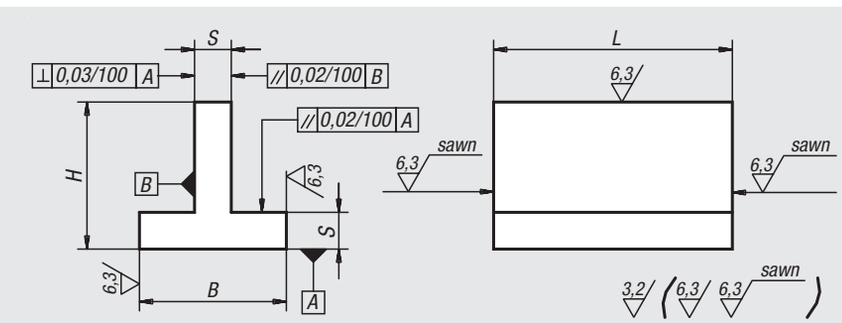
grey cast iron or aluminium

Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01580-05X300
(include length L)

On request:
Lengths 800 mm and 1000 mm in cast iron.





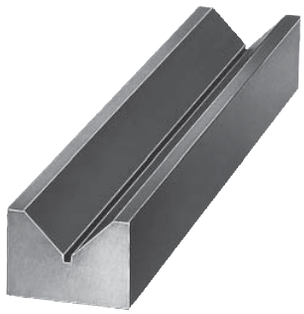
machined surfaces:
±0.25 mm
raw surfaces:
±2 mm
tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50

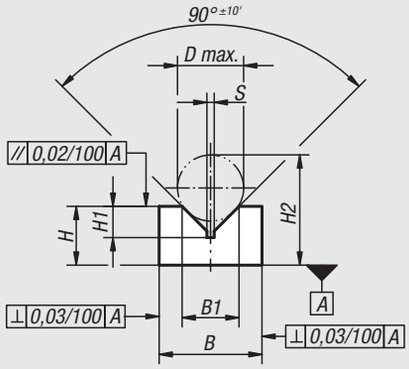
Order No. grey cast iron	Order No. Aluminium	L = length	B	H	S
01580-01X	01580-201X	300	40	40	10
01580-02X	01580-202X	150/300	63	63	12
01580-03X	01580-203X	300/600/800	80	80	16
01580-04X	01580-204X	300/600/1000	100	100	20
01580-05X	01580-205X	300/600/1000	125	125	20
01580-06X	01580-206X	300/600	160	160	25
01580-07X	01580-207X	300/600	200	200	32

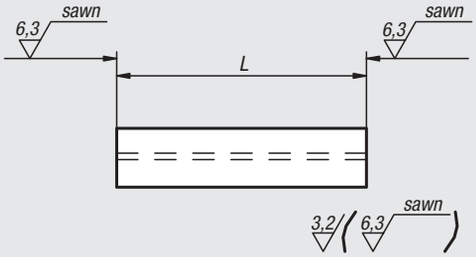
01640

V-block machined all sides

grey cast iron or aluminium





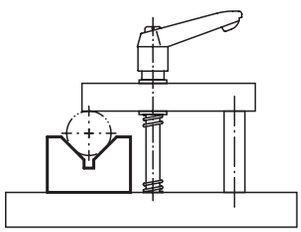


Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01640-05X200
(include length L)

machined surfaces:
±0.25 mm

tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50

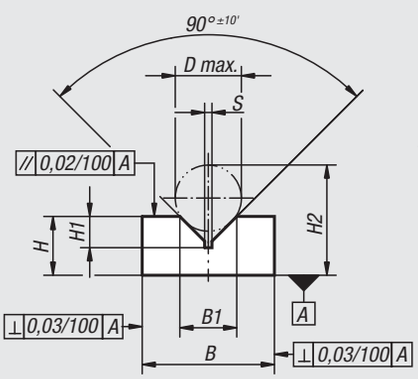


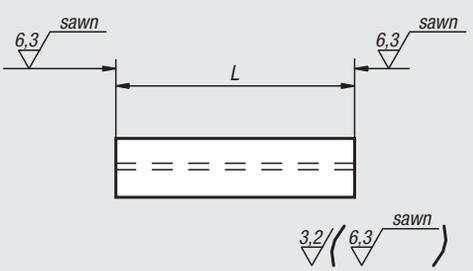
Order No. grey cast iron	Order No. Aluminium	L = length	B	B1	H	H1	H2	D max.	S
01640-01X	**01640-201X**	100/200	25	15,5	16	8,5	30	18	2
01640-02X	**01640-202X**	100/200	36	21,9	20	11	38	24	2
01640-03X	**01640-203X**	100/200	40	26	25	13,5	47	29	2,5
01640-04X	**01640-204X**	200/300/600	50	31,7	36	17	66	38	2,5
01640-05X	**01640-205X**	200/300/600	70	50	50	26	95	58	3
01640-06X	**01640-206X**	200/300/600	100	79,3	70	41	139	90	4

01660

V-block machined all sides

extra wide, grey cast iron



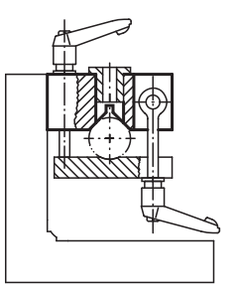


Material:
GJL 250 annealed.

Sample order:
nlm 01660-04X00
(include length L)

machined surfaces:
±0.25 mm

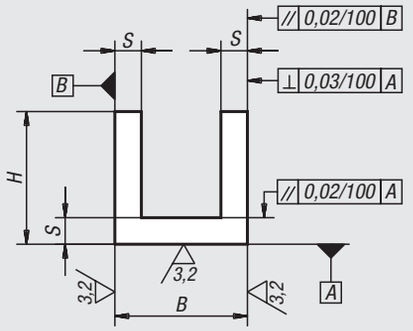
tolerances of lengths:
≤ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50

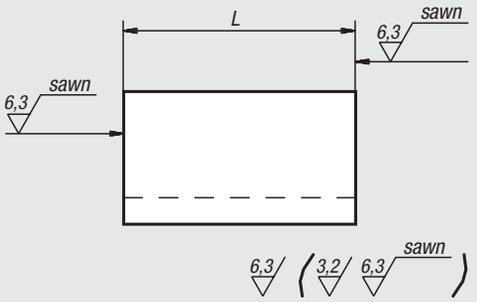


Order No.	L = length	B	B1	H	H1	H2	D max.	S
01660-01X	100/200	36	15,5	16	8,5	30	18	2
01660-02X	100/200	50	21,9	25	11	43	24	2
01660-03X	100/200	63	26	32	13,5	54	29	2,5
01660-04X	200/300/600	100	31,7	40	17	70	38	2,5
01660-05X	200/300/600	125	50	56	26	101	58	3
01660-06X	200/300/600	160	79,3	80	41	149	90	4

U-profiles machined all sides

grey cast iron or aluminium



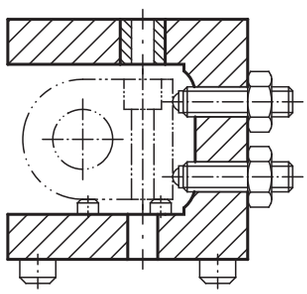


Material:
GJL 250 annealed or EN AW-7075.

Sample order:
nlm 01680-06X300
(include length L)

On request:
Lengths 800 mm and 1000 mm in cast iron.

machined surfaces:
±0.25 mm
tolerances of lengths:
≤200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥ 600 mm: +20/+50



Order No.	Version	L = length	B	H	S
01680-01X	grey cast iron	150/300	32	32	8
01680-02X	grey cast iron	150/300	40	40	10
01680-03X	grey cast iron	150/300/600	63	63	12
01680-04X	grey cast iron	200/300/600/800	80	80	16
01680-05X	grey cast iron	200/300/600/1000	100	100	20
01680-06X	grey cast iron	200/300/600/1000	125	125	20
01680-07X	grey cast iron	200/300/600	160	160	25
01680-08X	grey cast iron	200/300/600	200	200	32
01680-09X	grey cast iron	300/600	250	250	36
01680-10X	grey cast iron	300/600	250	200	36
01680-11X	grey cast iron	300/600	315	200	36
01680-201X	Aluminium	150/300	32	32	8
01680-202X	Aluminium	150/300	40	40	10
01680-203X	Aluminium	150/300/600	63	63	12
01680-204X	Aluminium	200/300/600/800	80	80	16
01680-205X	Aluminium	200/300/600/1000	100	100	20
01680-206X	Aluminium	200/300/600/1000	125	125	20
01680-207X	Aluminium	200/300/600	160	160	25
01680-208X	Aluminium	200/300/600	200	200	32
01680-209X	Aluminium	300/600	250	250	36
01680-210X	Aluminium	300/600	250	200	36
01680-211X	Aluminium	300/600	315	200	36

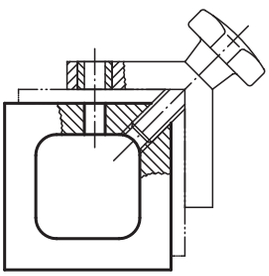
01740

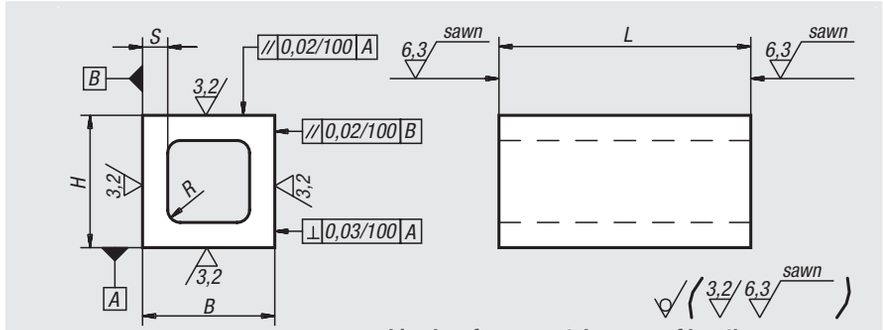
Square hollow profiles

grey cast iron

Material:
GJL 250 annealed.

Sample order:
nlm 01740-06X200 (include length L)





machined surfaces:
±0.25 mm
raw surfaces:
±2 mm

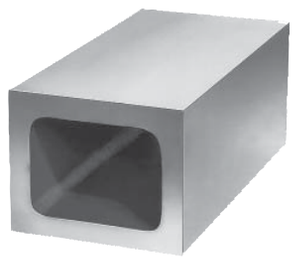
tolerances of lengths:
≥ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≤ 600 mm: +20/+50

Order No.	L = length	B	H	≈ S	R
01740-04X	100/200	63	63	12	6
01740-05X	200/400	80	80	18	8
01740-06X	200/400	100	100	20	10
01740-07X	200/400/600	125	125	22	12
01740-08X	200/300/600	160	160	25	16
01740-09X	200/300/600	200	200	28	20
01740-12X	600	250	250	36	20
01740-15X	600	315	315	56	20

01760

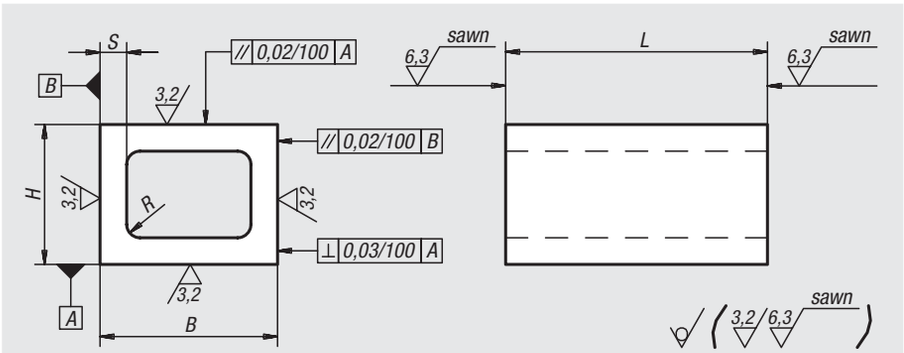
Rectangular hollow profiles

grey cast iron



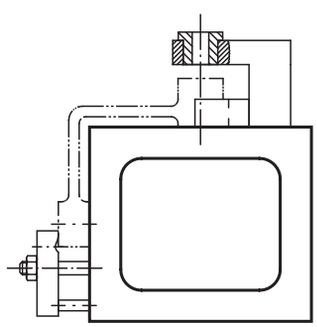
Material:
GJL 250 annealed.

Sample order:
nlm 01760-04X300 (include length L)



machined surfaces:
±0.25 mm
raw surfaces:
±2 mm

tolerances of lengths:
≥ 200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≤ 600 mm: +20/+50

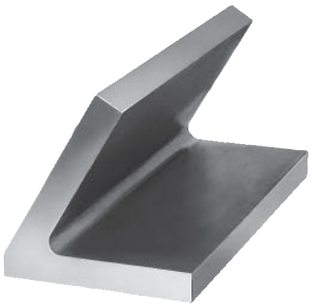


Order No.	L = length	B	H	≈ S	R
01760-01X	100/200	80	63	12	6
01760-02X	200/400	100	80	16	8
01760-03X	200/300/600	160	100	22	10
01760-04X	200/300/600	200	160	25	16
01760-05X	300/600	250	200	28	20

01780

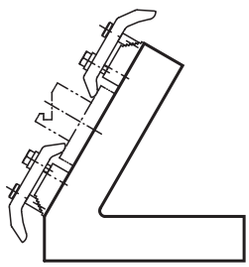
Angle profiles 60°

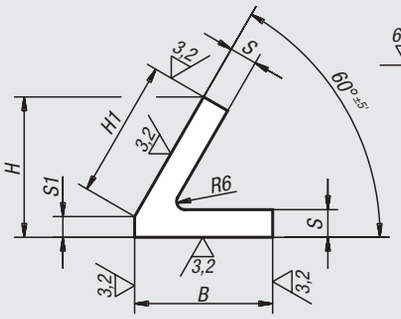
grey cast iron

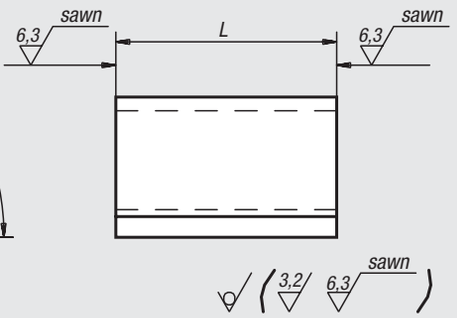


Material:
GJL 250 annealed.

Sample order:
nlm 01780-02X300 (include length L)







machined surfaces:
±0.25 mm
raw surfaces:
±2 mm
length tolerances:
≤200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥600 mm: +20/+50

Order No.	L = length	B	H	H1	S	S1
01780-02X	300/600	100	101,5	100	20	15
01780-05X	300/600	200	197,5	200	32	24

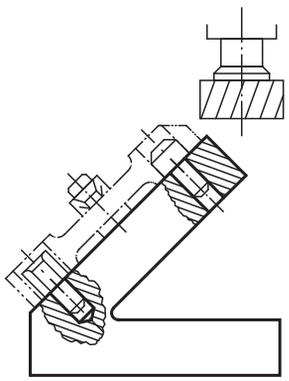
01820

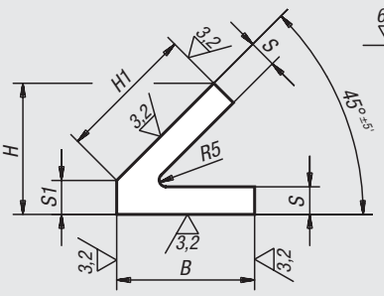
Angle profiles 45°

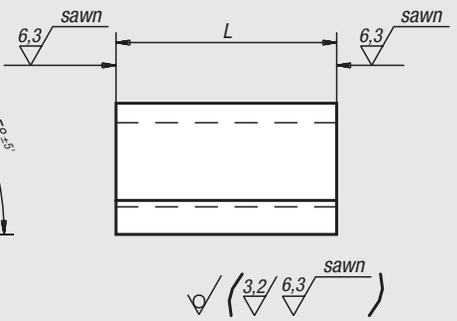
grey cast iron

Material:
GJL 250 annealed.

Sample order:
nlm 01820-05X300 (include length L)



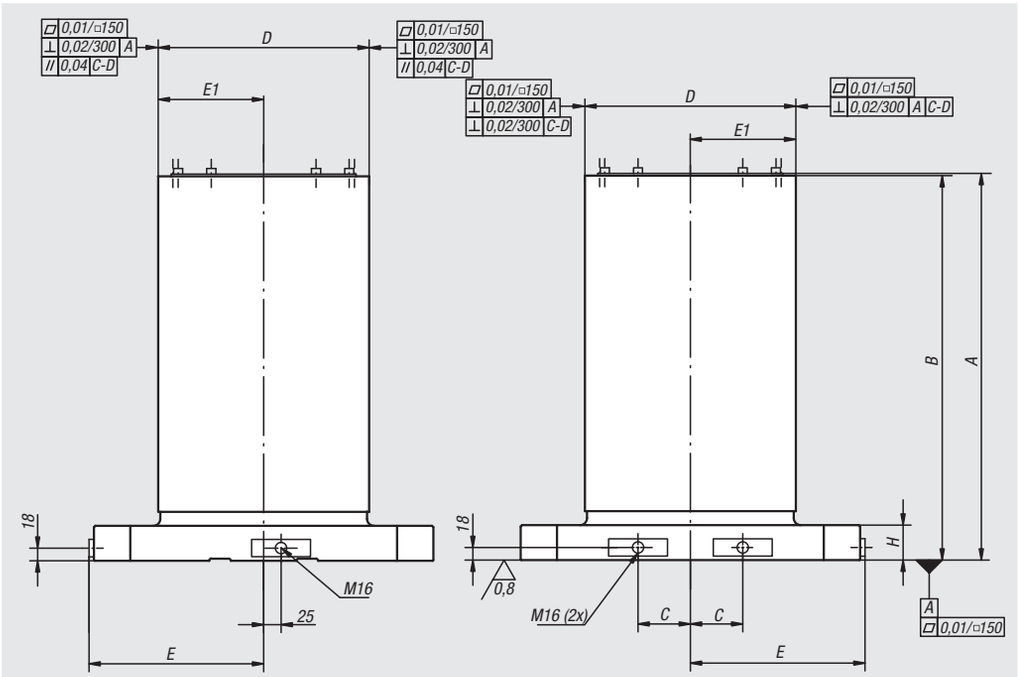




machined surfaces:
±0.25 mm
raw surfaces:
±2 mm
length tolerances:
≤200 mm: +3/+10
from 201 mm to 590 mm: +8/+15
≥600 mm: +20/+50

Order No.	L = length	B	H	H1	S	S1
01820-02X	300/600	100	95	100	20	24
01820-05X	300/600	200	181	200	32	40

Tombstones cube



Material:
GJL 300

Version:
Reference surfaces precision machined. The clamping surfaces have 0.5 mm allowance.

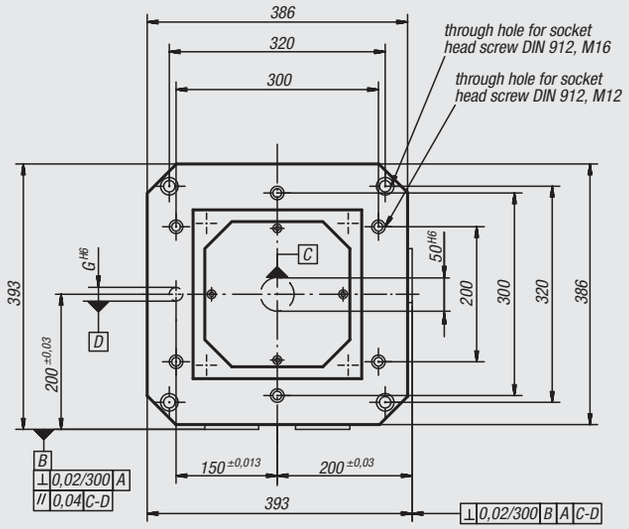
Sample order:
nlm 01850-008050

Note:
The cube tombstones are matched to subplates for machine tools acc. to DIN 55201 and JIS 6337-1980.
Ring bolts for lifting are supplied. A cover prevents the cavities filling with swarf.

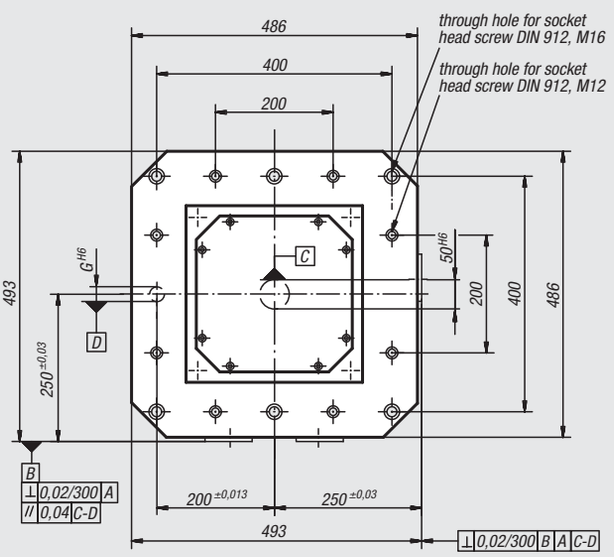
Order No.	A	B	C	D	E	E1	G	H
01850-005030	553	550	75	301 ±0,2	250	150,5 ±0,2	20	50
01850-006335	703	700	100	351 ±0,2	315	175,5 ±0,2	25	55
01850-008050	803	800	135	501 ±0,2	400	250,5 ±0,2	25	60
01850-0040251	553	550	55	251 ±0,2	200	125,5 ±0,2	20	50
01850-0050301	653	650	75	301 ±0,2	250	150,5 ±0,2	20	50
01850-0063351	803	800	100	351 ±0,2	315	175,5 ±0,2	25	55

Tombstones cube

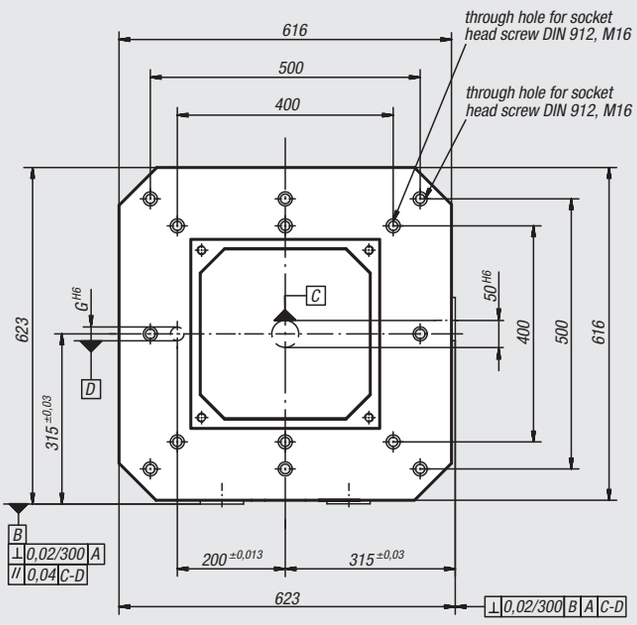
01850-0040251



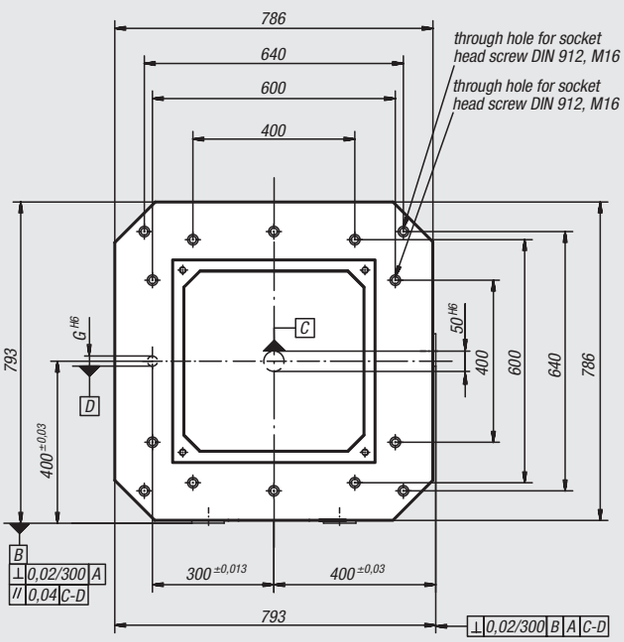
01850-005030
01850-0050301



01850-006335
01850-0063351

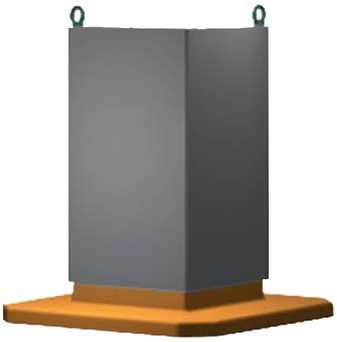


01850-008050



Tombstones cube

grey cast iron



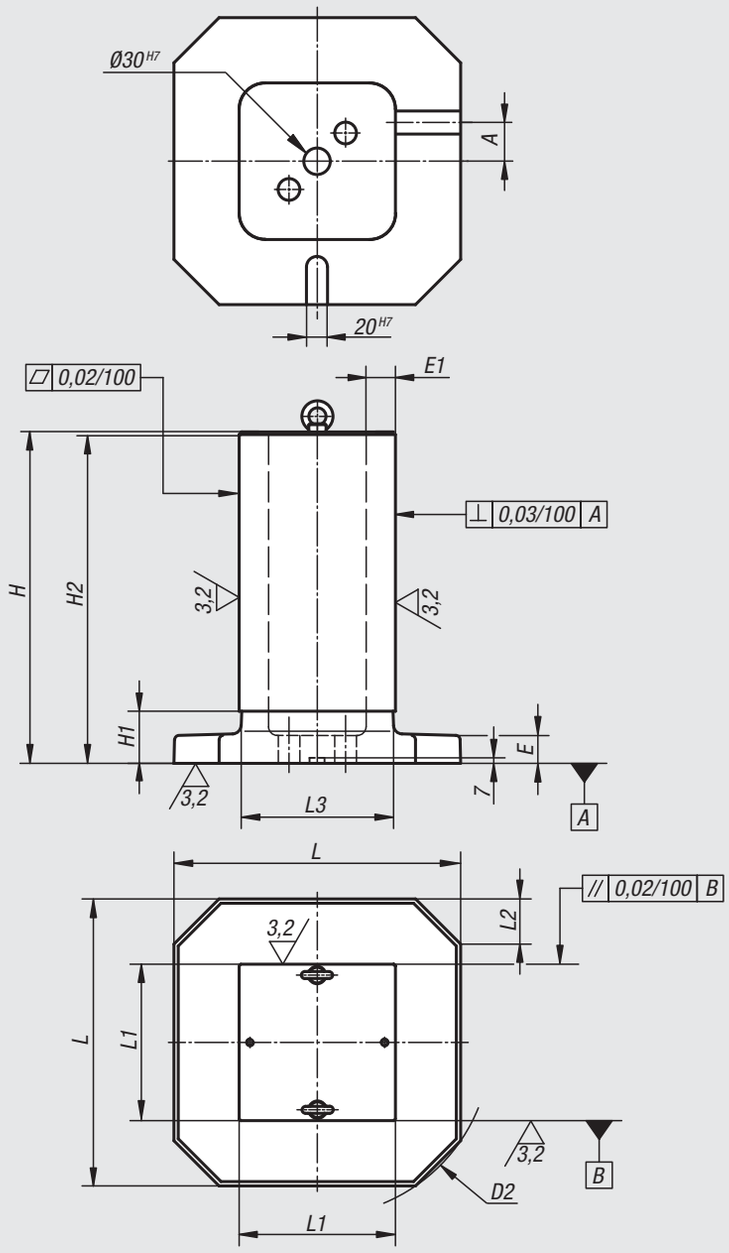
Material:
GJL 250

Version:
Reference surfaces precision machined

Sample order:
nlm 01852-320180

Note:
Ring bolts for lifting are supplied.
A cover prevents the cavities filling with swarf.

machined surfaces:
+0.2 mm/ +0.5 mm
raw surfaces:
±2 mm



Order No.	A	D2	E	E1	H	H1	H2	L	L1	L2	L3
01852-320180	32,5	400	32	25	381	80	378	330	180	52	174
01852-400270	50	500	32	32	485	60	482	410	270	62	262
01852-500320	55	630	40	40	603	100	600	510	320	70	312
01852-630360	70	800	40	45	753	100	750	640	360	80	350
01852-800500	80	1000	50	50	903	110	900	810	500	110	490

02000

Self-aligning pads
Fixture feet
Clamp rests
Support elements

Self-aligning pads

Material:
Body carbon steel.
Ball ball bearing steel 1.2067.
Form M has a carbide ball.

Version:
Body tempered and phosphated.
Ball hardened.
Form M ball nickel plated.

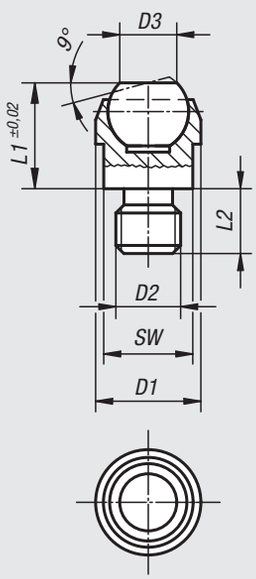
Sample order:
nlm 02000-120

Note:
Self-aligning pads serve as stops, supports and thrust pads in fixture constructions.

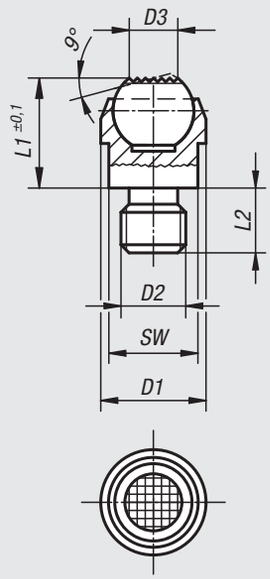
Ball secured against rotation.

* Valid only if the minimum bore depth is observed.

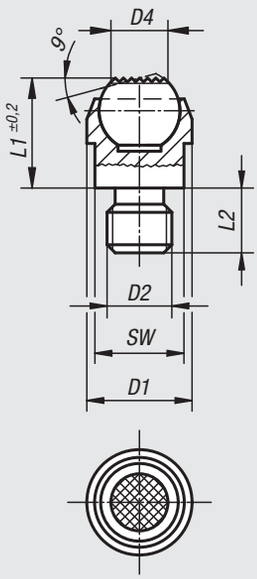
Form C
external thread,
flattened ball,
flat face



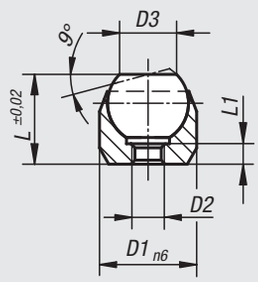
Form F
external thread,
flattened ball,
diamond grip



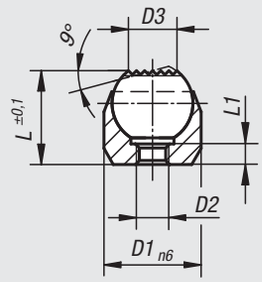
Form M
external thread,
flattened ball,
diamond grip

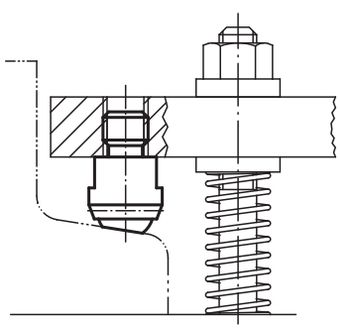


Form G
press fit,
flattened ball, flat face



Form J
press fit,
flattened ball, diamond grip





Self-aligning pads

Order No.	Form	D1	D2	D3	L1	L2	Ball-Ø	SW	Load rating max. kN (static load only)
02000-108	C	13	M8	7,2	13	8	10	11	10
02000-110	C	20	M10	10,5	18	10	16	17	25
02000-112	C	20	M12	10,5	18	12	16	17	25
02000-116	C	30	M16	20	27	16	25	27	90
02000-120	C	50	M20	34,5	35	20	40	41	165

Order No.	Form	D1	D2	D3	L1	L2	Ball-Ø	SW	Load rating max. kN (static load only)
02000-308	F	13	M8	7,2	13	8	10	11	10
02000-310	F	20	M10	10,5	18	10	16	17	25
02000-312	F	20	M12	10,5	18	12	16	17	25
02000-316	F	30	M16	20	27	16	25	27	90
02000-320	F	50	M20	34,5	35	20	40	41	165

Order No.	Form	D1	D2	D4	L1	L2	SW	Ball-Ø	Load rating max. kN (static load only)
02000-908	M	13	M8	7,7	13,3	8	11	10	10
02000-910	M	20	M10	12	18	10	17	16	25
02000-912	M	20	M12	12	18	12	17	16	25

Order No.	Form	D1	D2	D3	L	L1	Ball-Ø	Receiving hole	Load rating max. kN (static load only)
02000-403	G	12	M3	7,2	11	3,5	10	ø 12 H7 x 6 min.	10*
02000-404	G	18	M4	10,5	17	4,4	16	ø 18 H7 x 8 min.	25*
02000-405	G	28	M5	20	25	6,3	25	ø 28 H7 x 13 min.	90*

Order No.	Form	D1	D2	D3	L	L1	Ball-Ø	Receiving hole	Load rating max. kN (static load only)
02000-603	J	12	M3	7,2	11	3,5	10	ø 12 H7 x 6 min.	10*
02000-604	J	18	M4	10,5	17	4,4	16	ø 18 H7 x 8 min.	25*
02000-605	J	28	M5	20	25	6,3	25	ø 28 H7 x 13 min.	90*

Notes

Self-aligning pads

swivel angle 14° and 20°

Material:
Body steel.
Ball rust and acid resistant steel.
Form M with carbide insert.

Version:
Body black oxidised.
Ball bright.

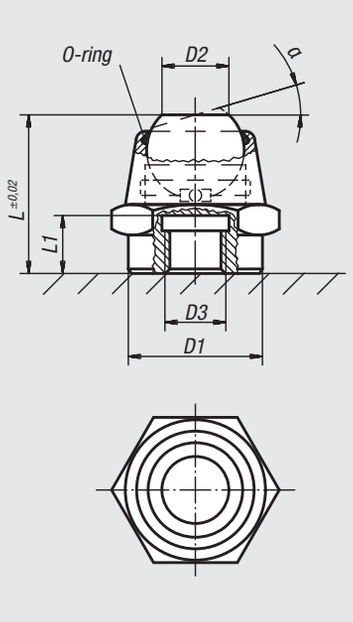
Sample order:
nlm 02001-108

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces. They also serve as stops, supports and thrust pads in fixture and toolmaking.
Grub screws or threaded studs can be screwed and glued into thread D3 making a self-aligning pad with external thread.

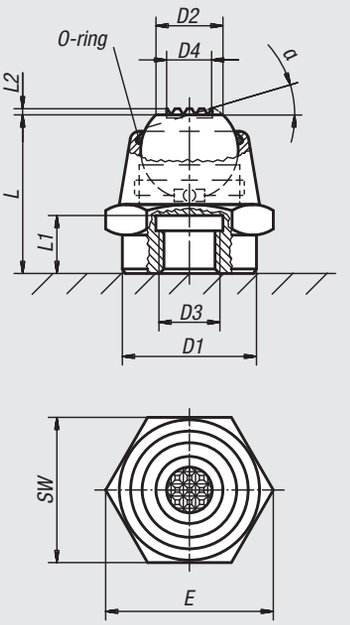
Ball secured against rotation.

Advantages:
- Self-aligning pads can be swiveled.
- High load forces can be absorbed.
- The built-in o-ring keeps dirt and foreign particles out, which in turn guarantees reliable operation.

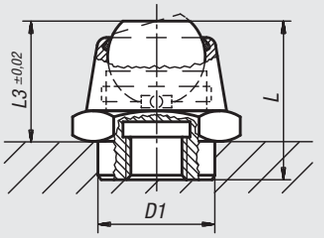
Form C
flattened ball,
flat face



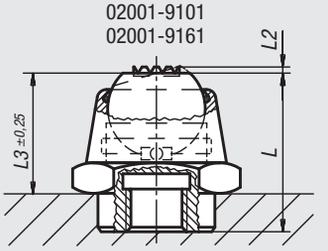
Form M
flattened ball,
carbide steel diamond grip



Type:
02001-1061
02001-1101
02001-1161



Type:
02001-9061
02001-9101
02001-9161



Order No. Form C	Order No. Form M	α	D1	D2	D3	D4	L	L1	L2	L3	E	SW	Ball-Ø	Load rating max. kN (static load only)
02001-1061	**02001-9061**	14°	12	7	M6	-/5	17,5	6	-/0,4	12,5	19,6	17	10	14
02001-106	**02001-906**	14°	16	7	M6	-/5	17,5	6	-/0,4	-	19,6	17	10	14
02001-108	**02001-908**	20°	22	11	M8	-/7,5	26	9	-/0,8	-	27,7	24	16	34
02001-1101	**02001-9101**	20°	18	11	M10	-/7,5	26	9	-/0,8	20	27,7	24	16	34
02001-110	**02001-910**	20°	22	11	M10	-/7,5	26	9	-/0,8	-	27,7	24	16	34
02001-112	**02001-912**	20°	22	11	M12	-/7,5	26	9	-/0,8	-	27,7	24	16	34
02001-1161	**02001-9161**	20°	26	18	M16	-/13	40	15	-/0,6	30	41,6	36	25	90
02001-116	**02001-916**	20°	34	18	M16	-/13	40	15	-/0,6	-	41,6	36	25	90
02001-120	**02001-920**	20°	34	18	M20	-/13	40	15	-/0,6	-	41,6	36	25	90

Self-aligning pads

with o-ring

Material:
Body carbon steel.
Ball:
Form C, F tool steel.
Form K POM.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane face.

Version:
Body tempered, black oxidised.
Ball:
Form C, F hardened, black oxidised.
Form K POM ball, white.
Form O surface comparable to 100 grade abrasive grit.
Form P polyurethane, Shore hardness 60°.

Sample order:
nlm 02002-704X012

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.

Ball secured against rotation.

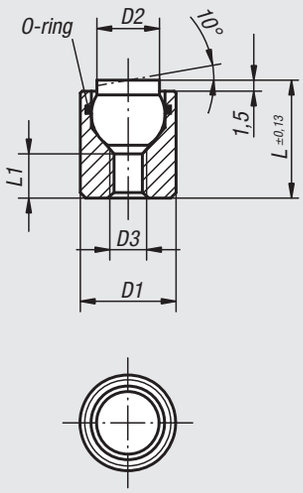
Form O: The abrasive diamond surface is fused firmly to the ball. It is ideally suited to supporting smooth or slippery applications with a minimum of clamping pressure. This allows the diamond particles to get a firm grip on a very small area with minimum damage to the surface. The diamond surface offers excellent wear resistance.

Form P: The polyurethane surface is permanently vulcanised on the ball. It is abrasion-resistant and does not discolour. Offers optimum protection against damage to delicate surfaces. The pearl-like surface gives a firm grip and allows air to escape so as to prevent any suction effect between the contact surface and the self-aligning pads.

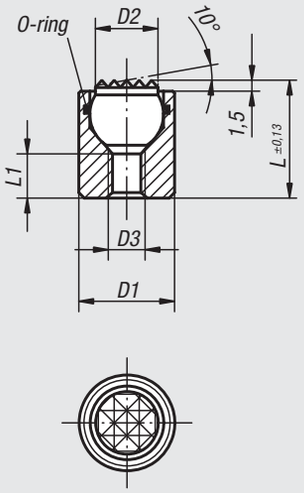
Advantages:
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out ensuring smooth and even movement.

Form C
flattened steel ball, flat face

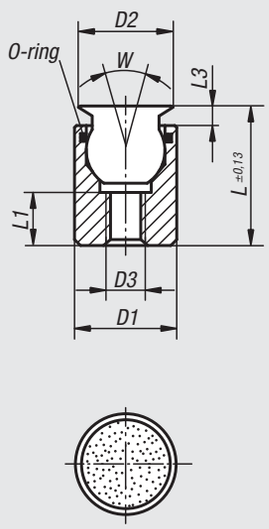
Form K
flattened POM ball, flat face



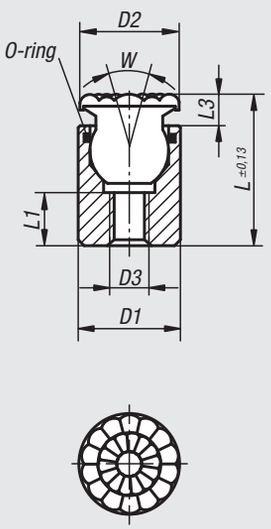
Form F
flattened steel ball,
diamond grip



Form O
stainless steel ball,
diamond impregnated



Form P
stainless steel ball
PUR surface



Self-aligning pads

with o-ring

Order No.	Form	D1	D2	D3	L	L1	Ball-Ø	Load rating max. kN (static load only)
02002-104X012	C	10	6	M4	12	4,5	7	12
02002-104X025	C	10	6	M4	25	12	7	12
02002-105X016	C	13	8,5	M5	16	5	10	20
02002-105X025	C	13	8,5	M5	25	12	10	20

Order No.	Form	D1	D2	D3	L	L1	Ball-Ø	Load rating max. kN (static load only)
02002-304X012	F	10	6	M4	12	4,5	7	12
02002-304X025	F	10	6	M4	25	12	7	12
02002-305X016	F	13	8,5	M5	16	5	10	20
02002-305X025	F	13	8,5	M5	25	12	10	20

Order No.	Form	D1	D2	D3	L	L1	Ball-Ø	Load rating max. kN (static load only)
02002-704X012	K	10	6	M4	12	4,5	7	2
02002-704X025	K	10	6	M4	25	12	7	2
02002-705X016	K	13	8,5	M5	16	5	10	4
02002-705X025	K	13	8,5	M5	25	12	10	4

Order No.	Form	D1	D2	D3	L	L1	L3	W	Ball-Ø	Load rating max. kN (static load only)
02002-504X012	O	10	8	M4	12,5	3,5	2	28	7	11,5
02002-504X025	O	10	8	M4	25,5	9	2	28	7	11,5
02002-505X017	O	13	11	M5	17,5	6,5	3	28	10	19,8
02002-505X026	O	13	11	M5	26,5	9	3	28	10	19,8
02002-506X021	O	17	14	M6	21	7,5	3	28	13	27,4
02002-508X024	O	19	19	M8	24	8,5	4	24	15	38,6
02002-510X028	O	24	21	M10	28	9	4	24	20	58,3

Order No.	Form	D1	D2	D3	L	L1	L3	W	Ball-Ø
02002-604X014	P	10	10	M4	14,5	3,5	4	28	7
02002-604X027	P	10	10	M4	27,5	9	4	28	7
02002-605X019	P	13	13	M5	19,5	6,5	5	28	10
02002-605X028	P	13	13	M5	28,5	9	5	28	10
02002-606X023	P	17	16	M6	23	7,5	5	28	13
02002-608X026	P	19	21	M8	26	8,5	6	24	15
02002-610X030	P	24	23	M10	30	9	6	24	20

Self-aligning pads

with O-ring and exchangeable inserts

Material:
Body carbon steel.
Ball rust and acid resistant steel.
Inserts:
Form C, F, M tool steel
Form K POM
Form E stainless steel.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane surface.

Version:
Body tempered, black oxidised.
Ball hardened, bright.
Inserts:
Form C, F hardened, black oxidised.
Form M with carbide serrations, black oxidised.
Form K white.
Form E hardened, bright.
Form O diamond impregnated surface comparable to 100 grade abrasive grit.
Form P polyurethane surface, hardness 60° Shore.

Sample order:
nlm 02003-736X036

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
In addition, they serve as stops, supports and thrust pads in fixtures and toolmaking.
The ball can be removed from the housing by applying light pressure to the socket head screw.

Ball secured against rotation.

Advantages:
Highly cost-effective as inserts can be exchanged.
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out, ensuring uniform movement.

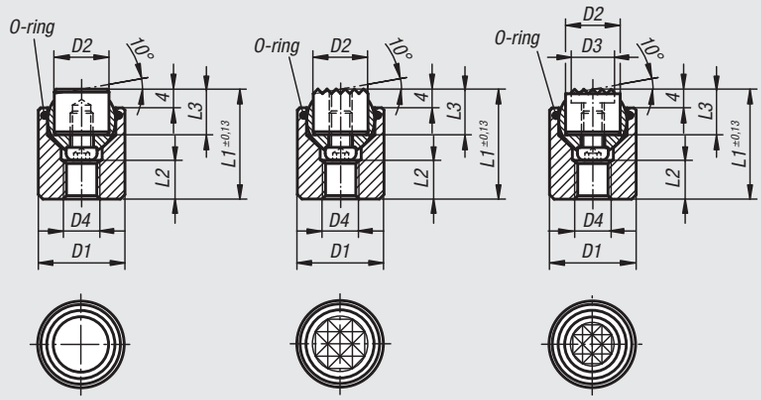
Form C
steel insert, flat face

Form E
stainless steel insert,
flat face

Form F
diamond grip insert

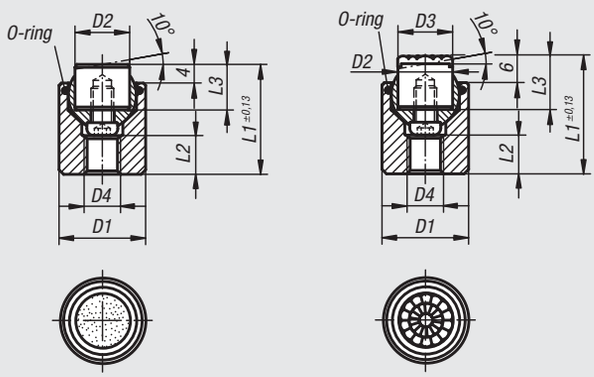
Form M
carbide steel
diamond grip insert

Form K
POM insert, flat face



Form O
stainless steel insert
diamond impregnated

Form P
stainless steel insert
PUR surface



Order No.	Form	D1	D2	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Order No. steel insert
02003-117X022	C	17	10	M6	22	7	10	13	28	07113-10108
02003-119X024	C	19	12	M8	24	8	10	15	39	07113-12108
02003-124X028	C	24	16	M10	28	8	10	20	58	07113-16108
02003-130X030	C	30	20	M12	30	9	10	23	95	07113-20108
02003-136X036	C	36	25	M12	36	11	10	28	136	07113-25108

Self-aligning pads

with O-ring and exchangeable inserts

Order No.	Form	D1	D2	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert
02003-217X022	E	17	10	M6	22	7	10	13	28	0,031	07113-10102
02003-219X024	E	19	12	M8	24	8	10	15	39	0,043	07113-12102
02003-224X028	E	24	16	M10	28	8	10	20	58	0,081	07113-16102
02003-230X030	E	30	20	M12	30	9	10	23	95	0,139	07113-20102
02003-236X036	E	36	25	M12	36	11	10	28	136	0,251	07113-25102

Order No.	Form	D1	D2	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Order No. gripper
02003-317X022	F	17	10	M6	22	7	10	13	28	07113-1010
02003-319X024	F	19	12	M8	24	8	10	15	39	07113-1210
02003-324X028	F	24	16	M10	28	8	10	20	58	07113-1610
02003-330X030	F	30	20	M12	30	9	10	23	95	07113-2010
02003-336X036	F	36	25	M12	36	11	10	28	136	07113-2510

Order No.	Form	D1	D2	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Order No. POM insert
02003-717X022	K	17	10	M6	22	7	10	13	4	07113-10109
02003-719X024	K	19	12	M8	24	8	10	15	7	07113-12109
02003-724X028	K	24	16	M10	28	8	10	20	14	07113-16109
02003-730X030	K	30	20	M12	30	9	10	23	27	07113-20109
02003-736X036	K	36	25	M12	36	11	10	28	47	07113-25109

Order No.	Form	D1	D2	D3	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Order No. gripper
02003-917X022	M	17	10	7,9	M6	22	7	10	13	28	07113-10107
02003-919X024	M	19	12	9,5	M8	24	8	10	15	39	07113-12107
02003-924X028	M	24	16	12,7	M10	28	8	10	20	58	07113-16107
02003-930X030	M	30	20	15,9	M12	30	9	10	23	95	07113-20107
02003-936X036	M	36	25	19	M12	36	11	10	28	136	07113-25107

Order No.	Form	D1	D2	D4	L1	L2	L3	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert, diamond surface
02003-517X022	O	17	10	M6	22	7	10	13	28	0,031	07113-10105
02003-519X024	O	19	12	M8	24	8	10	15	39	0,043	07113-12105
02003-524X028	O	24	16	M10	28	8	10	20	58	0,081	07113-16105
02003-530X030	O	30	20	M12	30	9	10	23	95	0,139	07113-20105
02003-536X036	O	36	25	M12	36	11	10	28	136	0,251	07113-25105

Order No.	Form	D1	D2	D3	D4	L1	L2	L3	Ball-Ø	Approx. weight kg	Order No. stainless steel insert, polyurethane surface
02003-617X024	P	17	10	10	M6	24	7	12	13	0,031	07113-10126
02003-619X026	P	19	12	13	M8	26	8	12	15	0,043	07113-12126
02003-624X030	P	24	16	16	M10	30	8	12	20	0,081	07113-16126
02003-630X032	P	30	20	21	M12	32	9	12	23	0,139	07113-20126
02003-636X038	P	36	25	27	M12	38	11	12	28	0,251	07113-25126

Self-aligning pads

self-righting

Material:
Carbon steel.

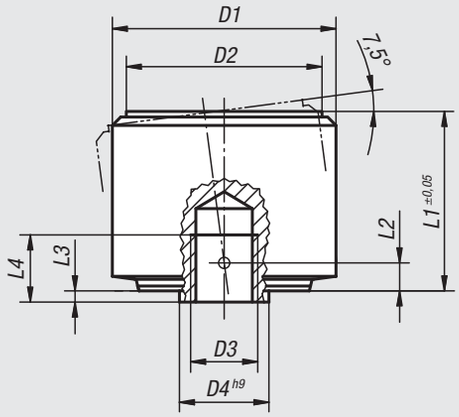
Version:
Hardened, black oxidised.

Sample order:
nlm 02004-105

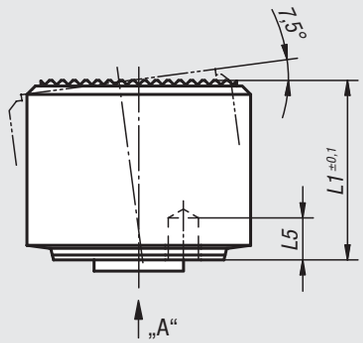
Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.

Advantages:
– The built-in o-ring prevents dirt and foreign particles from entering.
– The clamping surface swivels back automatically after clamping.
– High load rating and small size.

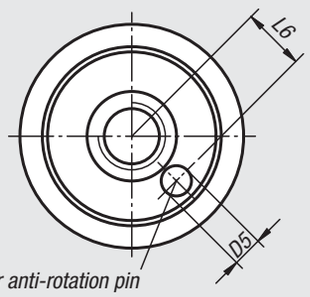
Form C
flat face



Form F
diamond grip face

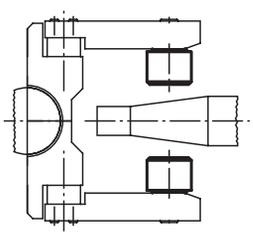


view "A"



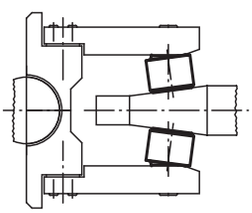
hole for anti-rotation pin

1. bring gripper into position



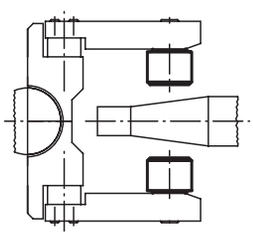
zero-point position of self-aligning pads

2. grip workpiece



self-aligning pads adapt to workpiece contour

3. open gripper



self-aligning pads swivel back automatically

Order No.	Form	D1	D2	D3	D4	D5	L1	L2	L3	L4	L5	L6	Load rating max. kN (static load only)
02004-105	C	18	15	M5	7	1,8	14	2,1	0,8	5	3	4,6	30
02004-106	C	22	18	M6	8	2,8	16,5	2,5	1	6	4	5,6	50
02004-108	C	28	23	M8	11	3,3	21,5	3,4	1,3	8	5	7,5	90
02004-110	C	34	29	M10	13	4,4	27	4,2	1,6	10	6	9,2	140
02004-112	C	40	35	M12	16	5,4	32	5	2	12	8	11,3	220

Order No.	Form	D1	D2	D3	D4	D5	L1	L2	L3	L4	L5	L6	Load rating max. kN (static load only)
02004-305	F	18	15	M5	7	1,8	14	2,1	0,8	5	3	4,6	30
02004-306	F	22	18	M6	8	2,8	16,5	2,5	1	6	4	5,6	50
02004-308	F	28	23	M8	11	3,3	21,5	3,4	1,3	8	5	7,5	90
02004-310	F	34	29	M10	13	4,4	27	4,2	1,6	10	6	9,2	140
02004-312	F	40	35	M12	16	5,4	32	5	2	12	8	11,3	220

Self-aligning pads

adjustable

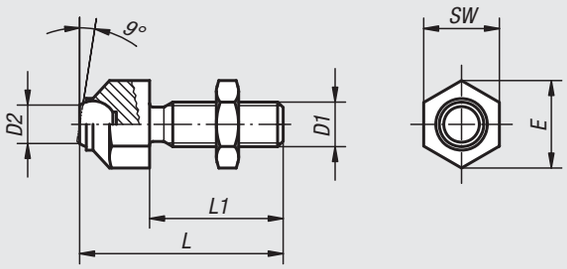
Material:
Steel.

Version:
Housing tempered and manganese phosphated.
Ball hardened, bright.
Nut black oxidised.

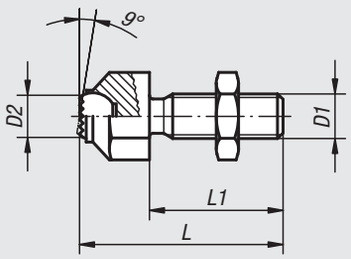
Sample order:
nlm 02005-316

Note:
Ball secured against rotation.

Form C
flattened ball, flat face



Form F
flattened ball, diamond grip



Order No.	Form	D1	D2	L	L1	E	SW	Ball-Ø	Load rating max. kN (static load only)
02005-108	C	M8	5,8	36,6	25	14,5	13	8,5	8
02005-110	C	M10	8,6	45,7	30	19	17	12	8
02005-112	C	M12	8,6	50,7	35	19	17	12	15
02005-116	C	M16	10,5	60,7	40	27	24	16	25
02005-120	C	M20	20	77,3	50	33	30	25	90

Order No.	Form	D1	D2	L	L1	E	SW	Ball-Ø	Load rating max. kN (static load only)
02005-308	F	M8	5,8	36,6	25	14,5	13	8,5	8
02005-310	F	M10	8,6	45,7	30	19	17	12	8
02005-312	F	M12	8,6	50,7	35	19	17	12	15
02005-316	F	M16	10,5	60,7	40	27	24	16	25
02005-320	F	M20	20	77,3	50	33	30	25	90

Self-aligning pads

adjustable with O-ring

Material:
Body carbon steel.
Ball:
Form C, F, tool steel.
Form K POM.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane surface.

Version:
Body tempered, black oxidised.
Ball:
Form C, F hardened, black oxidised.
Form K POM ball white.
Form O surface comparable to 100 grade abrasive grit.
Form P polyurethane Shore hardness 60°.

Sample order:
nlm 02006-106X040

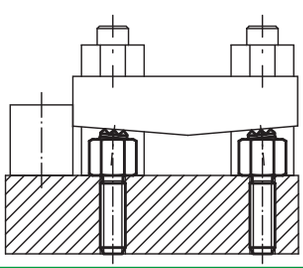
Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.

Ball secured against rotation.

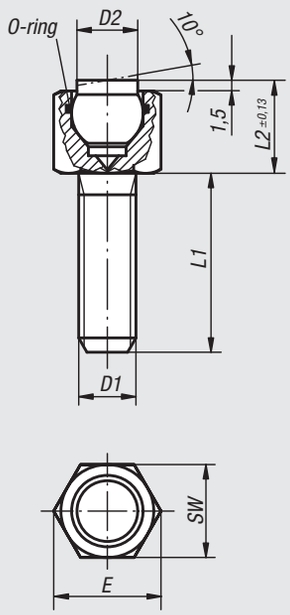
Form O: The abrasive diamond surface is bonded firmly to the ball. It is ideally suited to supporting smooth or slippery applications with a minimum of clamping pressure. This allows the diamond particles to get a firm grip on a very small area with minimum damage to the surface.
The diamond surface offers excellent wear resistance.

Form P: The polyurethane surface is vulcanised firmly to the ball. It is abrasion-resistant and does not discolour.
It offers optimum protection against damage to delicate surfaces. The pearl-like surface gives a firm grip and allows air to escape so as to prevent any suction effect between the contact surface and the self-aligning pads.

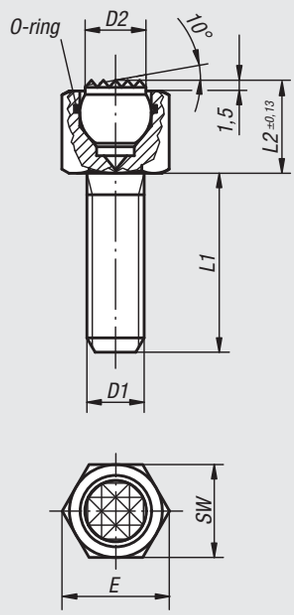
Advantages:
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out, ensuring uniform movement.



Form C
steel ball, flat face

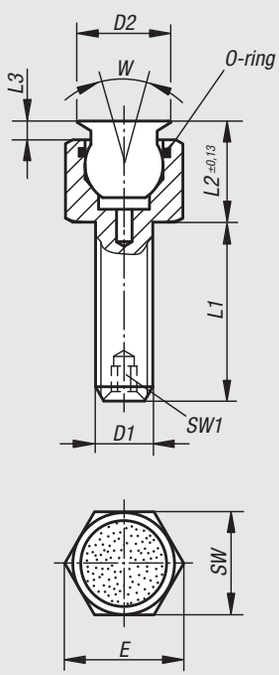


Form F
steel ball, diamond grip

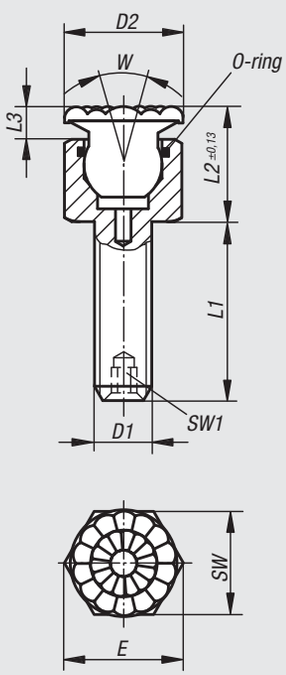


Form K
POM ball, flat face

Form O
stainless steel ball
diamond impregnated



Form P
stainless steel ball
PUR surface



Self-aligning pads

adjustable with O-ring

Order No.	Form	D1	D2	L1	L2	E	SW	Ball-Ø	Load rating max. kN (static load only)
02006-106X012	C	M6	6	12	9,5	11,5	10	7	9
02006-106X025	C	M6	6	25	9,5	11,5	10	7	9
02006-106X040	C	M6	6	40	9,5	11,5	10	7	9
02006-108X012	C	M8	8,5	12	13	15	13	10	15
02006-108X025	C	M8	8,5	25	13	15	13	10	15
02006-108X040	C	M8	8,5	40	13	15	13	10	15

Order No.	Form	D1	D2	L1	L2	E	SW	Ball-Ø	Load rating max. kN (static load only)
02006-306X012	F	M6	6	12	9,5	11,5	10	7	9
02006-306X025	F	M6	6	25	9,5	11,5	10	7	9
02006-306X040	F	M6	6	40	9,5	11,5	10	7	9
02006-308X012	F	M8	8,5	12	13	15	13	10	15
02006-308X025	F	M8	8,5	25	13	15	13	10	15
02006-308X040	F	M8	8,5	40	13	15	13	10	15

Order No.	Form	D1	D2	L1	L2	E	SW	Ball-Ø	Load rating max. kN (static load only)
02006-706X012	K	M6	6	12	9,5	11,5	10	7	2
02006-706X025	K	M6	6	25	9,5	11,5	10	7	2
02006-706X040	K	M6	6	40	9,5	11,5	10	7	2
02006-708X012	K	M8	8,5	12	13	15	13	10	4
02006-708X025	K	M8	8,5	25	13	15	13	10	4
02006-708X040	K	M8	8,5	40	13	15	13	10	4

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	W	Ball-Ø	Load rating max. kN (static load only)
02006-506X	O	M6	8	12/25/40	10	2	11,5	10	-	28	7	9,2
02006-508X	O	M8	11	12/25/40	14,5	3	15	13	-	28	10	15,5
02006-510X	O	M10	14	15/30/50	16	3	19,6	17	3	28	13	18,8
02006-512X	O	M12	19	20/40/60	19	4	21,9	19	5	24	15	29,8
02006-516X	O	M16	21	25/50/80	23	4	27,7	24	6	24	20	50,3

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	W	Ball-Ø
02006-606X	P	M6	10	12/25/40	12	4	11,5	10	-	28	7
02006-608X	P	M8	13	12/25/40	16,5	5	15	13	-	28	10
02006-610X	P	M10	16	15/30/50	18	5	19,6	17	3	28	13
02006-612X	P	M12	21	20/40/60	21	6	21,9	19	5	24	15
02006-616X	P	M16	23	25/50/80	25	6	27,7	24	6	24	20

Self-aligning pads

adjustable with O-ring and exchangeable inserts

Material:
Body carbon steel.
Ball rust and acid resistant steel.
Inserts:
Form C, F, M tool steel
Form K POM
Form E stainless steel.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane surface.

Version:
Body tempered, black oxidised.
Ball hardened, bright.
Inserts:
Form C, F hardened, black oxidised.
Form M with carbide serrations, black oxidised.
Form K white.
Form E hardened, bright.
Form O diamond impregnated surface comparable to 100 grade abrasive grit.
Form P polyurethane surface, hardness 60° Shore.

Sample order:
nlm 02007-124X100

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.
The ball can be removed from the housing by applying light pressure to the socket head screw.

Ball secured against rotation.

Advantages:
Highly cost-effective as inserts can be exchanged.
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out, ensuring uniform movement.

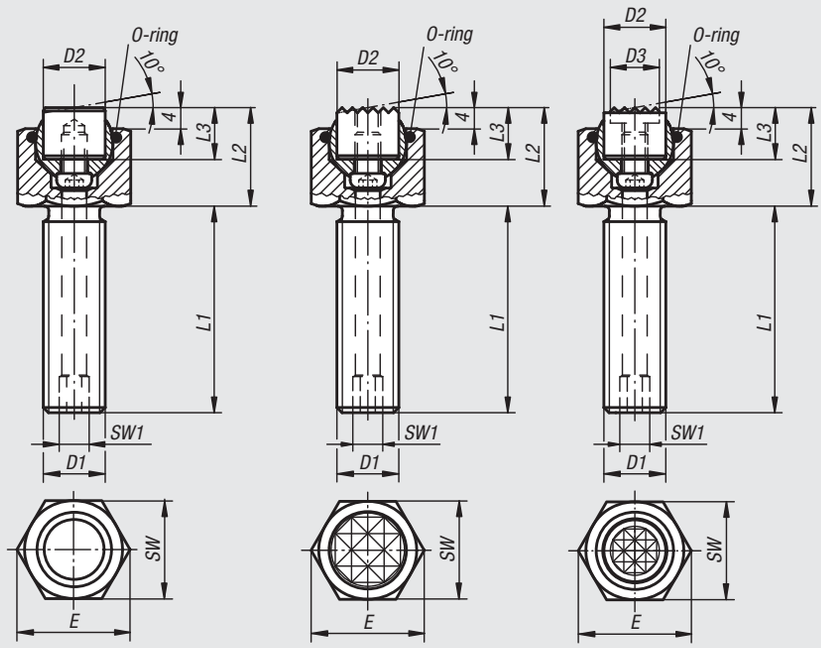
Form C
steel insert, flat face

Form E
stainless steel insert, flat face

Form K
POM insert, flat face

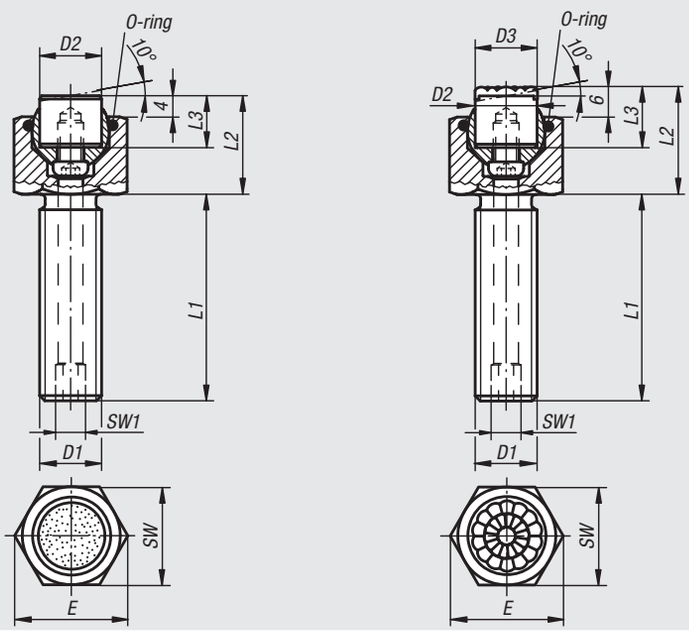
Form F
diamond grip insert

Form M
carbide steel
diamond grip



Form O
stainless steel insert
diamond impregnated

Form P
stainless steel insert,
PUR surface



Self-aligning pads

adjustable with O-ring and exchangeable inserts

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. steel insert
02007-110X015	C	M10	10	15	17	10	19,6	17	3	13	19	0,032	07113-10108
02007-110X030	C	M10	10	30	17	10	19,6	17	3	13	19	0,039	07113-10108
02007-110X050	C	M10	10	50	17	10	19,6	17	3	13	19	0,047	07113-10108
02007-112X020	C	M12	12	20	19	10	21,9	19	5	15	30	0,048	07113-12108
02007-112X040	C	M12	12	40	19	10	21,9	19	5	15	30	0,059	07113-12108
02007-112X060	C	M12	12	60	19	10	21,9	19	5	15	30	0,071	07113-12108
02007-116X025	C	M16	16	25	23	10	27,7	24	6	20	50	0,100	07113-16108
02007-116X050	C	M16	16	50	23	10	27,7	24	6	20	50	0,127	07113-16108
02007-116X080	C	M16	16	80	23	10	27,7	24	6	20	50	0,159	07113-16108
02007-120X030	C	M20	20	30	24	10	34,6	30	8	23	85	0,171	07113-20108
02007-120X060	C	M20	20	60	24	10	34,6	30	8	23	85	0,220	07113-20108
02007-120X100	C	M20	20	100	24	10	34,6	30	8	23	85	0,289	07113-20108
02007-124X040	C	M24	25	40	30	10	41,6	36	10	28	121	0,321	07113-25108
02007-124X100	C	M24	25	100	30	10	41,6	36	10	28	121	0,468	07113-25108

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert
02007-210X015	E	M10	10	15	17	10	19,6	17	3	13	19	0,032	07113-10102
02007-210X030	E	M10	10	30	17	10	19,6	17	3	13	19	0,039	07113-10102
02007-210X050	E	M10	10	50	17	10	19,6	17	3	13	19	0,047	07113-10102
02007-212X020	E	M12	12	20	19	10	21,9	19	5	15	30	0,048	07113-12102
02007-212X040	E	M12	12	40	19	10	21,9	19	5	15	30	0,059	07113-12102
02007-212X060	E	M12	12	60	19	10	21,9	19	5	15	30	0,071	07113-12102
02007-216X025	E	M16	16	25	23	10	27,7	24	6	20	50	0,100	07113-16102
02007-216X050	E	M16	16	50	23	10	27,7	24	6	20	50	0,127	07113-16102
02007-216X080	E	M16	16	80	23	10	27,7	24	6	20	50	0,159	07113-16102
02007-220X030	E	M20	20	30	24	10	34,6	30	8	23	85	0,171	07113-20102
02007-220X060	E	M20	20	60	24	10	34,6	30	8	23	85	0,220	07113-20102
02007-220X100	E	M20	20	100	24	10	34,6	30	8	23	85	0,289	07113-20102
02007-224X040	E	M24	25	40	30	10	41,6	36	10	28	121	0,321	07113-25102
02007-224X100	E	M24	25	100	30	10	41,6	36	10	28	121	0,468	07113-25102

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. gripper
02007-310X015	F	M10	10	15	17	10	19,6	17	3	13	19	0,031	07113-1010
02007-310X030	F	M10	10	30	17	10	19,6	17	3	13	19	0,038	07113-1010
02007-310X050	F	M10	10	50	17	10	19,6	17	3	13	19	0,047	07113-1010
02007-312X020	F	M12	12	20	19	10	21,9	19	5	15	30	0,050	07113-1210
02007-312X040	F	M12	12	40	19	10	21,9	19	5	15	30	0,061	07113-1210
02007-312X060	F	M12	12	60	19	10	21,9	19	5	15	30	0,073	07113-1210
02007-316X025	F	M16	16	25	23	10	27,7	24	6	20	50	0,100	07113-1610
02007-316X050	F	M16	16	50	23	10	27,7	24	6	20	50	0,127	07113-1610
02007-316X080	F	M16	16	80	23	10	27,7	24	6	20	50	0,159	07113-1610
02007-320X030	F	M20	20	30	24	10	34,6	30	8	23	85	0,173	07113-2010
02007-320X060	F	M20	20	60	24	10	34,6	30	8	23	85	0,222	07113-2010
02007-320X100	F	M20	20	100	24	10	34,6	30	8	23	85	0,290	07113-2010
02007-324X040	F	M24	25	40	30	10	41,6	36	10	28	121	0,319	07113-2510
02007-324X100	F	M24	25	100	30	10	41,6	36	10	28	121	0,466	07113-2510

Self-aligning pads

adjustable with O-ring and exchangeable inserts

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. POM insert
02007-710X015	K	M10	10	15	17	10	19,6	17	3	13	4	0,027	07113-10109
02007-710X030	K	M10	10	30	17	10	19,6	17	3	13	4	0,034	07113-10109
02007-710X050	K	M10	10	50	17	10	19,6	17	3	13	4	0,043	07113-10109
02007-712X020	K	M12	12	20	19	10	21,9	19	5	15	7	0,041	07113-12109
02007-712X040	K	M12	12	40	19	10	21,9	19	5	15	7	0,052	07113-12109
02007-712X060	K	M12	12	60	19	10	21,9	19	5	15	7	0,064	07113-12109
02007-716X025	K	M16	16	25	23	10	27,7	24	6	20	14	0,088	07113-16109
02007-716X050	K	M16	16	50	23	10	27,7	24	6	20	14	0,115	07113-16109
02007-716X080	K	M16	16	80	23	10	27,7	24	6	20	14	0,147	07113-16109
02007-720X030	K	M20	20	30	24	10	34,6	30	8	23	27	0,152	07113-20109
02007-720X060	K	M20	20	60	24	10	34,6	30	8	23	27	0,202	07113-20109
02007-720X100	K	M20	20	100	24	10	34,6	30	8	23	27	0,270	07113-20109
02007-724X040	K	M24	25	40	30	10	41,6	36	10	28	47	0,291	07113-25109
02007-724X100	K	M24	25	100	30	10	41,6	36	10	28	47	0,438	07113-25109

Order No.	Form	D1	D2	D3	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. gripper
02007-910X015	M	M10	10	7,9	15	17	10	19,6	17	3	13	19	07113-10107
02007-910X030	M	M10	10	7,9	30	17	10	19,6	17	3	13	19	07113-10107
02007-910X050	M	M10	10	7,9	50	17	10	19,6	17	3	13	19	07113-10107
02007-912X020	M	M12	12	9,5	20	19	10	21,9	19	5	15	30	07113-12107
02007-912X040	M	M12	12	9,5	40	19	10	21,9	19	5	15	30	07113-12107
02007-912X060	M	M12	12	9,5	60	19	10	21,9	19	5	15	30	07113-12107
02007-916X025	M	M16	16	12,7	25	23	10	27,7	24	6	20	50	07113-16107
02007-916X050	M	M16	16	12,7	50	23	10	27,7	24	6	20	50	07113-16107
02007-916X080	M	M16	16	12,7	80	23	10	27,7	24	6	20	50	07113-16107
02007-920X030	M	M20	20	15,9	30	24	10	34,6	30	8	23	85	07113-20107
02007-920X060	M	M20	20	15,9	60	24	10	34,6	30	8	23	85	07113-20107
02007-920X100	M	M20	20	15,9	100	24	10	34,6	30	8	23	85	07113-20107
02007-924X040	M	M24	25	19	40	30	10	41,6	36	10	28	121	07113-25107
02007-924X100	M	M24	25	19	100	30	10	41,6	36	10	28	121	07113-25107

Self-aligning pads

adjustable with O-ring and exchangeable inserts

Order No.	Form	D1	D2	L1	L2	L3	E	SW	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. stainless steel insert, diamond surface
02007-510X015	0	M10	10	15	17	10	19,6	17	3	13	19	07113-10105
02007-510X030	0	M10	10	30	17	10	19,6	17	3	13	19	07113-10105
02007-510X050	0	M10	10	50	17	10	19,6	17	3	13	19	07113-10105
02007-512X020	0	M12	12	20	19	10	21,9	19	5	15	30	07113-12105
02007-512X040	0	M12	12	40	19	10	21,9	19	5	15	30	07113-12105
02007-512X060	0	M12	12	60	19	10	21,9	19	5	15	30	07113-12105
02007-516X025	0	M16	16	25	23	10	27,7	24	6	20	50	07113-16105
02007-516X050	0	M16	16	50	23	10	27,7	24	6	20	50	07113-16105
02007-516X080	0	M16	16	80	23	10	27,7	24	6	20	50	07113-16105
02007-520X030	0	M20	20	30	24	10	34,6	30	8	23	85	07113-20105
02007-520X060	0	M20	20	60	24	10	34,6	30	8	23	85	07113-20105
02007-520X100	0	M20	20	100	24	10	34,6	30	8	23	85	07113-20105
02007-524X040	0	M24	25	40	30	10	41,6	36	10	28	121	07113-25105
02007-524X100	0	M24	25	100	30	10	41,6	36	10	28	121	07113-25105

Order No.	Form	D1	D2	D3	L1	L2	L3	E	SW	SW1	Ball-Ø	Approx. weight kg	Order No. stainless steel insert, polyurethane surface
02007-620X030	P	M20	20	21	30	26	12	34,6	30	8	23	0,171	07113-20126
02007-612X020	P	M12	12	13	20	21	12	21,9	19	5	15	0,049	07113-12126
02007-610X015	P	M10	10	10	15	19	12	19,6	17	3	13	0,032	07113-10126
02007-624X100	P	M24	25	27	100	32	12	41,6	36	10	28	0,468	07113-25126
02007-616X025	P	M16	16	16	25	25	12	27,7	24	6	20	0,100	07113-16126
02007-616X050	P	M16	16	16	50	25	12	27,7	24	6	20	0,127	07113-16126
02007-612X060	P	M12	12	13	60	21	12	21,9	19	5	15	0,071	07113-12126
02007-610X030	P	M10	10	10	30	19	12	19,6	17	3	13	0,039	07113-10126
02007-620X100	P	M20	20	21	100	26	12	34,6	30	8	23	0,289	07113-20126
02007-624X040	P	M24	25	27	40	32	12	41,6	36	10	28	0,321	07113-25126
02007-610X050	P	M10	10	10	50	19	12	19,6	17	3	13	0,047	07113-10126
02007-616X080	P	M16	16	16	80	25	12	27,7	24	6	20	0,159	07113-16126
02007-620X060	P	M20	20	21	60	26	12	34,6	30	8	23	0,220	07113-20126
02007-612X040	P	M12	12	13	40	21	12	21,9	19	5	15	0,059	07113-12126

Self-aligning pads

adjustable with O-ring and hexagon socket

Material:
Body carbon steel.
Ball:
Form C, F, tool steel.
Form K POM.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane surface.

Version:
Body tempered, black oxidised.
Ball:
Form C, F hardened, black oxidised.
Form K POM ball white.
Form O surface comparable to 100 grade abrasive grit.
Form P polyurethane, Shore hardness 60°.

Sample order:
nlm 02008-112X050
(Include length L.)

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.

Ball secured against rotation.

Form O: The abrasive diamond surface is bonded firmly to the ball. It is ideally suited to supporting smooth or slippery applications with a minimum of clamping pressure. This allows the diamond particles to get a firm grip on a very small area with minimum damage to the surface.
The diamond surface offers excellent wear resistance.

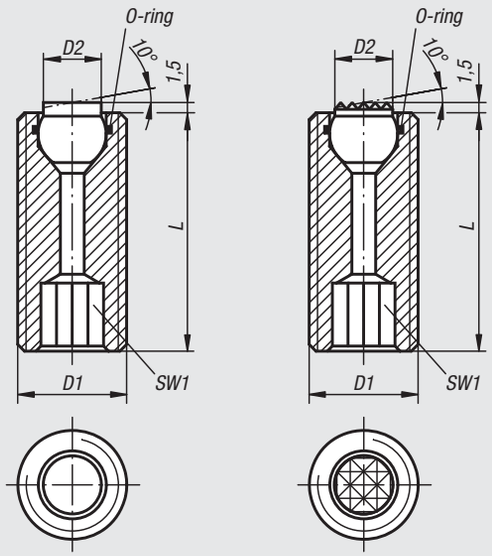
Form P: The polyurethane surface is vulcanised firmly to the ball. It is abrasion-resistant and does not discolour. Offers optimum protection against damage to delicate surfaces. The pearl-like surface gives a firm grip and allows air to escape so as to prevent any suction effect between the contact surface and the toggle locator.

Advantages:
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out, ensuring uniform movement.
The hexagon socket allows easy adjustment and positioning in through holes.

Form C
flattened steel ball,
flat face

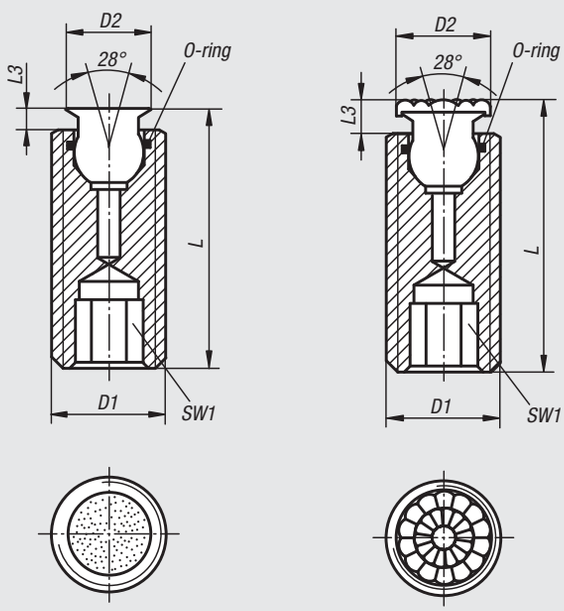
Form K
flattened POM ball, flat face

Form F
flattened steel ball,
diamond grip



Form O
stainless steel ball
diamond impregnated

Form P
stainless steel ball,
PUR surface



Order No.	Form	D1	D2	L	SW1	Ball-Ø	Load rating max. kN (static load only)
02008-112X025	C	M12	6	25	6	7	15
02008-112X035	C	M12	6	35	6	7	15
02008-112X050	C	M12	6	50	6	7	15
02008-116X025	C	M16	8,5	25	8	10	23
02008-116X035	C	M16	8,5	35	8	10	23
02008-116X050	C	M16	8,5	50	8	10	23

Order No.	Form	D1	D2	L	SW1	Ball-Ø	Load rating max. kN (static load only)
02008-312X025	F	M12	6	25	6	7	15
02008-312X035	F	M12	6	35	6	7	15
02008-312X050	F	M12	6	50	6	7	15
02008-316X025	F	M16	8,5	25	8	10	23
02008-316X035	F	M16	8,5	35	8	10	23
02008-316X050	F	M16	8,5	50	8	10	23

Order No.	Form	D1	D2	L	SW1	Ball-Ø	Load rating max. kN (static load only)
02008-712X025	K	M12	6	25	6	7	2
02008-712X035	K	M12	6	35	6	7	2
02008-712X050	K	M12	6	50	6	7	2
02008-716X025	K	M16	8,5	25	8	10	4
02008-716X035	K	M16	8,5	35	8	10	4
02008-716X050	K	M16	8,5	50	8	10	4

Order No.	Form	D1	D2	L	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg
02008-510X026	O	M10	6	26,5	1,5	5	5	-	0,010
02008-510X036	O	M10	6	36,5	1,5	5	5	-	0,014
02008-510X051	O	M10	6	51,5	1,5	5	5	-	0,022
02008-512X027	O	M12	8	27	2	6	7	15,4	0,015
02008-512X037	O	M12	8	37	2	6	7	15,4	0,021
02008-512X052	O	M12	8	52	2	6	7	15,4	0,033
02008-516X028	O	M16	11	28	3	8	10	23,3	0,027
02008-516X038	O	M16	11	38	3	8	10	23,3	0,040
02008-516X053	O	M16	11	53	3	8	10	23,3	0,060
02008-520X033	O	M20	14	33	3	10	13	37,7	0,049
02008-520X053	O	M20	14	53	3	10	13	37,7	0,090
02008-520X073	O	M20	14	73	3	10	13	37,7	0,128

Order No.	Form	D1	D2	L	L3	SW1	Ball-Ø	Approx. weight kg
02008-610X028	P	M10	8	28,5	3,5	5	5	0,010
02008-610X038	P	M10	8	38,5	3,5	5	5	0,014
02008-610X053	P	M10	8	53,5	3,5	5	5	0,022
02008-612X029	P	M12	10	29	4	6	7	0,015
02008-612X039	P	M12	10	39	4	6	7	0,021
02008-612X054	P	M12	10	54	4	6	7	0,033
02008-616X030	P	M16	13	30	5	8	10	0,027
02008-616X040	P	M16	13	40	5	8	10	0,040
02008-616X055	P	M16	13	55	5	8	10	0,060
02008-620X035	P	M20	16	35	5	10	13	0,050
02008-620X055	P	M20	16	55	5	10	13	0,091
02008-620X075	P	M20	16	75	5	10	13	0,129

Self-aligning pads

adjustable with O-ring, exchangeable inserts and hexagon socket

Material:
Body carbon steel.
Ball rust and acid resistant steel.
Inserts:
Form C, F, M tool steel
Form K POM
Form E stainless steel.
Form O stainless steel diamond impregnated.
Form P stainless steel with polyurethane surface.

Version:
Body tempered, black oxidised.
Ball hardened, bright.
Inserts:
Form C, F hardened, black oxidised.
Form M with carbide serrations, black oxidised.
Form K white.
Form E hardened, bright.
Form O diamond impregnated surface comparable to 100 grade abrasive grit.
Form P polyurethane surface, hardness 60° Shore.

Sample order:
nlm 02009-720X070

Note:
Self-aligning pads are used to support and clamp unmachined and machined workpieces.
They also serve as stops, supports and thrust pads in fixtures and toolmaking.
The ball can be removed from the housing by applying light pressure to the socket head screw.

Ball secured against rotation.

Advantages:
Highly cost-effective as inserts can be exchanged.
The built-in O-ring holds the ball in place and keeps dirt and foreign particles out, ensuring uniform movement.

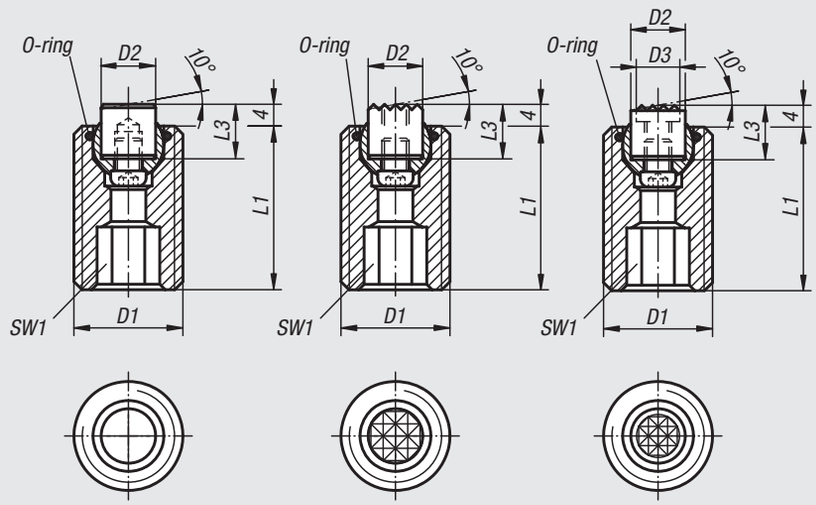
Form C
steel insert, flat face

Form E
stainless steel insert, flat face

Form F
diamond grip insert

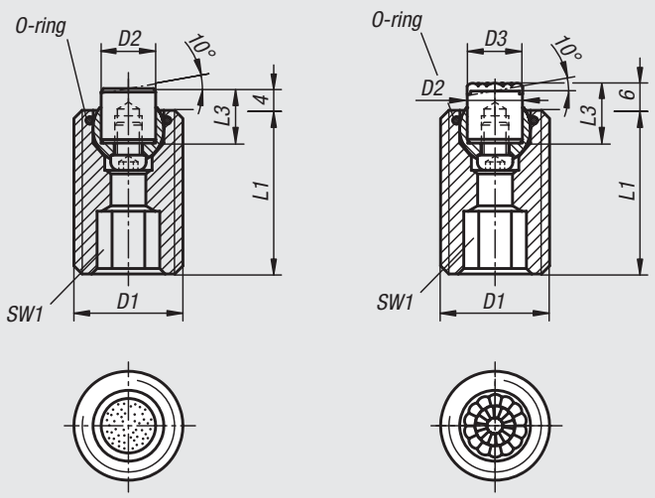
Form M
carbide steel
diamond grip

Form K
POM insert, flat face



Form O
stainless steel insert
diamond impregnated

Form P
stainless steel insert,
PUR surface



Order No.	Form	D1	D2	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. steel insert
02009-120X030	C	M20	10	30	10	10	13	37	07113-10108
02009-120X050	C	M20	10	50	10	10	13	37	07113-10108
02009-120X070	C	M20	10	70	10	10	13	37	07113-10108
02009-124X040	C	M24	12	40	10	10	15	55	07113-12108
02009-124X080	C	M24	12	80	10	10	15	55	07113-12108

Self-aligning pads

adjustable with O-ring, exchangeable inserts and hexagon socket

Order No.	Form	D1	D2	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert
02009-220X030	E	M20	10	30	10	10	13	37	0,049	07113-10102
02009-220X050	E	M20	10	50	10	10	13	37	0,084	07113-10102
02009-220X070	E	M20	10	70	10	10	13	37	0,122	07113-10102
02009-224X040	E	M24	12	40	10	10	15	55	0,101	07113-12102
02009-224X080	E	M24	12	80	10	10	15	55	0,200	07113-12102

Order No.	Form	D1	D2	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. gripper
02009-320X030	F	M20	10	30	10	10	13	37	07113-1010
02009-320X050	F	M20	10	50	10	10	13	37	07113-1010
02009-320X070	F	M20	10	70	10	10	13	37	07113-1010
02009-324X040	F	M24	12	40	10	10	15	55	07113-1210
02009-324X080	F	M24	12	80	10	10	15	55	07113-1210

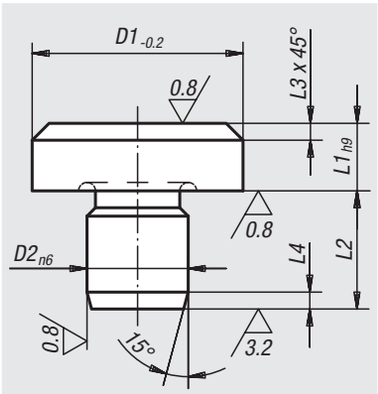
Order No.	Form	D1	D2	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. POM insert
02009-720X030	K	M20	10	30	10	10	13	4	07113-10109
02009-720X050	K	M20	10	50	10	10	13	4	07113-10109
02009-720X070	K	M20	10	70	10	10	13	4	07113-10109
02009-724X040	K	M24	12	40	10	10	15	7	07113-12109
02009-724X080	K	M24	12	80	10	10	15	7	07113-12109

Order No.	Form	D1	D2	D3	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Order No. gripper
02009-920X030	M	M20	10	7,9	30	10	10	13	37	07113-10107
02009-920X050	M	M20	10	7,9	50	10	10	13	37	07113-10107
02009-920X070	M	M20	10	7,9	70	10	10	13	37	07113-10107
02009-924X040	M	M24	12	9,5	40	10	10	15	55	07113-12107
02009-924X080	M	M24	12	9,5	80	10	10	15	55	07113-12107

Order No.	Form	D1	D2	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert, diamond surface
02009-520X030	O	M20	10	30	10	10	13	37	0,049	07113-10105
02009-520X050	O	M20	10	50	10	10	13	37	0,084	07113-10105
02009-520X070	O	M20	10	70	10	10	13	37	0,122	07113-10105
02009-524X040	O	M24	12	40	10	10	15	55	0,101	07113-12105
02009-524X080	O	M24	12	80	10	10	15	55	0,200	07113-12105

Order No.	Form	D1	D2	D3	L1	L3	SW1	Ball-Ø	Load rating max. kN (static load only)	Approx. weight kg	Order No. stainless steel insert, polyurethane surface
02009-620X030	P	M20	10	10	30	12	10	13	37	0,049	07113-10126
02009-620X050	P	M20	10	10	50	12	10	13	37	0,084	07113-10126
02009-620X070	P	M20	10	10	70	12	10	13	37	0,122	07113-10126
02009-624X040	P	M24	12	13	40	12	10	15	55	0,101	07113-12126
02009-624X080	P	M24	12	13	80	12	10	15	55	0,200	07113-12126

Rest pads

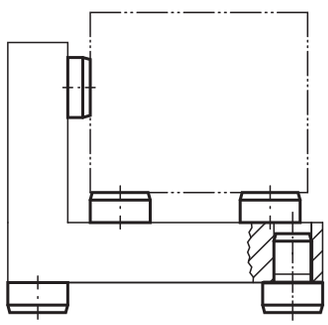


Material:
Tool steel.

Version:
Hardened and ground.
No centre bore on top face.

Sample order:
nlm 02010-041

Note:
If more than one rest pad is used, the support height can be reground. Rest pads can also be used as feet for jigs and fixtures.



Order No.	D1	L1	D2	L2	L3	L4
02010-041	6	2,5	4	6,5	0,7	1,2
02010-042	6	4,5	4	8,5	0,7	1,2
02010-04	6	5	4	6	0,7	1,2
02010-061	10	4,5	6	8,5	0,9	1,5
02010-06	10	8	6	8,5	0,9	1,5
02010-08	16	5	8	10	2	2
02010-081	16	13	8	10	2	2
02010-10	20	6	10	12	2	2
02010-101	20	12	10	12	2	2
02010-12	25	8	12	14	2	2
02010-122	25	20	12	14	2	2
02010-123	25	30	12	14	2	2
02010-16	30	25	16	20	2,5	2,5
02010-164	30	40	16	20	2,5	2,5
02010-165	30	50	16	20	2,5	2,5
02010-166	30	65	16	20	2,5	2,5
02010-20	30	80	20	20	2,5	2,5
02010-201	30	100	20	20	2,5	2,5
02010-202	40	13	20	20	3,2	3,2
02010-203	40	32	20	20	3,2	3,2

Locating pins and rest pads

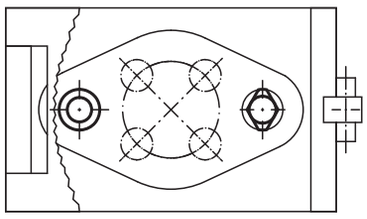
DIN 6321 (Issue 1973)

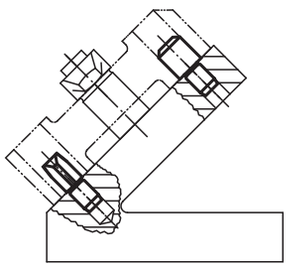
Material:
Tool steel.

Version:
Hardened and ground.

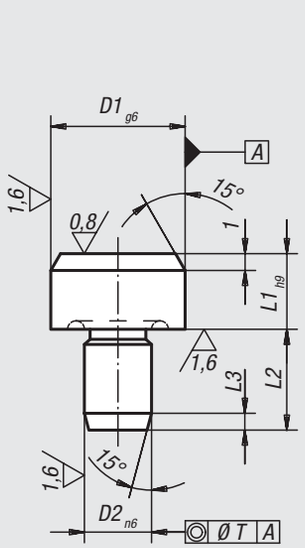
Sample order:
nlm 02020-212

Note:
Rest pads Form A are supports for workpieces and fixtures.
Locating pins Form B are for positioning workpieces and fixture components in reamed holes.
The flattened Form C can be used to bridge tolerances in hole spacing or to secure the part to be positioned in one direction only.
Form A and B can also be used as hardened stops and as fixture feet.
For similar pins see 03120, 03130, 03140 and 03150.

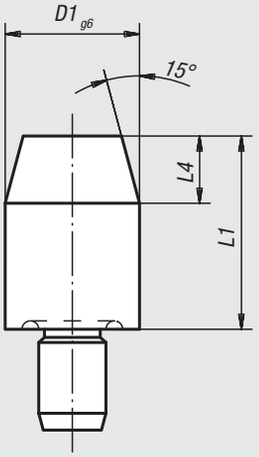




Form A
rest pad

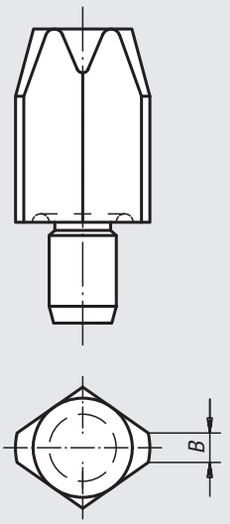


Form B
cylindrical
locating pin



other dimensions and
data same as Form A

Form C
flattened
locating pin



Locating pins and rest pads

Order No.	Form	Version	D1	L1	D2	L2	L3	T
02020-106	A	without centrebore	6	5	4	6	1,2	0,02
02020-110	A	without centrebore	10	6	6	9	1,6	0,02
02020-116	A	without centrebore	16	8	8	12	2	0,04
02020-125	A	without centrebore	25	10	12	18	2,5	0,04

Locating pins, short

Order No. Form B	Order No. Form C	Version	D1	L1	D2	L2	L3	L4	B	T
02020-206	**02020-406**	short	6	7	4	6	1,2	4	-/1	0,02
02020-208	**02020-408**	short	8	10	6	9	1,6	6	-/1,6	0,02
02020-210	**02020-410**	short	10	10	6	9	1,6	6	-/2,5	0,02
02020-212	**02020-412**	short	12	10	6	9	1,6	6	-/2,5	0,02
02020-216	**02020-416**	short	16	13	8	12	2	8	-/3,5	0,04
02020-220	**02020-420**	short	20	15	12	18	2,5	9	-/5	0,04
02020-225	**02020-425**	short	25	15	12	18	2,5	9	-/5	0,04

Locating pins, long

Order No. Form B	Order No. Form C	Version	D1	L1	D2	L2	L3	L4	B	T
02020-306	**02020-506**	long	6	12	4	6	1,2	4	-/1	0,02
02020-308	**02020-508**	long	8	16	6	9	1,6	6	-/1,6	0,02
02020-310	**02020-510**	long	10	18	6	9	1,6	6	-/2,5	0,02
02020-312	**02020-512**	long	12	18	6	9	1,6	6	-/2,5	0,02
02020-316	**02020-516**	long	16	22	8	12	2	8	-/3,5	0,04
02020-320	**02020-520**	long	20	25	12	18	2,5	9	-/5	0,04
02020-325	**02020-525**	long	25	25	12	18	2,5	9	-/5	0,04

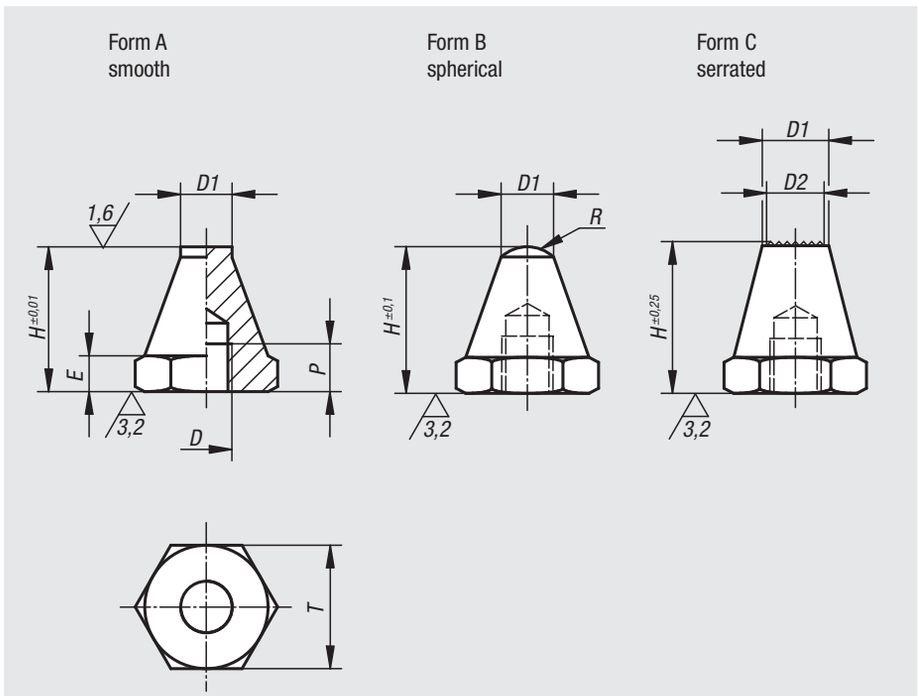
Rest pads

Material:
Body carbon steel.

Version:
Body tempered and black oxidised.

Sample order:
nlm 02028-106012

Note:
Rest pads are for supporting machined and non-machined parts. They can also be used as stops and thrust pads in fixtures and toolmaking.
Studs or grub screws can be screwed and glued into the tapped hole D to make a rest pad with external thread.



Order No. Form A	Order No. Form B	Order No. Form C	D	D1	D2	E	H	P	R	T
02028-106012	**02028-206012**	**02028-306012**	M6	6	-/-/5	3	12,5	4	-/5/-	11
02028-106025	**02028-206025**	**02028-306025**	M6	6	-/-/5	3	25	7	-/5/-	11
02028-108015	**02028-208015**	**02028-308015**	M8	8	-/-/6	4	15	6	-/8,5/-	13
02028-108030	**02028-208030**	**02028-308030**	M8	8	-/-/6	4	30	9	-/8,5/-	13
02028-110020	**02028-210020**	**02028-310020**	M10	10	-/-/8	5	20	9	-/9/-	17
02028-110040	**02028-210040**	**02028-310040**	M10	10	-/-/8	5	40	13	-/9/-	17
02028-112025	**02028-212025**	**02028-312025**	M12	12	-/-/9,5	6	25	11	-/12,75/-	19
02028-112050	**02028-212050**	**02028-312050**	M12	12	-/-/9,5	6	50	16	-/12,75/-	19
02028-116030	**02028-216030**	**02028-316030**	M16	16	-/-/13	8	30	12	-/17/-	24
02028-116060	**02028-216060**	**02028-316060**	M16	16	-/-/13	8	60	20	-/17/-	24

Rest pads

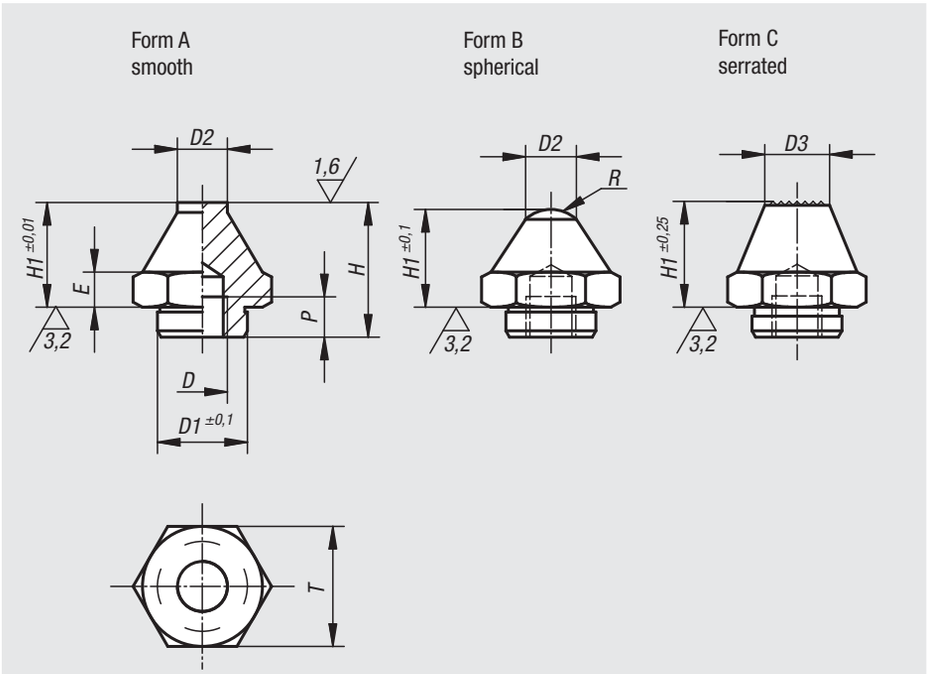
with positioning pin

Material:
Body carbon steel.

Version:
Body tempered and black oxidised.
Contact faces case-hardened.

Sample order:
nlm 02029-106012

Note:
Rest pads are for supporting machined and unmachined parts. They can also be used as stops and thrust pads in fixtures and toolmaking. Studs or grub screws can be screwed and glued into the tapped hole D to make a support with external thread.



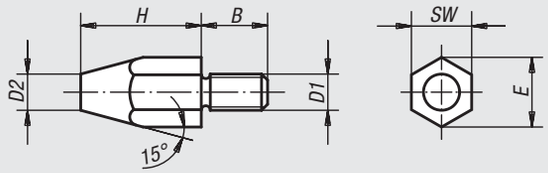
Order No.	Form	D	D1	D2	D3	E	H	H1	P	R	T
02029-106012	A	M6	11,9	7	-	4	16,5	12,5	6	-	17
02029-106025	A	M6	11,9	7	-	4	29	25	6	-	17
02029-110020	A	M10	17,8	10	-	7	25	20	10	-	24
02029-110040	A	M10	17,8	10	-	7	46	40	10	-	24
02029-116030	A	M16	25,8	20	-	13	40	30	16	-	41
02029-116060	A	M16	25,8	20	-	13	70	60	16	-	41
02029-206012	B	M6	11,9	7	-	4	16,5	12,5	6	6	17
02029-206025	B	M6	11,9	7	-	4	29	25	6	6	17
02029-210020	B	M10	17,8	10	-	7	25	20	10	7,5	24
02029-210040	B	M10	17,8	10	-	7	46	40	10	7,5	24
02029-216030	B	M16	25,8	20	-	13	40	30	16	26	41
02029-216060	B	M16	25,8	20	-	13	70	60	16	26	41
02029-310020	C	M10	17,8	-	15	7	25	20	10	-	24
02029-310040	C	M10	17,8	-	10	7	46	40	10	-	24
02029-316030	C	M16	25,8	-	20	13	40	30	16	-	41
02029-316060	C	M16	25,8	-	20	13	70	60	16	-	41

02030

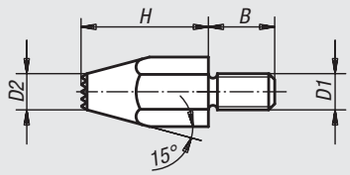
Feet

with threaded pin, DIN 6320 (Edition 1971)

Form A
with smooth
support surface



Form B
with carbide tips

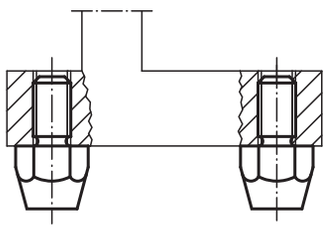


Material:
Carbon steel 1.1172.

Version:
Black oxidised.

Sample order:
nlm 02030-10

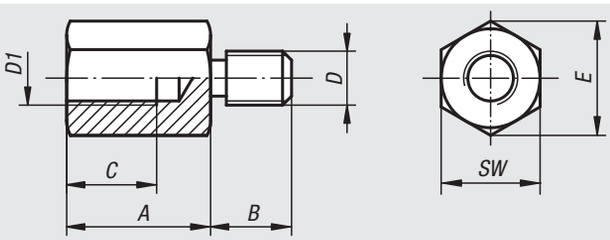
Note:
Rest pads 02010 and 02020 can also be used as feet.



Order No.	Form	D1	D2	H	B	E	SW
02030-06	A	M6	8	10	11	11,5	10
02030-061	A	M6	6	20	11	11,5	10
02030-08	A	M8	10	15	13	15	13
02030-081	A	M8	9	30	13	15	13
02030-10	A	M10	13	20	16	19,6	17
02030-101	A	M10	13	40	16	19,6	17
02030-12	A	M12	15	25	20	21,9	19
02030-121	A	M12	15	50	20	21,9	19
02030-083	B	M8	11,5	15	13	15	13
02030-123	B	M12	15	25	20	21,9	19

02035

Extension pieces



Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 02035-120750

Note:
Extension pieces are used to extend self-aligning pads, spring plungers, positioning feet, rest pads etc.

Order No.	A	B	C	D	D1	E	SW
02035-08025	25	13	15	M8	M8	15	13
02035-08032	32	13	15	M8	M8	15	13
02035-08040	40	13	15	M8	M8	15	13
02035-10025	25	15	17	M10	M10	19,6	17
02035-10032	32	15	17	M10	M10	19,6	17
02035-10040	40	15	17	M10	M10	19,6	17
02035-120320	32	18	20	M12	M12	25,4	22
02035-120500	50	18	20	M12	M12	25,4	22
02035-120750	75	18	20	M12	M12	25,4	22
02035-160320	32	25	20	M16	M16	31,2	27
02035-160500	50	25	30	M16	M16	31,2	27
02035-160750	75	25	30	M16	M16	31,2	27

Support bolts

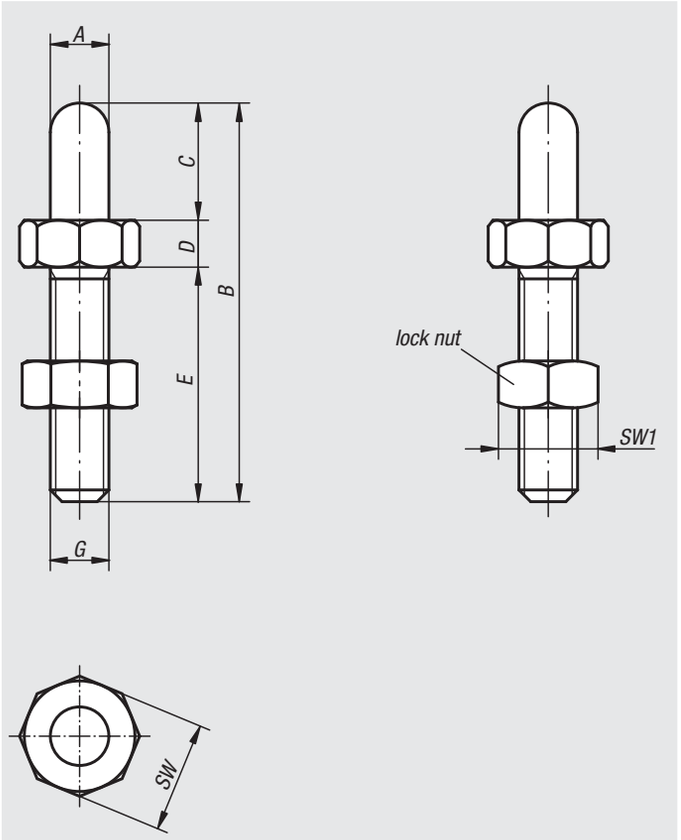
Material:
Carbon steel, tempered.

Version:
Black oxidised.

Sample order:
nlm 02037-16016

Note:
The rounded nose also allows support bolts to be used as positioning elements for workpieces with matching holes.

The version 02037-08016 has a hexagon.



Order No.	A	B	C	D	E	G	SW	SW1
02037-06006	6	37	6	6	25	M6	13	10
02037-06012	6	43	12	6	25	M6	13	10
02037-08008	8	45	8	7	30	M8	13	13
02037-08016	8	53	16	7	30	M8	13	13
02037-10010	10	58	10	8	40	M10	17	17
02037-10020	10	68	20	8	40	M10	17	17
02037-12012	12	72	12	10	50	M12	19	19
02037-12024	12	84	24	10	50	M12	19	19
02037-16016	16	89	16	13	60	M16	24	24
02037-16032	16	105	32	13	60	M16	24	24
02037-20020	20	115	20	15	80	M20	36	30
02037-20040	20	135	40	15	80	M20	36	30

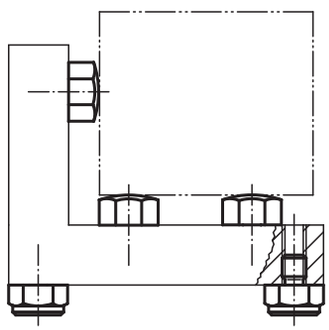
Positioning feet

Material:
Free-cutting steel.

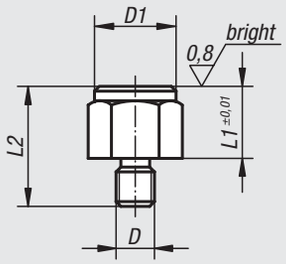
Version:
Case-hardened and black oxidised.

Sample order:
nlm 02040-215

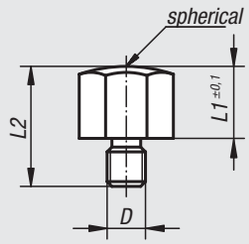
Note:
Positioning feet are used as supports, stops and thrust pads for fixtures and general machine and appliance construction.



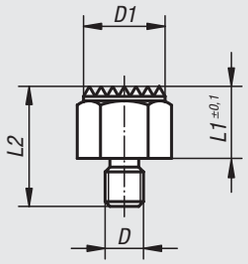
Form A
with external thread
and smooth face



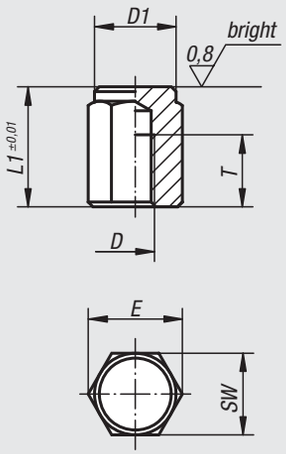
Form B
with external thread
and spherical surface



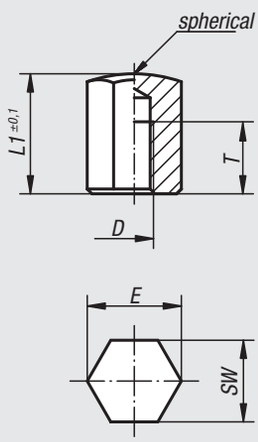
Form C
with external thread
and serrated surface



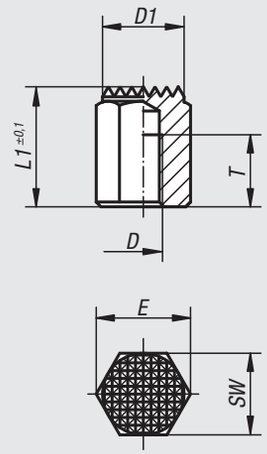
Form D
with internal thread
and smooth face



Form E
with internal thread
and spherical surface



Form F
with internal thread
and serrated surface



Order No. Form A	Order No. Form B	Order No. Form C	D	L1	D1	L2	E	SW	Tightening torque max. Nm
02040-1101	**02040-2101**	**02040-3101**	M8	10	17/-/17	20	19,4	17	18
02040-110	**02040-210**	**02040-310**	M12	10	22/-/22	24	25,2	22	60
02040-115	**02040-215**	**02040-315**	M12	15	22/-/22	29	25,2	22	60
02040-1151	**02040-2151**	**02040-3151**	M16	15	30/-/30	34	33	30	140
02040-1201	**02040-2201**	**02040-3201**	M16	20	30/-/30	39	33	30	140

Order No. Form D	Order No. Form E	Order No. Form F	D	L1	D1	T	E	SW
02040-415	**02040-515**	**02040-615**	M8	15	17/-/17	6	19,4	17
02040-4251	**02040-5251**	**02040-6251**	M8	25	17/-/17	16	19,4	17
02040-420	**02040-520**	**02040-620**	M12	20	22/-/22	10	25,2	22
02040-425	**02040-525**	**02040-625**	M12	25	22/-/22	15	25,2	22
02040-430	**02040-530**	**02040-630**	M12	30	22/-/22	20	25,2	22
02040-440	**02040-540**	**02040-640**	M12	40	22/-/22	25	25,2	22
02040-450	**02040-550**	**02040-650**	M12	50	22/-/22	25	25,2	22
02040-4301	**02040-5301**	**02040-6301**	M16	30	30/-/30	20	33	30
02040-4501	**02040-5501**	**02040-6501**	M16	50	30/-/30	25	33	30

Positioning feet

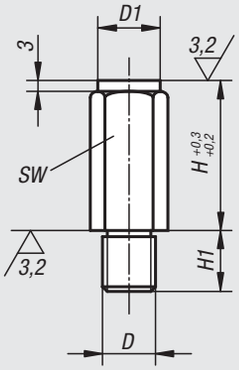
Material:
Body carbon steel.

Version:
Body tempered and black oxidised.
Contact faces case-hardened.

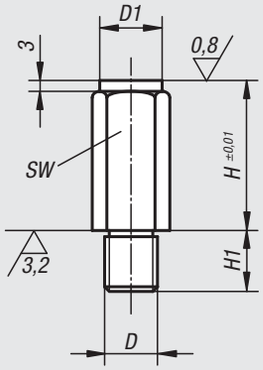
Sample order:
nlm 02041-106010

Note:
The positioning feet act as supports for rough and machined parts. They can also be used as stops and thrust pads in fixtures and toolmaking.

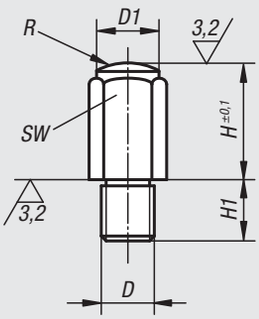
Form A
hardened smooth face



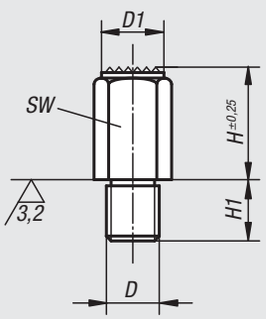
Form B
smooth face hardened
and ground



Form C
hardened spherical surface



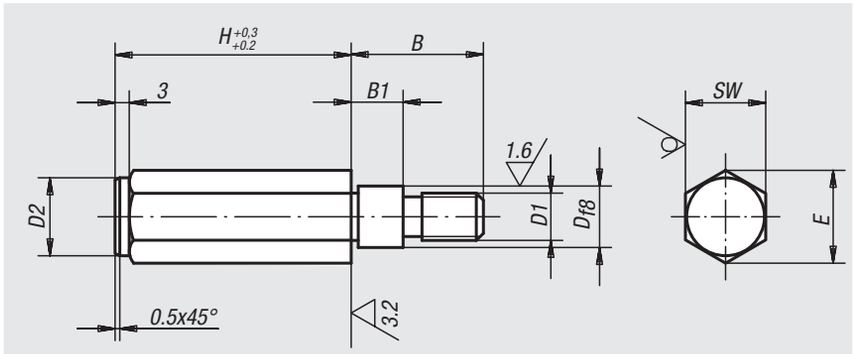
Form D
tempered serrated surface



Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	H	H1	R	SW
02041-106010	**02041-206010**	**02041-306010**	**02041-406010**	M6	10	10	11	-/-/15/-	10
02041-106020	**02041-206020**	**02041-306020**	**02041-406020**	M6	10	20	11	-/-/15/-	10
02041-108010	**02041-208010**	**02041-308010**	-	M8	13	10	13	-/-/20	13
02041-108015	**02041-208015**	**02041-308015**	**02041-408015**	M8	13	15	13	-/-/20/-	13
02041-108030	**02041-208030**	**02041-308030**	**02041-408030**	M8	13	30	13	-/-/20/-	13
02041-110010	**02041-210010**	**02041-310010**	-	M10	17	10	16	-/-/30	17
02041-110020	**02041-210020**	**02041-310020**	**02041-410020**	M10	17	20	16	-/-/30/-	17
02041-110040	**02041-210040**	**02041-310040**	**02041-410040**	M10	17	40	16	-/-/30/-	17
02041-112010	**02041-212010**	**02041-312010**	-	M12	19	10	20	-/-/40	19
02041-112025	**02041-212025**	**02041-312025**	**02041-412025**	M12	19	25	20	-/-/35/-	19
02041-112050	**02041-212050**	**02041-312050**	**02041-412050**	M12	19	50	20	-/-/35/-	19
02041-116015	**02041-216015**	**02041-316015**	-	M16	27	15	24	-/-/50	27
02041-116030	**02041-216030**	**02041-316030**	**02041-416030**	M16	27	30	24	-/-/50/-	27
02041-116060	**02041-216060**	**02041-316060**	**02041-416060**	M16	27	60	24	-/-/50/-	27
02041-120040	**02041-220040**	**02041-320040**	**02041-420040**	M20	32	40	29	-/-/60/-	32
02041-120080	**02041-220080**	**02041-320080**	**02041-420080**	M20	32	80	29	-/-/60/-	32

Fixture feet

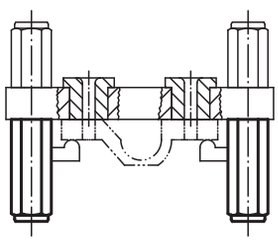
with external thread



Material:
Carbon steel 1.1181.

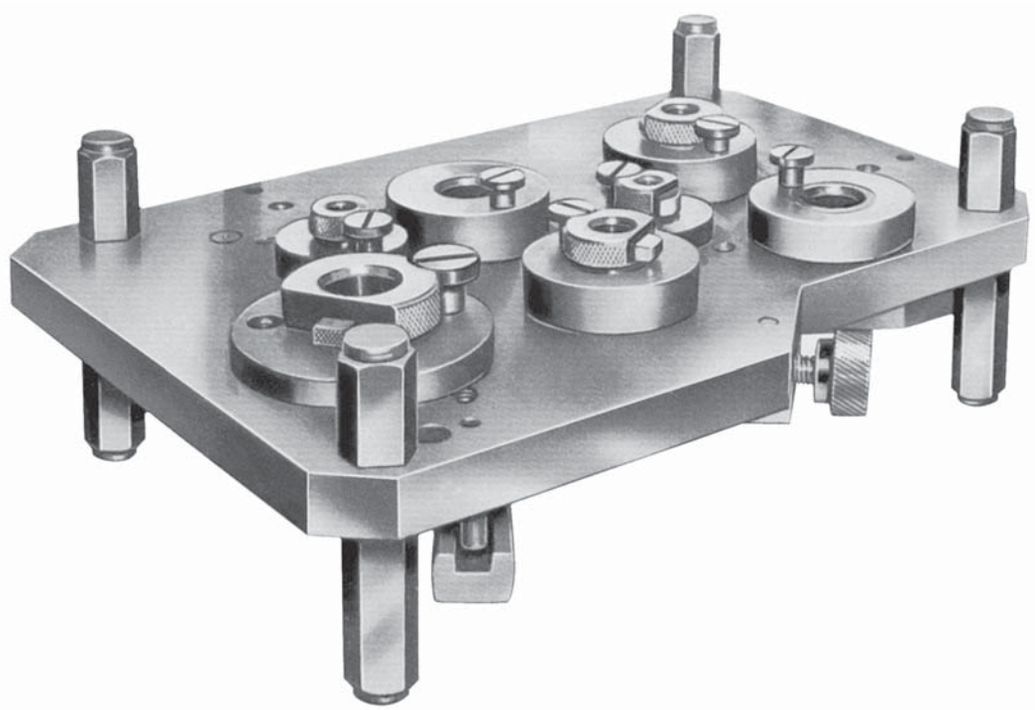
Version:
Black oxidised.

Sample order:
nlm 02050-10X75 (include height H)



Order No.	H	B	B1	D	D1	D2	E	SW
02050-10X	50/75/100	28	11	11	M10	16,5	19,5	17
02050-12X	50/75/100/125	35	18	13	M12	18,5	21,5	19

Application of a drilling jig



Fixture feet

with internal thread

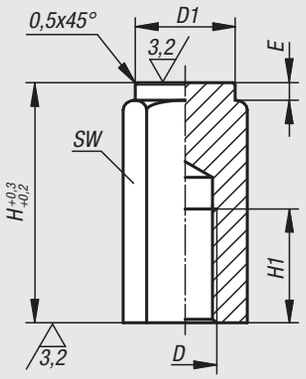
Material:
Body carbon steel.

Version:
Body tempered and black oxidised.
Contact faces case-hardened.

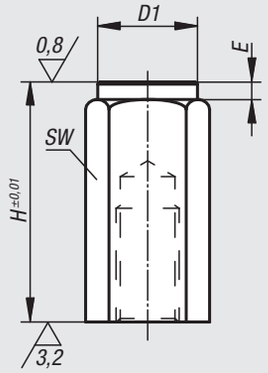
Sample order:
nlm 02070-106X20

Note:
Fixture feet with internal thread are used as supports for fixtures or rough or machined workpieces. They can also be used as stops or thust pads in fixtures and toolmaking.

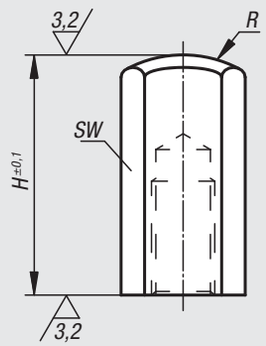
Form A
flat face hardened



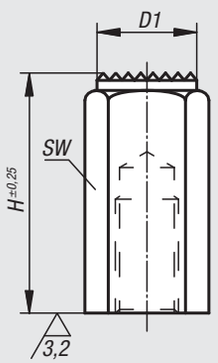
Form B
flat face hardened
and ground

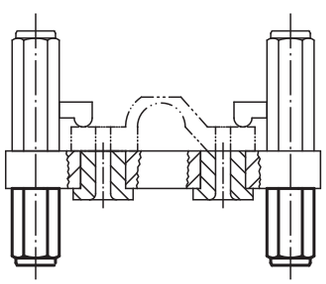


Form C
convex face hardened



Form D
diamond grip tempered





Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	E	H	H1	R	SW
02070-106X20	02070-206X20	02070-306X20	02070-406X20	M6	9,5/9,5/-/9,5	2/2/-/-	20	12	-/-/15/-	10
02070-106X40	02070-206X40	02070-306X40	02070-406X40	M6	9,5/9,5/-/9,5	2/2/-/-	40	12	-/-/15/-	10
02070-110X32	02070-210X32	02070-310X32	02070-410X32	M10	16,5/16,5/-/16,5	3/3/-/-	32	18	-/-/30/-	17
02070-110X63	02070-210X63	02070-310X63	02070-410X63	M10	16,5/16,5/-/16,5	3/3/-/-	63	18	-/-/30/-	17
02070-112X32	02070-212X32	02070-312X32	02070-412X32	M12	18,5/18,5/-/18,5	3/3/-/-	32	18	-/-/35/-	19
02070-112X63	02070-212X63	02070-312X63	02070-412X63	M12	18,5/18,5/-/18,5	3/3/-/-	63	18	-/-/35/-	19
02070-116X50	02070-216X50	02070-316X50	02070-416X50	M16	23/23/-/23	4/4/-/-	50	24	-/-/40/-	24
02070-116X100	02070-216X100	02070-316X100	02070-416X100	M16	23/23/-/23	4/4/-/-	100	24	-/-/40/-	24

Self-aligning pads

swivel 12°

Material:
Body carbon steel.
Ball ball-bearing steel 1.3505.

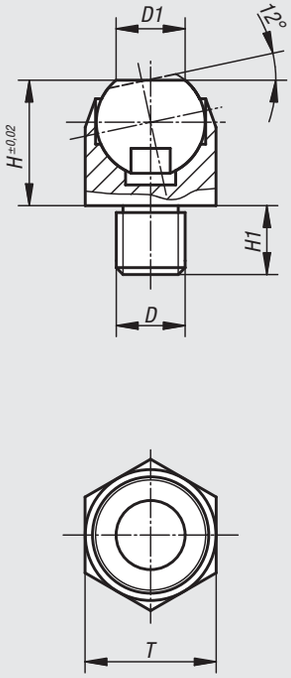
Version:
Body tempered.
Ball hardened (50 - 55 HRC).

Sample order:
nlm 02080-106

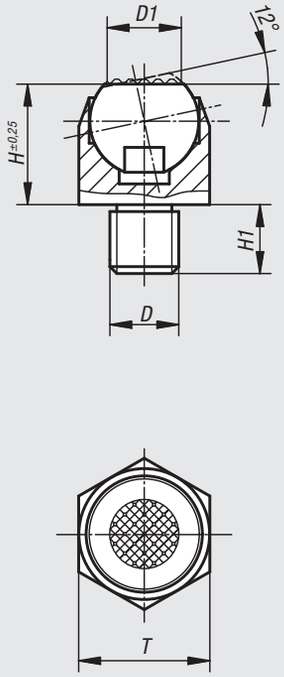
Note:
Self-aligning pads serve as stops, supports and thrust pads in fixture construction. They can also be installed in existing clamping devices, e.g. „arness“ clamps.

Ball is secured against rotation.

Form C
external thread,
flattened ball, flat face



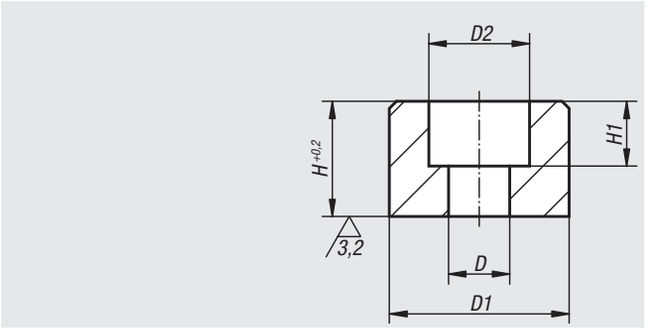
Form F
external thread
flattened ball, diamond grip



Order No. Form C	Order No. Form F	D	D1	H	H1	Ball-Ø	T	Load rating max. kN (static load only)
02080-106	**02080-306**	M6	6,7	13	7	10	13	10
02080-108	**02080-308**	M8	6,7	13	8	10	13	10
02080-110	**02080-310**	M10	10	18	10	16	19	25
02080-112	**02080-312**	M12	10	18	12	16	19	25
02080-116	**02080-316**	M16	20	27	16	24	30	90
02080-120	**02080-320**	M20	20	27	20	24	30	90

02090

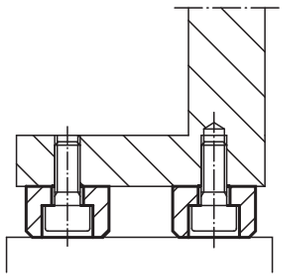
Locating feet



Material:
Hardened steel 1.0301.

Version:
Case-hardened and black oxidised.

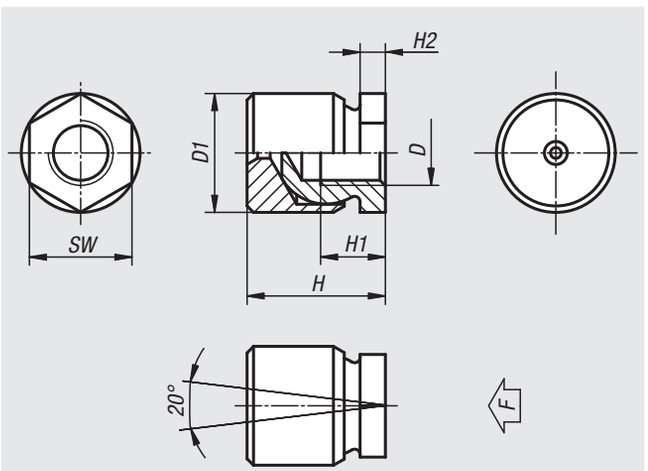
Sample order:
nlm 02090-08



Order No.	D	D1	D2	H	H1
02090-05	5,5	16	10	10	5,7
02090-06	6,6	20	11	12	7
02090-08	9	25	15	16	9
02090-10	11	32	18	20	11
02090-12	13,5	36	20	25	13

02110

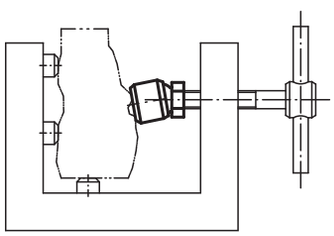
Swivel pads



Material:
Ball element case-hardened steel.
Thrust pad mild steel ETG 100.

Version:
Black oxidised.

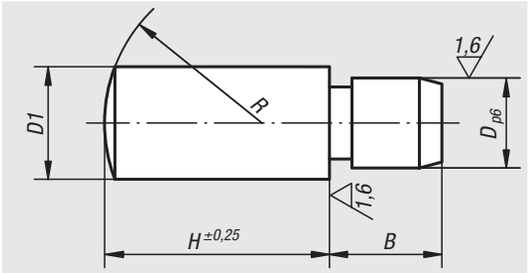
Sample order:
nlm 02110-10



Order No.	D	D1	H	H1	H2	SW	F max. N
02110-05	M5	13	16,5	6,5	4	10	1620
02110-06	M6	13	16,5	8,5	4	10	2330
02110-08	M8	16	21	9	4	13	4150
02110-10	M10	19	23	10	4	17	6480
02110-12	M12	22	25,5	12	4,7	19	8320
02110-16	M16	25	29,5	14	5	24	13940
02110-20	M20	32	36	18	8,5	30	21000

02130

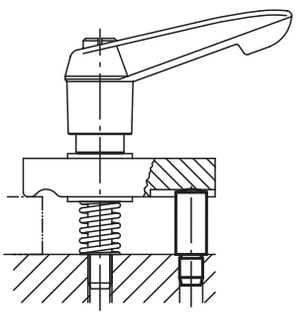
Rest pad



Material:
Hardened steel 1.0301.

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 02130-05X8 (include height H)

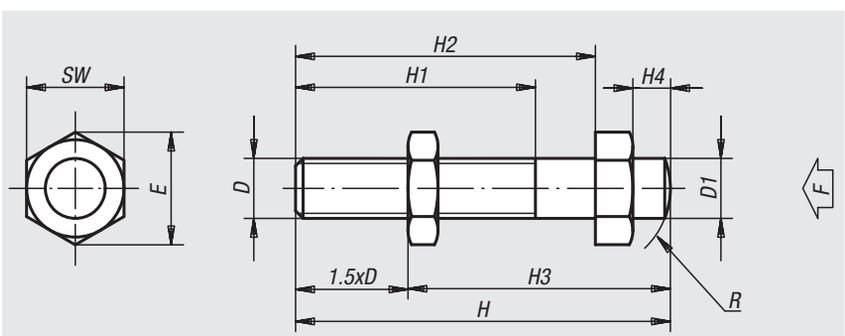


Order No.	H	B	D	D1	R
02130-05X	8/10/12/16	5	4	5	7
02130-06X	10/12/16/20	6	5	6	8
02130-08X	12/16/20/25	8	6	8	11
02130-10X	16/20/25/32	10	8	10	14
02130-12X	20/25/32/40	12	10	12	16
02130-14X	20/25/32/40	14	12	14	20
02130-16X	25/32/40/50	16	14	16	25
02130-20X	25/32/40/50	20	16	20	28

02150

Rest pads adjustable

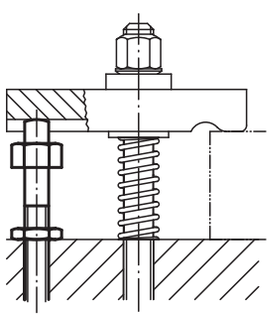
with locknut



Material:
Carbon steel 1.1181.

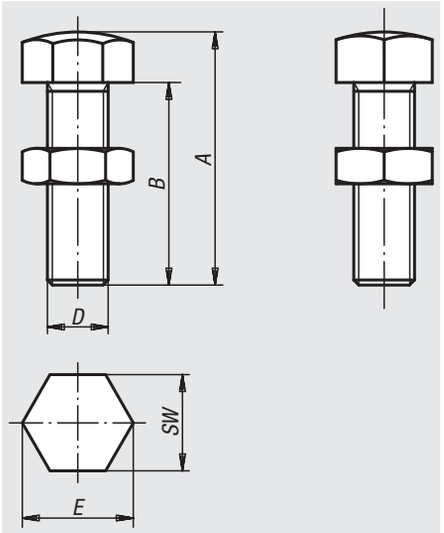
Version:
Surface hardened, black oxidised.

Sample order:
nlm 02150-05



Order No.	D	D1	H	H1	H2	H3 min.	H3 max.	H4	E	SW	R	F approx.N
02150-05	M5	5	50	32	40	20,5	42,5	5	11,5	10	7	1000
02150-06	M6	6	50	32	40	21	41	5	11,5	10	8	1430
02150-08	M8	8	50	32	40	22	38	5	15	13	11	2620
02150-10	M10	10	52	32	40	25	37	5	19,6	17	14	4180
02150-101	M10	10	70	32	56	42	55	6	19,6	17	14	4180
02150-12	M12	12	70	40	56	36	52	6	21,9	19	16	6100
02150-121	M12	12	95	50	80	51	77	6	21,9	19	16	6100
02150-14	M14	14	100	63	80	44	79	8	25,4	22	20	8320
02150-16	M16	16	100	63	80	45	76	8	27,7	24	25	11520
02150-161	M16	16	120	63	100	65	96	8	27,7	24	25	11520
02150-20	M20	20	110	70	88	50	90	10	34,6	30	28	18000

Rest pads



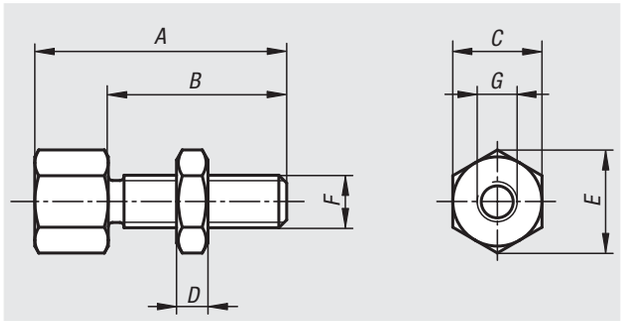
Material:
Carbon steel or brass

Version:
Tempered and black oxidised.

Sample order:
nlm 02153-16055

Order No.	Material	A	B	D	E	SW
02153-06030	tempered steel	30	25	M6	11,5	10
02153-06040	tempered steel	40	35	M6	11,5	10
02153-06050	tempered steel	50	45	M6	11,5	10
02153-08036	tempered steel	36	30	M8	15	13
02153-08046	tempered steel	46	40	M8	15	13
02153-08056	tempered steel	56	50	M8	15	13
02153-10042	tempered steel	42	35	M10	19,6	17
02153-10048	tempered steel	48	40	M10	19,6	17
02153-10058	tempered steel	58	50	M10	19,6	17
02153-10068	tempered steel	68	60	M10	19,6	17
02153-12048	tempered steel	50	42	M12	21,9	19
02153-12070	tempered steel	70	60	M12	21,9	19
02153-12080	tempered steel	80	70	M12	21,9	19
02153-16055	tempered steel	55	45	M16	27,7	24
02153-16075	tempered steel	75	65	M16	27,7	24
02153-16085	tempered steel	85	75	M16	27,7	24
02153-12148	brass	50	42	M12	21,9	19
02153-16155	brass	55	45	M16	27,7	24

Jack screws

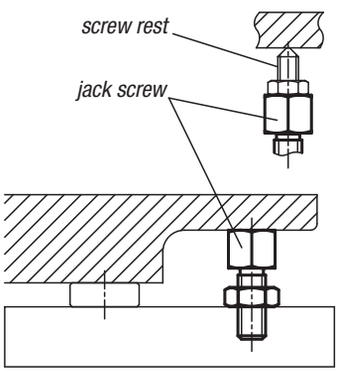


Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 02155-0803006

Adjustable support, accepts various inserts.



Order No.	A	B	C	D	E	F	G
02155-0803006	30	20	13	5	14,4	M8	M6x6
02155-0804006	40	30	13	5	14,4	M8	M6x6
02155-1003808	38	24	17	6	18,9	M10	M8x8
02155-1004808	48	34	17	6	18,9	M10	M8x8
02155-1205110	51	33	22	7	24,5	M12	M10x10
02155-1206610	66	48	22	7	24,5	M12	M10x10
02155-1606212	62	40	27	10	30,1	M16	M12x12
02155-1607712	77	55	27	10	30,1	M16	M12x12

Stop, adjustable

with end position feedback

Material:
Screw and plunger stainless steel 1.4301
Guide bush stainless steel 1.4112
Sensor housing stainless steel.

Version:
Screw and plunger, bright.
Guide bushing, bright.
Sensor housing, bright.
Inductive sensor:
Relay (NO)
Operating voltage 10 - 30 V DC
Operating current 100 mA
Switching distance 0,8
Protection class: IP 67
Connection type: 0,3 m cable, PUR, with plug connector
Temperature range: -25°C - +70°C
Approval: CE, c-UL-us

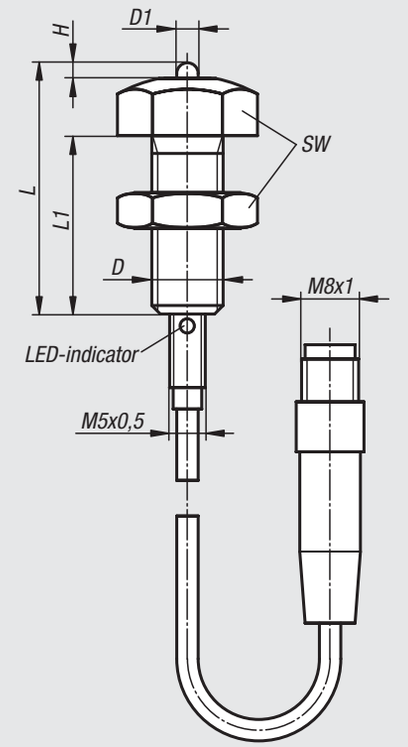
Sample order:
nlm 02160-080352

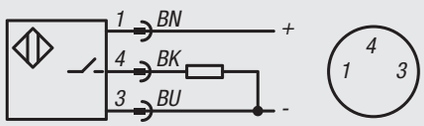
Note:
The ensured sensing distance is achieved if the plunger is actuated flush up to the stop surface of the guide bush. The sensor is supplied unassembled.

Installation recommendation: glue in with Loctite 638.

Caution: screw sensor in until it comes to a stop.

Safety:
The use of adjustable stops is not suitable for protecting people.





Connection diagram:

BN = brown
BK = black
BU = blue

Order No.	Size	D	D1	H	L	L1	SW	Approx. weight kg
02160-080352	1	M8	3	2	35,2	25	13	0,025
02160-100352	2	M10	3	2	35,2	25	17	0,035
02160-120352	3	M12	3	2	35,2	25	19	0,045

02170

Screw rest

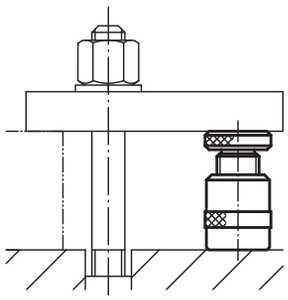
with flat face, steel

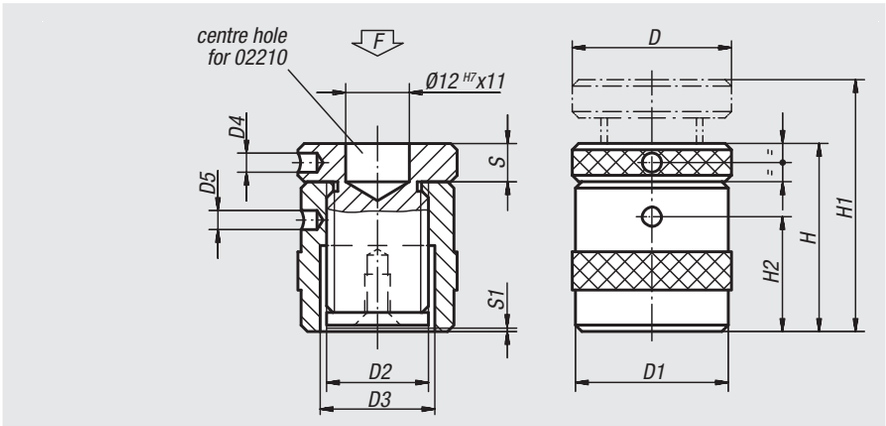
Material:
Carbon steel.

Version:
Painted, trapezoidal thread - self-locking, spindle has end lock

Sample order:
nlm 02170-02

Note:
The version 02170-01 has no Ø 12 centring hole.





Order No.	D	D1	D2	D3	D4	D5	H	H1	H2	S	S1	F max. kN
02170-01	31	31	Tr 20 x 4	23	4	4	38	52	23	8	2	15
02170-015	50	49	Tr 30 x 4	36	6	6	42	52	24	12	2	60
02170-02	50	49	Tr 30 x 4	36	6	6	50	72	30	12	0,5	60
02170-03	50	49	Tr 30 x 4	36	6	6	71	102	43	16	1,5	60
02170-04	65	70	Tr 40 x 7	43	6	6	100	140	58	25	2,5	100
02170-05	70	80	Tr 50 x 8	55	6	6	140	212	90	30	4	170
02170-06	80	100	Tr 65 x 10	70	6	8	190	300	126	34	5	350

02180

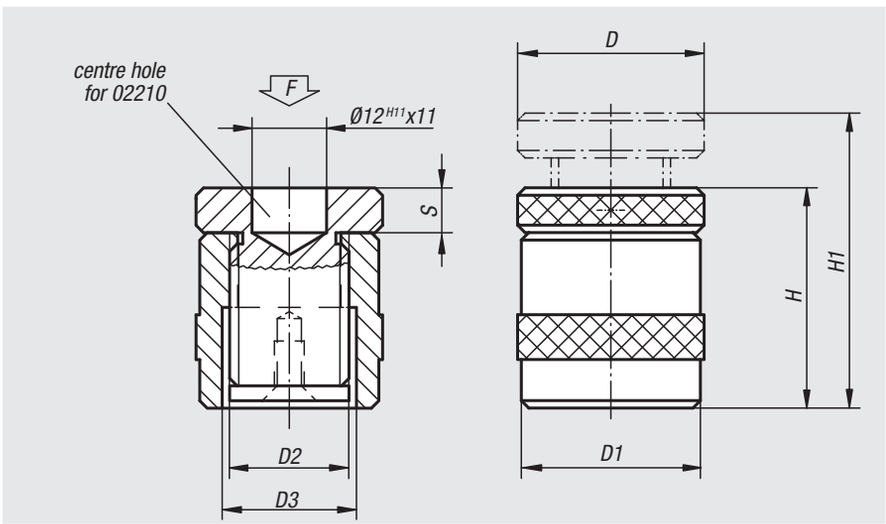
Screw rest

with flat face, aluminium

Material:
Aluminium (400 N/mm² tensile strength).
Spindle carbon steel.

Version:
Self-locking trapezoidal thread, spindle has end lock.

Sample order:
nlm 02180-01



Order No.	D	D1	D2	D3	H	H1	S	F max. kN
02180-01	50	50	Tr 30 x 4	36	42	52	12	30
02180-02	50	50	Tr 30 x 4	36	50	70	12	30
02180-03	50	50	Tr 30 x 4	36	70	100	12	30

02182

Screw rest

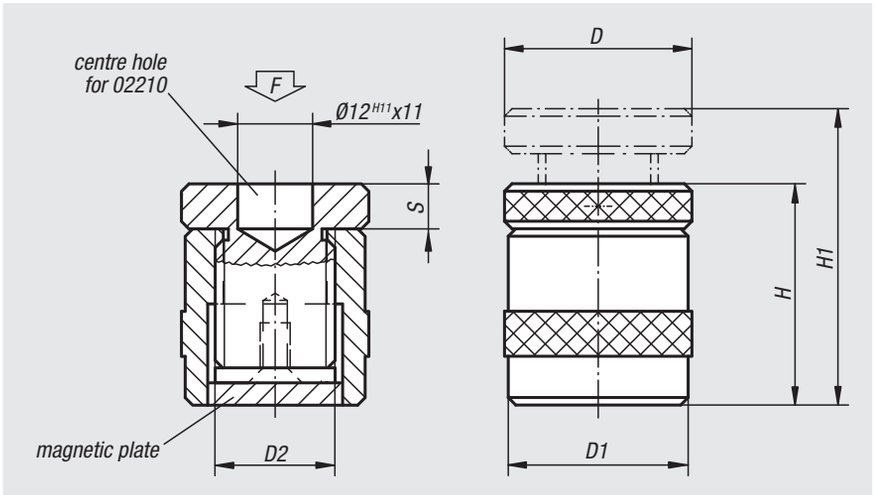
with flat face and magnetic foot, aluminium

Material:
Aluminium (400 N/mm² tensile strength).
Spindle carbon steel.

Version:
Self-locking trapezoidal thread, spindle has end lock.

Sample order:
nlm 02182-01

Note:
Suitable for horizontal and vertical applications. The magnetic foot allows durable and accurate vertical positioning of the workpiece.



Order No.	D	D1	D2	H	H1	S	F max. kN
02182-01	50	50	Tr 30 x 4	52	62	12	30
02182-02	50	50	Tr 30 x 4	60	80	12	30
02182-03	50	50	Tr 30 x 4	80	110	12	30

02190

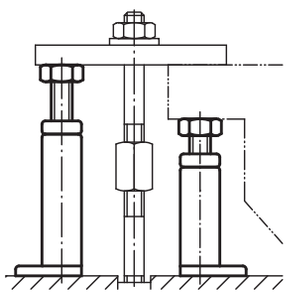
Atlas jack

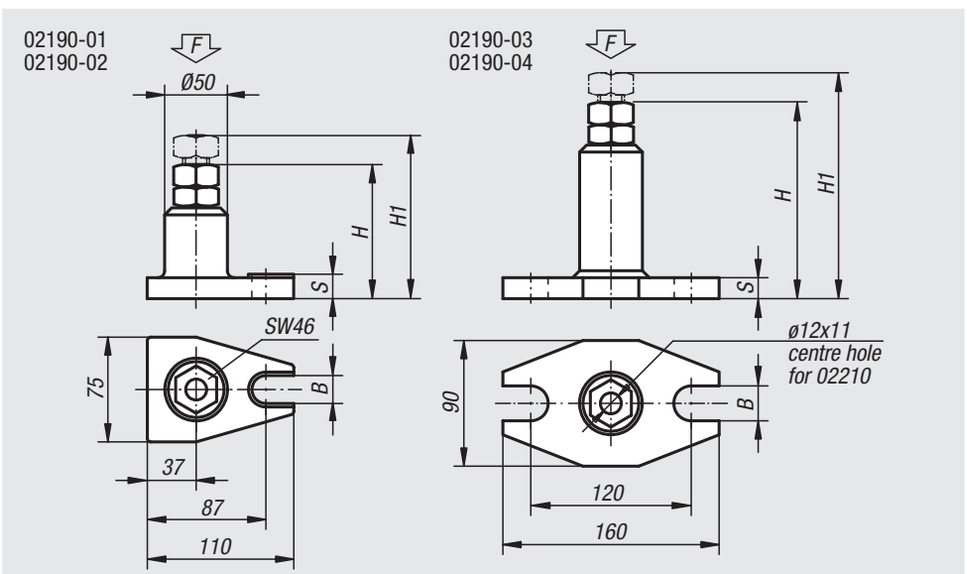
with locknut

Material:
Carbon steel.

Version:
Hammertone, spindle with 30 x 6 trapezoidal thread.

Sample order:
nlm 02190-03





Order No.	Adjustment range	base plate	H	H1	B	S	F kN
02190-01	100 - 140	76x111	100	140	18	17	60
02190-02	140 - 200	76x111	140	200	18	17	60
02190-03	200 - 320	90x160	200	320	22	22	40
02190-04	320 - 540	90x160	320	540	22	25	25

Screw rest inserts

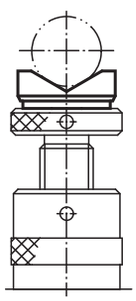
spherical, centring disc, prism, locating pin, revolving ball

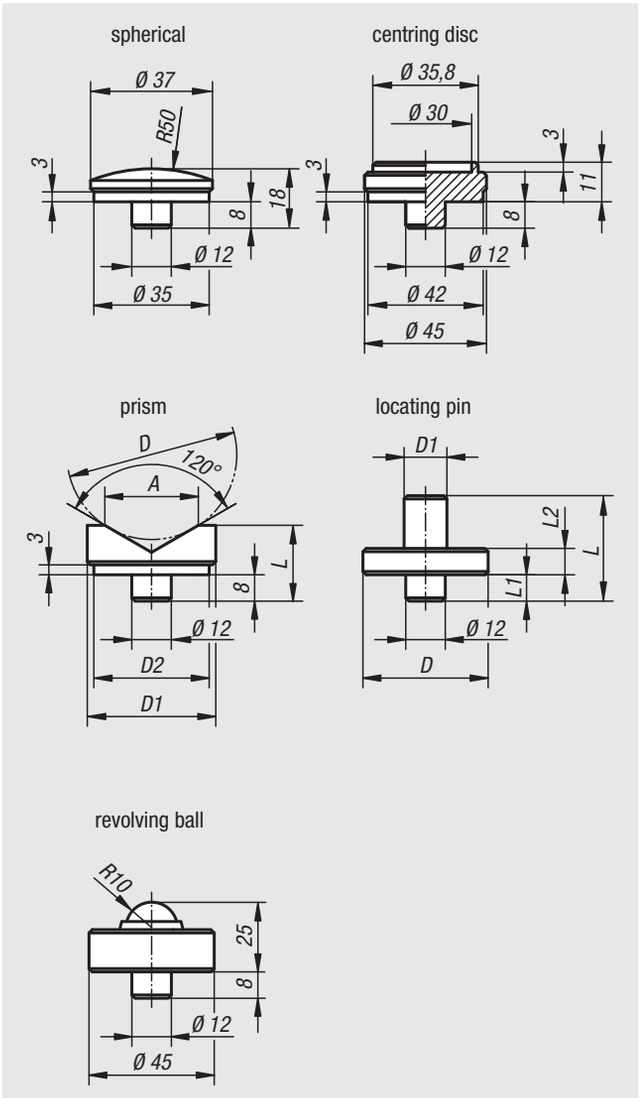
Material:
Carbon steel.

Version:
Tempered and black oxidised.
Ball hardened.

Sample order:
nlm 02210-021

Note:
Can be used with
02170
02180
02182
02190
02320
02330-020
02350-010





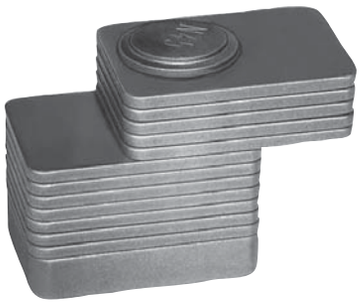
Order No.	Version
02210-01	spherical
02210-03	centring disc

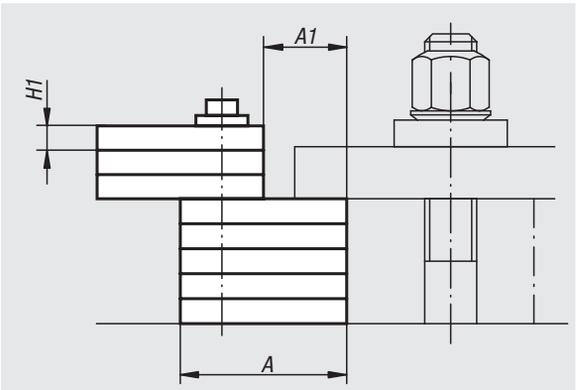
Order No.	Version	D max.	D min.	D1	D2	L	A
02210-02	prism	50	10	45	42	23	32
02210-021	prism	100	22	65	62	38	56

Order No.	Version	D	D1	L	L1	L2
02210-04	locating pin	63	14	40	8	12
02210-041	locating pin	78	25	53	8	15

Order No.	Version	F max. kN
02210-05	revolving ball	30

Support blocks compact



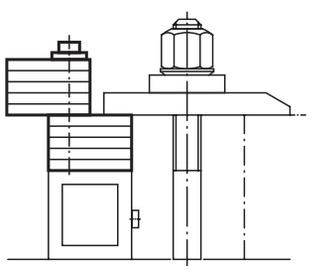


Material:
Carbon steel.

Version:
tempered.

Sample order:
nlm 02240-75

Note:
Compact support blocks are a stack of steel plates which are permanently pinned together. The plates can be individually rotated and engage at 90°, allowing the block to be used horizontally and vertically.
Any required support height can be quickly set. All sizes can be combined.



Order No.	Version	max. clamping height	support steps	H1	Base surface A x B	Clamping surface A1 x B
02240-30	support block only	30	11	2	50x35	20x35
02240-46	support block only	46	13	3	50x35	20x35
02240-85	support block only	85	26	3	50x35	20x35
02240-50	support block only	48	11	4	60x50	26x50
02240-102	support block only	102	24	4	60x50	26x50
02240-75	support block only	77	14	5	90x80	40x80
02240-150	support block only	153	29	5	90x80	40x80
02240-35	block with magnetic base	35	11	2	50x35	20x35
02240-51	block with magnetic base	51	13	3	50x35	20x35
02240-55	block with magnetic base	55	11	4	60x50	26x50

02270

Step blocks

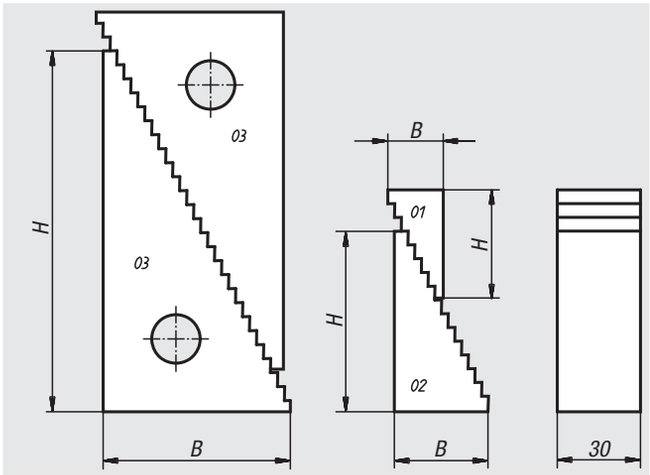
Material:
Carbon steel.

Version:
Painted

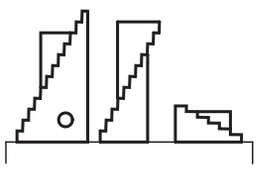
Sample order:
nlm 02270-02

Note:
For step block sets, see 02310.
Step blocks can also be used together with stepped-heel clamp straps 04070.

Vertical step height: 4.65 mm
Horizontal step height: 2.3 mm



application example:



Order No.	B	H	Support height max.	Support height min.
02270-01	19	32	51	22
02270-02	35,5	65	107	39
02270-03	68	130	208	71

02310

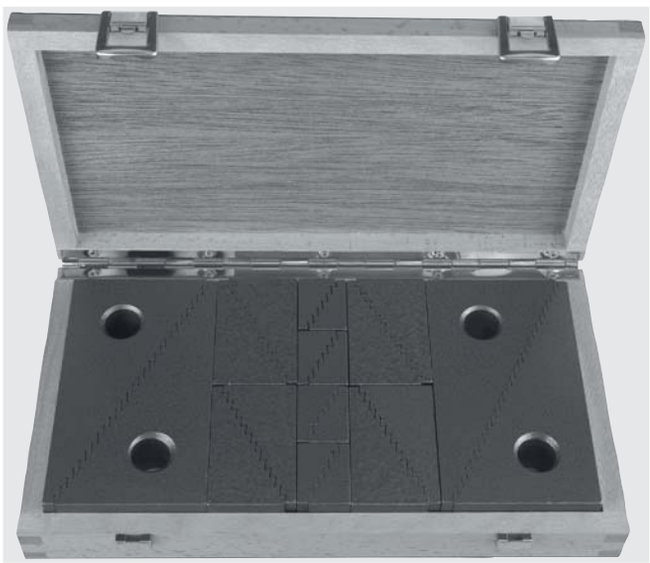
Step block sets

Material:
Carbon steel.

Version:
Painted

Sample order:
nlm 02310-01

Note:
The special tooth form allow these blocks to be used vertically or horizontally. The complete set in a wooden box comprises 20 parts which are interchangeable and provide many possible uses. These blocks can also be ordered separately, see 02270. Step blocks can also be used together with stepped-heel clamp straps 04070.



Order No.	Content	Support height mm	Box dimensions mm
02310-01	8 blocks No. 01 8 blocks No. 02 4 blocks No. 03	from 22 up to 208	280 x 155 x 40

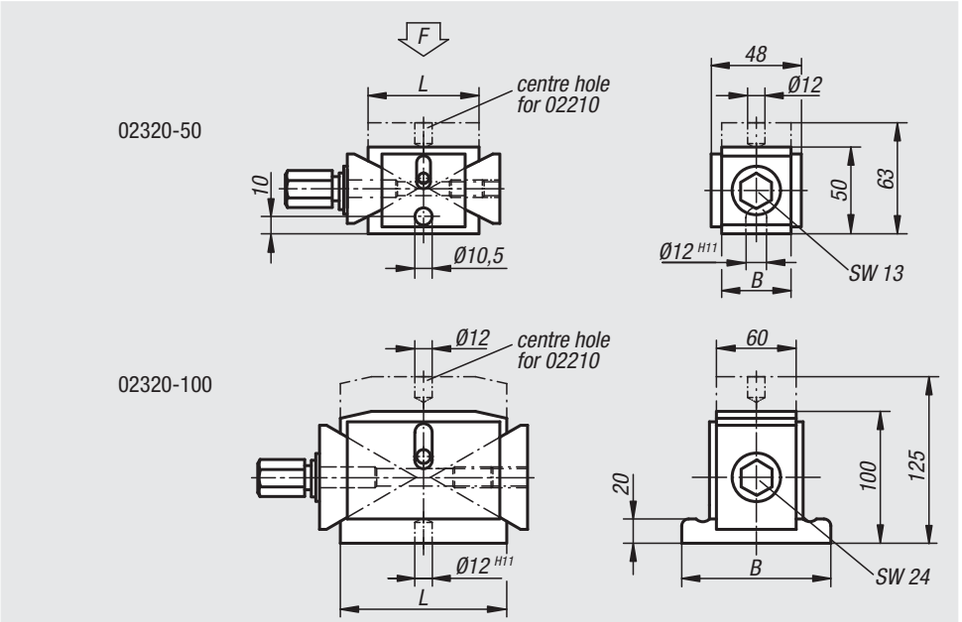
Wedge supports

Material:
Carbon steel and ductile iron.

Version:
Tempered and black oxidised.
Wedge faces fine machined.

Sample order:
nlm 02320-50

Note:
Fine adjustments made using knurled screw or hexagon key. Vertical movement with no lateral shift. Particularly suited for marking out or machining heavy parts. A spherical insert 02210-01 is included with every support wedge.



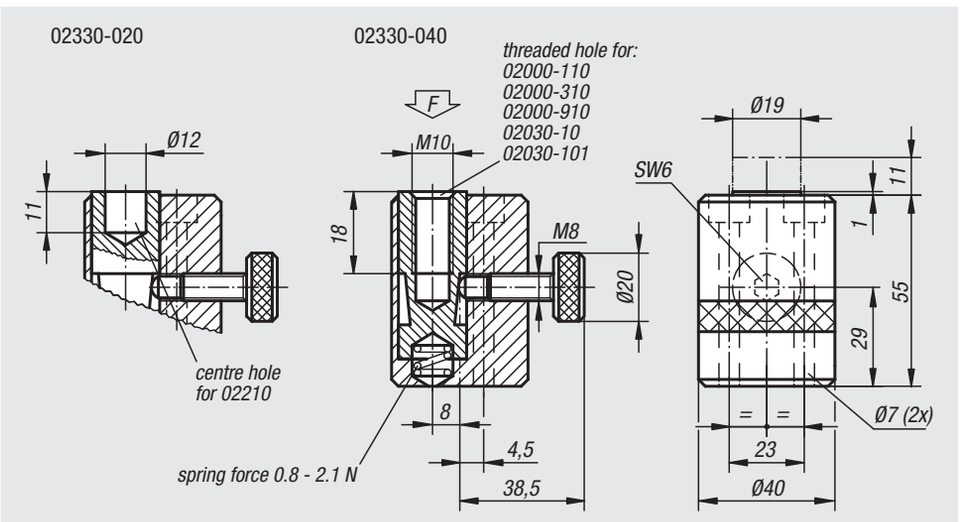
Order No.	Clamp range	L	B	travel per spindle rotation	F kN
02320-50	50 - 63	63	40	0,86	40
02320-100	100 - 125	125	115	1,16	100

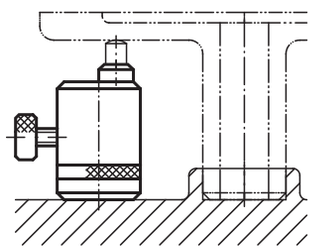
Support elements cylindrical

Material:
Carbon steel 1.1181.

Version:
Black oxidised.

Sample order:
nlm 02330-40





Order No.	F max. N
02330-020	4000
02330-040	4000

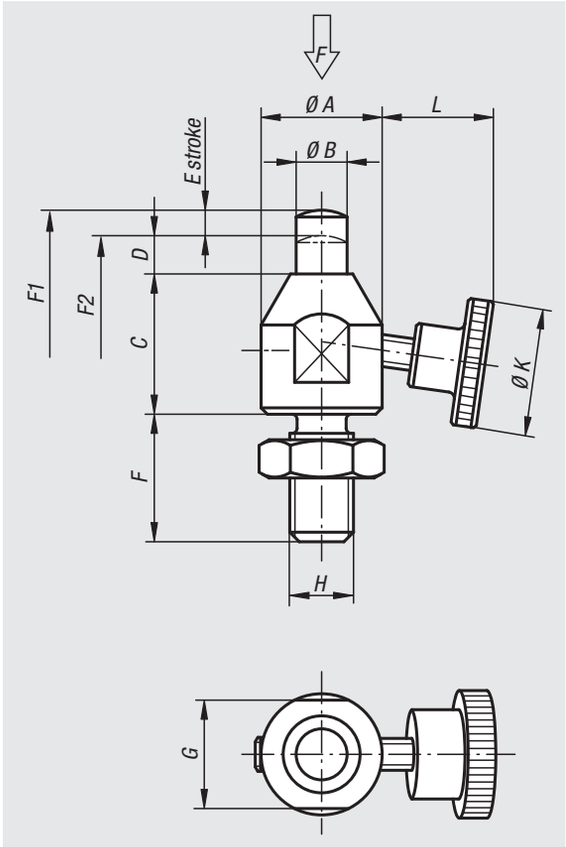
Workpiece supports

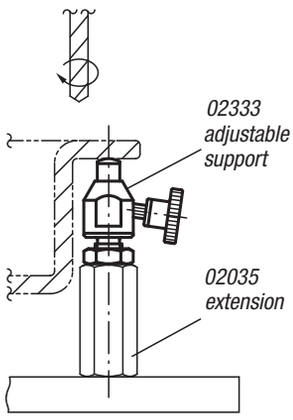
adjustable

Material:
Carbon steel.

Version:
Body black oxidised.
Rest pad hardened and black oxidised.

Sample order:
nlm 02333-08023





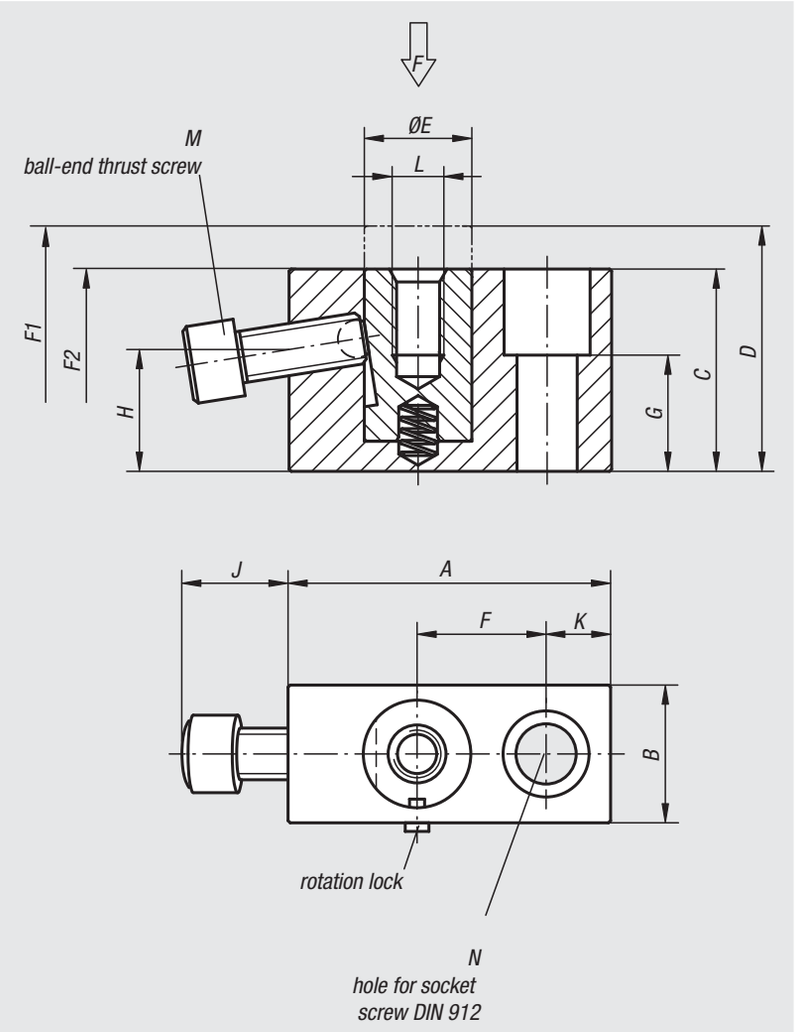
Order No.	A	B	C	D	E	F	G	H	K	L	F N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
02333-08023	15	6	18	5	3	16	13	M8	20	13,2	200	1,5	3
02333-10028	19	8	22	6	4	20	17	M10	25	16,3	300	1,8	3
02333-12031	22	10	25	6	4	24	19	M12	28	22,3	400	1,8	3

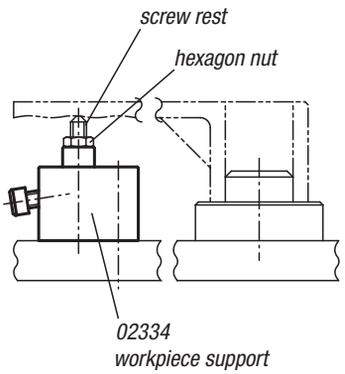
Workpiece supports

Material:
Carbon steel.

Version:
Body black oxidised.
Thrust pin tempered and black oxidised.

Sample order:
nlm 02334-06029





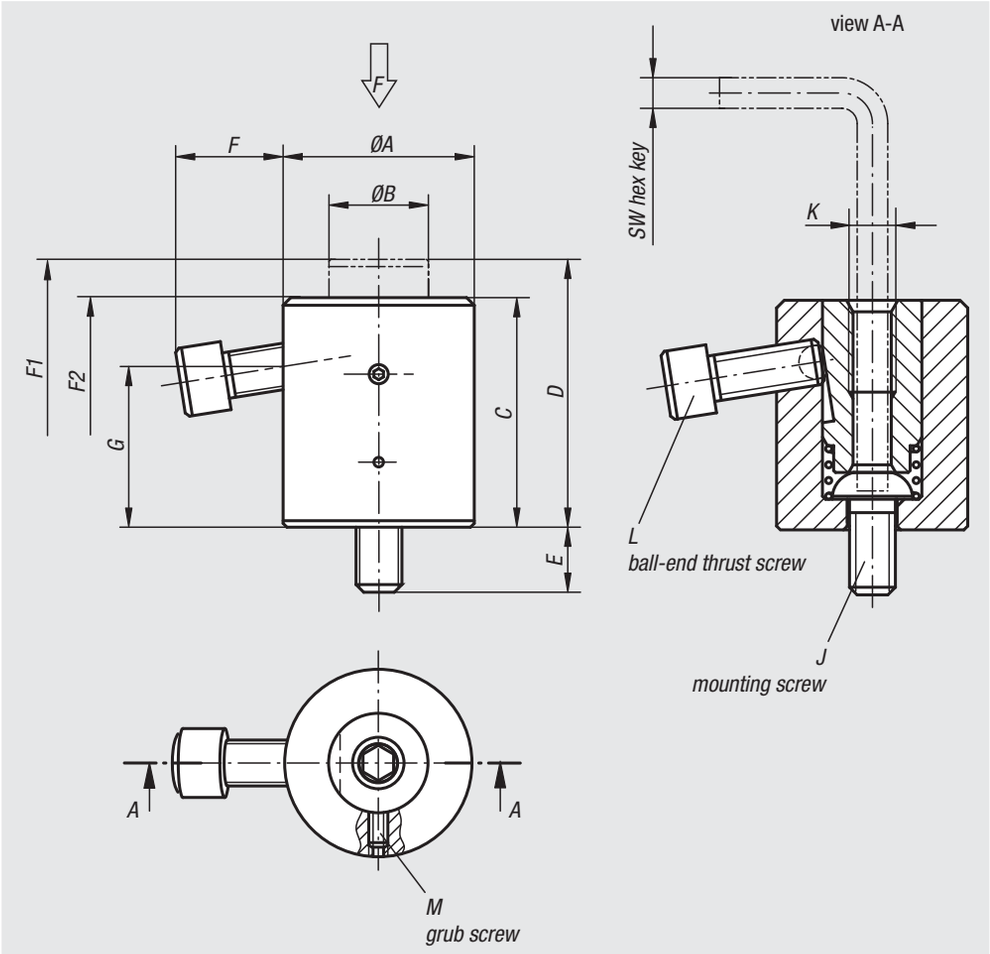
Order No.	A	B	C	D	E	F	G	H	J	K	L	M	N	F N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
02334-06029	38	19	29	35	12	15	15	17,6	13	8	M6x10	M6x16	M6	4000	0	6
02334-08037	50	22	37	47	16	20	20	21,1	16	10	M8x15	M8x20	M8	6000	0	7
02334-12047	75	32	47	57	25	30	27	28,3	25	15	M12x20	M12x30	M12	9000	1	11

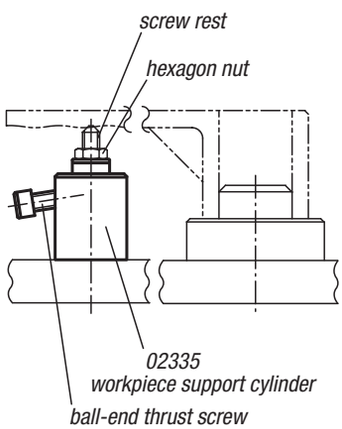
Workpiece support cylinders

Material:
Carbon steel.

Version:
Body black oxidised.
Thrust pin hardened and black oxidised.

Sample order:
nlm 02335-06039





Order No.	A	B	C	D	E	F	G	J	K	L	M	SW	F N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
02335-06039	28	14	33	39	10	13,1	22,2	M6	M6x12	M6x16	M4x8	4	4000	10	22
02335-08052	35	19	42	52	14	17,2	27,5	M8	M8x16	M8x20	M4x8	5	6000	10	27
02335-12070	50	26	60	70	16	28,1	42,1	M12	M12x24	M12x30	M5x12	8	9000	15	30
02335-16080	60	33	70	80	22	26,6	47,4	M16	M16x32	M12x30	M5x15	10	9000	15	35

Support element

Material:
Main body hardened steel.
Housing aluminium.

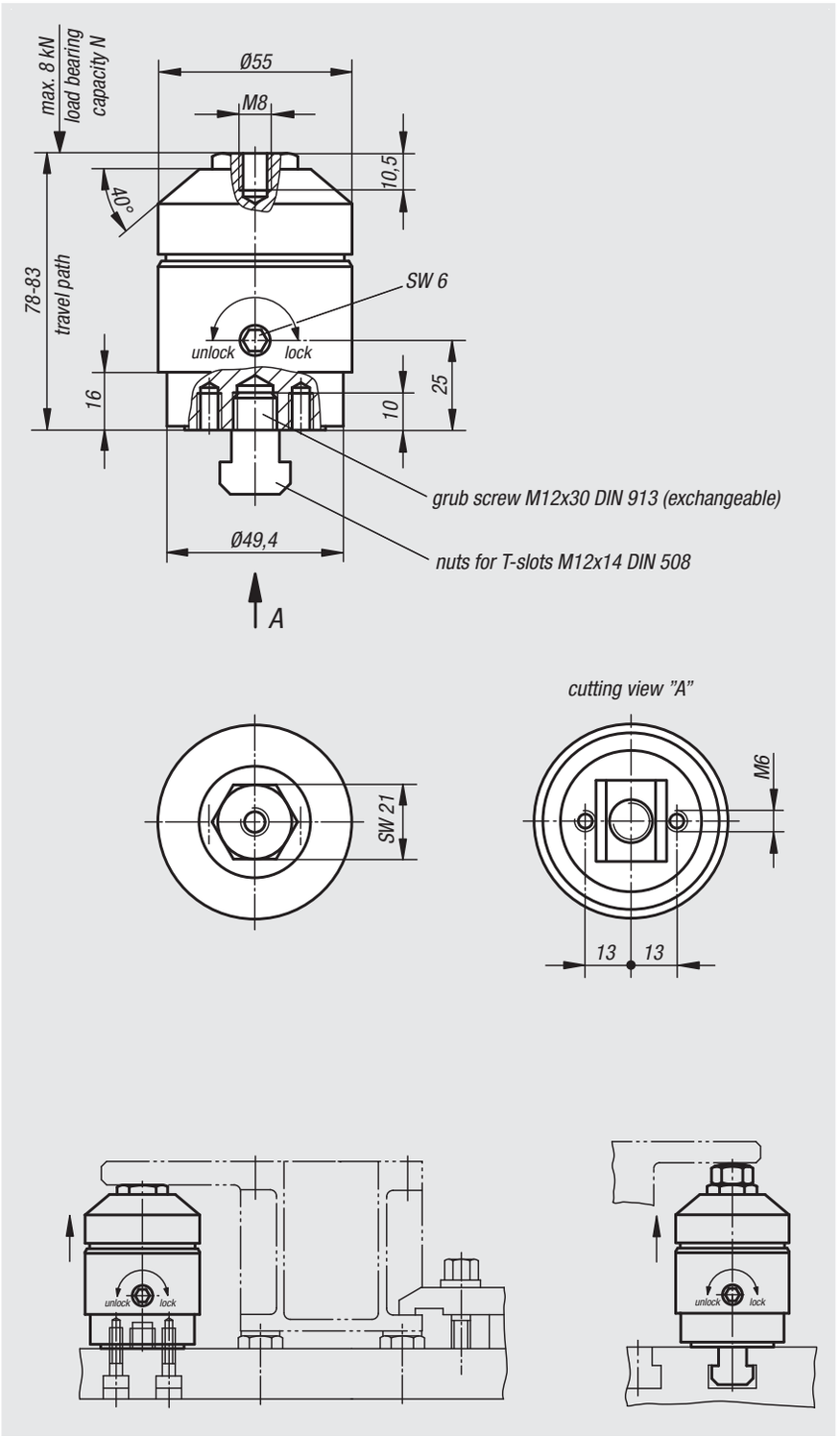
Version:
Main body nitrated, manganese phosphated and ground.
Housing red anodized.

Sample order:
nlm 02340-0508

Note:
The support element is for supporting overhanging workpiece parts. It prevents vibration and bending during machining.

Method of operation:
1. Turn the cam screw (hex. socket SW 6) on the side of the housing, the support bolt will move out under light spring load until it makes contact with the workpiece.
2. Continue to turn to „lock“ position. The support bolt locks without changing position.
3. Turn the cam screw in the opposite direction and the support bolt will unlock. Continue turning to the „unlock“ position and the support bolt will slide back into the body.

Assembly:
Mount the support element to the fixture using the two M6 tapped holes.
Alternatively: Exchange the M12x10 plug screw for a M12x30 grub screw and mount the support directly onto the machine table with a T-nut.
For safe operation the M12 tapped hole must always be filled.
It is possible to countersink the support element by 16 mm.
Various rest pads can be mounted into the M8 tapped hole on the support bolt.
Supplied with M12x30 grub screw and M12 nut for T-slots (DIN 508).



Order No.	Load capacity N	Travel path
02340-0508	8000	5

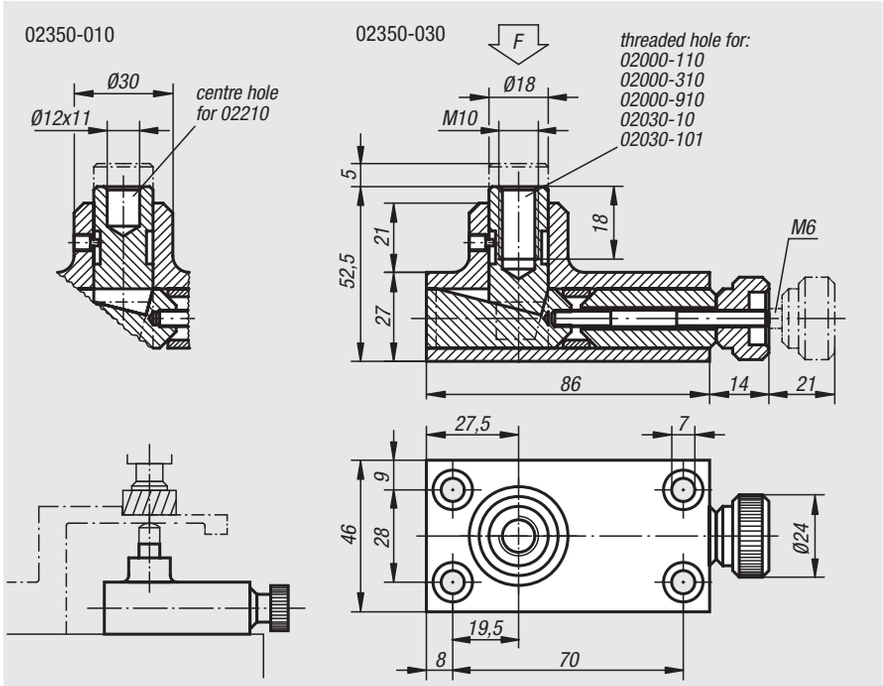
02350

Rectangular support elements

Material:
Casing GJL 250, thrust pads and locking parts carbon steel.

Version:
Housing painted, steel parts black oxidised.

Sample order:
nlm 02350-030



Order No.	F max. kN
02350-010	30
02350-030	30

02360

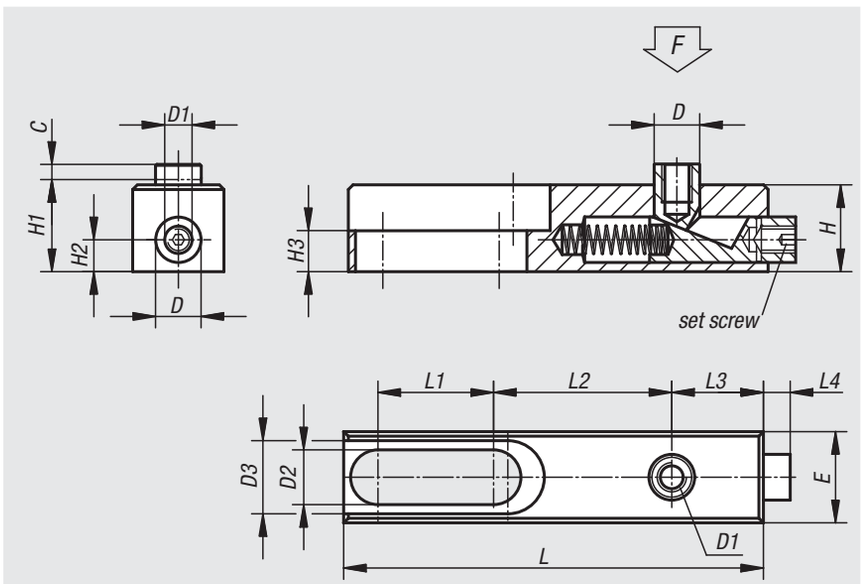
Workpiece supports

Material:
Steel.

Version:
Case-hardened, black oxidised and ground

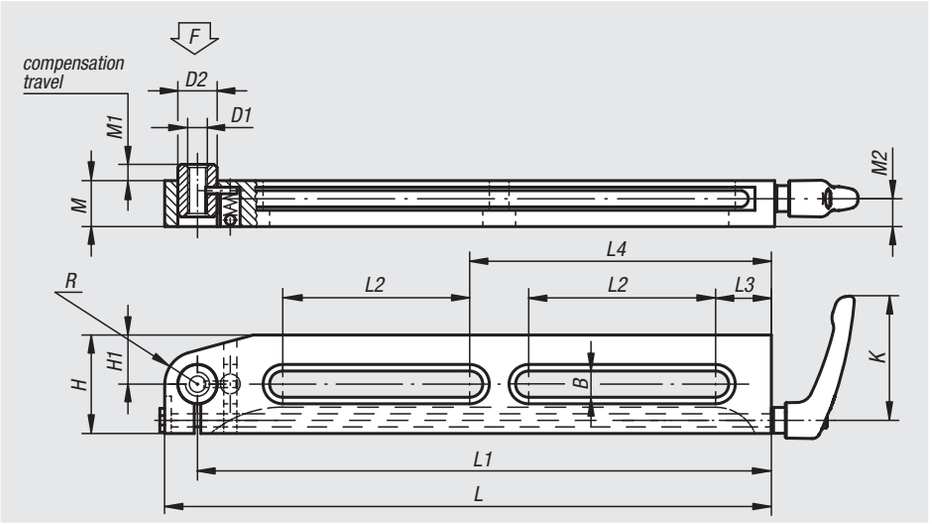
Sample order:
nlm 02360-006

Note:
These supports are placed under long or thin workpieces to prevent vibration or bending during milling, drilling, grinding or shaping operations.



Order No.	C	D	D1	D2	D3	E	H	H1	H2	H3	L	L1	L2	L3	L4	F kN
02360-006	4	10	M6	8,2	16,2	20	19	19,5	7	9	92	25,5	39	20	6	3
02360-010	6	16	M10	12,5	24,4	30	30	31	10	10	149	44	61	32	11	15

Workpiece supports



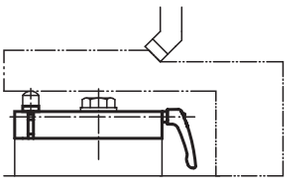
Material:
Steel.

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 02380-150

Note:
These supports are placed under long or thin workpieces to prevent vibration or bending during milling, drilling, grinding or shaping operations. The support can be accurately placed without the need to reach under the workpiece. The support pin contacts the workpiece under light pressure. It can be tightened in any position. Various types of pins can be screwed into the tapped hole in the thrust pin to adapt the support height.

The supports 02380-075, 02380-150 and 02380-170 have only 1 slot.



Order No.	K	L	L1	L2	L3	L4	B	H	H1	D1	D2	M	M1	M2	R	F (N)
02380-75	65	85	75	35	13	-	8,5	30	10	M8	13	19,5	3	11,5	-	500
02380-150	80	165	150	90	20	-	13	50	25	M10	20	24	6	14	15	2500
02380-170	110	190	170	100	25	-	17	60	20	M16	26	34	11	21,5	-	5000
02380-300	80	315	300	100	30	160	13	50	25	M10	20	24	6	14	15	2500

02385

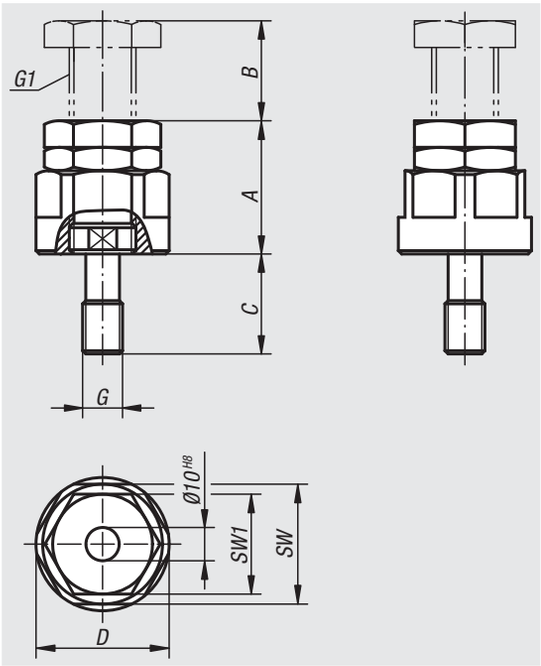
Jack screws

Material:
Carbon steel.

Version:
Black oxidised.
Adjustment spindle tempered.

Sample order:
nlm 02385-16100

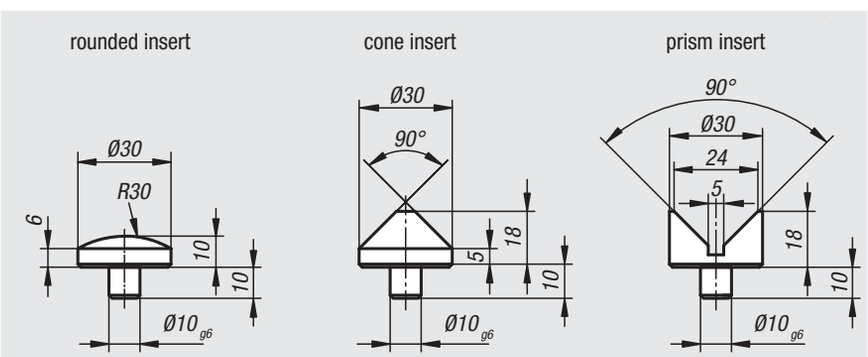
Note:
Use the inserts 02387 to adapt the contact face to requirements.



Order No.	A min.	B max.	C	D	SW	SW1	G	G1
02385-12040	40	10	30	40	36	30	M12	M20x1,5
02385-12050	50	20	30	40	36	30	M12	M20x1,5
02385-12070	70	40	30	40	36	30	M12	M20x1,5
02385-12100	100	50	30	50	46	36	M12	M24x2
02385-12150	150	100	30	50	46	36	M12	M24x2
02385-16040	40	10	30	40	36	30	M16	M20x1,5
02385-16050	50	20	30	40	36	30	M16	M20x1,5
02385-16070	70	40	30	40	36	30	M16	M20x1,5
02385-16100	100	50	30	50	46	36	M16	M24x2
02385-16150	150	100	30	50	46	36	M16	M24x2

02387

Inserts



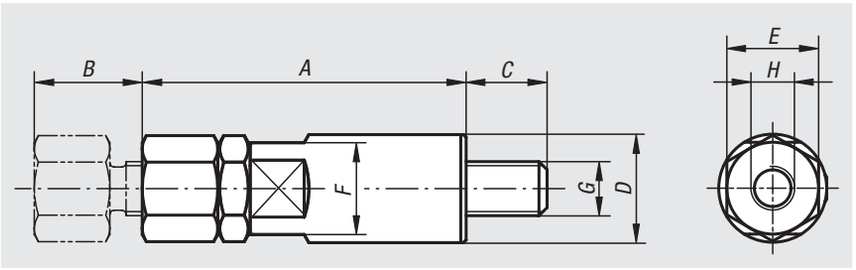
Material:
Carbon steel.

Version:
Tempered to 1100-1200 N/mm^2, black oxidised.

Sample order:
nlm 02387-02

Order No.	Version
02387-01	rounded insert
02387-02	cone insert
02387-03	prism insert

Jack screws extended

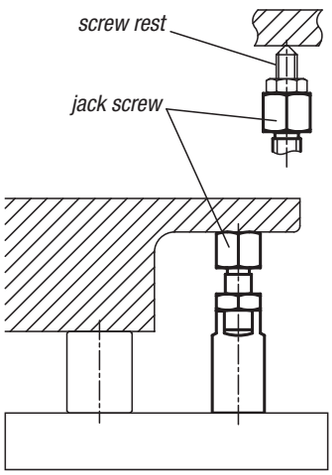


Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 02388-08040

Adjustable support that accepts various rests.



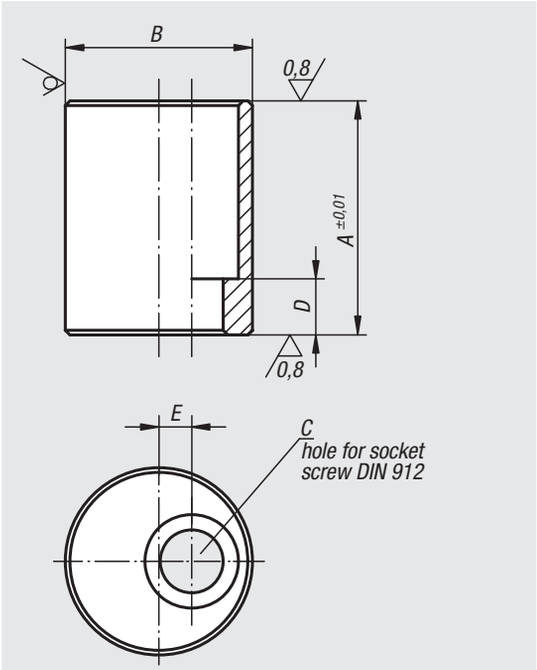
Order No.	A	B	C	D	E	F	G	H
02388-08040	40	10	12	16	13	13	M8	M6x6
02388-08050	50	20	12	16	13	13	M8	M6x6
02388-10050	50	10	14	20	17	17	M10	M8x8
02388-10060	60	20	14	20	17	17	M10	M8x8
02388-12065	65	15	19	24	22	22	M12	M10x10
02388-12080	80	30	19	24	22	22	M12	M10x10
02388-16080	80	15	24	32	27	27	M16	M12x12
02388-16095	95	30	24	32	27	27	M16	M12x12

Eccentric supports

Material:
Special steel alloy.

Version:
Tempered, black oxidised.
Contact faces ground.

Sample order:
nlm 02390-10040



Order No.	A	B	C thru hole for	D	E
02390-08016	16	25	M8	7	3,5
02390-08020	20	25	M8	7	3,5
02390-08025	25	25	M8	7	3,5
02390-08032	32	25	M8	7	3,5
02390-08040	40	25	M8	7	3,5
02390-08050	50	25	M8	7	3,5
02390-10020	20	32	M10	9	5
02390-10025	25	32	M10	9	5
02390-10032	32	32	M10	9	5
02390-10040	40	32	M10	9	5
02390-10050	50	32	M10	9	5
02390-10063	63	32	M10	9	5
02390-12020	20	40	M12	7	7
02390-12025	25	40	M12	12	7
02390-12032	32	40	M12	12	7
02390-12040	40	40	M12	12	7
02390-12050	50	40	M12	12	7
02390-12063	63	40	M12	12	7
02390-12080	80	40	M12	22	7
02390-12100	100	40	M12	22	7
02390-12125	125	40	M12	22	7
02390-16025	25	50	M16	8	10
02390-16032	32	50	M16	15	10
02390-16040	40	50	M16	15	10
02390-16050	50	50	M16	15	10
02390-16063	63	50	M16	15	10
02390-16080	80	50	M16	35	10
02390-16100	100	50	M16	35	10
02390-16125	125	50	M16	35	10

03000

Spring plungers
Indexing plungers
Stops
Centring and positioning components
Locking pins
T-slot nuts

Notes

Spring plungers with LONG-LOK thread lock

LONG-LOK, the most advanced thread locking mechanism

With the following crucial advantages:

1. Vibration resistant.

The integrated LONG-LOK thread lock secures spring plungers rationally and economically. No loosening or falling out after impacts, knocks or vibrations.

2. Extremly high loosening torque.

The elastic nylon insert is squeezed like a wedge between the internal and external threads. The nylon locking system pushes the play between the threads to one side causing surface pressure on the thread flanks. The resulting loosening torque is higher than that by most conventional mechanical methods.

3. Secure in every position.

The LONG-LOK thread lock requires neither initial tension nor any defined position. This is ideal for the positioning of the spring plungers.

4. Saves assembly time and stocking space.

The LONG-LOK thread lock is integrated into spring plungers. There are no additional components. No circlips, no spring washers, no locking nuts. As a result, assembly and stocking costs are reduced considerably.

5. For repeated use.

When using the LONG-LOK thread lock for the first time, it requires a slightly higher tightening torque. After third or fourth use, the last reached value remains nearly constant for about 20 times.

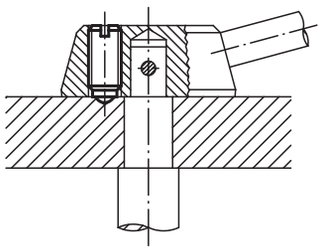
6. Problem solver from M3 to M16.

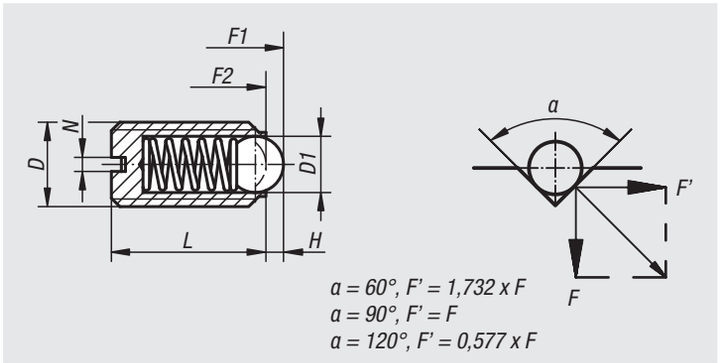
Light-weight or heavy-weight: name your requirements! We will supply you with the suitable spring plungers with integrated LONG-LOK thread lock.

Spring plungers

with slot and ball, steel

handle indexing





Material:
Sleeve steel grade 5.8.
Ball steel.
Spring in spring steel class D.

Version:
Black oxidised.
Ball hardened.

Sample order:
nlm 03000-203

Spring plungers with slot and ball, standard spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03000-03	M3	1,5	7	0,4	0,4	1,5	3
03000-04	M4	2,5	9	0,8	0,6	4	10
03000-05	M5	3	12	0,9	0,8	6	11
03000-06	M6	3,5	14	1	1	9	13
03000-08	M8	5	16	1,5	1,2	15	30
03000-10	M10	6	19	2	1,6	20	35
03000-12	M12	8	22	2,5	2	30	55
03000-16	M16	10	24	3,5	2,5	65	125
03000-20	M20	12	30	4,5	2,5	80	160

Spring plungers with slot and ball, reinforced spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03000-203	M3	1,5	7	0,4	0,4	5	7
03000-204	M4	2,5	9	0,8	0,6	12	22
03000-205	M5	3	12	0,9	0,8	19	30
03000-206	M6	3,5	14	1	1	28	40
03000-208	M8	5	16	1,5	1,2	47	73
03000-210	M10	6	19	2	1,6	66	100
03000-212	M12	8	22	2,5	2	66	120
03000-216	M16	10	24	3,5	2,5	90	180
03000-220	M20	12	30	4,5	2,5	115	240

Spring plungers with slot and ball, long version, standard spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03000-404	M4	2,5	16	0,8	0,6	4	10
03000-405	M5	3	20	0,9	0,8	6	11
03000-406	M6	3,5	25	1	1	9	13
03000-408	M8	5	30	1,5	1,2	15	30
03000-410	M10	6	35	2	1,6	20	35
03000-412	M12	8	40	2,5	2	30	55
03000-416	M16	10	45	3,5	2,5	65	125

Spring plungers

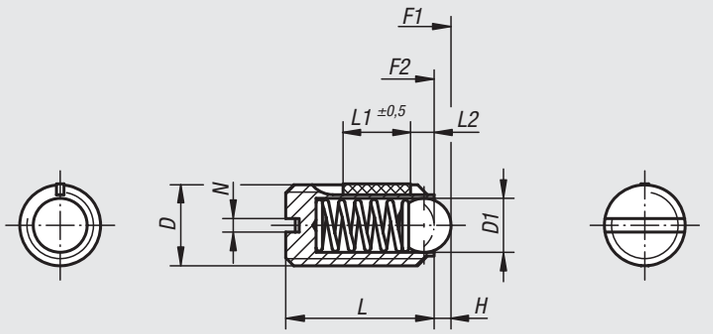
with slot and ball, LONG-LOK secured, steel

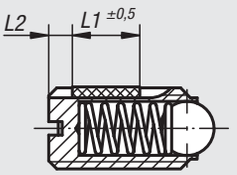
Material:
Sleeve steel grade 5.8.
Ball steel.
Spring in spring steel class D.

LONG-LOK thread lock nylon.

Version:
Black oxidised.
Ball hardened.

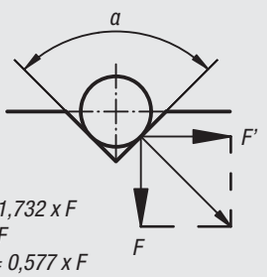
Sample order:
nlm 03001-12





applies to models with
D = M3, M4, M5 and M6

L2 = approx. 2x thread pitch



a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Spring plungers with slot and ball, standard spring, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03001-03	M3	1,5	7	4	0,4	0,4	1,5	3	0,10	0,07
03001-04	M4	2,5	9	5	0,8	0,6	4	10	0,18	0,12
03001-05	M5	3	12	6	0,9	0,8	6	11	0,12	0,08
03001-06	M6	3,5	14	7	1	1	9	13	0,43	0,21
03001-08	M8	5	16	8	1,5	1,2	15	30	1,09	0,37
03001-10	M10	6	19	9	2	1,6	20	35	1,36	0,62
03001-12	M12	8	22	10	2,5	2	30	55	2,03	1,36
03001-16	M16	10	24	14	3,5	2,5	65	125	3,95	2,95

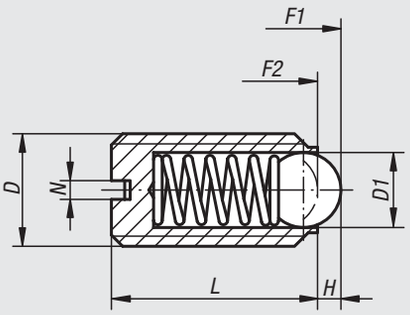
Spring plungers with slot and ball, reinforced spring, LONG-LOK secured

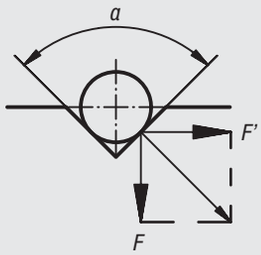
Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03001-203	M3	1,5	7	4	0,4	0,4	5	7	0,10	0,07
03001-204	M4	2,5	9	5	0,8	0,6	12	22	0,18	0,12
03001-205	M5	3	12	6	0,9	0,8	19	30	0,12	0,08
03001-206	M6	3,5	14	7	1	1	28	40	0,43	0,21
03001-208	M8	5	16	8	1,5	1,2	47	73	1,09	0,37
03001-210	M10	6	19	9	2	1,6	66	100	1,36	0,62
03001-212	M12	8	22	10	2,5	2	66	120	2,03	1,36
03001-216	M16	10	24	14	3,5	2,5	90	180	3,95	2,95

03004

Spring plungers

with slot and POM ball





α = 60°, F' = 1,732 x F
α = 90°, F' = F
α = 120°, F' = 0,577 x F

Material:
Sleeve, plastic.
Ball POM.
Spring 1.4310.

Version:
Ball, white.

Sample order:
nlm 03004-10

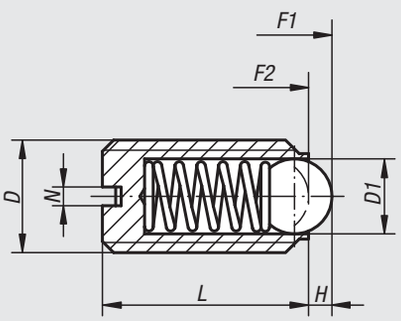
Note:
Spring plungers are used for indexing and positioning. They can also be used as ejectors.

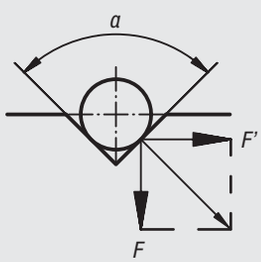
Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03004-06	M6	3,5	14	1	1	9	13
03004-08	M8	5	16	1,5	1,2	15	30
03004-10	M10	6	19	2	1,6	20	40

03008

Spring plungers

with slot and ceramic ball, stainless steel





α = 60°, F' = 1,732 x F
α = 90°, F' = F
α = 120°, F' = 0,577 x F

Material:
Sleeve 1.4305.
Ceramic ball Si_3N_4.
Spring 1.4310.

Version:
Bright.

Sample order:
nlm 03008-05

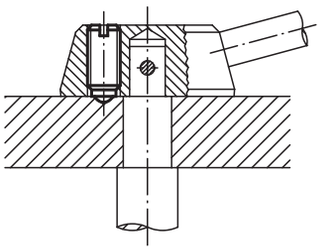
Note:
The combination of excellent material properties is a special feature of silicon nitride (Si_3N_4). These include, for example, high tenacity and stability, excellent wear resistance and efficient chemical resistance.

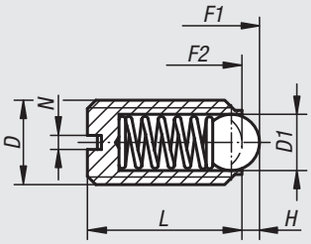
Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03008-05	M5	3	12	0,9	0,8	6	11
03008-06	M6	3,5	14	1	1	9	13
03008-08	M8	5	16	1,5	1,2	15	30
03008-10	M10	6	19	2	1,6	20	35
03008-12	M12	8	22	2,5	2	30	55
03008-16	M16	10	24	3,5	2,5	65	125

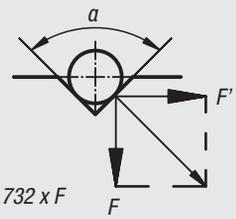
Spring plungers

with slot and ball, stainless steel

handle indexing







a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Material:
Sleeve 1.4305.
Ball 1.4034.
Spring 1.4310.

Version:
Bright. Ball hardened.

Sample order:
nlm 03010-203

Spring plungers with slot and ball, standard spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03010-03	M3	1,5	7	0,4	0,4	1,5	3
03010-04	M4	2,5	9	0,8	0,6	4	10
03010-05	M5	3	12	0,9	0,8	6	11
03010-06	M6	3,5	14	1	1	9	13
03010-08	M8	5	16	1,5	1,2	15	30
03010-10	M10	6	19	2	1,6	20	35
03010-12	M12	8	22	2,5	2	30	55
03010-16	M16	10	24	3,5	2,5	65	125
03010-20	M20	12	30	4,5	2,5	80	160

Spring plungers with slot and ball, reinforced spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03010-203	M3	1,5	7	0,4	0,4	5	7
03010-204	M4	2,5	9	0,8	0,6	12	22
03010-205	M5	3	12	0,9	0,8	19	30
03010-206	M6	3,5	14	1	1	28	40
03010-208	M8	5	16	1,5	1,2	47	73
03010-210	M10	6	19	2	1,6	66	100
03010-212	M12	8	22	2,5	2	66	120
03010-216	M16	10	24	3,5	2,5	90	180
03010-220	M20	12	30	4,5	2,5	115	240

Spring plungers with slot and ball, long version, standard spring

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03010-404	M4	2,5	16	0,8	0,6	4	10
03010-405	M5	3	20	0,9	0,8	6	11
03010-406	M6	3,5	25	1	1	9	13
03010-408	M8	5	30	1,5	1,2	15	30
03010-410	M10	6	35	2	1,6	20	35
03010-412	M12	8	40	2,5	2	30	55
03010-416	M16	10	45	3,5	2,5	65	125

Spring plungers

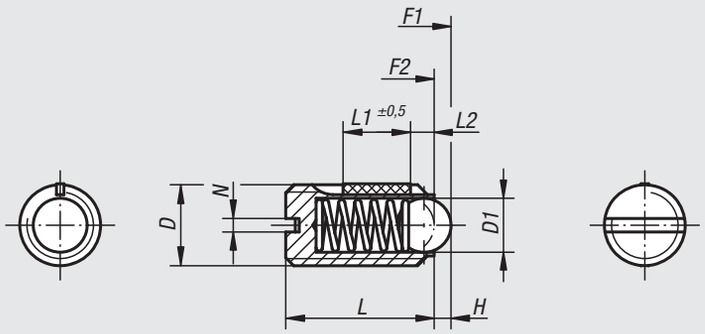
with slot and ball, LONG-LOK secured, stainless steel

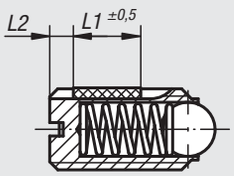
Material:
Sleeve 1.4305.
Ball 1.4034.
Spring 1.4310.

LONG-LOK thread lock in nylon.

Version:
Bright. Ball hardened.

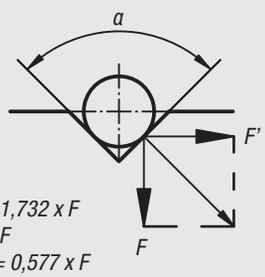
Sample order:
nlm 03011-12





applies to models with
D = M3, M4, M5 and M6

L2 = approx. 2x thread pitch



a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Spring plungers with slot and ball, standard spring, LONG-LOK secured

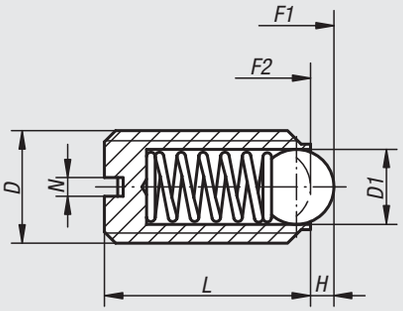
Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03011-03	M3	1,5	7	4	0,4	0,4	1,5	3	0,10	0,07
03011-04	M4	2,5	9	5	0,8	0,6	4	10	0,18	0,12
03011-05	M5	3	12	6	0,9	0,8	6	11	0,12	0,08
03011-06	M6	3,5	14	7	1	1	9	13	0,43	0,21
03011-08	M8	5	16	8	1,5	1,2	15	30	1,09	0,37
03011-10	M10	6	19	9	2	1,6	20	35	1,36	0,62
03011-12	M12	8	22	10	2,5	2	30	55	2,03	1,36
03011-16	M16	10	24	14	3,5	2,5	65	125	3,95	2,95

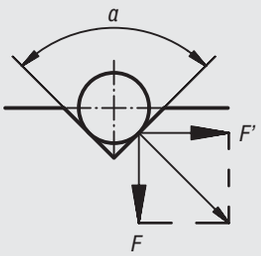
Spring plungers with slot and ball, reinforced spring, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03011-203	M3	1,5	7	4	0,4	0,4	5	7	0,10	0,07
03011-204	M4	2,5	9	5	0,8	0,6	12	22	0,18	0,12
03011-205	M5	3	12	6	0,9	0,8	19	30	0,12	0,08
03011-206	M6	3,5	14	7	1	1	28	40	0,43	0,21
03011-208	M8	5	16	8	1,5	1,2	47	73	1,09	0,37
03011-210	M10	6	19	9	2	1,6	66	100	1,36	0,62
03011-212	M12	8	22	10	2,5	2	66	120	2,03	1,36
03011-216	M16	10	24	14	3,5	2,5	90	180	3,95	2,95

Spring plungers

with slot and stainless steel ball





a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Material:
Sleeve plastic.
Ball stainless steel 1.4034.
Spring 1.4310.

Version:
Ball, hardened.

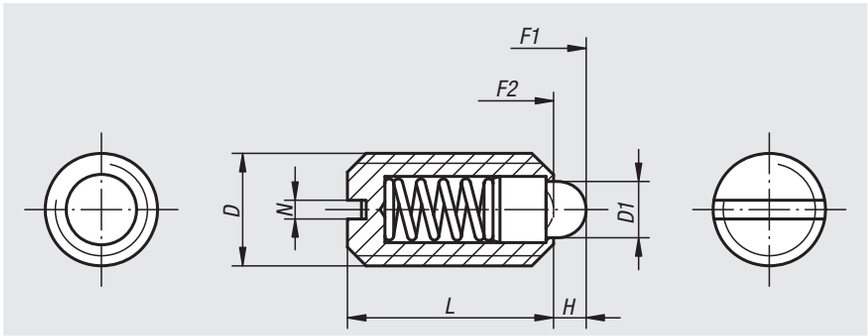
Sample order:
nlm 03014-10

Note:
Spring plungers are used for indexing and positioning. They can also be used as ejectors.

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03014-06	M6	3,5	14	1	1	9	13
03014-08	M8	5	16	1,5	1,2	15	30
03014-10	M10	6	19	2	1,6	20	40

Spring plungers

with slot and thrust pin, steel



Material:
Sleeve steel grade 5.8.
Thrust pin steel.
Spring spring steel grade D.

Version:
Black oxidised.
Thrust pin hardened.

Sample order:
nlm 03020-10

Spring plungers with slot and thrust pin, standard spring force

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03020-04	M4	1,8	9	1,5	0,6	6	20
03020-05	M5	2,4	12	2	0,8	6	20
03020-06	M6	2,7	14	2	1	7	20
03020-08	M8	4	16	2	1,2	15	30
03020-10	M10	4,5	19	2,5	1,6	20	35
03020-12	M12	6	22	3,5	2	30	55
03020-16	M16	8,5	24	4,5	2,5	45	100
03020-20	M20	10	30	6,5	2,5	60	120

Spring plungers with slot and thrust pin, light spring force

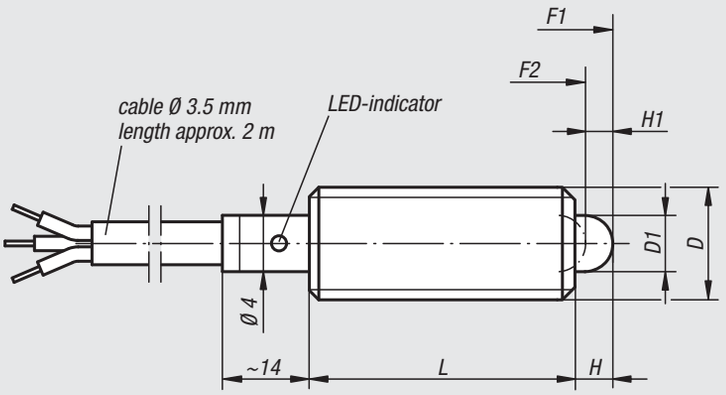
Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03020-104	M4	1,8	9	1,5	0,6	3	10
03020-105	M5	2,4	12	2	0,8	3	10
03020-106	M6	2,7	14	2	1	4	10
03020-108	M8	4	16	2	1,2	7	15
03020-110	M10	4,5	19	2,5	1,6	9	16
03020-112	M12	6	22	3,5	2	14	26
03020-116	M16	8,5	24	4,5	2,5	22	50
03020-120	M20	10	30	6,5	2,5	30	60

Spring plungers with slot and thrust pin, reinforced spring force

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03020-205	M5	2,4	12	2	0,8	9	25
03020-206	M6	2,7	14	2	1	11	25
03020-208	M8	4	16	2	1,2	22	43
03020-210	M10	4,5	19	2,5	1,6	20	54
03020-212	M12	6	22	3,5	2	36	94
03020-216	M16	8,5	24	4,5	2,5	60	110

Spring plungers

with end position feedback



Material:
Sleeve, thrust pin and steel spring.
Inductive proximity switch.

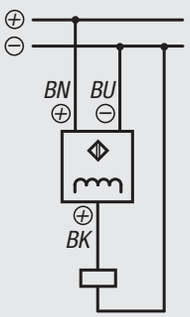
Version:
Black oxidised.
Thrust pin hardened.

Sample order:
nlm 03020-5081

Note:
An electrical control signal can be sent via the built-in end switch.
Voltage: U = 10 – 30 V DC
Electricity: I max. = 200 mA
Temperature range: -25 °C – +70 °C
Protection class: IP 67

Safety:
The use of spring plungers with end position feedback is not suitable for safeguarding persons.

Connection diagram:



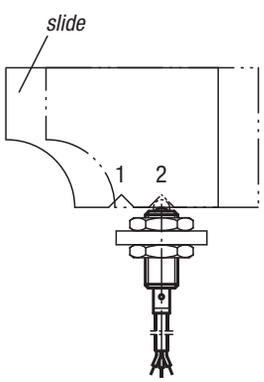
BN = brown
BK = black
BU = blue

PNP

Normally closed

Normally open

Application, position feedback:
Pos. 1: slide engaged
Pos. 2: slide disengaged



Order No.	Version	D	D1	L	H	H1	Switching contact from stroke H1	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03020-5061	normally closed	M6	2,7	27	3	2	1,2 - 1,6	7	20
03020-5081	normally closed	M8	4	29	3	2	1,2 - 1,8	15	30
03020-5101	normally closed	M10	4,5	36	4	3	2,2 - 2,8	26	44
03020-5062	normally open	M6	2,7	27	3	2	1,2 - 1,6	7	20
03020-5082	normally open	M8	4	29	3	2	1,2 - 1,8	15	30
03020-5102	normally open	M10	4,5	36	4	3	2,2 - 2,8	26	44

Spring plungers

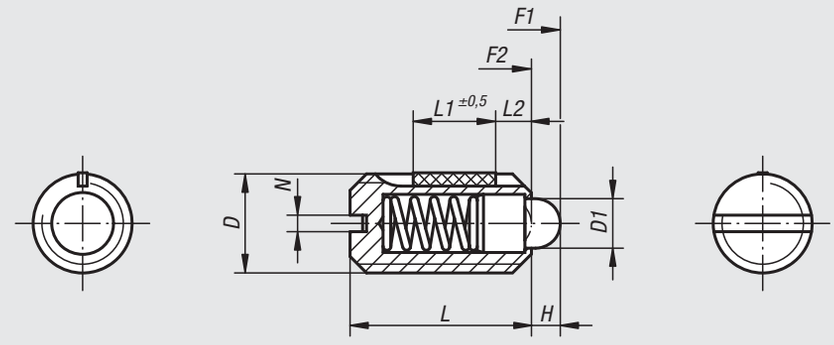
with slot and thrust pin, LONG-LOK secured, steel

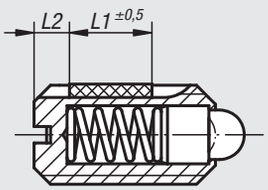
Material:
Sleeve steel grade 5.8.
Thrust pin steel.
Spring steel Grade D.

LONG-LOK thread lock nylon.

Version:
Black oxidised.
Thrust pin hardened.

Sample order:
nlm 03021-10





applies to models with
D = M4, M5 and M6

L2 = approx. 2x thread pitch

Spring plungers with slot and thrust pin, standard spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03021-04	M4	1,8	9	5	1,5	0,6	6	20	0,18	0,12
03021-05	M5	2,4	12	6	2	0,8	6	20	0,12	0,08
03021-06	M6	2,7	14	7	2	1	7	20	0,44	0,21
03021-08	M8	4	16	8	2	1,2	15	30	1,10	0,38
03021-10	M10	4,5	19	9	2,5	1,6	20	35	1,36	0,62
03021-12	M12	6	22	10	3,5	2	30	55	2,11	1,41
03021-16	M16	8,5	24	14	4,5	2,5	45	100	3,95	3,05

Spring plungers with slot and thrust pin, light spring force, LONG-LOK secured

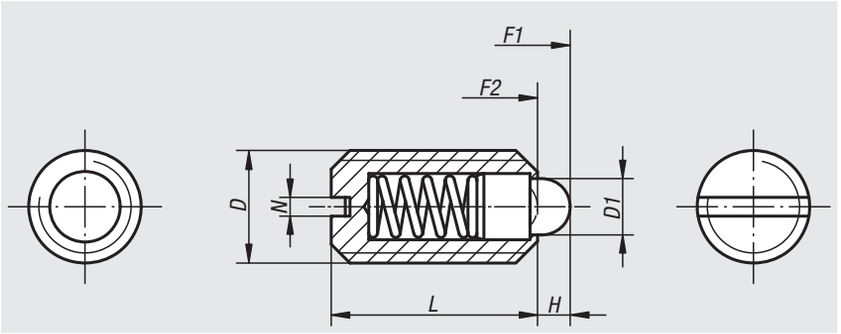
Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03021-104	M4	1,8	9	5	1,5	0,6	3	10	0,18	0,12
03021-105	M5	2,4	12	6	2	0,8	3	10	0,12	0,08
03021-106	M6	2,7	14	7	2	1	4	10	0,44	0,21
03021-108	M8	4	16	8	2	1,2	7	15	1,10	0,38
03021-110	M10	4,5	19	9	2,5	1,6	9	16	1,36	0,62
03021-112	M12	6	22	10	3,5	2	14	26	2,11	1,41
03021-116	M16	8,5	24	14	4,5	2,5	22	50	3,95	3,05

Spring plungers with slot and thrust pin, reinforced spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03021-205	M5	2,4	12	6	2	0,8	9	25	0,12	0,08
03021-206	M6	2,7	14	7	2	1	11	25	0,44	0,21
03021-208	M8	4	16	8	2	1,2	22	43	1,1	0,38
03021-210	M10	4,5	19	9	2,5	1,6	20	54	1,36	0,62
03021-212	M12	6	22	10	3,5	2	36	94	2,11	1,41
03021-216	M16	8,5	24	14	4,5	2,5	60	110	3,99	3,05

Spring plungers

with slot and thrust pin, stainless steel



Material:
Sleeve 1.4305.
Thrust pin 1.4034.
Spring 1.4310.

Version:
Bright.
Thrust pin hardened.

Sample order:
nlm 03025-10

Spring plungers with slot and thrust pin, standard spring force

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03025-04	M4	1,8	9	1,5	0,6	6	20
03025-05	M5	2,4	12	2	0,8	6	20
03025-06	M6	2,7	14	2	1	7	20
03025-08	M8	4	16	2	1,2	15	30
03025-10	M10	4,5	19	2,5	1,6	20	35
03025-12	M12	6	22	3,5	2	30	55
03025-16	M16	8,5	24	4,5	2,5	45	100
03025-20	M20	10	30	6,5	2,5	60	120

Spring plungers with slot and thrust pin, light spring force

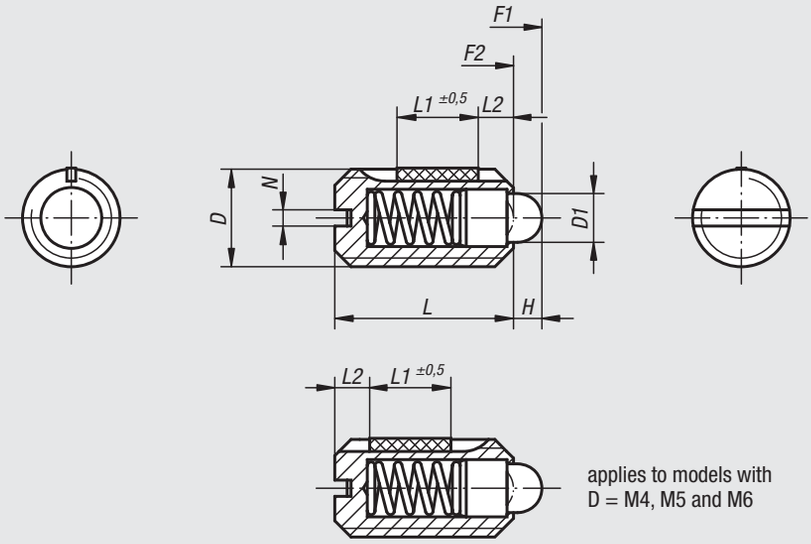
Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03025-104	M4	1,8	9	1,5	0,6	3	10
03025-105	M5	2,4	12	2	0,8	3	10
03025-106	M6	2,7	14	2	1	4	10
03025-108	M8	4	16	2	1,2	7	15
03025-110	M10	4,5	19	2,5	1,6	9	16
03025-112	M12	6	22	3,5	2	14	26
03025-116	M16	8,5	24	4,5	2,5	22	50
03025-120	M20	10	30	6,5	2,5	30	60

Spring plungers with slot and thrust pin, reinforced spring force

Order No.	D	D1	L	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03025-205	M5	2,4	12	2	0,8	9	25
03025-206	M6	2,7	14	2	1	11	25
03025-208	M8	4	16	2	1,2	22	43
03025-210	M10	4,5	19	2,5	1,6	20	54
03025-212	M12	6	22	3,5	2	36	94
03025-216	M16	8,5	24	4,5	2,5	60	110

Spring plungers

with slot and thrust pin, LONG-LOK secured, stainless steel



L2 = approx. 2x thread pitch

Material:
Sleeve 1.4305.
Thrust pin 1.4034.
Spring 1.4310.

LONG-LOK thread lock in nylon.

Version:
Bright.
Thrust pin hardened.

Sample order:
nlm 03026-10

Spring plungers with slot and thrust pin, standard spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03026-04	M4	1,8	9	5	1,5	0,6	6	20	0,18	0,12
03026-05	M5	2,4	12	6	2	0,8	6	20	0,12	0,08
03026-06	M6	2,7	14	7	2	1	7	20	0,44	0,21
03026-08	M8	4	16	8	2	1,2	15	30	1,10	0,38
03026-10	M10	4,5	19	9	2,5	1,6	20	35	1,36	0,62
03026-12	M12	6	22	10	3,5	2	30	55	2,11	1,41
03026-16	M16	8,5	24	14	4,5	2,5	45	100	3,95	3,05

Spring plungers with slot and thrust pin, light spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03026-104	M4	1,8	9	5	1,5	0,6	3	10	0,18	0,12
03026-105	M5	2,4	12	6	2	0,8	3	10	0,12	0,08
03026-106	M6	2,7	14	7	2	1	4	10	0,44	0,21
03026-108	M8	4	16	8	2	1,2	7	15	1,10	0,38
03026-110	M10	4,5	19	9	2,5	1,6	9	16	1,36	0,62
03026-112	M12	6	22	10	3,5	2	14	26	2,11	1,41
03026-116	M16	8,5	24	14	4,5	2,5	22	50	3,95	3,05

Spring plungers with slot and thrust pin, reinforced spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	N	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03026-205	M5	2,4	12	6	2	0,8	9	25	0,12	0,08
03026-206	M6	2,7	14	7	2	1	11	25	0,44	0,21
03026-208	M8	4	16	8	2	1,2	22	43	1,1	0,38
03026-210	M10	4,5	19	9	2,5	1,6	20	54	1,36	0,62
03026-212	M12	6	22	10	3,5	2	36	94	2,11	1,41
03026-216	M16	8,5	24	14	4,5	2,5	60	110	3,99	3,05

Spring plungers

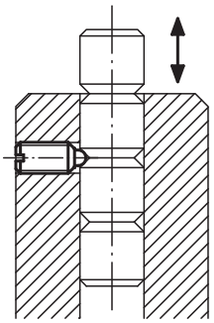
with hexagon socket and ball, steel

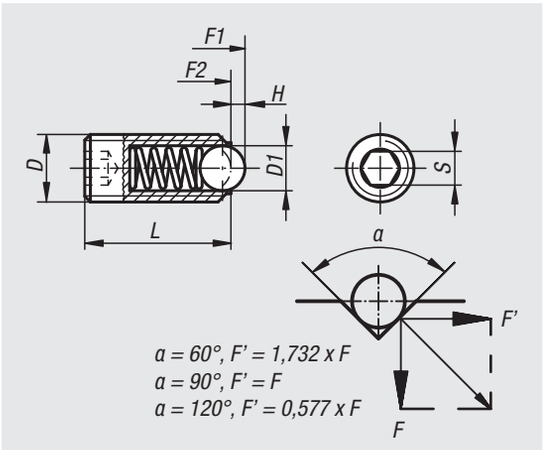
Material:
Sleeve steel grade 5.8.
Ball steel.
Spring in spring steel class D.

Version:
Black oxidised.
Ball hardened.

Sample order:
nlm 03030-210

column indexing





Spring plungers with hexagon socket and ball, standard spring

Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03030-03	M3	1,5	9	0,4	1,5	1,5	3
03030-04	M4	2,5	10	0,8	2	4	10
03030-05	M5	3	14	0,9	2,5	6	11
03030-06	M6	3,5	15	1	3	9	13
03030-08	M8	5	18	1,5	4	15	30
03030-10	M10	6	23	2	5	20	35
03030-12	M12	8	26	2,5	6	30	55
03030-16	M16	10	33	3,5	8	65	125
03030-20	M20	12	43	4,5	10	80	160
03030-24	M24	15	48	5,5	12	90	180

Spring plungers with hexagon socket and ball, reinforced spring

Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03030-203	M3	1,5	9	0,4	1,5	5	7
03030-204	M4	2,5	10	0,8	2	12	22
03030-205	M5	3	14	0,9	2,5	19	30
03030-206	M6	3,5	15	1	3	28	40
03030-208	M8	5	18	1,5	4	47	73
03030-210	M10	6	23	2	5	66	100
03030-212	M12	8	26	2,5	6	66	120
03030-216	M16	10	33	3,5	8	90	180
03030-220	M20	12	43	4,5	10	115	240
03030-224	M24	15	48	5,5	12	130	270

Spring plungers with hexagon socket and ball, long version, standard spring

Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03030-404	M4	2,5	16	0,8	2	4	10
03030-405	M5	3	20	0,9	2,5	6	11
03030-406	M6	3,5	25	1	3	9	13
03030-408	M8	5	30	1,5	4	15	30
03030-410	M10	6	35	2	5	20	35
03030-412	M12	8	40	2,5	6	30	55
03030-416	M16	10	45	3,5	8	65	125

Spring plungers

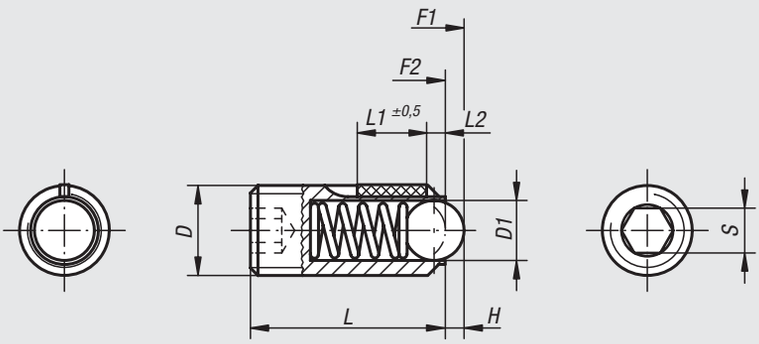
with hexagon socket and ball, LONG-LOK secured, steel

Material:
Sleeve steel grade 5.8.
Ball steel.
Spring in spring steel class D.

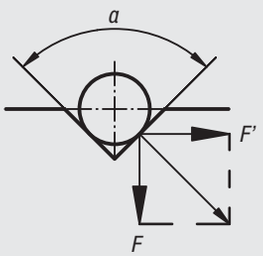
LONG-LOK thread lock nylon.

Version:
Black oxidised.
Ball hardened.

Sample order:
nlm 03031-08



L2 = approx. 2x thread pitch



a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Spring plungers with hexagon socket and ball, standard spring, LONG-LOK secured

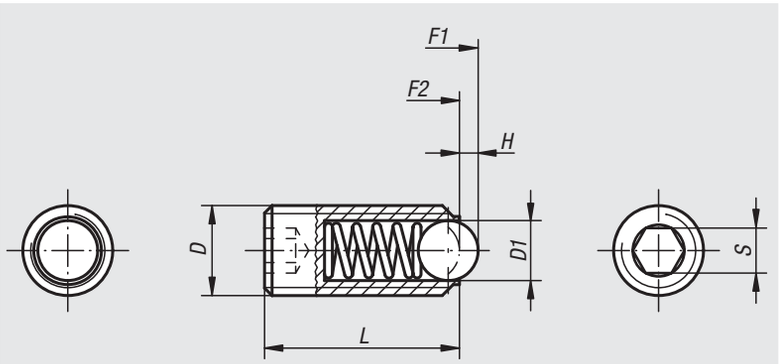
Order No.	D	D1	L	L1	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03031-03	M3	1,5	9	4	0,4	1,5	1,5	3	0,10	0,07
03031-04	M4	2,5	10	5	0,8	2	4	10	0,18	0,12
03031-05	M5	3	14	6	0,9	2,5	6	11	0,12	0,08
03031-06	M6	3,5	15	7	1	3	9	13	0,44	0,21
03031-08	M8	5	18	8	1,5	4	15	30	1,10	0,38
03031-10	M10	6	23	9	2	5	20	35	1,30	0,60
03031-12	M12	8	26	10	2,5	6	30	55	2,00	1,30
03031-16	M16	10	33	14	3,5	8	65	125	3,90	3,00

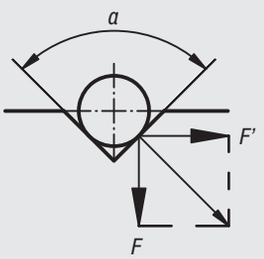
Spring plungers with hexagon socket and ball, reinforced spring, LONG-LOK secured

Order No.	D	D1	L	L1	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03031-203	M3	1,5	9	4	0,4	1,5	5	7	0,10	0,07
03031-204	M4	2,5	10	5	0,8	2	12	22	0,18	0,12
03031-205	M5	3	14	6	0,9	2,5	19	30	0,12	0,08
03031-206	M6	3,5	15	7	1	3	28	40	0,44	0,21
03031-208	M8	5	18	8	1,5	4	47	73	1,10	0,38
03031-210	M10	6	23	9	2	5	66	100	1,30	0,60
03031-212	M12	8	26	10	2,5	6	66	120	2,00	1,30
03031-216	M16	10	33	14	3,5	8	90	180	3,90	3,00

Spring plungers

with hexagon socket and ceramic ball





α = 60°, F' = 1,732 x F
α = 90°, F' = F
α = 120°, F' = 0,577 x F

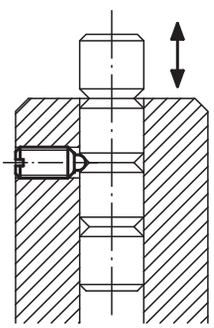
Material:
Sleeve 1.4305.
Ceramic ball Si_3N_4.
Spring 1.4310.

Version:
Bright.

Sample order:
nlm 03033-05

Note:
The combination of excellent material properties is a special feature of silicon nitride (Si_3N_4). These include, for example, high tenacity and stability, excellent wear resistance and efficient chemical resistance.

column indexing



Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03033-05	M5	3	14	0,9	2,5	6	11
03033-06	M6	3,5	15	1	3	9	13
03033-08	M8	5	18	1,5	4	15	30
03033-10	M10	6	23	2	5	20	35
03033-12	M12	8	26	2,5	6	30	55
03033-16	M16	10	33	3,5	8	65	125

Spring plungers

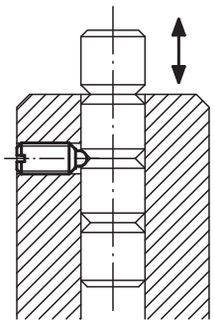
with hexagon socket and ball, stainless steel

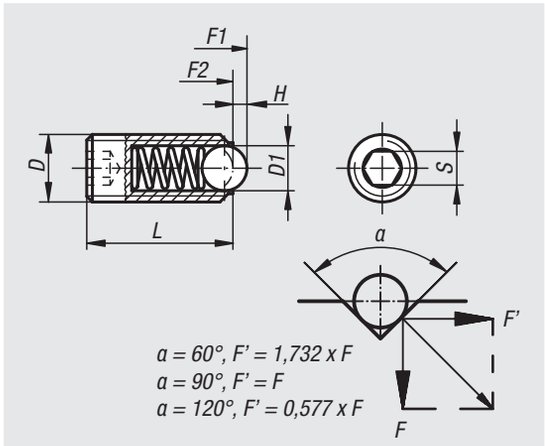
Material:
Sleeve 1.4305.
Ball 1.4034.
Spring 1.4310.

Version:
Bright. Ball hardened.

Sample order:
nlm 03030-210

column indexing





Spring plungers with hexagon socket and ball, standard spring

Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03035-03	M3	1,5	9	0,4	1,5	1,5	3
03035-04	M4	2,5	10	0,8	2	4	10
03035-05	M5	3	14	0,9	2,5	6	11
03035-06	M6	3,5	15	1	3	9	13
03035-08	M8	5	18	1,5	4	15	30
03035-10	M10	6	23	2	5	20	35
03035-12	M12	8	26	2,5	6	30	55
03035-16	M16	10	33	3,5	8	65	125
03035-20	M20	12	43	4,5	10	80	160
03035-24	M24	15	48	5,5	12	90	180

Spring plungers with hexagon socket and ball, reinforced spring

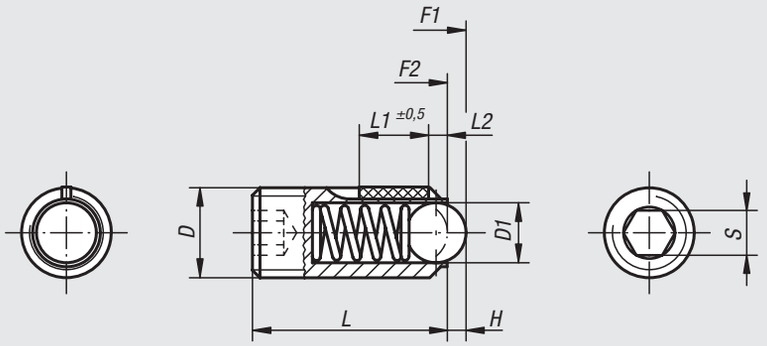
Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03035-203	M3	1,5	9	0,4	1,5	5	7
03035-204	M4	2,5	10	0,8	2	12	22
03035-205	M5	3	14	0,9	2,5	19	30
03035-206	M6	3,5	15	1	3	28	40
03035-208	M8	5	18	1,5	4	47	73
03035-210	M10	6	23	2	5	66	100
03035-212	M12	8	26	2,5	6	66	120
03035-216	M16	10	33	3,5	8	90	180
03035-220	M20	12	43	4,5	10	115	240
03035-224	M24	15	48	5,5	12	130	270

Spring plungers with hexagon socket and ball, long version, standard spring

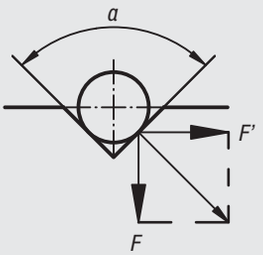
Order No.	D	D1	L	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03035-404	M4	2,5	16	0,8	2	4	10
03035-405	M5	3	20	0,9	2,5	6	11
03035-406	M6	3,5	25	1	3	9	13
03035-408	M8	5	30	1,5	4	15	30
03035-410	M10	6	35	2	5	20	35
03035-412	M12	8	40	2,5	6	30	55
03035-416	M16	10	45	3,5	8	65	125

Spring plungers

with hexagon socket and ball, LONG-LOK secured stainless steel



L2 = approx. 2x thread pitch



a = 60°, F' = 1,732 x F
a = 90°, F' = F
a = 120°, F' = 0,577 x F

Material:
Sleeve 1.4305.
Ball 1.4034.
Spring 1.4310.

LONG-LOK thread lock in nylon.

Version:
Bright. Ball hardened.

Sample order:
nlm 03036-08

Spring plungers with hexagon socket and ball, standard spring, LONG-LOK secured

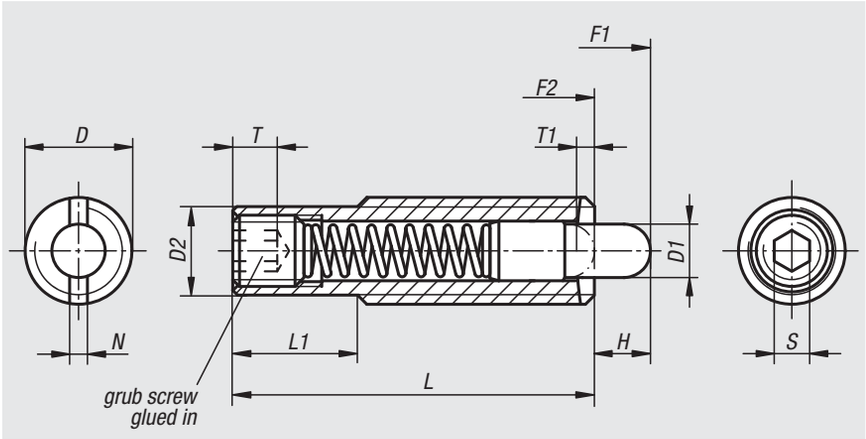
Order No.	D	D1	L	L1	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03036-03	M3	1,5	9	4	0,4	1,5	1,5	3	0,10	0,07
03036-04	M4	2,5	10	5	0,8	2	4	10	0,18	0,12
03036-05	M5	3	14	6	0,9	2,5	6	11	0,12	0,08
03036-06	M6	3,5	15	7	1	3	9	13	0,44	0,21
03036-08	M8	5	18	8	1,5	4	15	30	1,10	0,38
03036-10	M10	6	23	9	2	5	20	35	1,30	0,60
03036-12	M12	8	26	10	2,5	6	30	55	2,00	1,30
03036-16	M16	10	33	14	3,5	8	65	125	3,90	3,00

Spring plungers with hexagon socket and ball, reinforced spring, LONG-LOK secured

Order No.	D	D1	L	L1	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm
03036-203	M3	1,5	9	4	0,4	1,5	5	7	0,10	0,07
03036-204	M4	2,5	10	5	0,8	2	12	22	0,18	0,12
03036-205	M5	3	14	6	0,9	2,5	19	30	0,12	0,08
03036-206	M6	3,5	15	7	1	3	28	40	0,44	0,21
03036-208	M8	5	18	8	1,5	4	47	73	1,10	0,38
03036-210	M10	6	23	9	2	5	66	100	1,30	0,60
03036-212	M12	8	26	10	2,5	6	66	120	2,00	1,30
03036-216	M16	10	33	14	3,5	8	90	180	3,90	3,00

Spring plungers

with hexagon socket and thrust pin, long version



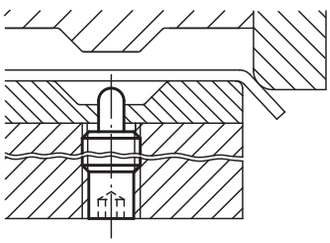
Material:
Sleeve steel grade 5.8.
Thrust pin steel.
Spring steel grade D.

Version:
Black oxidised.
Thrust pin hardened.

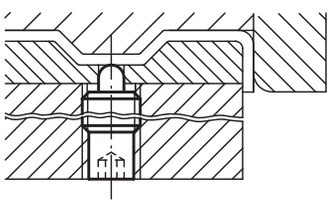
Sample order:
nlm 03040-616

Note:
These spring plungers are chiefly used as ejectors and spring stops in machine construction.

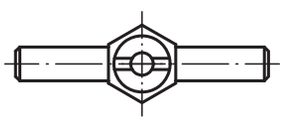
bending the shank

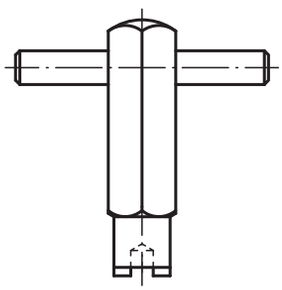


forming



assembly key





Order No.	D	D1	D2	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03040-608X30	M8	3,5	6,2	30	10	6	2	1,4	1,2	2,5	8	20	03040-908
03040-608X40	M8	3,5	6,2	40	20	8	2	1,4	1,2	2,5	10	28	03040-908
03040-608X50	M8	3,5	6,2	50	30	10	2	1,4	1,2	2,5	12	38	03040-908
03040-608X60	M8	3,5	6,2	60	40	15	2	1,4	1,2	2,5	15	45	03040-908
03040-610X40	M10	4	8	40	10	8	2	1,4	1,6	3	12	30	03040-910
03040-610X50	M10	4	8	50	20	10	2	1,4	1,6	3	16	46	03040-910
03040-610X60	M10	4	8	60	30	15	2	1,4	1,6	3	20	55	03040-910
03040-610X80	M10	4	8	80	50	20	2	1,4	1,6	3	25	65	03040-910
03040-612X50	M12	6	9,6	50	20	10	3	2	2	4	20	50	03040-912
03040-612X60	M12	6	9,6	60	30	15	3	2	2	4	25	76	03040-912
03040-612X80	M12	6	9,6	80	50	20	3	2	2	4	35	102	03040-912
03040-612X100	M12	6	9,6	100	70	25	3	2	2	4	40	102	03040-912
03040-616X60	M16	7,5	13,4	60	30	12	6	2,5	2,5	5	30	64	03040-916
03040-616X80	M16	7,5	13,4	80	50	20	6	2,5	2,5	5	30	110	03040-916
03040-616X100	M16	7,5	13,4	100	70	30	6	2,5	2,5	5	30	120	03040-916
03040-616X120	M16	7,5	13,4	120	90	40	6	2,5	2,5	5	20	130	03040-916

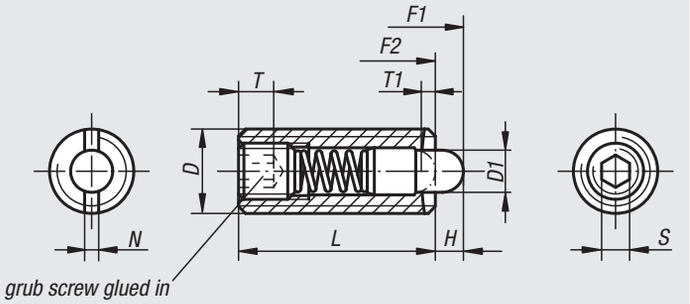
Spring plungers

with hexagon socket and thrust pin, steel

Material:
Sleeve steel grade 5.8.
Thrust pin steel.
Spring steel grade D.

Version:
Black oxidised.
Thrust pin hardened.

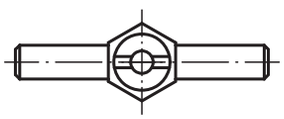
Sample order:
nlm 03040-16

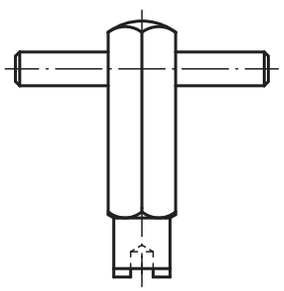


Spring plungers with hexagon socket and thrust pin, standard spring force

Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03040-03	M3	1	10	1,5	1,5	1	0,4	0,7	0,5	3	03040-903
03040-04	M4	1,5	15	1,5	2	0,6	0,6	1,3	5	16	03040-904
03040-05	M5	2,4	18	2,3	2	0,8	0,8	1,5	6	20	03040-905
03040-06	M6	2,7	20	2,5	2,5	1	1	2	7	20	03040-906
03040-08	M8	3,5	22	3	3	1,4	1,2	2,5	9	35	03040-908
03040-10	M10	4	22	3	3,5	1,4	1,6	3	9	35	03040-910
03040-12	M12	6	28	4	5	2	2	4	12	55	03040-912
03040-16	M16	7,5	32	5	6	2,5	2,5	5	45	100	03040-916
03040-20	M20	10	40	7	8	3	2,5	6	60	120	-
03040-24	M24	12	52	10	10	3	2,5	8	80	160	-

assembly key

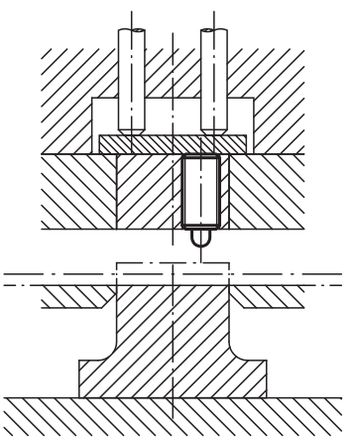




Spring plungers with hexagon socket and thrust pin, light spring force

Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03040-104	M4	1,5	15	1,5	2	0,6	0,6	1,3	2	7	03040-904
03040-105	M5	2,4	18	2,3	2	0,8	0,8	1,5	3	10	03040-905
03040-106	M6	2,7	20	2,5	2,5	1	1	2	3	9	03040-906
03040-108	M8	3,5	22	3	3	1,4	1,2	2,5	4	16	03040-908
03040-110	M10	4	22	3	3,5	1,4	1,6	3	4	16	03040-910
03040-112	M12	6	28	4	5	2	2	4	5	27	03040-912
03040-116	M16	7,5	32	5	6	2,5	2,5	5	20	45	03040-916

Spring plunger
cutaway view



Spring plungers with hexagon socket and thrust pin, reinforced spring force

Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03040-205	M5	2,4	18	2,3	2	0,8	0,8	1,5	11	29	03040-905
03040-206	M6	2,7	20	2,5	2,5	1	1	2	14	37	03040-906
03040-208	M8	3,5	22	3	3	1,4	1,2	2,5	22	65	03040-908
03040-210	M10	4	22	3	3,5	1,4	1,6	3	19	70	03040-910
03040-212	M12	6	28	4	5	2	2	4	25	85	03040-912
03040-216	M16	7,5	32	5	6	2,5	2,5	5	60	150	03040-916
03040-220	M20	10	40	7	8	3	2,5	6	75	190	-
03040-224	M24	12	52	10	10	3	2,5	8	95	240	-

Spring plungers

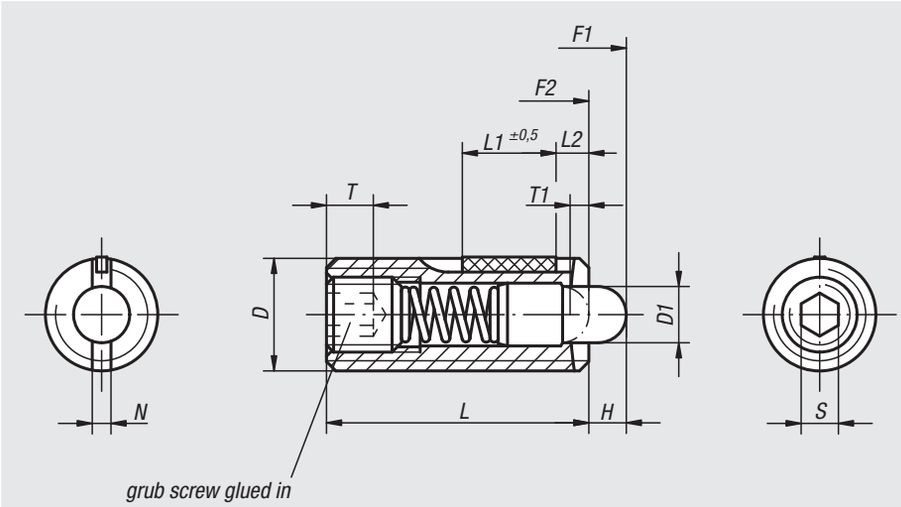
with hexagon socket and thrust pin, LONG-LOK secured, steel

Material:
Sleeve steel grade 5.8.
Thrust pin steel.
Spring steel grade D.

LONG-LOK thread lock nylon.

Version:
Black oxidised.
Thrust pin hardened.

Sample order:
nlm 03041-12



L2 = approx. 2x thread pitch

Spring plungers with hexagon socket and thrust pin, standard spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03041-05	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	6	20	0,12	0,08	03040-905
03041-06	M6	2,7	20	7	2,5	2,5	1	1	2	7	20	0,45	0,22	03040-906
03041-08	M8	3,5	22	8	3	3	1,4	1,2	2,5	9	35	1,05	0,37	03040-908
03041-10	M10	4	22	9	3	3,5	1,4	1,6	3	9	35	1,30	0,60	03040-910
03041-12	M12	6	28	10	4	5	2	2	4	12	55	2,00	1,30	03040-912
03041-16	M16	7,5	32	14	5	6	2,5	2,5	5	45	100	3,90	3,00	03040-916

Spring plungers with hexagon socket and thrust pin, light spring force, LONG-LOK secured

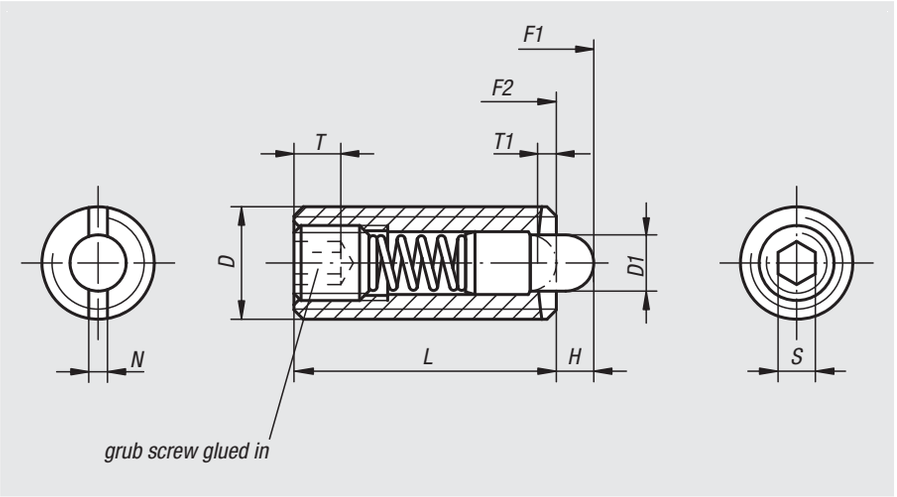
Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03041-105	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	3	10	0,12	0,08	03040-905
03041-106	M6	2,7	20	7	2,5	2,5	1	1	2	3	9	0,45	0,22	03040-906
03041-108	M8	3,5	22	8	3	3	1,4	1,2	2,5	4	16	1,05	0,37	03040-908
03041-110	M10	4	22	9	3	3,5	1,4	1,6	3	4	16	1,30	0,60	03040-910
03041-112	M12	6	28	10	4	5	2	2	4	5	27	2,00	1,30	03040-912
03041-116	M16	7,5	32	14	5	6	2,5	2,5	5	20	45	3,90	3,00	03040-916

Spring plungers with hexagon socket and thrust pin, reinforced spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03041-205	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	11	29	0,12	0,08	03040-905
03041-206	M6	2,7	20	7	2,5	2,5	1	1	2	14	37	0,45	0,22	03040-906
03041-208	M8	3,5	22	8	3	3	1,4	1,2	2,5	22	65	1,05	0,37	03040-908
03041-210	M10	4	22	9	3	3,5	1,4	1,6	3	19	70	1,30	0,60	03040-910
03041-212	M12	6	28	10	4	5	2	2	4	25	85	2,00	1,30	03040-912
03041-216	M16	7,5	32	14	5	6	2,5	2,5	5	60	150	3,90	3,00	03040-916

Spring plungers

with hexagon socket and POM thrust pin, steel

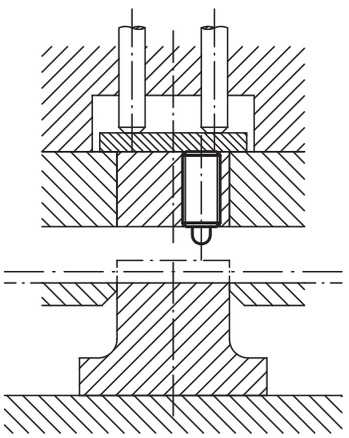


Material:
Sleeve steel grade 5.8.
Thrust pin POM.
Spring steel grade D.

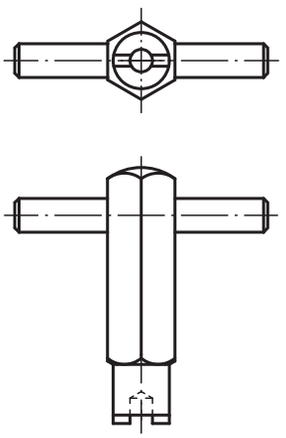
Version:
Black oxidised.

Sample order:
nlm 03050-16

Spring plunger
cutaway view



assembly key



Spring plungers with hexagon socket and thrust pin, standard spring force

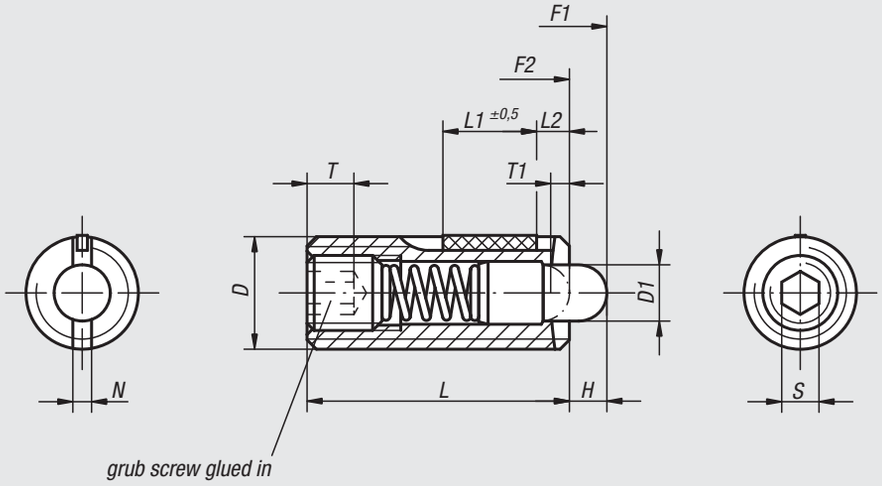
Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03050-03	M3	1	10	1,5	1,5	1	0,4	0,7	0,5	3	03040-903
03050-04	M4	1,5	15	1,5	2	0,6	0,6	1,3	5	16	03040-904
03050-05	M5	2,4	18	2,3	2	0,8	0,8	1,5	6	20	03040-905
03050-06	M6	2,7	20	2,5	2,5	1	1	2	7	20	03040-906
03050-08	M8	3,5	22	3	3	1,4	1,2	2,5	9	35	03040-908
03050-10	M10	4	22	3	3,5	1,4	1,6	3	9	35	03040-910
03050-12	M12	6	28	4	5	2	2	4	12	55	03040-912
03050-16	M16	7,5	32	5	6	2,5	2,5	5	45	100	03040-916

Spring plungers with hexagon socket and thrust pin, light spring force

Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03050-104	M4	1,5	15	1,5	2	0,6	0,6	1,3	2	7	03040-904
03050-105	M5	2,4	18	2,3	2	0,8	0,8	1,5	3	10	03040-905
03050-106	M6	2,7	20	2,5	2,5	1	1	2	3	9	03040-906
03050-108	M8	3,5	22	3	3	1,4	1,2	2,5	4	16	03040-908
03050-110	M10	4	22	3	3,5	1,4	1,6	3	4	16	03040-910
03050-112	M12	6	28	4	5	2	2	4	5	27	03040-912
03050-116	M16	7,5	32	5	6	2,5	2,5	5	20	45	03040-916

Spring plungers

with hexagon socket and POM thrust pin, LONG-LOK secured, steel



L2 = approx. 2x thread pitch

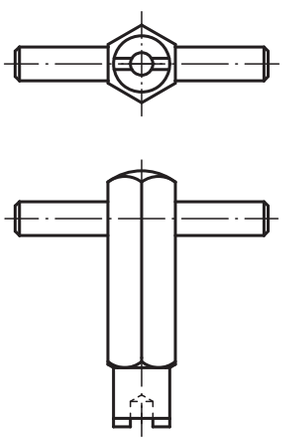
Material:
Sleeve steel grade 5.8.
Thrust pin POM.
Spring steel grade D.

LONG-LOK thread lock nylon.

Version:
Black oxidised.

Sample order:
nlm 03051-12

assembly key



Spring plungers with hexagon socket and thrust pin, standard spring force, LONG-LOK secured

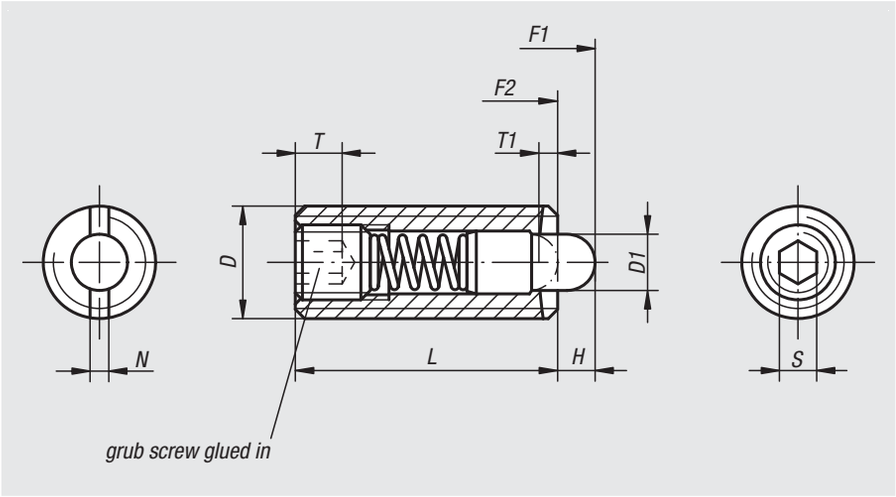
Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03051-05	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	6	20	0,12	0,08	03040-905
03051-06	M6	2,7	20	7	2,5	2,5	1	1	2	7	20	0,45	0,22	03040-906
03051-08	M8	3,5	22	8	3	3	1,4	1,2	2,5	9	35	1,05	0,37	03040-908
03051-10	M10	4	22	9	3	3,5	1,4	1,6	3	9	35	1,30	0,60	03040-910
03051-12	M12	6	28	10	4	5	2	2	4	12	55	2,00	1,30	03040-912
03051-16	M16	7,5	32	14	5	6	2,5	2,5	5	45	100	3,90	3,00	03040-916

Spring plungers with hexagon socket and thrust pin, light spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03051-105	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	3	10	0,12	0,08	03040-905
03051-106	M6	2,7	20	7	2,5	2,5	1	1	2	3	9	0,45	0,22	03040-906
03051-108	M8	3,5	22	8	3	3	1,4	1,2	2,5	4	16	1,05	0,37	03040-908
03051-110	M10	4	22	9	3	3,5	1,4	1,6	3	4	16	1,30	0,60	03040-910
03051-112	M12	6	28	10	4	5	2	2	4	5	27	2,00	1,30	03040-912
03051-116	M16	7,5	32	14	5	6	2,5	2,5	5	20	45	3,90	3,00	03040-916

Spring plungers

with hexagon socket and thrust pin, stainless steel

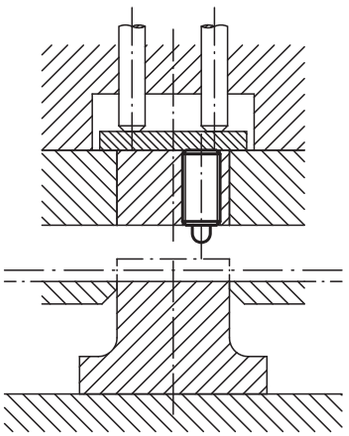


Material:
Sleeve 1.4305.
Thrust pin 1.4034.
Spring 1.4310.

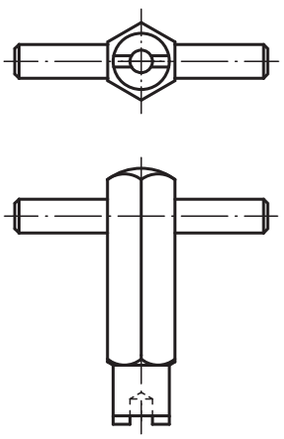
Version:
Bright.
Thrust pin hardened.

Sample order:
nlm 03055-16

Spring plunger
cutaway view



assembly key



Spring plungers with hexagon socket and thrust pin, standard spring force

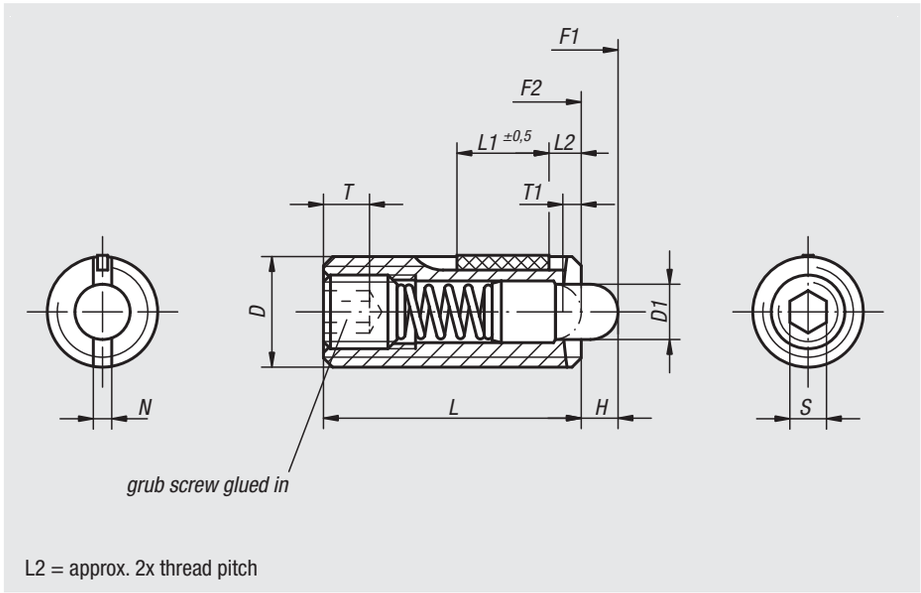
Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03055-03	M3	1	10	1,5	1,5	1	0,4	0,7	0,5	3	03040-903
03055-04	M4	1,5	15	1,5	2	0,6	0,6	1,3	5	16	03040-904
03055-05	M5	2,4	18	2,3	2	0,8	0,8	1,5	5	17	03040-905
03055-06	M6	2,7	20	2,5	2,5	1	1	2	6	17	03040-906
03055-08	M8	3,5	22	3	3	1,4	1,2	2,5	7	29	03040-908
03055-10	M10	4	22	3	3,5	1,4	1,6	3	8	31	03040-910
03055-12	M12	6	28	4	5	2	2	4	10	47	03040-912
03055-16	M16	7,5	32	5	6	2,5	2,5	5	45	100	03040-916

Spring plungers with hexagon socket and thrust pin, reinforced spring force

Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03055-205	M5	2,4	18	2,3	2	0,8	0,8	1,5	9	26	03040-905
03055-206	M6	2,7	20	2,5	2,5	1	1	2	11	35	03040-906
03055-208	M8	3,5	22	3	3	1,4	1,2	2,5	15	48	03040-908
03055-210	M10	4	22	3	3,5	1,4	1,6	3	15	58	03040-910
03055-212	M12	6	28	4	5	2	2	4	19	74	03040-912

Spring plungers

with hexagon socket and thrust pin, LONG-LOK secured, stainless steel



L2 = approx. 2x thread pitch

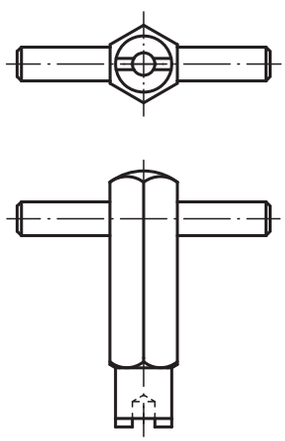
Material:
Sleeve 1.4305.
Thrust pin 1.4034.
Spring 1.4310.

LONG-LOK thread lock in nylon.

Version:
Bright.
Thrust pin hardened.

Sample order:
nlm 03056-12

assembly key



Spring plungers with hexagon socket and thrust pin, standard spring force, LONG-LOK secured

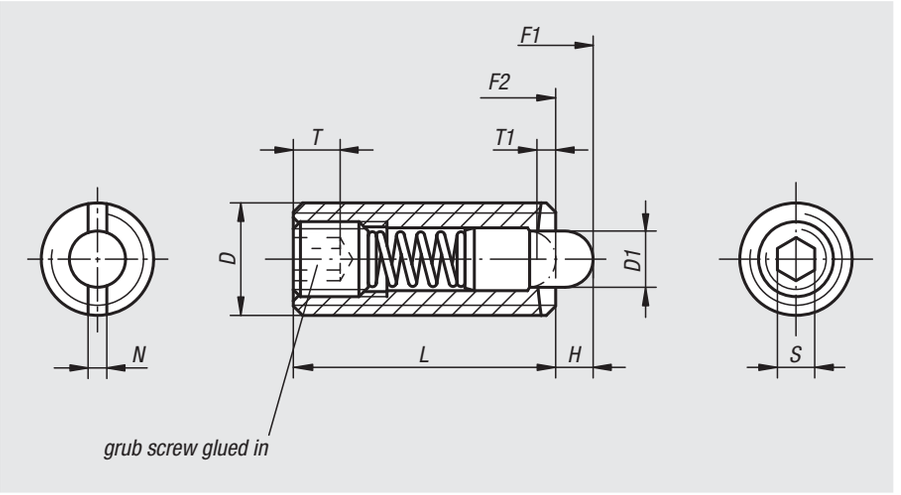
Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03056-05	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	5	17	0,12	0,08	03040-905
03056-06	M6	2,7	20	7	2,5	2,5	1	1	2	6	17	0,45	0,22	03040-906
03056-08	M8	3,5	22	8	3	3	1,4	1,2	2,5	7	29	1,05	0,37	03040-908
03056-10	M10	4	22	9	3	3,5	1,4	1,6	3	8	31	1,30	0,60	03040-910
03056-12	M12	6	28	10	4	5	2	2	4	10	47	2,00	1,30	03040-912
03056-16	M16	7,5	32	14	5	6	2,5	2,5	5	45	100	3,90	3,00	03040-916

Spring plungers with hexagon socket and thrust pin, reinforced spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03056-205	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	9	26	0,12	0,08	03040-905
03056-206	M6	2,7	20	7	2,5	2,5	1	1	2	11	35	0,45	0,22	03040-906
03056-208	M8	3,5	22	8	3	3	1,4	1,2	2,5	15	48	1,05	0,37	03040-908
03056-210	M10	4	22	9	3	3,5	1,4	1,6	3	15	58	1,30	0,60	03040-910
03056-212	M12	6	28	10	4	5	2	2	4	19	74	2,00	1,30	03040-912

Spring plungers

with hexagon socket and POM thrust pin, stainless steel

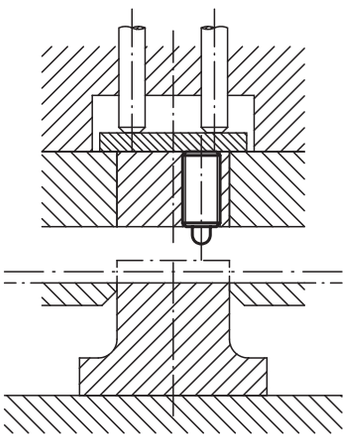


Material:
Stainless steel sleeve 1.4305.
Thrust pin POM.
Stainless steel spring 1.4310.

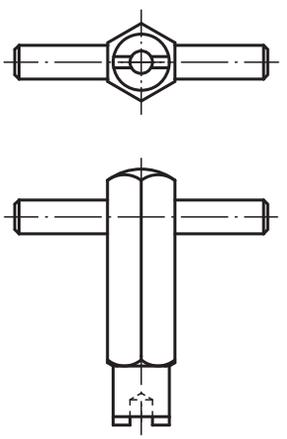
Version:
Bright.

Sample order:
nlm 03058-16

Spring plunger
cutaway view



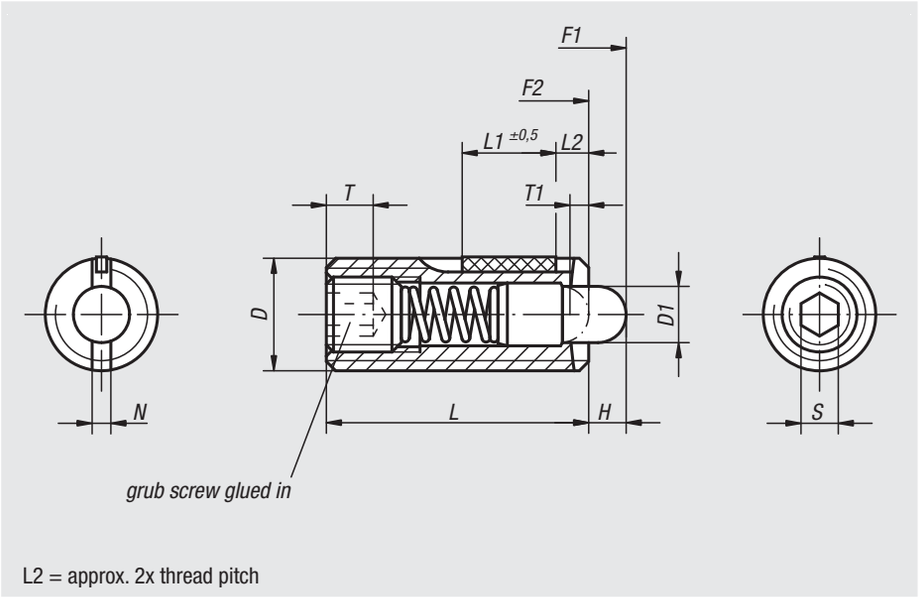
assembly key



Order No.	D	D1	L	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. assembly key
03058-03	M3	1	10	1,5	1,5	1	0,4	0,7	0,5	3	03040-903
03058-04	M4	1,5	15	1,5	2	0,6	0,6	1,3	5	16	03040-904
03058-05	M5	2,4	18	2,3	2	0,8	0,8	1,5	5	17	03040-905
03058-06	M6	2,7	20	2,5	2,5	1	1	2	6	17	03040-906
03058-08	M8	3,5	22	3	3	1,4	1,2	2,5	7	29	03040-908
03058-10	M10	4	22	3	3,5	1,4	1,6	3	8	31	03040-910
03058-12	M12	6	28	4	5	2	2	4	10	47	03040-912
03058-16	M16	7,5	32	5	6	2,5	2,5	5	45	100	03040-916

Spring plungers

with hexagon socket and POM thrust pin, LONG-LOK secured, stainless steel



L2 = approx. 2x thread pitch

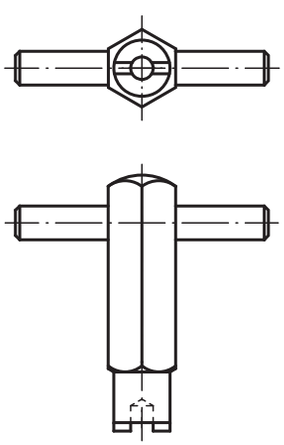
Material:
Stainless steel sleeve 1.4305.
Thrust pin POM.
Stainless steel spring 1.4310.

LONG-LOK thread lock nylon.

Version:
Bright.

Sample order:
nlm 03059-12

assembly key

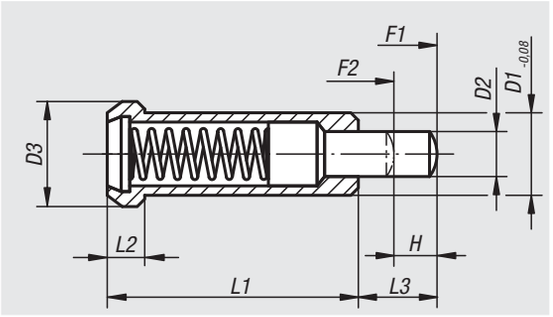


Spring plungers with hexagon socket and thrust pin, standard spring force, LONG-LOK secured

Order No.	D	D1	L	L1	H	T	T1	N	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque approx. Nm	Loosening torque, after third unscrewing approx. Nm	Order No. assembly key
03059-05	M5	2,4	18	7	2,3	2	0,8	0,8	1,5	5	17	0,12	0,08	03040-905
03059-06	M6	2,7	20	7	2,5	2,5	1	1	2	6	17	0,45	0,22	03040-906
03059-08	M8	3,5	22	8	3	3	1,4	1,2	2,5	7	29	1,05	0,37	03040-908
03059-10	M10	4	22	9	3	3,5	1,4	1,6	3	8	31	1,30	0,60	03040-910
03059-12	M12	6	28	10	4	5	2	2	4	10	47	2,00	1,30	03040-912
03059-16	M16	7,5	32	14	5	6	2,5	2,5	5	45	100	3,90	3,00	03040-916

Spring plungers

with head

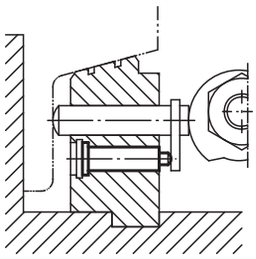


Material:
Free cutting steel.

Version:
Black oxidised.
Thrust pin hardened.

Sample order:
nlm 03060-10

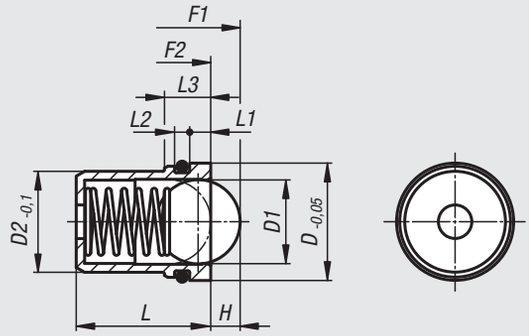
Note:
These spring plungers are chiefly used as ejectors and spring stops in machine construction.



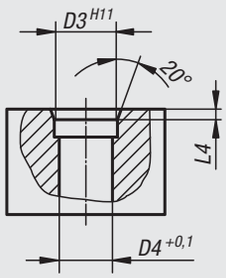
Order No.	D1	D2	D3	L1	L2	L3	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03060-06	6	2,95	8	20	3,2	6	3,5	10	22
03060-08	8	3,95	10	24	3,2	8	4,5	30	90
03060-10	10	5,95	13	30	4	10	5,5	42	110
03060-12	12	7,95	16	36	5	12	6,5	50	130

Spring plungers

with detent ring



Assembly dimensions



Material:
Sleeve, spring and ball in stainless steel.
O-ring NBR.

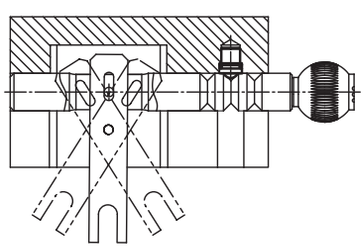
Version:
Sleeve bright.
Ball hardened, bright.
O-ring black.

Sample order:
nlm 03065-05

Note:
These spring plungers with o-ring are suitable for overhead installation or for installating in difficult to access positions.

They can be pressed into the location hole by hand or using simple assembly tools. The O-ring holds the plunger in place and prevents it falling out. Other components can be easily installed without the need for further assembly aids.

Application example:



Order No.	D	D1	D2	D3	D4	H	L	L1	L2	L3	L4	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03065-05	4,95	3	4	5	4,1	0,8	5	1	0,7	2,3	0,7	3	7
03065-06	5,95	4	5	6	5,1	1	6	1	0,7	2,3	0,7	4	7
03065-08	7,95	5	6	8	6,1	1,5	7	1,5	1,2	3,7	1	6	12
03065-10	9,95	6,5	8	10	8,1	1,8	9	2	1,2	4,2	1,5	6	12
03065-12	11,95	8	10	12	10,1	2,7	13,5	2,5	1,8	5,3	2	10	20
03065-14	13,95	10	12	14	12,1	3,5	16	2,5	1,8	5,5	2	15	25

Locators

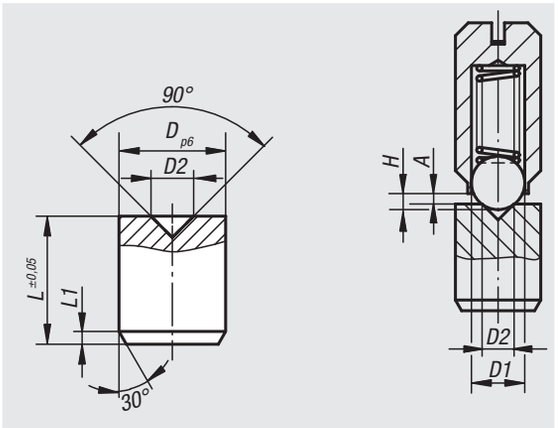
Material:
Free-cutting steel

Version:
Bright, hardened.

Sample order:
nlm 03069-05020

Note:
If abrasion-resistant and exact locking is necessary, locators can be used together with spring plungers, especially with strong spring force.

$$A = H - \left(\frac{D1 + D2}{2} - \frac{\sqrt{2}}{2} \times D1 \right)$$



Order No.	Suitable for Spring Plunger D	D	D1	D2	H	L	L1
03069-04015	- / M4	4	see relevant product page for dimensions	1,5	see relevant product page for dimensions	5	0,5
03069-05020	ø 4 / M5	5	see relevant product page for dimensions	2	see relevant product page for dimensions	6	0,5
03069-06020	ø 5 / M6	6	see relevant product page for dimensions	2	see relevant product page for dimensions	8	0,7
03069-08030	ø 6 / M8	8	see relevant product page for dimensions	3	see relevant product page for dimensions	10	1
03069-10040	ø 8 / M10	10	see relevant product page for dimensions	4	see relevant product page for dimensions	12	1,2
03069-12060	ø 10 / M12	12	see relevant product page for dimensions	6	see relevant product page for dimensions	14	1,5
03069-16080	ø 12 / M16	16	see relevant product page for dimensions	8	see relevant product page for dimensions	18	2

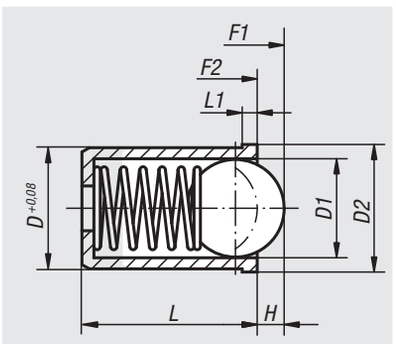
Spring plungers

smooth version, extended, stainless steel

Material:
Sleeve and spring stainless steel.
Ball stainless steel or POM.

Version:
Sleeve bright.
Ball hardened, bright.

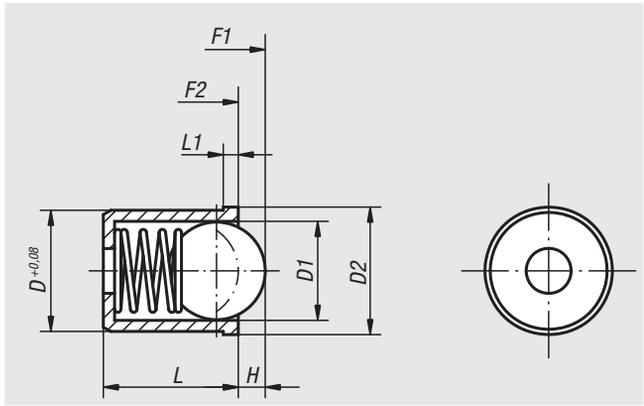
Sample order:
nlm 03070-104



Order No.	Version	D	D1	D2	L	L1	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03070-104	stainless steel ball	4	3	4,6	9	1	0,8	12	22
03070-105	stainless steel ball	5	4	5,6	12	1	1	19	30
03070-106	stainless steel ball	6	5	6,5	14	1	1,5	22	40
03070-108	stainless steel ball	8	6	8,5	16	1	1,8	42	73
03070-110	stainless steel ball	10	8	12	22	2,5	2,7	54	100
03070-112	stainless steel ball	12	10	14	24	2,5	3,2	54	122
03070-404	POM ball	4	3	4,6	9	1	0,8	12	22
03070-405	POM ball	5	4	5,6	12	1	1	19	30
03070-406	POM ball	6	5	6,5	14	1	1,5	22	40
03070-408	POM ball	8	6	8,5	16	1	1,8	42	73
03070-410	POM ball	10	8	12	22	2,5	2,7	54	100
03070-412	POM ball	12	10	14	24	2,5	3,2	54	122

Spring plungers

smooth version, stainless steel

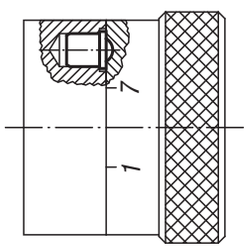


Material:
Sleeve and spring stainless steel.
Ball stainless steel or POM.

Version:
Sleeve bright.
Ball hardened, bright.

Sample order:
nlm 03070-05

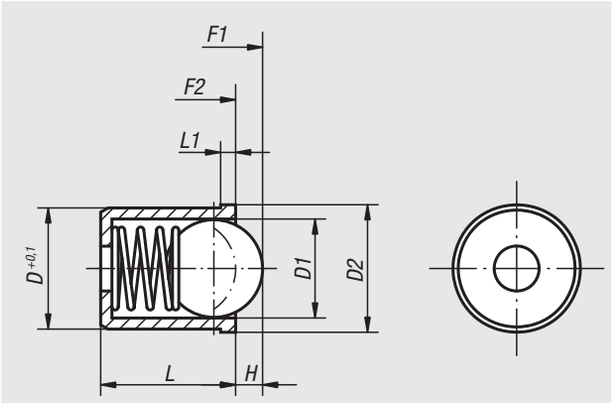
example:



Order No.	Version	D	D1	D2	L	L1	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03070-03	stainless steel ball	3	2,5	3,5	4	0,8	0,65	1,7	3,4
03070-04	stainless steel ball	4	3	4,6	5	1	0,8	3	7
03070-05	stainless steel ball	5	4	5,6	6	1	1	4	7
03070-06	stainless steel ball	6	5	6,5	7	1	1,5	6	12
03070-08	stainless steel ball	8	6,5	8,5	9	1	1,8	6	12
03070-10	stainless steel ball	10	8	12	13,5	2,5	2,7	10	20
03070-12	stainless steel ball	12	10	14	16	2,5	3,5	15	25
03070-304	POM ball	4	3	4,6	5	1	0,5	3	7
03070-305	POM ball	5	4	5,6	6	1	0,6	4	7
03070-306	POM ball	6	5	6,5	7	1	1,1	6	12
03070-308	POM ball	8	6,5	8,5	9	1	1,5	6	12
03070-310	POM ball	10	8	12	13,5	2,5	2,3	10	20
03070-312	POM ball	12	10	14	16	2,5	3,1	15	25

Spring plungers

smooth version, plastic



Material:
Sleeve thermoplastic.
Spring stainless steel.
Ball in stainless steel or in POM.

Version:
Sleeve black.
Ball hardened, bright.

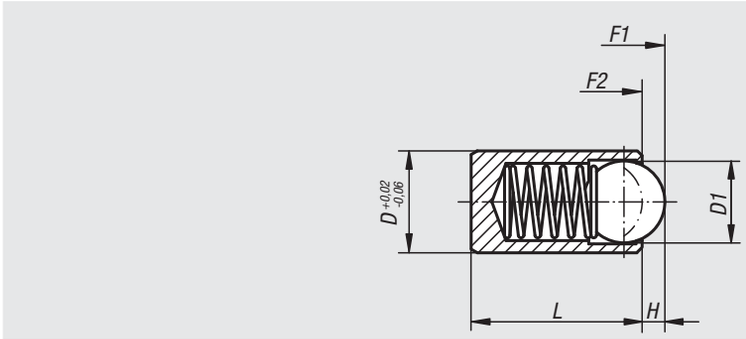
Sample order:
nlm 03071-05

Order No.	Version	D	D1	D2	L	L1	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03071-04	stainless steel ball	4	3	4,6	5	1	0,7	3	7
03071-05	stainless steel ball	5	4	5,6	6	1	1	4	7
03071-06	stainless steel ball	6	5	6,5	7	1	1,5	6	12
03071-08	stainless steel ball	8	6,5	8,5	9	1	1,8	6	12
03071-10	stainless steel ball	10	8	12	13,5	2,5	2,7	10	20
03071-12	stainless steel ball	12	10	14	16	2,5	3,5	15	25
03071-204	POM ball	4	3	4,6	5	1	0,7	3	7
03071-205	POM ball	5	4	5,6	6	1	1	4	7
03071-206	POM ball	6	5	6,5	7	1	1,5	6	12
03071-208	POM ball	8	6,5	8,5	9	1	1,8	6	12
03071-210	POM ball	10	8	12	13,5	2,5	2,7	10	20
03071-212	POM ball	12	10	14	16	2,5	3,5	15	25

03072

Spring plungers

smooth version without collar, stainless steel



Material:
Sleeve, ball and spring in stainless steel.

Version:
Ball hardened, bright.

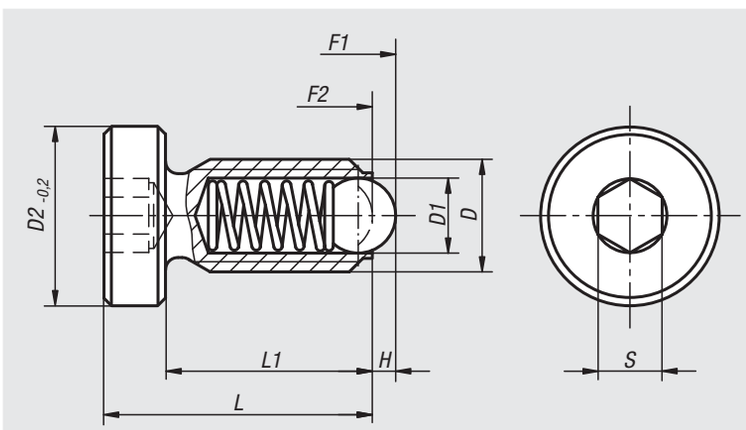
Sample order:
nlm 03072-208

Order No.	D	D1	L	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03072-203	3	2	7	0,65	5	7
03072-204	4	3	9	0,8	12	22
03072-205	5	4	12	1	19	30
03072-206	6	5	14	1,5	22	40
03072-208	8	6	16	1,8	42	73
03072-210	10	8	22	2,7	54	100
03072-212	12	10	24	3,2	54	122

03073

Spring plungers

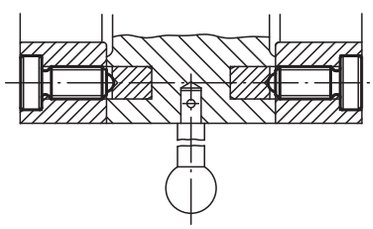
with head



Material:
Free cutting steel or stainless steel.

Version:
Steel black oxidised.
Stainless steel bright.
Ball steel or stainless steel, hardened, bright.

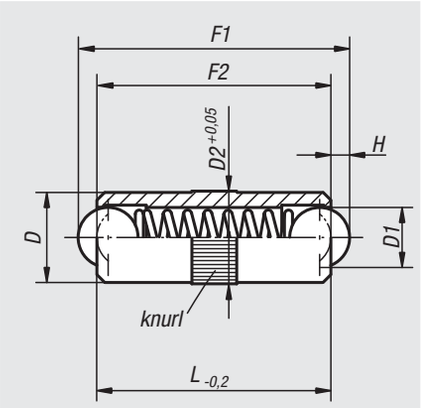
Sample order:
nlm 03073-10



Order No. steel	Order No. stainless steel	D	D1	D2	L	L1	H	S	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03073-06	**03073-061**	M6	3,5	10	16	12	1	3	9	13
03073-08	**03073-081**	M8	5	13	21	16	1,5	4	15	30
03073-10	**03073-101**	M10	6	16	26	20	2	5	20	35
03073-12	**03073-121**	M12	8	18	32	25	2,5	6	30	55

Spring plungers

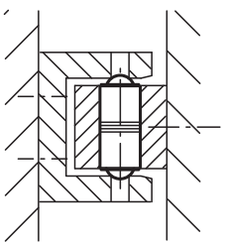
smooth version, double-sided



Material:
Sleeve brass. Ball and spring stainless steel.

Version:
Balls hardened, bright.

Sample order:
nlm 03074-05



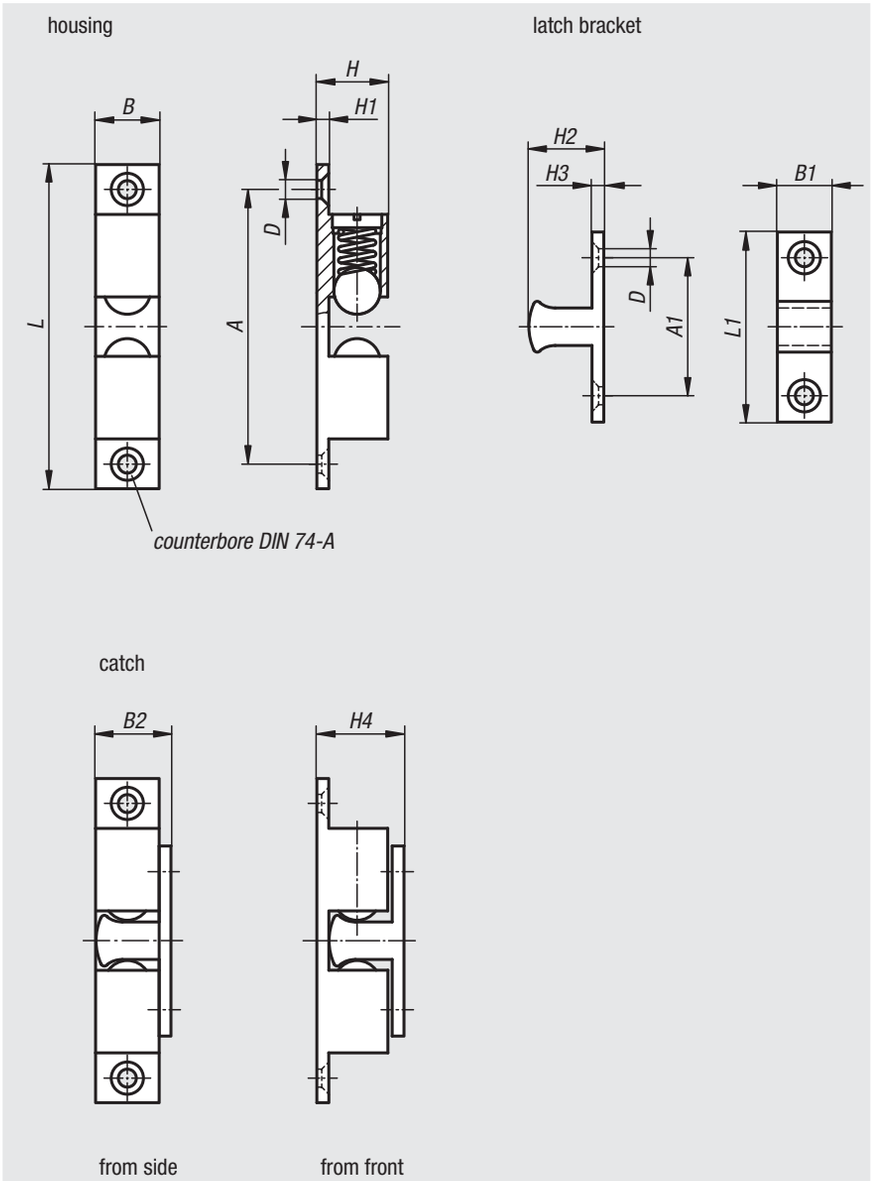
Order No.	D	D1	D2	L	H	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03074-025	2,5	2	2,55	6	0,65	1,5	2,8
03074-03	3	2,5	3,05	8	0,8	2,5	6
03074-04	4	3	4,05	10	0,9	3	7
03074-05	5	4	5,05	12	1,2	4	8
03074-06	6	5	6,05	16	1,6	6	10
03074-08	8	6	8,05	20	2	8	12
03074-10	10	8	10,05	24	2,9	10	16

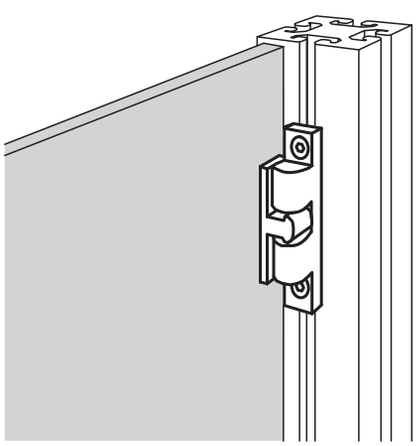
Double ball catch

Material:
Housing and latch chrome plated brass.
Balls and springs stainless steel.

Sample order:
nlm 03075-50

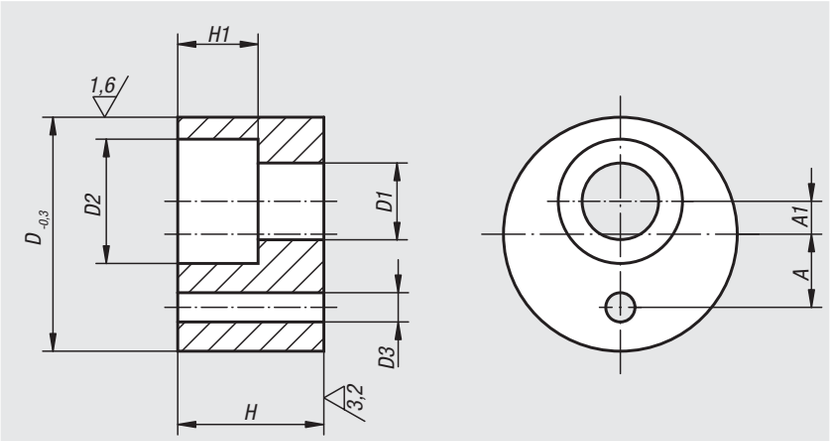
Note:
Quick catch for various applications such as holding doors, hatches, screens etc. closed. The double ball catch consists of a housing and a latch bracket that engages between the two balls. The latch bracket can engage from the front or the side. The engagement pressure is adjustable.





Order No.	A	A1	B	B1	B2	D	H	H1	H2	H3	H4	L	L1	Approx. weight kg
03075-50	39,8	19,8	8,8	7,6	10,8	3,8	10,6	2	11,2	2	13,2	49	28,8	0,024
03075-60	50	23,5	11	9	13,5	4,8	13,2	2,4	13,5	2,2	15,5	60	35	0,04
03075-70	58	30	13	12	15,2	4,8	15	2,4	15,7	2,2	18,1	68,4	40,2	0,065

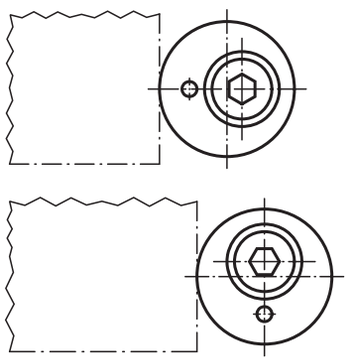
Eccentric stops



Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 03080-10



Order No.	D	D1	D2	D3	H	H1	A	A1
03080-05	16	5,5	10	2	10	6	5	1,5
03080-06	20	6,6	11	2	12	7	6	2,5
03080-08	25	9	15	4	16	9	8	3,5
03080-10	32	11	18	4	20	11	10	4,5
03080-12	36	13,5	20	4	25	13	12	5,5

03083

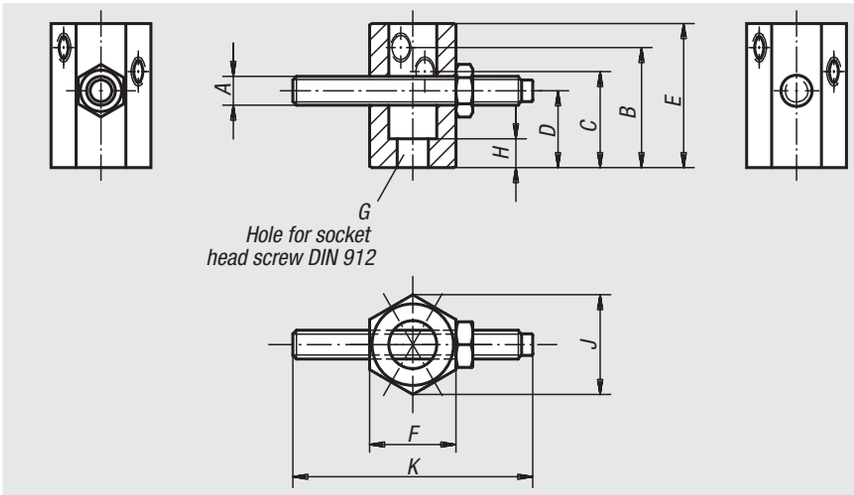
Adjustable stops

Material:
Body and set screw carbon steel.

Version:
Body black oxidised.
Set screw tempered and black oxidised.

Sample order:
nlm 03083-16063

Note:
The adjustable stops have three tapped holes to accept the set screws.



Order No.	A	B	C	D	E	F	G hole for	H	J	K
03083-08032	M8	32	25	20	40	21	M8	7	24,3	50
03083-12050	M12	50	40	32	60	36	M12	12	41,6	100
03083-16063	M16	63	50	40	80	46	M16	16	53,1	100

03084

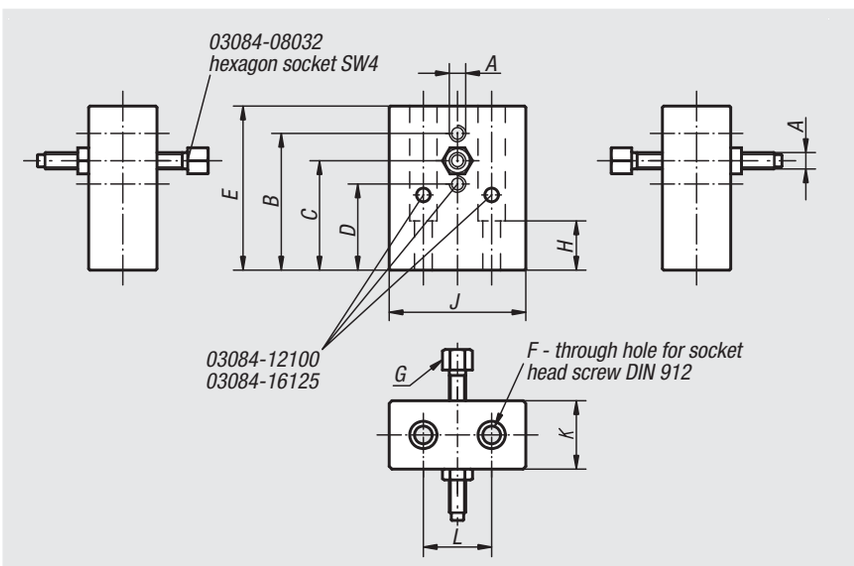
Adjustable stops

Material:
Body, set screw carbon steel.

Version:
Body black oxidised.
Set screw tempered, black oxidised.

Sample order:
nlm 03084-08032

Note:
The adjustable stops have tapped holes to hold the adjusting bolt.



Order No.	A	B	C	D	E	F hole for	G	H	J	K	L
03084-08032	M8	32	20	-	40	M8	M8x50	20	50	22	25
03084-12100	M12	100	80	63	120	M12	M12x110	37	100	50	50
03084-16125	M16	125	100	80	150	M16	M16x110	46	100	50	50

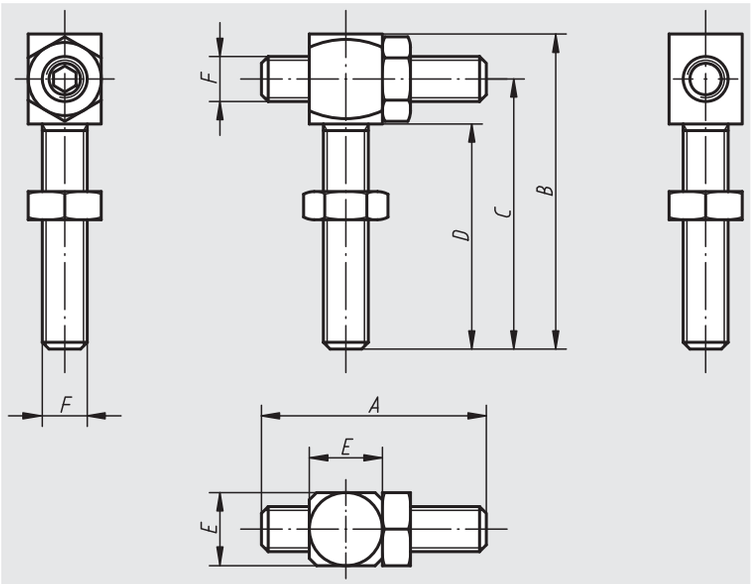
03085

Adjustable mini stops

Material:
Carbon steel, tempered.

Version:
Black oxidised.

Sample order:
nlm 03085-10



Order No.	A	B	C	D	E	F
03085-08	40	56	48	40	13	M8
03085-10	50	70	60	50	17	M10
03085-12	60	84	72	60	19	M12
03085-16	80	112	96	80	24	M16

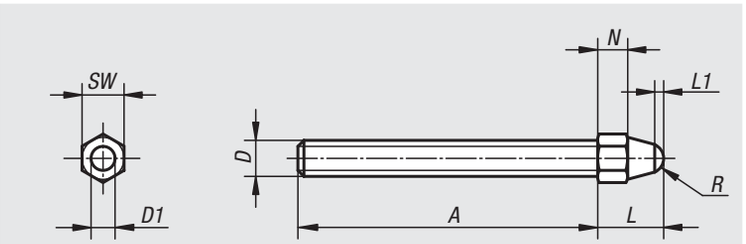
03086

Stop screw

Material:
Steel.

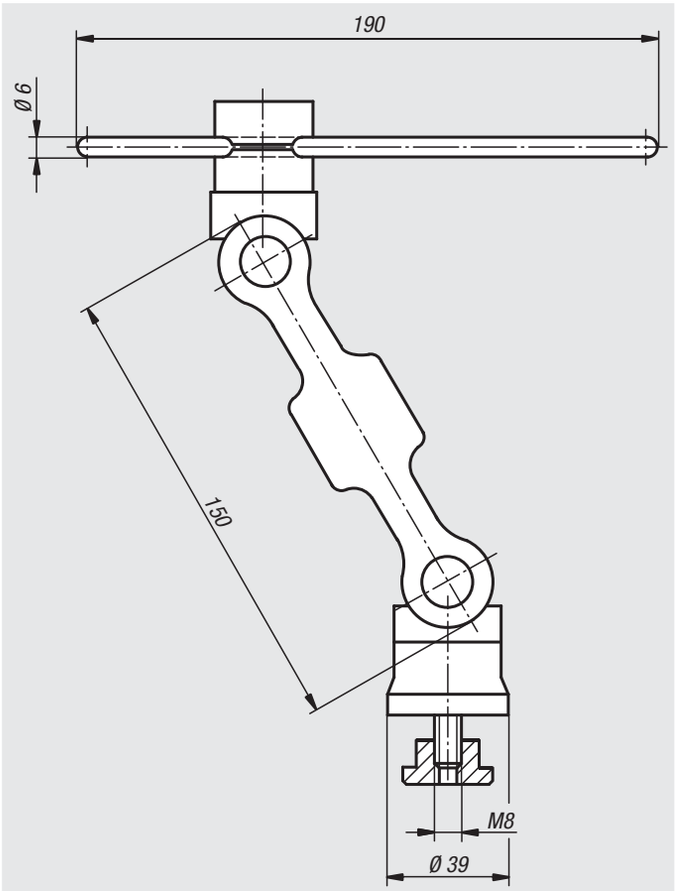
Version:
Black oxidised. Domed head hardened.

Sample order:
nlm 03086-108



Order No.	A	D	D1	L	L1	N	R	SW
03086-106	50	M6	4	10	1,5	4	2,5	7
03086-108	65	M8	6	14	1,5	6	3,75	10
03086-110	85	M10	8	17	2	7	5	11
03086-112	110	M12	10	20	2,5	8	6,25	13
03086-116	130	M16	12	26	3	10	7,5	17

5D workpiece stops



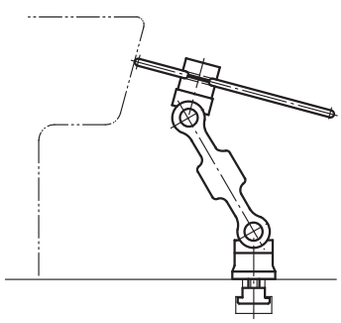
Material:
Clamping joint high-tensile aluminium.
Hinge pin, support plate and stop bar, steel.

Version:
Clamping joint anodized blue and black.
Hinge pins, support plate and stop bar black oxidised.

Sample order:
nlm 03088-15012

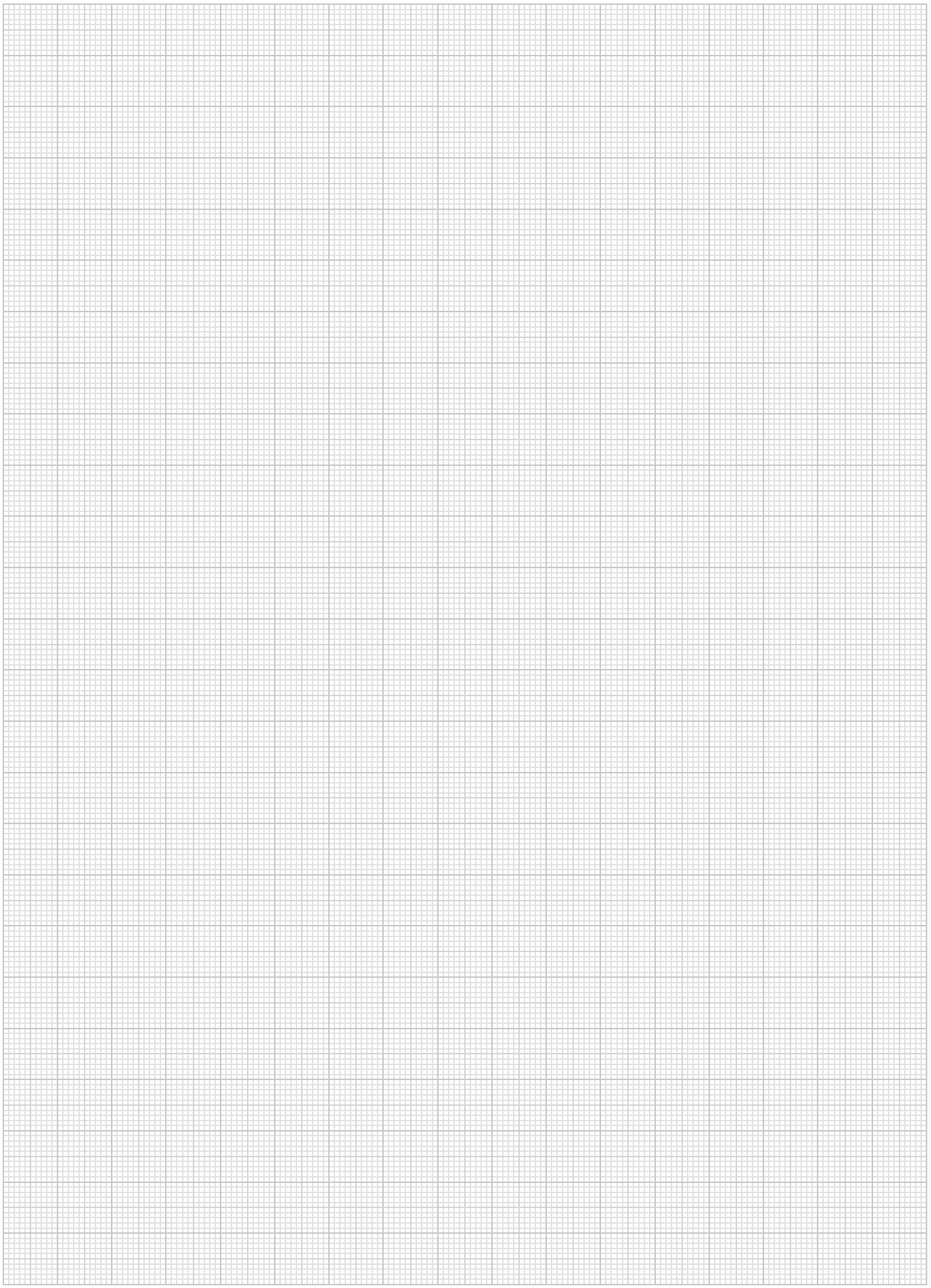
Note:
The 5D-swivelling stop serves, among other things, as a versatile instrument for positioning on machining tools or for assembly work. It is continuously adjustable, quickly and flexibly, in 5 axes. Supplied complete with M8x12 T-slot nut and hex key.

On request:
Connecting element for combining several 5D-swivelling stops.



Order No.	Size
03088-15012	150

Notes



Indexing plungers

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

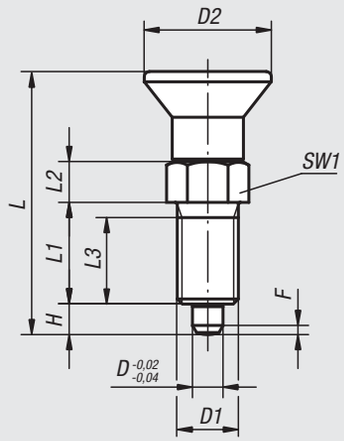
Sample order:
nlm 03089-04206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged. Form C or D is recommended for applications where the plunger remains disengaged over a long period and the pin should be prevented from springing back.

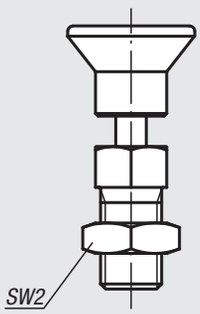
On request:
Special versions.

Accessories:
Spacer rings 03089

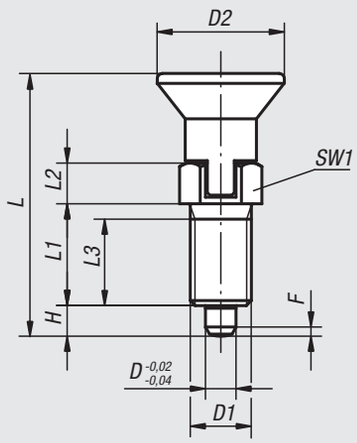
Form A
non-lockout type
without locknut



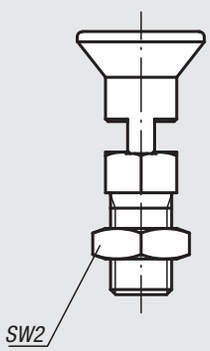
Form B
non-lockout type
with locknut

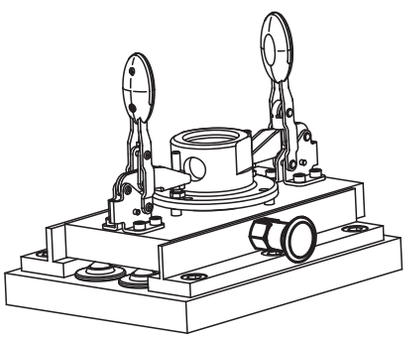


Form C
lockout type
without locknut



Form D
lockout type
with locknut





Indexing plungers

Indexing plungers, steel, indexing pin hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30° Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-1903	**03089-2903**	**03089-3903**	**03089-4903**	3	M6x0,75	14	31,5	12	5	10	3,5	8	-/10/-/10	0,8	4,5	10
03089-1004	**03089-2004**	**03089-3004**	**03089-4004**	4	M8x1	18	38,5	15	6	13	4	10	-/13/-/13	1	6	12
03089-1105	**03089-2105**	**03089-3105**	**03089-4105**	5	M10x1	21	43,5	17	7	15	5	13	-/17/-/17	1,3	5	12
03089-1206	**03089-2206**	**03089-3206**	**03089-4206**	6	M12x1,5	25	51,7	20	8	17	6	14	-/19/-/19	1,8	6	14
03089-1308	**03089-2308**	**03089-3308**	**03089-4308**	8	M16x1,5	33	68	26	10	23	8	19	-/24/-/24	2,3	15	35
03089-1410	**03089-2410**	**03089-3410**	**03089-4410**	10	M20x1,5	33	74	28	12	25	10	22	-/30/-/30	2,8	15	34
03089-1412	**03089-2412**	**03089-3412**	**03089-4412**	12	M20x1,5	33	78	28	14	25	12	22	-/30/-/30	2,8	15	39
03089-1516	**03089-2516**	**03089-3516**	**03089-4516**	16	M24x2	40	96	32	18	28	16	27	-/36/-/36	3,2	20	46

Indexing plungers, stainless steel, indexing pin hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30° Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-01903	**03089-02903**	**03089-03903**	**03089-04903**	3	M6x0,75	14	31,5	12	5	10	3,5	8	-/10/-/10	0,8	4,5	10
03089-01004	**03089-02004**	**03089-03004**	**03089-04004**	4	M8x1	18	38,5	15	6	13	4	10	-/13/-/13	1	6	12
03089-01105	**03089-02105**	**03089-03105**	**03089-04105**	5	M10x1	21	43,5	17	7	15	5	13	-/17/-/17	1,3	5	12
03089-01206	**03089-02206**	**03089-03206**	**03089-04206**	6	M12x1,5	25	51,7	20	8	17	6	14	-/19/-/19	1,8	6	14
03089-01308	**03089-02308**	**03089-03308**	**03089-04308**	8	M16x1,5	33	68	26	10	23	8	19	-/24/-/24	2,3	15	35
03089-01410	**03089-02410**	**03089-03410**	**03089-04410**	10	M20x1,5	33	74	28	12	25	10	22	-/30/-/30	2,8	15	34
03089-01412	**03089-02412**	**03089-03412**	**03089-04412**	12	M20x1,5	33	78	28	14	25	12	22	-/30/-/30	2,8	15	39
03089-01516	**03089-02516**	**03089-03516**	**03089-04516**	16	M24x2	40	96	32	18	28	16	27	-/36/-/36	3,2	20	46

Indexing plungers, stainless steel, indexing pin not hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30° Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-11903	**03089-12903**	**03089-13903**	**03089-14903**	3	M6x0,75	14	31,5	12	5	10	3,5	8	-/10/-/10	0,8	4,5	10
03089-11004	**03089-12004**	**03089-13004**	**03089-14004**	4	M8x1	18	38,5	15	6	13	4	10	-/13/-/13	1	6	12
03089-11105	**03089-12105**	**03089-13105**	**03089-14105**	5	M10x1	21	43,5	17	7	15	5	13	-/17/-/17	1,3	5	12
03089-11206	**03089-12206**	**03089-13206**	**03089-14206**	6	M12x1,5	25	51,7	20	8	17	6	14	-/19/-/19	1,8	6	14
03089-11308	**03089-12308**	**03089-13308**	**03089-14308**	8	M16x1,5	33	68	26	10	23	8	19	-/24/-/24	2,3	15	35
03089-11410	**03089-12410**	**03089-13410**	**03089-14410**	10	M20x1,5	33	74	28	12	25	10	22	-/30/-/30	2,8	15	34
03089-11412	**03089-12412**	**03089-13412**	**03089-14412**	12	M20x1,5	33	78	28	14	25	12	22	-/30/-/30	2,8	15	39
03089-11516	**03089-12516**	**03089-13516**	**03089-14516**	16	M24x2	40	96	32	18	28	16	27	-/36/-/36	3,2	20	46

Indexing plungers

with extended indexing pin

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

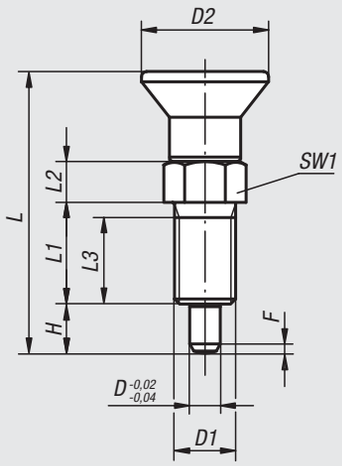
Sample order:
nlm 03089-21004

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.

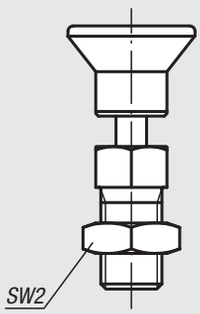
On request:
Special versions.

Accessories:
Spacer rings 03089

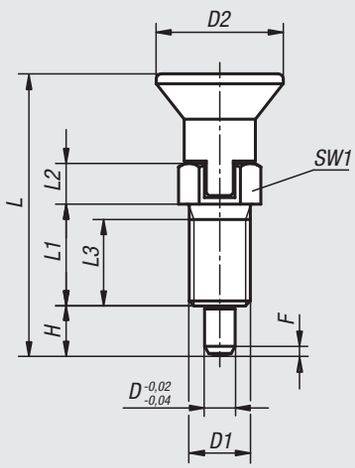
Form A
non-lockout type
without locknut



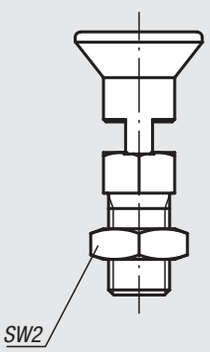
Form B
non-lockout type
with locknut

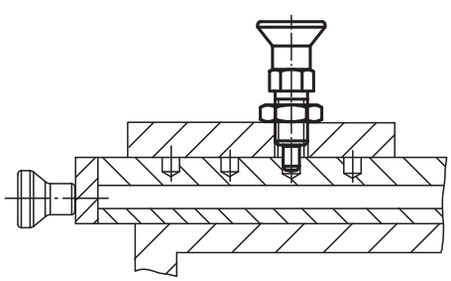


Form C
lockout type
without locknut



Form D
lockout type
with locknut





Indexing plungers with extended indexing pins, steel, indexing pins hardened

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-21903	**03089-22903**	3	M6x0,75	14	33	12	5	10	5	8	-/10	0,8	4,5	12
03089-21004	**03089-22004**	4	M8x1	18	40,5	15	6	13	6	10	-/13	1	6	15
03089-21105	**03089-22105**	5	M10x1	21	46,5	17	7	15	8	13	-/17	1,3	5	16
03089-21206	**03089-22206**	6	M12x1,5	25	54,7	20	8	17	9	14	-/19	1,8	6	18
03089-21308	**03089-22308**	8	M16x1,5	33	72	26	10	23	12	19	-/24	2,3	15	45
03089-21410	**03089-22410**	10	M20x1,5	33	79	28	12	25	15	22	-/30	2,8	15	43
03089-21412	**03089-22412**	12	M20x1,5	33	84	28	14	25	18	22	-/30	2,8	15	51
03089-21516	**03089-22516**	16	M24x2	40	104	32	18	28	24	27	-/36	3,2	20	60

Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-23105	**03089-24105**	5	M10x1	21	49,5	17	10	15	8	13	-/17	1,3	5	16
03089-23206	**03089-24206**	6	M12x1,5	25	57,7	20	11	17	9	14	-/19	1,8	6	18
03089-23308	**03089-24308**	8	M16x1,5	33	76	26	14	23	12	19	-/24	2,3	15	45

Indexing plungers with extended indexing pins, stainless steel, indexing pins hardened

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-201903	**03089-202903**	3	M6x0,75	14	33	12	5	10	5	8	-/10	0,8	4,5	12
03089-201004	**03089-202004**	4	M8x1	18	40,5	15	6	13	6	10	-/13	1	6	15
03089-201105	**03089-202105**	5	M10x1	21	46,5	17	7	15	8	13	-/17	1,3	5	16
03089-201206	**03089-202206**	6	M12x1,5	25	54,7	20	8	17	9	14	-/19	1,8	6	18
03089-201308	**03089-202308**	8	M16x1,5	33	72	26	10	23	12	19	-/24	2,3	15	45
03089-201410	**03089-202410**	10	M20x1,5	33	79	28	12	25	15	22	-/30	2,8	15	43
03089-201412	**03089-202412**	12	M20x1,5	33	84	28	14	25	18	22	-/30	2,8	15	51
03089-201516	**03089-202516**	16	M24x2	40	104	32	18	28	24	27	-/36	3,2	20	60

Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-203105	**03089-204105**	5	M10x1	21	49,5	17	10	15	8	13	-/17	1,3	5	16
03089-203206	**03089-204206**	6	M12x1,5	25	57,7	20	11	17	9	14	-/19	1,8	6	18
03089-203308	**03089-204308**	8	M16x1,5	33	76	26	14	23	12	19	-/24	2,3	15	45

Indexing plungers with extended indexing pins, stainless steel, indexing pins not hardened

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-211903	**03089-212903**	3	M6x0,75	14	33	12	5	10	5	8	-/10	0,8	4,5	12
03089-211004	**03089-212004**	4	M8x1	18	40,5	15	6	13	6	10	-/13	1	6	15
03089-211105	**03089-212105**	5	M10x1	21	46,5	17	7	15	8	13	-/17	1,3	5	16
03089-211206	**03089-212206**	6	M12x1,5	25	54,7	20	8	17	9	14	-/19	1,8	6	18
03089-211308	**03089-212308**	8	M16x1,5	33	72	26	10	23	12	19	-/24	2,3	15	45
03089-211410	**03089-212410**	10	M20x1,5	33	79	28	12	25	15	22	-/30	2,8	15	43
03089-211412	**03089-212412**	12	M20x1,5	33	84	28	14	25	18	22	-/30	2,8	15	51
03089-211516	**03089-212516**	16	M24x2	40	104	32	18	28	24	27	-/36	3,2	20	60

Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-213105	**03089-214105**	5	M10x1	21	49,5	17	10	15	8	13	-/17	1,3	5	16
03089-213206	**03089-214206**	6	M12x1,5	25	57,7	20	11	17	9	14	-/19	1,8	6	18
03089-213308	**03089-214308**	8	M16x1,5	33	76	26	14	23	12	19	-/24	2,3	15	45

Indexing plungers

short version

Material:
Steel version:
Indexing pin hardened:
grade 5.8

Stainless steel version:
Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305

Mushroom knob black grey thermoplastic.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin not hardened, ground, bright.

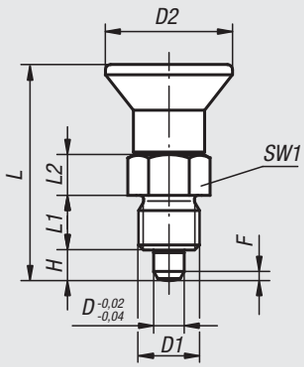
Sample order:
nlm 03089-16206

Note:
Indexing plungers are used to prevent any change in position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged. Form C or D is recommended for applications in which the pin is disengaged over extended periods and should be prevented from springing back.

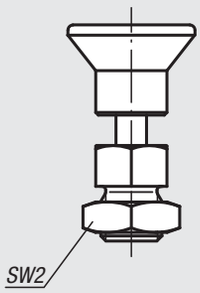
On request:
Special versions.

Accessories:
Spacer rings 03089

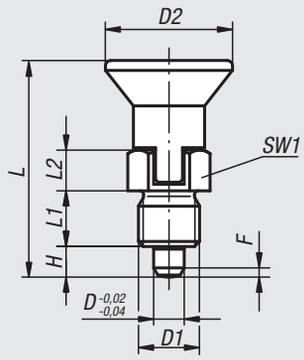
Form A
non-lockout type
without locknut



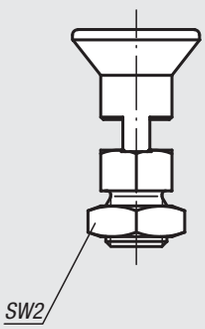
Form B
non-lockout type
with locknut

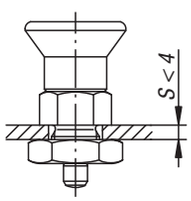


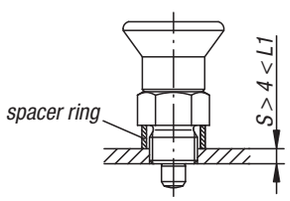
Form C
lockout type
without locknut

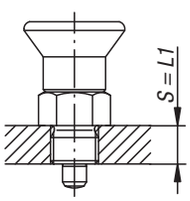


Form D
lockout type
with locknut









Indexing plungers

short version

Indexing plungers, short version, steel, indexing pin hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-5903	**03089-6903**	**03089-7903**	**03089-8903**	3	M6x0,75	14	25,5	6	5	3,5	8	- / 10 / - / 10	0,8	4	10
03089-5004	**03089-6004**	**03089-7004**	**03089-8004**	4	M8x1	18	29,5	6	6	4	10	- / 13 / - / 13	1	4	12
03089-5105	**03089-6105**	**03089-7105**	**03089-8105**	5	M10x1	21	34,5	8	7	5	13	- / 17 / - / 17	1,3	5	12
03089-5206	**03089-6206**	**03089-7206**	**03089-8206**	6	M12x1,5	25	41,7	10	8	6	14	- / 19 / - / 19	1,8	6	14
03089-5308	**03089-6308**	**03089-7308**	**03089-8308**	8	M16x1,5	33	54	12	10	8	19	- / 24 / - / 24	2,3	14	28
03089-5410	**03089-6410**	**03089-7410**	**03089-8410**	10	M20x1,5	33	61	15	12	10	22	- / 30 / - / 30	2,8	15	32

Indexing plungers, short version, stainless steel, indexing pin not hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-15903	**03089-16903**	**03089-17903**	**03089-18903**	3	M6x0,75	14	25,5	6	5	3,5	8	- / 10 / - / 10	0,8	4	10
03089-15004	**03089-16004**	**03089-17004**	**03089-18004**	4	M8x1	18	29,5	6	6	4	10	- / 13 / - / 13	1	4	12
03089-15105	**03089-16105**	**03089-17105**	**03089-18105**	5	M10x1	21	34,5	8	7	5	13	- / 17 / - / 17	1,3	5	12
03089-15206	**03089-16206**	**03089-17206**	**03089-18206**	6	M12x1,5	25	41,7	10	8	6	14	- / 19 / - / 19	1,8	6	14
03089-15308	**03089-16308**	**03089-17308**	**03089-18308**	8	M16x1,5	33	54	12	10	8	19	- / 24 / - / 24	2,3	14	28
03089-15410	**03089-16410**	**03089-17410**	**03089-18410**	10	M20x1,5	33	61	15	12	10	22	- / 30 / - / 30	2,8	15	32

Indexing plungers stainless steel

Material:
Indexing pin hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4034.

Indexing pin not hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4305.

Mushroom knob 1.4305, electrolytic-polish.

Version:
Bright.
Indexing pin ground.

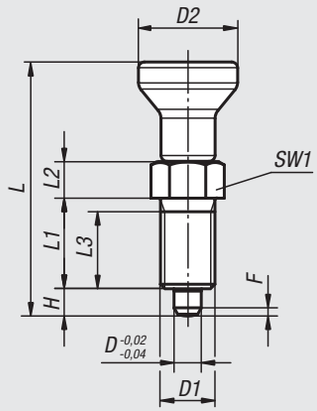
Sample order:
nlm 03089-001004

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged. Form C or D is recommended for applications in which the pin is disengaged over extended periods and should be prevented from springing back.

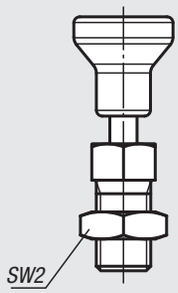
On request:
Special versions.

Accessories:
Spacer rings 03089

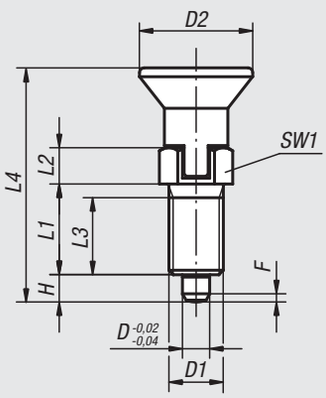
Form A
non-lockout type
without locknut



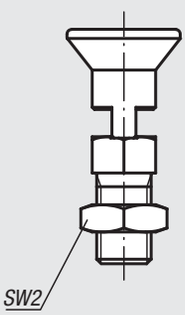
Form B
non-lockout type
with locknut



Form C
lockout type
without locknut



Form D
lockout type
with locknut



Indexing plungers stainless steel, indexing pin hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-001903	03089-002903	03089-003903	03089-004903	3	M6x0,75	14	34,5/34,5/-/-	12	5	10	-/-/31,5/31,5	3,5	8	-/10/-/10	0,8	4,5	10
03089-001004	03089-002004	03089-003004	03089-004004	4	M8x1	18	43/43/-/-	15	6	13	-/-/38,5/38,5	4	10	-/13/-/13	1	6	12
03089-001105	03089-002105	03089-003105	03089-004105	5	M10x1	21	50/50/-/-	17	7	15	-/-/43,5/43,5	5	13	-/17/-/17	1,3	5	12
03089-001206	03089-002206	03089-003206	03089-004206	6	M12x1,5	25	59/59/-/-	20	8	17	-/-/51,7/51,7	6	14	-/19/-/19	1,8	6	14
03089-001308	03089-002308	03089-003308	03089-004308	8	M16x1,5	33	77/77/-/-	26	10	23	-/-/68/68	8	19	-/24/-/24	2,3	15	35
03089-001410	03089-002410	03089-003410	03089-004410	10	M20x1,5	33	83/83/-/-	28	12	25	-/-/74/74	10	22	-/30/-/30	2,8	15	34
03089-001412	03089-002412	03089-003412	03089-004412	12	M20x1,5	33	87/87/-/-	28	14	25	-/-/78/78	12	22	-/30/-/30	2,8	15	39
03089-001516	03089-002516	03089-003516	03089-004516	16	M24x2	40	106/106/-/-	32	18	28	-/-/96/96	16	27	-/36/-/36	3,2	20	46

Indexing plungers stainless steel, indexing pin not hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-111903	03089-112903	03089-113903	03089-114903	3	M6x0,75	14	34,5/34,5/-/-	12	5	10	-/-/31,5/31,5	3,5	8	-/10/-/10	0,8	4,5	10
03089-111004	03089-112004	03089-113004	03089-114004	4	M8x1	18	43/43/-/-	15	6	13	-/-/38,5/38,5	4	10	-/13/-/13	1	6	12
03089-111105	03089-112105	03089-113105	03089-114105	5	M10x1	21	50/50/-/-	17	7	15	-/-/43,5/43,5	5	13	-/17/-/17	1,3	5	12
03089-111206	03089-112206	03089-113206	03089-114206	6	M12x1,5	25	59/59/-/-	20	8	17	-/-/51,7/51,7	6	14	-/19/-/19	1,8	6	14
03089-111308	03089-112308	03089-113308	03089-114308	8	M16x1,5	33	77/77/-/-	26	10	23	-/-/68/68	8	19	-/24/-/24	2,3	15	35
03089-111410	03089-112410	03089-113410	03089-114410	10	M20x1,5	33	83/83/-/-	28	12	25	-/-/74/74	10	22	-/30/-/30	2,8	15	34
03089-111412	03089-112412	03089-113412	03089-114412	12	M20x1,5	33	87/87/-/-	28	14	25	-/-/78/78	12	22	-/30/-/30	2,8	15	39
03089-111516	03089-112516	03089-113516	03089-114516	16	M24x2	40	106/106/-/-	32	18	28	-/-/96/96	16	27	-/36/-/36	3,2	20	46

Indexing plungers

for thin-walled parts

Material:
Steel version:
Indexing pin hardened:
grade 5.8

Stainless steel version:
Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305

Mushroom knob black grey thermoplastic.

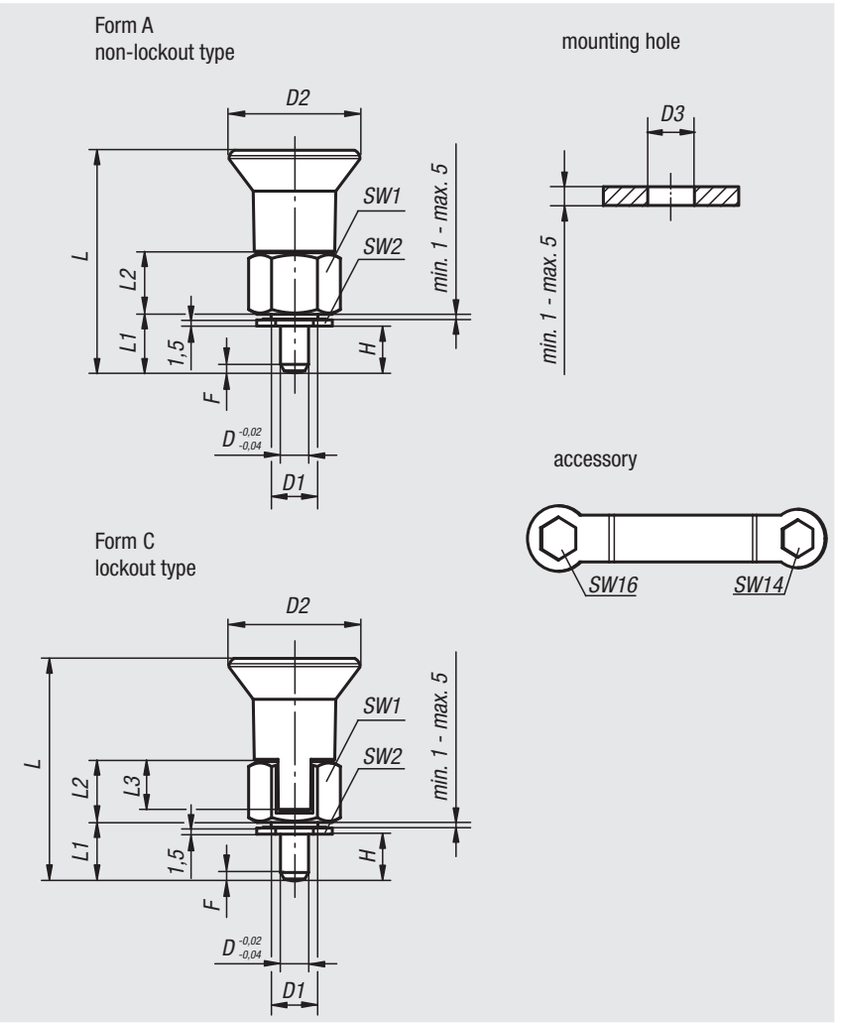
Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin not hardened, ground, bright.

Sample order:
nlm 03089-31105 (indexing plunger)
nlm 03089-91416 (ring spanner)

Note:
These indexing plungers are especially well-suited for assembly in thin-walled parts.
Indexing plungers are used where any change in locking position due to lateral forces should be prevented. A new locking position can be set only after the pin has been manually disengaged.
Form C is recommended for applications where the locking pin should remain disengaged for an extended period and be prevented from springing back.

Accessories:
A double-ended ring spanner can be supplied as an accessory to tighten the nut.



Indexing plungers for thin-walled parts, steel, indexing pin hardened

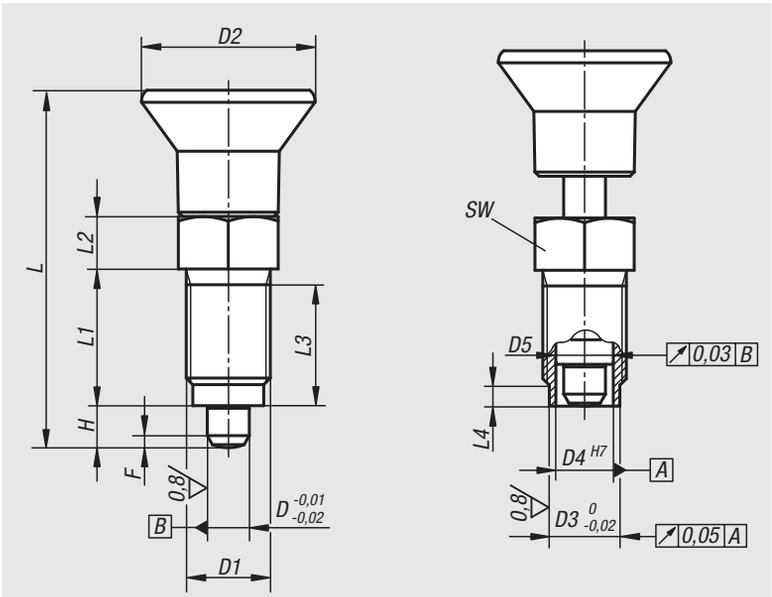
Order No.	Form	D	D1	D2	D3	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Article number double-ended ring spanner
03089-31105	A	5	M10x1	28	10	46,5	11,5	13	10,5	5-9	17	14	1,3	6	15	03089-91416
03089-31206	A	6	M10x1	28	10	47,5	12,5	13	10,5	6-10	17	14	1,8	7	19	03089-91416
03089-33105	C	5	M10x1	28	10	46,5	11,5	13	10,5	5-9	17	14	1,3	6	15	03089-91416
03089-33206	C	6	M10x1	28	10	47,5	12,5	13	10,5	6-10	17	14	1,8	7	19	03089-91416

Indexing plungers for thin-walled parts, stainless steel, indexing pin not hardened

Order No.	Form	D	D1	D2	D3	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Article number double-ended ring spanner
03089-311105	A	5	M10x1	28	10	46,5	11,5	13	10,5	5-9	17	14	1,3	6	15	03089-91416
03089-311206	A	6	M10x1	28	10	47,5	12,5	13	10,5	6-10	17	14	1,8	7	19	03089-91416
03089-313105	C	5	M10x1	28	10	46,5	11,5	13	10,5	5-9	17	14	1,3	6	15	03089-91416
03089-313206	C	6	M10x1	28	10	47,5	12,5	13	10,5	6-10	17	14	1,8	7	19	03089-91416

Indexing plungers - Premium

with cylindrical pin



Material:
Steel version:
indexing pin hardened:
grade 5.8

Stainless steel version:
indexing pin hardened
threaded sleeve 1.4305
indexing pin 1.4034

Mushroom knob black grey thermoplastic.

Version:
Steel version:
indexing pin hardened, ground and black oxidised.

Stainless steel version:
indexing pin hardened, ground and bright.

Sample order:
nlm 03089-41105

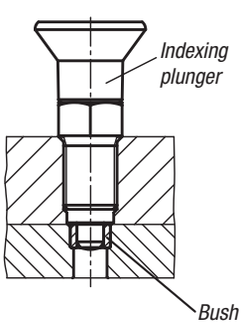
Note:
Premium indexing plungers are characterized by more stringent manufacturing requirements for the indexing plungers and threaded sleeve. In addition, a centring locator that can be used to increase the positioning accuracy is provided on the threaded sleeve. These indexing plungers are used when it is necessary to prevent shifting of the locked position by transverse forces and greater positioning accuracy is required. A new locking position can only be set after the pin has been manually disengaged. When high lateral forces are to be expected, the centring locator should be used.

Assembly:
When using the threaded sleeve centring, it is recommended the receiving reamed hole be machined before tapping.

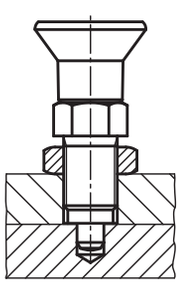
On request:
Special versions and spacer rings.

Accessories:
Matching cylindrical bush 03089.
Locknut 07212-….

Fixation
with bush:



Fixation
without bush:



Indexing plungers - Premium

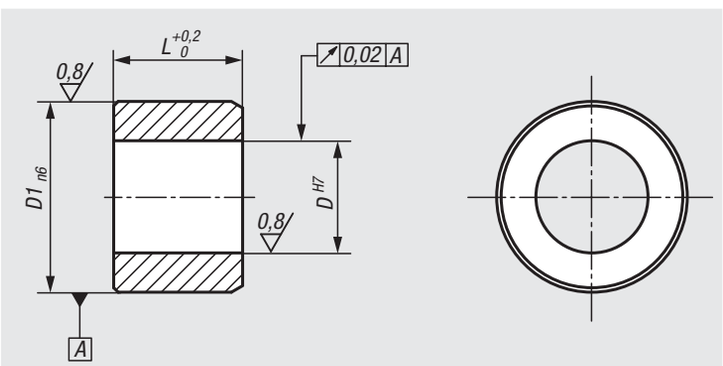
with cylindrical pin

Order No.	Material	D	D1	D2	D3	D4	D5	L	L1	L2	L3	L4	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-41105	Steel	5	M10x1	21	8	6	6 -0,01/-0,02	43,5	17	7	15	3	5	13	1,3	5	12
03089-41206	Steel	6	M12x1,5	25	10	8,5	8,5 -0,01/-0,03	51,7	20	8	17	3	6	14	1,8	6	14
03089-41308	Steel	8	M16x1,5	33	13,5	11	11 -0,01/-0,03	68	26	10	23	4	8	19	2,3	15	35
03089-41410	Steel	10	M20x1,5	33	17	11	11 -0,01/-0,03	74	28	12	25	4	10	22	2,8	15	34

Order No.	Material	D	D1	D2	D3	D4	D5	L	L1	L2	L3	L4	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-401105	Stainless steel	5	M10x1	21	8	6	6 -0,01/-0,02	43,5	17	7	15	3	5	13	1,3	5	12
03089-401206	Stainless steel	6	M12x1,5	25	10	8,5	8,5 -0,01/-0,03	51,7	20	8	17	3	6	14	1,8	6	14
03089-401308	Stainless steel	8	M16x1,5	33	13,5	11	11 -0,01/-0,03	68	26	10	23	4	8	19	2,3	15	35
03089-401410	Stainless steel	10	M20x1,5	33	17	11	11 -0,01/-0,03	74	28	12	25	4	10	22	2,8	15	34

03089

Bushes cylindrical



Material:
Steel or stainless steel 1.4034.

Version:
Steel version:
black oxidised, hardened and ground.
Stainless steel version:
bright, hardened and ground.

Sample order:
nlm 03089-9005

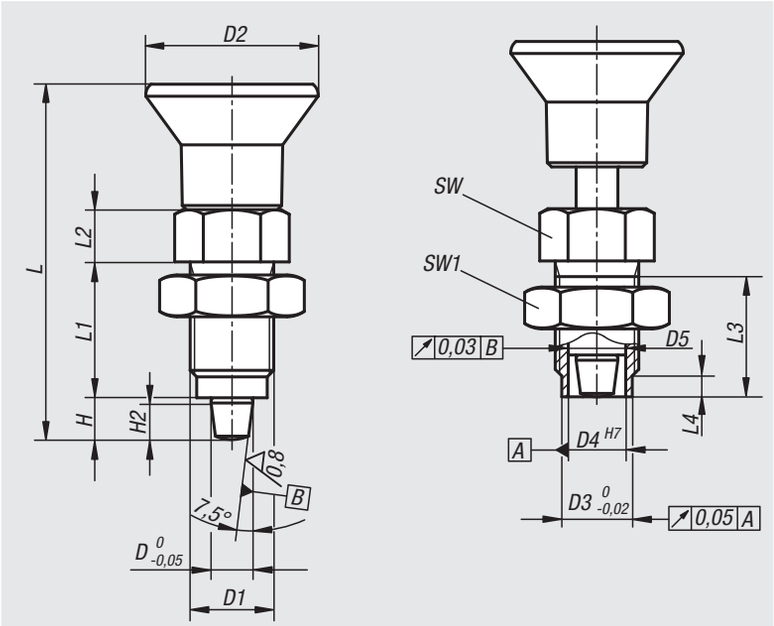
Note:
Bush for premium indexing plungers with cylindrical indexing pin 03089.

Assembly:
To increase the coaxial alignment accuracy, the hole for the bush and the premium indexing plunger can be machined simultaniously.

Order No.	Material	D	D1	L
03089-9005	Steel	5	8	6
03089-9006	Steel	6	10	7
03089-9008	Steel	8	13,5	9,5
03089-9010	Steel	10	17	11,5
03089-90005	Stainless steel	5	8	6
03089-90006	Stainless steel	6	10	7
03089-90008	Stainless steel	8	13,5	9,5
03089-90010	Stainless steel	10	17	11,5

Indexing plungers - Premium

with tapered pin



Material:
Steel version:
indexing pin hardened:
grade 5.8

Stainless steel version:
indexing pin hardened
threaded sleeve 1.4305
indexing pin 1.4034

Mushroom knob black grey thermoplastic.

Version:
Steel version:
indexing pin hardened, ground and black oxidised.

Stainless steel version:
indexing pin hardened, ground and bright.

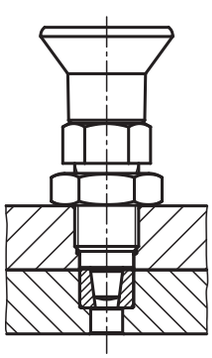
Sample order:
nlm 03089-52206

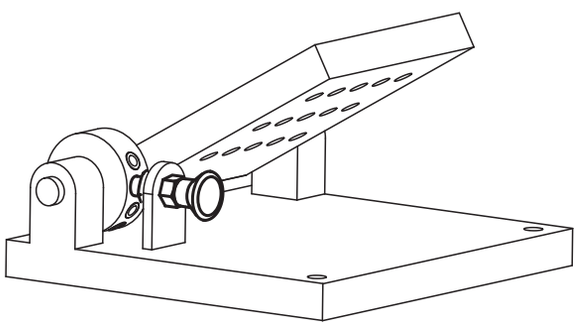
Note:
Premium indexing plungers are characterized by more stringent manufacturing requirements for the indexing plungers and the threaded sleeve. In addition, a centring locator that can be used to increase the positioning accuracy is provided on the threaded sleeve. These indexing plungers are used when it is necessary to prevent shifting of the locked position by transverse forces and greater positioning accuracy is required. A new locking position can only be set after the pin has been manually disengaged. When high lateral forces are to be expected, the centring locator should be used.

Assembly:
When using the threaded sleeve centring, it is recommended the receiving reamed hole be machined before tapping.
The conical contact surface is aligned by the threaded sleeve and locking nut.

On request:
Special versions and spacer rings.

Accessories:
Matching tapered bush 03089.





Indexing plungers - Premium

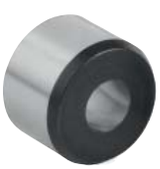
with tapered pin

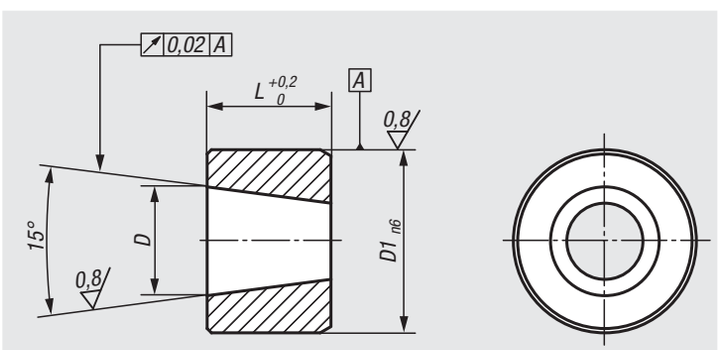
Order No.	Material	D	D1	D2	D3	D4	D5	L	L1	L2	L3	L4	H	H2	SW	SW1	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-52105	Steel	5	M10x1	21	8	6	6 -0,01/-0,02	43,5	17	7	15	3	5	4	13	17	5	12
03089-52206	Steel	6	M12x1,5	25	10	8,5	8,5 -0,01/-0,03	51,7	20	8	17	3	6	5	14	19	6	14
03089-52308	Steel	8	M16x1,5	33	13,5	11	11 -0,01/-0,03	68	26	10	23	4	8	7	19	24	15	35
03089-52410	Steel	10	M20x1,5	33	17	11	11 -0,01/-0,03	74	28	12	25	4	10	9	22	30	15	34

Order No.	Material	D	D1	D2	D3	D4	D5	L	L1	L2	L3	L4	H	H2	SW	SW1	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03089-502105	Stainless steel	5	M10x1	21	8	6	6 -0,01/-0,02	43,5	17	7	15	3	5	4	13	17	5	12
03089-502206	Stainless steel	6	M12x1,5	25	10	8,5	8,5 -0,01/-0,03	51,7	20	8	17	3	6	5	14	19	6	14
03089-502308	Stainless steel	8	M16x1,5	33	13,5	11	11 -0,01/-0,03	68	26	10	23	4	8	7	19	24	15	35
03089-502410	Stainless steel	10	M20x1,5	33	17	11	11 -0,01/-0,03	74	28	12	25	4	10	9	22	30	15	34

03089

Bushes tapered





Material:
Steel or stainless steel 1.4034.

Version:
Steel version:
black oxidised, hardened and ground.
Stainless steel version:
bright, hardened and ground.

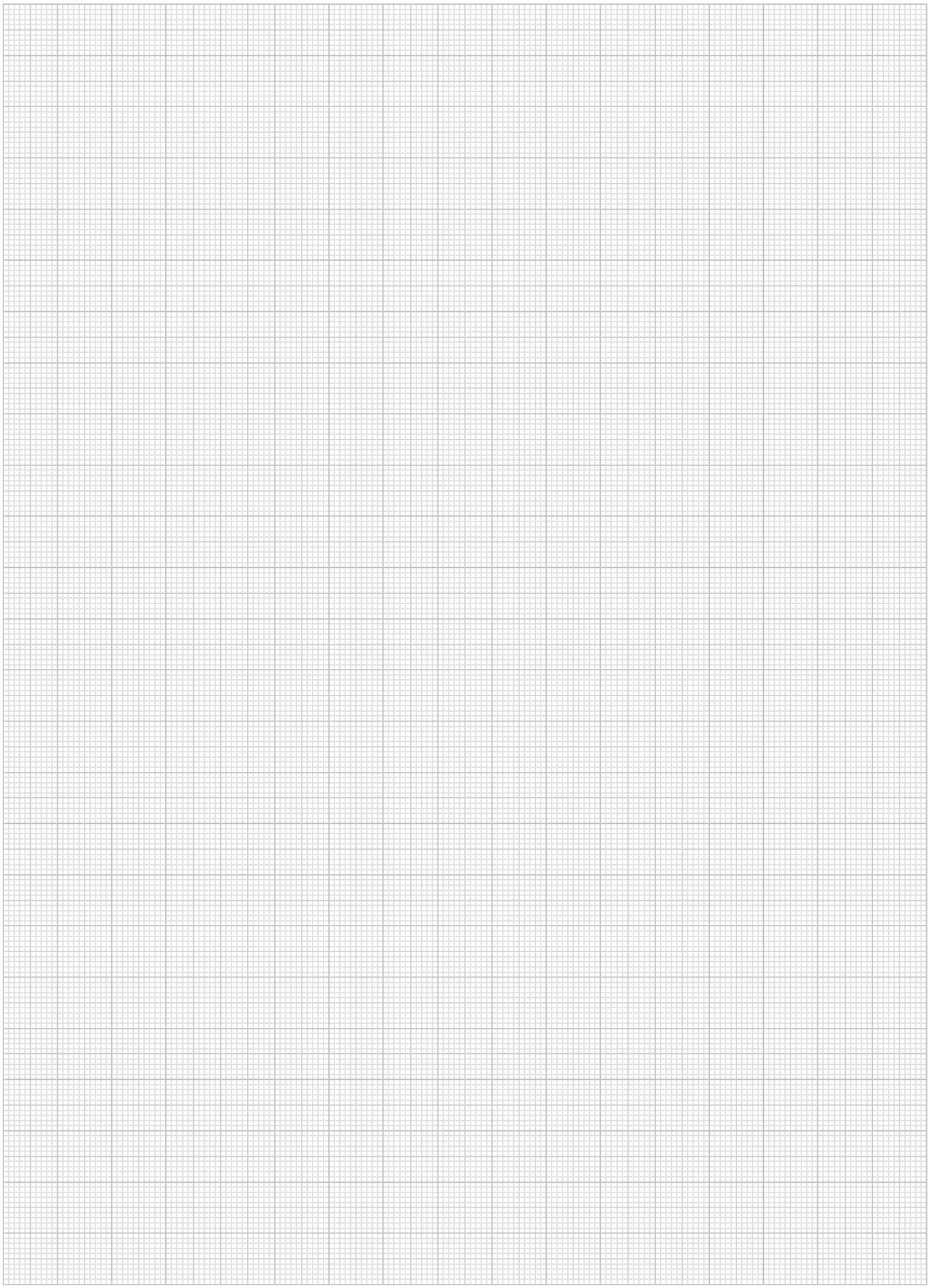
Sample order:
nlm 03089-9106

Note:
Matching bush for premium indexing plungers with tapered pin 03089.

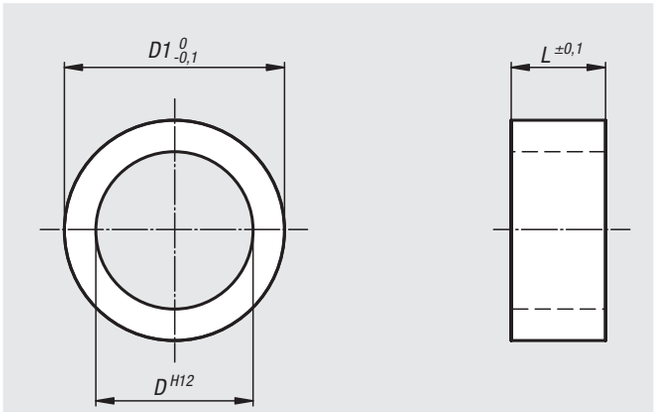
Assembly:
To increase the coaxial alignment accuracy, the holes for the bush and the premium indexing plunger can be machined simultaniously.

Order No.	Material	D	D1	L
03089-9105	Steel	5	8	6
03089-9106	Steel	6	10	7
03089-9108	Steel	8	13,5	9,5
03089-9110	Steel	10	17	11,5
03089-91005	Stainless steel	5	8	6
03089-91006	Stainless steel	6	10	7
03089-91008	Stainless steel	8	13,5	9,5
03089-91010	Stainless steel	10	17	11,5

Notes



Spacer rings

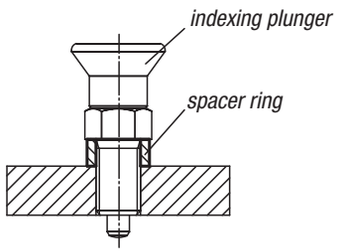


Material:
Stainless steel

Version:
Bright.

Sample order:
nlm 03089-90811021

Note:
Spacer rings are used to adjust the indexing plunger thread length to suit the application wall thickness.



Order No.	D	D1	L
03089-90811021	8	11	2
03089-90811031	8	11	3
03089-90811041	8	11	4
03089-90811061	8	11	6
03089-90811081	8	11	8
03089-91014021	10	14	2
03089-91014031	10	14	3
03089-91014041	10	14	4
03089-91014061	10	14	6
03089-91014081	10	14	8
03089-91215021	12	15	2
03089-91215041	12	15	4
03089-91215051	12	15	5
03089-91215061	12	15	6
03089-91215081	12	15	8
03089-91217021	12	17	2
03089-91217041	12	17	4
03089-91217051	12	17	5
03089-91217061	12	17	6
03089-91217081	12	17	8
03089-91621041	16	21	4
03089-91621051	16	21	5
03089-91621061	16	21	6
03089-91621081	16	21	8
03089-91621101	16	21	10

Indexing plungers

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

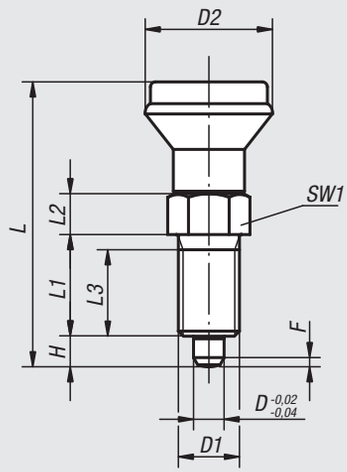
Sample order:
nlm 03090-04206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged. Form C or D is recommended for applications in which the pin is disengaged over extended periods and should be prevented from springing back.

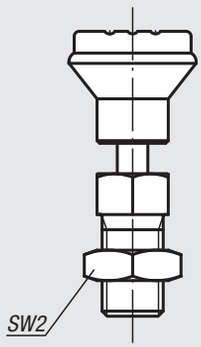
On request:
Special versions.

Accessories:
Spacer rings 03089

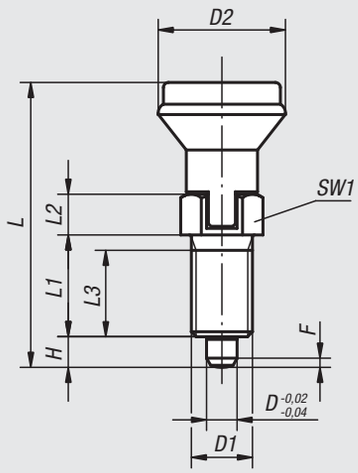
Form A
non-lockout type
without locknut



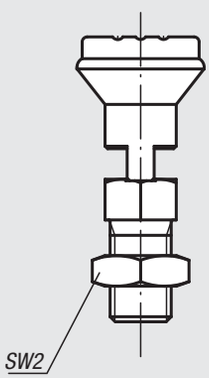
Form B
non-lockout type
with locknut

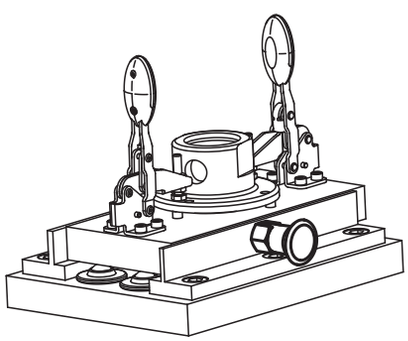


Form C
lockout type
without locknut



Form D
lockout type
with locknut





Indexing plungers

Indexing plungers, steel, indexing pin hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03090-1105	**03090-2105**	**03090-3105**	**03090-4105**	5	M10x1	21	47	17	7	15	5	13	- / 17 / - / 17	1,3	5	12
03090-1206	**03090-2206**	**03090-3206**	**03090-4206**	6	M12x1,5	25	56	20	8	17	6	14	- / 19 / - / 19	1,8	6	14
03090-1308	**03090-2308**	**03090-3308**	**03090-4308**	8	M16x1,5	33	74	26	10	23	8	19	- / 24 / - / 24	2,3	15	35
03090-1410	**03090-2410**	**03090-3410**	**03090-4410**	10	M20x1,5	33	80	28	12	25	10	22	- / 30 / - / 30	2,8	15	34

Indexing plungers, stainless steel, indexing pin hardened

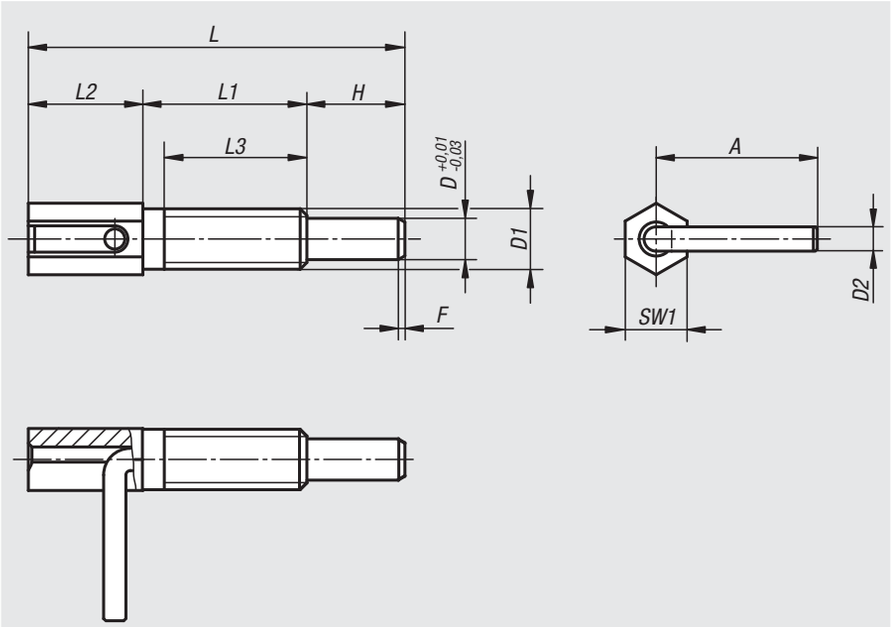
Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03090-01105	**03090-02105**	**03090-03105**	**03090-04105**	5	M10x1	21	47	17	7	15	5	13	- / 17 / - / 17	1,3	5	12
03090-01206	**03090-02206**	**03090-03206**	**03090-04206**	6	M12x1,5	25	56	20	8	17	6	14	- / 19 / - / 19	1,8	6	14
03090-01308	**03090-02308**	**03090-03308**	**03090-04308**	8	M16x1,5	33	74	26	10	23	8	19	- / 24 / - / 24	2,3	15	35
03090-01410	**03090-02410**	**03090-03410**	**03090-04410**	10	M20x1,5	33	80	28	12	25	10	22	- / 30 / - / 30	2,8	15	34

Indexing plungers, stainless steel, indexing pin not hardened

Order No. Form A	Order No. Form B	Order No. Form C	Order No. Form D	D	D1	D2	L	L1	L2	L3	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03090-11105	**03090-12105**	**03090-13105**	**03090-14105**	5	M10x1	21	47	17	7	15	5	13	- / 17 / - / 17	1,3	5	12
03090-11206	**03090-12206**	**03090-13206**	**03090-14206**	6	M12x1,5	25	56	20	8	17	6	14	- / 19 / - / 19	1,8	6	14
03090-11308	**03090-12308**	**03090-13308**	**03090-14308**	8	M16x1,5	33	74	26	10	23	8	19	- / 24 / - / 24	2,3	15	35
03090-11410	**03090-12410**	**03090-13410**	**03090-14410**	10	M20x1,5	33	80	28	12	25	10	22	- / 30 / - / 30	2,8	15	34

Notes

Indexing plungers



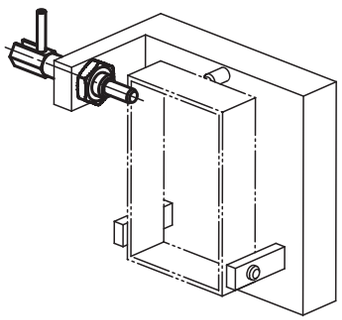
Material:
Steel grade 5.8.

Version:
Blue chromed.

Sample order:
nlm 03091-1206

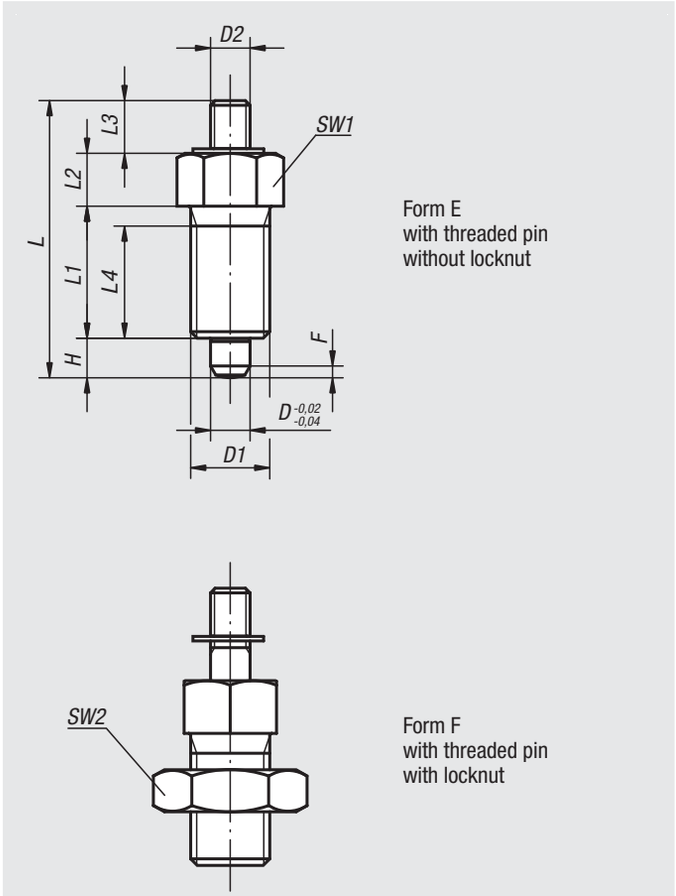
Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.

On request:
Special versions.



Order No.	D	D1	D2	L	L1	L2	L3	H	A	SW1	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Tightening torque max. Nm
03091-1104	4	M6	2,3	41,5	20	12	17	9,5	15,5	6	0,7	3	10	1,6
03091-1905	5	M8	3	54	27	15	24	12	19,2	8	0,9	3,5	13,5	4,5
03091-1206	6	M10	3,5	65	33,5	17,5	30	14	22,9	10	1,1	4	16	10
03091-1308	8	M12	4,7	73	31,8	22,2	28	19	31,2	12	1,3	4	22	13
03091-1410	10	M16	4,7	102,5	50,5	27	44,5	25	32,7	16	1,6	4	23	42

Indexing plungers



Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version:
Indexing pin hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4034.

Indexing pin not hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4305.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

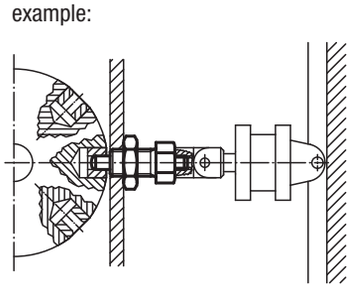
Sample order:
nlm 03092-02308

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been disengaged. Special grips can be fitted on the projecting threaded pin. This pin is also suitable for automatic actuation e.g. programme controlled pneumatic cylinder or by remote control using bowden cables.

On request:
Special versions.

Accessories:
Spacer rings 03089

example:



Indexing plungers

Indexing plungers, steel, indexing pin hardened

Order No. Form E	Order No. Form F	D	D1	D2	L	L1	L2	L3	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-1903	**03092-2903**	3	M6x0,75	M2	24	12	5	3,5	10	3,5	8	- / 10	0,8	4,5	10
03092-1004	**03092-2004**	4	M8x1	M3	32	15	6	7	13	4	10	- / 13	1	6	12
03092-1105	**03092-2105**	5	M10x1	M4	37	17	7	8	15	5	13	- / 17	1,3	5	12
03092-1206	**03092-2206**	6	M12x1,5	M6	42	20	8	8	17	6	14	- / 19	1,8	6	14
03092-1308	**03092-2308**	8	M16x1,5	M8	56	26	10	12	23	8	19	- / 24	2,3	15	35
03092-1410	**03092-2410**	10	M20x1,5	M8	62	28	12	12	25	10	22	- / 30	2,8	15	34
03092-1412	**03092-2412**	12	M20x1,5	M8	66	28	14	12	25	12	22	- / 30	2,8	15	39
03092-1516	**03092-2516**	16	M24x2	M10	80	32	18	14	28	16	27	- / 36	3,2	20	46

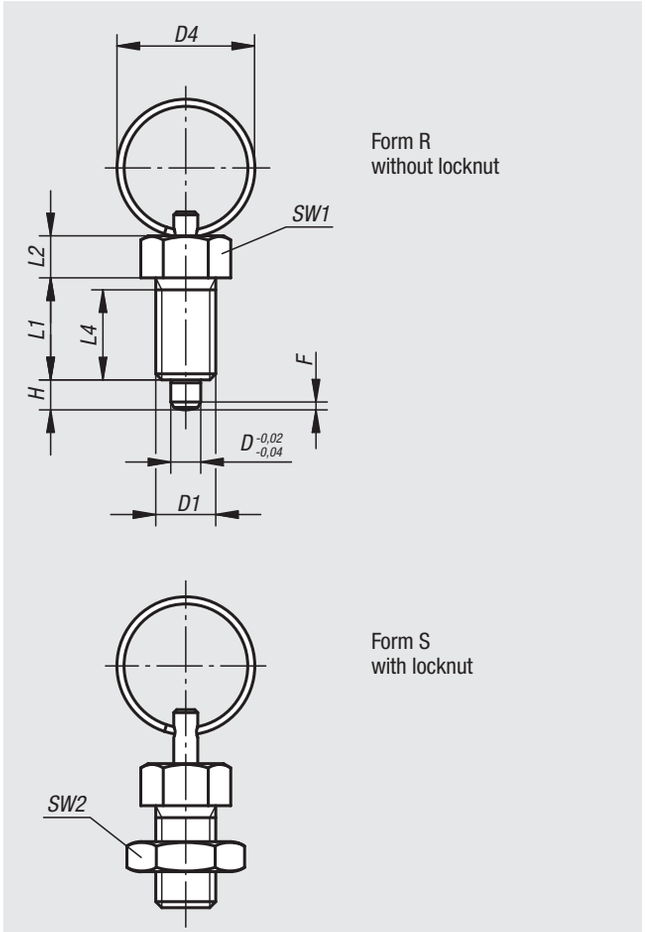
Indexing plungers, stainless steel, indexing pin hardened

Order No. Form E	Order No. Form F	D	D1	D2	L	L1	L2	L3	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-01903	**03092-02903**	3	M6x0,75	M2	24	12	5	3,5	10	3,5	8	- / 10	0,8	4,5	10
03092-01004	**03092-02004**	4	M8x1	M3	32	15	6	7	13	4	10	- / 13	1	6	12
03092-01105	**03092-02105**	5	M10x1	M4	37	17	7	8	15	5	13	- / 17	1,3	5	12
03092-01206	**03092-02206**	6	M12x1,5	M6	42	20	8	8	17	6	14	- / 19	1,8	6	14
03092-01308	**03092-02308**	8	M16x1,5	M8	56	26	10	12	23	8	19	- / 24	2,3	15	35
03092-01410	**03092-02410**	10	M20x1,5	M8	62	28	12	12	25	10	22	- / 30	2,8	15	34
03092-01412	**03092-02412**	12	M20x1,5	M8	66	28	14	12	25	12	22	- / 30	2,8	15	39
03092-01516	**03092-02516**	16	M24x2	M10	80	32	18	14	28	16	27	- / 36	3,2	20	46

Indexing plungers, stainless steel, indexing pin not hardened

Order No. Form E	Order No. Form F	D	D1	D2	L	L1	L2	L3	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-11903	**03092-12903**	3	M6x0,75	M2	24	12	5	3,5	10	3,5	8	- / 10	0,8	4,5	10
03092-11004	**03092-12004**	4	M8x1	M3	32	15	6	7	13	4	10	- / 13	1	6	12
03092-11105	**03092-12105**	5	M10x1	M4	37	17	7	8	15	5	13	- / 17	1,3	5	12
03092-11206	**03092-12206**	6	M12x1,5	M6	42	20	8	8	17	6	14	- / 19	1,8	6	14
03092-11308	**03092-12308**	8	M16x1,5	M8	56	26	10	12	23	8	19	- / 24	2,3	15	35
03092-11410	**03092-12410**	10	M20x1,5	M8	62	28	12	12	25	10	22	- / 30	2,8	15	34
03092-11412	**03092-12412**	12	M20x1,5	M8	66	28	14	12	25	12	22	- / 30	2,8	15	39
03092-11516	**03092-12516**	16	M24x2	M10	80	32	18	14	28	16	27	- / 36	3,2	20	46

Indexing plungers



Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version:
Indexing pin hardened:
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305

Key ring 1.4310, bright.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

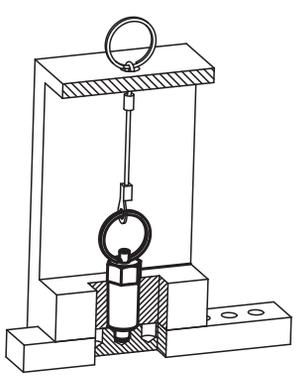
Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03092-03308

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been disengaged. The key ring is also suitable for automatic actuation of the indexing plunger by e.g. programme-controlled pneumatic cylinder or by remote control using bowden cables.

On request:
Special versions.

Accessories:
Spacer rings 03089



Indexing plungers

Indexing plungers, steel, indexing pin hardened

Order No. Form R	Order No. Form S	D	D1	D4	L1	L2	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-3004	**03092-4004**	4	M8x1	15	15	6	13	4	10	- / 13	1	6	12
03092-3105	**03092-4105**	5	M10x1	23	17	7	15	5	13	- / 17	1,3	5	12
03092-3206	**03092-4206**	6	M12x1,5	23	20	8	17	6	14	- / 19	1,8	6	14
03092-3308	**03092-4308**	8	M16x1,5	28	26	10	23	8	19	- / 24	2,3	15	35
03092-3410	**03092-4410**	10	M20x1,5	28	28	12	25	10	22	- / 30	2,8	15	34

Indexing plungers, stainless steel, indexing pin hardened

Order No. Form R	Order No. Form S	D	D1	D4	L1	L2	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-03004	**03092-04004**	4	M8x1	15	15	6	13	4	10	- / 13	1	6	12
03092-03105	**03092-04105**	5	M10x1	23	17	7	15	5	13	- / 17	1,3	5	12
03092-03206	**03092-04206**	6	M12x1,5	23	20	8	17	6	14	- / 19	1,8	6	14
03092-03308	**03092-04308**	8	M16x1,5	28	26	10	23	8	19	- / 24	2,3	15	35
03092-03410	**03092-04410**	10	M20x1,5	28	28	12	25	10	22	- / 30	2,8	15	34

Indexing plungers, stainless steel, indexing pin not hardened

Order No. Form R	Order No. Form S	D	D1	D4	L1	L2	L4	H	SW1	SW2	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03092-13004	**03092-14004**	4	M8x1	15	15	6	13	4	10	- / 13	1	6	12
03092-13105	**03092-14105**	5	M10x1	23	17	7	15	5	13	- / 17	1,3	5	12
03092-13206	**03092-14206**	6	M12x1,5	23	20	8	17	6	14	- / 19	1,8	6	14
03092-13308	**03092-14308**	8	M16x1,5	28	26	10	23	8	19	- / 24	2,3	15	35
03092-13410	**03092-14410**	10	M20x1,5	28	28	12	25	10	22	- / 30	2,8	15	34

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

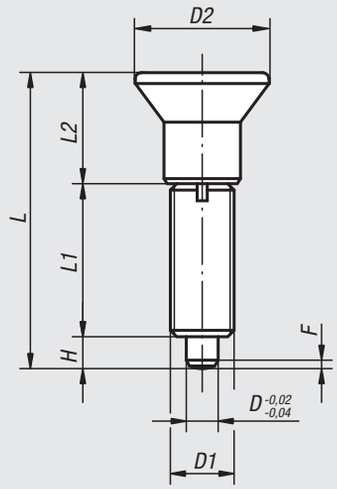
Sample order:
nlm 03093-02206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
A washer is available to aid by screwing in the indexing plungers. The washer slides beneath the mushroom knob so that the carrier pins engage in the slot.

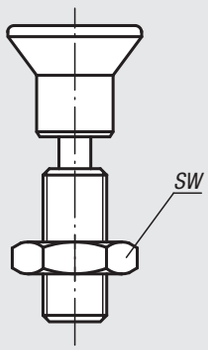
On request:
Special versions.

Accessories:
Spacer rings 03089

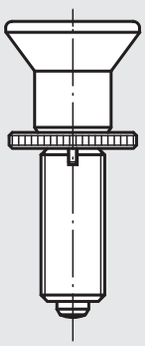
Form G
without locknut



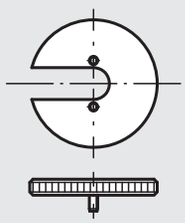
Form H
with locknut

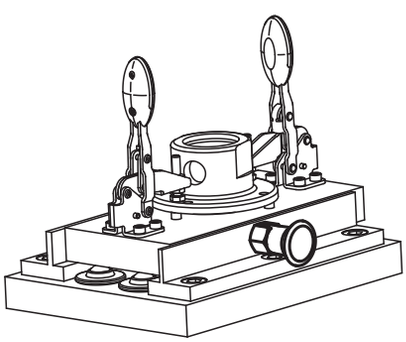


with screw-in washer



screw-in washer





Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-1903	**03093-2903**	3	M6x0,75	14	31,5	17	11	3,5	- / 10	0,8	4,5	10	03094-99
03093-1004	**03093-2004**	4	M8x1	18	38,5	21	13,5	4	- / 13	1,3	6	12	03094-90
03093-1105	**03093-2105**	5	M10x1	21	43,5	24	14,5	5	- / 17	1,3	5	12	03094-91
03093-1206	**03093-2206**	6	M12x1,5	25	51,7	28	17,7	6	- / 19	1,8	6	14	03094-92
03093-1308	**03093-2308**	8	M16x1,5	33	68	36	24	8	- / 24	2,3	15	35	03094-93
03093-1410	**03093-2410**	10	M20x1,5	33	74	40	24	10	- / 30	2,8	15	34	03094-94
03093-1412	**03093-2412**	12	M20x1,5	33	78	42	24	12	- / 30	2,8	15	39	03094-94
03093-1516	**03093-2516**	16	M24x2	40	96	50	30	16	- / 36	3,2	20	46	03094-95

Indexing plungers without collar, stainless steel, indexing pin hardened

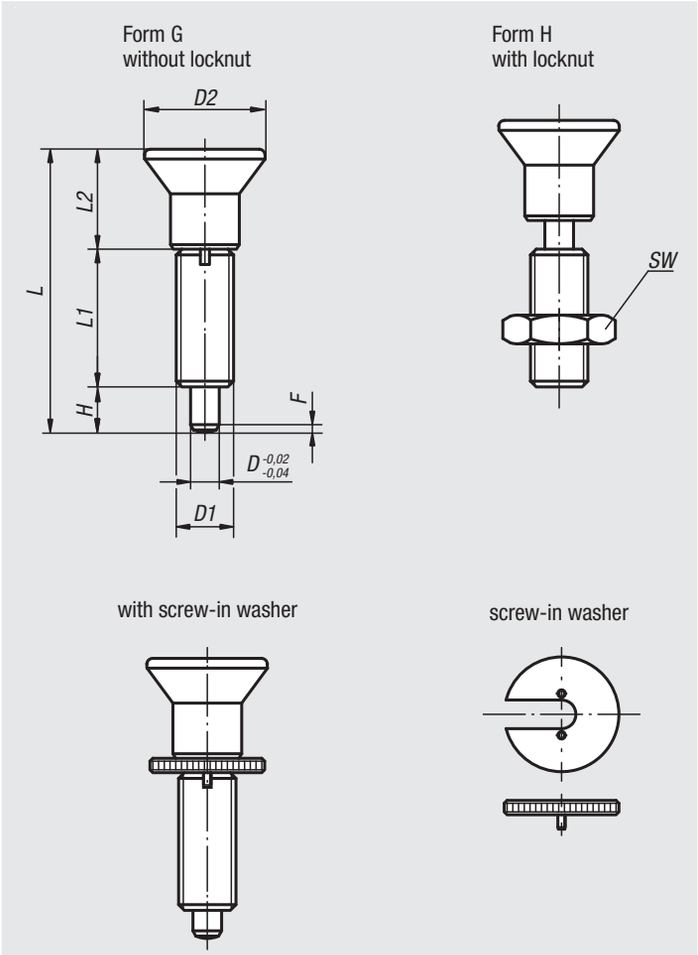
Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-01903	**03093-02903**	3	M6x0,75	14	31,5	17	11	3,5	- / 10	0,8	4,5	10	03094-99
03093-01004	**03093-02004**	4	M8x1	18	38,5	21	13,5	4	- / 13	1,3	6	12	03094-90
03093-01105	**03093-02105**	5	M10x1	21	43,5	24	14,5	5	- / 17	1,3	5	12	03094-91
03093-01206	**03093-02206**	6	M12x1,5	25	51,7	28	17,7	6	- / 19	1,8	6	14	03094-92
03093-01308	**03093-02308**	8	M16x1,5	33	68	36	24	8	- / 24	2,3	15	35	03094-93
03093-01410	**03093-02410**	10	M20x1,5	33	74	40	24	10	- / 30	2,8	15	34	03094-94
03093-01412	**03093-02412**	12	M20x1,5	33	78	42	24	12	- / 30	2,8	15	39	03094-94
03093-01516	**03093-02516**	16	M24x2	40	96	50	30	16	- / 36	3,2	20	46	03094-95

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-11903	**03093-12903**	3	M6x0,75	14	31,5	17	11	3,5	- / 10	0,8	4,5	10	03094-99
03093-11004	**03093-12004**	4	M8x1	18	38,5	21	13,5	4	- / 13	1,3	6	12	03094-90
03093-11105	**03093-12105**	5	M10x1	21	43,5	24	14,5	5	- / 17	1,3	5	12	03094-91
03093-11206	**03093-12206**	6	M12x1,5	25	51,7	28	17,7	6	- / 19	1,8	6	14	03094-92
03093-11308	**03093-12308**	8	M16x1,5	33	68	36	24	8	- / 24	2,3	15	35	03094-93
03093-11410	**03093-12410**	10	M20x1,5	33	74	40	24	10	- / 30	2,8	15	34	03094-94
03093-11412	**03093-12412**	12	M20x1,5	33	78	42	24	12	- / 30	2,8	15	39	03094-94
03093-11516	**03093-12516**	16	M24x2	40	96	50	30	16	- / 36	3,2	20	46	03094-95

Indexing plungers

without collar with extended indexing pin



Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

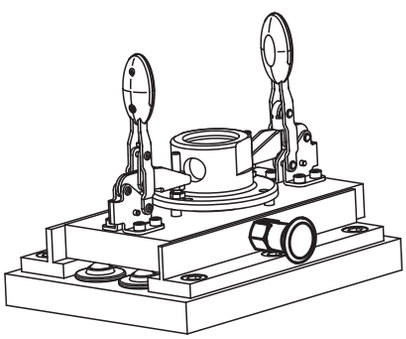
Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03093-21004

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
A washer is available to aid by screwing in the indexing plungers. The washer slides beneath the mushroom knob so that the carrier pins engage in the slot.

On request:
Special versions.

Accessories:
Spacer rings 03089



Indexing plungers

without collar with extended indexing pin

Indexing plungers without collar with extended indexing pin, steel, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-21903	**03093-22903**	3	M6x0,75	14	33	17	11	5	- / 10	0,8	4,5	12	03094-99
03093-21004	**03093-22004**	4	M8x1	18	40,5	21	13,5	6	- / 13	1	6	15	03094-90
03093-21105	**03093-22105**	5	M10x1	21	46,5	24	14,5	8	- / 17	1,3	5	16	03094-91
03093-21206	**03093-22206**	6	M12x1,5	25	54,7	28	17,7	9	- / 19	1,8	6	18	03094-92
03093-21308	**03093-22308**	8	M16x1,5	33	72	36	24	12	- / 24	2,3	15	45	03094-93
03093-21410	**03093-22410**	10	M20x1,5	33	79	40	24	15	- / 30	2,8	15	43	03094-94
03093-21412	**03093-22412**	12	M20x1,5	33	84	42	24	18	- / 30	2,8	15	51	03094-94
03093-21516	**03093-22516**	16	M24x2	40	104	50	30	24	- / 36	3,2	20	60	03094-95

Indexing plungers without collar with extended indexing pin, stainless steel, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-201903	**03093-202903**	3	M6x0,75	14	33	17	11	5	- / 10	0,8	4,5	12	03094-99
03093-201004	**03093-202004**	4	M8x1	18	40,5	21	13,5	6	- / 13	1	6	15	03094-90
03093-201105	**03093-202105**	5	M10x1	21	46,5	24	14,5	8	- / 17	1,3	5	16	03094-91
03093-201206	**03093-202206**	6	M12x1,5	25	54,7	28	17,7	9	- / 19	1,8	6	18	03094-92
03093-201308	**03093-202308**	8	M16x1,5	33	72	36	24	12	- / 24	2,3	15	45	03094-93
03093-201410	**03093-202410**	10	M20x1,5	33	79	40	24	15	- / 30	2,8	15	43	03094-94
03093-201412	**03093-202412**	12	M20x1,5	33	84	42	24	18	- / 30	2,8	15	51	03094-94
03093-201516	**03093-202516**	16	M24x2	40	104	50	30	24	- / 36	3,2	20	60	03094-95

Indexing plungers without collar with extended indexing pin, stainless steel, indexing pin not hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-211903	**03093-212903**	3	M6x0,75	14	33	17	11	5	- / 10	0,8	4,5	12	03094-99
03093-211004	**03093-212004**	4	M8x1	18	40,5	21	13,5	6	- / 13	1	6	15	03094-90
03093-211105	**03093-212105**	5	M10x1	21	46,5	24	14,5	8	- / 17	1,3	5	16	03094-91
03093-211206	**03093-212206**	6	M12x1,5	25	54,7	28	17,7	9	- / 19	1,8	6	18	03094-92
03093-211308	**03093-212308**	8	M16x1,5	33	72	36	24	12	- / 24	2,3	15	45	03094-93
03093-211410	**03093-212410**	10	M20x1,5	33	79	40	24	15	- / 30	2,8	15	43	03094-94
03093-211412	**03093-212412**	12	M20x1,5	33	84	42	24	18	- / 30	2,8	15	51	03094-94
03093-211516	**03093-212516**	16	M24x2	40	104	50	30	24	- / 36	3,2	20	60	03094-95

Indexing plungers stainless steel

without collar

Material:
Indexing pin hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4034.

Indexing pin not hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4305.

Mushroom knob 1.4305, electrolytic-polish.

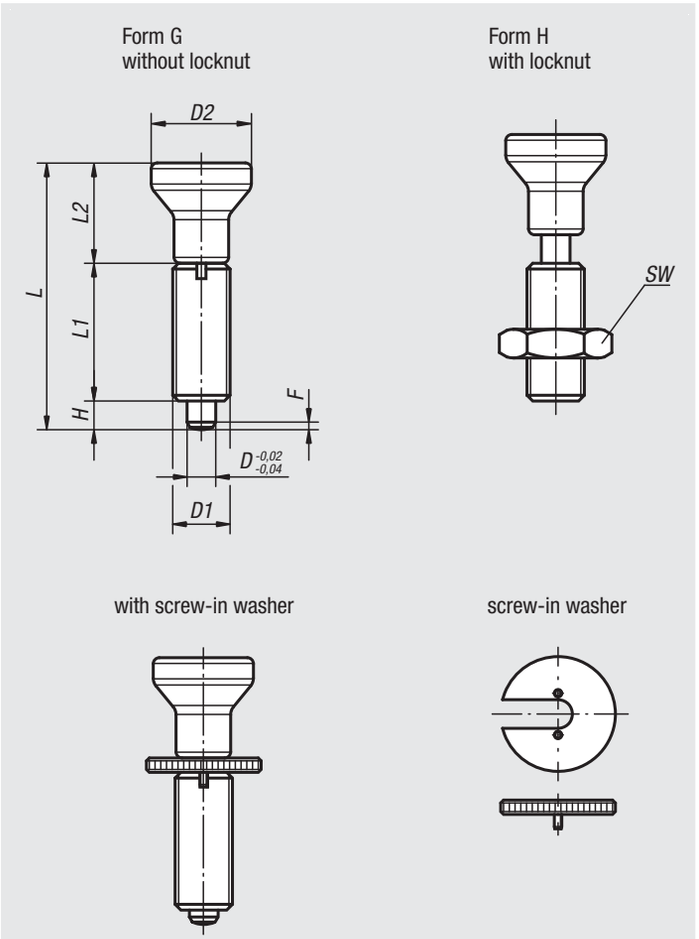
Version:
Bright.
Indexing pin ground.

Sample order:
nlm 03093-001004

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
A screw-in washer can be supplied to help screw in the indexing plungers. The washer is slid beneath the disengaged mushroom knob so that the follower pins engage in the slot.

On request:
Special versions.

Accessories:
Spacer rings 03089



Indexing plungers stainless steel

without collar

Indexing plungers stainless steel without collar, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-001903	**03093-002903**	3	M6x0,75	14	34,5	17	14	3,5	- / 10	0,8	4,5	10	03094-99
03093-001004	**03093-002004**	4	M8x1	18	43	21	18	4	- / 13	1	6	12	03094-90
03093-001105	**03093-002105**	5	M10x1	21	50	24	21	5	- / 17	1,3	5	12	03094-91
03093-001206	**03093-002206**	6	M12x1,5	25	59	28	25	6	- / 19	1,8	6	14	03094-92
03093-001308	**03093-002308**	8	M16x1,5	33	77	36	33	8	- / 24	2,3	15	35	03094-93
03093-001410	**03093-002410**	10	M20x1,5	33	83	40	33	10	- / 30	2,8	15	34	03094-94
03093-001412	**03093-002412**	12	M20x1,5	33	87	42	33	12	- / 30	2,8	15	39	03094-94
03093-001516	**03093-002516**	16	M24x2	40	106	50	40	16	- / 36	3,2	20	46	03094-95

Indexing plungers stainless steel without collar, indexing pin not hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03093-111903	**03093-112903**	3	M6x0,75	14	34,5	17	14	3,5	- / 10	0,8	4,5	10	03094-99
03093-111004	**03093-112004**	4	M8x1	18	43	21	18	4	- / 13	1	6	12	03094-90
03093-111105	**03093-112105**	5	M10x1	21	50	24	21	5	- / 17	1,3	5	12	03094-91
03093-111206	**03093-112206**	6	M12x1,5	25	59	28	25	6	- / 19	1,8	6	14	03094-92
03093-111308	**03093-112308**	8	M16x1,5	33	77	36	33	8	- / 24	2,3	15	35	03094-93
03093-111410	**03093-112410**	10	M20x1,5	33	83	40	33	10	- / 30	2,8	15	34	03094-94
03093-111412	**03093-112412**	12	M20x1,5	33	87	42	33	12	- / 30	2,8	15	39	03094-94
03093-111516	**03093-112516**	16	M24x2	40	106	50	40	16	- / 36	3,2	20	46	03094-95

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version,
Indexing pin hardened
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305
Mushroom knob black grey thermoplastic

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

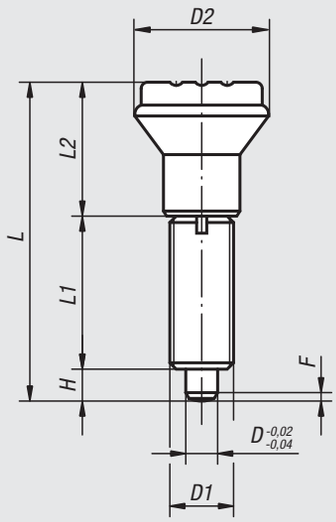
Sample order:
nlm 03094-02206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
A screw-in washer can be supplied to help screw in the indexing plungers. The washer is slid beneath the disengaged mushroom knob so that the carrier pins engage in the slot.

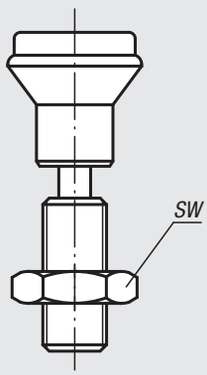
On request:
Special versions.

Accessories:
Spacer rings 03089

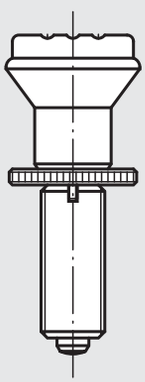
Form G
without locknut



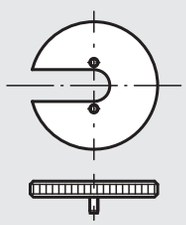
Form H
with locknut

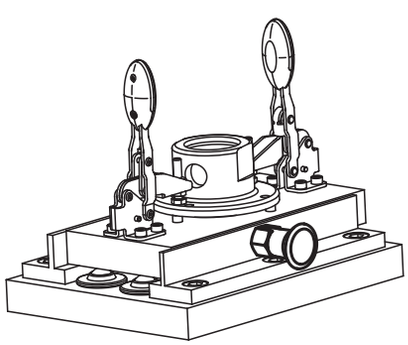


with screw-in washer



screw-in washer





Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03094-1105	**03094-2105**	5	M10x1	21	47	24	18	5	-/17	1,3	5	12	03094-91
03094-1206	**03094-2206**	6	M12x1,5	25	56	28	22	6	-/19	1,8	6	14	03094-92
03094-1308	**03094-2308**	8	M16x1,5	33	74	36	30	8	-/24	2,3	15	35	03094-93
03094-1410	**03094-2410**	10	M20x1,5	33	80	40	30	10	-/30	2,8	15	34	03094-94

Indexing plungers without collar, stainless steel, indexing pin hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03094-01105	**03094-02105**	5	M10x1	21	47	24	18	5	-/17	1,3	5	12	03094-91
03094-01206	**03094-02206**	6	M12x1,5	25	56	28	22	6	-/19	1,8	6	14	03094-92
03094-01308	**03094-02308**	8	M16x1,5	33	74	36	30	8	-/24	2,3	15	35	03094-93
03094-01410	**03094-02410**	10	M20x1,5	33	80	40	30	10	-/30	2,8	15	34	03094-94

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form G	Order No. Form H	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03094-11105	**03094-12105**	5	M10x1	21	47	24	18	5	-/17	1,3	5	12	03094-91
03094-11206	**03094-12206**	6	M12x1,5	25	56	28	22	6	-/19	1,8	6	14	03094-92
03094-11308	**03094-12308**	8	M16x1,5	33	74	36	30	8	-/24	2,3	15	35	03094-93
03094-11410	**03094-12410**	10	M20x1,5	33	80	40	30	10	-/30	2,8	15	34	03094-94

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version:
Indexing pin hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4034.

Indexing pin not hardened:
Threaded sleeve 1.4305.
Indexing pin 1.4305.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

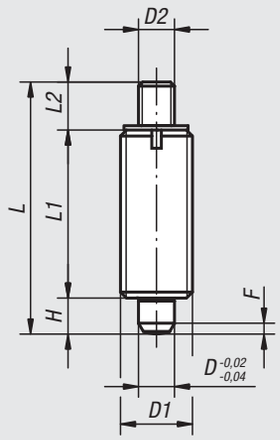
Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03096-01206

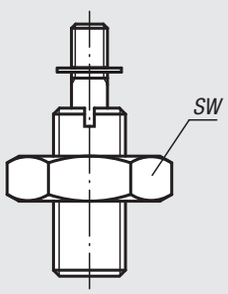
Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been disengaged.
Special grips can be fitted on the projecting threaded pin. This pin is also suitable for automatic actuation by e.g. program controlled pneumatic cylinder or by remote control using bowden cables.
A washer is available to aid screwing in the indexing plungers. The washer is placed on the threaded sleeve so that the carrier pins engage in the slot.

On request:
Special versions.

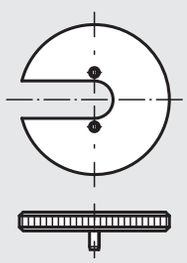
Accessories:
Spacer rings 03089



Form J
with threaded pin
without locknut



Form K
with threaded pin
with locknut



screw-in washer

Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form J	Order No. Form K	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-1903	**03096-2903**	3	M6x0,75	M2	24	17	3,5	3,5	- / 10	0,8	4,5	10	03094-99
03096-1004	**03096-2004**	4	M8x1	M3	32	21	7	4	- / 13	1	6	12	03094-90
03096-1105	**03096-2105**	5	M10x1	M4	37	24	8	5	- / 17	1,3	5	12	03094-91
03096-1206	**03096-2206**	6	M12x1,5	M6	42	28	8	6	- / 19	1,8	6	14	03094-92
03096-1308	**03096-2308**	8	M16x1,5	M8	56	36	12	8	- / 24	2,3	15	35	03094-93
03096-1410	**03096-2410**	10	M20x1,5	M8	62	40	12	10	- / 30	2,8	15	34	03094-94
03096-1412	**03096-2412**	12	M20x1,5	M8	66	42	12	12	- / 30	2,8	15	39	03094-94
03096-1516	**03096-2516**	16	M24x2	M10	80	50	14	16	- / 36	3,2	20	46	03094-95

Indexing plungers without collar, stainless steel, indexing pin hardened

Order No. Form J	Order No. Form K	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-01903	**03096-02903**	3	M6x0,75	M2	24	17	3,5	3,5	- / 10	0,8	4,5	10	03094-99
03096-01004	**03096-02004**	4	M8x1	M3	32	21	7	4	- / 13	1	6	12	03094-90
03096-01105	**03096-02105**	5	M10x1	M4	37	24	8	5	- / 17	1,3	5	12	03094-91
03096-01206	**03096-02206**	6	M12x1,5	M6	42	28	8	6	- / 19	1,8	6	14	03094-92
03096-01308	**03096-02308**	8	M16x1,5	M8	56	36	12	8	- / 24	2,3	15	35	03094-93
03096-01410	**03096-02410**	10	M20x1,5	M8	62	40	12	10	- / 30	2,8	15	34	03094-94
03096-01412	**03096-02412**	12	M20x1,5	M8	66	42	12	12	- / 30	2,8	15	39	03094-94
03096-01516	**03096-02516**	16	M24x2	M10	80	50	14	16	- / 36	3,2	20	46	03094-95

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form J	Order No. Form K	D	D1	D2	L	L1	L2	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-11903	**03096-12903**	3	M6x0,75	M2	24	17	3,5	3,5	- / 10	0,8	4,5	10	03094-99
03096-11004	**03096-12004**	4	M8x1	M3	32	21	7	4	- / 13	1	6	12	03094-90
03096-11105	**03096-12105**	5	M10x1	M4	37	24	8	5	- / 17	1,3	5	12	03094-91
03096-11206	**03096-12206**	6	M12x1,5	M6	42	28	8	6	- / 19	1,8	6	14	03094-92
03096-11308	**03096-12308**	8	M16x1,5	M8	56	36	12	8	- / 24	2,3	15	35	03094-93
03096-11410	**03096-12410**	10	M20x1,5	M8	62	40	12	10	- / 30	2,8	15	34	03094-94
03096-11412	**03096-12412**	12	M20x1,5	M8	66	42	12	12	- / 30	2,8	15	39	03094-94
03096-11516	**03096-12516**	16	M24x2	M10	80	50	14	16	- / 36	3,2	20	46	03094-95

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
grade 5.8.

Stainless steel version:
Indexing pin hardened:
Threaded sleeve 1.4305
Indexing pin 1.4034

Indexing pin not hardened
Threaded sleeve 1.4305
Indexing pin 1.4305

Key ring 1.4310, bright.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

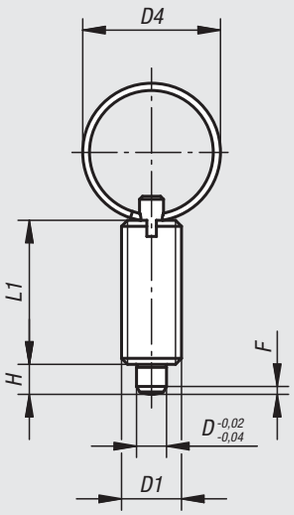
Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03096-03206

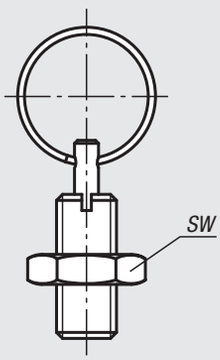
Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been disengaged.
The key ring is also suitable for actuation of the indexing plungers e.g. automatically (program-controlled) with the aid of a pneumatic cylinder or remote control with bowden cables.
A screw-in washer can be supplied to help screw in the indexing plungers. The washer is fitted onto the threaded sleeve so that the carrier pins engage in the slot.

On request:
Special versions.

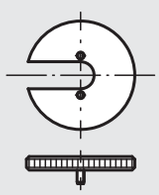
Accessories:
Spacer rings 03089



Form T
without locknut



Form U
with locknut



screw-in washer

Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form T	Order No. Form U	D	D1	D4	L1	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-3004	**03096-4004**	4	M8x1	15	21	4	-/13	1	6	12	03094-90
03096-3105	**03096-4105**	5	M10x1	23	24	5	-/17	1,3	5	12	03094-91
03096-3206	**03096-4206**	6	M12x1,5	23	28	6	-/19	1,8	6	14	03094-92
03096-3308	**03096-4308**	8	M16x1,5	28	36	8	-/24	2,3	15	35	03094-93
03096-3410	**03096-4410**	10	M20x1,5	28	40	10	-/30	2,8	15	34	03094-94

Indexing plungers without collar, stainless steel, indexing pin hardened

Order No. Form T	Order No. Form U	D	D1	D4	L1	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-03004	**03096-04004**	4	M8x1	15	21	4	-/13	1	6	12	03094-90
03096-03105	**03096-04105**	5	M10x1	23	24	5	-/17	1,3	5	12	03094-91
03096-03206	**03096-04206**	6	M12x1,5	23	28	6	-/19	1,8	6	14	03094-92
03096-03308	**03096-04308**	8	M16x1,5	28	36	8	-/24	2,3	15	35	03094-93
03096-03410	**03096-04410**	10	M20x1,5	28	40	10	-/30	2,8	15	34	03094-94

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form T	Order No. Form U	D	D1	D4	L1	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Order No. screw-in washer
03096-13004	**03096-14004**	4	M8x1	15	21	4	-/13	1	6	12	03094-90
03096-13105	**03096-14105**	5	M10x1	23	24	5	-/17	1,3	5	12	03094-91
03096-13206	**03096-14206**	6	M12x1,5	23	28	6	-/19	1,8	6	14	03094-92
03096-13308	**03096-14308**	8	M16x1,5	28	36	8	-/24	2,3	15	35	03094-93
03096-13410	**03096-14410**	10	M20x1,5	28	40	10	-/30	2,8	15	34	03094-94

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
Sleeve 1.0403 weldable.
Indexing pin grade 5.8

Stainless steel version:
Indexing pin hardened
Sleeve1.4301 weldable.
Indexing pin 1.4034.

Indexing pin not hardened:
Sleeve 1.4301 weldable.
Indexing pin 1.4305.

Mushroom knob black grey thermoplastic.

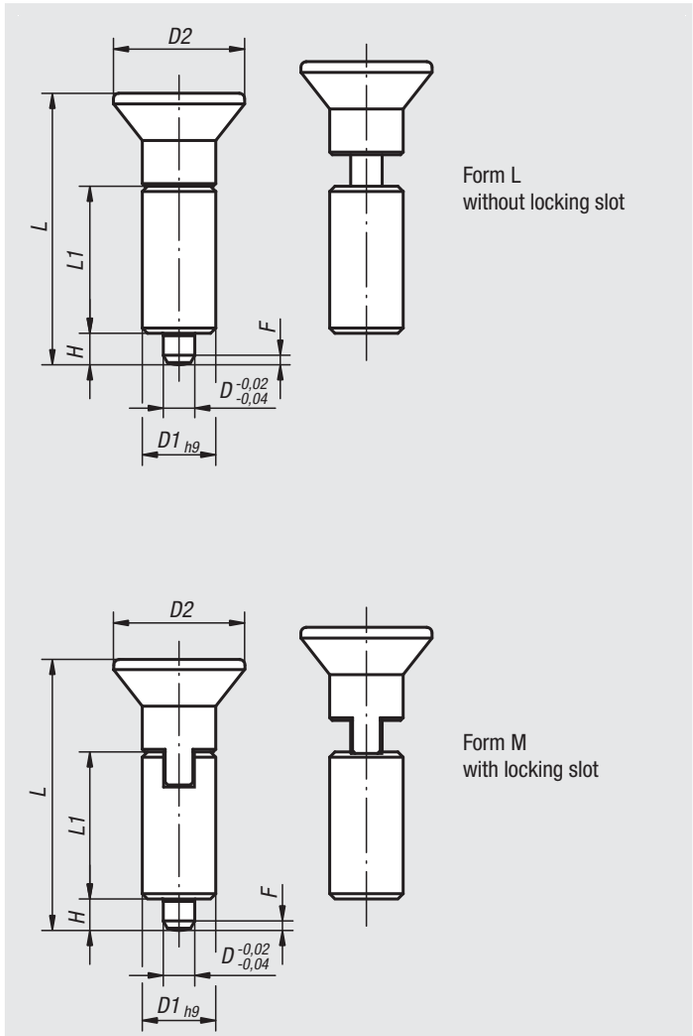
Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03097-01206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
Form M is recommended for applications in where the indexing plungers should remain disengaged over extended periods and the pin prevented from springing back.
To weld the indexing plungers we recommend inert gas-shielded welding with TIG welding equipment.

On request:
Special versions.



Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form L	Order No. Form M	D	D1	D2	L	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03097-1004	**03097-2004**	4	10	18	38,5	21	4	1	6	12
03097-1105	**03097-2105**	5	12	21	43,5	24	5	1,3	5	12
03097-1206	**03097-2206**	6	14	25	51,7	28	6	1,8	6	14
03097-1308	**03097-2308**	8	18	33	68	36	8	2,3	15	35
03097-1410	**03097-2410**	10	22	33	74	40	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin hardened

Order No. Form L	Order No. Form M	D	D1	D2	L	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03097-01004	**03097-02004**	4	10	18	38,5	21	4	1	6	12
03097-01105	**03097-02105**	5	12	21	43,5	24	5	1,3	5	12
03097-01206	**03097-02206**	6	14	25	51,7	28	6	1,8	6	14
03097-01308	**03097-02308**	8	18	33	68	36	8	2,3	15	35
03097-01410	**03097-02410**	10	22	33	74	40	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form L	Order No. Form M	D	D1	D2	L	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03097-11004	**03097-12004**	4	10	18	38,5	21	4	1	6	12
03097-11105	**03097-12105**	5	12	21	43,5	24	5	1,3	5	12
03097-11206	**03097-12206**	6	14	25	51,7	28	6	1,8	6	14
03097-11308	**03097-12308**	8	18	33	68	36	8	2,3	15	35
03097-11410	**03097-12410**	10	22	33	74	40	10	2,8	15	34

Indexing plungers

without collar

Material:
Steel version:
Indexing pin hardened:
Sleeve1.0403 weldable.
Indexing pin grade 5.8.

Stainless steel version:
Indexing pin hardened:
Sleeve 1.4301 weldable.
Indexing pin 1.4034.

Indexing pin not hardened:
Sleeve 1.4301 weldable.
Indexing pin 1.4305.

Mushroom knob black grey thermoplastic.

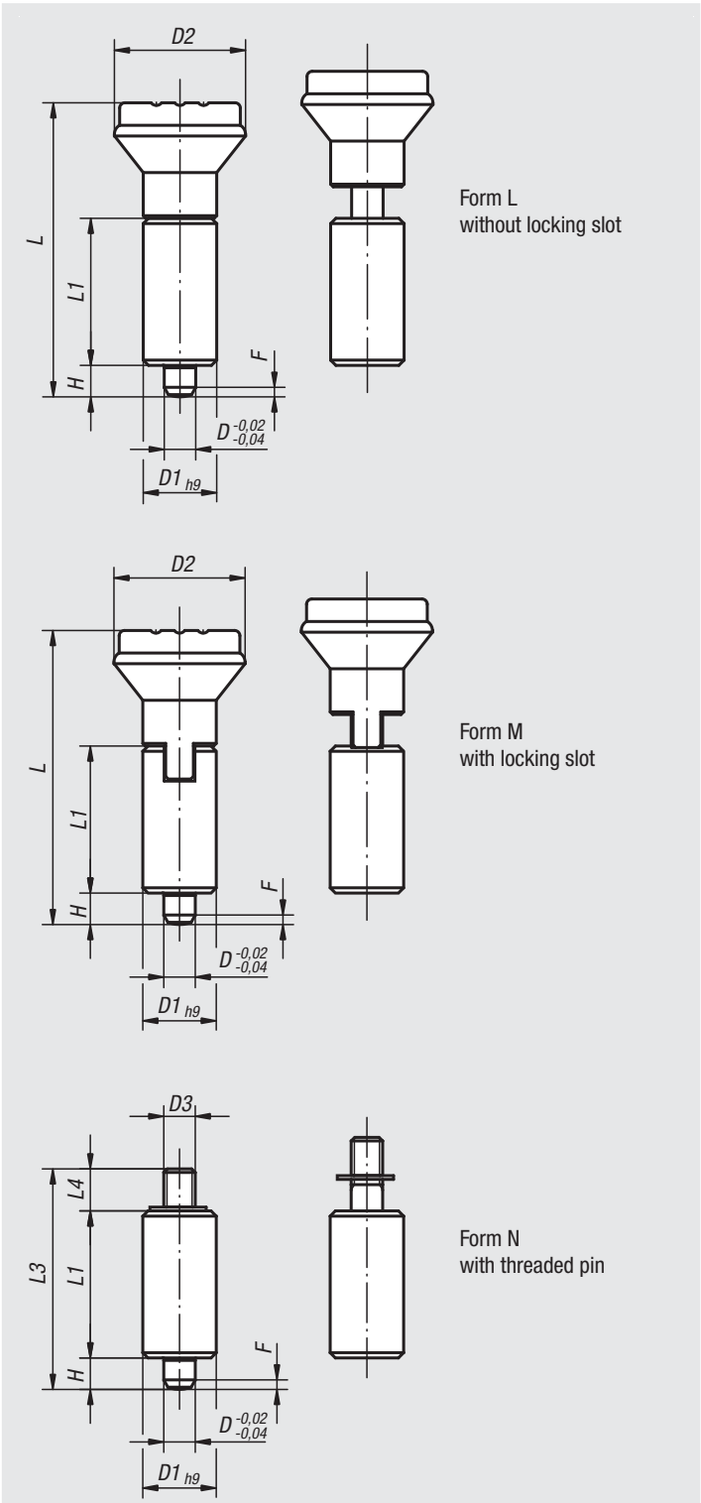
Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03098-02206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been manually disengaged.
Form M is recommended for applications where the indexing plungers should remain disengaged over an extended period and the pin prevented from springing back.
Special grips can be fitted on the projecting threaded pin of Form N. This pin is also suitable for actuation of the locking bolt e.g. automatically (program-controlled) with the aid of a pneumatic cylinder or remote controlled with bowden cables.
To weld the indexing plungers we recommend inert gas shielded welding with TIG welding equipment.

On request:
Special versions.



Indexing plungers

without collar

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form L	Order No. Form M	Order No. Form N	D	D1	D2	D3	L	L1	L3	L4	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-1105	**03098-2105**	**03098-3105**	5	12	21/21/-	-/-/M4	47/47/-	24	-/-/37	-/-/8	5	1,3	5	12
03098-1206	**03098-2206**	**03098-3206**	6	14	25/25/-	-/-/M6	56/56/-	28	-/-/43	-/-/9	6	1,8	6	14
03098-1308	**03098-2308**	**03098-3308**	8	18	33/33/-	-/-/M8	74/74/-	36	-/-/56	-/-/12	8	2,3	15	35
03098-1410	**03098-2410**	**03098-3410**	10	22	33/33/-	-/-/M8	80/80/-	40	-/-/62	-/-/12	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin hardened

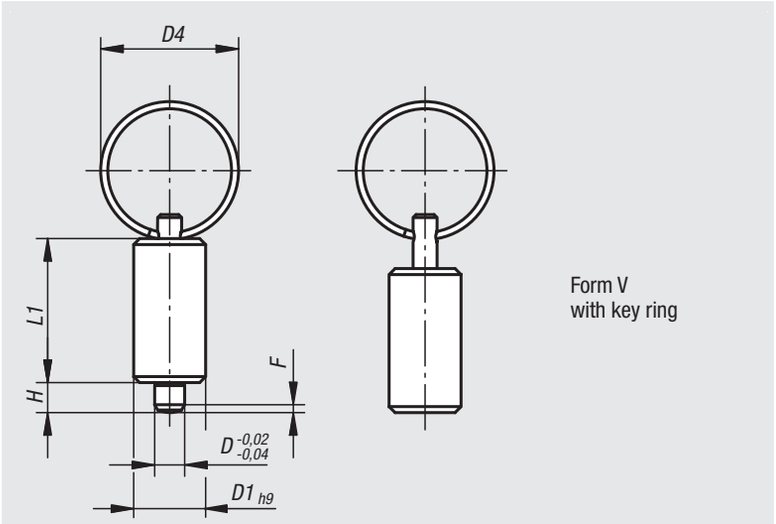
Order No. Form L	Order No. Form M	Order No. Form N	D	D1	D2	D3	L	L1	L3	L4	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-01105	**03098-02105**	**03098-03105**	5	12	21/21/-	-/-/M4	47/47/-	24	-/-/37	-/-/8	5	1,3	5	12
03098-01206	**03098-02206**	**03098-03206**	6	14	25/25/-	-/-/M6	56/56/-	28	-/-/43	-/-/9	6	1,8	6	14
03098-01308	**03098-02308**	**03098-03308**	8	18	33/33/-	-/-/M8	74/74/-	36	-/-/56	-/-/12	8	2,3	15	35
03098-01410	**03098-02410**	**03098-03410**	10	22	33/33/-	-/-/M8	80/80/-	40	-/-/62	-/-/12	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form L	Order No. Form M	Order No. Form N	D	D1	D2	D3	L	L1	L3	L4	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-11105	**03098-12105**	**03098-13105**	5	12	21/21/-	-/-/M4	47/47/-	24	-/-/37	-/-/8	5	1,3	5	12
03098-11206	**03098-12206**	**03098-13206**	6	14	25/25/-	-/-/M6	56/56/-	28	-/-/43	-/-/9	6	1,8	6	14
03098-11308	**03098-12308**	**03098-13308**	8	18	33/33/-	-/-/M8	74/74/-	36	-/-/56	-/-/12	8	2,3	15	35
03098-11410	**03098-12410**	**03098-13410**	10	22	33/33/-	-/-/M8	80/80/-	40	-/-/62	-/-/12	10	2,8	15	34

Indexing plungers

without collar



Material:
Steel version:
Indexing pin hardened.
Sleeve1.0403 weldable.
Indexing pin grade 5.8.

Stainless steel version:
Indexing pin hardened:
Sleeve 1.4301 weldable.
Indexing pin 1.4034.

Indexing pin not hardened:
Sleeve 1.4301 weldable.
Indexing pin 1.4305.

Key ring 1.4310, bright.

Version:
Steel version:
Indexing pin hardened, ground, black oxidised.

Stainless steel version:
Indexing pin hardened, ground and bright.
Indexing pin not hardened, ground and bright.

Sample order:
nlm 03098-4206

Note:
Indexing plungers are used to prevent any change in locking position due to lateral forces. A new locking position can only be set after the pin has been disengaged.
The key ring is also suitable for actuation of the indexing plungers e.g. automatically (programme-controlled) with the aid of a pneumatic cylinder or remote control actuation with bowden cables.
To weld the indexing plungers we recommend inert gas-shielded welding with TIG welding equipment.

On request:
Special versions.

Indexing plungers without collar, steel, indexing pin hardened

Order No. Form V	D	D1	D4	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-4004	4	10	15	21	4	1	6	12
03098-4105	5	12	23	24	5	1,3	5	12
03098-4206	6	14	23	28	6	1,8	6	14
03098-4308	8	18	28	36	8	2,3	15	35
03098-4410	10	22	28	40	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin hardened

Order No. Form V	D	D1	D4	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-04004	4	10	15	21	4	1	6	12
03098-04105	5	12	23	24	5	1,3	5	12
03098-04206	6	14	23	28	6	1,8	6	14
03098-04308	8	18	28	36	8	2,3	15	35
03098-04410	10	22	28	40	10	2,8	15	34

Indexing plungers without collar, stainless steel, indexing pin not hardened

Order No. Form V	D	D1	D4	L1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03098-14004	4	10	15	21	4	1	6	12
03098-14105	5	12	23	24	5	1,3	5	12
03098-14206	6	14	23	28	6	1,8	6	14
03098-14308	8	18	28	36	8	2,3	15	35
03098-14410	10	22	28	40	10	2,8	15	34

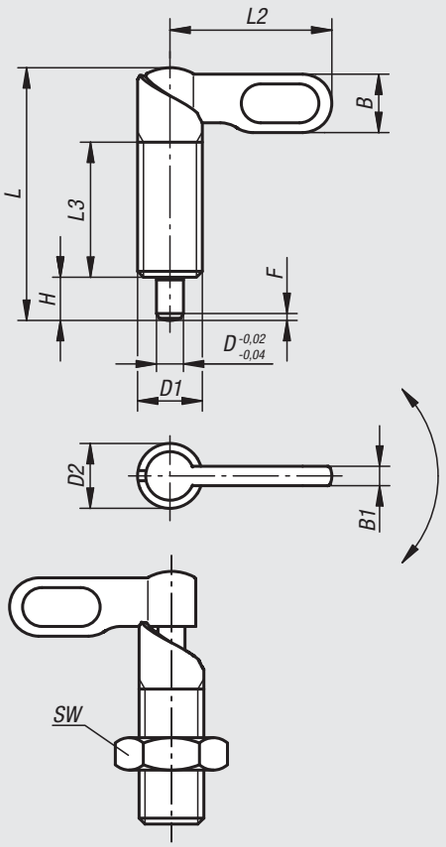
Cam-action indexing plungers

Material:
Steel grade 5.8.

Version:
Black oxidised.
Pin hardened and ground.

Sample order:
nlm 03099-040616

Note:
Cam -action indexing plungers are used when the indexing pin should not project all the time. Turning the handle through 180° retracts the pin.
A notch ensures that the handle remains in this position.



Form A
grip uncoated
without nut

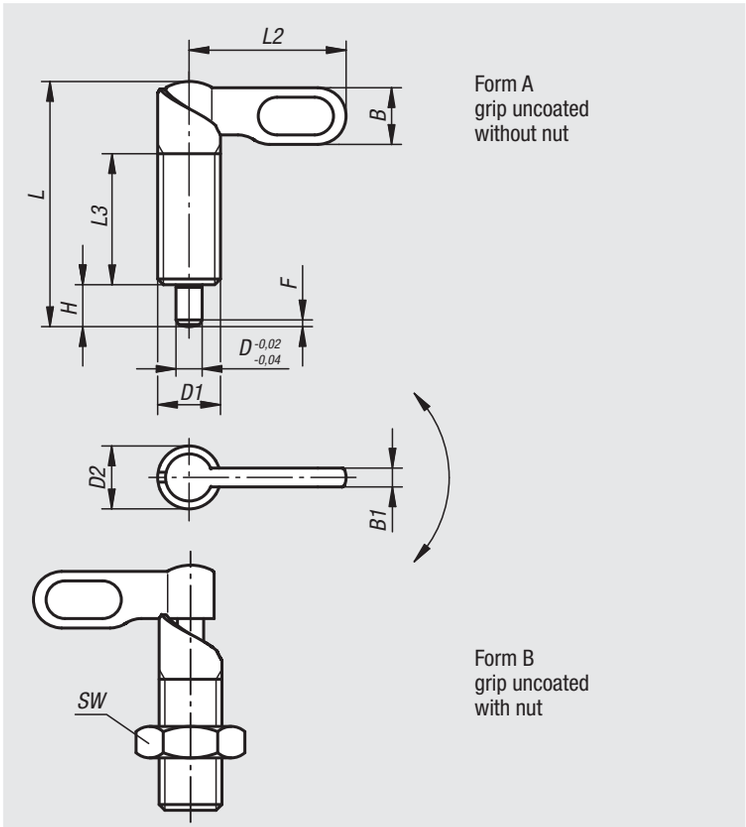
Form C
grip powder-coated
without nut

Form B
grip uncoated
with nut

Form D
grip powder-coated
with nut

Order No. Form A	Order No. Form C	Order No. Form B	Order No. Form D	D	D1	D2	L	L2	L3	B	B1	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03099-040410	03099-060410	03099-050410	03099-070410	4	M10	10	38	25	20	9	3	6	-/-/17/17	1	8	14
03099-040510	03099-060510	03099-050510	03099-070510	5	M10	10	38	25	20	9	3	6	-/-/17/17	1,3	8	14
03099-040610	03099-060610	03099-050610	03099-070610	6	M10	10	38	25	20	9	3	6	-/-/17/17	1,8	8	14
03099-0404101	03099-0604101	03099-0504101	03099-0704101	4	M10x1	10	38	25	20	9	3	6	-/-/17/17	1	8	14
03099-0405101	03099-0605101	03099-0505101	03099-0705101	5	M10x1	10	38	25	20	9	3	6	-/-/17/17	1,3	8	14
03099-0406101	03099-0606101	03099-0506101	03099-0706101	6	M10x1	10	38	25	20	9	3	6	-/-/17/17	1,8	8	14
03099-040512	03099-060512	03099-050512	03099-070512	5	M12	12	46,8	30	25	10,8	3,6	8	-/-/19/19	1,3	8	15
03099-040612	03099-060612	03099-050612	03099-070612	6	M12	12	46,8	30	25	10,8	3,6	8	-/-/19/19	1,8	8	15
03099-040812	03099-060812	03099-050812	03099-070812	8	M12	12	46,8	30	25	10,8	3,6	8	-/-/19/19	2,3	8	15
03099-0405121	03099-0605121	03099-0505121	03099-0705121	5	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/-/19/19	1,3	8	15
03099-0406121	03099-0606121	03099-0506121	03099-0706121	6	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/-/19/19	1,8	8	15
03099-0408121	03099-0608121	03099-0508121	03099-0708121	8	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/-/19/19	2,3	8	15
03099-040616	03099-060616	03099-050616	03099-070616	6	M16	16	60,4	40	32	14,4	4,8	10	-/-/24/24	1,8	15	35
03099-040816	03099-060816	03099-050816	03099-070816	8	M16	16	60,4	40	32	14,4	4,8	10	-/-/24/24	2,3	15	35
03099-041016	03099-061016	03099-051016	03099-071016	10	M16	16	60,4	40	32	14,4	4,8	10	-/-/24/24	2,8	15	35
03099-0406161	03099-0606161	03099-0506161	03099-0706161	6	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/-/24/24	1,8	15	35
03099-0408161	03099-0608161	03099-0508161	03099-0708161	8	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/-/24/24	2,3	15	35
03099-0410161	03099-0610161	03099-0510161	03099-0710161	10	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/-/24/24	2,8	15	35
03099-040820	03099-060820	03099-050820	03099-070820	8	M20	20	70	50	35	18	6	12	-/-/30/30	2,3	20	60
03099-041020	03099-061020	03099-051020	03099-071020	10	M20	20	70	50	35	18	6	12	-/-/30/30	2,8	20	60
03099-041220	03099-061220	03099-051220	03099-071220	12	M20	20	70	50	35	18	6	12	-/-/30/30	3	20	60
03099-0408201	03099-0608201	03099-0508201	03099-0708201	8	M20x1,5	20	70	50	35	18	6	12	-/-/30/30	2,3	20	60
03099-0410201	03099-0610201	03099-0510201	03099-0710201	10	M20x1,5	20	70	50	35	18	6	12	-/-/30/30	2,8	20	60
03099-0412201	03099-0612201	03099-0512201	03099-0712201	12	M20x1,5	20	70	50	35	18	6	12	-/-/30/30	3	20	60

Cam-action indexing plungers stainless steel



Material:
Stainless steel 1.4305.

Version:
Bright. Indexing pin ground, not hardened.

Sample order:
nlm 03099-1040616

Note:
Cam -action indexing plungers are used when the indexing pin should not project all the time. Turning the handle through 180° retracts the pin.
A notch ensures that the handle remains in this position.

Order No. Form A	Order No. Form B	D	D1	D2	L	L2	L3	B	B1	H	SW	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03099-1040410	**03099-1050410**	4	M10	10	38	25	20	9	3	6	-/17	1	8	14
03099-1040510	**03099-1050510**	5	M10	10	38	25	20	9	3	6	-/17	1,3	8	14
03099-1040610	**03099-1050610**	6	M10	10	38	25	20	9	3	6	-/17	1,8	8	14
03099-10404101	**03099-10504101**	4	M10x1	10	38	25	20	9	3	6	-/17	1	8	14
03099-10405101	**03099-10505101**	5	M10x1	10	38	25	20	9	3	6	-/17	1,3	8	14
03099-10406101	**03099-10506101**	6	M10x1	10	38	25	20	9	3	6	-/17	1,8	8	14
03099-1040512	**03099-1050512**	5	M12	12	46,8	30	25	10,8	3,6	8	-/19	1,3	8	15
03099-1040612	**03099-1050612**	6	M12	12	46,8	30	25	10,8	3,6	8	-/19	1,8	8	15
03099-1040812	**03099-1050812**	8	M12	12	46,8	30	25	10,8	3,6	8	-/19	2,3	8	15
03099-10405121	**03099-10505121**	5	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/19	1,3	8	15
03099-10406121	**03099-10506121**	6	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/19	1,8	8	15
03099-10408121	**03099-10508121**	8	M12x1,5	12	46,8	30	25	10,8	3,6	8	-/19	2,3	8	15
03099-1040616	**03099-1050616**	6	M16	16	60,4	40	32	14,4	4,8	10	-/24	1,8	15	35
03099-1040816	**03099-1050816**	8	M16	16	60,4	40	32	14,4	4,8	10	-/24	2,3	15	35
03099-1041016	**03099-1051016**	10	M16	16	60,4	40	32	14,4	4,8	10	-/24	2,8	15	35
03099-10406161	**03099-10506161**	6	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/24	1,8	15	35
03099-10408161	**03099-10508161**	8	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/24	2,3	15	35
03099-10410161	**03099-10510161**	10	M16x1,5	16	60,4	40	32	14,4	4,8	10	-/24	2,8	15	35
03099-1040820	**03099-1050820**	8	M20	20	70	50	35	18	6	12	-/30	2,3	20	60
03099-1041020	**03099-1051020**	10	M20	20	70	50	35	18	6	12	-/30	2,8	20	60
03099-1041220	**03099-1051220**	12	M20	20	70	50	35	18	6	12	-/30	3	20	60
03099-10408201	**03099-10508201**	8	M20x1,5	20	70	50	35	18	6	12	-/30	2,3	20	60
03099-10410201	**03099-10510201**	10	M20x1,5	20	70	50	35	18	6	12	-/30	2,8	20	60
03099-10412201	**03099-10512201**	12	M20x1,5	20	70	50	35	18	6	12	-/30	3	20	60

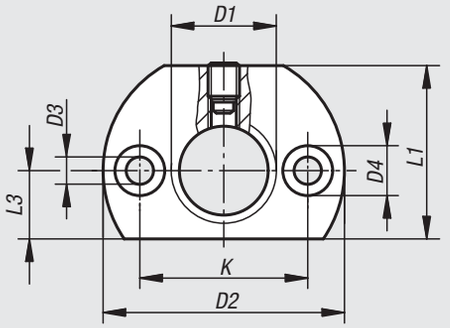
Mounting brackets

Material:
Steel.

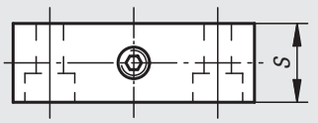
Version:
Black oxidised.

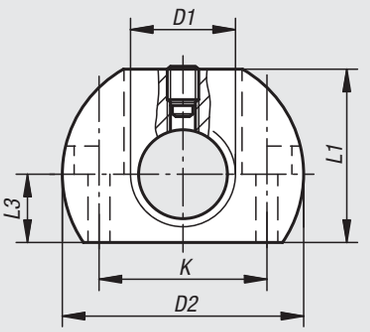
Sample order:
nlm 03099-116

Note:
Mounting brackets are assembly aids for cam-action indexing plungers and extend their application field. They can also be used for other indexing plungers.

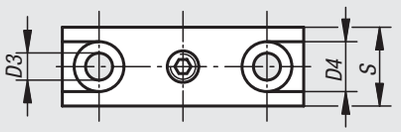


Form A
fastening hole parallel
to indexing plunger





Form B
fastening hole vertical
to indexing plunger



Order No.	Form	D1	D2	D3	D4	K	L1	L3	S
03099-112	A	M12	36	5,5	10	24	25	10	12
03099-1121	A	M12x1,5	36	5,5	10	24	25	10	12
03099-116	A	M16	46	5,5	10	32	33	13	15
03099-1161	A	M16x1,5	46	5,5	10	32	33	13	15
03099-120	A	M20	46	5,5	10	32	33	13	15
03099-1201	A	M20x1,5	46	5,5	10	32	33	13	15
03099-212	B	M12	36	5,5	10	24	25	10	12
03099-2121	B	M12x1,5	36	5,5	10	24	25	10	12
03099-216	B	M16	46	5,5	10	32	33	13	15
03099-2161	B	M16x1,5	46	5,5	10	32	33	13	15
03099-220	B	M20	46	5,5	10	32	33	13	15
03099-2201	B	M20x1,5	46	5,5	10	32	33	13	15

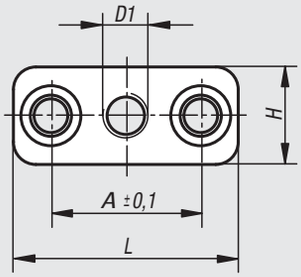
Mounting brackets aluminium

Material:
Aluminium 3.2163

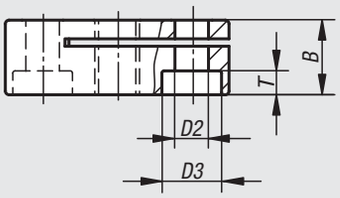
Version:
Black anodized

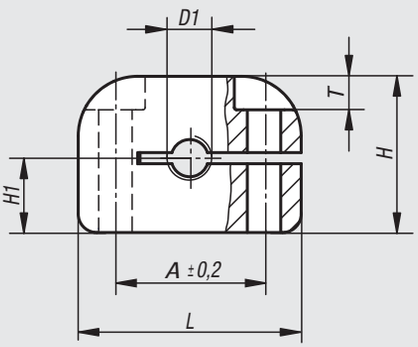
Sample order:
nlm 03099-308

Note:
Mounting brackets are an assembly aid for cam-action and other indexing plungers and expand the application field. For use with socket head screws DIN 912 / ISO 4762.

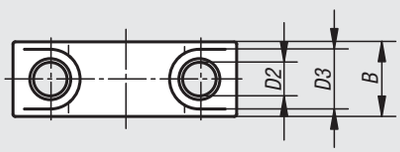


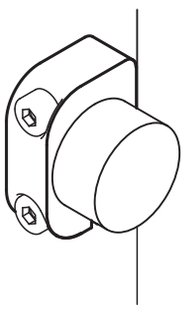
Form A
Fastening hole
parallel to thread

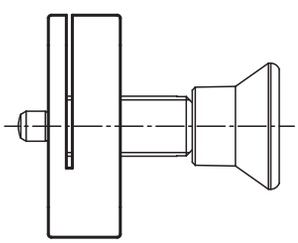




Form B
Fastening hole
vertical to thread



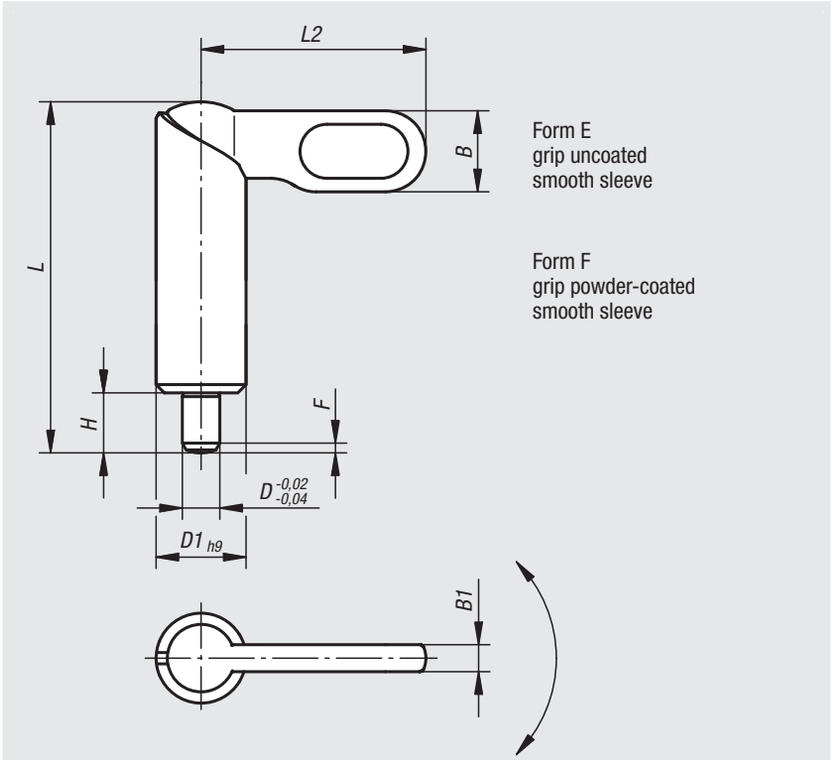




Mounting brackets aluminium

Order No.	Form	D1	D2	D3	A	B	H	H1	L	T
03099-306	A	M6	4,5	8	20	10	13	-	30	3,2
03099-3061	A	M6x0,75	4,5	8	20	10	13	-	30	3,2
03099-308	A	M8	4,5	8	20	10	13	-	30	3,2
03099-3081	A	M8x1	4,5	8	20	10	13	-	30	3,2
03099-310	A	M10	5,5	10	24	12	18	-	37	3,9
03099-3101	A	M10x1	5,5	10	24	12	18	-	37	3,9
03099-312	A	M12	5,5	10	24	12	18	-	37	3,9
03099-3121	A	M12x1,5	5,5	10	24	12	18	-	37	3,9
03099-316	A	M16	5,5	10	32	15	25	-	46	3,9
03099-3161	A	M16x1,5	5,5	10	32	15	25	-	46	3,9
03099-320	A	M20	5,5	10	32	15	25	-	46	3,9
03099-3201	A	M20x1,5	5,5	10	32	15	25	-	46	3,9
03099-406	B	M6	4,5	8	20	10	21	10	30	4,5
03099-4061	B	M6x0,75	4,5	8	20	10	21	10	30	4,5
03099-408	B	M8	4,5	8	20	10	21	10	30	4,5
03099-4081	B	M8x1	4,5	8	20	10	21	10	30	4,5
03099-410	B	M10	5,5	10	24	12	26	13	36	5,5
03099-4101	B	M10x1	5,5	10	24	12	26	13	36	5,5
03099-412	B	M12	5,5	10	24	12	26	13	36	5,5
03099-4121	B	M12x1,5	5,5	10	24	12	26	13	36	5,5
03099-416	B	M16	5,5	10	32	15	29	17	46	5,5
03099-4161	B	M16x1,5	5,5	10	32	15	29	17	46	5,5
03099-420	B	M20	5,5	10	32	15	29	17	46	5,5
03099-4201	B	M20x1,5	5,5	10	32	15	29	17	46	5,5

Cam-action indexing plungers



Material:
Handle 1.0503.
Pin steel grade 5.8.
Sleeve 1.0403 weldable.

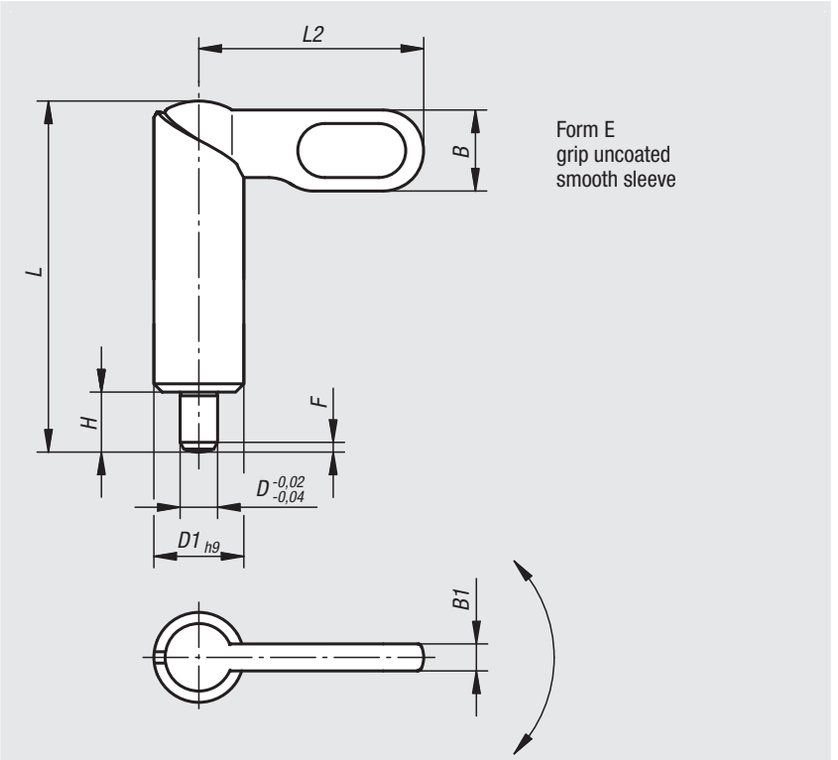
Version:
Black oxidised.
Pin hardened and ground.

Sample order:
nlm 03099-091220

Note:
Cam-action indexing plungers are used when the indexing pin should not project all the time. Turning the handle through 180° retracts the pin.
A notch ensures that the handle remains in this position.
To weld the plungers we recommend inert gas shielded welding with TIG welding equipment.

Order No. Form E	Order No. Form F	D	D1	L	L2	B	B1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03099-080410	**03099-090410**	4	10	38	25	9	3	6	1	8	14
03099-080510	**03099-090510**	5	10	38	25	9	3	6	1,3	8	14
03099-080610	**03099-090610**	6	10	38	25	9	3	6	1,8	8	14
03099-080512	**03099-090512**	5	12	46,8	30	10,8	3,6	8	1,3	8	15
03099-080612	**03099-090612**	6	12	46,8	30	10,8	3,6	8	1,8	8	15
03099-080812	**03099-090812**	8	12	46,8	30	10,8	3,6	8	2,3	8	15
03099-080616	**03099-090616**	6	16	60,4	40	14,4	4,8	10	1,8	15	35
03099-080816	**03099-090816**	8	16	60,4	40	14,4	4,8	10	2,3	15	35
03099-081016	**03099-091016**	10	16	60,4	40	14,4	4,8	10	2,8	15	35
03099-080820	**03099-090820**	8	20	70	50	18	6	12	2,3	20	60
03099-081020	**03099-091020**	10	20	70	50	18	6	12	2,8	20	60
03099-081220	**03099-091220**	12	20	70	50	18	6	12	3	20	60

Cam-action indexing plungers stainless steel



Material:
Handle stainless steel 1.4308.
Indexing pin stainless steel 1.4305.
Sleeve weldable stainless steel 1.4301.

Version:
Bright. Indexing pin ground, not hardened.

Sample order:
nlm 03099-1081220

Note:
Cam-action indexing plungers are used when the indexing pin should not project all the time. Turning the handle through 180° retracts the pin.
A notch ensures that the handle remains in this position.
To weld the plungers we recommend inert gas shielded welding with TIG welding equipment.

Order No.	Form	D	D1	L	L2	B	B1	H	F x 30°	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03099-1080410	E	4	10	38	25	9	3	6	1	8	14
03099-1080510	E	5	10	38	25	9	3	6	1,3	8	14
03099-1080610	E	6	10	38	25	9	3	6	1,8	8	14
03099-1080512	E	5	12	46,8	30	10,8	3,6	8	1,3	8	15
03099-1080612	E	6	12	46,8	30	10,8	3,6	8	1,8	8	15
03099-1080812	E	8	12	46,8	30	10,8	3,6	8	2,3	8	15
03099-1080616	E	6	16	60,4	40	14,4	4,8	10	1,8	15	35
03099-1080816	E	8	16	60,4	40	14,4	4,8	10	2,3	15	35
03099-1081016	E	10	16	60,4	40	14,4	4,8	10	2,8	15	35
03099-1080820	E	8	20	70	50	18	6	12	2,3	20	60
03099-1081020	E	10	20	70	50	18	6	12	2,8	20	60
03099-1081220	E	12	20	70	50	18	6	12	3	20	60

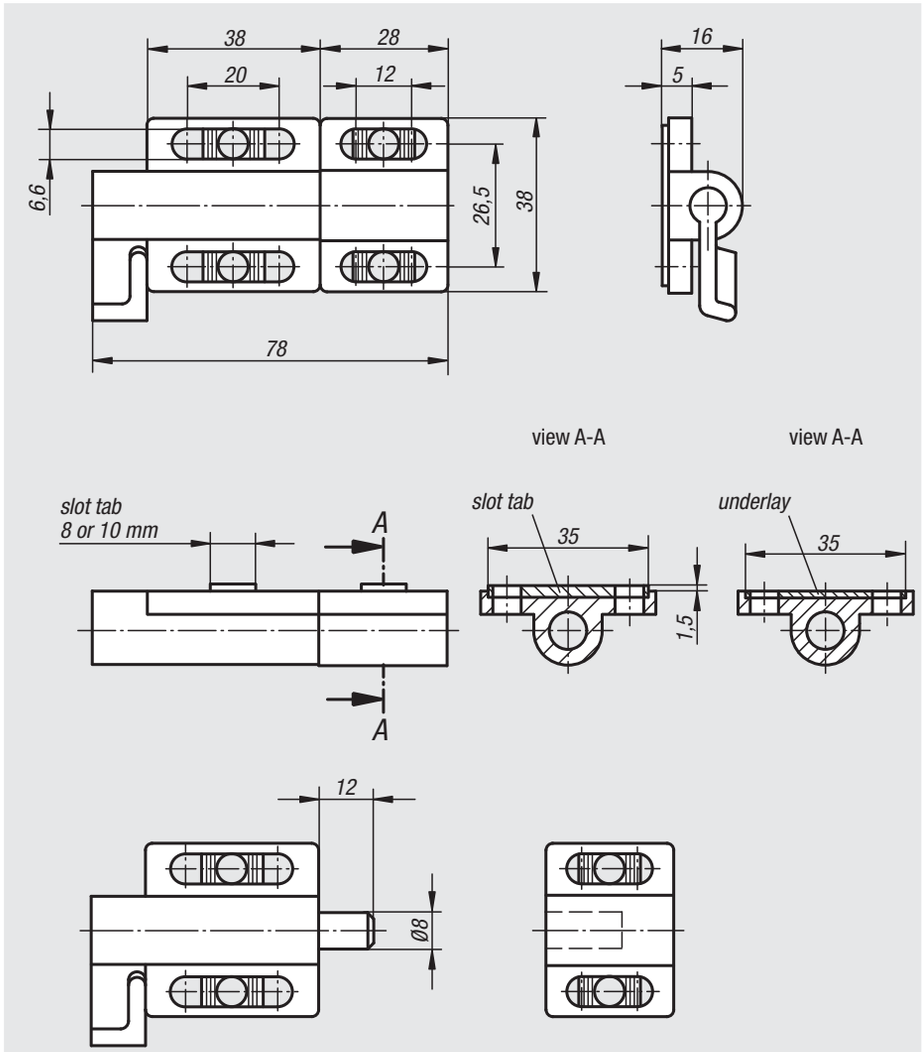
Barrel slide bolts

Material:
Housing die-cast zinc.
Grip, underlay and slot tabs thermoplastic PA.
Bolt stainless steel.

Version:
Housing painted silver.
Grip, underlay and slot tabs black.
Bolt bright.

Sample order:
nlm 03102-38038028

Note:
Spring loaded bolt.
Supplied with:
- 2 underlays for mounting on level surfaces.
- 2 of each tabs for mounting on profiles with 8 or 10 mm slots.

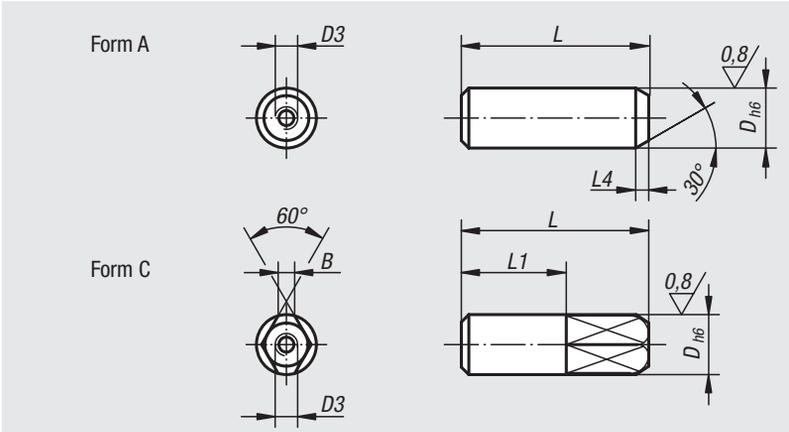


Order No.	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N
03102-38038028	5	15

03105

Locating pins removable

Form A and C



Material:
Tool steel

Version:
Hardened and ground (HRC 56 +2).

Sample order:
nlm 03105-12

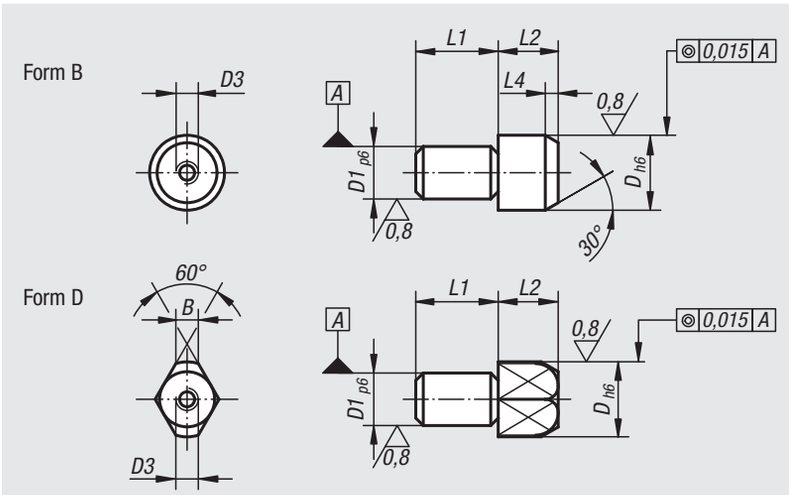
Note:
The locating pins can be easily removed with an extractor.

Order No. Form A	Order No. Form C	D	D3	L	L1	L4	B
03105-08	**03105-082**	8	M3	25	-/14	3/-	-/2,2
03105-10	**03105-102**	10	M3	30	-/17	3/-	-/3
03105-12	**03105-122**	12	M5	34	-/20	4/-	-/3,5
03105-16	**03105-162**	16	M5	42	-/26	4/-	-/5
03105-20	**03105-202**	20	M5	47	-/30	5/-	-/6
03105-25	**03105-252**	25	M5	49	-/30	5/-	-/8

03106

Locating pins removeable

Form B and D



Material:
Tool steel.

Version:
Hardened and ground (HRC 55-60).

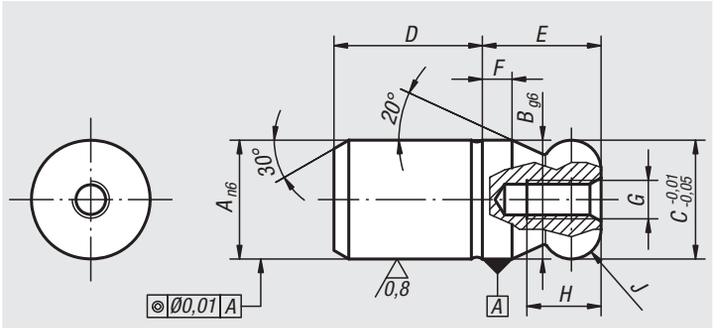
Sample order:
nlm 03106-20

Note:
Locating pins can be easily removed with an extractor.

Order No. Form B	Order No. Form D	D	D1	D3	L1	L2	L4	B
03106-10	**03106-102**	10	7	M3	11	11	3	-/3
03106-12	**03106-122**	12	8	M5	13	12	4	-/3,5
03106-16	**03106-162**	16	12	M5	18	14	4,5	-/5
03106-20	**03106-202**	20	14	M5	22	15	5	-/6
03106-22	**03106-222**	22	16	M5	22	17	5	-/7
03106-25	**03106-252**	25	18	M5	25	17	5	-/8

Locating pins

with ball-end Form A



Material:
Tool steel or stainless steel 1.4305.

Version:
Steel hardened and ground.
Stainless steel ground and kolsterised.

Sample order:
nlm 03107-12

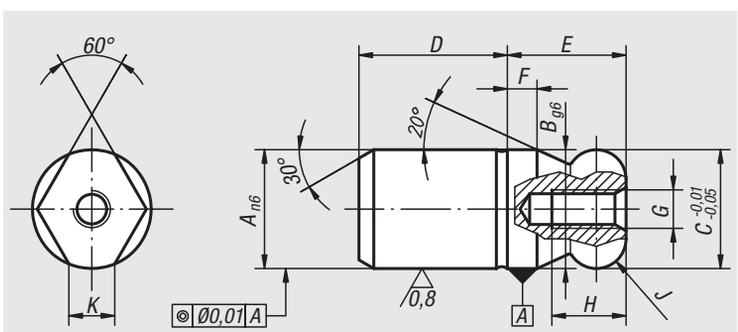
Note:
Ball end locating pins are specially designed to ease the locating process. The tendency to jam, caused by the locating hole not being at right angles to the pin or by the pushing force not being parallel to the pin axis, is minimized by the ball-end form. (See the illustration for 03108 Form B)

Order No. steel	Order No. stainless steel	A	B	C	D	E	F	G	H	J
03107-08	**03107-508**	8	8	8	10	8	2	M3	6	R 2
03107-10	**03107-510**	10	10	10	13	10	2,5	M3	6	R 2,5
03107-12	**03107-512**	12	12	12	15	12	3	M4	8	R 3
03107-16	**03107-516**	16	16	16	20	16	4	M5	10	R 4
03107-20	**03107-520**	20	20	20	25	20	5	M5	10	R 5
03107-25	-	25	25	25	25	25	6	M5	10	R 6
03107-30	-	30	30	30	30	30	8	M6	12	R 8
03107-40	-	40	40	40	40	40	10	M6	12	R 10
03107-50	-	50	50	50	50	50	12	M6	12	R 12

03107

Locating pins

with flattened ball-end Form C



Material:
Tool steel or stainless steel 1.4305.

Version:
Steel hardened and ground.
Stainless steel ground and kolsterised.

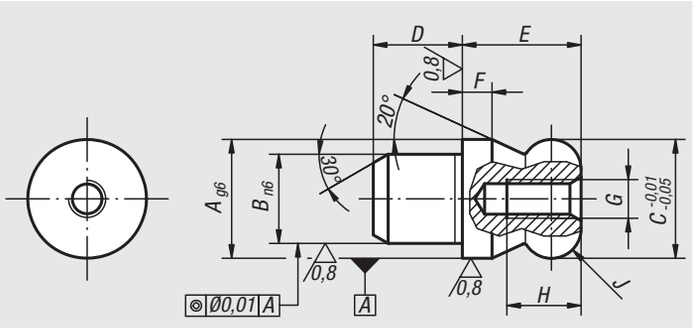
Sample order:
nlm 03107-162

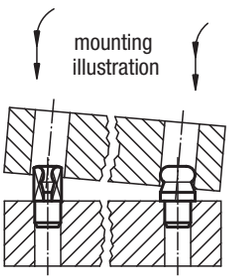
Note:
Ball end locating pins are specially designed to ease the locating process. The tendency to jam, caused by the locating hole not being at right angles to the pin or by the pushing force not being parallel to the pin axis, is minimized by the ball-end form. (See the illustration for 03108 Form B)

Order No. steel	Order No. stainless steel	A	B	C	D	E	F	G	H	J	K
03107-082	**03107-5082**	8	8	8	10	8	2	M3	6	R 2	1,9
03107-102	**03107-5102**	10	10	10	13	10	2,5	M3	6	R 2,5	2,5
03107-122	**03107-5122**	12	12	12	15	12	3	M4	8	R 3	2,5
03107-162	**03107-5162**	16	16	16	20	16	4	M5	10	R 4	4,3
03107-202	**03107-5202**	20	20	20	25	20	5	M5	10	R 5	5
03107-252	-	25	25	25	25	25	6	M5	10	R 6	5,6
03107-302	-	30	30	30	30	30	8	M6	12	R 8	8,8
03107-402	-	40	40	40	40	40	10	M6	12	R 10	12,8
03107-502	-	50	50	50	50	50	12	M6	12	R 12	16,7

Locating pins

with ball-end Form B





Material:
Tool steel or stainless steel 1.4305.

Version:
Steel hardened and ground.
Stainless steel ground and kolsterised.

Sample order:
nlm 03108-20

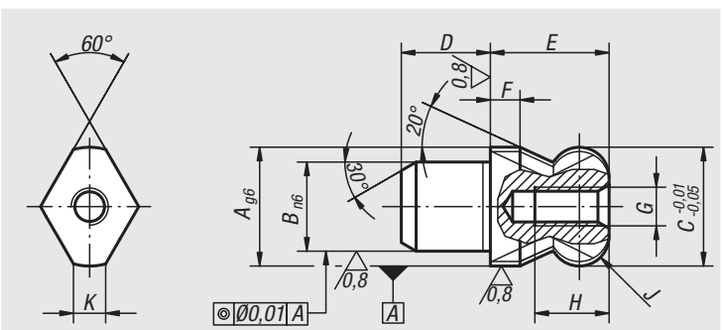
Note:
Ball end locating pins are specially designed to ease the locating process. The tendency to jam, caused by the locating hole not being at right angles to the pin or by the pushing force not being parallel to the pin axis, is minimized by the ball-end form (see illustration).

Order No. steel	Order No. stainless steel	A	B	C	D	E	F	G	H	J
03108-10	**03108-510**	10	7	10	7	10	2,5	M3	6	R 2,5
03108-12	**03108-512**	12	8	12	8	12	3	M4	8	R 3
03108-16	**03108-516**	16	12	16	12	16	4	M5	10	R 4
03108-20	**03108-520**	20	14	20	14	20	5	M5	10	R 5
03108-22	-	22	16	22	16	22	5,5	M5	10	R 5,5
03108-25	-	25	18	25	18	25	6	M5	10	R 6

03108

Locating pins

with flattened ball-end Form D



Material:
Tool steel or stainless steel 1.4305.

Version:
Steel hardened and ground.
Stainless steel ground and kolsterised.

Sample order:
nlm 03108-162

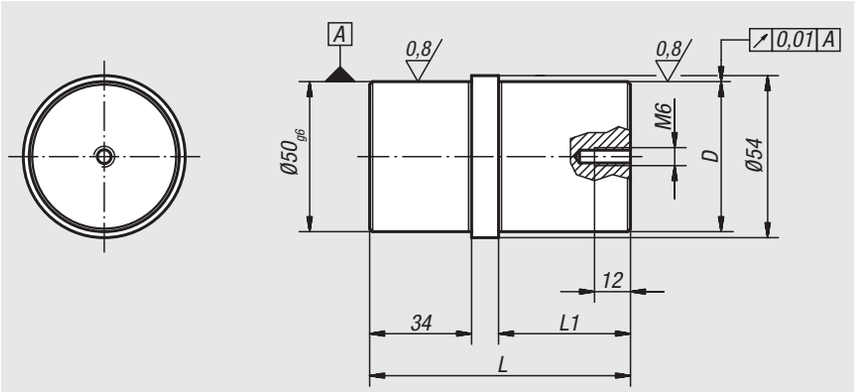
Note:
Ball end locating pins are specially designed to ease the locating process. The tendency to jam, caused by the locating hole not being at right angles to the pin or by the pushing force not being parallel to the pin axis, is minimized by the ball-end form. (See the illustration for 03108 Form B)

Order No. steel	Order No. stainless steel	A	B	C	D	E	F	G	H	J	K
03108-102	**03108-5102**	10	7	10	7	10	2,5	M3	6	R 2,5	2,5
03108-122	**03108-5122**	12	8	12	8	12	3	M4	8	R 3	2,5
03108-162	**03108-5162**	16	12	16	12	16	4	M5	10	R 4	4,3
03108-202	**03108-5202**	20	14	20	14	20	5	M5	10	R 5	5
03108-222	-	22	16	22	16	22	5,5	M5	10	R 5,5	5
03108-252	-	25	18	25	18	25	6	M5	10	R 6	5,6

03110

Centring pins

for central hole



Material:
Steel.

Version:
Case-hardened.
Toleranced diameter ground.

Sample order:
nlm 03110-5025

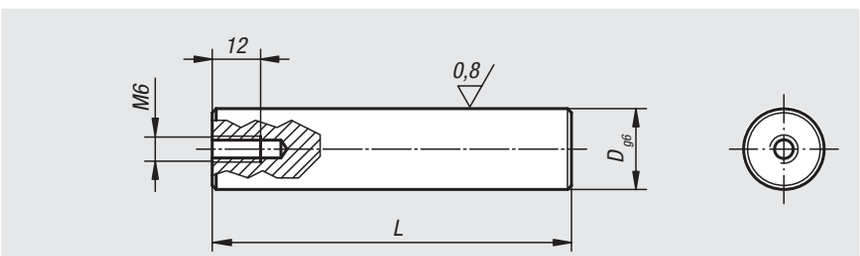
Note:
Centring pins for central holes are suitable for basic elements 01148, 01263, 01265, 01267 and 01850.

Order No.	D	L	L1
03110-5025	25 g6	77	34
03110-5030	30 h6	87	44
03110-5050	50 g6	87	44

03112

Centring pins

for aligning hole



Material:
Steel.

Version:
Case-hardened.
Toleranced diameter ground.

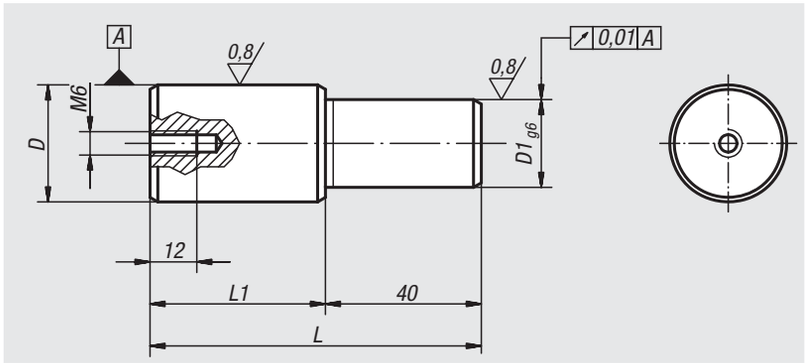
Sample order:
nlm 03112-25125

Note:
Centring pins for aligning holes are suitable for basic elements 01263, 01265 and 01850.

Order No.	D	L
03112-20075	20	75
03112-20089	20	89
03112-25125	25	125

Centring pins

for aligning hole



Material:
Steel.

Version:
Case-hardened.
Toleranced diameter ground.

Sample order:
nlm 03114-2520

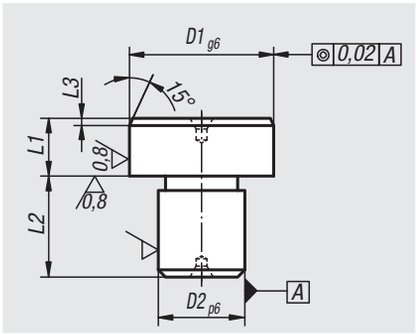
Note:
Centring pins for aligning holes are suitable for palettes 01148.

Order No.	D	D1	L	L1
03114-2520	25 g6	20	75	35
03114-3020	30 h6	20	85	45
03114-3025	30 h6	25	85	45

03120

Positioning pins cylindrical

ground

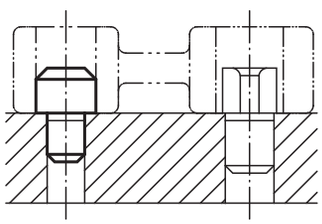


Material:
Tool steel.

Version:
Hardened and ground.

Sample order:
nlm 03120-08

Note:
Top face with centre hole.

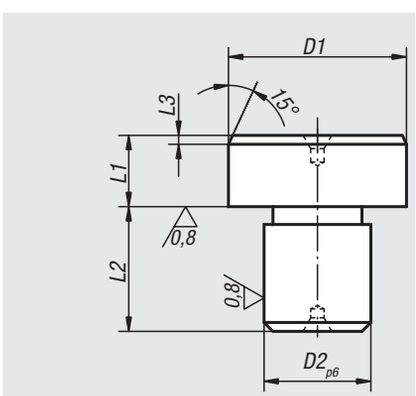


Order No.	Version	D1	D2	L1	L2	L3
03120-05	D1 ground	8	5	8	8	2
03120-07	D1 ground	10	7	8	8	2
03120-08	D1 ground	12	8	8	10	2
03120-081	D1 ground	14	8	8	10	3
03120-09	D1 ground	16	9	8	12	3
03120-12	D1 ground	18	12	8	12	3
03120-121	D1 ground	20	12	8	14	3
03120-14	D1 ground	22	14	8	14	3
03120-16	D1 ground	25	16	8	16	3

03130

Positioning pins cylindrical

not ground

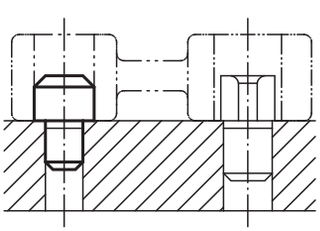


Material:
Tool steel.

Version:
Hardened.

Sample order:
nlm 03130-05

Note:
Top face with centre hole.



Order No.	Version	D1	D2	L1	L2	L3
03130-05	D1 not ground	8,5	5	8	8	2
03130-07	D1 not ground	10,5	7	8	8	2
03130-08	D1 not ground	12,5	8	8	10	2
03130-081	D1 not ground	14,5	8	8	10	3
03130-09	D1 not ground	16,5	9	8	12	3
03130-12	D1 not ground	18,5	12	8	12	3
03130-121	D1 not ground	20,5	12	8	14	3
03130-14	D1 not ground	22,5	14	8	14	3
03130-16	D1 not ground	25,5	16	8	16	3

03140

Positioning pins free-milled

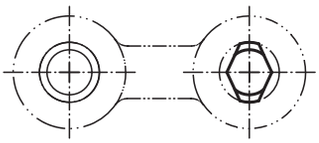
ground

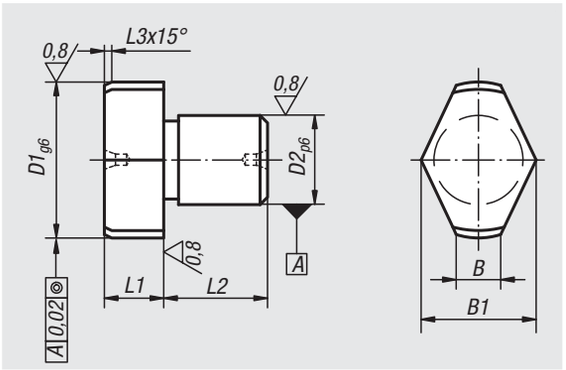
Material:
Tool steel.

Version:
Hardened and ground.

Sample order:
nlm 03140-08

Note:
Top face with centre hole.





Order No.	Version	D1	D2	L1	L2	L3	B	B1
03140-05	D1 ground	8	5	8	8	2	2	6,6
03140-07	D1 ground	10	7	8	8	2	3	8,6
03140-08	D1 ground	12	8	8	10	2	3	9,8
03140-081	D1 ground	14	8	8	10	3	3,5	11,2
03140-09	D1 ground	16	9	8	12	3	4	13,2
03140-12	D1 ground	18	12	8	12	3	4,5	14,7
03140-121	D1 ground	20	12	8	14	3	5	16,6
03140-14	D1 ground	22	14	8	14	3	5,6	18
03140-16	D1 ground	25	16	8	16	3	6	19,8

03150

Positioning pins free-milled

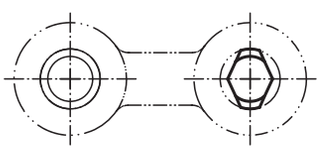
not ground

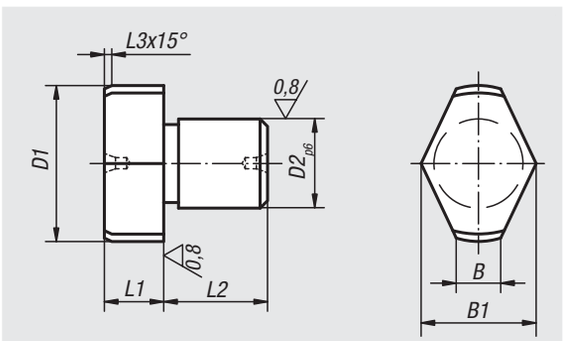
Material:
Tool steel.

Version:
Hardened.

Sample order:
nlm 03150-05

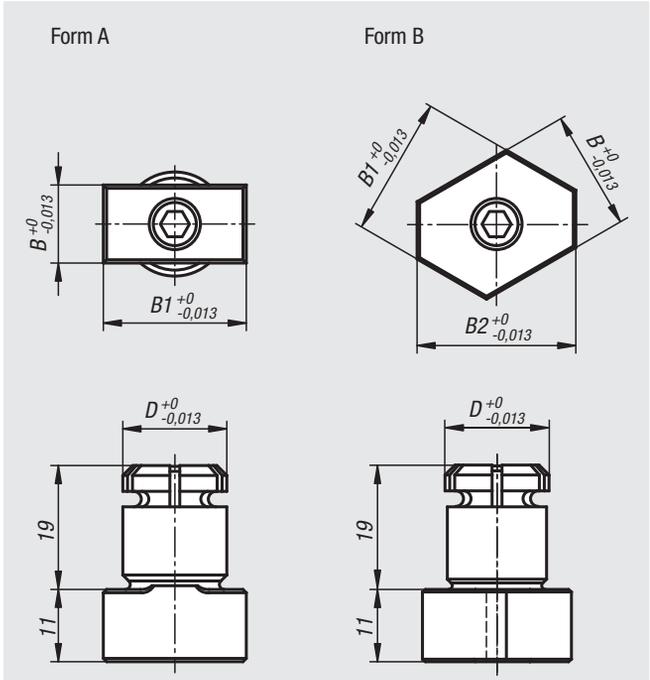
Note:
Top face with centre hole.





Order No.	Version	D1	D2	L1	L2	L3	B	B1
03150-05	D1 not ground	8,5	5	8	8	2	2	6,6
03150-07	D1 not ground	10,5	7	8	8	2	3	8,6
03150-08	D1 not ground	12,5	8	8	10	2	3	9,8
03150-081	D1 not ground	14,5	8	8	10	3	3,5	11,2
03150-09	D1 not ground	16,5	9	8	12	3	4	13,2
03150-12	D1 not ground	18,5	12	8	12	3	4,5	14,7
03150-121	D1 not ground	20,5	12	8	14	3	5	16,6
03150-14	D1 not ground	22,5	14	8	14	3	5,6	18
03150-16	D1 not ground	25,5	16	8	16	3	6	19,8

Locating pins expanding

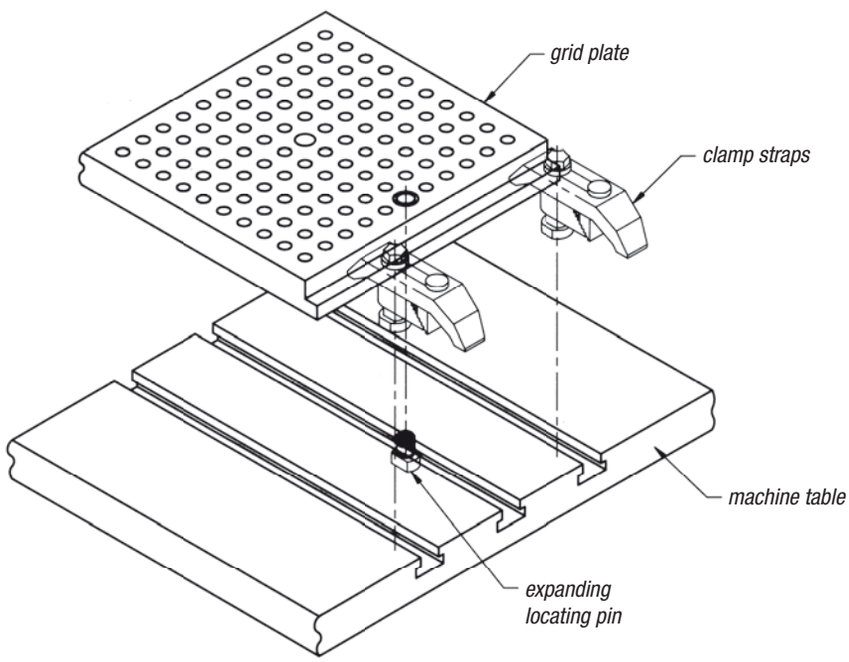


Material:
Carbon steel.

Version:
Tempered and black oxidised.
Locating diameter and guide faces ground.

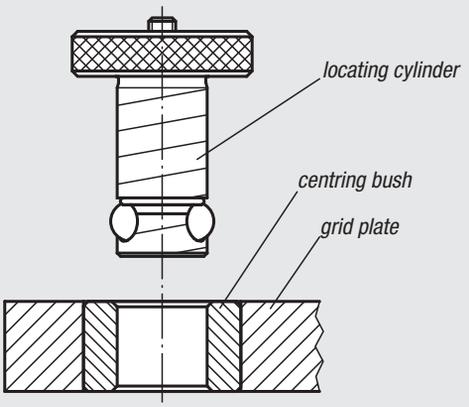
Sample order:
nlm 03151-1610

Note:
These expanding locating pins allow grid plates, for example, to be positioned on the T-slots of machine tables (see illustration).
The plates to be positioned must have two holes matching the expanding pin.
The expansion screw has a through broached hexagon socket allowing the pin to be tightened or loosened from two sides.

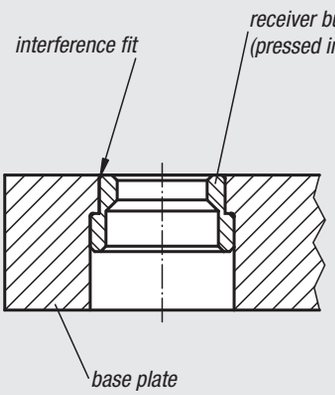


Order No.	Form	D	B	B1	B2	Recommended Ø
03151-1610	A	16	10	20	-	16,01 ±0,01
03151-1612	A	16	12	22	-	16,01 ±0,01
03151-1614	B	16	14	16	18	16,01 ±0,01
03151-2024	B	20	24	28	32	20,01 ±0,01

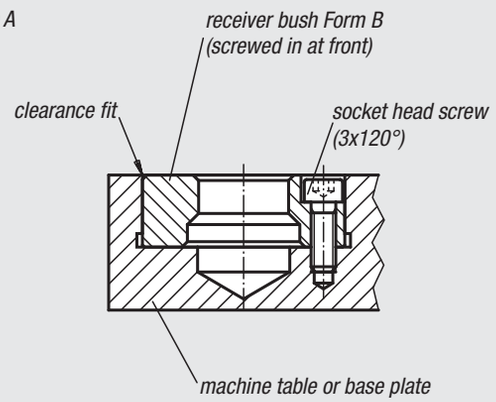
Ball lock locating and clamping system



recommanded installation



alternative installation



General information

1. The ball lock positioning and clamping system makes precise positioning and fastening of clamping and base plates possible in just seconds. The system consists of a locating cylinder, a centring bush and a receiver bushing.

2. Three easy steps to applying the ball lock positioning and clamping system:
   Mount two receiver bushings on the machine table or on the base plate, as well as two centring bushings on the fastening plate.
   Insert the locating cylinder through the centring bushings onto the receiver bushings in order to attain the precise positioning.
   Turn fixing screws in each locating cylinder approx. twice in order to attain positive tight clamping. Eighteen different locating cylinders, two centring bushing types and two receiver bushing models are available.

3. A centring bush grade I (left below) and a centring bush grade I or II (right above) should be installed in each fastening plate as far apart from one another as possible.

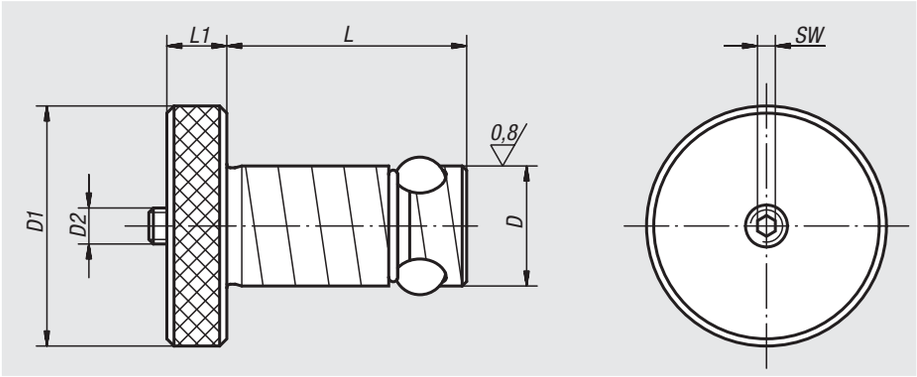
   When more than two locating cylinders are used, in order to attain additional retention force (this is dependent on the application), holes must be drilled in the fastening plate at 0.4 mm up to 0.8 mm larger than the selected locating cylinder diameter.

4. If for example the centre distance between the two positioning holes in the machine table and the clamping plate is kept within a tolerance of ±0.005 mm and two centring bushings grade I are used, a repeat accuracy within ±0.013 mm can be achieved.

   For a somewhat lower repeat accuracy within ±0.04 mm, a centring bushing grade I and a centring bushing grade II with a centre distance tolerance of ±0.03 mm are used.

5. The difference between the centring bush grade I and the centring bush grade II is that the centring bush grade II has a larger internal diameter in order to correspond to the greater centre distance tolerance in the machine table or the base plate.

Locating cylinders



Material:
Locating cylinder carbon steel.
Balls roller bearing steel.

Version:
Locating cylinder tempered, black oxidised.
Balls hardened, bright.

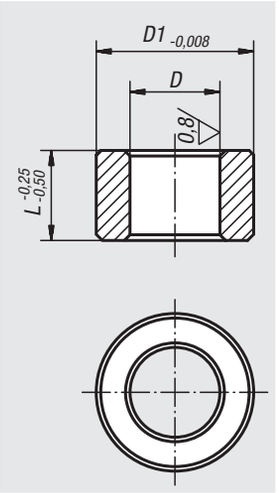
Sample order:
nlm 03153-16020

Note:
By tightening the thrust screw (D2) the centre ball is pressed downwards and in turn forces the three locking balls outwards, where they locked in the receiver bush.
With this easy to use system machine set-up times are up to twelve times shorter than when conventional methods are used.

Repair Kit:

Order No.	Grid plate thickness ±0,05	D	D1	D2	L	L1	SW	Holding force F kN	Tightening torque max. Nm	Order No. Repair Kit
03153-13013	13	13	22	M5	27,6	6	2,5	3,3	1	03153-913013
03153-13020	20	13	22	M5	34,6	6	2,5	3,3	1	03153-913020
03153-16020	20	16	32	M6	36,5	8	3	5,3	3	03153-916020
03153-16025	25	16	32	M6	41,5	8	3	5,3	3	03153-916025
03153-20020	20	20	40	M6	39,5	10	3	13,3	4	03153-920020
03153-20025	25	20	40	M6	44,5	10	3	13,3	4	03153-920025
03153-25020	20	25	45	M8	44	10	4	30	9	03153-925020
03153-25025	25	25	45	M8	49	10	4	30	9	03153-925025
03153-30020	20	30	50	M10	49	13	5	44	15	03153-930020
03153-30025	25	30	50	M10	54	13	5	44	15	03153-930025
03153-35020	20	35	60	M12	51	13	6	68	25	03153-935020
03153-35025	25	35	60	M12	56	13	6	68	25	03153-935025
03153-35040	40	35	60	M12	71	13	6	68	25	03153-935040
03153-35050	50	35	60	M12	81	13	6	68	25	03153-935050
03153-50020	20	50	75	M20	64	20	10	88	50	03153-950020
03153-50025	25	50	75	M20	69	20	10	88	50	03153-950025
03153-50040	40	50	75	M20	84	20	10	88	50	03153-950040
03153-50050	50	50	75	M20	94	20	10	88	50	03153-950050

Centring bushes



Material:
Ball bearing steel

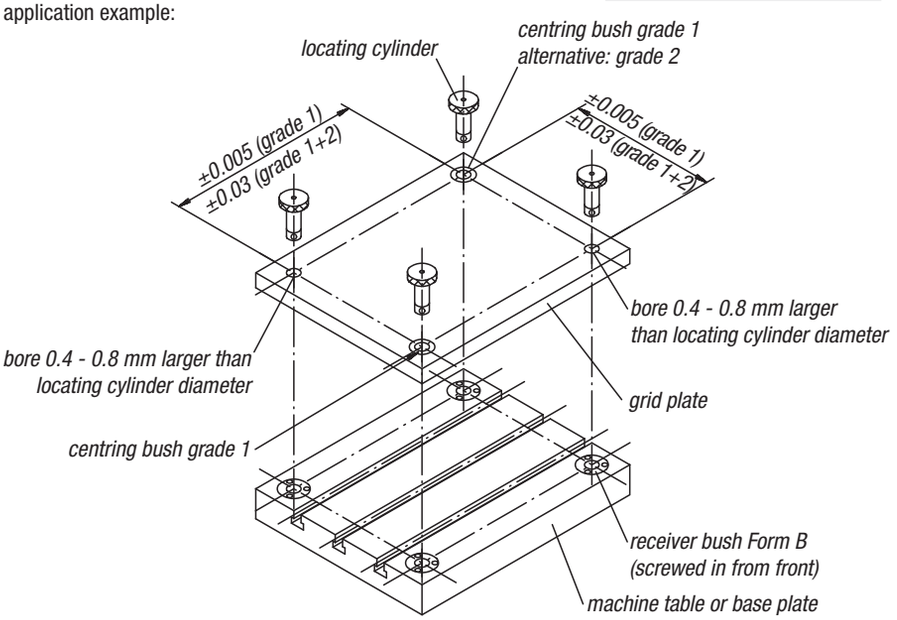
Version:
Hardened, black oxidised.

Sample order:
nlm 03154-113020

Note:
By a centre distance tolerance of ±0.005 mm and two grade I centring bushes a repeat accuracy of ±0.013 mm is possible.
By a centre distance tolerance of ±0.03 mm and one grade I centring bush and one grade II centring bush repeat accuracy of ±0.04 mm is possible.
The centring bush is pressed with light pressure into the receiver holes in tooling plates.
For further details see „General information“.

* Tol. for grade I centring bushes +0.005 / +0.018
Tol. for grade II centring bushes +0.025 / +0.050

application example:



Order No. grade 1	Order No. grade 2	D	D1	L	Receiving hole for centering bushing Ø +0,010
03154-113013	**03154-213013**	13*	19,040	13	19,016
03154-113020	**03154-213020**	13*	19,040	20	19,016
03154-116020	**03154-216020**	16*	25,042	20	25,016
03154-116025	**03154-216025**	16*	25,042	25	25,016
03154-120020	**03154-220020**	20*	35,042	20	35,018
03154-120025	**03154-220025**	20*	35,042	25	35,018
03154-125020	**03154-225020**	25*	35,042	20	35,018
03154-125025	**03154-225025**	25*	35,042	25	35,018
03154-130020	**03154-230020**	30*	45,042	20	45,018
03154-130025	**03154-230025**	30*	45,042	25	45,018
03154-135020	**03154-235020**	35*	45,042	20	45,018
03154-135025	**03154-235025**	35*	45,042	25	45,018
03154-135040	**03154-235040**	35*	45,042	40	45,018
03154-135050	**03154-235050**	35*	45,042	50	45,018
03154-150020	**03154-250020**	50*	63,546	20	63,521
03154-150025	**03154-250025**	50*	63,546	25	63,521
03154-150040	**03154-250040**	50*	63,546	40	63,521
03154-150050	**03154-250050**	50*	63,546	50	63,521

03155

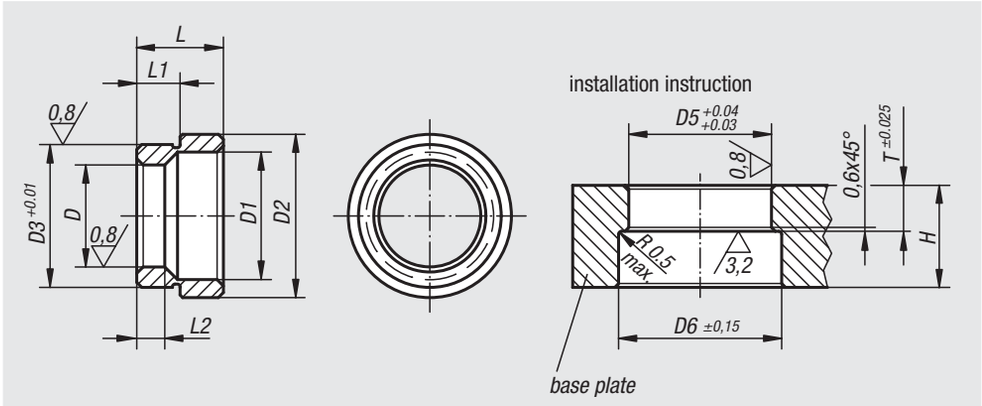
Receiver bushes

Form A (pressed in from rear)

Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 03155-20



Order No.	D	D1	D2	D3	L	L1	L2	D5	D6	T	Min. grid plate thickness H
03155-13	13	17,3	25	20,03	12,1	6,6	5,58	20	26	6,92	20
03155-16	16	20,7	28,6	22,03	12,1	6,9	6,6	22	29	7,24	20
03155-20	20	24,8	32,2	28,03	17,1	8,42	8,13	28	33	8,74	25
03155-25	25	30,4	40,2	35,03	21	10,22	10,16	35	41	10,54	25
03155-30	30	36,2	48,2	42,03	21,8	10,63	11,18	42	49	10,95	30
03155-35	35	41,3	54,2	48,03	25,1	12,18	14,78	48	55	12,5	32
03155-50	50	58,4	75,2	67,03	31,1	15,43	18,67	67	76	15,75	45

03156

Receiver bushes

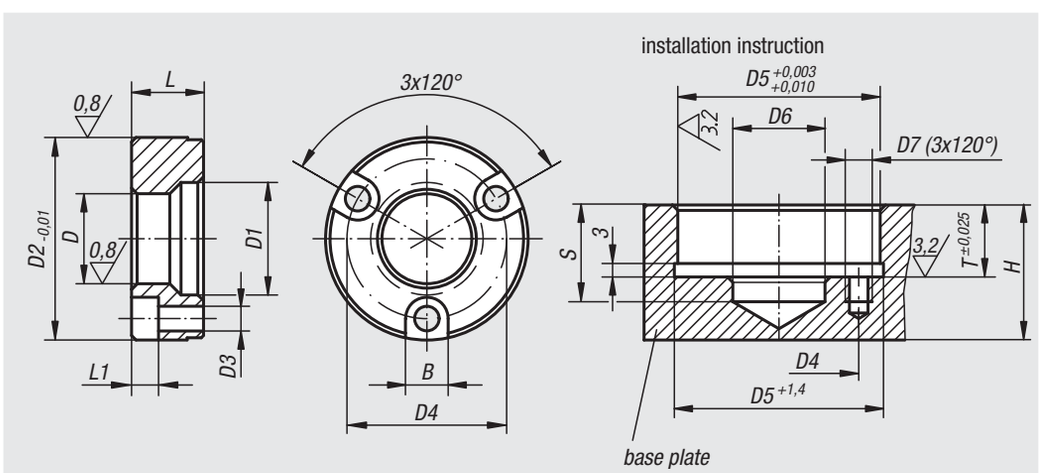
Form B (screwed down from front)

Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 03156-13

Note:
Fastening screws included.



Order No.	D	D1	D2	D3	D4	L	L1	B	D5	D6	D7	S	T	Min. grid plate thickness H
03156-13	13	17,3	34,99	4,4	25	11,56	4,5	7,6	35	13,5	M4x7	20	11,91	20
03156-16	16	20,7	36,99	4,4	29	11,56	4,5	7,6	37	21	M4x7	20	11,91	20
03156-20	20	24,8	44,99	5,4	35	15,82	6,0	9,5	45	21	M5x9	25	16,21	25
03156-25	25	30,4	54,99	6,4	42	19,94	7,0	11,0	55	25,5	M6x10	25	20,32	25
03156-30	30	36,2	59,99	6,4	48	21,77	7,0	11,0	60	30,5	M6x11	30	22,15	30
03156-35	35	41,3	69,99	8,4	56	22,61	9,0	14,0	70	40	M8x17	32	22,99	32
03156-50	50	58,4	91,99	10,4	75	31,12	11,0	17,0	92	55	M10x18	45	31,5	45

Mandrel collets

Material:
Mandrel mild steel.
Taper-head screw low-carbon steel

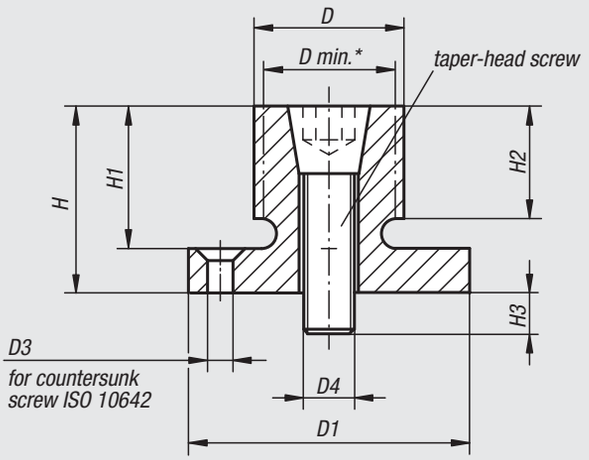
Version:
Mandrel black oxidised.
Taper-head screw case-hardened.

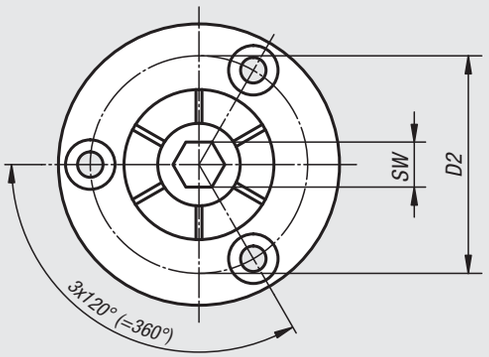
Sample order:
nlm 03157-081420

Note:
The mandrel collet is ideal for finish machining turned parts. The diameter D can be turned or milled to suit the workpiece ID.
Low design - no interfering clamp straps.
Tightened using a hex socket wrench or hydraulics.

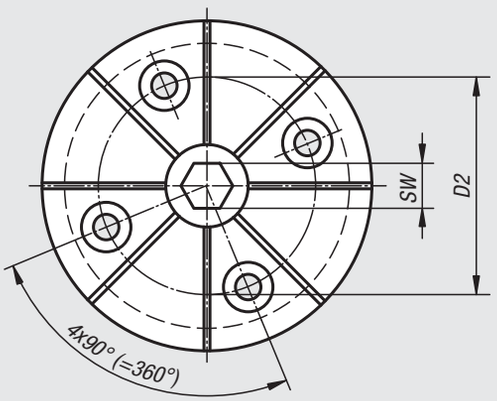
* D min. = smallest diameter to which „D“ may be turned or milled.

Assembly:
Expand the mandrel approx. 0.1 mm over the relaxed diameter. Turn or mill the mandrel to suit the internal diameter of the workpiece. The base flange can be centred in a pocket or using dowel pins.





03157-1630175



Order No.	D	D min.	D1	D2	D3 for countersunk screw	D4 Tapered-head bolt	H	H1	H2	H3	SW Tapered-head bolt	Tightening torque max. Nm	Clamping force max. kN
03157-020407	7,4	4,1	20 h9	13,7	M2	M2	10,7	7,6	6,1	4,1	1,5	0,7	1,1
03157-040812	12,4	7,2	29,72 h9	21	M3	M4	21,8	16	15	8	3	5	4,2
03157-061214	14,2	12,2	31,5 h9	23,1	M3	M6	24,9	19	15	12	5	17	8,5
03157-081420	20	13,5	37,5 h9	29	M3	M8	24,9	19	15	14	6	34	11,1
03157-062027	27	18	50 h9	39,4	M4	M10	28,6	22,2	17,5	17	8	60	20
03157-102535	35,3	23	56 h9	45,5	M4	M12	31,8	25,4	20,6	21	10	150	26,3
03157-123442	42	30	69,5 h8	55,9	M5	M16	39,6	31,8	27	22	14	280	44,5
03157-123452	51,5	23	75,5 h9	63,9	M5	M16	39,6	31,8	27	22	14	280	44,5
03157-163077	77,7	23	107,5 h9	92,5	M6	M16	45,5	37,6	32,3	20	14	280	44,5
03157-1630103	103	23	132,9 h9	118	M6	M16	45,5	37,6	32,3	20	14	280	44,5
03157-1630175	175	23	132,9 h9	118	M6	M16	45,5	37,6	32,3	20	14	280	44,5

Mandrel collets

with side lock

Material:
Mandrel mild steel.
Clamping screw carbon steel.

Version:
Mandrel black oxidised.
Clamping screw tempered to 10.9, hardened and PTFE coated.

Sample order:
nlm 03157-118029

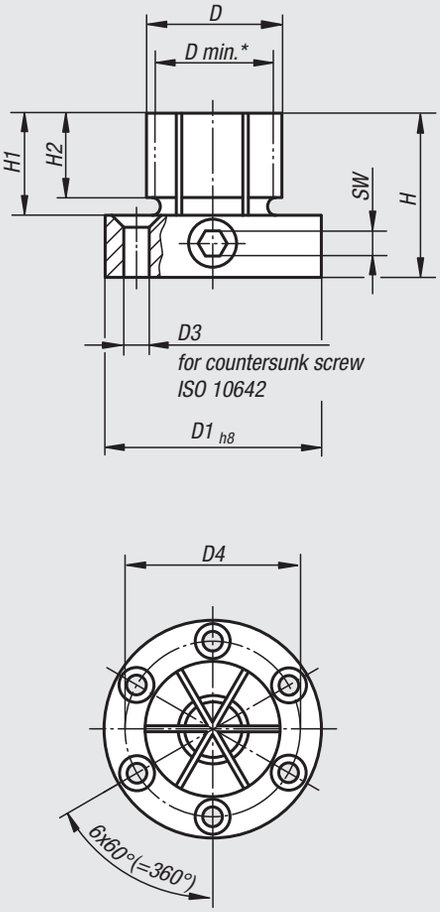
Note:
The side lock make these mandrel collets ideal for finish machining parts with blind internal diameters. The diameter D can be turned or milled to suit the workpiece ID.

Manual tightening with hexagon socket wrench.

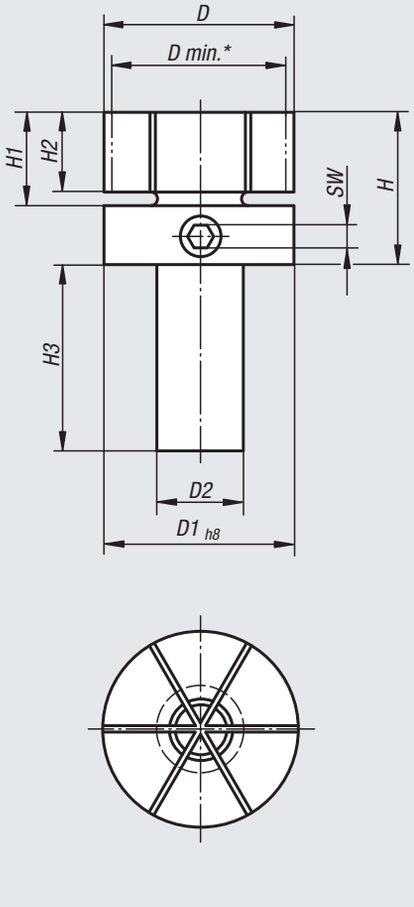
* D min. = smallest diameter to which „D“ may be turned or milled.

Assembly:
Expand the mandrel approx. 0.1 mm over the relaxed diameter. Turn or mill the mandrel to suit the internal diameter of the workpiece. A locking ring is included for machining.
The shank or flange is centred in a reamed hole or pocket.
Form A is supplied with 6 fastening screws.

Form A
for machining centres,
drilling and milling machines



Form B
with shaft for holding
in lathe chucks



Order No.	Form	D	D min.	D1	D2	D3 for countersunk screw	D4	H	H1	H2	H3	SW	Tightening torque max. Nm	Clamping force max. kN
03157-118029	A	28,7	17,8	50	-	M4	39,4	41,3	22,4	17,5	-	6	66	20
03157-218053	B	53,3	18	53,3	25	-	-	44,4	25,4	21	45	6	66	20

Centring clamps

with ball or hexagon segments

Material:
Body 1.2842.
Ball and hex segments 1.4112.
Tension spring 1.4310.

Version:
Body hardened and black oxidised.
Ball and hex segments hardened and ground.

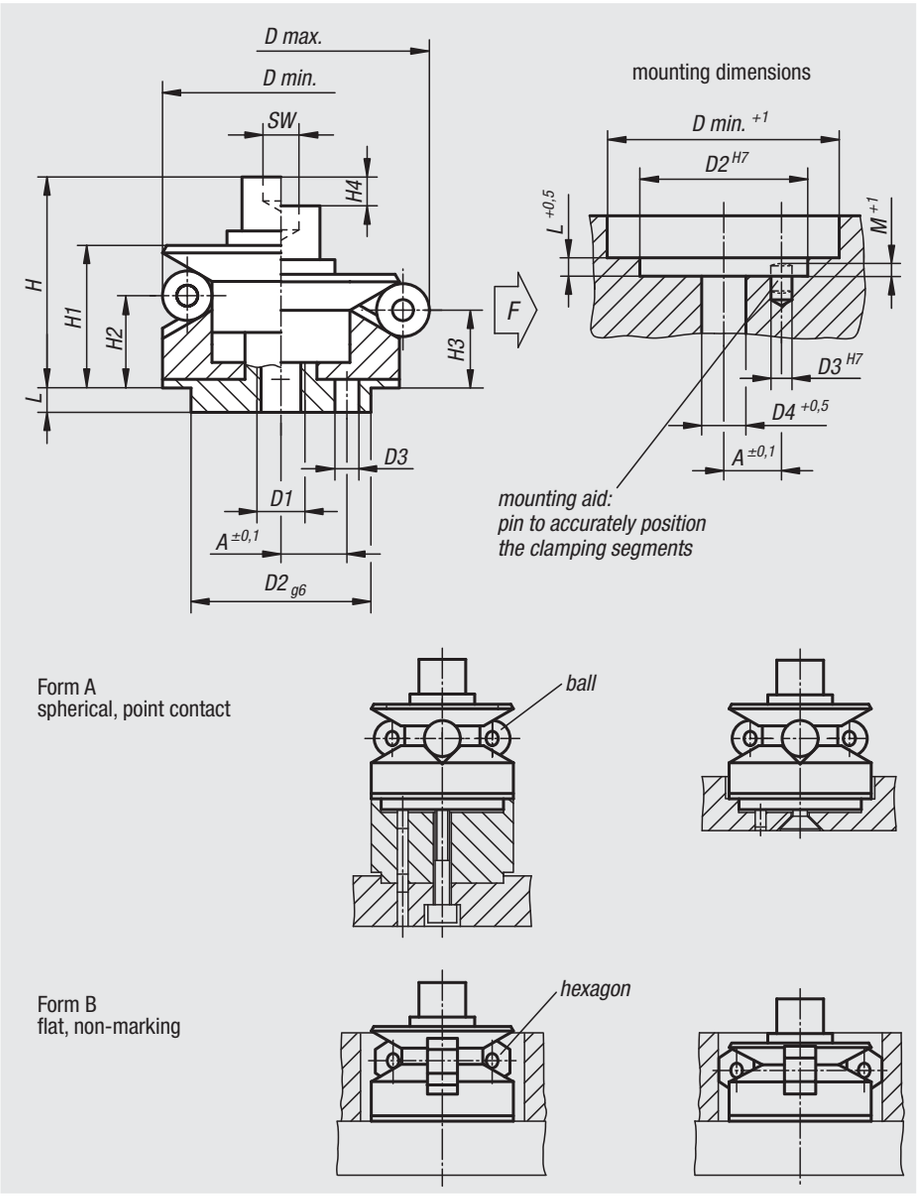
Sample order:
nlm 03158-101203

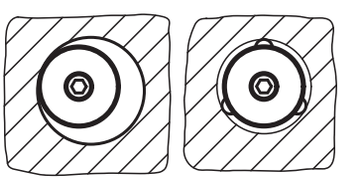
Note:
Form A: With balls for holes where light marking is acceptable.
Form B: With hexagons for sensitive hole surfaces.

Application:
To position and centre existing bores on the machining surface.

Advantages:
- Precise self-centring.
- Distortion free clamping.
- Large spread range.
- Low overall height.

Technical data:
Repetitive accuracy ±0.025
Concentric accuracy ±0.05





Order No. Form A	Order No. Form B	A	D min.	D max.	D1	D2	D3	D4	H	H1	H2	H3	H4	L	M	SW	Ball-Ø	Hex	No. off segments	F kN
03158-101203	**-**	3,5	11,7	14,2	M3	10	1,5	3,3	15,9	12	9,2	8,6	1,5	3,5	2,5	2,5	2,5	-	3	0,5
03158-101504	**03158-201504**	4,5	14,5	18,5	M4	12	2	4,3	19,6	14,1	9,1	7,9	2,3	5,5	3,5	3	4/-	-/4	3	3,5
03158-101905	**03158-201905**	5,5	18,5	22,5	M5	15	2,5	5,3	23,6	16,6	11,6	10,4	2,3	7,5	3	4	4/-	-/4	3	4,5
03158-102306	**03158-202306**	7	22,5	26,5	M6	15	3	6,4	29,1	20,1	15,1	13,9	2,3	6	4	5	4/-	-/4	3	5
03158-102706	**03158-202706**	7	26,5	30,5	M6	20	3	6,4	29,1	20,1	15,1	13,9	2,3	6	4,5	5	4/-	-/4	3	5
03158-103106	**03158-203106**	9	30,5	38,5	M6	25	4	6,4	33,2	24,2	15,2	12,8	4,6	7	4,5	5	8/-	-/8	3	5
03158-103908	**03158-203908**	11	38,5	46,5	M8	30	4	8,4	38,6	27,1	18,1	15,7	4,6	7,5	4,5	6	8/-	-/8	6	6,5
03158-104708	**03158-204708**	11	46,5	54,5	M8	30	4	8,4	38,6	27,1	18,1	15,7	4,6	7,5	4,5	6	8/-	-/8	6	6,5
03158-105510	**03158-205510**	15	54,5	70,5	M10	45	5	10,5	54,7	40,7	23,7	19	9,3	9	5,5	8	16/-	-/16	6	8
03158-107112	**03158-207112**	17	70,5	86,5	M12	60	5	13	62,1	45,6	28,3	23,6	9,3	10	5,5	10	16/-	-/16	6	10
03158-108712	**03158-208712**	17	86,5	102,5	M12	60	5	13	62,1	45,6	28,3	23,6	9,3	10	5,5	10	16/-	-/16	6	10

Centring clamps

with ball or hexagon segments

Material:
Body 1.2842.
Ball and hex segments 1.4112.
Tension spring 1.4310.

Version:
Body hardened and black oxidised.
Ball and hex segments hardened and ground.

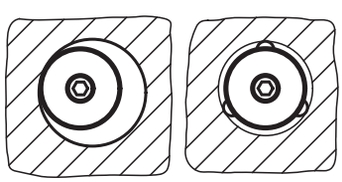
Sample order:
nlm 03158-0101203

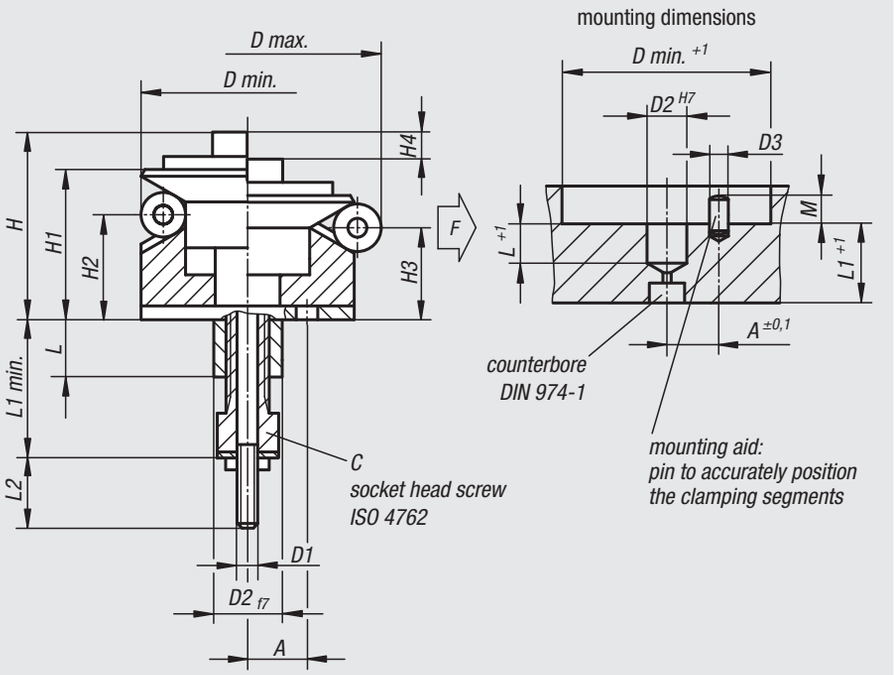
Note:
Form A: With balls for holes where light marking is acceptable.
Form B: With hexagons for sensitive hole surfaces.

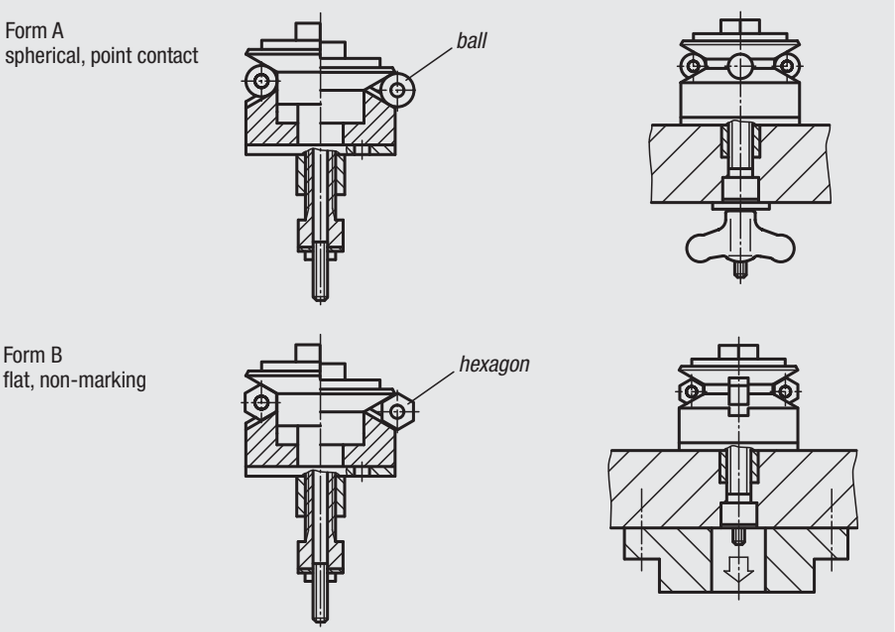
Application:
For centre positioning and clamping in blind holes. Operated from below, manual or automatic using pneumatics or hydraulics.

Advantages:
- Precise self-centring.
- Distortion free clamping.
- Large spread range.
- Low overall height.
- Positive down force.

Technical data:
Repetitive accuracy ±0.025
Concentric accuracy ±0.05







Order No. Form A	Order No. Form B	A	D min.	D max.	D1	D2	D3	H	H1	H2	H3	H4	L	L1 min.	L2	M	Ball-Ø	Hex	No. off segments	C (DIN 912)	F kN
03158-0101203	**-**	5,2	11,7	14,2	M3	8	1,5	15	11,9	9,2	8,6	1,5	7,5	19,5	10	1	2,5	-	3	M6x10	2
03158-0101503	**03158-0201503**	6	14,5	18,5	M3	8	2	17	14,1	9,1	7,9	2,3	7,5	19,5	10	1,5	4/-	-/4	3	M6x10	2
03158-0101904	**03158-0201904**	7,8	18,5	22,5	M4	12	2,5	20,6	16,6	11,6	10,4	2,3	11,5	28	16	1,5	4/-	-/4	3	M8x16	3,5
03158-0102305	**03158-0202305**	9,4	22,5	26,5	M5	15	3	27,1	20,1	15,1	13,9	2,3	11,5	30	14	2	4/-	-/4	3	M10x16	6
03158-0102705	**03158-0202705**	10,5	26,5	30,5	M5	15	3	27,1	20,1	15,1	13,9	2,3	11,5	30	14	2	4/-	-/4	3	M10x16	6
03158-0103106	**03158-0203106**	12,5	30,5	38,5	M6	20	4	32,7	24,2	15,2	12,8	4,6	15,5	36	16	2	8/-	-/8	3	M12x20	8,5
03158-0103906	**03158-0203906**	12,5	38,5	46,5	M6	20	4	35,6	27,1	18,1	15,7	4,6	15,5	36	16	2,5	8/-	-/8	6	M12x20	8,5
03158-0104706	**03158-0204706**	12,5	46,5	54,5	M6	20	4	35,6	27,1	18,1	15,7	4,6	15,5	36	16	2,5	8/-	-/8	6	M12x20	8,5
03158-0105508	**03158-0205508**	20	54,5	70,5	M8	30	5	50,2	40,7	23,7	19	9,3	16,5	43	16	2,5	16/-	-/16	6	M16x20	16
03158-0107108	**03158-0207108**	25	70,5	86,5	M8	40	5	55,1	45,6	28,3	23,6	9,3	16,5	43	16	2,5	16/-	-/16	6	M16x20	16
03158-0108708	**03158-0208708**	36,5	86,5	102,5	M8	60	5	55,1	45,6	28,3	23,6	9,3	16,5	43	16	2,5	16/-	-/16	6	M16x20	16

Ball-end locking screw

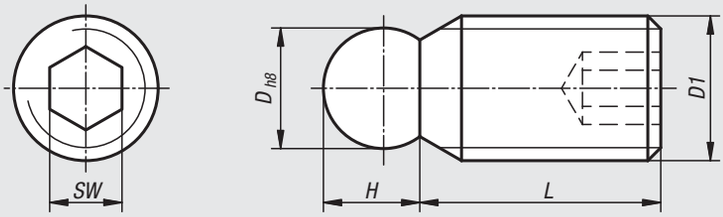
with rotating ball

Material:
Screw and ball steel

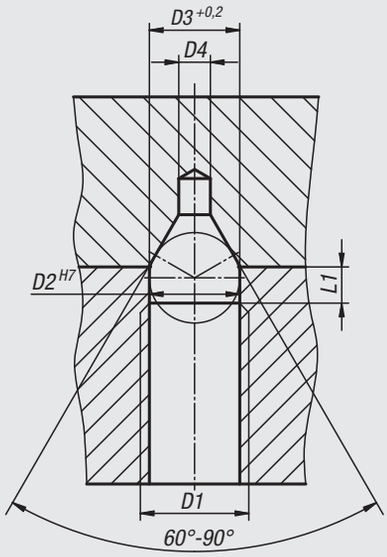
Version:
Screw black oxidised.
Ball hardened.

Sample order:
nlm 03159-05010

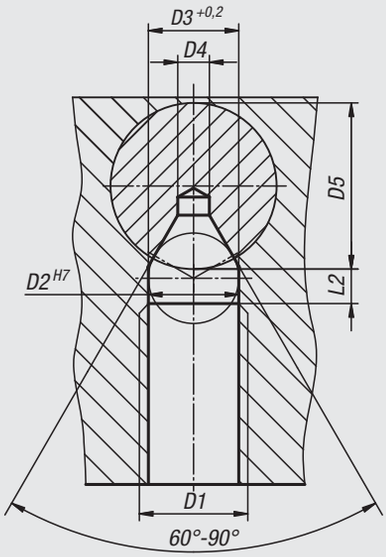
Note:
Locate, align and clamp round and flat parts, dies, castings, axles, shafts etc. with the rotating ball.

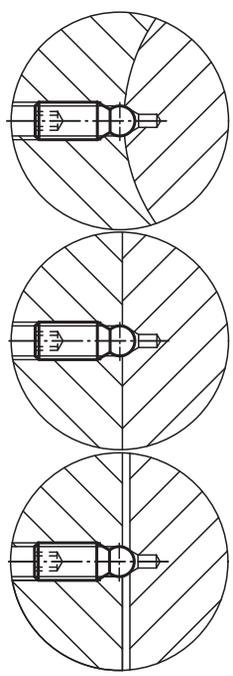


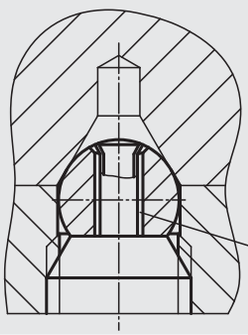
dimensions for flat parts



dimensions for round parts



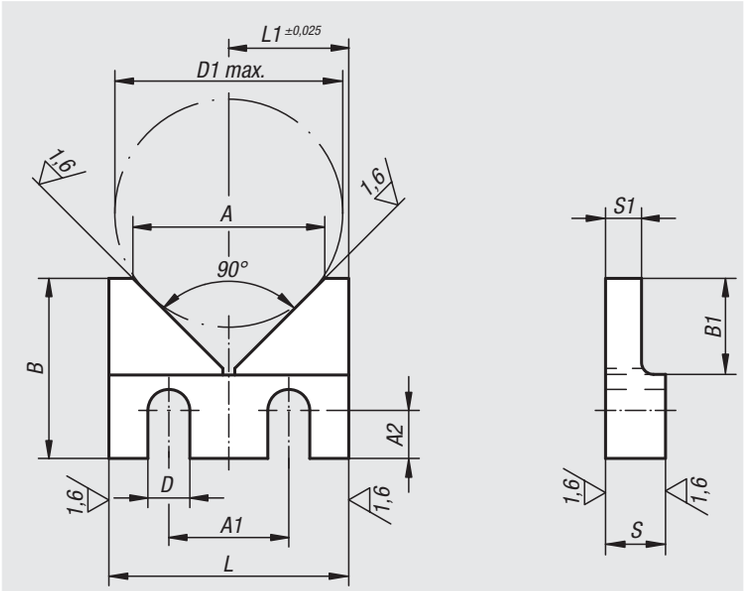




The full diameter of the ball must sit in the guide hole and the ball must sit tangential to the 60°-90° countersink in the workpiece, this governs the screw-in depth.
As the ball can rotate on the screw-end distortion cannot occur.

Order No.	D	D1	D2	D3	D4 max.	D5 min.	H	L	L1	L2	SW
03159-05010	4	M5	4	4	1,6	10	3,3	10	1,7	1,5	2,5
03159-08014	6	M8	6	6	2	14	5	14	2,5	2	4
03159-12020	10	M12	10	10	3,5	20	8	20	4	3	6

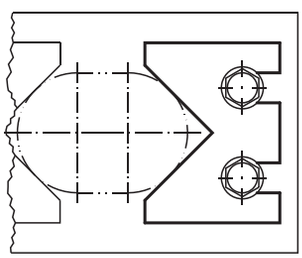
Centring V



Material:
Carbon steel 1.1181.

Version:
Black oxidised.

Sample order:
nlm 03160-02



Order No.	L	L1	B	B1	S	S1	D	D1 max.	A	A1	A2
03160-01	40	20	30	16	10	6	7	38	32	20	8
03160-02	50	25	40	20	12	8	9	46	40	25	12
03160-03	63	31,5	50	25	16	10	11	58	50	32	16

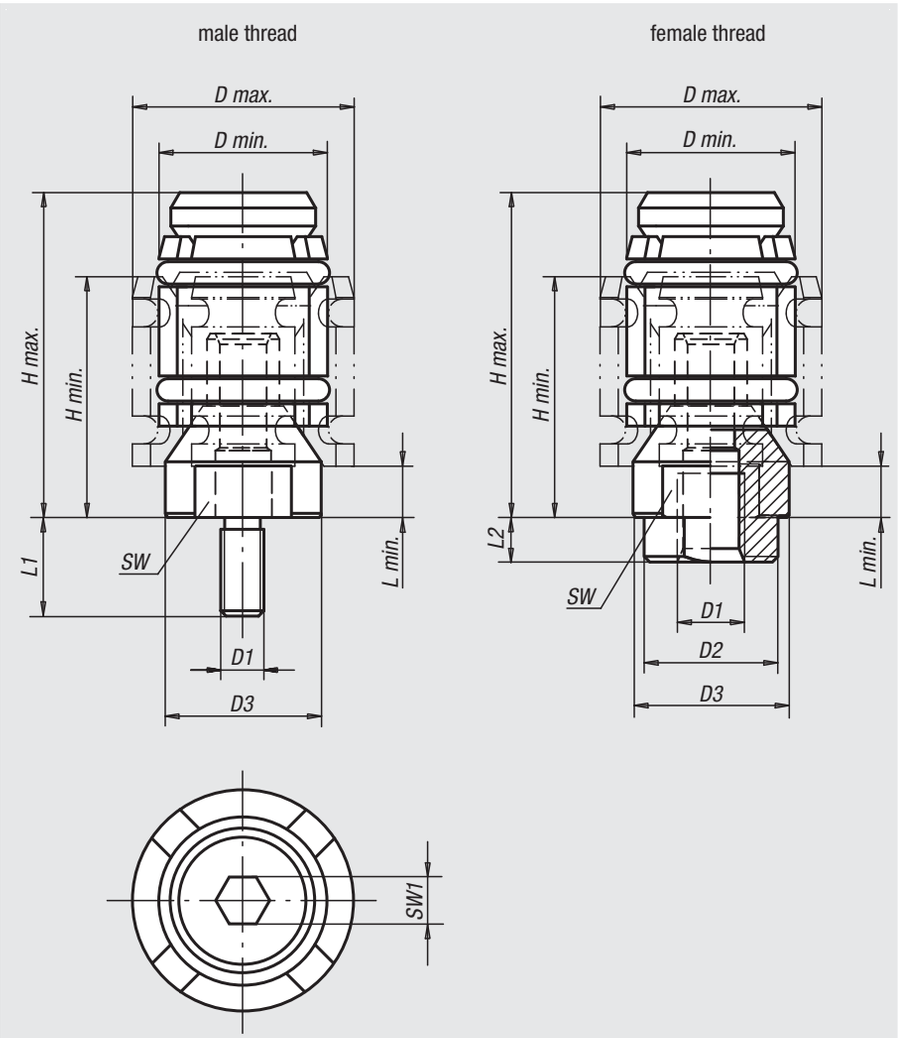
Centring clamps

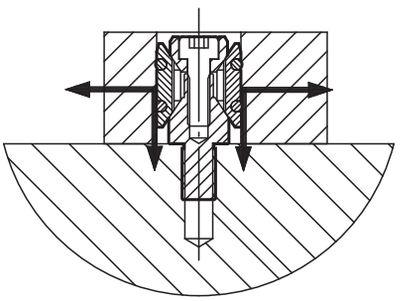
Material:
Body steel.
Bushes carbon steel.

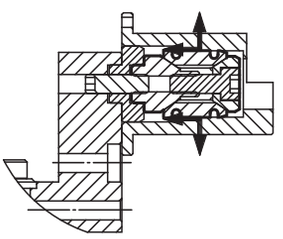
Version:
Black oxidised.

Sample order:
nlm 03165-0615

Note:
These centring clamps allow workpieces to be centred on and clamped in a bore. The clamps have a wide expansion range. The series covers a bore range of Ø12 to Ø30 mm. To increase the centring accuracy the clamps with internal thread have a centring spigot (D2) for a locating hole. These are also suitable for M6 grid systems (see application example).

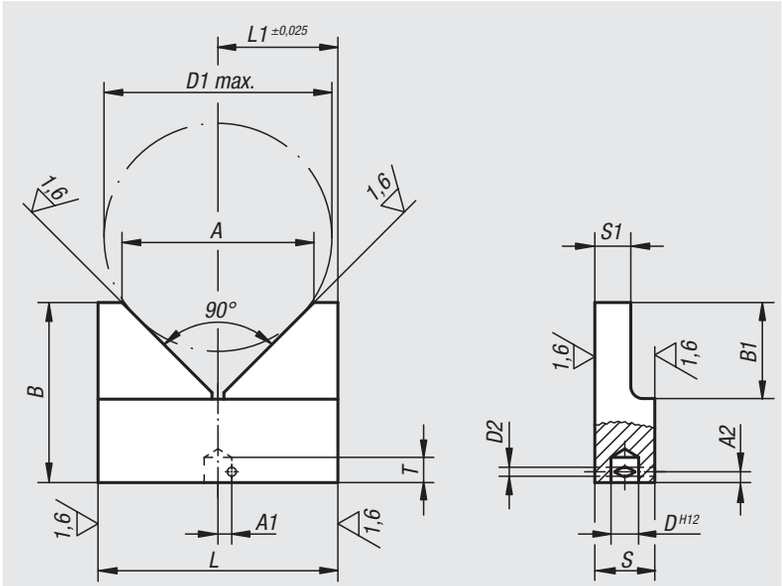






Order No.	Version	D1	L1	L2	D min.	D max.	D2	D3	H min.	H max.	L min.	SW	SW1
03165-0615	Internal thread	M6	-	4	12	15	12	11,4	22	27,5	4,8	9	2,5
03165-0619	Internal thread	M6	-	4	15	19	12	14	24,5	32	4,8	12	4
03165-0624	Internal thread	M6	-	4	19	24	12	17,8	26	35	4,5	15	5
03165-0630	Internal thread	M6	-	4	24	30	12	23	32	44,5	7	19	5
03165-061215	External thread	M6	12	-	12	15	-	11,4	22	27,5	4,8	9	2,5
03165-061219	External thread	M6	12	-	15	19	-	14	24,5	32	4,8	12	4
03165-081624	External thread	M8	16	-	19	24	-	17,8	26	35	4,5	15	5
03165-081630	External thread	M8	16	-	24	30	-	23	32	44,5	7	19	5

Centring V-plate

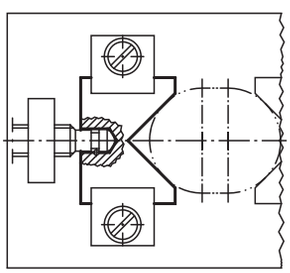


Material:
Carbon steel 1.1181.

Version:
Black oxidised.

Sample order:
nlm 03180-03

Note:
Thrust pad type screws such as 07120 or 06150 may be used for the spindle.



Order No.	L	L1	B	B1	S	S1	D	D1 max.	D2	A	A1	A2	T
03180-01	40	20	30	16	10	6	4,6	38	1,5	32	2,6	1,8	4,2
03180-02	50	25	40	20	12	8	6,1	46	1,5	40	3,7	2	5
03180-03	63	31,5	50	25	16	10	8,1	58	2	50	4,7	2,7	7

03182

Indexing plungers - Precision

with tapered pin

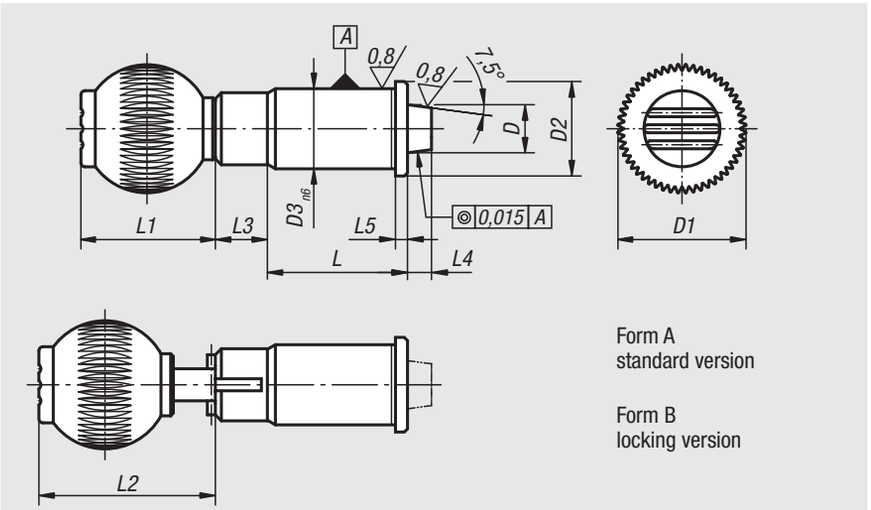
Material:
Steel.
Grip ball thermoplastic.

Version:
Hardened and ground.
Grip ball black grey.

Sample order:
nlm 03182-020

Note:
The indexing plungers with bushes are a perfect combination for rapid positioning and fixing. The precise design of both the indexing plunger and the bush guarantees high repeating accuracy when assembling two elements.

Technical information see assembly and installation instructions.



Order No. Form A	Order No. Form B	D	D1	D2	D3	L	L1	L2	L3	L4 min.	L5	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Internal thread grip ball
03182-010	**03182-110**	10	25	19	16	31	25	-/32,5	13	6	2,5	19	29	M6
03182-012	**03182-112**	12	32	23	20	35	33	-/40,5	13	6	3	22	35	M8
03182-016	**03182-116**	16	40	28	25	42	41,5	-/49	13	6	3	30	50	M10
03182-020	**03182-120**	20	40	33	30	50	41,5	-/49	13	6	3	46	63	M10
03182-025	**03182-125**	25	50	42	38	60	51	-/58,5	13	6	3	39	73	M10

03184

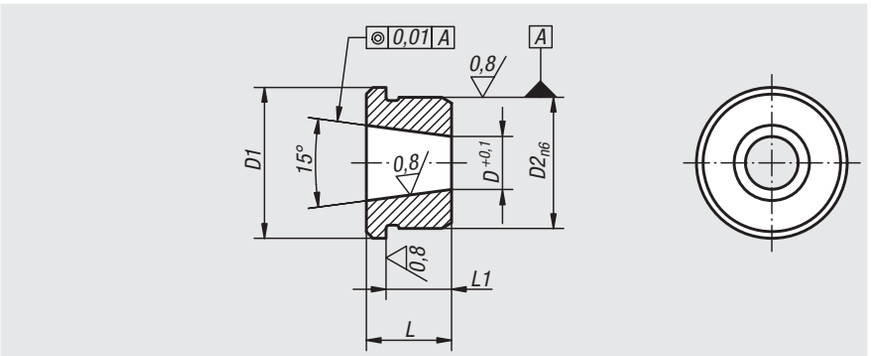
Bushes tapered

Material:
Steel.

Version:
Hardened and ground.

Sample order:
nlm 03184-20

Note:
Bushes for precision indexing plungers 03182.



Order No.	D	D1	D2	L	L1
03184-10	7,1	19	16	11	8,5
03184-12	8,28	23	20	13	10
03184-16	11,52	28	25	17	14
03184-20	15,49	33	30	16	13
03184-25	19,7	42	38	19	16

03186

Indexing plungers - Precision

with cylindrical pin

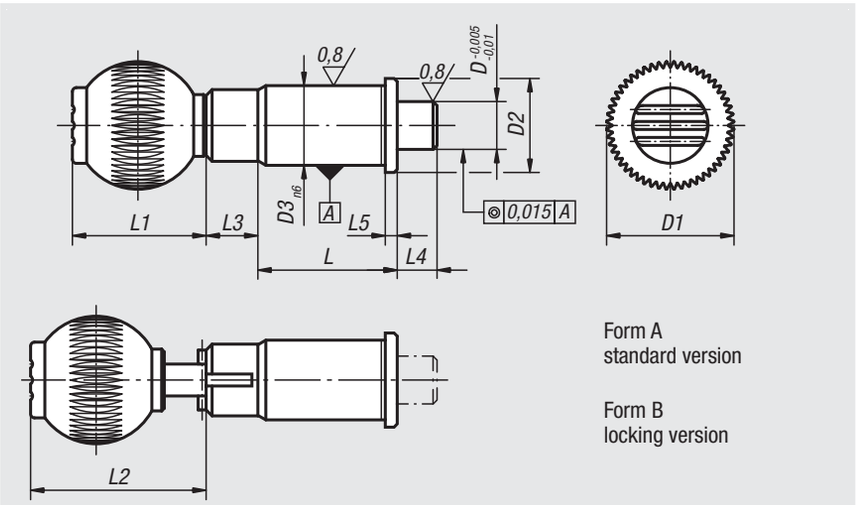
Material:
Steel.
Grip ball thermoplastic.

Version:
Hardened and ground.
Grip ball black grey.

Sample order:
nlm 03186-020

Note:
The indexing plungers with bushes are a perfect combination for rapid positioning and fixing. The precise design of both the indexing plungers and the bush guarantees high repeating accuracy when assembling two elements.

Technical Information see assembly and installation instructions.



Order No. Form A	Order No. Form B	D	D1	D2	D3	L	L1	L2	L3	L4 min.	L5	Spring force initial pressure F1 approx. N	Spring force final pressure F2 approx. N	Internal thread grip ball
03186-010	**03186-110**	10	25	19	16	31	25	-/36,5	13	10	2,5	15	30	M6
03186-012	**03186-112**	12	32	23	20	35	33	-/44,5	13	10	3	15	35	M8
03186-016	**03186-116**	16	40	28	25	42	41,5	-/53	13	10	3	20	50	M10
03186-020	**03186-120**	20	40	33	30	50	41,5	-/53	13	10	3	36	63	M10
03186-025	**03186-125**	25	50	42	38	60	51	-/62,5	13	10	3	20	73	M10

03188

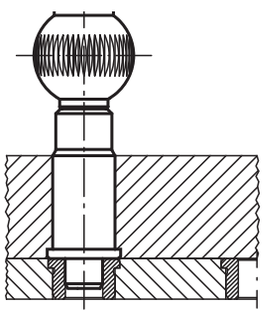
Bushes cylindrical

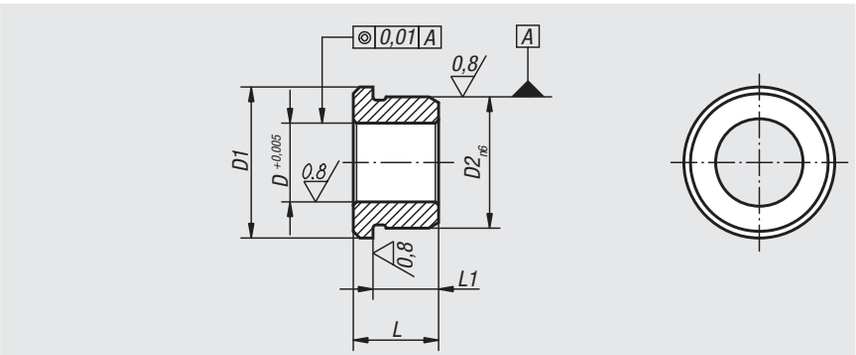
Material:
Steel.

Version:
Hardened and ground.

Sample order:
nlm 03188-20

Note:
Bushes for precision indexing plungers 03186.

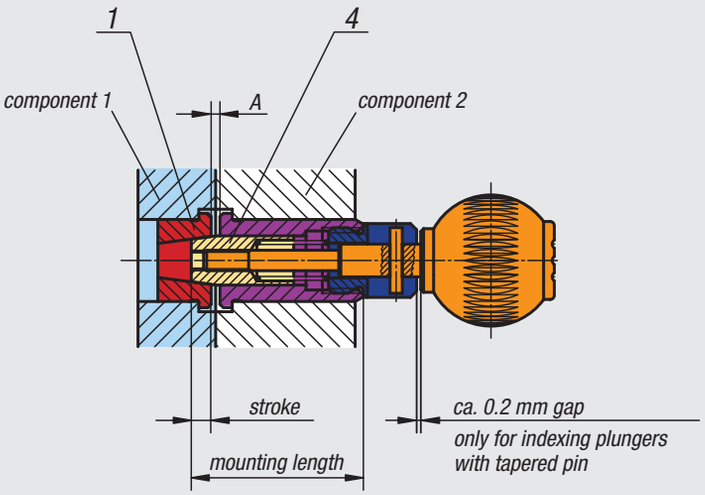




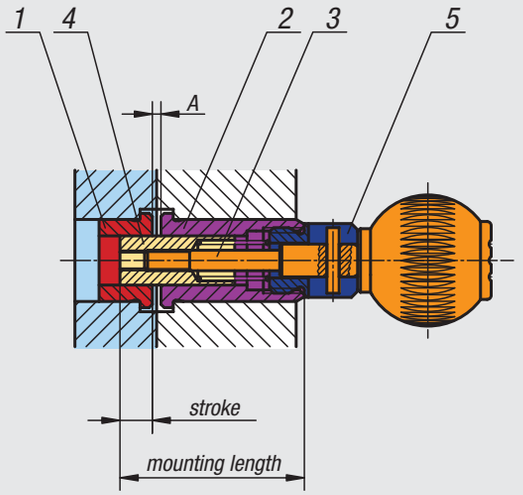
Order No.	D	D1	D2	L	L1
03188-10	10	19	16	11	8,5
03188-12	12	23	20	13	10
03188-16	16	28	25	17	14
03188-20	20	33	30	16	13
03188-25	25	42	38	19	16

Assembly and installation instructions for precision indexing plungers

Precision indexing plungers with tapered indexing pin



Precision indexing plungers with cylindrical indexing pin



Assembly instructions:

1. Fit tapered or cylindrical bush (No. 1) into component 1.
2. Mount sleeve (No. 2) into component 2.
3. Determine mounting length (actual dimension). Mounting length = A + stroke + length pos. 2. Models with tapered pin should have a 0.2 mm gap.
4. Glue screw (No. 3) and centering pin (No. 4) together grease-free with anaerobic adhesive. We recommend Loctite 638.
5. Screw centering pin with nut (No. 4) and handle into the mounted sleeve (No. 2). If necessary glue together grease-free with anaerobic adhesive.
6. Check whether the product is operational. Adhere to the index stroke length given in the catalogue.

Note:

The precision indexing plunger is only ready for operation after the stated adhesive hardening time. When gluing the components, ensure that no adhesive enters into contact with movable parts.

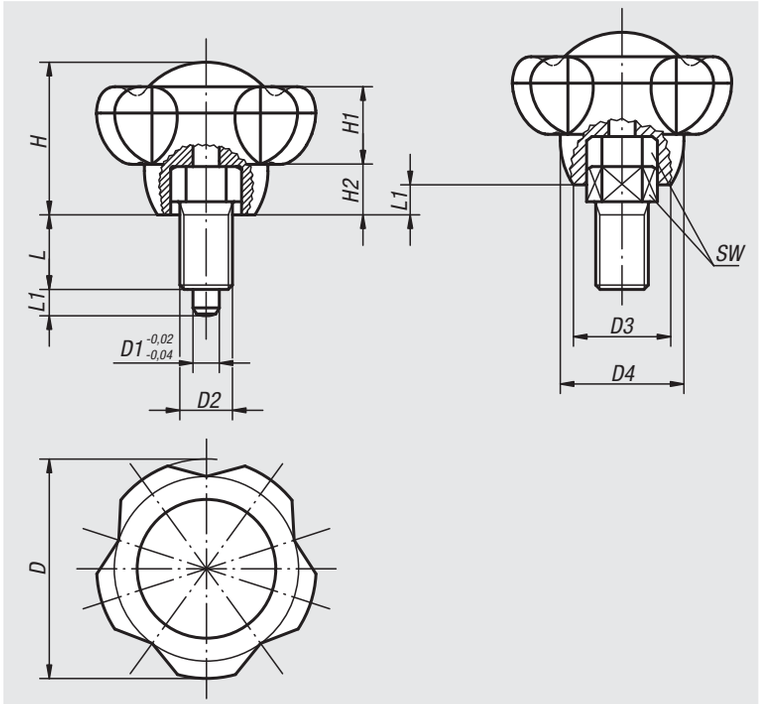
Indexing and clamp grips

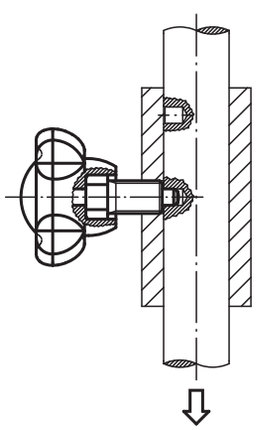
Material:
Thermoplastic.
Indexing pin and screw steel 5.8.

Version:
Grip black grey.
Indexing pin and screw black oxidised.
Indexing pin hardened and ground.

Sample order:
nlm 03190-11056 (cap colour traffic red)

Note:
Δ Add the desired cap colour here. No colour code is required with black grey grip caps.



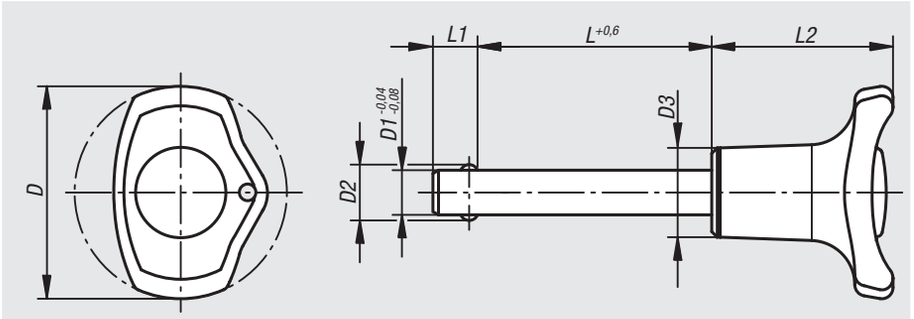


black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No.	Size	D	D1	D2	D3	D4	H	H1	H2	L	L1	SW
03190-1105Δ	1	50	5	M10x1	22,2	28,2	34,8	17,8	11,5	13	5	13
03190-1206Δ	2	50	6	M12x1,5	22,2	28,2	34,8	17,8	11,5	17	6	14
03190-1308Δ	3	63	8	M16x1,5	28	35,5	44	22,5	14,5	22	8	19
03190-1410Δ	4	63	10	M20x1,5	28	35,5	44	22,5	14,5	24	10	22

Ball lock pins

self-locking



Material:
Grip and push button thermoplastic.
Metal parts stainless steel.

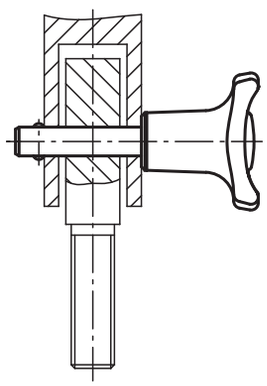
Version:
Grip black.
Push button traffic red.
Steel parts bright.

Sample order:
nlm 03193-3806050
(include length L e.g. 050 for L = 50 mm)

Note:
Ball lock pins are used for quick and easy fastening and joining of parts and workpieces.
The two balls are disengaged by pressing the push button and the pin can be slipped into holes in the workpieces. Release the button to lock the balls and secure the connection.

Shearing force double-shear (F) = S · τ aB max.

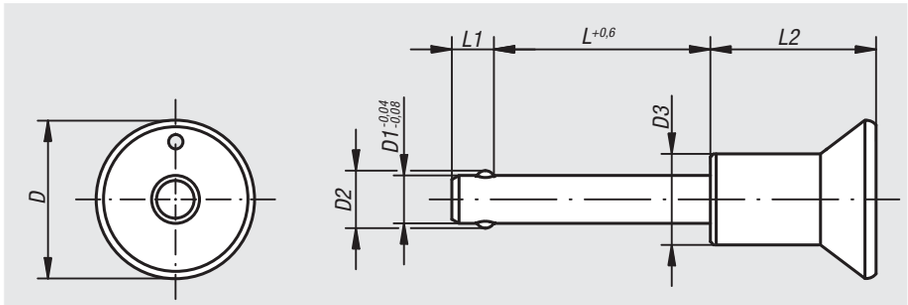
Accessories:
Safety spiral cable 03199-10200
Retaining cable with loop 03199-....
Key ring 03199-15/19/23



Order No.	D	D1	D2	D3	L	L1	L2	Receiving hole H11	Shearing force double shear max. kN
03193-3805* **	38	5	5,5	16	10/15/20/25/30	6	32,5	5	15
03193-3806* **	38	6	6,85	16	10/15/20/25/30/35/40/45/50	7	32,5	6	22
03193-3808* **	38	8	9,5	16	20/25/30/35/40/45/50	8	32,5	8	38
03193-4710* **	47	10	12	23	20/25/30/35/40/45/50/60	9	40	10	60
03193-4712* **	47	12	14,5	23	25/30/35/40/45/50/60/70/80	10	40	12	86
03193-4716* **	47	16	19	23	30/35/40/45/50/60/70/80	13	40	16	153

Ball lock pins

self-locking stainless steel



Material:
Metal parts stainless steel.

Version:
Bright.

Sample order:
nlm 03194-3110030
(include length L e.g. 030 for L = 30 mm)

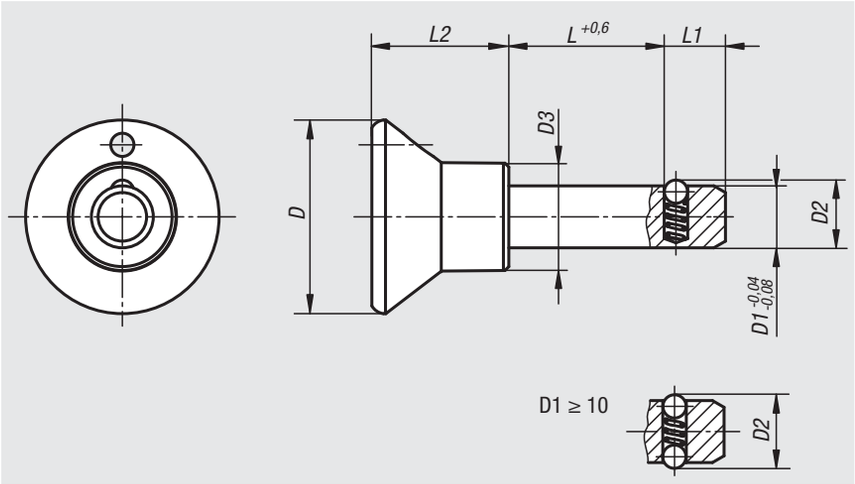
Note:
Ball lock pins are used for quick and easy fastening and joining of parts and workpieces.
The two balls are disengaged by pressing the push button and the pin can be slipped into holes in the workpieces. Release the button to lock the balls and secure the connection.
Corrosion resistant. Option for connecting retaining cable.
Application temperature max. +250 °C.

Shearing force double shear (F) = S · τ aB max.

Accessories:
Safety spiral cable: 03199-10200
Retaining cable with loop: 03199-...
Key Ring 03199-15/19/23

Order No.	D	D1	D2	D3	L	L1	L2	Receiving hole H11	Shearing force double shear max. kN
03194-2305* **	25	5	5,5	14	10/15/20/25/30	6	26,5	5	15
03194-2306* **	25	6	6,85	14	10/15/20/25/30/35/40/45/50	7	26,5	6	22
03194-2308* **	25	8	9,5	14	20/25/30/35/40/45/50	8	26,5	8	38
03194-3110* **	33	10	12	19	20/25/30/35/40/45/50/60	9	34,6	10	60
03194-3112* **	33	12	14,5	19	25/30/35/40/45/50/60/70/80	10	34,6	12	86
03194-3116* **	33	16	19	20	30/35/40/45/50/60/70/80	13,3	34,6	16	153

Locking pins



Material:
Grip thermoplastic.
Steel parts stainless steel.

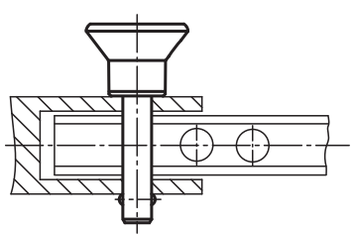
Version:
Grip black.
Steel parts bright.

Sample order:
nlm 03195-2508020
(include length L, e.g. 020 for L = 20 mm)

Note:
Locking pins are used for quick and easy fixating and joining of parts and workpieces.

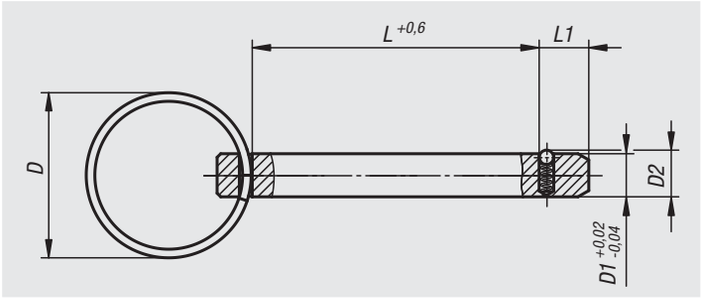
Shearing force double-shear (F) = S · τ aB max.

Accessories:
Safety spiral cable 03199-10200
Restraining cable with eye 03199-....
Key ring 03199-15/19/23



Order No.	D	D1	D2	D3	L	L1	L2	Receiving hole H11	Shearing force double shear max.kN
03195-2506* **	25	6	6,5	14	10/15/20/25/30/40/50	7	17,7	6	22
03195-2508* **	25	8	8,75	14	15/20/25/30/40/50	8	17,7	8	38
03195-3310* **	33	10	12	19	15/20/25/30/40/50	9	24	10	60
03195-3312* **	33	12	14,5	19	20/30/40/50	10	24	12	86

Locking pins with key ring



Material:
Steel pin.
Key ring stainless steel.

Version:
Pins galvanized.
Key ring bright.

Sample order:
nlm 03195-102306015

Note:
Locking pins are used for fast and easy fixing and joining of parts and workpieces.

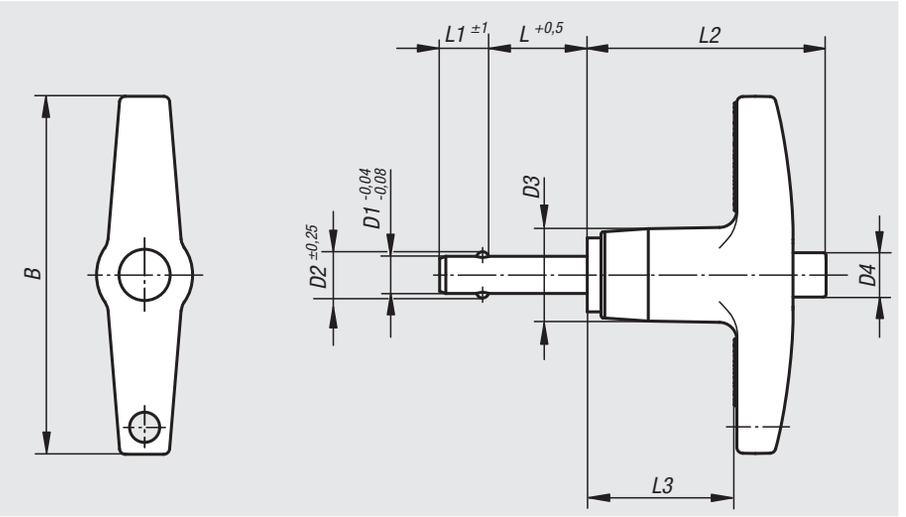
Shearing force double shear (F) = S · τ aB max.

The locking pins with key ring represent a cost-effective alternative to other locking pins.

Order No.	D	D1	D2	L	L1	Shearing force double shear max.kN
03195-102306015	23	6	6,5	15	7	22
03195-102306020	23	6	6,5	20	7	22
03195-102306030	23	6	6,5	30	7	22
03195-102306040	23	6	6,5	40	7	22
03195-102808030	28	8	8,8	30	8	38
03195-102808040	28	8	8,8	40	8	38
03195-102808050	28	8	8,8	50	8	38

Ball lock pins

with T-grip, self-locking



Material:
Pin stainless steel 1.4542.
Grip die-cast aluminium EN-AC 46000.
Push button aluminium EN-AW 2024 T4.
Balls stainless steel 1.4125.
Compression spring stainless steel.

Version:
All stainless steel parts passivated.
Pin hardened to min. 40 HRC.
Grip black anodised.
Push button blue anodised.
Balls hardened to 58 +4 HRC.

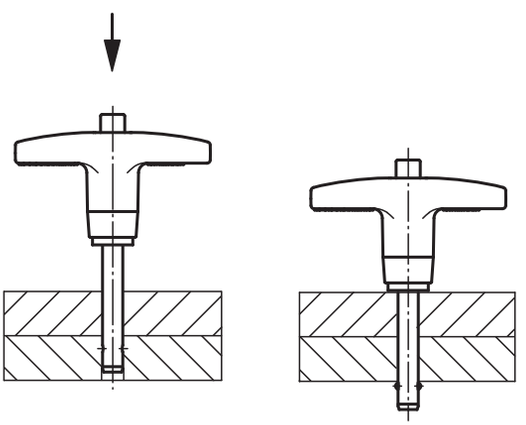
Sample order:
nlm 03196-24605030
(include length L e.g. 030 for L = 30 mm)

Note:
Ball lock pins are used for quick and easy fastening and joining of parts and workpieces. The two balls are disengaged by pressing the push button and the pin can be slipped into holes in the workpieces. Release the button to lock the balls and secure the connection. The ball lock pins can be provided with a retaining cable if required.

The hardened, high-tensile stainless steel pin permits extreme loads with low wear.

Shearing force double shear (F) = S · τ aB max.

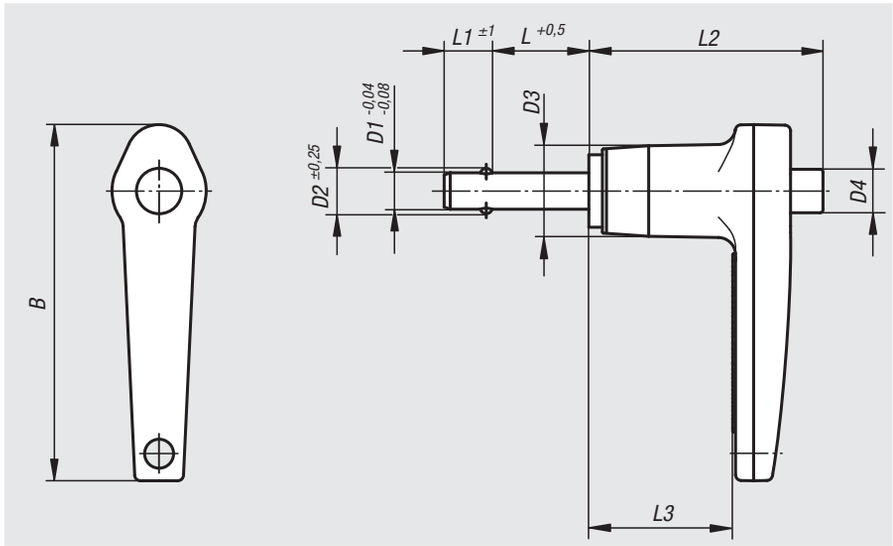
Accessories:
Safety spiral cable 03199-10200
Retaining cable with loop 03199-....
Key ring 03199-15/19/23/28



Order No.	B	D1	D2	D3	D4	L	L1	L2	L3	Receiving hole H11	Shearing force double shear max.kN
03196-24605* **	46	5	5,54	11,9	5,8	10/15/20/25/30/35/40/50/60/70	6	30,7	19,3	5	24,40
03196-24606* **	46	6	6,99	11,9	5,8	10/15/20/25/30/35/40/50/60/70/80	7	30,7	19,3	6	35,64
03196-24608* **	46	8	9,42	11,9	5,8	10/15/20/25/30/35/40/50/60/70/80	8	30,7	19,3	8	63,80
03196-25110* **	50,8	10	11,86	14,2	7,4	15/20/25/30/35/40/50/60/70/80/90/100	9	34,8	22,1	10	100,10
03196-25812* **	57,2	12	14,45	18,3	10,7	20/25/30/35/40/50/60/70/80/90/100	10	40,6	25,4	12	144,06
03196-27816* **	78	16	19	23,9	13,7	25/30/35/40/50/60/70/80/90/100	14	45	28,2	16	257,18

Ball lock pins

with L-grip, self-locking



Material:
Pin stainless steel 1.4542.
Grip die-cast aluminium EN-AC 46000.
Push button aluminium EN-AW 2024 T4.
Balls stainless steel 1.4125.
Compression spring stainless steel.

Version:
All stainless steel parts passivated.
Pin hardened to min. 40 HRC.
Grip black anodized.
Push button blue anodized.
Balls hardened to 58 +4 HRC.

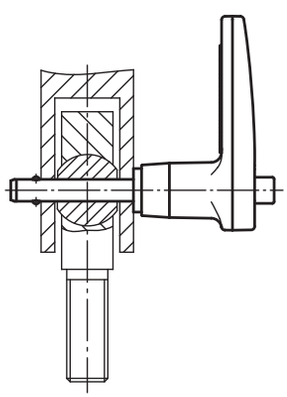
Sample order:
nlm 03196-14405030
(include length L e.g. 030 for L = 30 mm)

Note:
Ball lock pins are used for quick and easy fastening and joining of parts and workpieces. The two balls are disengaged by pressing the push button and the pin can be slipped into holes in the workpieces. Release the button to lock the balls and secure the connection. The ball lock pins can be provided with a retaining cable if required.

The hardened, high-tensile stainless steel pin permits extreme loads with low wear.

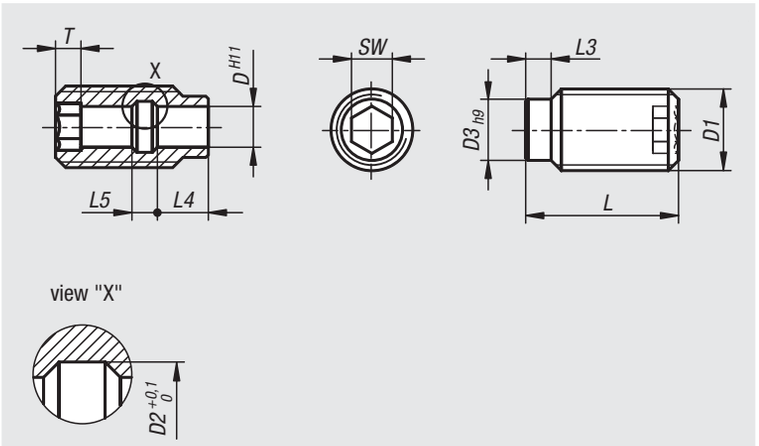
Shearing force double shear (F) = S · τ aB max.

Accessories:
Safety spiral cable 03199-10200
Retaining cable with loop 03199-....
Key ring 03199-15/19/23



Order No.	B	D1	D2	D3	D4	L	L1	L2	L3	Receiving hole H11	Shearing force double shear max.kN
03196-14405* **	46,7	5	5,54	11,9	5,8	10/15/20/25/30/35/40/50/60/70	6	30,7	19,3	5	24,40
03196-14406* **	46,7	6	6,99	11,9	5,8	10/15/20/25/30/35/40/50/60/70/80	7	30,7	19,3	6	35,64
03196-14408* **	46,7	8	9,42	11,9	5,8	10/15/20/25/30/35/40/50/60/70/80	8	30,7	19,3	8	63,80
03196-15110* **	54,1	10	11,86	14,2	7,4	15/20/25/30/35/40/50/60/70/80/90/100	9	34,8	22,1	10	100,10
03196-15712* **	60,2	12	14,45	18,3	10,7	20/25/30/35/40/50/60/70/80/90/100	10	40,6	25,4	12	144,06
03196-16816* **	68,3	16	19	23,9	13,7	25/30/35/40/50/60/70/80/90/100	14	45	28,2	16	257,18

Bushing for ball lock pins



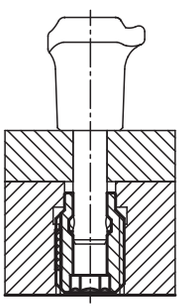
Material:
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 03197-11224

Note:
Bushing for ball lock pins are ideal for the easy and quick positioning of ball lock pins and socket pins.

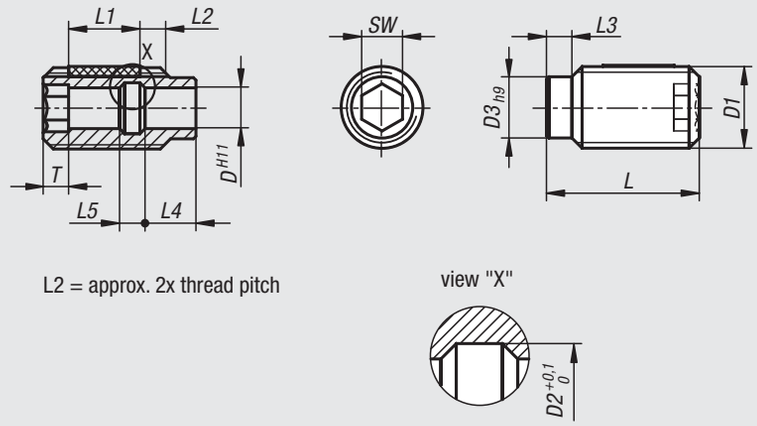
Advantages:
- The bushing is centred by the centring collar.
- easy and reliable screwing in.
- can be screwed into various materials.
- usable both sides



Order No.	D	D1	D2	D3	L	L3	L4	L5	SW	T
03197-10512	5	M12	6	9	25	4	7	3	5	4
03197-10616	6	M16	7,5	12	30	5	10	5	6	5
03197-10816	8	M16	10	12	30	5	10	5	8	5
03197-11024	10	M24	13	18	35	6	8	7	10	6
03197-11224	12	M24	15	18	35	6	8	7	12	6
03197-11630	16	M30	20	24	40	8	11	9	16	7

Bushing for ball lock pins

with LONG-LOK thread lock



Material:
Stainless steel 1.4305

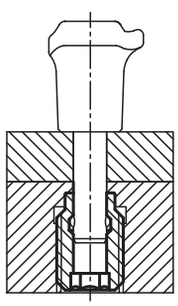
LONG-LOK thread lock nylon.

Version:
Bright.

Sample order:
nlm 03197-112241

Note:
Bushing for ball lock pins are ideal for the easy and quick positioning of ball lock pins and socket pins.

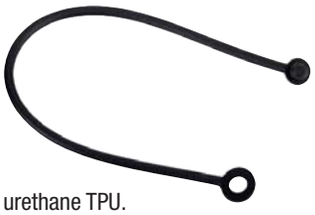
Advantages:
- the bushing is centred by the centring collar.
- easy and reliable screwing in.
- can be screwed into various materials.
- usable both sides
- the LONG-LOK thread lock allows the depth to be exactly matched to existing components, no locknut is required.



Order No.	D	D1	D2	D3	L	L1	L3	L4	L5	SW	T
03197-105121	5	M12	6	9	25	10	4	7	3	5	4
03197-106161	6	M16	7,5	12	30	14	5	10	5	6	5
03197-108161	8	M16	10	12	30	14	5	10	5	8	5
03197-110241	10	M24	13	18	35	14	6	8	7	10	6
03197-112241	12	M24	15	18	35	14	6	8	7	12	6
03197-116301	16	M30	20	24	40	14	8	11	9	16	7

03198

Safety band



Material:
Thermoplastic urethane TPU.

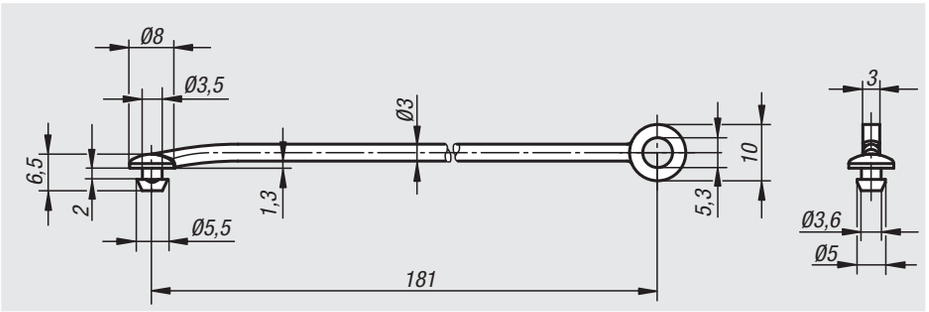
Sample order:
nlm 03198-04190

Note:
The safety band is distinguished by its high elongation and good rebound resilience.
Depending on the wall thickness, it can be attached to almost every operating part, fastening element or other objects and so make them unlosable.

It was especially conceived for the star grips 06212, 06220 as an unlosable operating part.

Refitting of existing star grips 06212, 06220 as well as knurled knobs 06266/06267 and knurled knobs 06092 from our assortment is possible with this safety band.

Assembly:
Recommended hole Ø 3.8-0.1.
The hole edge should be deburred.
A Teflon based lubrication is recommended to aid assembly.



Order No.	Dimensions
03198-04190	see drawing

03199

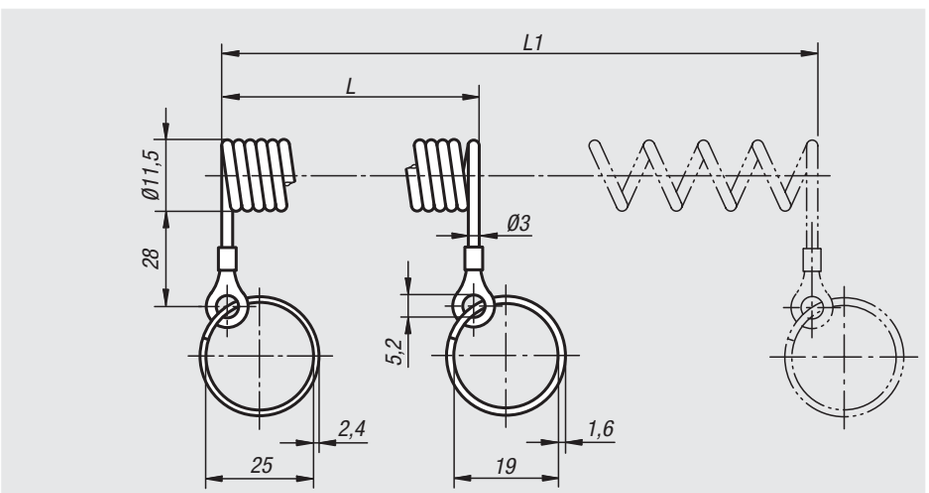
Safety spiral cable

Material:
Spiral cable PUR.
Eye galvanized copper.
Key ring steel.

Version:
Spiral cable, black.
Eye, galvanized.
Key ring, chromium-plated.

Sample order:
nlm 03199-10200

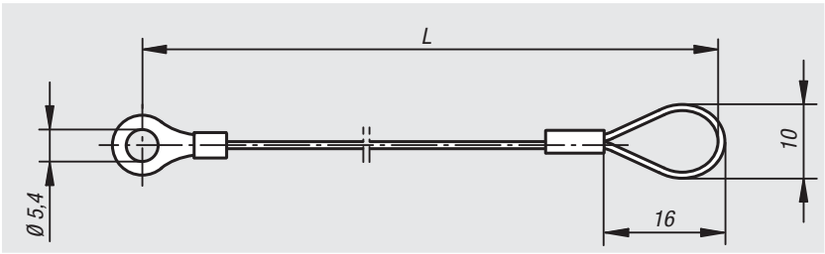
Note:
Elastic spiral cable to secure equipment parts.
Very good reset force, robust and wear-resistant.



Order No.	L	L1
03199-10100	100	500
03199-10200	200	1000

Retaining cables

with loop

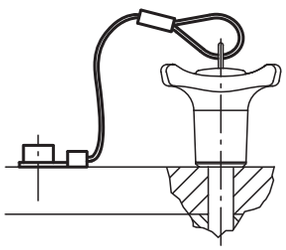


Material:
Cable stainless steel.
Clamp and crimp terminal aluminium.

Version:
Cable plastic coated.

Sample order:
nlm 03199-0200

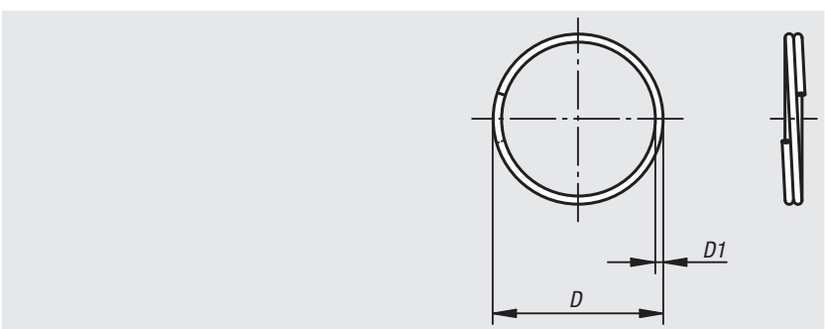
Note:
With the retaining cable and pin ring (03199) the ball lock pins (03193, 03194 and 03196) can be secured so that they cannot be lost. An M5 screw is used to secure the retaining cable.
Application temperature: +80 °C.



Order No.	L
03199-0150	150
03199-0200	200
03199-0300	300

03199

Key rings



Material:
Stainless steel 1.4310.

Version:
Bright.

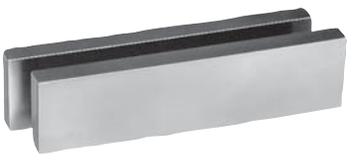
Sample order:
nlm 03199-23

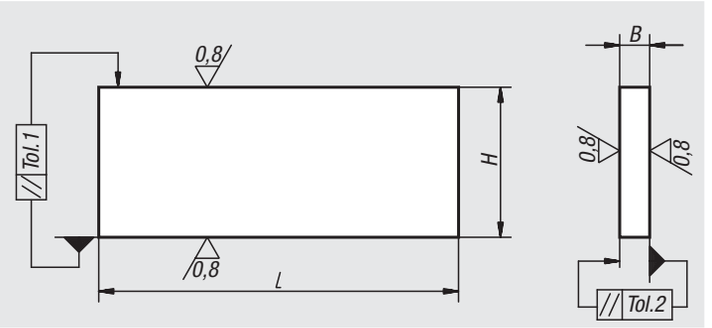
Note:
Suitable for restraining cable with eye 03199, ball locking bolts 03193, 03194, 03196, locking pins 03195 and locking bolts 03092, 03096, 03098.

Order No.	D	D1
03199-15	15	1
03199-19	19	1
03199-23	23	1,2
03199-28	28	1,7

Parallel blocks pair

DIN 6346



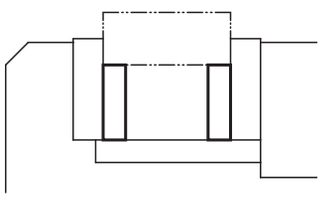


Material:
Steel.

Version:
Hardened and ground, precision grade 1, paired tolerance IT 5, nominal dimensional tolerance DIN ISO 2768-mK

Sample order:
nlm 03200-10

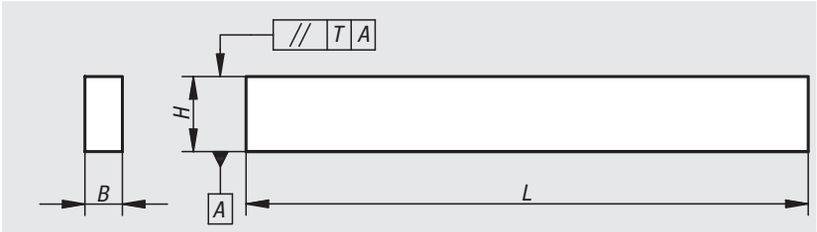
On request:
Several matched pairs.



Order No.	H	Tolerance 1	Tolerance DIN ISO 2768-mK	Tolerance per pair IT 5	B	Tolerance 2	Tolerance DIN ISO 2768-mk (2)	Tolerance per pair IT 5 (2)	L
03200-01	8	0,006	±0,2	±0,006	2,5	0,004	±0,1	±0,005	63
03200-02	10	0,006	±0,2	±0,006	3,2	0,005	±0,1	±0,005	63
03200-03	12	0,008	±0,2	±0,008	4	0,005	±0,1	±0,005	63
03200-04	16	0,008	±0,2	±0,008	5	0,005	±0,1	±0,005	63
03200-05	20	0,009	±0,2	±0,009	6,3	0,006	±0,2	±0,006	63
03200-06	12	0,008	±0,2	±0,008	4	0,005	±0,1	±0,005	100
03200-07	16	0,008	±0,2	±0,008	5	0,005	±0,1	±0,005	100
03200-08	20	0,009	±0,2	±0,009	6,3	0,006	±0,2	±0,006	100
03200-09	25	0,009	±0,2	±0,009	8	0,006	±0,2	±0,006	100
03200-10	32	0,011	±0,3	±0,011	10	0,006	±0,2	±0,006	100
03200-11	40	0,011	±0,3	±0,011	12	0,008	±0,2	±0,008	100
03200-12	25	0,009	±0,2	±0,009	8	0,006	±0,2	±0,006	160
03200-13	32	0,011	±0,3	±0,011	10	0,006	±0,2	±0,006	160
03200-14	40	0,011	±0,3	±0,011	12	0,008	±0,2	±0,008	160
03200-15	50	0,011	±0,3	±0,011	16	0,008	±0,2	±0,008	160
03200-16	63	0,013	±0,3	±0,013	20	0,009	±0,2	±0,009	160
03200-17	63	0,013	±0,3	±0,013	20	0,009	±0,2	±0,009	250
03200-18	80	0,013	±0,3	±0,013	25	0,009	±0,2	±0,009	250
03200-19	100	0,015	±0,3	±0,015	32	0,011	±0,3	±0,011	250

03212

Parallel block sets



Material:
Steel.

Version:
Case-hardened and ground.
Paired height tolerance 0.004 mm, nominal dimension height tolerance of ±0.004 mm.
B and L nominal dimension tolerances acc. to DIN ISO 2768-m.

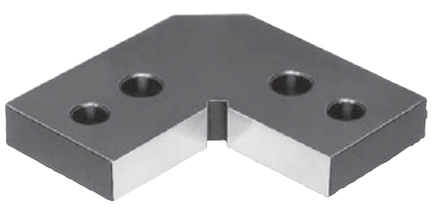
Sample order:
nlm 03212-01

Note:
The parallel block set is supplied in a wooden box with removable lid.

Order No.	Contents 1 pair of each H x B x L	H paired tolerance T	H nom. dim. tolerance
03212-01	14 x 10 x 150 16 x 10 x 150 18 x 10 x 150 20 x 10 x 150 22 x 10 x 150 24 x 10 x 150 26 x 10 x 150 28 x 10 x 150 30 x 10 x 150 32 x 10 x 150 35 x 10 x 150 40 x 10 x 150 45 x 10 x 150 50 x 10 x 150	0,004	±0,004

03220

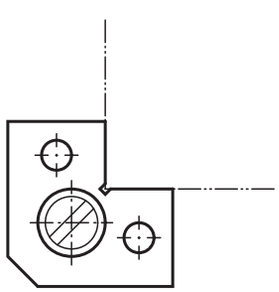
Positioning brackets



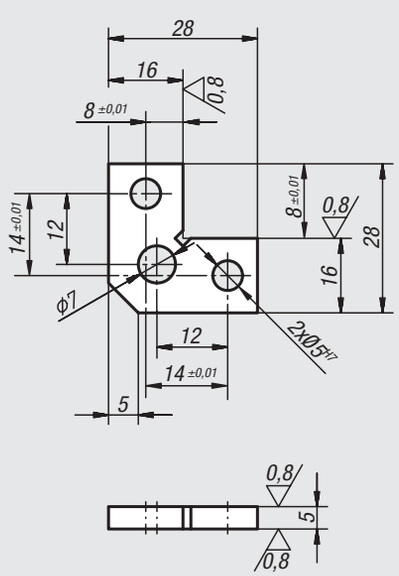
Material:
Carbon steel 1.7225

Version:
Tempered to 1400 N/mm², ground.

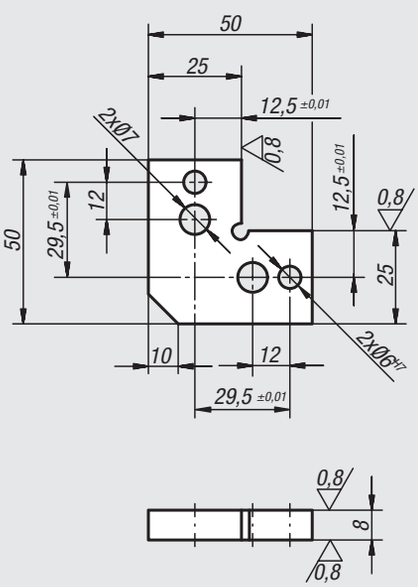
Sample order:
nlm 03220-02



03220-01



03220-02



Order No.	Dimensions
03220-01	see drawing
03220-02	see drawing

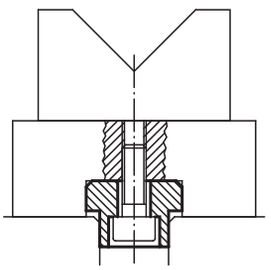
03240

T-slot keys

Material:
Carbon steel 1.1191

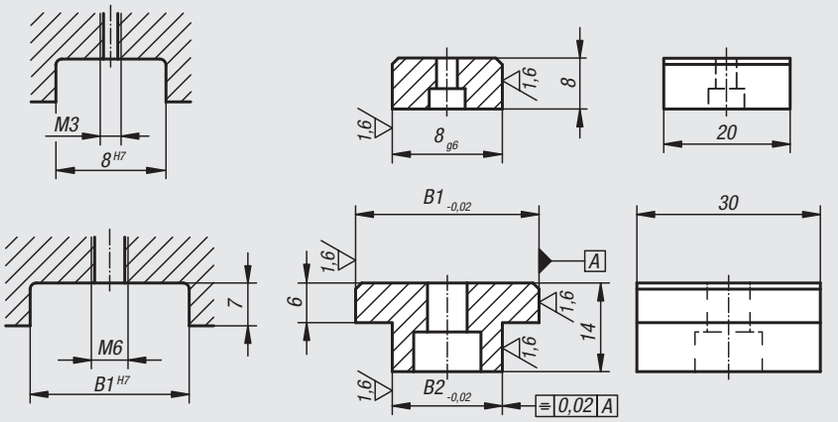
Version:
Black oxidised.

Sample order:
nlm 03240-08X8 (include dimension B1)



slot dimensions:

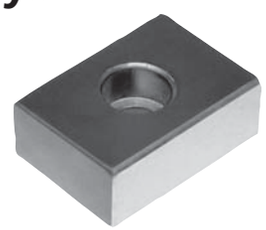
03240-08x8



Order No.	B1	B2
03240-08X	8	8
03240-12X	20/22/30	12
03240-14X	20/22/30	14
03240-16X	20/22/30	16
03240-18X	20/22/30	18
03240-22X	20/22/30	22

03250

Slot keys

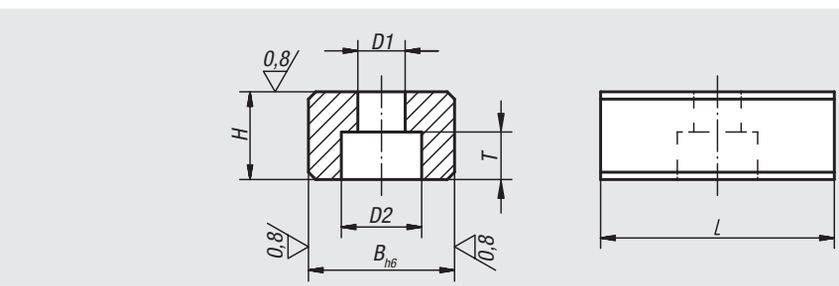


Material:
Steel.

Version:
Case-hardened, black oxidised and ground.

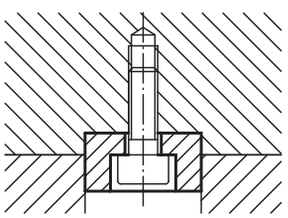
Sample order:
nlm 03250-16

Note:
Slot keys are used to align fixtures and clamps on machine tables with DIN 650 T-slots. They are screwed into the fixture alignment slots. Slot keys are only used when the fixture and machine table have the same slot width.



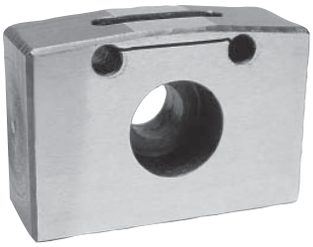
Order No.	B	H	L	D1	D2	T	for screws DIN 84 or 912
03250-10	10	8	20	4,5	8	4,3	M4x10
03250-12	12	8	20	5,5	10	5,3	M5x12
03250-14	14	10	22	6,6	11	6,3	M6x16
03250-16	16	10	22	6,6	11	6,3	M6x16
03250-18	18	10	22	6,6	11	6,3	M6x16
03250-20	20	10	22	6,6	11	6,3	M6x16
03250-22	22	12	32	6,6	11	6,3	M6x16

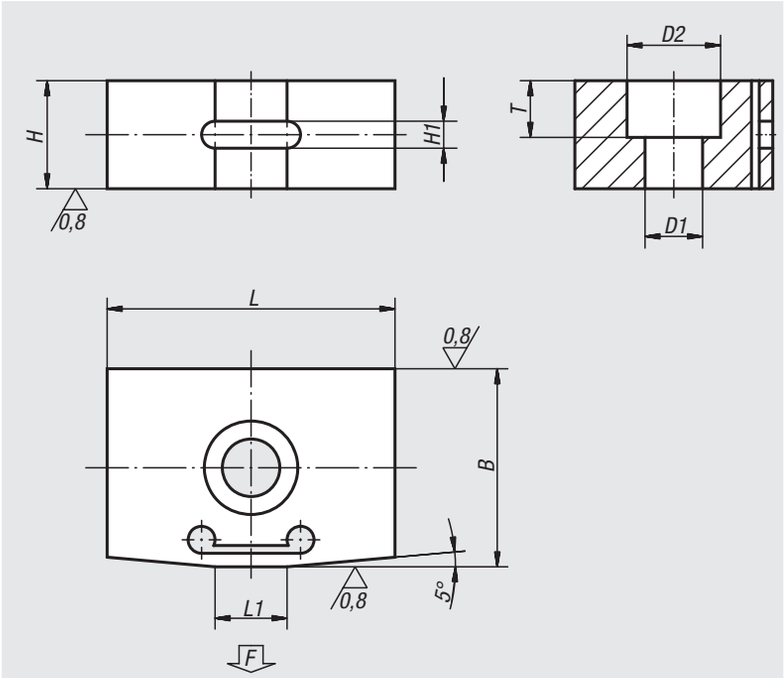
application example:



Elastic slot keys

Pat. No. 4200676





Material:
Steel.

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 03252-12

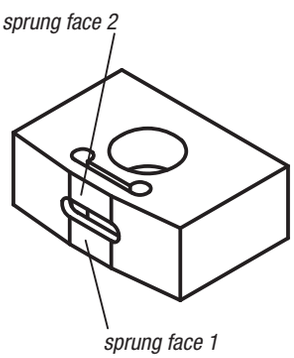
Note:
Elastic slot keys are used to align fixtures and clamps play-free on machine tables with DIN 650 T-slots.

Advantages:
- Play-free seating through elastic deformation.
- The two-part sprung face allows the tolerance play of the guide slots in the machine table and fixture/clamp to be independently equalised.
- Repeat accuracies within 0.005 mm are possible.

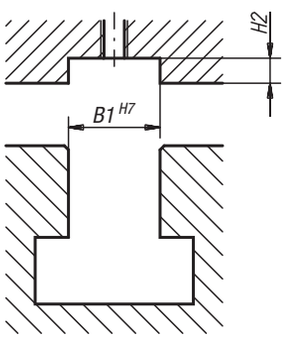
Independent equalisation of two different slot dimensions

Sprung face 1:
Adjusts to the slot on the tool (fixture/clamp).

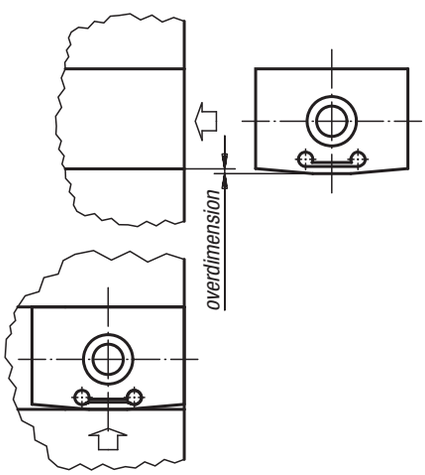
Sprung face 2:
Adjusts to the slot on the machine table.



installation dimensions:



elastic deformation produces a perfect seating



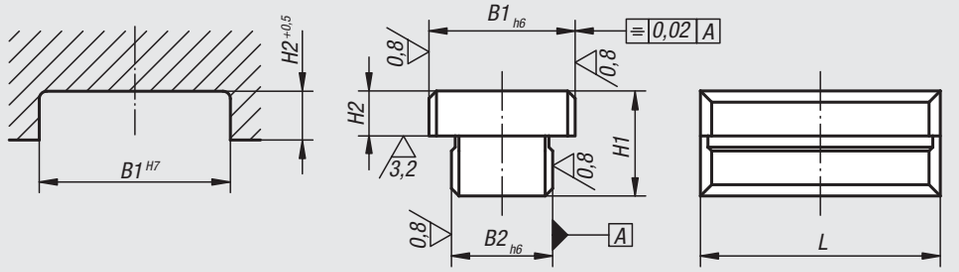
Order No.	B	B1	H	H1	H2	L	L1	D1	D2	T	Approx. spring force at 0,02 spring tension	Approx. spring force at 0,03 spring tension
03252-10	10 +0,035 +0,020	10	8	2	4	20	6	4,3	7,4	4,3	100	200
03252-12	12 +0,038 +0,023	12	8	2	4	20	6	5,3	9,4	5,3	100	200
03252-14	14 +0,038 +0,023	14	10	3	5	22	8	6,4	10,4	6,3	100	200
03252-16	16 +0,038 +0,023	16	10	3	5	22	8	6,4	10,4	6,3	100	200
03252-18	18 +0,038 +0,023	18	10	3	5	22	8	6,4	10,4	6,3	100	200
03252-20	20 +0,040 +0,025	20	10	3	5	22	8	6,4	10,4	6,3	100	200
03252-22	22 +0,040 +0,025	22	12	3	6	32	11	6,4	10,4	6,3	100	200

03260

Slot keys loose

DIN 6323

slot dimensions:



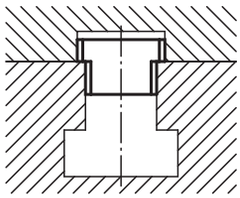
Material:
Hardened steel 1.0401

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 03260-14

Note:
Loose slot keys 03260 acc. to DIN 6323 combine the advantages of fixed slot keys with the improved handling of machine vices, dividing heads and fixtures. These keys can slide sideways after rough alignment.
No protruding key on the base to damage the machine table when moving the fixture.

application example:

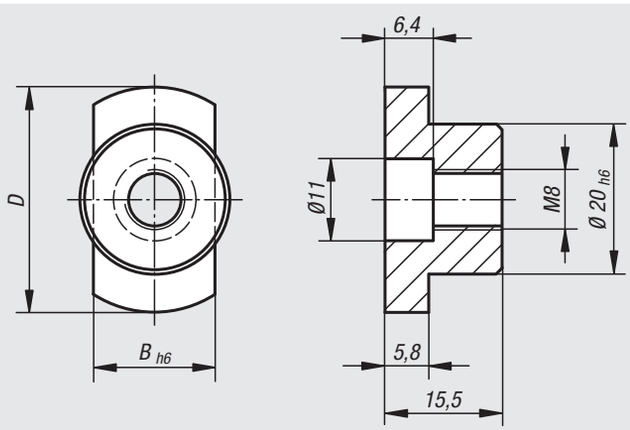


Order No.	B1	B2	H1	H2	L
03260-10	12	10	12	3,6	20
03260-12	20	12	14	5,5	32
03260-14	20	14	14	5,5	32
03260-16	20	16	14	5,5	32
03260-18	20	18	14	5,5	32

03270

Slot keys

with locating pin

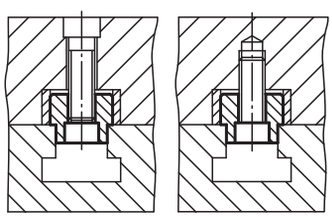


Material:
Steel.

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 03270-10

Note:
To align fixtures and clamping elements on subplates and palettes with location holes.
They can be mounted in holes or slots.

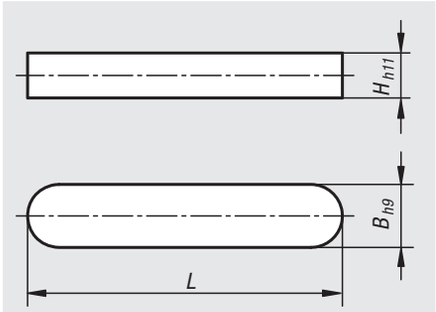


Order No.	B	D
03270-10	10	30
03270-12	12	30
03270-14	14	30
03270-16	16	30
03270-18	18	30
03270-20	20	36
03270-22	22	40

03288

Parallel keys

DIN 6885 A



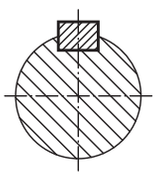
Material:
Steel 1.1192.

Version:
Bright.

Sample order:
nlm 03288-04X12 (include length L)

On request:
Parallel keys stainless steel 1.4571.

Application example:

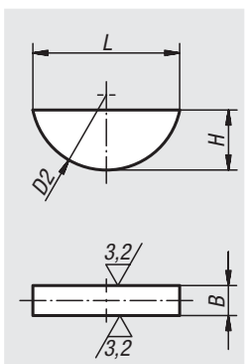


Order No.	B	H	L = length
03288-03X	3	3	8/10/12/14/16/18/20/22/25/28
03288-04X	4	4	8/10/12/14/16/18/20/22/25/28
03288-05X	5	5	12/14/16/18/20/22/25/28/32/36/40
03288-06X	6	6	12/14/16/18/20/22/25/28/32/36/40/45
03288-08X	8	7	14/16/18/20/22/25/28/32/36/40/45/50/70
03288-10X	10	8	22/25/28/32/36/40/45/50/56/70/80
03288-12X	12	8	25/28/32/36/40/45/50/56/70/80
03288-14X	14	9	25/28/32/36/40/45/50/56/70/80
03288-16X	16	10	50/56/63/70/80/90/100

03289

Woodruff keys

DIN 6888



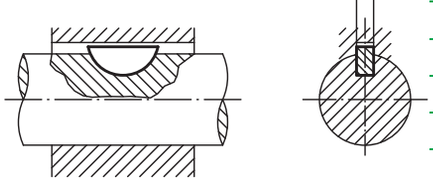
Material:
Steel 1.1192

Version:
Bright.

Sample order:
nlm 03289-04X65 (Include dimension H, e.g. 65 for H = 6.5 mm)

On request:
Woodruff keys stainless steel 1.4571.

Application example:



Order No.	B	H	L	D2
03289-02X5	2	5	12,6	13
03289-03X5	3	5	12,6	13
03289-03X65	3	6,5	15,7	16
03289-04X5	4	5	12,6	13
03289-04X65	4	6,5	15,7	16
03289-04X75	4	7,5	18,6	19
03289-05X65	5	6,5	15,7	16
03289-05X75	5	7,5	18,6	19
03289-05X9	5	9	21,6	22
03289-06X9	6	9	21,6	22
03289-06X10	6	10	24,5	25
03289-06X11	6	11	27,3	28
03289-08X11	8	11	27,3	28
03289-08X13	8	13	31,4	32
03289-10X13	10	13	31,4	32
03289-10X16	10	16	43,1	45

Carrier keys

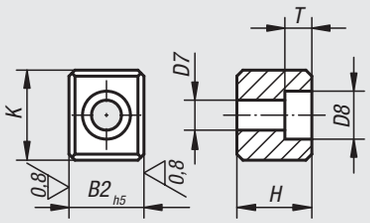
DIN 2079

Material:
Steel.

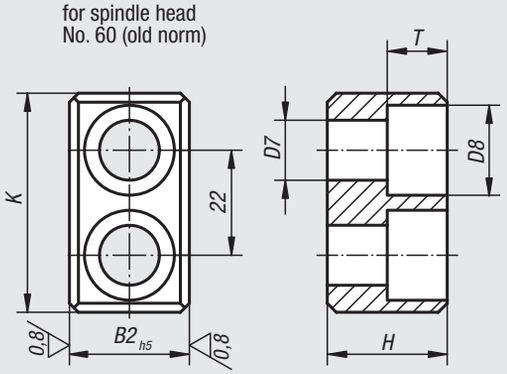
Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 03290-04

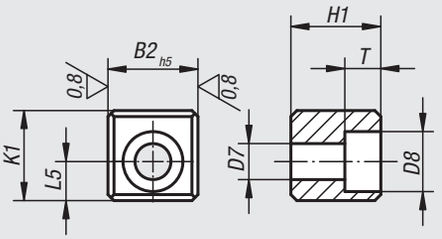
Form A
for spindle head
No. 30 to 60

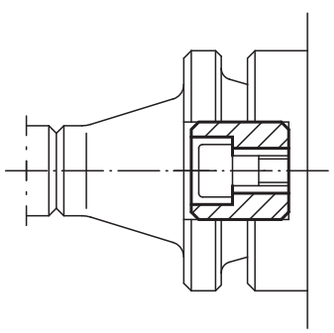


Form B
for spindle head
No. 60 (old norm)



Form C
for spindle head
No. 30 to 50





Order No. Form A	Order No. Form B	Order No. Form C	for spindle head No.	K	K1	B2	D7	D8	H	H1	T	L5
03290-01	-	**03290-013**	30	16,5	13,5	15,9	6,4	10,4	16	24,5	6,2	5,5
03290-02	-	**03290-023**	40	19,5	16,5	15,9	6,4	10,4	16	24,5	6,2	7
03290-03	-	**03290-033**	45	19,5	17,5	19	8,4	13,5	19	26	8,3	7,5
03290-04	-	**03290-043**	50-55	26,5	24	25,4	13	19	25	29	12,3	11
03290-05	**03290-06**	-	60	45,5	-	25,4	13	19	25	-	12,3	-

03320

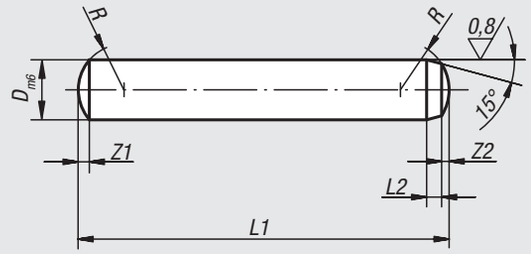
Cylindrical pins

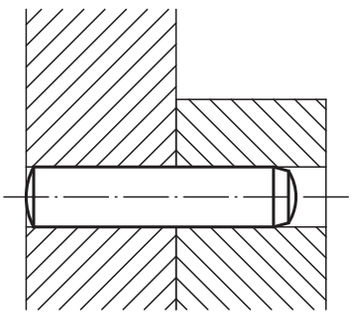
DIN 6325

Material:
Tool steel 1.2067

Version:
Hardened; hardness 550 – 650 HV 30, ground

Sample order:
nlm 03320-06X28 (include length L1)





Order No.	D	L1 = length	L2	R	Z1	Z2
03320-02X	2	6/8/10/12/14/16/18/20	0,6	2	0,3	0,18
03320-25X	2,5	6/8/10/12/14/16/18/20/22/24	0,7	2,5	0,4	0,25
03320-03X	3	8/10/12/14/16/18/20/22/24/28/30/32	0,8	3	0,45	0,3
03320-04X	4	8/10/12/14/16/18/20/22/24/28/30/32/36/40	1	4	0,6	0,4
03320-05X	5	10/12/14/16/18/20/22/24/28/30/32/36/40/45/50	1,2	5	0,75	0,5
03320-06X	6	10/12/14/16/18/20/22/24/28/30/32/36/40/45/50/55/60	1,5	6	0,9	0,6
03320-08X	8	12/14/16/18/20/22/24/28/30/32/36/40/45/50/55/60/70/80	1,8	8	1,2	0,8
03320-10X	10	16/18/20/24/28/30/32/36/40/45/50/55/60/70/80/90/100	2	10	1,5	1
03320-12X	12	18/20/24/28/30/32/36/40/45/50/55/60/70/80/90/100/120	2,5	12	1,8	1,3
03320-14X	14	24/28/32/36/40/45/50/55/60/70/80/90/100/120	2,5	16	2	1,3
03320-16X	16	24/28/32/36/40/45/50/55/60/70/80/90/100/110/120	3	16	2,5	1,7

03325

Cylindrical pins with internal thread

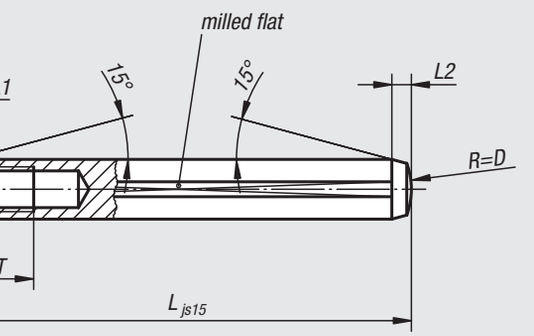
DIN 7979

Material:
Tool steel 1.2067

Version:
Surface-hardened;
hardness 60 ±2 HRC, tempered, ground and lapped

Sample order:
nlm 03325-06X28 (include length L)

Note:
Tapped cylindrical pins are chiefly used in blind holes. The milled flat prevents air compression in blind holes. The tapping makes it possible to use the extractor 03328.



Order No.	D	L	D1	T	L1 approx.	L2 approx.
03325-05X	5	16/20/24/28/32/36/40/45	M3	6	0,6	1,7
03325-06X	6	16/18/20/24/28/32/36/40/45/50/55/60	M4	6	0,8	2,1
03325-08X	8	20/24/28/32/36/40/45/50/55/60/70/80/90/100	M5	8	1	2,6
03325-10X	10	20/24/28/32/36/40/45/50/55/60/70/80/90/100	M6	10	1,2	3
03325-12X	12	32/36/40/45/50/55/60/70/80/90/100/120	M6	10	1,6	3,8
03325-14X	14	32/36/40/45/50/55/60/70/80/90/100/120	M8	12	1,8	4
03325-16X	16	40/45/50/55/60/70/80/90/100/120	M8	12	2	4,7
03325-20X	20	45/50/55/60/70/80/90/100/120	M10	16	2,5	6

Extractor

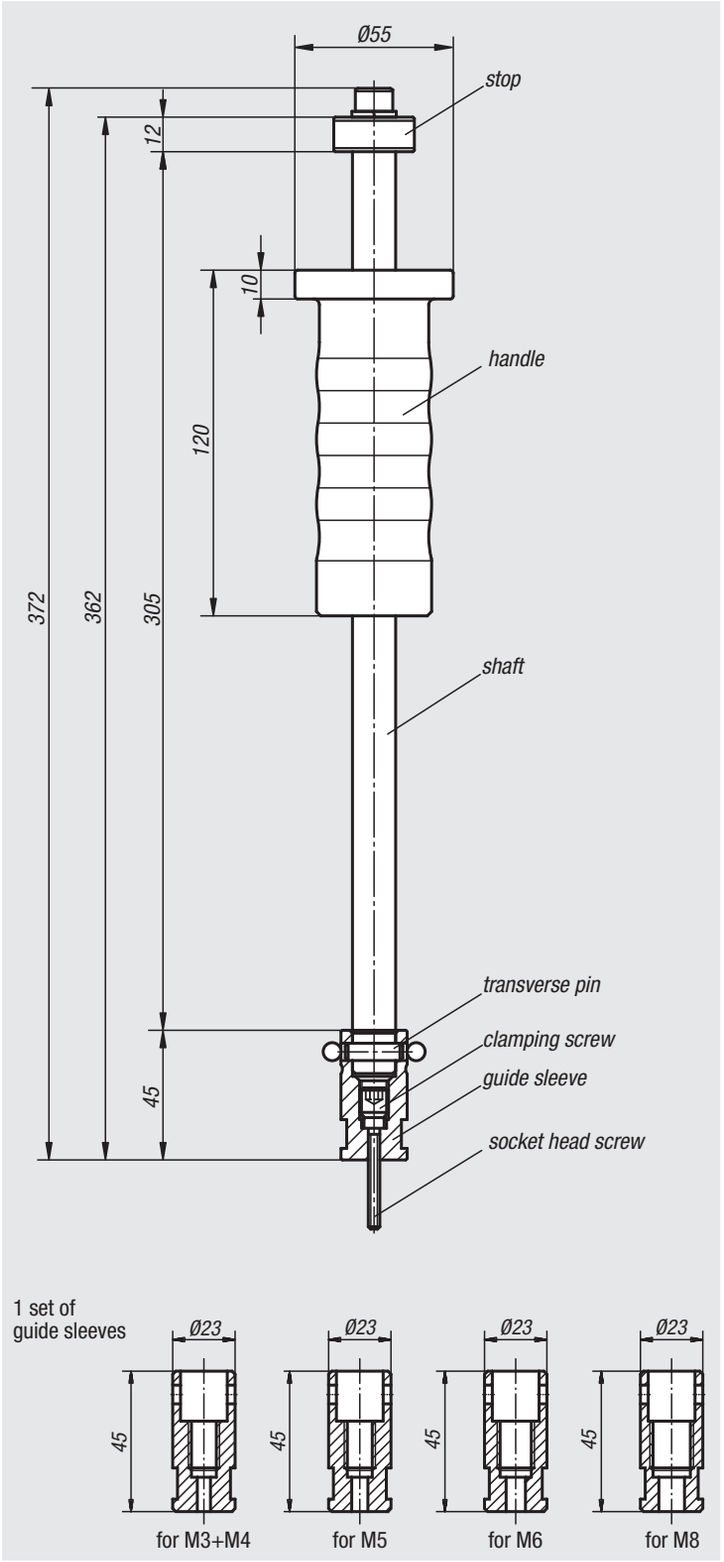
Material:
Hammer head carbon steel.
Shaft, stop and guide sleeves tool steel.

Version:
Hammer head tempered and chromed.
Shaft, stop and guide sleeve hardened and chromed.

Sample order:
nlm 03328-40

Note:
These extractors are used to remove locating pins and centring pins (03105, 03106, 03107, 03108, 03325) with M3 - M8 taps.

Accessories:
Storage case for guide sleeves.



Order No.	Dimensions
03328-40	see drawing

Lateral spring plungers

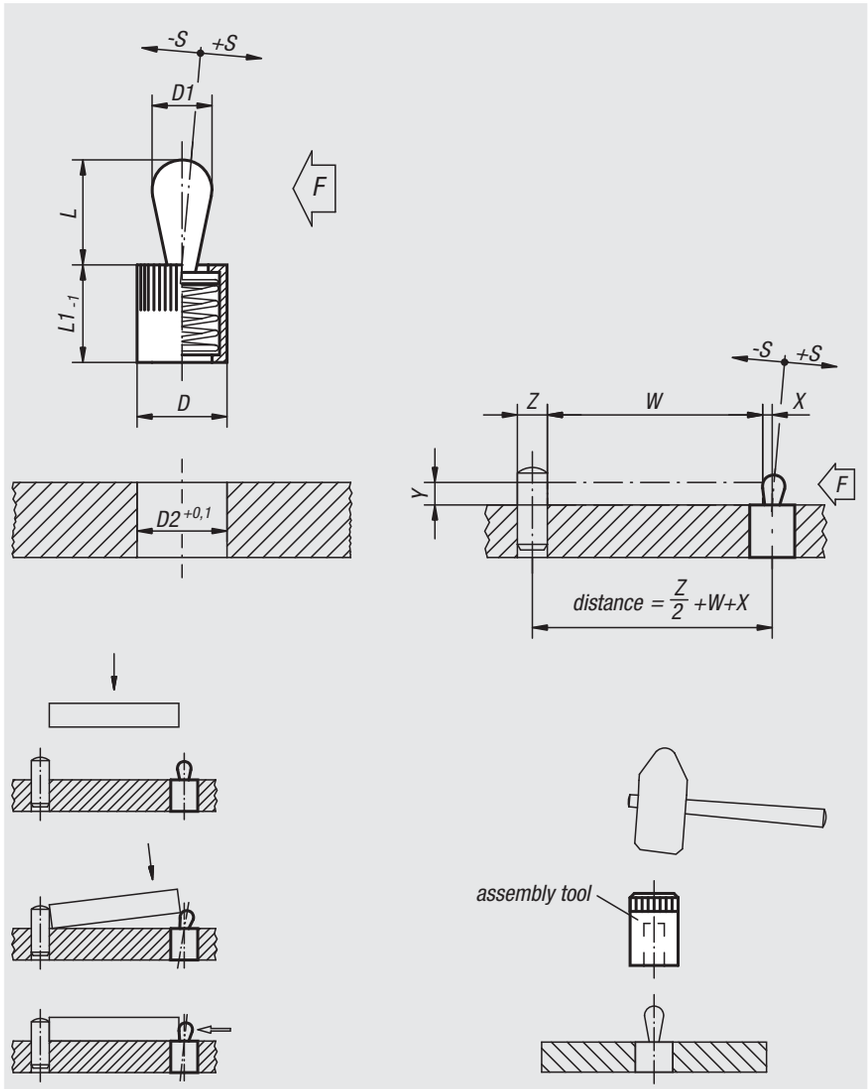
Material:
Sleeve aluminium.
Spring steel.
Thrust pin steel or POM.

Version:
Thrust pin (steel) hardened and galvanized.
Sleeve blue galvanized.

Sample order:
nlm 03330-72064

Note:
Lateral spring plungers are for positioning, clamping, holding and fastening of workpieces during engraving, labelling, drilling, reaming, tapping, honing, grinding, welding, soldering, tooling, assembling, etc.
Eccentric adjustment bushes see 03330.

W and Z are customer specific.



Lateral spring plungers without seal, thrust pin and spring steel

Order No.	D	D1	L	L1	D2	±S	F approx. N	X if Y = 1	X if Y = 2	X if Y = 3	X if Y = 4.5	X if Y = 6	X if Y = 8	Order No. assembly tool
03330-21034	6	3	4	7	6	0,5	10	0,8	1	1	1	1	1	03330-03
03330-21036	6	3	4	7	6	0,5	20	0,8	1	1	1	1	1	03330-03
03330-21038	6	3	4	7	6	0,5	40	0,8	1	1	1	1	1	03330-03
03330-21054	10	5	6,7	11	10	0,8	20	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-21056	10	5	6,7	11	10	0,8	50	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-21058	10	5	6,7	11	10	0,8	100	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-21064	10	6	10,7	11	10	1	40	-	-	-	1,7	1,9	1,9	03330-05
03330-21066	10	6	10,7	11	10	1	75	-	-	-	1,7	1,9	1,9	03330-05
03330-21068	10	6	10,7	11	10	1	150	-	-	-	1,7	1,9	1,9	03330-05
03330-21084	12	8	13,9	13	12	1,3	50	-	-	-	-	2,5	2,7	03330-08
03330-21086	12	8	13,9	13	12	1,3	100	-	-	-	-	2,5	2,7	03330-08
03330-21088	12	8	13,9	13	12	1,3	200	-	-	-	-	2,5	2,7	03330-08
03330-21104	16	10	16,7	17	16	1,6	100	-	-	-	-	-	3,1	03330-10
03330-21106	16	10	16,7	17	16	1,6	200	-	-	-	-	-	3,1	03330-10
03330-21108	16	10	16,7	17	16	1,6	300	-	-	-	-	-	3,1	03330-10

Lateral spring plungers

Lateral spring plungers with seal, thrust pin and spring steel

Order No.	D	D1	L	L1	D2	±S	F approx. N	X if Y = 1	X if Y = 2	X if Y = 3	X if Y = 4.5	X if Y = 6	X if Y = 8	Order No. assembly tool
03330-22034	6	3	4	7	6	0,5	10	0,8	1	1	1	1	1	03330-03
03330-22036	6	3	4	7	6	0,5	20	0,8	1	1	1	1	1	03330-03
03330-22038	6	3	4	7	6	0,5	40	0,8	1	1	1	1	1	03330-03
03330-22054	10	5	6	12	10	0,8	20	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-22056	10	5	6	12	10	0,8	50	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-22058	10	5	6	12	10	0,8	100	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-22064	10	6	10	12	10	1	40	-	-	-	1,7	1,9	1,9	03330-05
03330-22066	10	6	10	12	10	1	75	-	-	-	1,7	1,9	1,9	03330-05
03330-22068	10	6	10	12	10	1	150	-	-	-	1,7	1,9	1,9	03330-05
03330-22084	12	8	13	14	12	1,3	50	-	-	-	-	2,5	2,7	03330-08
03330-22086	12	8	13	14	12	1,3	100	-	-	-	-	2,5	2,7	03330-08
03330-22088	12	8	13	14	12	1,3	200	-	-	-	-	2,5	2,7	03330-08
03330-22104	16	10	16	18	16	1,6	100	-	-	-	-	-	3,1	03330-10
03330-22106	16	10	16	18	16	1,6	200	-	-	-	-	-	3,1	03330-10
03330-22108	16	10	16	18	16	1,6	300	-	-	-	-	-	3,1	03330-10

Lateral spring plungers without seal, thrust pin POM, spring steel

Order No.	D	D1	L	L1	D2	±S	F approx. N	X if Y = 1	X if Y = 2	X if Y = 3	X if Y = 4.5	X if Y = 6	X if Y = 8	Order No. assembly tool
03330-71034	6	3	4	7	6	0,5	10	0,8	1	1	1	1	1	03330-03
03330-71036	6	3	4	7	6	0,5	20	0,8	1	1	1	1	1	03330-03
03330-71054	10	5	6,7	11	10	0,8	20	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-71056	10	5	6,7	11	10	0,8	50	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-71064	10	6	10,7	11	10	1	40	-	-	-	1,7	1,9	1,9	03330-05
03330-71066	10	6	10,7	11	10	1	75	-	-	-	1,7	1,9	1,9	03330-05
03330-71084	12	8	13,9	13	12	1,3	50	-	-	-	-	2,5	2,7	03330-08
03330-71086	12	8	13,9	13	12	1,3	100	-	-	-	-	2,5	2,7	03330-08
03330-71104	16	10	16,7	17	16	1,6	100	-	-	-	-	-	3,1	03330-10
03330-71106	16	10	16,7	17	16	1,6	200	-	-	-	-	-	3,1	03330-10

Lateral spring plungers with seal, thrust pin POM, spring steel

Order No.	D	D1	L	L1	D2	±S	F approx. N	X if Y = 1	X if Y = 2	X if Y = 3	X if Y = 4.5	X if Y = 6	X if Y = 8	Order No. assembly tool
03330-72034	6	3	4	7	6	0,5	10	0,8	1	1	1	1	1	03330-03
03330-72036	6	3	4	7	6	0,5	20	0,8	1	1	1	1	1	03330-03
03330-72054	10	5	6	12	10	0,8	20	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-72056	10	5	6	12	10	0,8	50	-	1,5	1,7	1,7	1,7	1,7	03330-05
03330-72064	10	6	10	12	10	1	40	-	-	-	1,7	1,9	1,9	03330-05
03330-72066	10	6	10	12	10	1	75	-	-	-	1,7	1,9	1,9	03330-05
03330-72084	12	8	13	14	12	1,3	50	-	-	-	-	2,5	2,7	03330-08
03330-72086	12	8	13	14	12	1,3	100	-	-	-	-	2,5	2,7	03330-08
03330-72104	16	10	16	18	16	1,6	100	-	-	-	-	-	3,1	03330-10
03330-72106	16	10	16	18	16	1,6	200	-	-	-	-	-	3,1	03330-10

Eccentric bushes and assembly tools

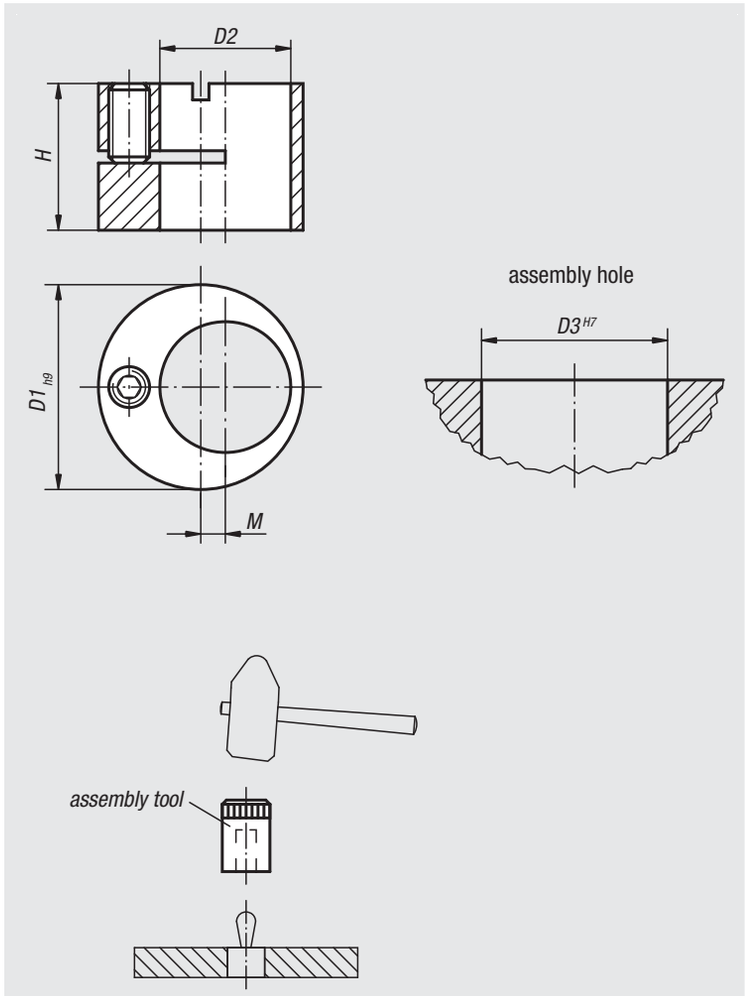
for lateral spring plungers

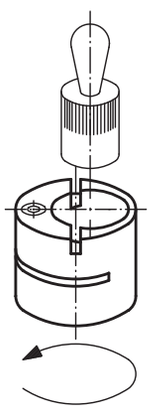
Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 03330-180

Note:
Eccentric bushes enable lateral spring plungers to be positioned exactly to the workpiece.





Assembly tools

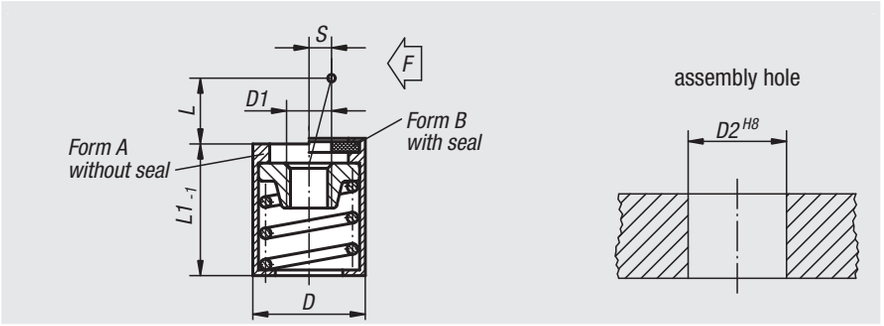
Order No.	Suitable for lateral spring plungers with D =
03330-03	6
03330-05	10
03330-08	12
03330-10	16

Eccentric bushes for lateral spring plungers

Order No.	D1	D2	D3	H	M	Suitable for lateral spring plungers with D =
03330-120	12	6	12	9,9	2	6
03330-150	15	8	15	9,9	2	8
03330-160	16	10	16	11,9	2	10
03330-180	18	12	18	13,9	2	12
03330-250	25	16	25	17,9	3	16

Lateral spring plungers

without thrust pin



Material:
Sleeve aluminium.
Receiving washer steel.
Spring steel.

Version:
Sleeve blue galvanized.
Receiving washer, hardened and burnished.

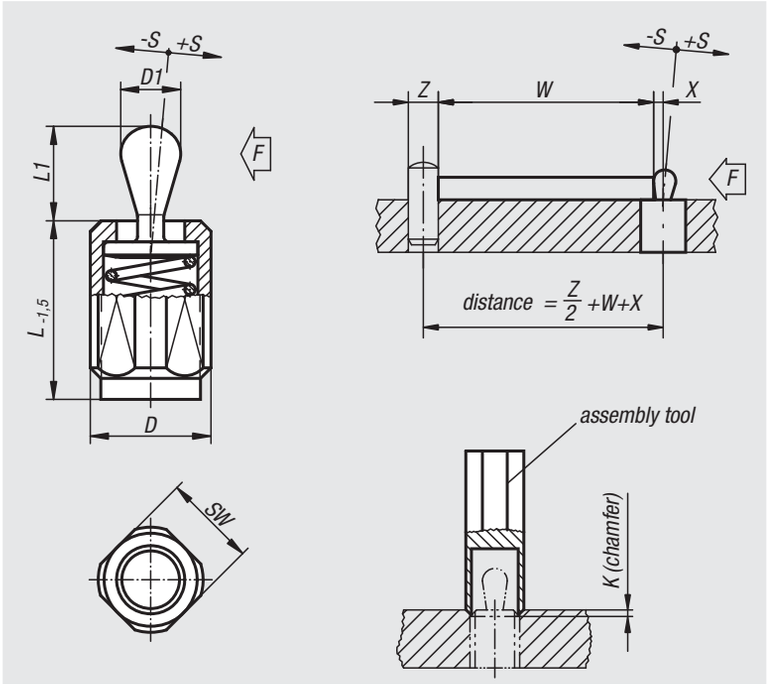
Sample order:
nlm 03332-31058

Note:
The thrust pin can be made to suit the required circumstances and screwed into the tapped hole in the locating washer.
The required lateral thrust (F) can be achieved through the stroke (S) and length (L).
Form B has a seal to keep swarf and dirt out.

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	S	F approx.N
03332-31054	**03332-32054**	10	M4	10	4	12	1,6	20
03332-31056	**03332-32056**	10	M4	10	4	12	1,6	50
03332-31058	**03332-32058**	10	M4	10	4	12	1,6	100
03332-31064	**03332-32064**	10	M4	10	7,5	12	2	40
03332-31066	**03332-32066**	10	M4	10	7,5	12	2	75
03332-31068	**03332-32068**	10	M4	10	7,5	12	2	150
03332-31104	**03332-32104**	16	M6	16	11,5	18	3,2	100
03332-31106	**03332-32106**	16	M6	16	11,5	18	3,2	200
03332-31108	**03332-32108**	16	M6	16	11,5	18	3,2	300

Lateral spring plungers

with threaded sleeve



Material:
Sleeve and spring steel.
Thrust pin steel or POM.

Version:
Thrust pin steel, hardened and galvanized.
Sleeve blue galvanized.

Sample order:
nlm 03334-1020X12

Note:
Lateral spring plungers with threaded sleeve can be individually adjusted to suit the the part being held. The threaded sleeve is also suitable for screwing into thin sheet metal as it can be fastened with one or two nuts.
W and Z are customer specified.

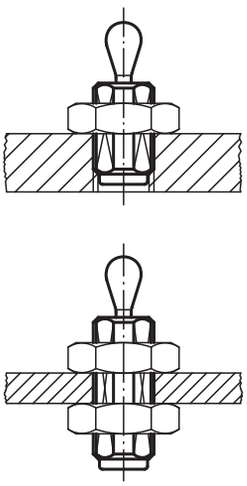
Lateral spring plungers without seal, thrust pin steel or POM

Order No. thrust pin steel	Order No. thrust pin POM	L	L1	D	D1	±S	F approx.N	X	SW	K	Order No. assembly tool
03334-1020X12	**03334-2020X12**	11,5	6,7	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-1020X20	**03334-2020X20**	19	6,7	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-1020X27	**03334-2020X27**	26,5	6,7	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-1050X12	**03334-2050X12**	11,5	6,7	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-1050X20	**03334-2050X20**	19	6,7	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-1050X27	**03334-2050X27**	26,5	6,7	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-1100X12	-	11,5	6,7	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-1100X20	-	19	6,7	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-1100X27	-	26,5	6,7	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-1040X12	**03334-2040X12**	11,5	10,7	M12	6	1	40	1,8	10	2x60°	03334-06
03334-1040X20	**03334-2040X20**	19	10,7	M12	6	1	40	1,8	10	2x60°	03334-06
03334-1040X27	**03334-2040X27**	26,5	10,7	M12	6	1	40	1,8	10	2x60°	03334-06
03334-1075X12	**03334-2075X12**	11,5	10,7	M12	6	1	75	1,8	10	2x60°	03334-06
03334-1075X20	**03334-2075X20**	19	10,7	M12	6	1	75	1,8	10	2x60°	03334-06
03334-1075X27	**03334-2075X27**	26,5	10,7	M12	6	1	75	1,8	10	2x60°	03334-06
03334-1150X12	-	11,5	10,7	M12	6	1	150	1,8	10	2x60°	03334-06
03334-1150X20	-	19	10,7	M12	6	1	150	1,8	10	2x60°	03334-06
03334-1150X27	-	26,5	10,7	M12	6	1	150	1,8	10	2x60°	03334-06
03334-1100X16	**03334-2100X16**	18	16,7	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-1100X29	**03334-2100X29**	31,5	16,7	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-1100X43	**03334-2100X43**	45	16,7	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-1200X16	**03334-2200X16**	18	16,7	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-1200X29	**03334-2200X29**	31,5	16,7	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-1200X43	**03334-2200X43**	45	16,7	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-1300X16	-	18	16,7	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10
03334-1300X29	-	31,5	16,7	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10
03334-1300X43	-	45	16,7	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10

Lateral spring plungers

with threaded sleeve

mounting example

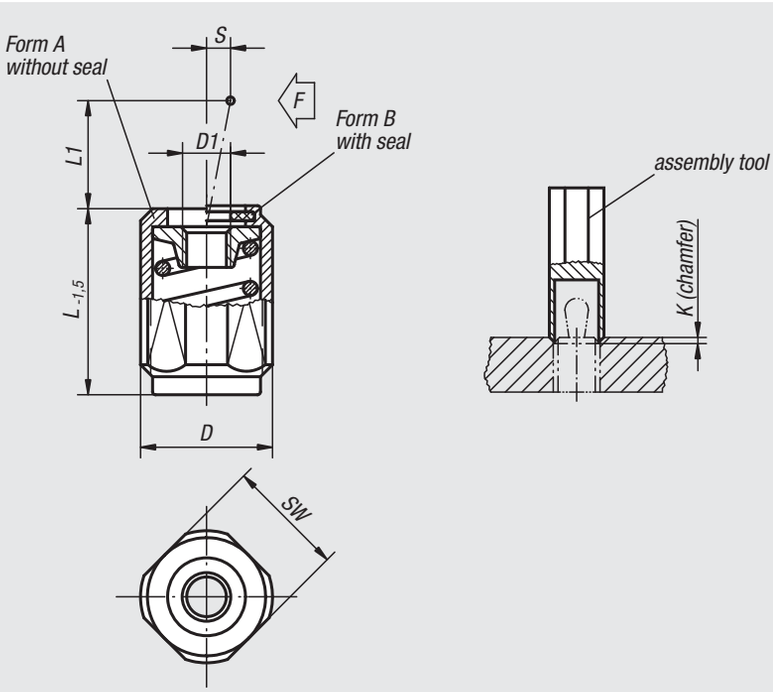


Lateral spring plungers with seal, thrust pin steel or POM

Order No. thrust pin steel	Order No. thrust pin POM	L	L1	D	D1	±S	F approx.N	X	SW	K	Order No. assembly tool
03334-3020X12	**03334-4020X12**	11,5	6	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-3020X20	**03334-4020X20**	19	6	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-3020X27	**03334-4020X27**	26,5	6	M12	5	0,8	20	1,6	10	2x60°	03334-06
03334-3050X12	**03334-4050X12**	11,5	6	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-3050X20	**03334-4050X20**	19	6	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-3050X27	**03334-4050X27**	26,5	6	M12	5	0,8	50	1,6	10	2x60°	03334-06
03334-3100X12	-	11,5	6	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-3100X20	-	19	6	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-3100X27	-	26,5	6	M12	5	0,8	100	1,6	10	2x60°	03334-06
03334-3040X12	**03334-4040X12**	11,5	10	M12	6	1	40	1,8	10	2x60°	03334-06
03334-3040X20	**03334-4040X20**	19	10	M12	6	1	40	1,8	10	2x60°	03334-06
03334-3040X27	**03334-4040X27**	26,5	10	M12	6	1	40	1,8	10	2x60°	03334-06
03334-3075X12	**03334-4075X12**	11,5	10	M12	6	1	75	1,8	10	2x60°	03334-06
03334-3075X20	**03334-4075X20**	19	10	M12	6	1	75	1,8	10	2x60°	03334-06
03334-3075X27	**03334-4075X27**	26,5	10	M12	6	1	75	1,8	10	2x60°	03334-06
03334-3150X12	-	11,5	10	M12	6	1	150	1,8	10	2x60°	03334-06
03334-3150X20	-	19	10	M12	6	1	150	1,8	10	2x60°	03334-06
03334-3150X27	-	26,5	10	M12	6	1	150	1,8	10	2x60°	03334-06
03334-3100X16	**03334-4100X16**	18	16	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-3100X29	**03334-4100X29**	31,5	16	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-3100X43	**03334-4100X43**	45	16	M18x1,5	10	1,6	100	3,2	16	2,5x60°	03334-10
03334-3200X16	**03334-4200X16**	18	16	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-3200X29	**03334-4200X29**	31,5	16	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-3200X43	**03334-4200X43**	45	16	M18x1,5	10	1,6	200	3,2	16	2,5x60°	03334-10
03334-3300X16	-	18	16	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10
03334-3300X29	-	31,5	16	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10
03334-3300X43	-	45	16	M18x1,5	10	1,6	300	3,2	16	2,5x60°	03334-10

Lateral spring plungers

with threaded sleeve, without thrust pin



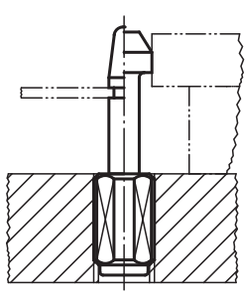
Material:
Steel.

Version:
Sleeve blue galvanized.
Receiving washer, hardened and burnished.

Sample order:
nlm 03336-1100X20

Note:
The thrust pin can be made to suit the required circumstances and screwed into the tapped hole in the locating washer.
The required lateral thrust (F) can be achieved through the stroke (S) and length (L).
Form B has a seal to keep swarf and dirt out.

Order No. Form A	Order No. Form B	L	L1	D	D1	±S	F approx.N	SW	K	Order No. assembly tool
03336-1020X12	**03336-2020X12**	11,5	4	M12	M4	1,6	20	10	2x60°	03334-06
03336-1020X20	**03336-2020X20**	19	4	M12	M4	1,6	20	10	2x60°	03334-06
03336-1020X27	**03336-2020X27**	26,5	4	M12	M4	1,6	20	10	2x60°	03334-06
03336-1050X12	**03336-2050X12**	11,5	4	M12	M4	1,6	50	10	2x60°	03334-06
03336-1050X20	**03336-2050X20**	19	4	M12	M4	1,6	50	10	2x60°	03334-06
03336-1050X27	**03336-2050X27**	26,5	4	M12	M4	1,6	50	10	2x60°	03334-06
03336-1100X12	**03336-2100X12**	11,5	4	M12	M4	1,6	100	10	2x60°	03334-06
03336-1100X20	**03336-2100X20**	19	4	M12	M4	1,6	100	10	2x60°	03334-06
03336-1100X27	**03336-2100X27**	26,5	4	M12	M4	1,6	100	10	2x60°	03334-06
03336-1040X12	**03336-2040X12**	11,5	7,5	M12	M4	2	40	10	2x60°	03334-06
03336-1040X20	**03336-2040X20**	19	7,5	M12	M4	2	40	10	2x60°	03334-06
03336-1040X27	**03336-2040X27**	26,5	7,5	M12	M4	2	40	10	2x60°	03334-06
03336-1075X12	**03336-2075X12**	11,5	7,5	M12	M4	2	75	10	2x60°	03334-06
03336-1075X20	**03336-2075X20**	19	7,5	M12	M4	2	75	10	2x60°	03334-06
03336-1075X27	**03336-2075X27**	26,5	7,5	M12	M4	2	75	10	2x60°	03334-06
03336-1150X12	**03336-2150X12**	11,5	7,5	M12	M4	2	150	10	2x60°	03334-06
03336-1150X20	**03336-2150X20**	19	7,5	M12	M4	2	150	10	2x60°	03334-06
03336-1150X27	**03336-2150X27**	26,5	7,5	M12	M4	2	150	10	2x60°	03334-06
03336-1100X16	**03336-2100X16**	18	11,5	M18x1,5	M6	3,2	100	16	2,5x60°	03334-10
03336-1100X29	**03336-2100X29**	31,5	11,5	M18x1,5	M6	3,2	100	16	2,5x60°	03334-10
03336-1100X43	**03336-2100X43**	45	11,5	M18x1,5	M6	3,2	100	16	2,5x60°	03334-10
03336-1200X16	**03336-2200X16**	18	11,5	M18x1,5	M6	3,2	200	16	2,5x60°	03334-10
03336-1200X29	**03336-2200X29**	31,5	11,5	M18x1,5	M6	3,2	200	16	2,5x60°	03334-10
03336-1200X43	**03336-2200X43**	45	11,5	M18x1,5	M6	3,2	200	16	2,5x60°	03334-10
03336-1300X16	**03336-2300X16**	18	11,5	M18x1,5	M6	3,2	300	16	2,5x60°	03334-10
03336-1300X29	**03336-2300X29**	31,5	11,5	M18x1,5	M6	3,2	300	16	2,5x60°	03334-10
03336-1300X43	**03336-2300X43**	45	11,5	M18x1,5	M6	3,2	300	16	2,5x60°	03334-10



Push-Pull spring plungers

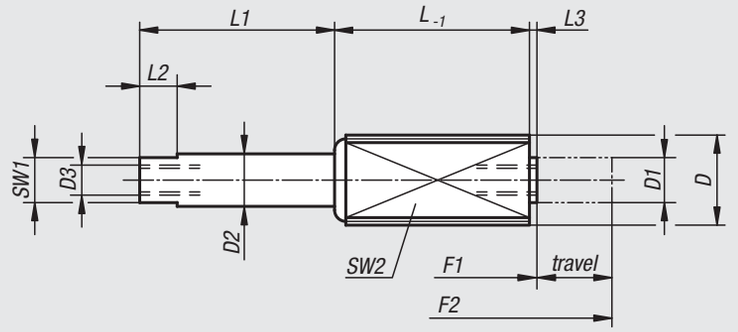
Material:
Steel.

Version:
Sleeve blue galvanized.
Spring pins black oxidised.

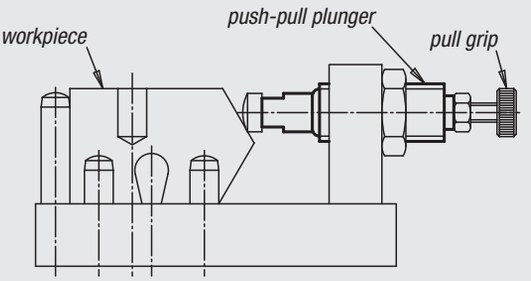
Sample order:
nlm 03338-1202004

Note:
The tapped hole in both ends of the spring pin allow various inserts to be attached e.g. prisms, thrust pins, self-aligning pads, knobs, grips etc.

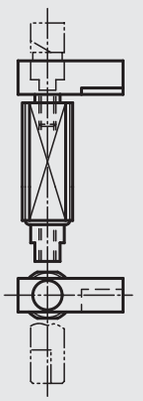
Assembly:
LOCTITE threadlocker 97990-243.... is recommended for gluing the threaded sleeve in position.



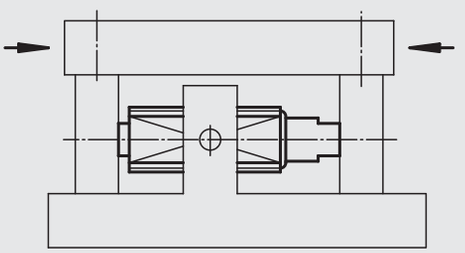
Push-Pull plunger



pull plunger as lock

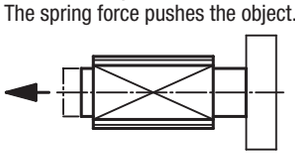


push-pull plunger as carrier

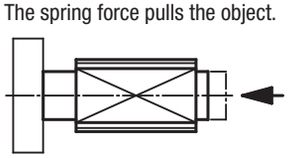


Application:

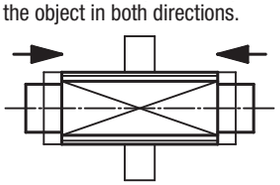
As **push plunger:**
The spring force pushes the object.



As **pull plunger:**
The spring force pulls the object.



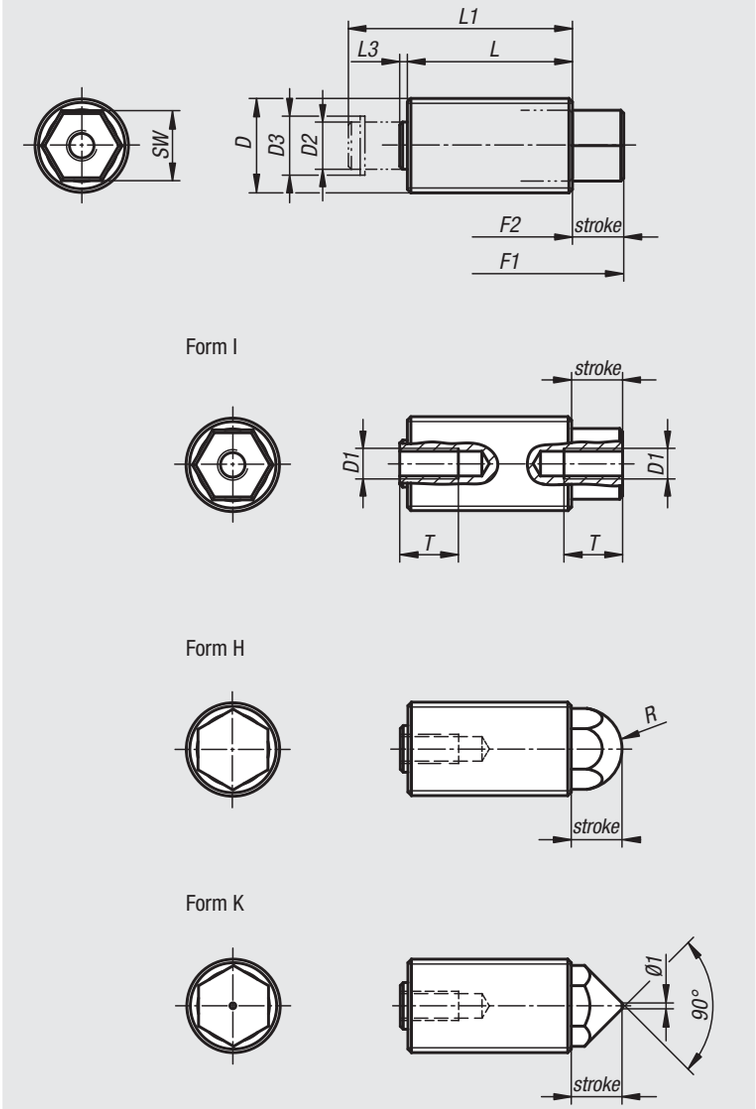
As **push-pull plunger**:
In this case the internal pin has a fixed position. The threaded sleeve acts as carrier.
The spring force pushes or pulls the object in both directions.



Order No.	D	D1	D2	D3	F1 (N)	F2 (N)	Travel	L	L1	L2	L3	SW1	SW2 square
03338-1202004	M12	6	7	M4x8	5	20	3,5	11	4,5	5	1	6	10
03338-1202006	M12	6	7	M4x8	5	20	6	18,5	7	5	1	6	10
03338-1202010	M12	6	7	M4x8	5	20	10	26	11	5	1	6	10
03338-1206003	M12	6	7	M4x8	12	40	3	11	4,5	5	1	6	10
03338-1206005	M12	6	7	M4x8	12	40	5	18,5	7	5	1	6	10
03338-1206008	M12	6	7	M4x8	12	40	8	26	11	5	1	6	10
03338-1212503	M12	6	7	M4x8	20	100	3	11	4,5	5	1	6	10
03338-1212505	M12	6	7	M4x8	20	100	5	18,5	7	5	1	6	10
03338-1212508	M12	6	7	M4x8	20	100	8	26	11	5	1	6	10
03338-1815004	M18x1,5	10	11	M6x12	50	150	4	17	6	6	2,5	9	16
03338-1815007	M18x1,5	10	11	M6x12	50	150	7	29,5	11,5	6	2,5	9	16
03338-1815013	M18x1,5	10	11	M6x12	50	150	12,5	45,5	16	6	2,5	9	16

Push-Pull spring plunger

with rotation lock



Material:
Steel.

Version:
Threaded sleeve galvanized, blue chromed.
Threaded pin case-hardened, black-oxidised.
Standard spring force, reinforced spring force.

Sample order:
nlm 03339-1112

Note:
The push-pull spring plungers, also called two-way spring plungers are used to engage, position or clamp various components. The threaded pin, which is locked against rotation by the hexagonal form can be used for traction or thrust.

Order No.	Form	Version	D	SW	D1	D2	D3	F1 (N)	F2 (N)	Travel	L	L1	L3	R	T min.
03339-1112	I	standard spring force	M12x1,5	8	M4	5,5	6,78	16	38	6,12	20	27,5	1,38	-	8
03339-1212	I	strong spring force	M12x1,5	8	M4	5,5	6,78	20	60	6,12	20	27,5	1,38	-	8
03339-1116	I	standard spring force	M16x1,5	12	M5	8	10	25	71	8,7	28	38	1,3	-	10
03339-1216	I	strong spring force	M16x1,5	12	M5	8	10	35	103	8,7	28	38	1,3	-	10
03339-1120	I	standard spring force	M20x1,5	15	M6	10	12,2	40	140	10,3	34	47	2,7	-	12
03339-1220	I	strong spring force	M20x1,5	15	M6	10	12,2	60	175	10,3	34	47	2,7	-	12
03339-2112	H	standard spring force	M12x1,5	8	M4	5,5	6,78	16	38	6,12	20	27,5	1,38	5,5	8
03339-2212	H	strong spring force	M12x1,5	8	M4	5,5	6,78	20	60	6,12	20	27,5	1,38	5,5	8
03339-2116	H	standard spring force	M16x1,5	12	M5	8	10	25	71	8,7	28	38	1,3	7	10
03339-2216	H	strong spring force	M16x1,5	12	M5	8	10	35	103	8,7	28	38	1,3	7	10
03339-2120	H	standard spring force	M20x1,5	15	M6	10	12,2	40	140	10,3	34	47	2,7	9	12
03339-2220	H	strong spring force	M20x1,5	15	M6	10	12,2	60	175	10,3	34	47	2,7	9	12
03339-3112	K	standard spring force	M12x1,5	8	M4	5,5	6,78	16	38	6,12	20	27,5	1,38	-	8
03339-3212	K	strong spring force	M12x1,5	8	M4	5,5	6,78	20	60	6,12	20	27,5	1,38	-	8
03339-3116	K	standard spring force	M16x1,5	12	M5	8	10	25	71	8,7	28	38	1,3	-	10
03339-3216	K	strong spring force	M16x1,5	12	M5	8	10	35	103	8,7	28	38	1,3	-	10
03339-3120	K	standard spring force	M20x1,5	15	M6	10	12,2	40	140	10,3	34	47	2,7	-	12
03339-3220	K	strong spring force	M20x1,5	15	M6	10	12,2	60	175	10,3	34	47	2,7	-	12

Lateral spring plungers

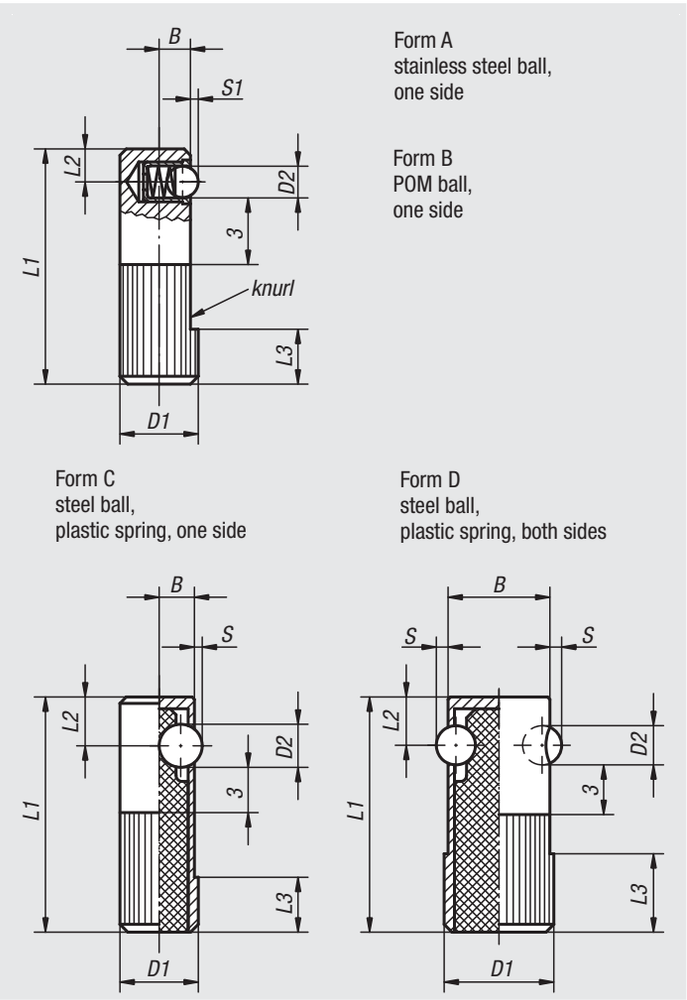
Material:
Body mild steel.
Ball steel or stainless steel hardened or POM.
Spring stainless steel or plastic.

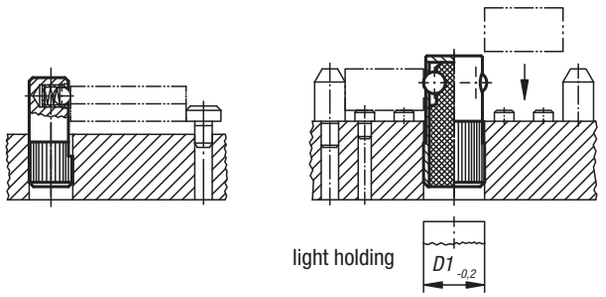
Version:
Body black oxidised.
Ball bright.

Sample order:
nlm 03340-410

Note:
The lateral spring plunger must be pressed into the hole to at least depth L3. These plungers are for positioning and holding small parts in fixtures. If mechanical machining of the workpiece is to be carried out, other clamps may be necessary. When the fixture is not in use it should be ensured that plastic springs are not under stress.

Spring force refers to a mean value.





Order No.	Form	D1	D2	L1	L2	L3	B	S	S1	Receiving hole H8	Spring force initial N	Spring force final N
03340-008	A	8	3	25	3,6	6	3,2	-	0,7	8	2,5	6,5
03340-010	A	10	4	30	4,2	7	4	-	1	10	4,5	9
03340-012	A	12	5	35	4,8	9	5	-	1,5	12	6,5	13
03340-014	A	14	6,5	40	5,8	10	5,4	-	1,8	14	8	18
03340-108	B	8	3	25	3,6	6	3,2	-	0,7	8	2,5	6,5
03340-110	B	10	4	30	4,2	7	4	-	1,0	10	4,5	9
03340-112	B	12	5	35	4,8	9	5	-	1,5	12	6,5	13
03340-114	B	14	6,5	40	5,8	10	5,4	-	1,8	14	8	18
03340-410	C	10	5,5	30	7	8	4,5	1	-	10	60	170
03340-412	C	12	6,5	35	8	9	5,5	1,5	-	12	80	260
03340-414	C	14	8	40	9	10	6,5	2	-	14	120	480
03340-616	D	16	5,5	35	7	11	15	1,5	-	16	110	220
03340-618	D	18	6,5	40	8	12	17	1,8	-	18	120	330
03340-622	D	22	8	45	9	15	21	2,5	-	22	130	540

Shaft clamping units

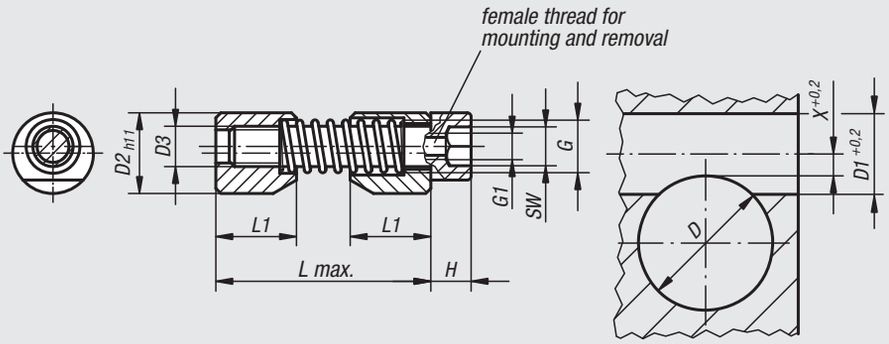
Material:
Jaws steel.
Spring 1.4310.
Screw grade 8.8.

Version:
Jaws black oxidised.
Screw blue galvanised.

Sample order:
nlm 03350-04

Note:
These shaft clamping units are the simple alternative to conventional shaft clamping (slot and grub screw). The units are suitable for various materials (metal, plastic, wood etc).
To loosen a jammed clamp simply hit it axially or extract it using a screw in the jaw end or screw head.

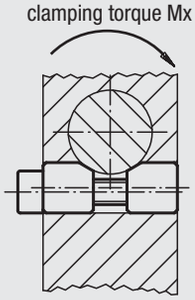
On request:
Spacer rings



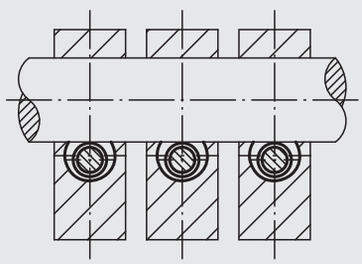
Application:

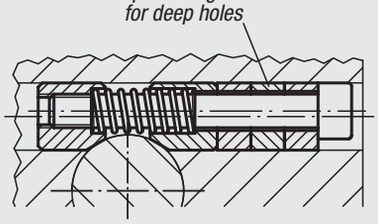
axial and radial clamping

clamping torque Mx



adjusting and clamping





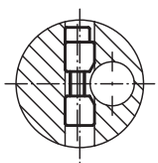
Shafts situated away from the outer edge can also be clamped using spacer rings and longer screws (without mounting thread).

assembly tool

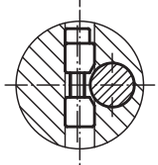
Special hex key with a threaded pin. The pin is screwed into the hole G1 in the head of the cap screw to aid in positioning or removing the clamping unit.

Mounting instructions:

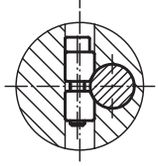
Insert clamping unit



Insert shaft or tube

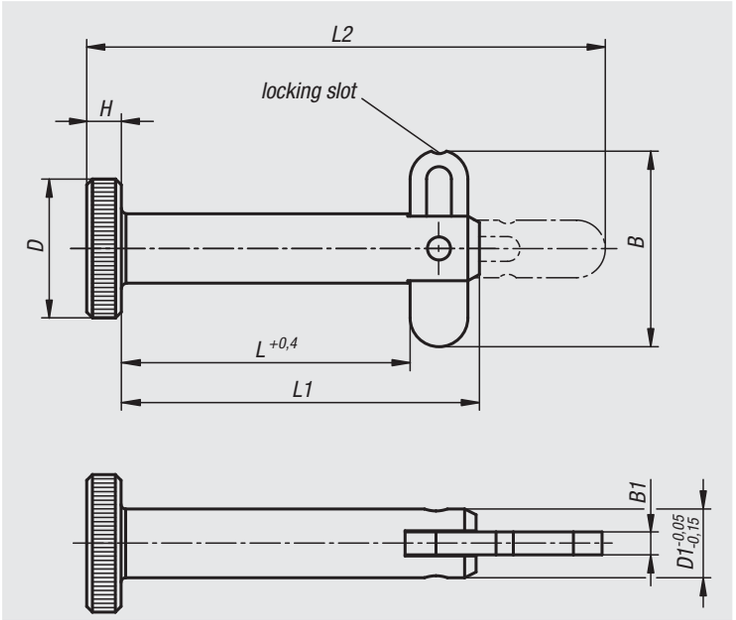


Clamp shaft or tube



Order No.	D	D1	D2	D3	L max.	L1	X	G	G1	H	K	SW	Mx Nm	Order No. assembly tool
03350-04	6-10	8	8	M4	27	8	2,8	M5	M2,5	4	10	3	max. 20	03350-904
03350-05	10-15	10	10	M5	33	10	3,3	M6	M3	5	10	4	max. 45	03350-905
03350-06	15-20	12	12	M6	39	12	3,5	M7	M4	6	10	5	max. 100	03350-906
03350-08	20-30	16	16	M8	46	16	4	M10	M5	8	10	6	max. 170	03350-908
03350-10	30-40	20	20	M10	53	20	4,8	M12	M6	10	15	8	max. 290	03350-910
03350-12	40-60	25	25	M12	70	25	5,6	M14	M8	12	15	10	max. 450	03350-912
03350-16	60-125	30	30	M16	81	30	7,9	M18	M10	16	15	14	max. 650	03350-916

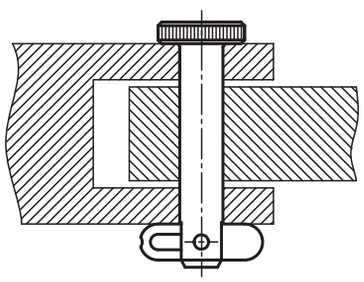
Locking pins with folding latch



Material:
Steel galvanized.

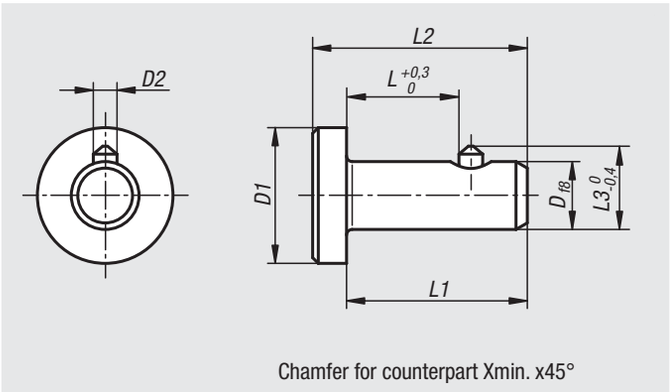
Sample order:
nlm 03400-06025

Note:
Locking pins with folding latch are not only used for fast and easy fixing but also for permanent joining of movable parts and workpieces.
The wide folding latch lets you secure the parts to be joined over a large cross section. It can also work under pressure in the axial direction.
Indexing slots in the folding latch allow definite „Closed“ and „Open“ positions.



Order No.	D	D1	L	L1	L2	H	B	B1	Receiving hole H11	Shearing force double shear max.kN	Extraction force F in N
03400-06025	12	6	25	31	45	3	16,9	2	6	12	190
03400-06040	12	6	40	46	60	3	16,9	2	6	12	190
03400-06050	12	6	50	56	70	3	16,9	2	6	12	190
03400-08025	16	8	25	31	46	4	16,9	2	8	21	270
03400-08040	16	8	40	46	61	4	16,9	2	8	21	270
03400-08050	16	8	50	56	71	4	16,9	2	8	21	270

Locking pins with axial locking



Chamfer for counterpart Xmin. x45°

Material:
Steel.

Version:
galvanized

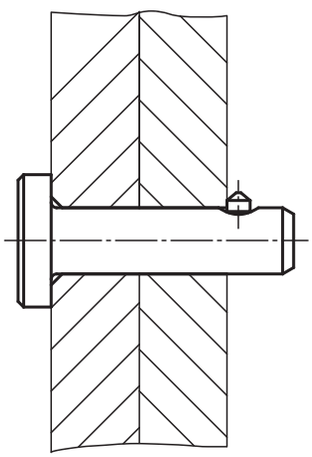
Sample order:
nlm 03410-1206016

Note:
Locking pins are used for quick and easy fixating and joining of parts and workpieces.

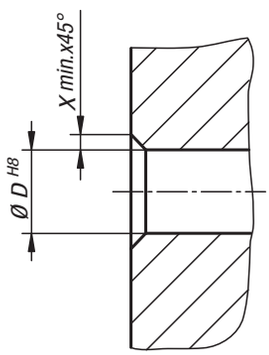
Shearing force double-shear (F) = S · τ aB max.

Assembly:
In the counterpiece, observe the length X as an inlet guide.

Example of use



assembly hole



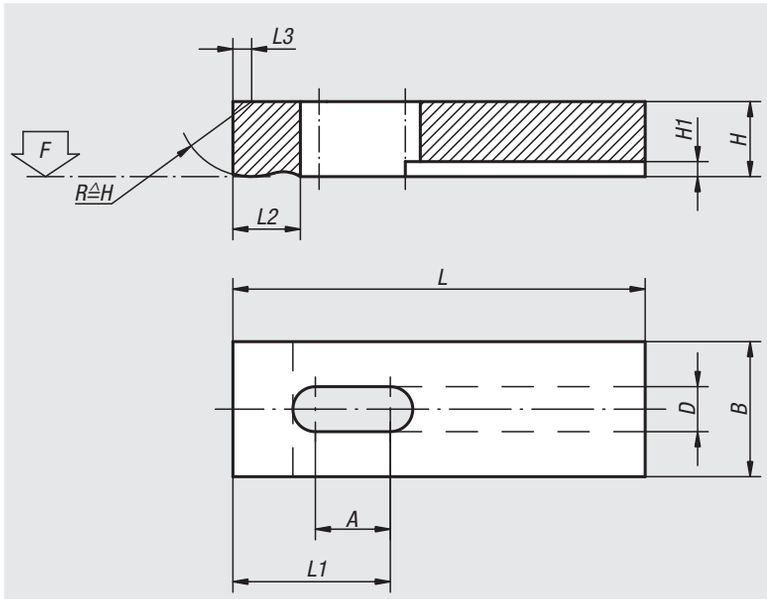
Order No.	D	D1	D2	X	L	L1	L2	L3	Shearing force double shear max.kN
03410-1206010	6	12	2,1	1,1	10	16	19	7,4	12
03410-1206012	6	12	2,1	1,1	12	18	21	7,4	12
03410-1206016	6	12	2,1	1,1	16	22	25	7,4	12
03410-1206020	6	12	2,1	1,1	20	26	29	7,4	12
03410-1608012	8	16	2,1	1,1	12	18	22	9,4	22
03410-1608016	8	16	2,1	1,1	16	22	26	9,4	22
03410-1608020	8	16	2,1	1,1	20	26	30	9,4	22
03410-1608025	8	16	2,1	1,1	25	31	35	9,4	22
03410-2010012	10	20	2,8	1,2	12	20	24	11,8	35
03410-2010016	10	20	2,8	1,2	16	24	28	11,8	35
03410-2010020	10	20	2,8	1,2	20	28	32	11,8	35
03410-2010025	10	20	2,8	1,2	25	33	37	11,8	35
03410-2412016	12	24	2,8	1,2	16	24	29	13,8	51
03410-2412020	12	24	2,8	1,2	20	28	33	13,8	51
03410-2412025	12	24	2,8	1,2	25	33	38	13,8	51
03410-2412030	12	24	2,8	1,2	30	38	43	13,8	51

04000

Clamp straps
Clamping devices

Clamp straps

slotted heel

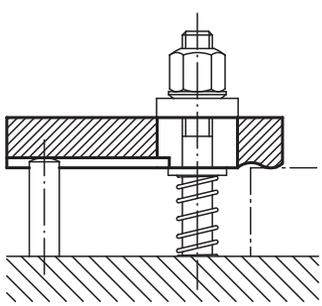


Material:
Carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04010-101

Note:
For suitable supports and rest pads see 02130 and 02150.

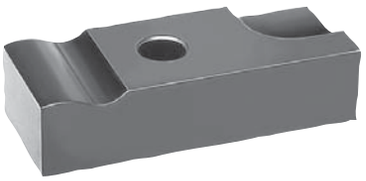


Order No.	A	B	D	H	H1	L	L1	L2	L3	F kN
04010-05	8	12	5,5	8	3	32	14	8	1,2	3,42
04010-051	13	12	5,5	8	3	50	23	8	1,2	3,42
04010-06	10	16	7	10	3	40	17	10	1,6	4,82
04010-061	17	16	7	10	3	63	29	10	1,6	4,82
04010-08	12	20	9	12	4	50	22	12	2	8,77
04010-081	21	20	9	12	4	80	37	12	2	8,77
04010-10	16	25	11	16	4,5	63	28	16	2,5	13,9
04010-101	26	25	11	16	4,5	100	46	16	2,5	13,9
04010-12	20	32	14	20	5	80	35	20	3	20,2
04010-121	33	32	14	20	5	125	58	20	3	20,2
04010-14	25	40	16	25	6	100	44	25	4	27,6
04010-141	42	40	16	30	6	160	74	25	4	27,6
04010-16	42	50	18	30	6	160	73	32	5	37,8
04010-20	52	60	22	30	8	200	92	40	6	58,8

04030

Clamp straps

swivel-heel

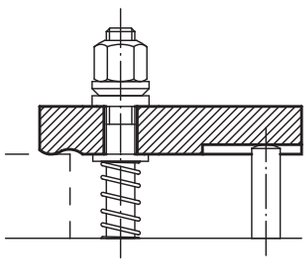


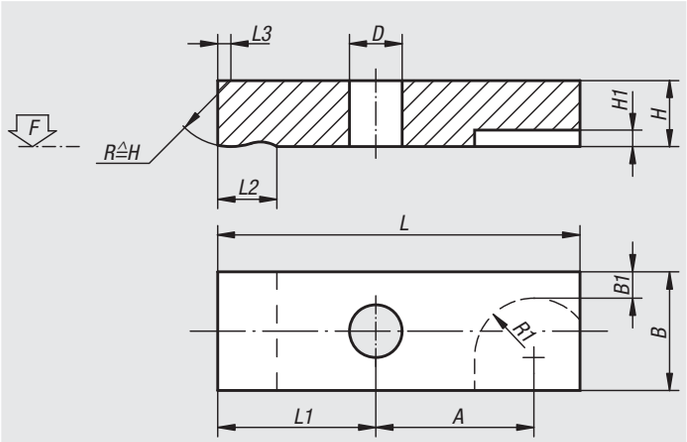
Material:
Carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04030-10

Note:
Recommended clamp supports: 02130 and 02150.





Order No.	L	L1	L2	L3	B	B1	H	H1	D	A	R1	F kN
04030-05	32	14	8	1,2	12	2,5	8	3	5,5	14	7	3,42
04030-06	40	17	10	1,6	16	4	10	3	7	18	8	4,82
04030-08	50	22	12	2	20	5	12	4	9	22	10	8,77
04030-10	63	28	16	2,5	25	6,5	16	4	11	27	12	13,9
04030-12	80	35	20	3	32	9	20	5	14	35	14	20,2
04030-14	100	44	25	4	40	12	25	6	16	44	16	27,6
04030-16	125	55	32	5	50	16	30	6	18	54	18	37,8
04030-20	160	75	40	6	60	20,5	30	8	22	65	22	58,8

04050

Clamp straps

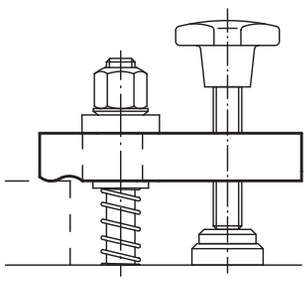
tapped-heel

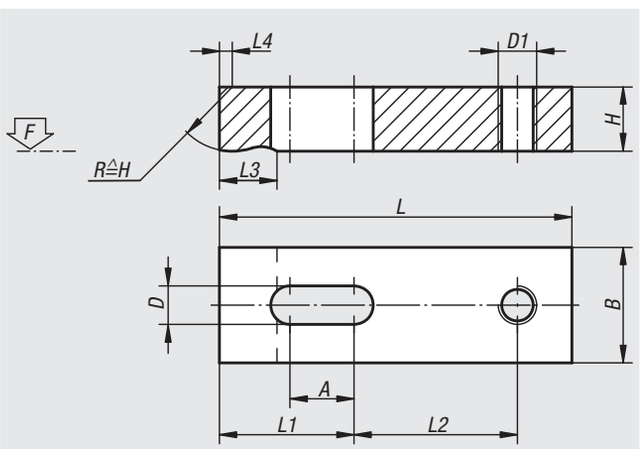
Material:
Carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04050-08

Note:
When using spherical washers use the wide series 07420 Form G.

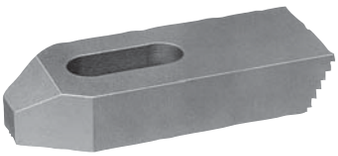




Order No.	L	L1	L2	L3	L4	B	H	D	D1	A	F kN
04050-05	40	18	18	8	1,2	12	8	5,5	M6	10	3,42
04050-06	50	22	23	10	1,6	16	10	7	M6	12	4,82
04050-08	63	28	29	12	2	20	12	9	M8	16	8,77
04050-10	80	36	36	16	2,5	25	16	11	M10	20	13,9
04050-12	100	45	45	20	3	32	20	14	M12	25	20,2
04050-14	125	57	56	25	4	40	25	16	M14	32	27,6
04050-16	160	72	72	32	5	50	30	18	M16	40	37,8
04050-20	200	90	90	40	6	60	30	22	M20	50	58,8

Clamp straps

stepped-heel, steel or aluminium



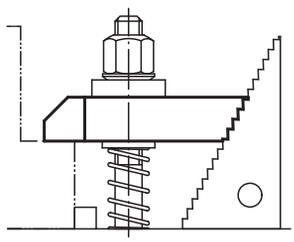
Material:
Carbon steel or EN AW-7022.

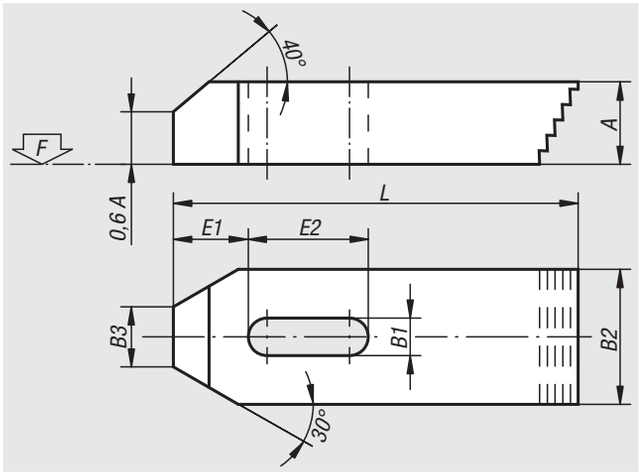
Version:
Painted, aluminium bright.

Sample order:
nlm 04070-12

Note:
Use only with step blocks 02270.

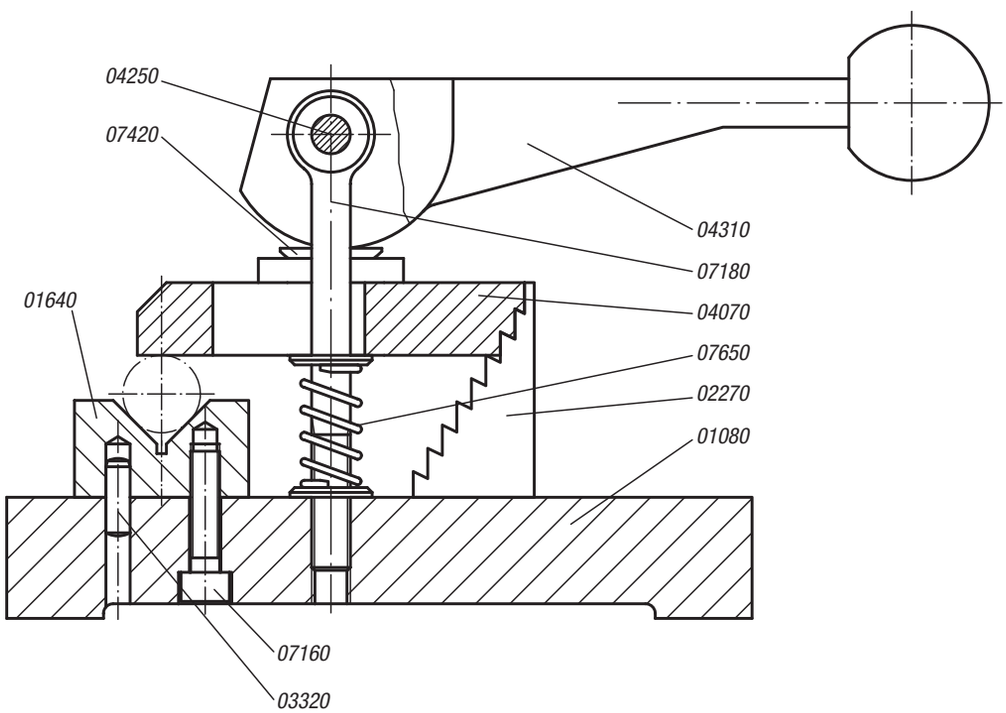
When using spherical washers 07420 use Form G.





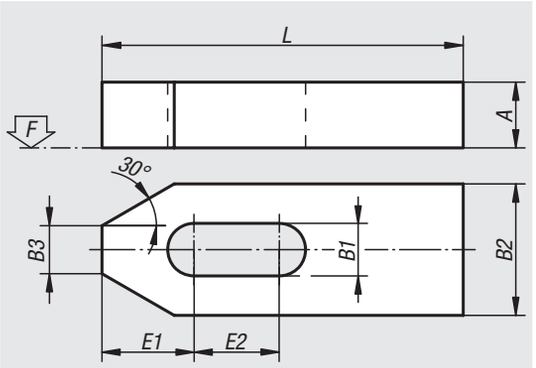
Order No. Material steel	Order No. Material aluminium	L	A	B1	B2	B3	E1	E2	F kN	for screw
04070-06	**04070-206**	50	10	7	20	8	10	20	4,82	M6
04070-08	**04070-208**	60	12	9	25	10	13	22	8,77	M8
04070-10	**04070-210**	80	15	11	30	12	15	30	13,9	M10
04070-12	**04070-212**	100	20	14	40	14	21	40	20,2	M12/M14
04070-16	**04070-216**	125	25	18	50	18	26	45	37,8	M16/M18
04070-20	**04070-220**	160	30	22	60	22	30	60	58,8	M20/M22
04070-24	**04070-224**	200	30	26	70	26	35	80	84,7	M24

Example of a fixture using almost exclusively norelem parts:



Clamp straps

DIN 6314 straight, steel or aluminium

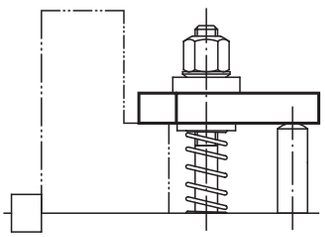


Material:
Carbon steel or EN AW-7022.

Version:
Painted, aluminium bright.

Sample order:
nlm 04080-16

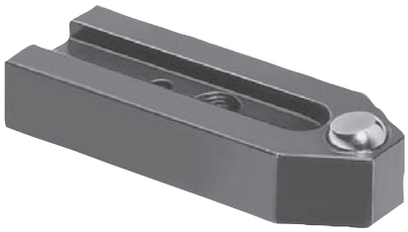
Note:
When using spherical washers use the wide series 07420 Form G.

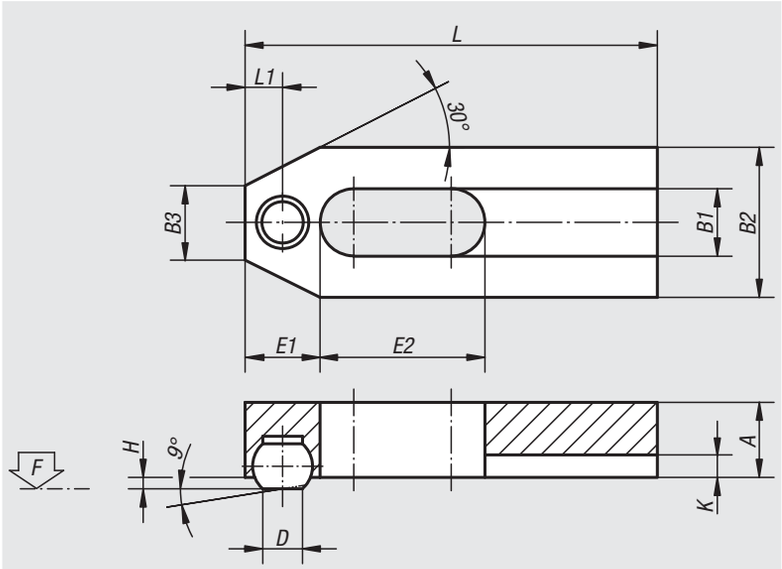


Order No. Material steel	Order No. Material aluminium	L	A	B1	B2	B3	E1	E2	F kN	for screw
04080-06	**04080-206**	50	10	7	20	8	13,5	13	4,82	M6
04080-08	**04080-208**	60	12	9	25	10	14,5	13	8,77	M8
04080-10	**04080-210**	80	15	11	30	12	20,5	19	13,9	M10
04080-12	**04080-212**	100	20	14	40	14	28	26	20,2	M12/M14
04080-14	**04080-214**	125	20	14	40	14	28	36	20,2	M12/M14
04080-16	**04080-216**	125	25	18	50	18	35	27	37,8	M16/M18
04080-18	**04080-218**	160	25	18	50	18	35	47	37,8	M16/M18
04080-20	**04080-220**	160	30	22	60	22	41	38	58,8	M20/M22
04080-201	**04080-2201**	200	30	22	60	22	41	58	58,8	M20/M22
04080-24	**04080-224**	200	30	26	70	26	48	54	84,7	M24
04080-241	**04080-2241**	250	35	26	70	26	48	79	84,7	M24
04080-30	**04080-230**	250	40	34	80	34	62	66	135	M30/M32
04080-301	**04080-2301**	315	50	34	80	34	62	96	135	M30/M32

Clamp straps

with flattened ball



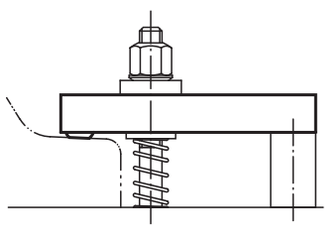


Material:
Straps carbon steel.
Balls roller bearing steel.

Version:
Strap black oxidised.
Ball hardened, bright.

Sample order:
nlm 04081-08

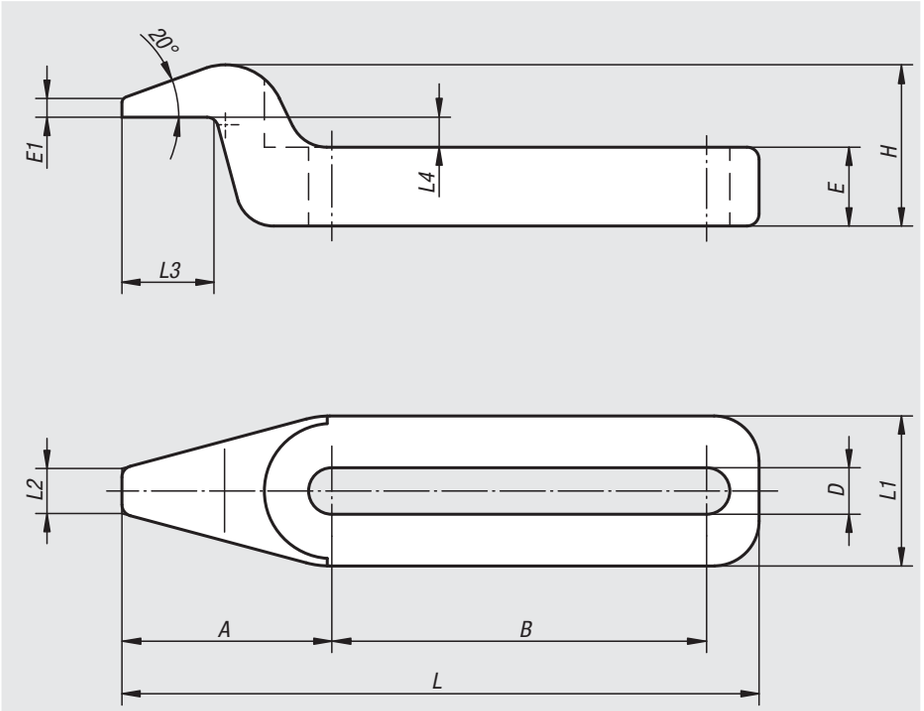
Note:
When using spherical washers 07420 use Form G.
Ball secured against rotation.



Order No.	L	L1	A	B1	B2	B3	D	H	K	Ball-Ø	E1	E2	F kN	for screw
04081-06	50	5	10	7	20	8	5,5	1,6	2,5	8,5	10	20	4,82	M6
04081-08	60	6,5	12	9	25	10	7,2	2	3	10	13	22	8,77	M8
04081-10	80	7,5	15	11	30	12	8,6	2,7	3,5	12	15	30	13,9	M10
04081-12	125	10,5	20	13	40	14	10,5	3,5	4	16	21	50	20,2	M12

Clamp straps gooseneck

narrow, steel

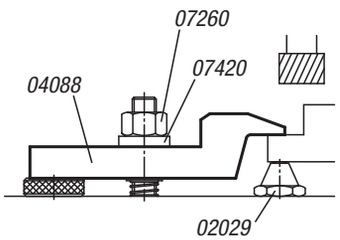


Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 04088-06010

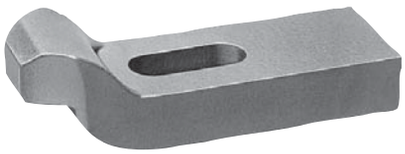
Note:
The flat gooseneck allows lower steps on the workpiece to be machined or clamped. When using spherical washers 07420 use Form G.

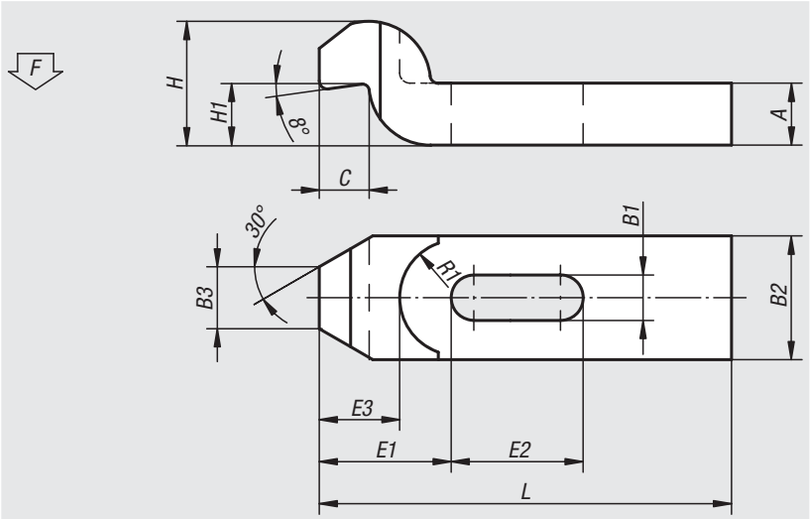


Order No.	A	B	D	E	E1	H	L	L1	L2	L3	L4	Clamping force kN
04088-06005	28	32	6,2	7,5	2,5	18,5	67	20	6	12,5	4	4,82
04088-06010	28	50	6,2	10,5	2,5	21,5	85	20	6	12,5	4	4,82
04088-08005	28	32	8,2	7,5	2,5	18,5	67	20	6	12,5	4	8,77
04088-08010	28	50	8,2	10,5	2,5	21,5	85	20	6	12,5	4	8,77
04088-10005	45	50	10,2	12	4	30	105	30	10	20	6	13,9
04088-10010	45	80	10,2	17	4	35	135	30	10	20	6	13,9
04088-12005	45	50	12,2	12	4	30	105	30	10	20	6	20,2
04088-12010	45	80	12,2	17	4	35	135	30	10	20	6	20,2
04088-16005	72	80	16,2	19	7	48	168	48	16	32	9,5	37,8
04088-16010	72	128	16,2	27	7	56	216	48	16	32	9,5	37,8
04088-20005	72	80	20,2	19	7	48	168	48	16	32	9,5	58,8
04088-20010	72	128	20,2	27	7	56	216	48	16	32	9,5	58,8

Clamp straps gooseneck

DIN 6316 wide, steel or aluminium



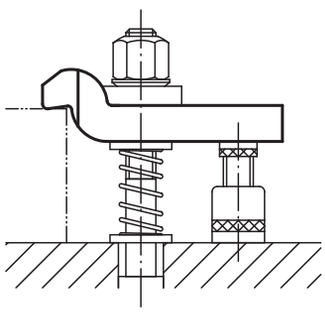


Material:
Carbon steel or EN AW-7022.

Version:
Painted, aluminium bright.

Sample order:
nlm 04090-10

Note:
When using spherical washers use the wide series 07420 Form G.



Order No. Material steel	Order No. Material aluminium	L	B1	B2	B3	H	H1	A	C	E1	E2	E3	R1	F kN	for screw
04090-06	**04090-206**	60	7	20	10	20	9	10	8	20	20	14	11	4,82	M6
04090-08	**04090-208**	80	9	25	12	24	11	12	9	25	25	17	14	8,77	M8
04090-10	**04090-210**	100	11	30	15	30	14	15	12	32	32	22	18	13,9	M10
04090-12	**04090-212**	125	14	40	20	40	18	20	16	40	40	28	20	20,2	M12/M14
04090-16	**04090-216**	125	18	50	25	46	23	25	20	49	40	38	25	37,8	M16/M18
04090-161	**04090-2161**	160	18	50	25	46	23	25	20	49	50	38	25	37,8	M16/M18
04090-20	**04090-220**	160	22	60	30	60	28	30	24	55	55	40	28	58,8	M20/M22
04090-201	**04090-2201**	200	22	60	30	60	28	30	24	55	70	40	28	58,8	M20/M22
04090-24	**04090-224**	200	26	70	35	70	32	35	28	72	60	54	34	84,7	M24
04090-241	**04090-2241**	250	26	70	35	70	32	35	28	72	80	54	34	84,7	M24
04090-30	**04090-230**	250	34	80	40	80	37	40	40	91	80	72	40	135	M30/M32
04090-301	**04090-2301**	315	34	80	40	100	56	50	40	91	100	72	40	135	M30/M32

Clamp straps

assorted, long slot

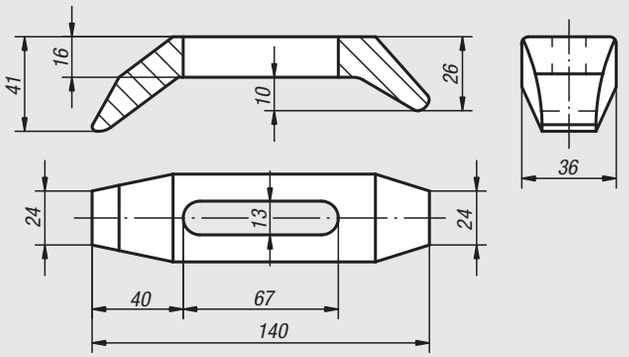
Material:
Carbon steel 1.7225

Version:
Tempered to 1000 N/mm², black oxidised.

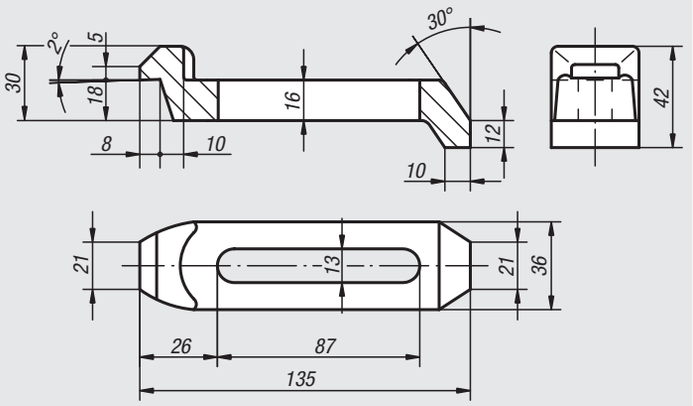
Sample order:
nlm 04100-10

Note:
These clamp straps with long slot are also used with the compact clamp strap module 04200.

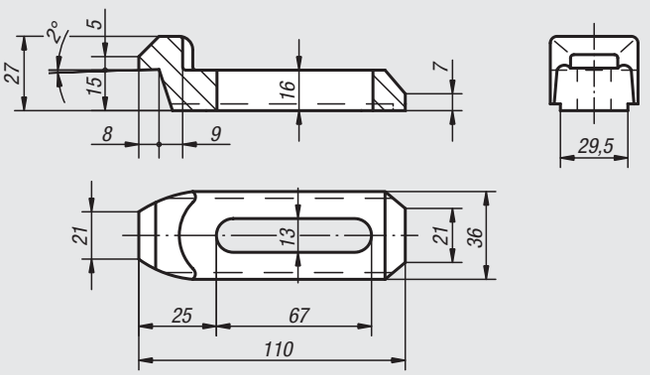
04100-01 (0,5 kg)

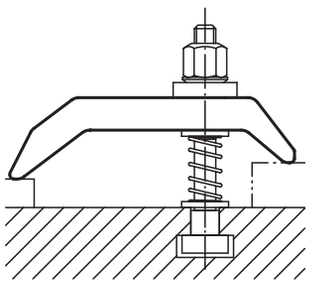


04100-05 (0,48 kg)



04100-10 (0,35 kg)





Order No.	Approx. weight kg
04100-01	0,5
04100-05	0,48
04100-10	0,355

Clamp straps open U

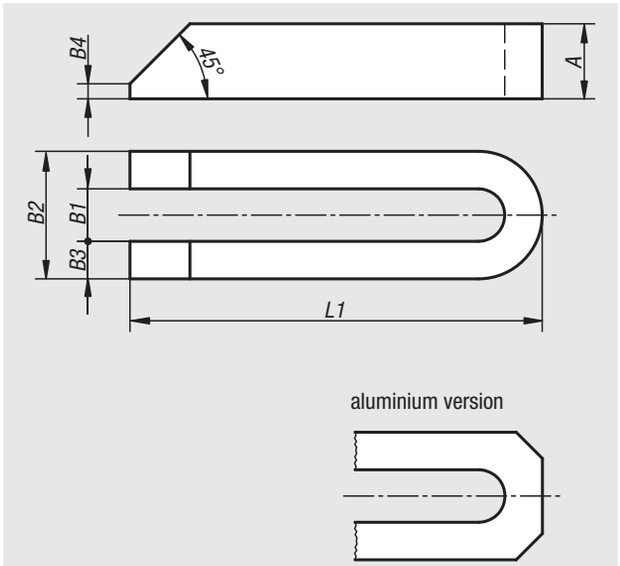
DIN 6315, steel or aluminium

Material:
Carbon steel or EN AW-7022.

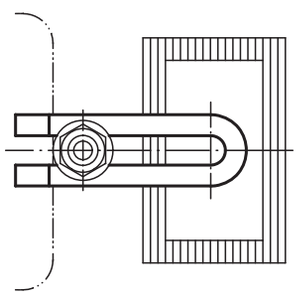
Version:
Painted, aluminium bright.

Sample order:
nlm 04110-06

Note:
When using spherical washers use the wide series 07420 Form G.

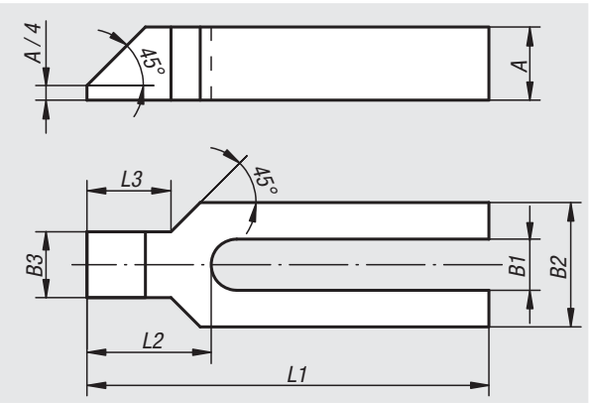


Order No.	Material	L1	A	B1	B2	B3	B4	for screw
04110-06	steel	60	12	7	19	6	3	M6
04110-08	steel	80	15	9	25	8	4	M8
04110-10	steel	100	20	11	31	10	5	M10
04110-12	steel	125	25	14	39	12	6	M12/M14
04110-121	steel	160	25	14	39	12	6	M12/M14
04110-122	steel	200	25	14	38	12	6	M12/M14
04110-16	steel	160	30	18	48	15	8	M16/M18
04110-161	steel	200	30	18	48	15	8	M16/M18
04110-162	steel	250	40	18	48	15	10	M16/M18
04110-20	steel	200	40	22	52	15	10	M20/M22
04110-201	steel	250	40	22	63	20	10	M20/M22
04110-202	steel	315	40	22	62	20	10	M20/M22
04110-24	steel	200	40	26	66	20	10	M24
04110-241	steel	250	40	26	66	20	10	M24
04110-242	steel	315	40	26	66	20	10	M24
04110-301	steel	250	50	34	74	20	12	M30/M32
04110-30	steel	315	50	34	74	20	12	M30/M32
04110-302	steel	400	50	34	74	20	12	M30/M32
04110-40	steel	400	60	40	100	30	12	M36
04110-401	steel	600	60	40	100	30	12	M36
04110-206	aluminium	60	12	7	19	6	3	M6
04110-208	aluminium	80	15	9	25	8	4	M8
04110-210	aluminium	100	20	11	31	10	5	M10
04110-212	aluminium	125	25	14	39	12	6	M12/M14
04110-2121	aluminium	160	28	14	39	12	6	M12/M14
04110-216	aluminium	160	30	18	48	15	8	M16/M18
04110-2161	aluminium	200	36	18	48	15	8	M16/M18
04110-220	aluminium	200	40	22	52	15	10	M20/M22
04110-2201	aluminium	250	40	22	63	20	10	M20/M22
04110-224	aluminium	200	40	26	66	20	10	M24
04110-2241	aluminium	250	40	26	66	20	10	M24
04110-230	aluminium	315	50	34	74	20	12	M30/M32



Clamp straps open U

flat pin, steel or aluminium

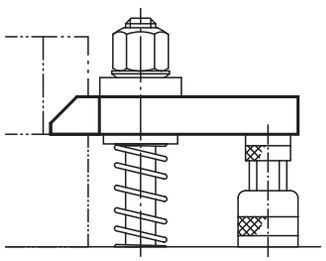


Material:
Carbon steel or EN AW-7022.

Version:
Painted, aluminium bright.

Sample order:
nlm 04130-12

Note:
When using spherical washers use the wide series 07420 Form G.

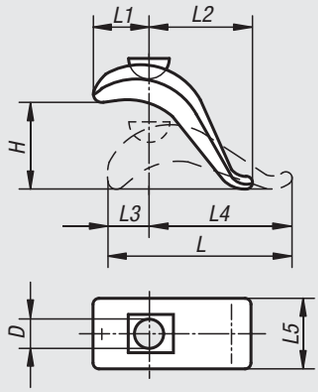


Order No.	Material	L1	A	B1	B2	B3	L2	L3	for screw
04130-08	steel	100	15	9	30	16	32	18	M8
04130-10	steel	125	20	11	30	20	38	24	M10
04130-12	steel	160	25	14	40	24	47	30	M12/M14
04130-121	steel	200	25	14	40	24	47	30	M12/M14
04130-16	steel	200	30	18	50	28	57	36	M16/M18
04130-161	steel	250	30	18	50	28	57	36	M16/M18
04130-20	steel	250	40	22	60	35	68	45	M20/M22
04130-201	steel	315	40	22	60	35	68	45	M20/M22
04130-24	steel	250	40	26	70	43	83	56	M24
04130-241	steel	315	40	26	70	43	83	56	M24
04130-30	steel	315	50	34	80	50	88	56	M30/M32
04130-301	steel	400	50	34	80	50	88	56	M30/M32
04130-208	aluminium	100	15	9	30	16	32	18	M8
04130-210	aluminium	125	20	11	30	20	38	24	M10
04130-212	aluminium	160	28	14	40	24	47	30	M12/M14
04130-2121	aluminium	200	36	14	40	24	47	30	M12/M14
04130-216	aluminium	200	36	18	50	28	57	36	M16/M18
04130-2161	aluminium	250	40	18	50	28	57	36	M16/M18
04130-220	aluminium	250	40	22	60	35	68	45	M20/M22
04130-2201	aluminium	315	48	22	60	35	68	45	M20/M22
04130-224	aluminium	250	40	26	70	43	83	56	M24
04130-2241	aluminium	315	48	26	70	43	83	56	M24
04130-230	aluminium	315	50	34	80	50	88	56	M30/M32
04130-2301	aluminium	400	50	34	80	50	88	56	M30/M32

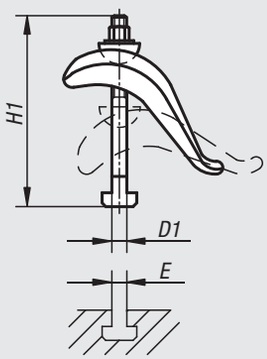
Clamp straps pivot

strap only or assembly

Form A
strap only



Form B
with T-slot bolt,
nut and washer



Material:
Steel.

Version:
Forged, tempered and painted.
Bolts, nuts, washers grade 8.8

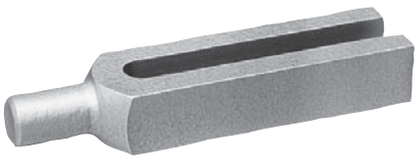
Sample order:
nlm 04140-010

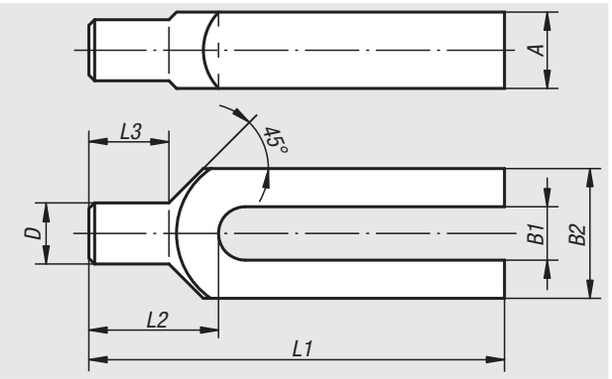
Note:
The strap provides instant height adjustment without blocks or shims and requires little space on the machine table. Designed for rugged use and highly suitable for clamping blanking and punching dies.

Order No.	Form	D	D1	E	H	H1	L	L1	L2	L3	L4	L5	Clamping force kN
04140-010	A	17	-	-	75	-	140	55	60	30	110	50	20,2
04140-020	A	21	-	-	85	-	175	70	80	40	135	60	37,8
04140-030	B	17	M12	12	50	125	140	55	60	30	110	50	20,2
04140-040	B	17	M12	14	50	125	140	55	60	30	110	50	20,2
04140-050	B	17	M16	16	75	160	140	55	60	30	110	50	37,8
04140-060	B	17	M16	18	75	160	140	55	60	30	110	50	37,8
04140-080	B	21	M16	16	65	160	175	70	80	40	135	60	37,8
04140-100	B	21	M16	18	65	160	175	70	80	40	135	60	37,8
04140-120	B	21	M20	22	85	200	175	70	80	40	135	60	58,8

Clamp straps open U

DIN 6315 C, round pin, steel or aluminium





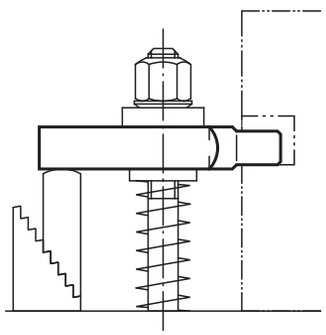
Material:
Carbon steel or EN AW-7022.

Version:
Painted, aluminium bright.

Sample order:
nlm 04150-161

Note:
When using spherical washers 07420 use Form G.

The stated clamping forces are only valid for steel straps.

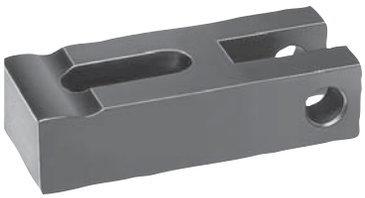


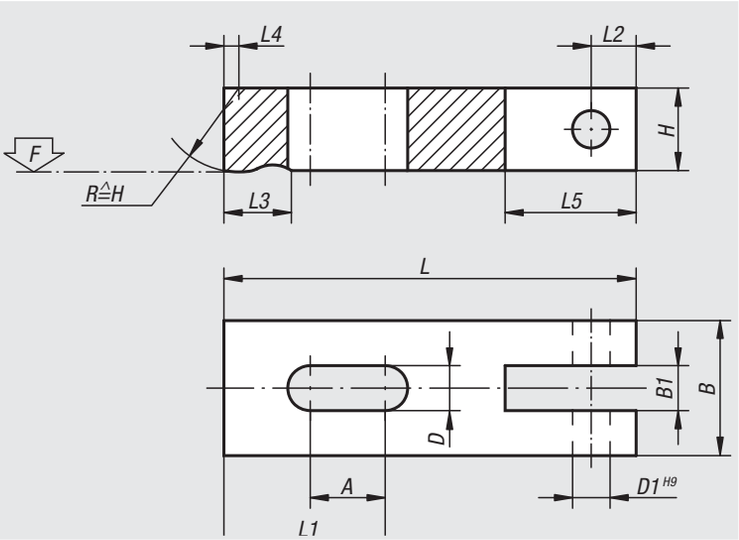
Order No.	Material	L1	A	B1	B2	D	L2	L3	for screw	Clamping force kN
04150-08	steel	100	15	9	30	12	30	18	M8	8,77
04150-10	steel	125	20	11	30	16	36	24	M10	13,9
04150-12	steel	160	25	14	40	20	45	30	M12/M14	20,2
04150-121	steel	200	25	14	40	20	45	30	M12/M14	20,2
04150-16	steel	200	30	18	50	24	55	36	M16/M18	37,8
04150-161	steel	250	30	18	50	24	55	36	M16/M18	37,8
04150-20	steel	250	40	22	60	30	65	45	M20/M22	58,8
04150-201	steel	315	40	22	60	30	65	45	M20/M22	58,8
04150-208	aluminium	100	15	9	30	12	30	18	M8	-
04150-210	aluminium	125	20	11	30	16	36	24	M10	-
04150-212	aluminium	160	28	14	40	20	45	30	M12/M14	-
04150-216	aluminium	200	30	18	50	24	55	36	M16/M18	-
04150-2161	aluminium	250	30	18	50	24	55	36	M16/M18	-
04150-220	aluminium	250	40	22	60	30	65	45	M20/M22	-

04170

Clamp straps

hinge heel



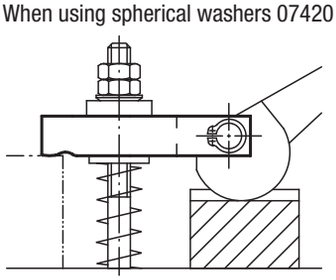


Material:
Carbon steel 1.1191

Version:
Tempered and black oxidised.

Sample order:
nlm 04170-12

Note:
Suitable hinge pins 04250. Cam levers 04290.
When using spherical washers 07420 use Form G.

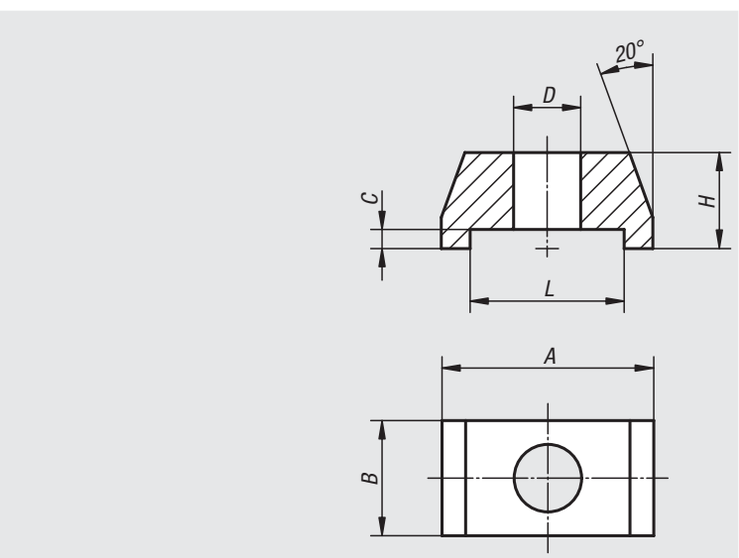


Order No.	L	L1	L2	L3	L4	L5	B	B1	H	D	D1	A	F max. kN
04170-08	63	28	8	12	2	24	25	9,5	16	9	8	16	8,77
04170-10	80	36	10	16	2,5	29	32	12,5	20	11	10	20	13,9
04170-12	100	45	12	22	3	36	40	14,5	25	14	12	25	20,2

04185

Clamp straps mini

double sided

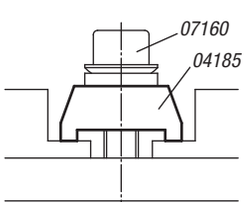


Material:
Steel.

Version:
Black oxidised.

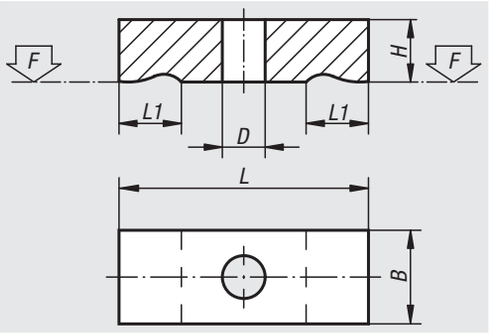
Sample order:
nlm 04185-012

Note:
Two workpieces can be clamped simultaneously from one clamping point using the mini clamp strap.



Order No.	A	B	C	D	H	L	Clamping force kN
04185-006	22	12	2	7	10	16	4,82
04185-008	22	12	2	9	10	16	8,77
04185-010	35	19	3	11	15	24	13,9
04185-012	35	19	3	13	15	24	20,2
04185-016	50	29	5	17	25	36	37,8

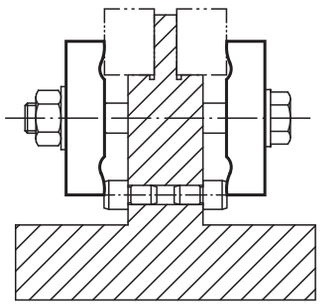
Clamp straps double sided



Material:
Carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04190-12



Order No.	L	L1	B	H	D	F kN
04190-05	32	8	12	8	5,5	3,42
04190-06	40	10	16	10	7	4,82
04190-08	50	12	20	12	9	8,77
04190-10	63	16	25	16	11	13,9
04190-12	80	20	32	20	14	20,2
04190-14	100	25	40	25	16	27,6
04190-16	125	32	50	30	18	37,8
04190-20	160	40	60	30	22	58,8

Notes

Clamp straps, double-sided

90° swivelling

Material:
Carbon steel.

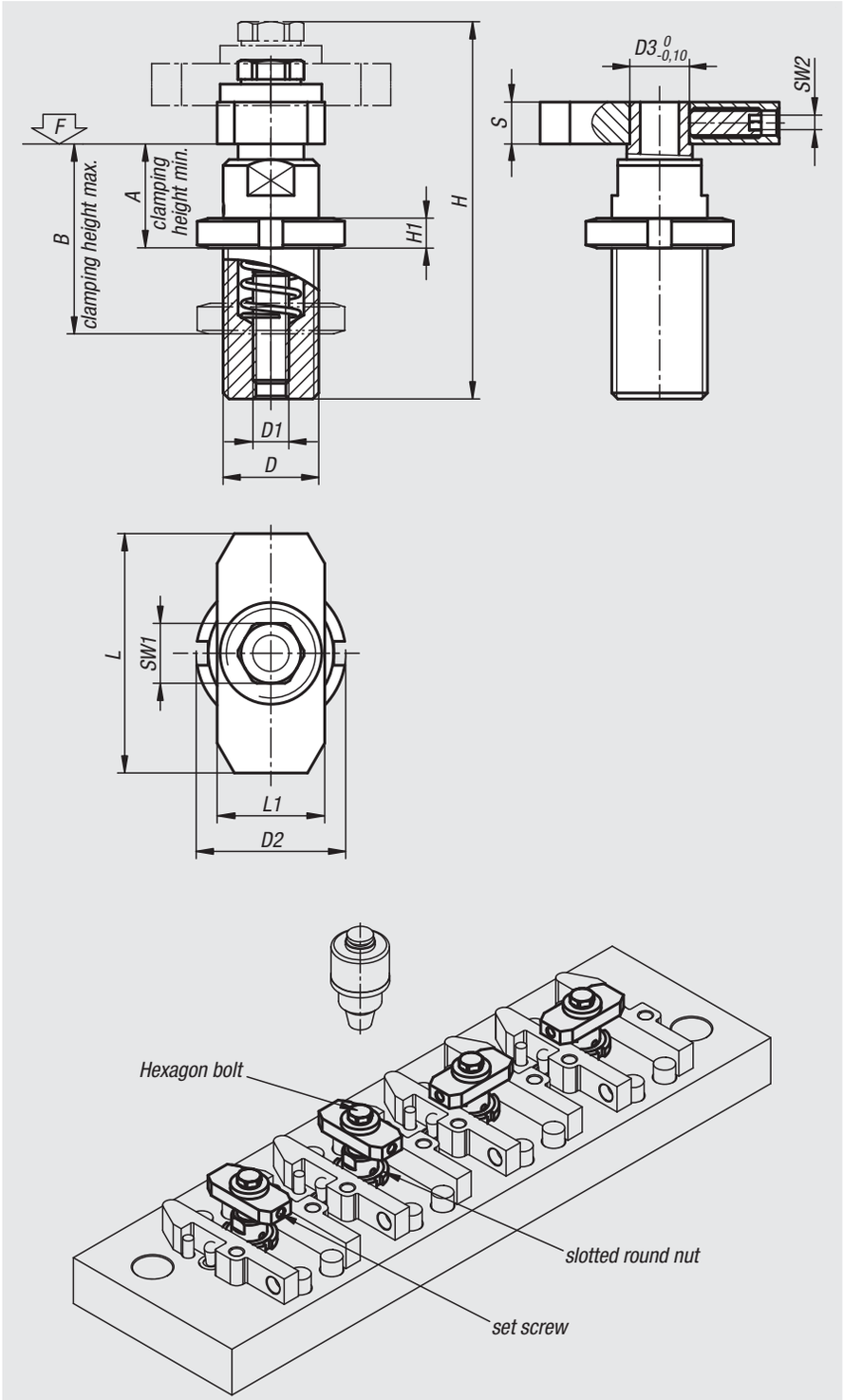
Version:
Tempered and black oxidised.

Sample order:
nlm 04191-1640

Note:
The double-sided clamp straps are ideal for series clamping.
For special applications, the clamping flange can be replaced with another clamping flange by loosening the clamping screw. The clamping flange must always have a contact point on both sides.

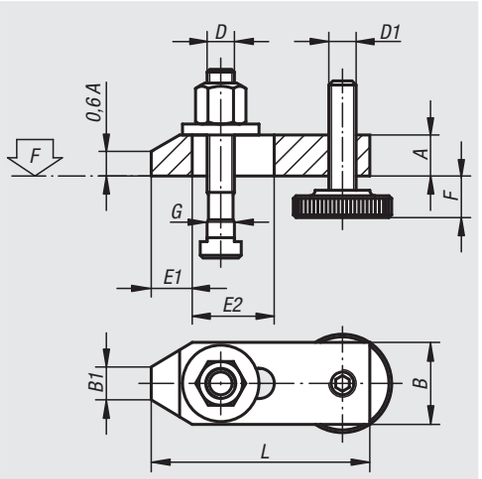
Functional principle:
1. Use a hand-held or electric tool to tighten the hexagon head bolt (make sure that the maximum tightening torque is not exceeded). When clamping, the clamping flange automatically turns by quarter of a rotation and starts the clamping stroke.

2. Use reverse procedure to loosen the hexagon head bolt. The clamping flange automatically returns to its starting position (the clamping screw can be used to change the position of the clamping flange).



Order No.	D	D1	D2	D3	A	B	S	H	H1	L	L1	SW1	SW2	Tightening torque max. Nm	F max. kN
04191-1640	M16x1	M6	25	10	15	25	7	61	5	40	18	10	2,5	10,4	8,97
04191-2460	M24x2	M8	36	14	22	35	9	87	7	60	28	13	3	25,3	16,5

Clamp strap assemblies



Material:
Carbon steel.
Screws tempered to 8.8.

Version:
Clamp painted. Screws black oxidised.

Sample order:
nlm 04192-1616

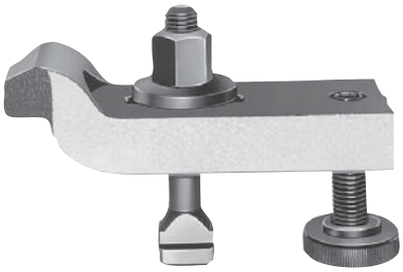
Note:
„F“ is dependent on the depth of slot according to DIN 650.

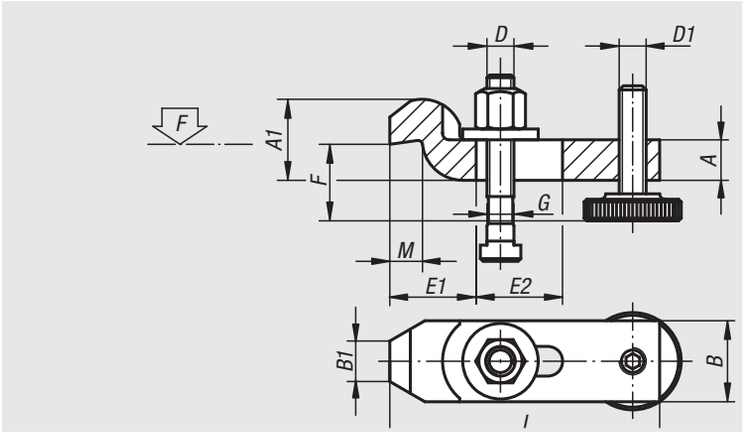
Order No.	L	A	B	B1	E1	E2	F	G for T-slot	D	D1	F kN
04192-1010	80	15	30	12	15	30	8-32	10	M10x80	M10	13,9
04192-1212	100	20	40	14	21	40	10-40	12	M12x100	M12	20,2
04192-1214	100	20	40	14	21	40	10-38	14	M12x100	M12	20,2
04192-1616	125	25	50	18	26	45	13-49	16	M16x125	M16	37,8
04192-1618	125	25	50	18	26	45	13-46	18	M16x125	M16	37,8
04192-2020	160	30	60	22	30	60	16-65	20	M20x160	M20	58,8
04192-2022	160	30	60	22	30	60	16-65	22	M20x160	M20	58,8

04193

Clamp strap assemblies

goose-neck





Material:
Carbon steel.
Screws tempered to 8.8.

Version:
Straps painted.
Screws black oxidised.

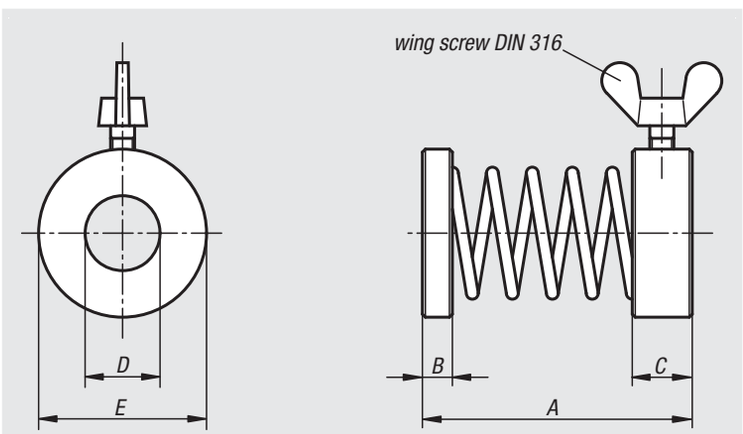
Sample order:
nlm 04193-1616

Note:
„F“ is dependent on the slot depth acc. to DIN 650.

Order No.	L	A	A1	B	B1	E1	E2	F	G for T-slot	D	D1	M	F kN
04193-1010	100	15	30	30	15	32	32	22-46	10	M10x80	M10	12	13,9
04193-1212	125	20	40	40	20	40	40	28-58	12	M12x100	M12	16	20,2
04193-1214	125	20	40	40	20	40	40	28-56	14	M12x100	M12	16	20,2
04193-1616	160	25	50	50	25	49	50	36-72	16	M16x125	M16	20	37,8
04193-1618	160	25	50	50	25	49	50	36-69	18	M16x125	M16	20	37,8
04193-2020	200	30	60	60	30	55	70	43-92	20	M20x160	M20	24	58,8
04193-2022	200	30	60	60	30	55	70	43-92	22	M20x160	M20	24	58,8

04195

Clamp springs



Material:
Thrust and retaining ring carbon steel, spring spring steel

Version:
Thrust and retaining ring black oxidised.
Spring bright.

Sample order:
nlm 04195-12046

Order No.	A	B	C	D	E	Wing nuts to DIN 316
04195-08029	29	2	6	8,5	16	M4x6
04195-12046	46	3	8	13	25	M4x10
04195-16050	50	4	8	16,5	28	M5x10

Clamp strap modules

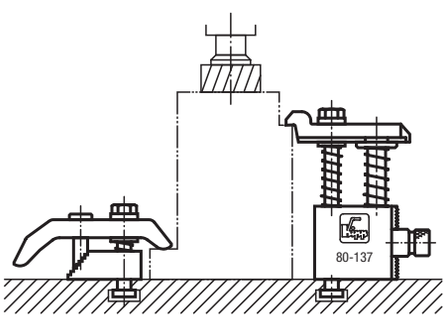
compact

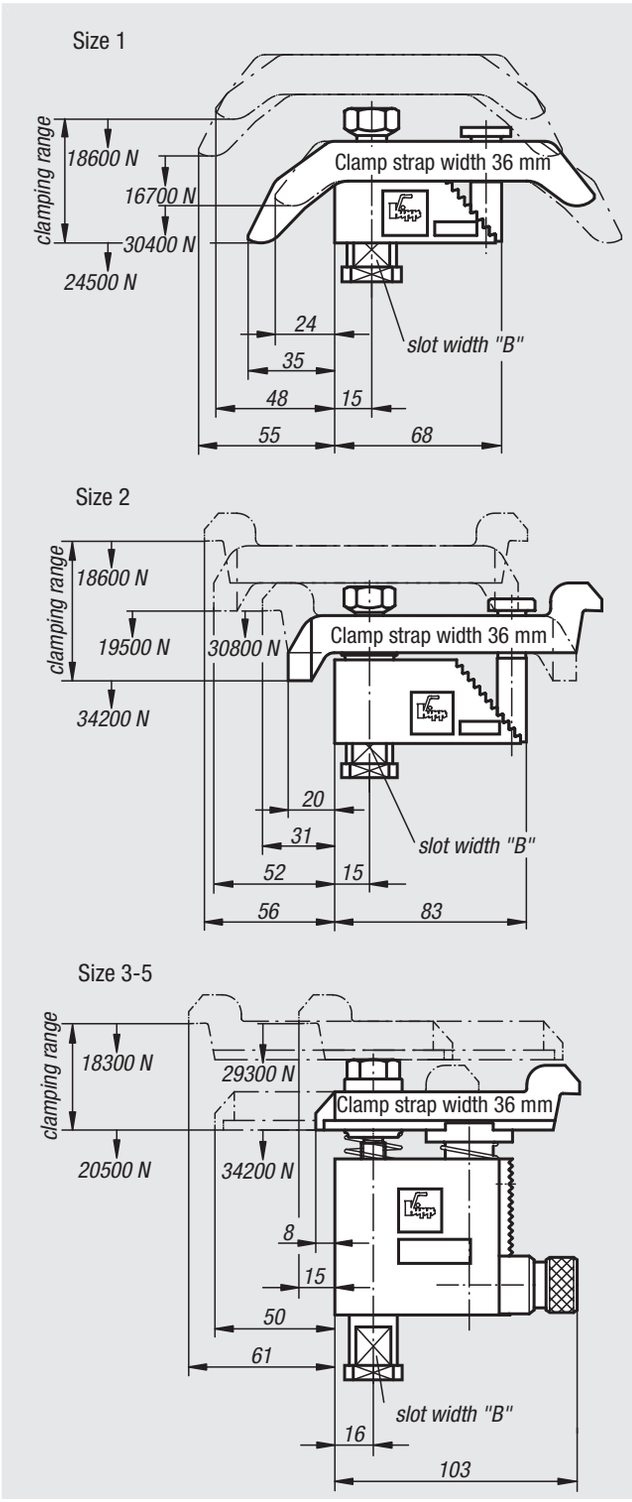
Material:
Base, ductile iron.
Strap clamps and clamping screw carbon steel.

Version:
Black oxidised.

Sample order:
nlm 04200-40X16 (include dimension B)

Note:
These clamp strap modules are universal, flexible clamps constructed from individual components building a compact unit. There are no loose parts which first have to be altered for a clamping operation. The compact design allows these clamps to be placed close to the workpiece allowing the full area of the machine table can be used.





Order No.	Size	Clamp range	Slot width B to DIN 650
04200-10X	1	0-35	12/14/16/18
04200-20X	2	25-85	12/14/16/18
04200-30X	3	80-137	12/14/16/18
04200-40X	4	125-224	12/14/16/18
04200-50X	5	160-300	12/14/16/18

04205

Clamp straps pivot

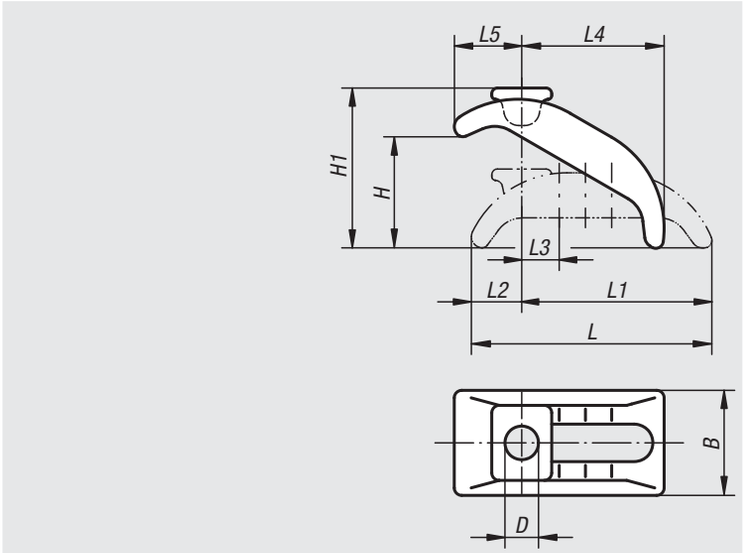
steel

Material:
Carbon steel.

Version:
Blue galvanised.

Sample order:
nlm 04205-20

Note:
The strap provides instant height adjustment without blocks or shims and requires little space on the machine table. Designed for rugged use and highly suitable for clamping blanking and punching dies. Suitable mounting bolts for these clamps see 07040.



Order No.	suitable for slot width	suitable fastening screw	D	L	L1	L2	L3	L4	L5	B	H	H1
04205-12	12, 14	M12	13	88	68	23	14	48	28	38	0-40	57
04205-16	16, 18	M16	18	130	101	29	18	74	38	56	0-65	90
04205-20	20, 22	M20	22	144	112	32	20	80	46	66	0-70	103
04205-24	24, 28	M24	26	174	135	39	24	100	52	76	0-85	120

04210

Clamp straps hinge heel

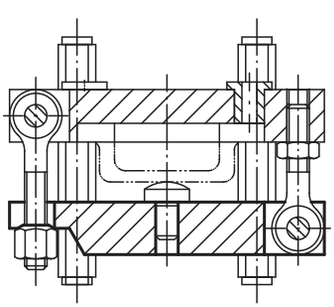
with bolt slot

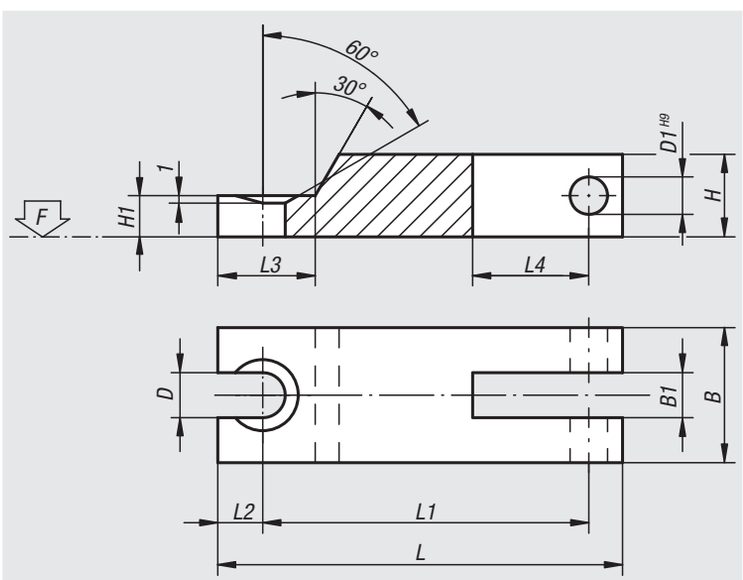
Material:
Carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04210-10

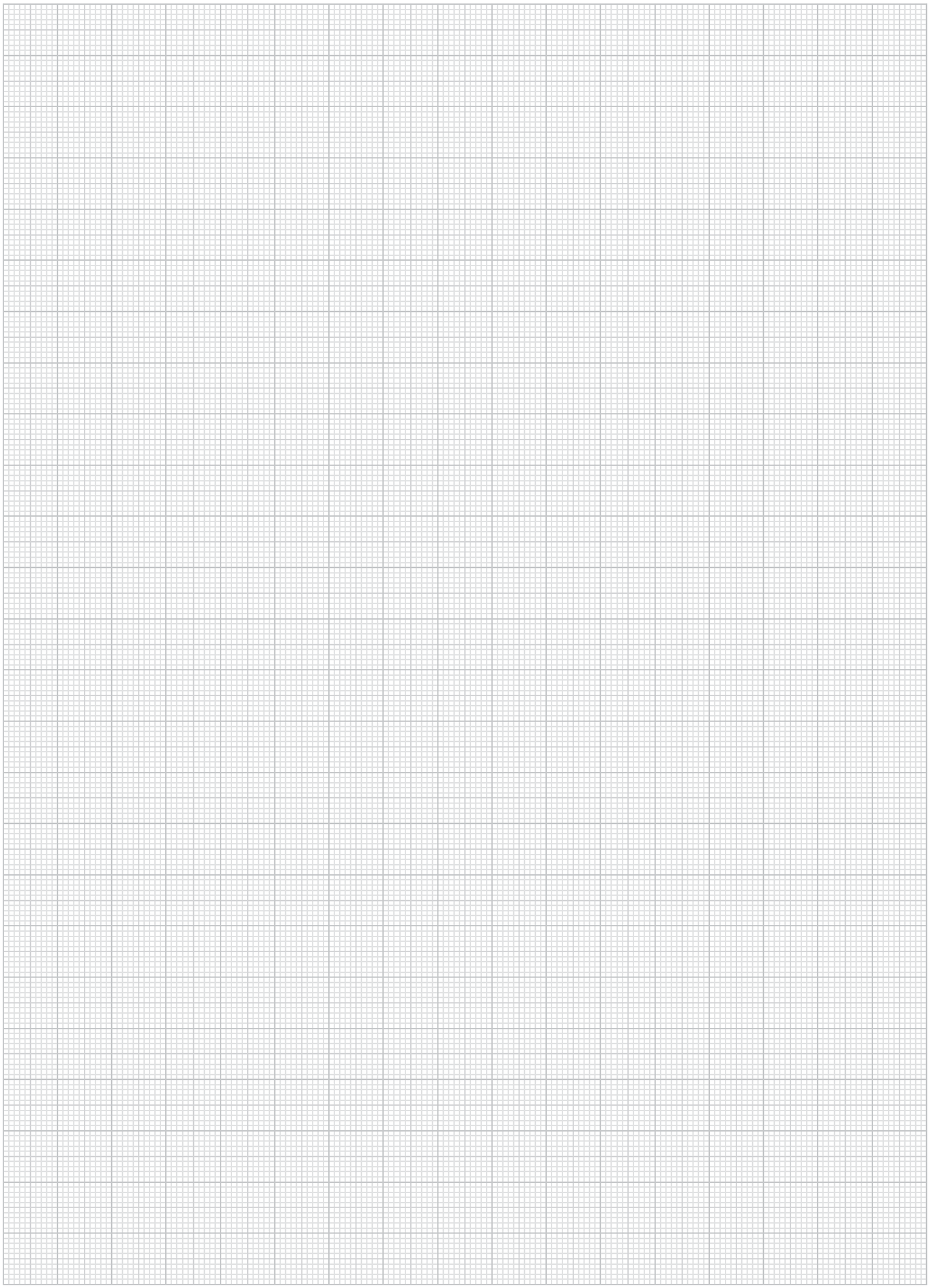
Note:
Suitable hinge pins see 04520.
Use hexagon nut 07260 to clamp.





Order No.	L	L1	L2	L3	L4	B	B1	H	H1	D	D1	F kN
04210-08	100	85	7	17	11	25	9,5	16	8	9	8	17,54
04210-10	125	105	10	24	12	32	12,5	20	10	11	10	27,8
04210-12	160	138	10	25	15	40	14,5	25	12,5	14	12	40,4

Notes



Cam levers

internal and external thread, steel or stainless steel

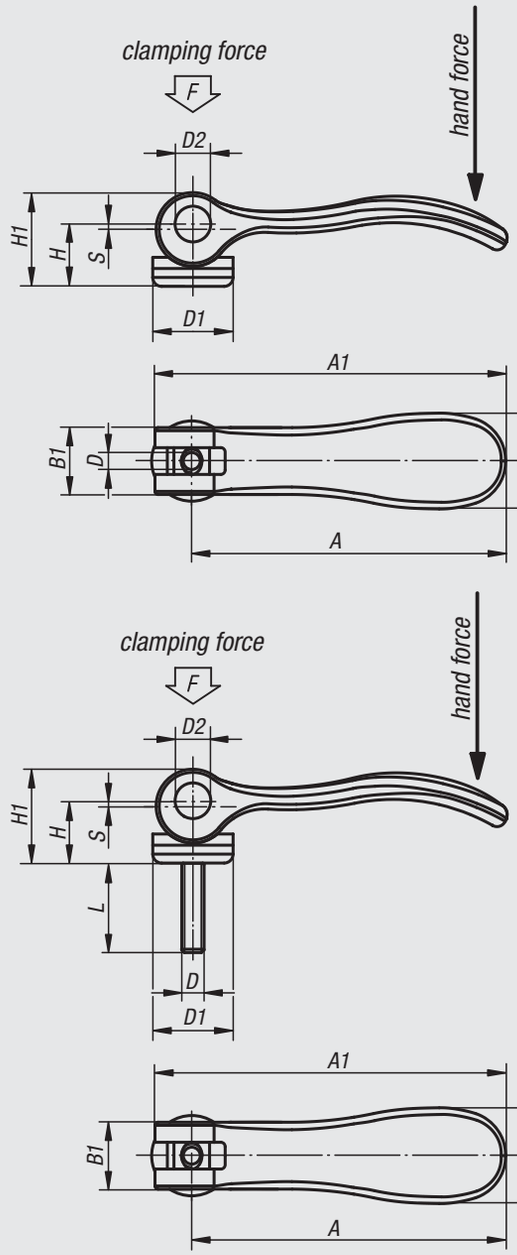
Material:
Handles cast aluminum EN AC-46200.
Thrust washer plastic PA 66 GF 35-X fibreglass reinforced.
Hinge pin stainless steel 1.4305.
Studs and washer steel grade 5.8 or stainless steel 1.4305.

Version:
Handles black powder-coated.
Thrust washer, black.
Hinge pin, bright.
Studs and washer blue chromed steel or bright stainless steel.

Sample order:
nlm 04232-1501105X20 (include length L)

Note:
Plastics are characterized by creeping under load (retardation).

Cam lever
with internal thread



Cam lever
with external thread

Cam levers

internal and external thread, steel or stainless steel

Cam levers with internal thread

Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	Clamping force F (kN)	Hand force N
04232-9501103	**04232-9511103**	M3	12	6	14,4	11,5	9	13	36,2	41,7	1	1,5	90
04232-9501104	**04232-9511104**	M4	12	6	14,4	11,5	9	13	36,2	41,7	1	1,5	90
04232-0501104	**04232-0511104**	M4	15,4	8	18	13	11,2	17	52,3	59,1	1	2,5	100
04232-0501105	**04232-0511105**	M5	15,4	8	18	13	11,2	17	52,3	59,1	1	2,5	100
04232-1501105	**04232-1511105**	M5	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	4	120
04232-1501106	**04232-1511106**	M6	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	4	120
04232-2501108	**04232-2511108**	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	8	350

Cam levers with external thread

Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	L	Clamping force F (kN)	Hand force N
04232-9501103X	**04232-9511103X**	M3	12	6	14,4	11,5	9	13	36,2	41,7	1	10/15/30	1,5	90
04232-9501104X	**04232-9511104X**	M4	12	6	14,4	11,5	9	13	36,2	41,7	1	10/15/30	1,5	90
04232-0501104X	**04232-0511104X**	M4	15,4	8	18	13	11,2	17	52,3	59,1	1	15/20/30	2,5	100
04232-0501105X	**04232-0511105X**	M5	15,4	8	18	13	11,2	17	52,3	59,1	1	20/30/40/50	2,5	100
04232-1501105X	**04232-1511105X**	M5	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04232-1501106X	**04232-1511106X**	M6	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04232-2501108X	**04232-2511108X**	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350
04232-2501110X	**04232-2511110X**	M10	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350

Cam levers

internal and external thread, stainless steel

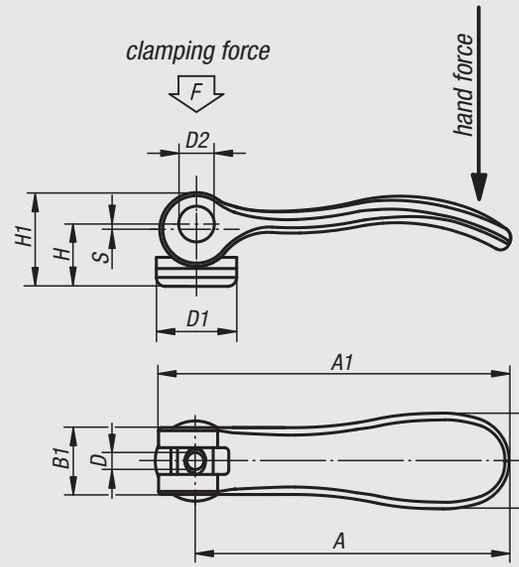
Material:
Handles 1.4308.
Thrust washer plastic PA 66 GF 35-X fibreglass reinforced.
Hinge pin bolt, washer and studs 1.4305.

Version:
Handle electrolytic polished.
Thrust washer, black.
Hinge pin, washer and studs, bright.

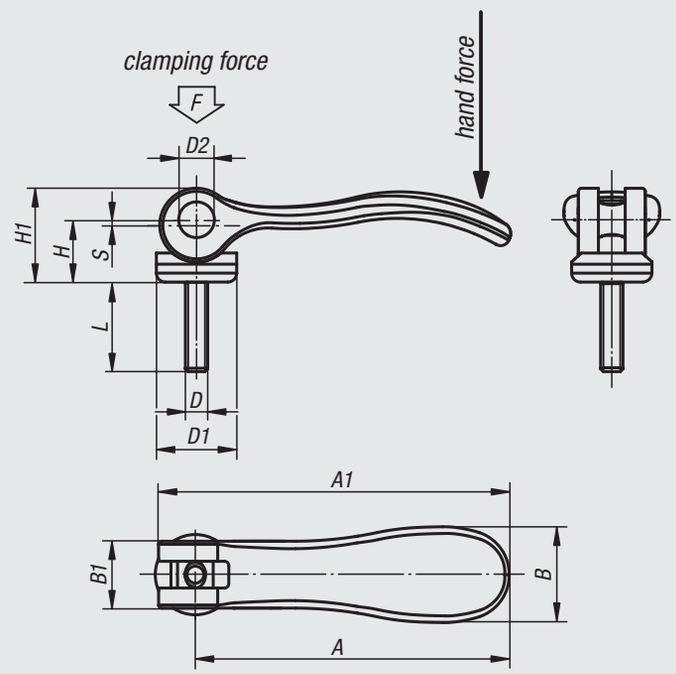
Sample order:
nlm 04232.1512005X20 (include length L)

Note:
Plastics are characterized by creeping under load (retardation).

Cam lever
with internal thread



Cam lever
with external thread



Cam levers with internal thread, stainless steel

Order No.	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	Clamping force F (kN)	Hand force N
04232-1512005	M5	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	4	120
04232-1512006	M6	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	4	120
04232-2512008	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	8	350

Cam levers with external thread, stainless steel

Order No.	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	L	Clamping force F (kN)	Hand force N
04232-1512005X	M5	18,1	9	21,5	15	14,5	22	70,4	79,5	1,2	20/30/40/50	4	120
04232-1512006X	M6	18,1	9	21,5	15	14,5	22	70,4	79,5	1,2	20/30/40/50	4	120
04232-2512008X	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350
04232-2512010X	M10	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350

Cam levers with plastic handle

internal and external thread, steel or stainless steel

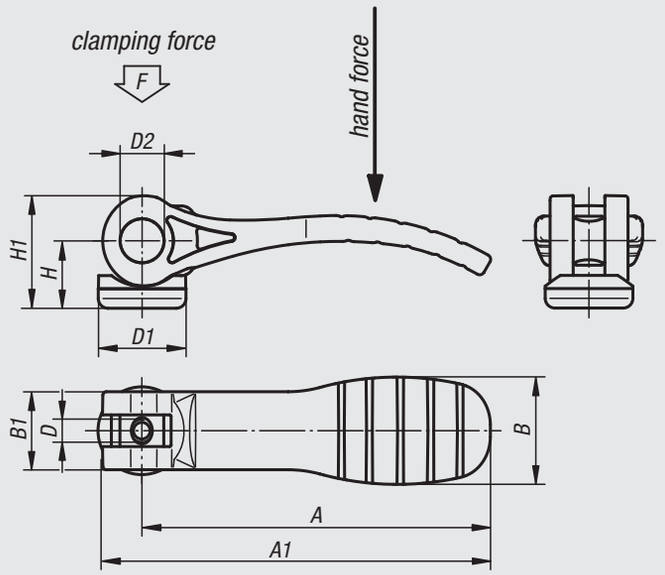
Material:
Handles and thrust washer plastic PA 66 fibreglass reinforced.
Hinge pins stainless steel 1.4305.
Studs and washer steel grade 5.8 or stainless steel 1.4305.

Version:
Handle and thrust washer, black.
Hinge pin, bright.
Studs and washer blue chromed or bright stainless steel.

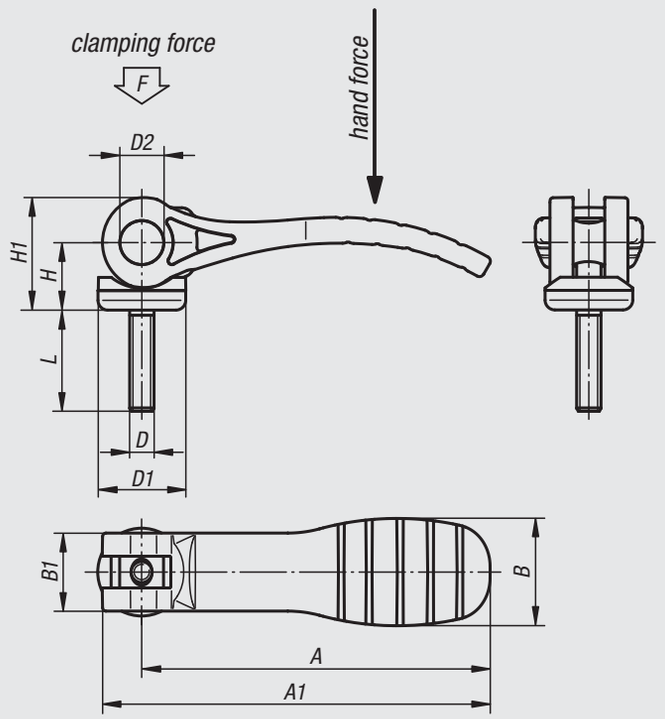
Sample order:
nlm 04232-1521105X20 (include length L)

Note:
Plastics are subject to creeping under load (retardation), this can cause reduced clamping force.

Cam lever with internal thread



Cam lever with external thread



Cam levers with plastic handle and internal thread

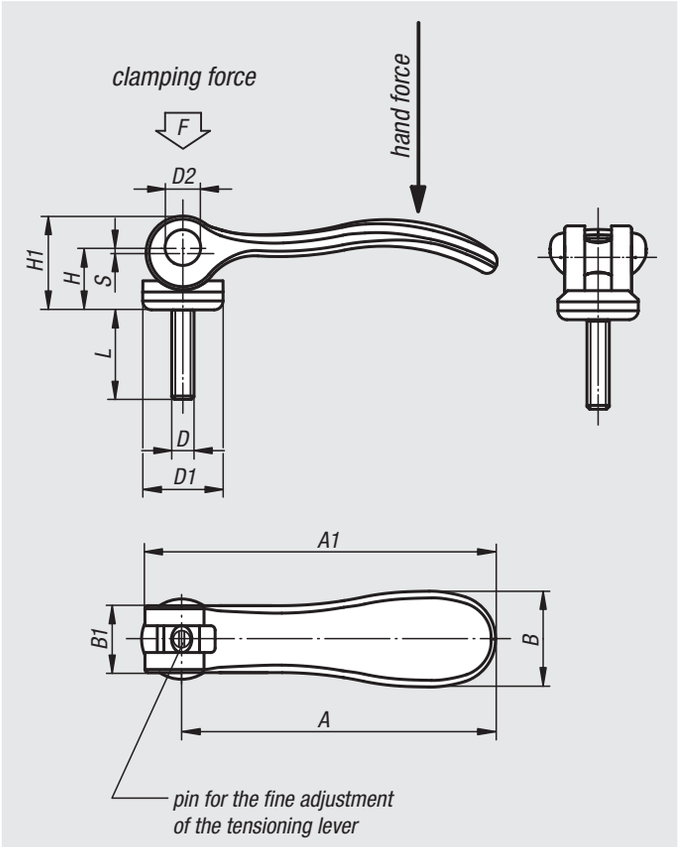
Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Travel	Clamping force F (kN)	Hand force N
04232-1521105	04232-1531105	M5	18,1	9	22	16	14	23,4	71,5	79,6	1,15	2,5	125
04232-1521106	04232-1531106	M6	18,1	9	22	16	14	23,4	71,5	79,6	1,15	2,5	125
04232-2521108	04232-2531108	M8	27,1	11	33	24,2	16,2	27,7	100	110	1,5	5	170

Cam levers with plastic handle and external thread

Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Travel	L	Clamping force F (kN)	Hand force N
04232-1521105X	04232-1531105X	M5	18,1	9	22	16	14	23,4	71,5	79,6	1,15	20/30/40/50	2,5	125
04232-1521106X	04232-1531106X	M6	18,1	9	22	16	14	23,4	71,5	79,6	1,15	20/30/40/50	2,5	125
04232-2521108X	04232-2531108X	M8	27,1	11	33	24,2	16,2	27,7	100	110	1,5	25/30/40/50	5	170
04232-2521110X	04232-2531110X	M10	27,1	11	33	24,2	16,2	27,7	100	110	1,5	25/30/40/50	5	170

Cam levers adjustable

external thread, steel or stainless steel



Material:
Handles cast aluminium EN AC-46200.
Thrust washer plastic PA 66 GF 35-X fibreglass reinforced.
Hinge pins stainless steel 1.4305.
Studs and washer steel grade 5.8 or stainless steel 1.4305.

Version:
Handles powder-coated, black.
Thrust washer, black.
Hinge pins, bright.
Studs and washer blue chromed steel or bright stainless steel.

Sample order:
nlm 04233-1501105X20 (include length L)

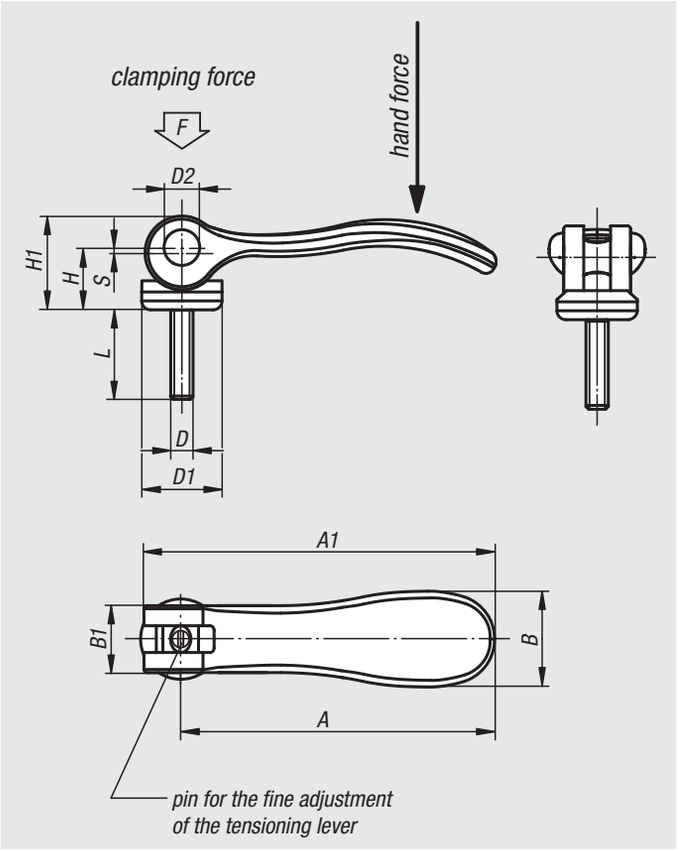
Note:
Adjustable cam levers are used when the position of the clamping lever relative to the clamping axis permits only one specific position (swing circle interference). The exact position of the clamping lever is adjusted with a screwdriver via the fine thread on the stud.

Plastics are subject to creeping under load (retardation), this can cause reduced clamping force.

Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	L	Clamping force F (kN)	Hand force N
04233-9501103X	**04233-9511103X**	M3	12	6	14,4	11,5	9	13	36,2	41,7	1	10/15/30	1,5	90
04233-9501104X	**04233-9511104X**	M4	12	6	14,4	11,5	9	13	36,2	41,7	1	10/15/30	1,5	90
04233-0501104X	**04233-0511104X**	M4	15,4	8	18	13	11,2	17	52,3	59,1	1	15/20/30	2,5	100
04233-0501105X	**04233-0511105X**	M5	15,4	8	18	13	11,2	17	52,3	59,1	1	20/30/40/50	2,5	100
04233-1501105X	**04233-1511105X**	M5	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04233-1501106X	**04233-1511106X**	M6	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04233-2501108X	**04233-2511108X**	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350
04233-2501110X	**04233-2511110X**	M10	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350

Cam levers adjustable

external thread, stainless steel



Material:
Handles 1.4308.
Thrust washer plastic PA 66 GF 35-X fibreglass reinforced.
Hinge pin bolt, washer and studs 1.4305.

Version:
Handle electrolytic polished.
Thrust washer, black.
Hinge pin, washer and studs, bright.

Sample order:
nlm 04233-1512005X20 (include length L)

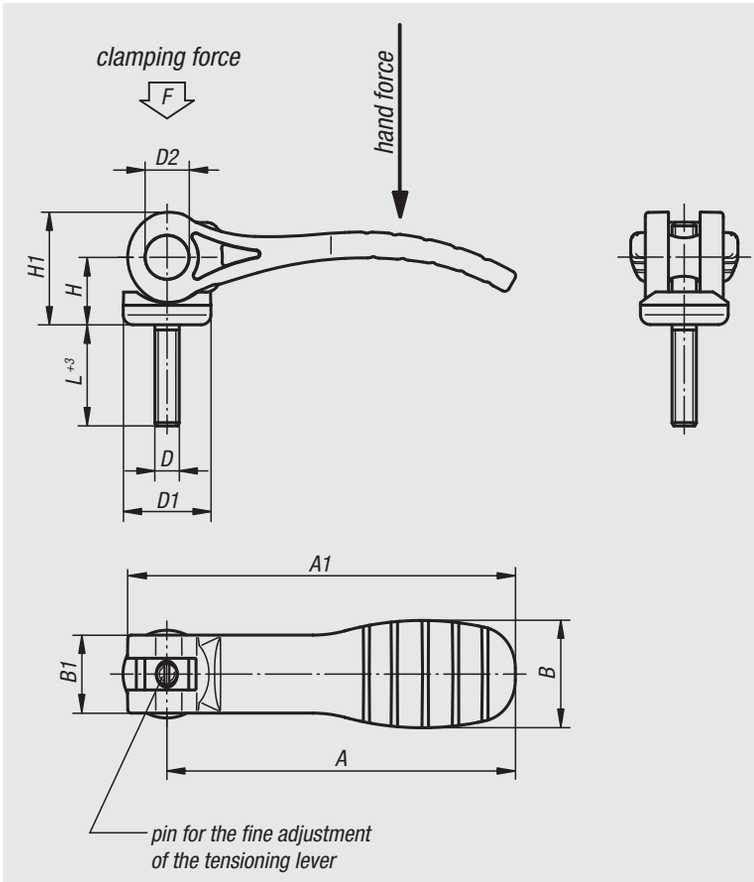
Note:
Adjustable cam levers are used when the position of the clamping lever relative to the clamping axis permits only one specific position (swing circle interference). The exact position of the clamping lever is adjusted with a screwdriver via the fine thread on the stud.

Plastics are subject to creeping under load (retardation), this can cause reduced clamping force.

Order No.	D	D1	D2	B	B1	H	H1	A	A1	Stroke S	L	Clamping force F (kN)	Hand force N
04233-1512005X	M5	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04233-1512006X	M6	18,1	9	21,5	15	14,5	22	70,4	79,2	1,2	20/30/40/50	4	120
04233-2512008X	M8	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/50	8	350
04233-2512010X	M10	27,1	11	33,3	24	18	28,5	96	108	1,5	25/30/40/40	8	350

Cam levers adjustable with plastic handle

external thread, steel or stainless steel



Material:
Handles and thrust washer plastic PA 66 fibreglass reinforced.
Hinge pins stainless steel 1.4305.
Studs and washer steel grade 5.8 or stainless steel 1.4305.

Version:
Handles and thrust washer black.
Hinge pins, bright.
Studs and washer blue chromed steel or bright stainless steel.

Sample order:
nlm 04233-1521105X20 (include length L)

Note:
Adjustable cam levers are used if the position of the clamping lever relative to the clamping axis permits just one specific position (swing circle interference). The exact position of the clamping lever is adjusted with a screwdriver via the fine thread on the stud.

Plastics are subject to creeping under load (retardation), this can cause reduced clamping force.

Order No. Steel	Order No. Stainless steel	D	D1	D2	B	B1	H	H1	A	A1	Travel	L	Clamping force F (kN)	Hand force N
04233-1521105X	**04233-1531105X**	M5	18,1	9	22	16	14	23,4	71,5	79,6	1,15	20/30/40/50	2,5	125
04233-1521106X	**04233-1531106X**	M6	18,1	9	22	16	14	23,4	71,5	79,6	1,15	20/30/40/50	2,5	125
04233-2521108X	**04233-2531108X**	M8	27,1	11	33	24	16,2	27,7	100	110	1,5	25/30/40/50	5	170
04233-2521110X	**04233-2531110X**	M10	27,1	11	33	24	16,2	27,7	100	110	1,5	25/30/40/50	5	170

04250

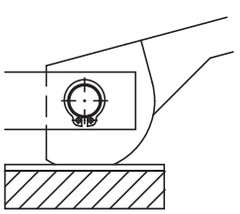
Hinge pins

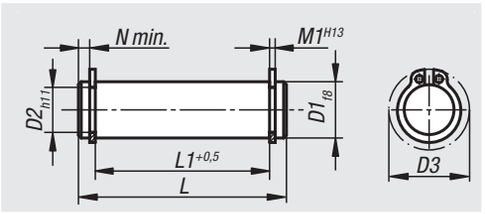
Material:
Carbon steel 1.0503.07

Version:
Tempered. Ground, bright.

Sample order:
nlm 04250-08

Note:
For use with:
Single cam levers 04290 and 04310.
Eye bolts 07180.
Clevis 07620.
Circlips supplied.





Order No.	D1	L	L1	M1	N min.	D2	D3
04250-05	5	18	13	0,7	1,8	4,8	10,7
04250-06	6	22	17	0,8	1,7	5,7	12,2
04250-08	8	30	25	0,9	1,5	7,6	15,2
04250-081	8	20	16	0,9	1,1	7,6	15,2
04250-082	8	27	21	0,9	2,1	7,6	15,2
04250-10	10	37	32	1,1	1,3	9,6	17,6
04250-101	10	25	20	1,1	1,3	9,6	17,6
04250-102	10	35	29	1,1	1,9	9,6	17,6
04250-12	12	46	40	1,1	1,5	11,5	19,6
04250-121	12	31	25	1,1	1,7	11,5	19,6
04250-122	12	37	31	1,1	1,9	11,5	19,6
04250-14	14	44	37	1,1	2,4	13,4	22
04250-16	16	48	41	1,1	2,4	15,2	24,4
04250-18	18	58	51	1,3	2,2	17	26,8

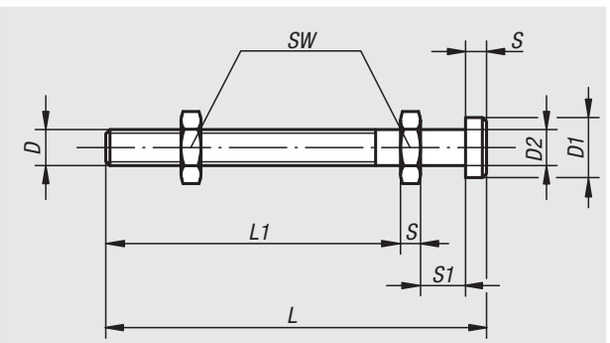
04270

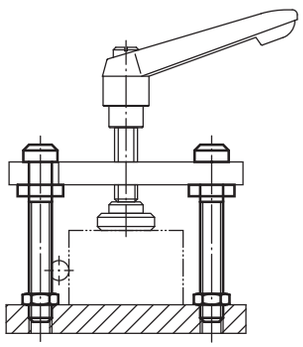
Spacer bolts

Material:
Carbon steel 1.1181.

Version:
Tempered and black oxidised.

Sample order:
nlm 04270-08





Order No.	D	D1	D2	L	L1	S	S1	SW
04270-08	M8	13	8	80	60	4	11	13
04270-10	M10	17	10	100	77	5	13	17
04270-12	M12	19	12	125	97	6	15	19
04270-14	M14	22	14	160	129	7	17	22

04290

Cam levers single

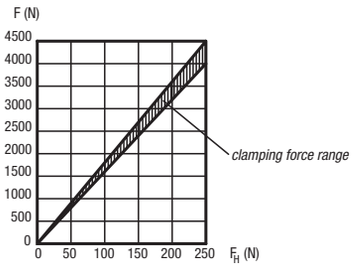
Material:
Carbon steel 1.7220.
Plastic ball.

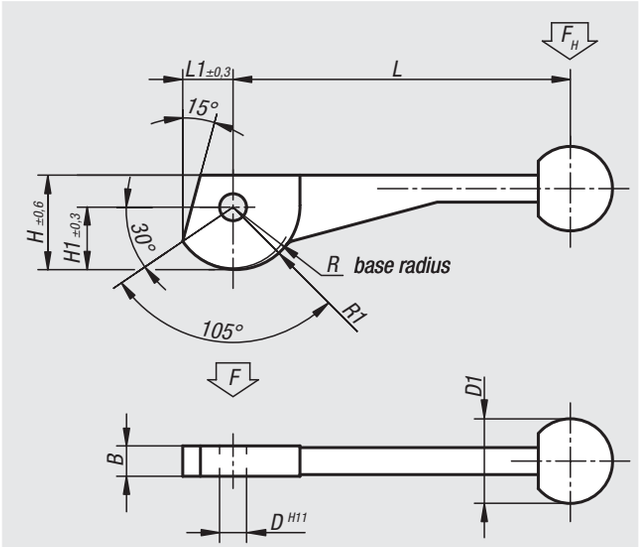
Version:
Tempered and black oxidised.

Sample order:
nlm 04290-10

Note:
Suitable hinge pin see 04250.
The cam lever is an eccentric lever that moves along a logarithmic spiral. Its clamping properties are even over the entire contact surface of the cam.

Force diagram





Order No.	L	L1	B	H	H1	D	D1	R	R1
04290-08	104±2	14,9	9	28,2	18,7	8	25	17,2	19,2
04290-10	123±2	18,6	12	34,8	23,3	10	30	21,5	24
04290-12	146±3	24,3	14	43,8	30,3	12	30	28	31,2

04310

Cam levers double

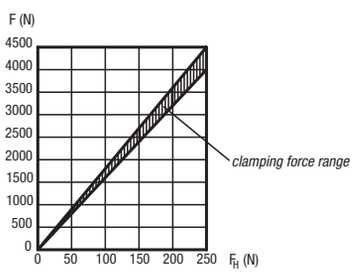
Material:
Carbon steel 1.7220.
Plastic ball.

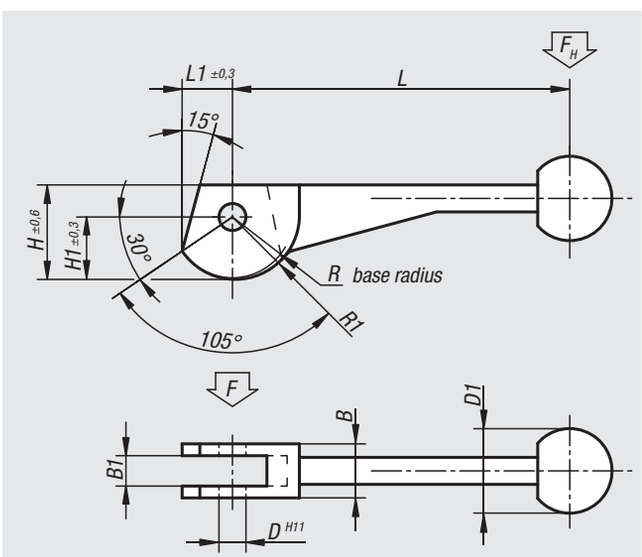
Version:
Tempered and black oxidised.

Sample order:
nlm 04310-12

Note:
Suitable hinge pin see 04250.
The cam lever is an eccentric lever that moves along a logarithmic spiral. Its clamping properties are even over the entire contact surface of the cam.

Force diagram





Order No.	L	L1	B	B1	H	H1	D	D1	R	R1
04310-08	104±2	14,9	16	9	28,2	18,7	8	25	17,2	19,2
04310-10	123±2	18,6	20	12	34,8	23,3	10	30	21,5	24
04310-12	146±3	24,3	25	14	43,8	30,3	12	30	28	31,2

Cam clamps

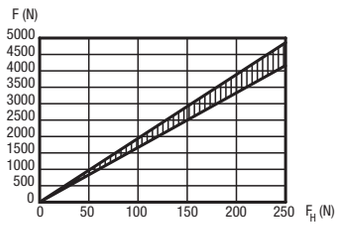
with end lock

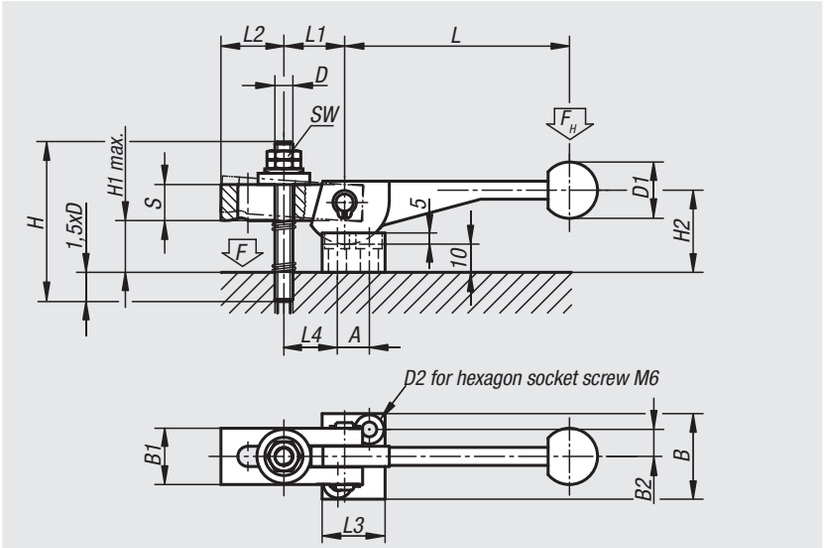
Material:
Eccentric lever carbon steel 1.7220.
Strap carbon steel 1.1191.

Version:
Black oxidised.

Sample order:
nlm 04330-10

Force diagram





Order No.	L	L1	L2	L3	L4	B	B1	B2	S	H	H1 max.	H2	D	D1	D2	A	SW
04330-08	104±2	27	28	28	27	38	25	12	16	70	25	34	M8	25	7	14	13
04330-10	123±2	34	36	32	35	41	32	13,5	20	80	24	40	M10	30	7	16	17
04330-12	146±3	43	45	37	45	43	40	14,5	25	100	31	48	M12	30	7	19	19

Cam clamps

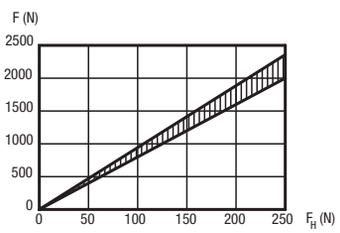
with middle lock

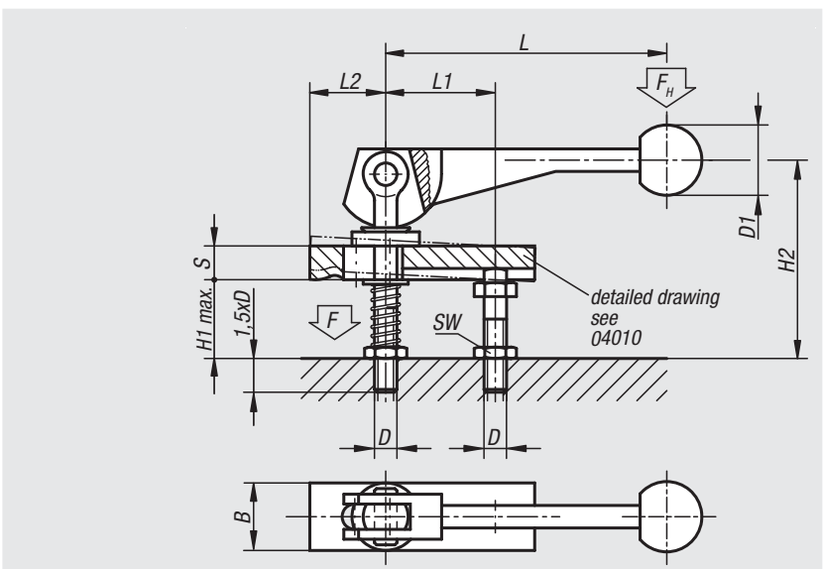
Material:
Eccentric lever carbon steel 1.7220.
Strap carbon steel 1.1191

Version:
Black oxidised.

Sample order:
nlm 04350-12

Force diagram

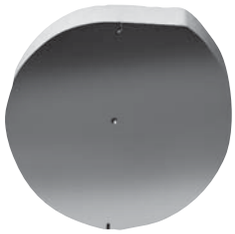




Order No.	L	L1	L2	B	S	H1 max.	H2	D	D1	SW
04350-08	104±2	39	37	20	12	28	74	M8	25	13
04350-10	123±2	49	46	25	16	39	92	M10	30	17
04350-12	146±3	61	58	32	20	49	120	M12	30	19

04360

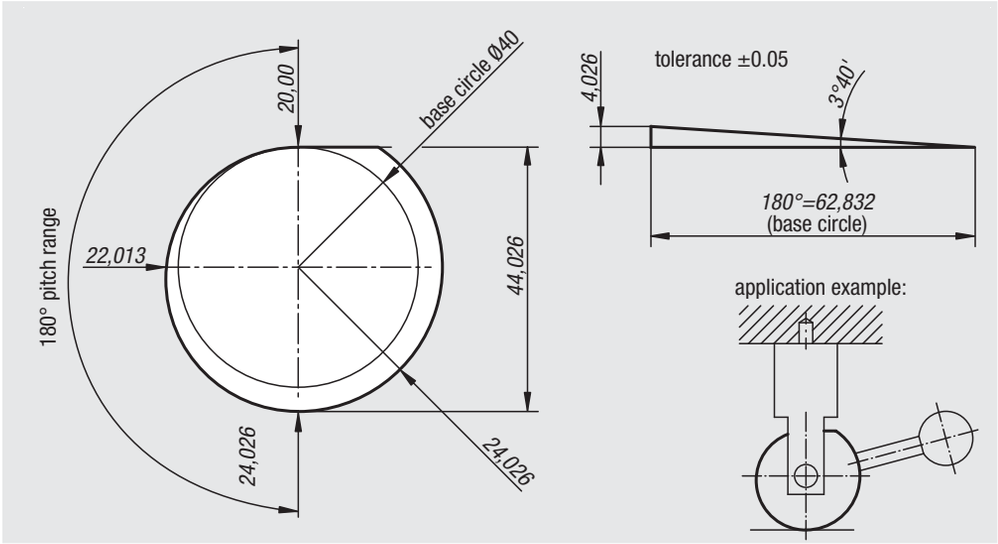
Spiral cams



Material:
Profile steel 1.7131.

Version:
Saw cut and deburred.
Centre is centre-punched.
Start and end of spiral is marked.

Sample order:
nlm 04360-14



Note:
Spiral cams are used where something must be self-locking clamped or secured.
The cam is operated mechanically, pneumatically or hydraulically using a shaft through the centre or a lever fastened to the side.
By pressure failure the self-locking effect is still operative leading to much higher operating safety by pneumatic and hydraulic clamping.

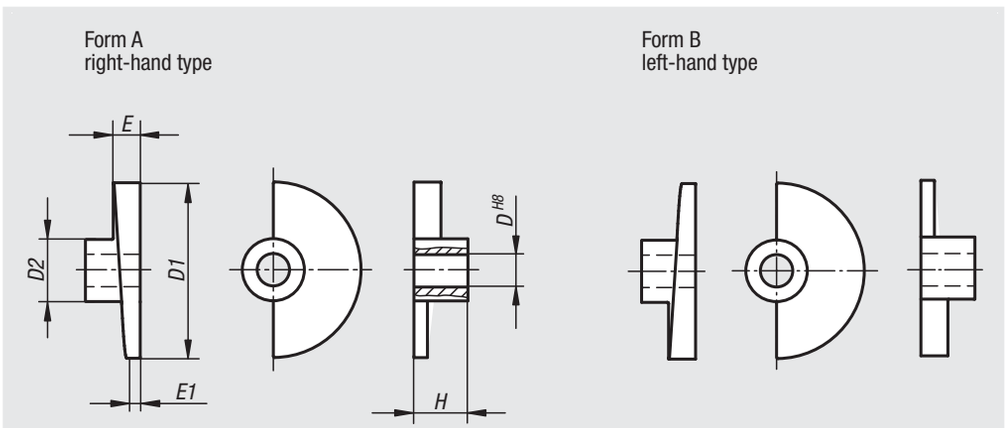
Order No.	base circle Ø	disc thickness
04360-14	40	14
04360-20	40	20

04362

Door latch

Material:
Sintered steel

Sample order:
nlm 04362-108



Order No. Form A	Order No. Form B	D	D1	D2	E	E1	H
04362-108	**04362-208**	8	35	18	7	3	15
04362-110	**04362-210**	10	35	18	7	3	15
04362-112	**04362-212**	12	65	23	7	5	20
04362-116	**04362-216**	16	80	27	9	6	24

Swing clamps

mini, with cam lever

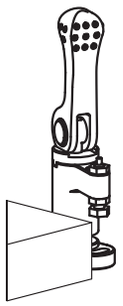
Material:
Carbon steel.

Version:
Tempered and black oxidised.

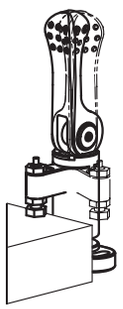
Sample order:
nlm 04363-0100

Note:
Swing clamps are used where the clamping points must be free when the workpiece is loaded or removed.

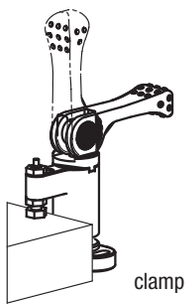
* Admissible hand force for the handle.



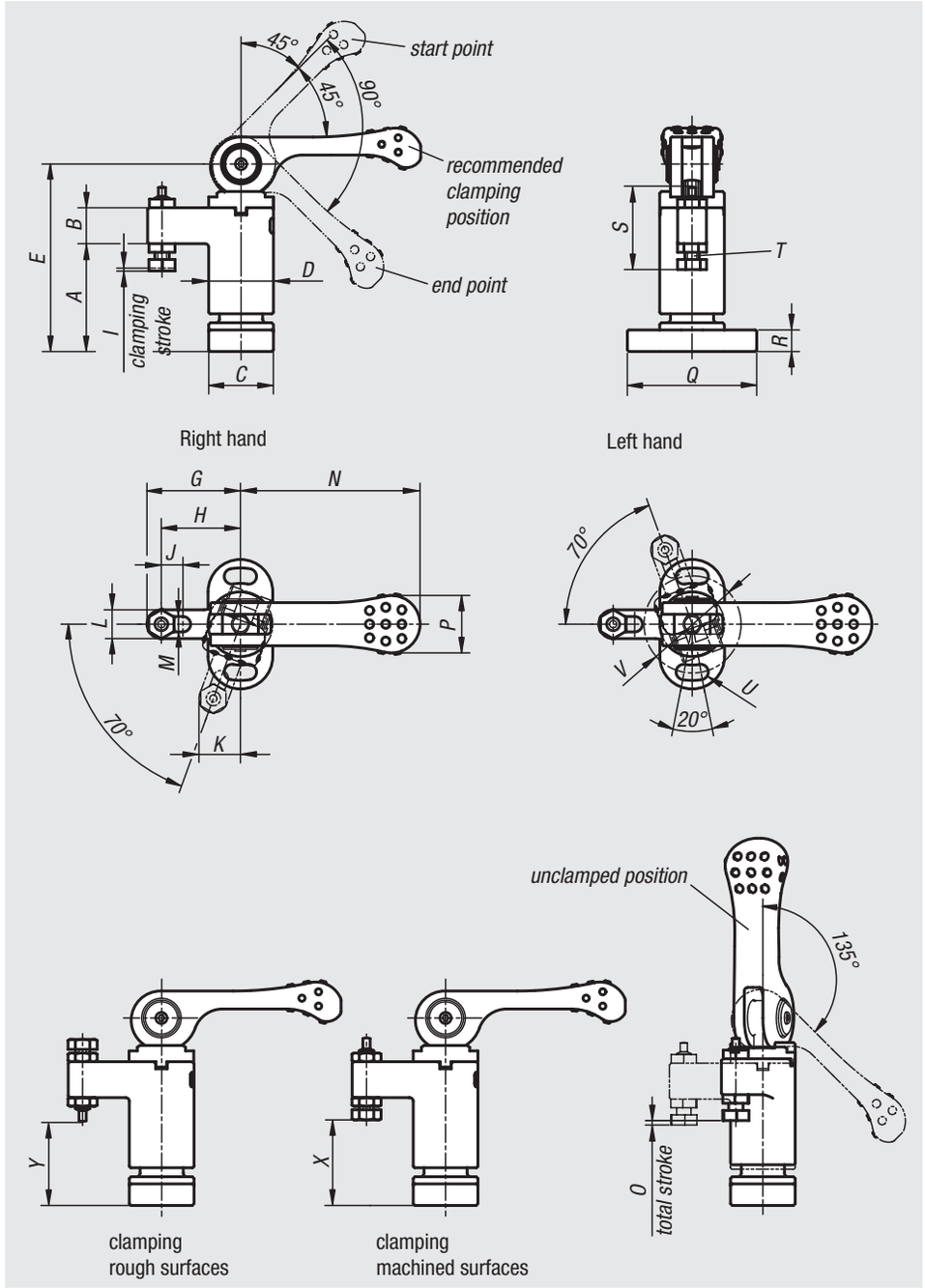
unclamped



swivel



clamp



Order No. left-hand type	Order No. right-hand type	A	B	C	D	E	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X min.	X max.	Y min.	Y max.	Clamping force N	Hand force N
04363-0100	**04363-1100**	30	10	18	18	52	26	22	0,8	6	11,5	8	4,3	50	1,2	16	36	6	22,8	M4	4,3	27	22,4	25,2	22	24,8	800	100*
04363-0150	**04363-1150**	40	14	23	23	68	35	30	1	8	15,3	10	5,3	63	1,5	19	45	8	28,5	M5	5,3	34	30,8	33,8	31,7	34,7	1500	150*
04363-0200	**04363-1200**	50	18	30	30	87	45	37	1,2	8	20,7	16	8,4	80	1,8	24	65	12	45,5	M8	8,4	48	31,9	39,6	32,9	40,6	2100	200*
04363-0300	**04363-1300**	60	22	40	40	107	55	45	1,5	8	25,4	20	10,4	100	2,3	30	85	15	57	M10	10,5	64	35,7	46,7	38,2	49,2	2800	300*

Swing clamps mini

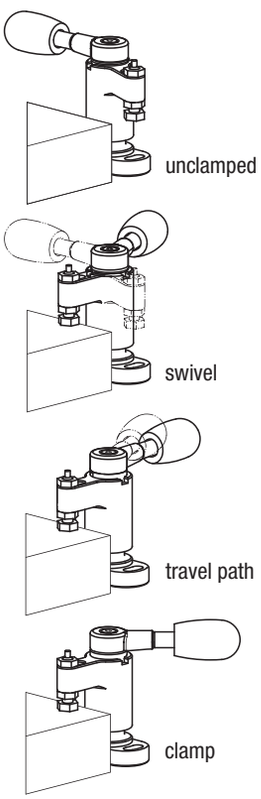
Material:
Carbon steel.
Grip plastic.

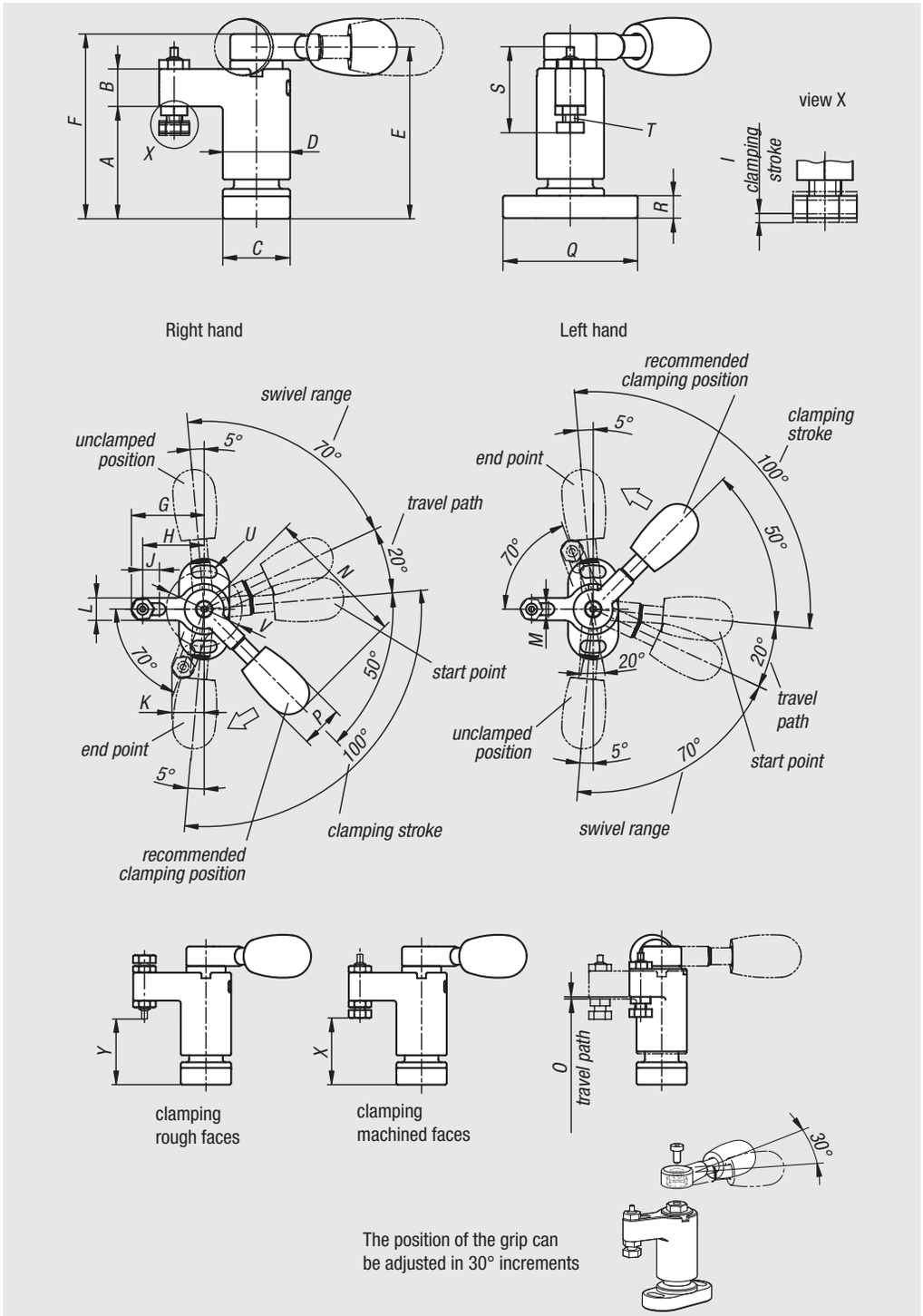
Version:
Tempered, black oxidised.
Grip black.

Sample order:
nlm 04364-0100

Note:
Swing clamps are used where the clamping points must be free when the workpiece is loaded or removed.

* Admissible hand force for the handle.





Order No. left-hand type	Order No. right-hand type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X min.	X max.	Y min.	Y max.	Clamping force N	Hand force N
04364-0100	**04364-1100**	30	10	18	18	45,8	49	26	22	1	6	11,5	8	4,3	50	0,8	15	36	6	22,8	M4	4,3	27	22,3	25,3	21,9	24,9	1100	100*
04364-0150	**04364-1150**	40	14	23	23	61,3	66	35	30	1,4	8	15,3	10	5,3	63	1,1	20	45	8	28,5	M5	5,3	34	30,6	34	31,5	34,9	1800	150*
04364-0200	**04364-1200**	50	18	30	30	76,5	82	45	37	1,5	8	20,7	16	8,4	80	1,4	26	65	12	45,5	M8	8,4	48	31,7	39,7	32,7	40,7	2200	200*
04364-0300	**04364-1300**	60	22	40	40	93	100	55	45	1,9	8	25,4	20	10,4	100	1,7	33	85	15	57	M10	10,5	64	35,5	46,9	38	49,4	3500	300*

Swing clamps

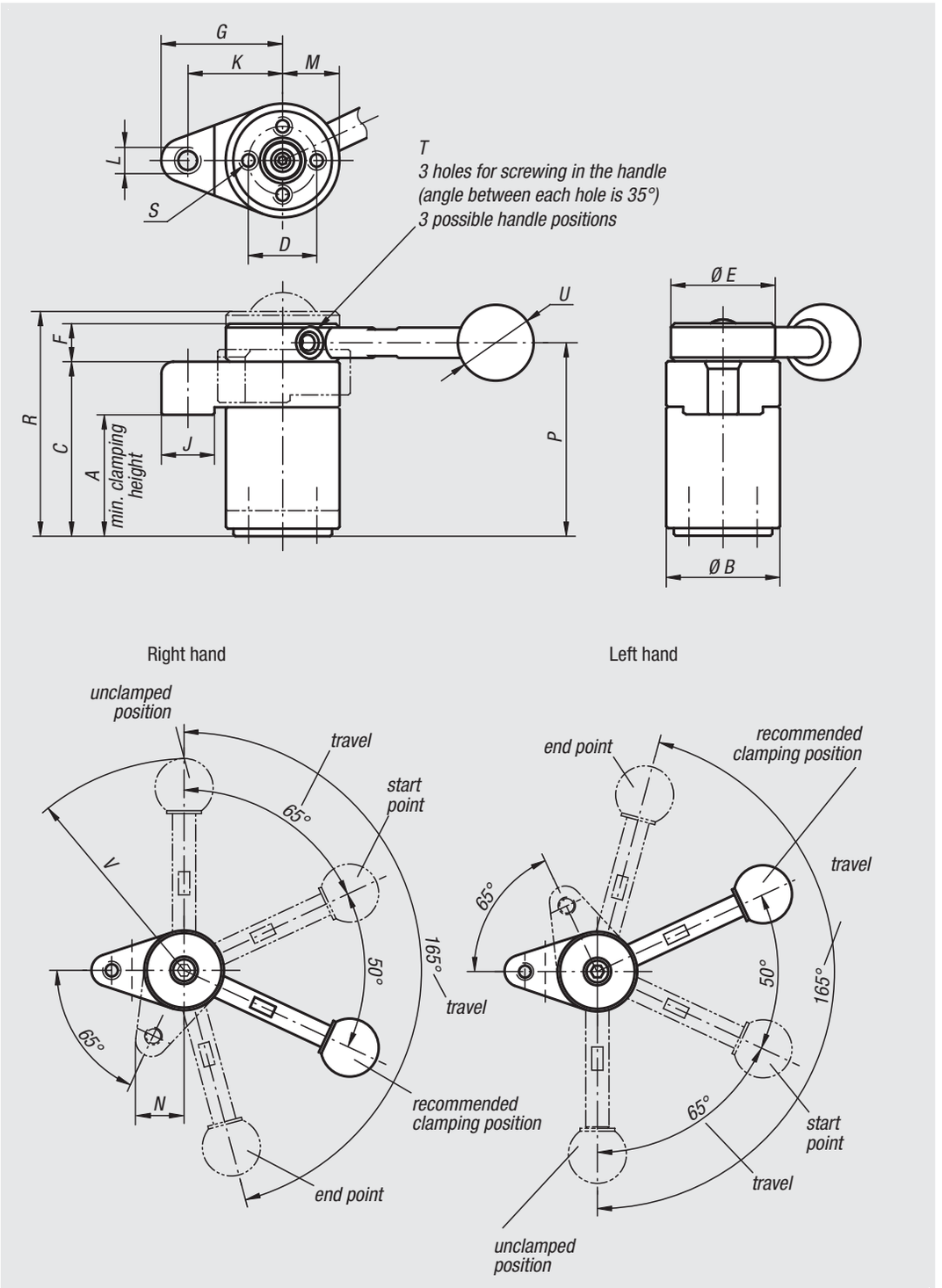
Material:
Carbon steel.
Ball knob plastic.

Version:
Tempered and black oxidised.
Ball knob Duroplast PF 31, black.

Sample order:
nlm 04366-013232

Note:
* Admissible hand force to operate the handle.

Accessories:
Standard handles 06355. Screw-in handles with adjustable torque 06357.



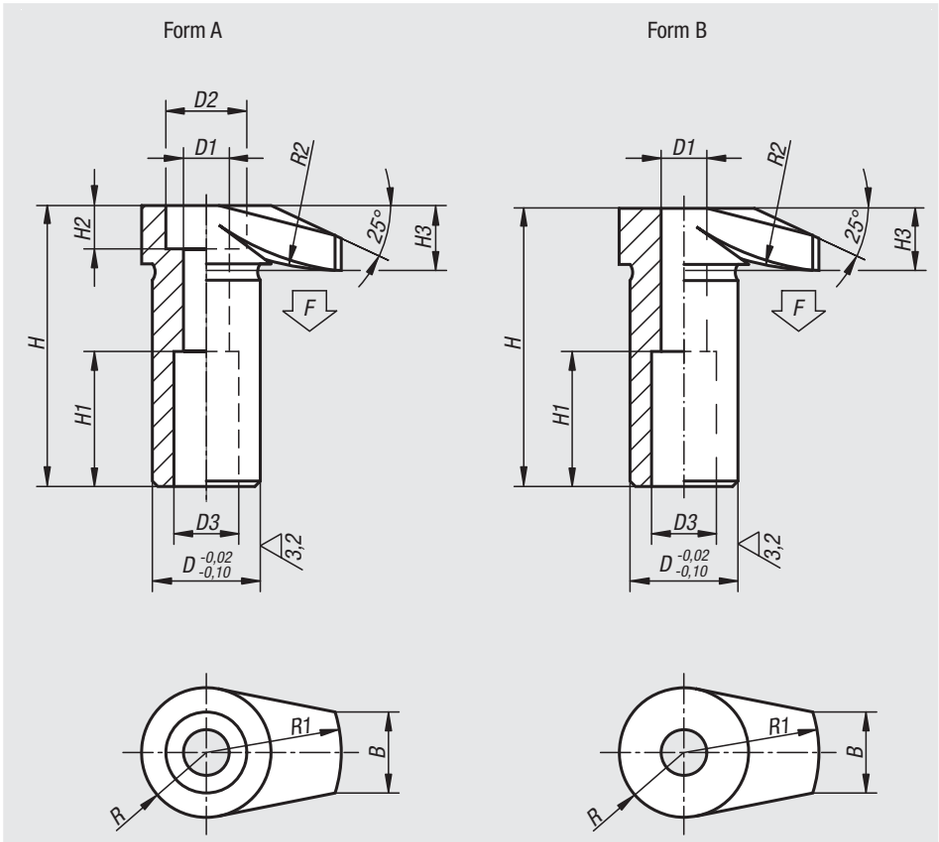
Order No. left-hand type	Order No. right-hand type	Version	A min.	A max.	B	C	D	E	F	G	J	K	L	M	N	P	R	S	T	U	V	Clamping force N	Hand force N
04366-003232	**04366-103232**	without handle	31,4	32,6	30	46	18	30	10	32	14	25	M6	15	17	51	57,5	M4x8	M5	-	-	800	150*
04366-004540	**04366-104540**	without handle	44,1	45,9	40	63	25	38	13	40	16	32	M8	20	22,5	69,5	78,1	M6x12	M6	-	-	1200	200*
04366-013232	**04366-113232**	with handle	31,4	32,6	30	46	18	30	10	32	14	25	M6	15	17	51	57,5	M4x8	M5	20	73	800	150*
04366-014540	**04366-114540**	with handle	44,1	45,9	40	63	25	38	13	40	16	32	M8	20	22,5	69,5	78,1	M6x12	M6	25	107	1200	200*

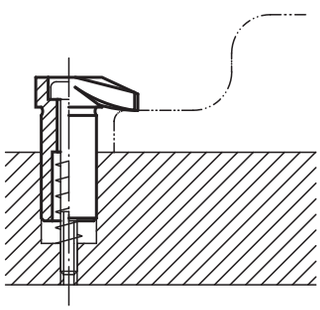
Hook clamps

Material:
Carbon steel, tempered.

Version:
Black oxidised.

Sample order:
nlm 04370-10





Order No.	Form	D	D1	D2	D3	H	H1	H2	H3	B	R	R1	R2	F max. kN
04370-06	A	16	6,5	11	10	42	20	6	10	11	9	20	30	4,8
04370-08	A	20	8,5	15	12	52	25	8	12	15	12	25	50	8,8
04370-10	A	25	10,5	18	14	66	32	10	16	17	14	32	60	13,9
04370-12	A	32	12,5	20	17	83	40	12	20	20	18	40	80	20,2

Order No.	Form	D	D1	D3	H	H1	H3	B	R	R1	R2	F max. kN
04370-106	B	16	6,5	10	41,5	20	9,5	11	9	20	30	4,8
04370-108	B	20	8,5	12	51,5	25	11,5	15	12	25	50	8,8
04370-110	B	25	10,5	14	65,5	32	15,5	17	14	32	60	13,9
04370-112	B	32	12,5	17	82,5	40	19,5	20	18	40	80	20,2

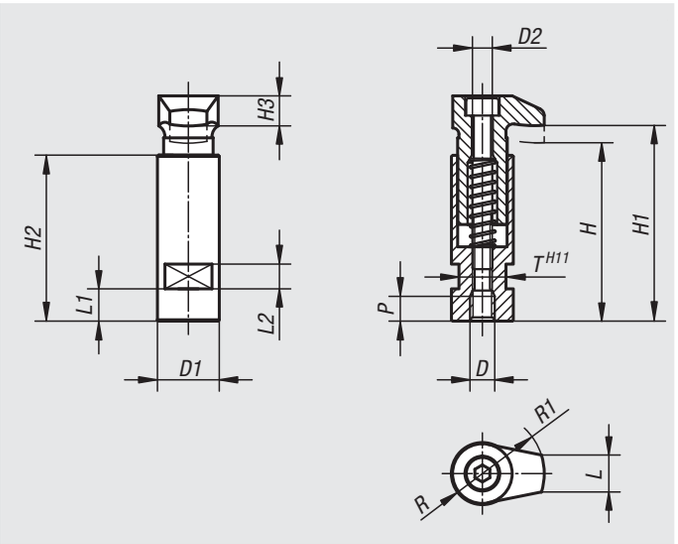
Hook clamps

with collar

Material:
Carbon steel.

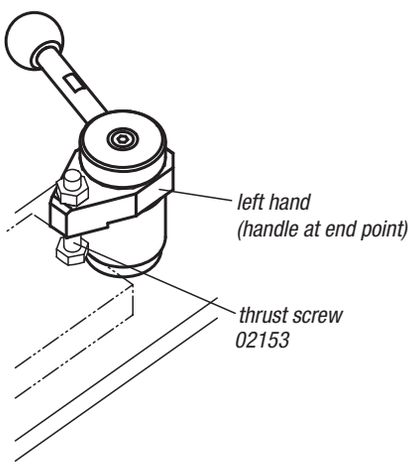
Version:
Tempered and black oxidised.

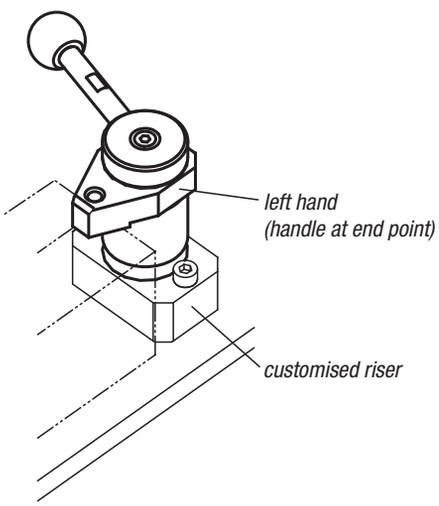
Sample order:
nlm 04371-06



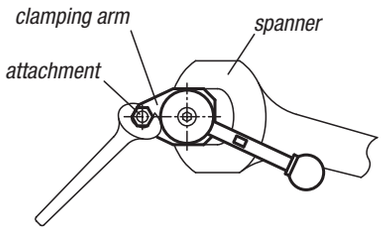
Order No.	D	D1	D2	H	H1	H2	H3	L	L1	L2	P	R	R1	T	Clamping force kN
04371-06	M6	20	6	56	60	53	10	11	9	8	8	9	20	17	4,82
04371-08	M8	20	6	56	60	53	10	11	9	8	8	9	20	17	8,77
04371-10	M10	25	8	72	79	67	12	15	13	10	10	12	25	19	13,9
04371-12	M12	32	10	88	96	82	16	17	18	12	12	14	32	27	20,2
04371-16	M16	40	12	109	118	102	20	20	22	12	16	18	40	32	37,8

Technical information for swing clamps





Mounting an attachment



When mounting an attachment on the clamping arm, use a spanner to lock the arm and prevent it from turning.

Hook clamps ground

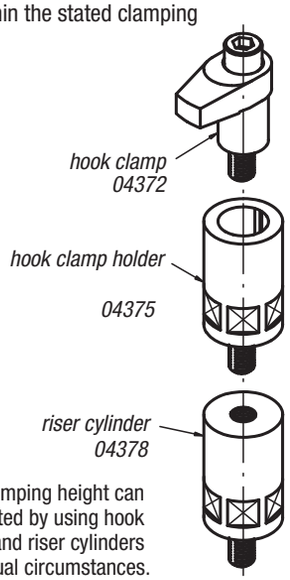
Form A/B/C

Material:
Carbon steel, tempered.

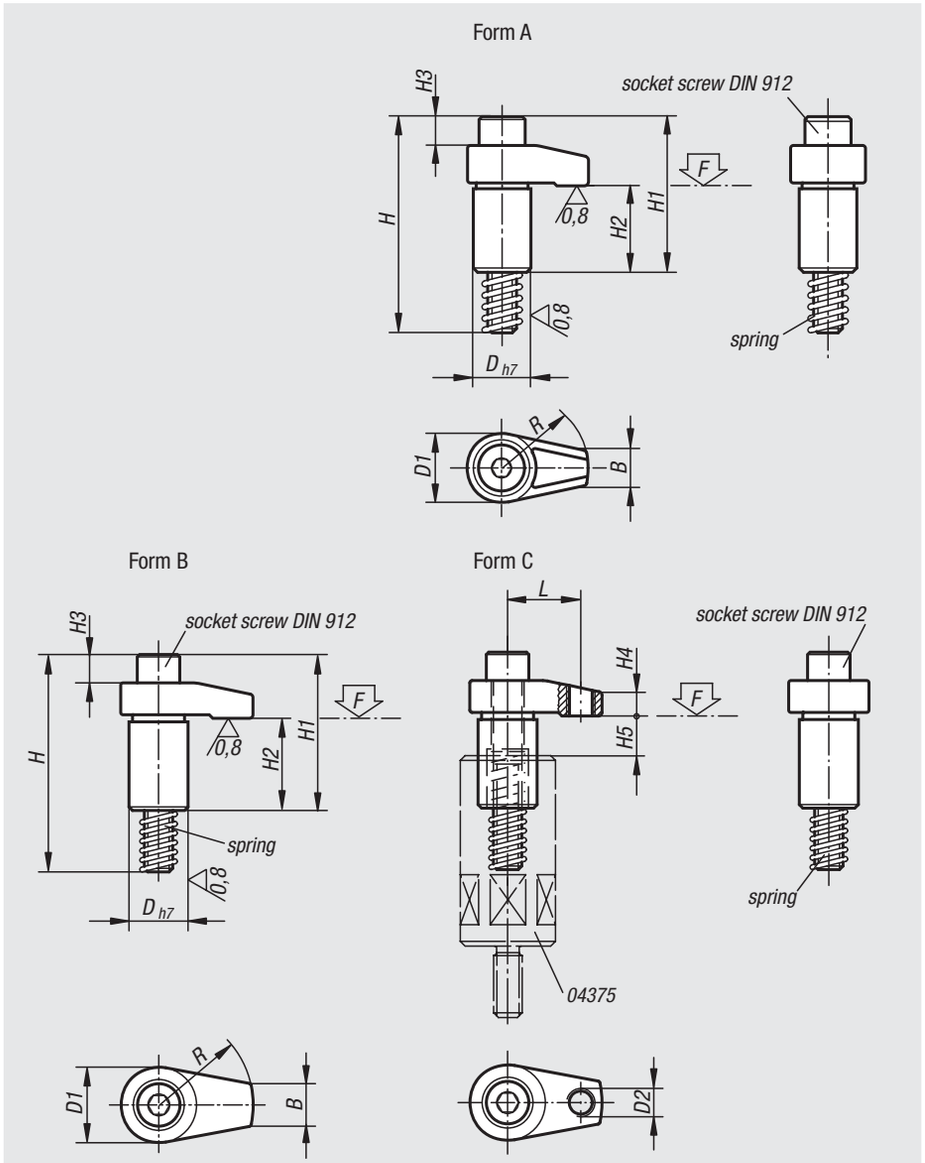
Version:
Black oxidised. Shaft OD ground.

Sample order:
nlm 04372-216040

Note:
The stated clamping forces (F max.) and tightening torques are valid within the stated clamping ranges (H5).



The clamping height can be adjusted by using hook clamp holders and riser cylinders to suit individual circumstances.



Order No.	Form	D	D1	D2	H	H1	H2	H3	H4	H5 max. clamping range	B	L	R	Socket head screw DIN 912	Tightening torque max. Nm	F max. kN
04372-110030	A	20	25	-	75	54	30	9	10	12	12	-	30	M10x65	37,2	13
04372-110040	A	20	25	-	75	54	30	9	10	12	12	-	40	M10x65	31,4	9,8
04372-208020	B	18	22	-	58	37	23	2	7	10	10	-	20	M8x50	37,2	13,6
04372-208025	B	18	22	-	58	37	23	2	7	10	10	-	25	M8x50	32,3	10,9
04372-208030	B	18	22	-	58	37	23	2	7	10	10	-	30	M8x50	29,4	9
04372-212040	B	25	32	-	92	66	39	11	12	15	18	-	40	M12x80	58,8	17,5
04372-212050	B	25	32	-	92	68	39	11	12	15	18	-	50	M12x80	49	14
04372-212060	B	25	32	-	92	68	39	11	12	15	18	-	60	M12x80	45,1	11,6
04372-216040	B	32	36	-	101	75	39	15	15	15	22	-	40	M16x85	166,6	37,9
04372-216050	B	32	36	-	101	75	39	15	15	15	22	-	50	M16x85	147	30,4
04372-216060	B	32	36	-	101	75	39	15	15	15	22	-	60	M16x85	127,4	25,2
04372-312140	C	25	32	M12	92	66	39	11	10	15	18	31	40	M12x80	58,8	22,6
04372-312150	C	25	32	M12	92	68	39	11	13	15	18	38	50	M12x80	49	18,5
04372-312160	C	25	32	M12	92	68	39	11	13	15	18	46	60	M12x80	45,1	15,2
04372-316150	C	32	36	M12	101	75	39	15	16	15	22	38	50	M16x85	147	38
04372-316160	C	32	36	M12	101	75	39	15	16	15	22	46	60	M16x85	127,4	33

Hook clamps

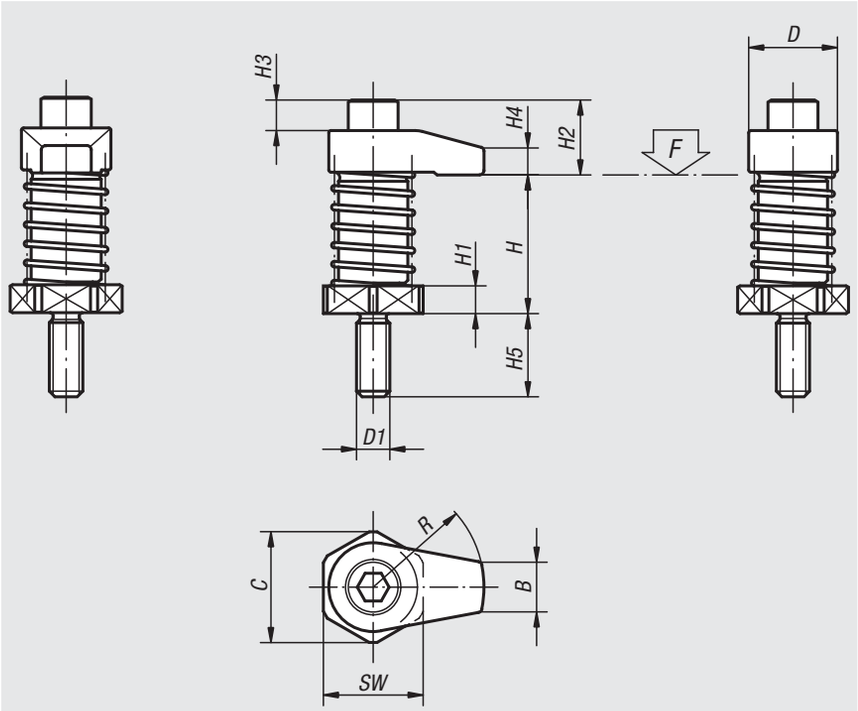
with collar

Material:
Hook clamps and hook clamp holders carbon steel, tempered.

Version:
Black oxidised.

Sample order:
nlm 04373-12060

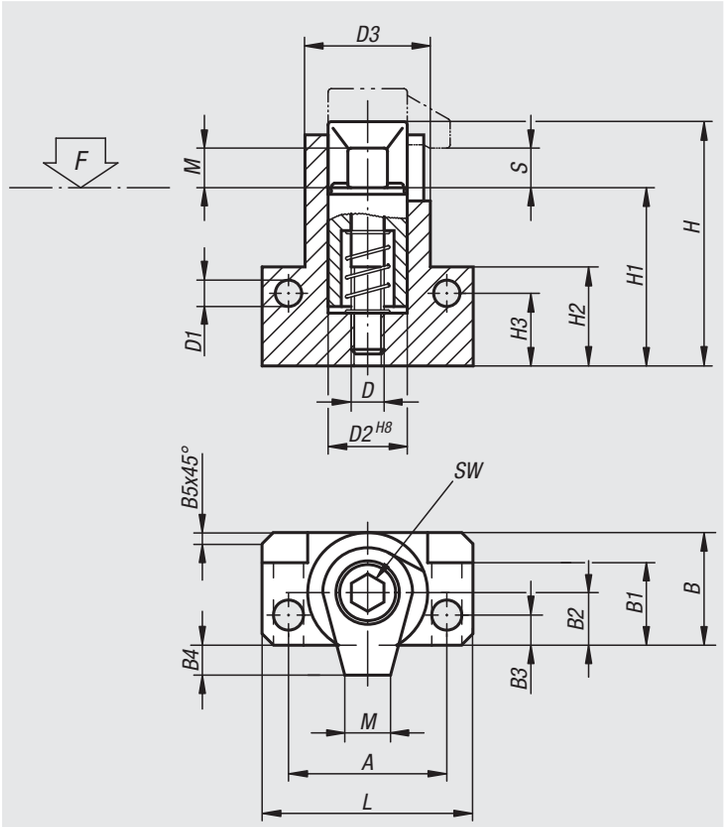
Note:
Hook clamps with collars can be screwed directly into grid holes etc. with or without counterbore.
For suitable height adjustment elements see risers 04378.



Order No.	D	D1	H clamping range	H1	H2	H3	H4	H5	B	C	R	SW	Tightening torque max. Nm	F max. kN
04373-08020	22	M8	35 - 45	6	14	2	7	19	10	25	20	22	20	7,9
04373-08025	22	M8	35 - 45	6	14	2	7	19	10	25	25	22	20	7,3
04373-08030	22	M8	35 - 45	6	14	2	7	19	10	25	30	22	20	6,7
04373-08120	22	M8	45 - 55	16	14	2	7	19	10	25	20	22	20	7,9
04373-08125	22	M8	45 - 55	16	14	2	7	19	10	25	25	22	20	7,3
04373-08130	22	M8	45 - 55	16	14	2	7	19	10	25	30	22	20	6,7
04373-12040	32	M12	50 - 65	10	27	11	10	30	18	40	40	36	45	13,5
04373-12050	32	M12	50 - 65	10	29	11	12	30	18	40	50	36	45	12,6
04373-12060	32	M12	50 - 65	10	29	11	12	30	18	40	60	36	45	11,7
04373-12140	32	M12	65 - 80	25	27	11	10	30	18	40	40	36	45	13,5
04373-12150	32	M12	65 - 80	25	29	11	12	30	18	40	50	36	45	12,6
04373-12160	32	M12	65 - 80	25	29	11	12	30	18	40	60	36	45	11,7
04373-16040	36	M16	50 - 65	10	36	15	15	30	22	40	40	36	60	13,4
04373-16050	36	M16	50 - 65	10	36	15	15	30	22	40	50	36	60	12,4
04373-16060	36	M16	50 - 65	10	36	15	15	30	22	40	60	36	60	12
04373-16140	36	M16	65 - 80	25	36	15	15	30	22	40	40	36	60	13,4
04373-16150	36	M16	65 - 80	25	36	15	15	30	22	40	50	36	60	12,4
04373-16160	36	M16	65 - 80	25	36	15	15	30	22	40	60	36	60	12

Hook clamps

with mounting bracket

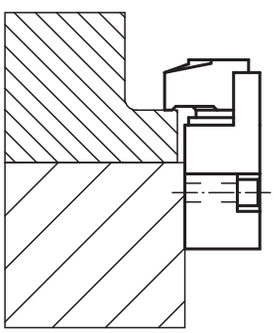


Material:
Hook clamps and clamping screw carbon steel, tempered.

Version:
Black oxidised.

Sample order:
nlm 04374-12

example:



Order No.	D	D1	D2	D3	A	B	B1	B2	B3	B4	B5	H	H1	H2	H3	L	M	S	SW	Tightening torque max. Nm	F max. kN
04374-08	M8	6,4	20	28	38	26	19,5	12	6	6	2,5	62	47,5	25	18	50	10	4	6	30	17
04374-10	M10	8,4	24	34	48	31	22,5	14	7,5	9	3	74	57,5	30	21	64	12	5	8	50	18
04374-12	M12	10,5	28	40	55	36,5	26	16,5	9	10,5	3,5	87	67	35	24	75	15	5	10	60	20
04374-16	M16	12,8	34	48	65	43,5	31	19,5	10	16,5	4	112	87	45	32	88	20	5	14	120	24

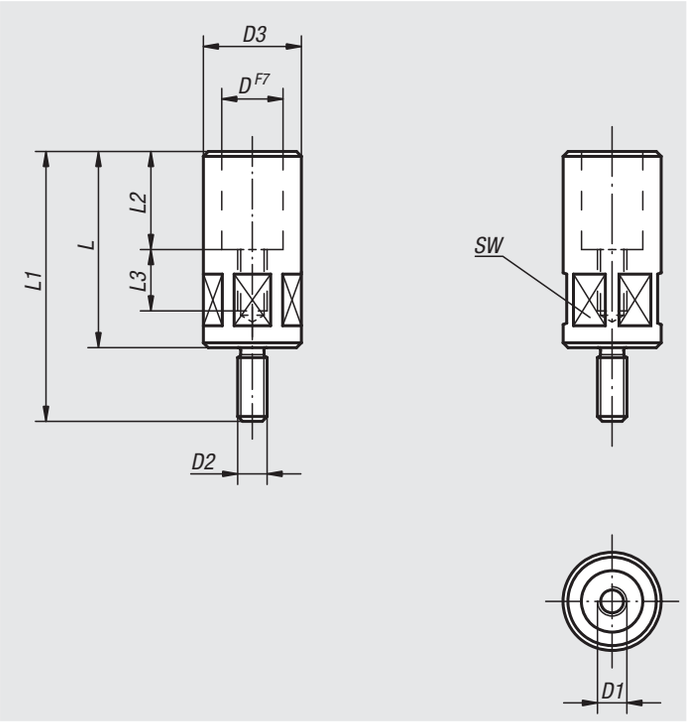
Hook clamp holders

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 04375-12080

Note:
Hook clamp holders are for holding and raising hook clamps.



Order No.	D	D1	D2	D3	L	L1	L2	L3	SW	Tightening torque max. Nm
04375-08055	18	M8	M8	24	55	74	25	20	22	29,4
04375-10063	20	M10	M12	32	63	93	30	21	30	39,2
04375-10080	20	M10	M12	32	80	110	30	23	30	39,2
04375-12080	25	M12	M12	40	80	110	40	25	36	49
04375-12100	25	M12	M12	40	100	130	40	28	36	49
04375-16080	32	M16	M16	50	80	110	40	25	46	78,4
04375-16100	32	M16	M16	50	100	130	40	28	46	78,4

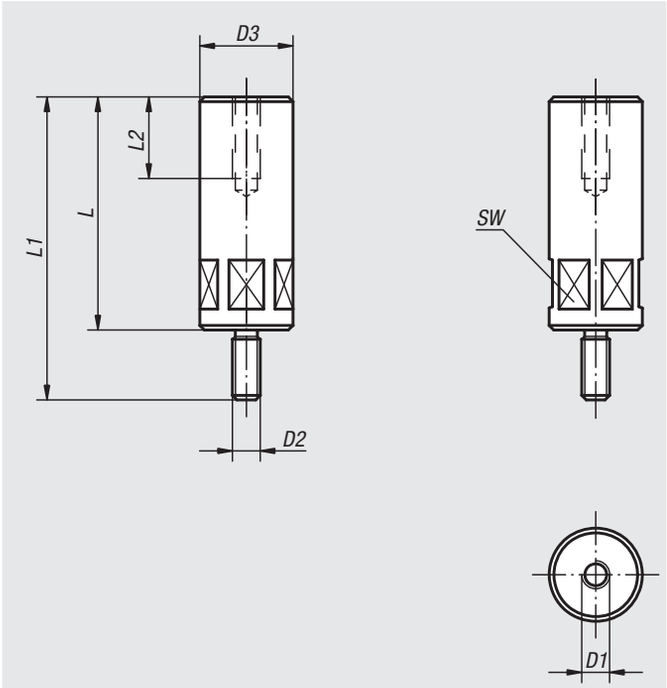
Riser bars

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 04378-16050

Note:
The height of the hook clamps and hook clamp holders can be raised with riser cylinders.



Order No.	D1	D2	D3	L	L1	L2	SW	Tightening torque max. Nm
04378-08032	M8	M8	24	32	51	20	22	29,4
04378-08040	M8	M8	24	40	59	20	22	29,4
04378-08050	M8	M8	24	50	69	20	22	29,4
04378-08065	M8	M8	24	65	84	20	22	29,4
04378-12050	M12	M12	40	50	80	35	36	49
04378-12065	M12	M12	40	65	95	35	36	49
04378-12080	M12	M12	40	80	110	35	36	49
04378-12100	M12	M12	40	100	130	35	36	49
04378-12125	M12	M12	40	125	155	35	36	49
04378-12160	M12	M12	40	160	190	35	36	49
04378-12200	M12	M12	40	200	230	35	36	49
04378-16050	M16	M16	50	50	80	35	46	78,4
04378-16065	M16	M16	50	65	95	35	46	78,4
04378-16080	M16	M16	50	80	110	35	46	78,4
04378-16100	M16	M16	50	100	130	35	46	78,4
04378-16125	M16	M16	50	125	155	35	46	78,4
04378-16160	M16	M16	60	160	190	35	55	78,4
04378-16200	M16	M16	60	200	230	35	55	78,4

Hook clamps precision

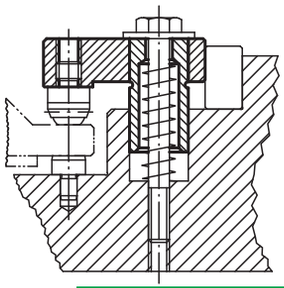
Material:
Steel.

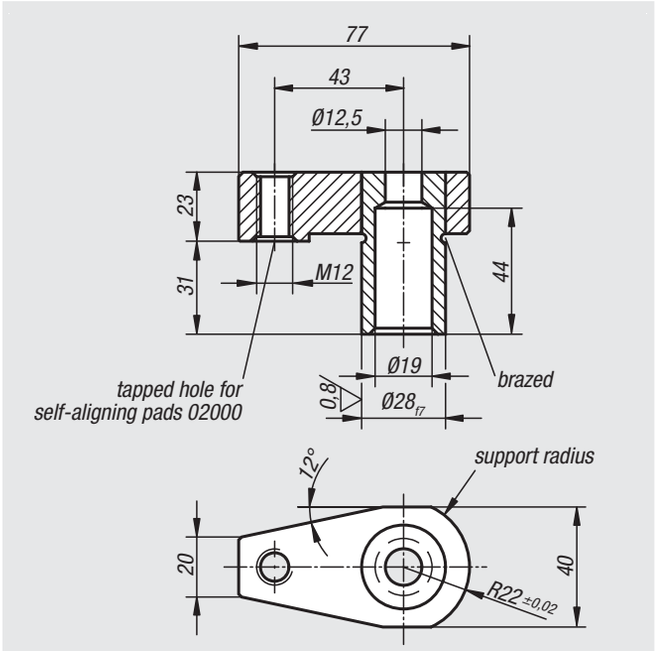
Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 04380-00

Note:
Precision hook clamps are used as conventional clamping elements in fixtures.
A reamed hole is drilled into the fixture base. The hole depth depends on the required clamping height. A support is placed under the rear rounded hook part (radius 22) to take the counterforce, this can be flat, semicircular or prismatic. A DIN 933 hex. head screw tightens the clamp.

application example:





Order No.	Dimensions
04380-00	see drawing

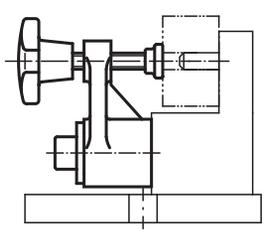
Swing clamps

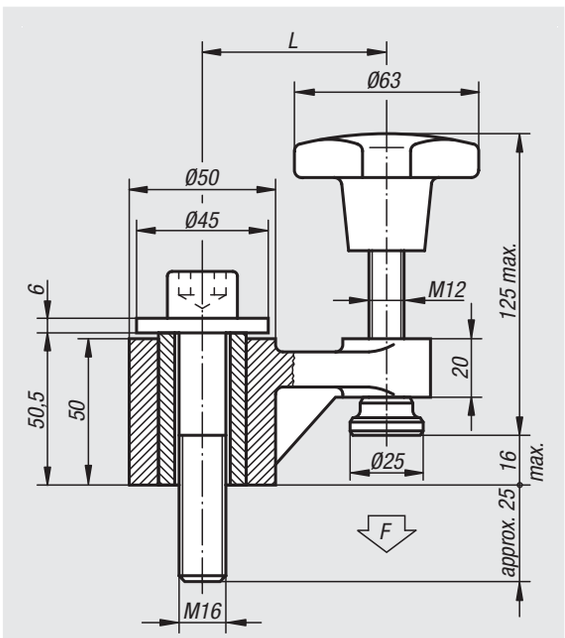
Material:
Malleable iron body.
Carbon steel ring 1.1191.
Carbon steel screw 1.1181.
Mild steel thrust pad 1.0301.

Version:
Painted, thrust pads case-hardened.

Sample order:
nlm 04390-01

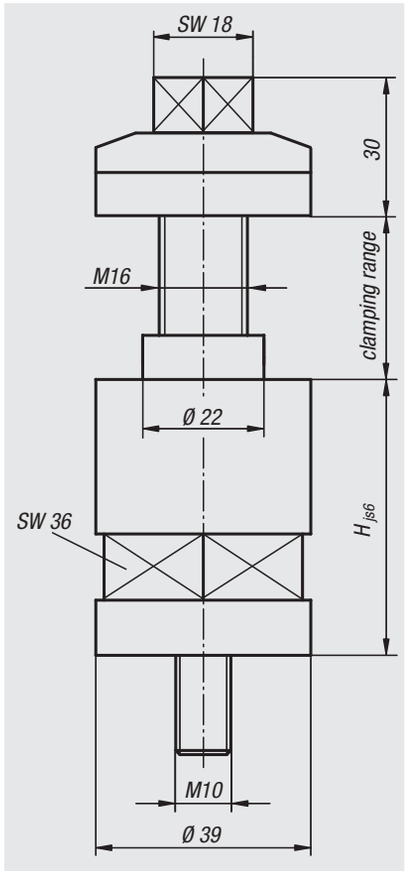
example:





Order No.	L	F kN
04390-01	63	5
04390-02	100	3

Clamping bolts



Material:
Clamping bolt, steel.
Clamping screw, carbon steel.
Clamping ring brass.

Version:
Clamping bolt hardened and black oxidised.
Clamping screw black oxidised.
Clamping ring bright.

Sample order:
nlm 04395-050

Note:
The clamping bolts can be fixed to the machine table directly with T-slot nuts. Clamping parallel to the table is guaranteed by low tolerance classes (js6) for the height.
The clamping range is 8 – 40 mm. Clamping screws for the ranges 40 – 67 and 65 – 87 mm are also available.
The intermediate plate prevents damage to the machine table, as well as shifting during tightening. The brass clamping ring prevents impressions on the workpiece.

Clamping bolts

Order No.	H	Clamp range
04395-050	50	8 - 40
04395-100	100	8 - 40

Clamping screws

Order No.	Clamp range
04395-4067	40 - 67
04395-6587	65 - 87

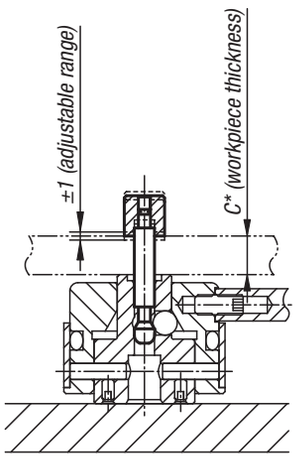
Clamping pins

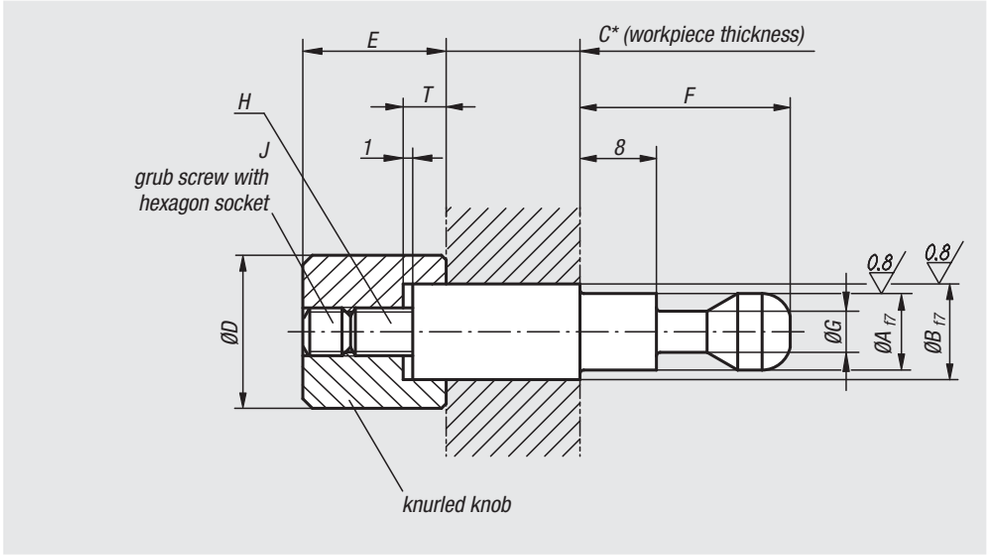
Material:
Carbon steel.

Version:
Pins tempered and ground.
Knurled knob tempered,
black oxidised.

Sample order:
nlm 04400-005050

Note:
* The clamping pin can be altered to suit the workpiece thickness.





Order No.	A	B	C	D	E	F	G	H	J	T	Suitable for
04400-005050	5	5	50	10	10	17	3	M3	M3x4	3	04400-3240...
04400-006050	5	6	50	10	10	17	3	M3	M3x4	3	04400-3240...
04400-008080	8	8	80	16	15	22	4,3	M5	M5x5	4,5	04400-4050...
04400-010080	8	10	80	16	15	22	4,3	M5	M5x5	4,5	04400-4050...

04400

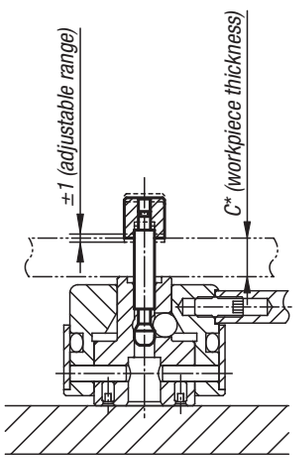
Clamping pins (high force)

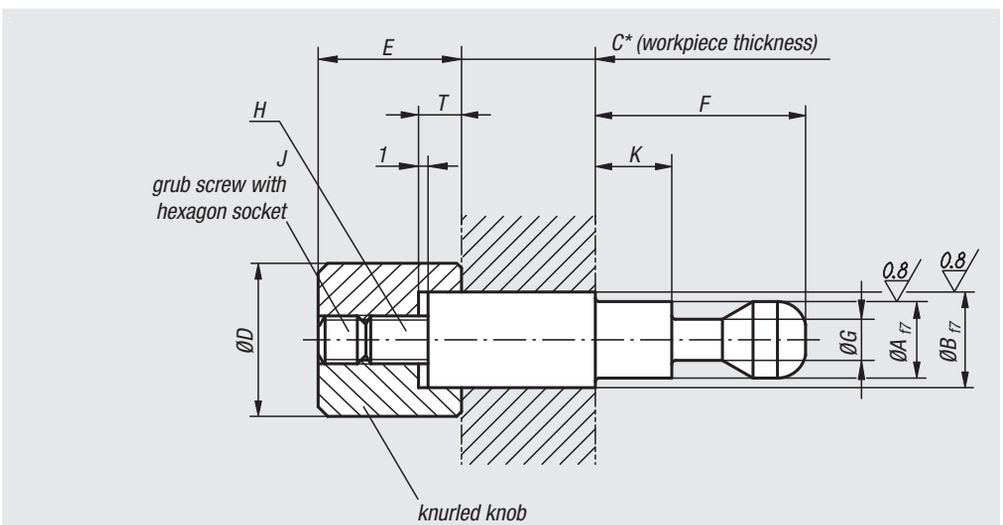
Material:
Carbon steel.

Version:
Pins tempered and ground.
Knurled knob tempered,
black oxidised.

Sample order:
nlm 04400-412100

Note:
* The clamping pin can be altered to suit the workpiece thickness.





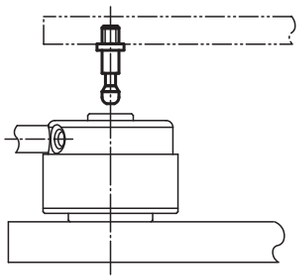
Order No.	A	B	C	D	E	F	G	H	J	K	T	Suitable for
04400-412100	12	12	100	18	23	38	6,5	M8	M8x8	21,5	7	04400-506501
04400-416100	12	16	100	24	23	38	6,5	M8	M8x8	21,5	7	04400-506501
04400-516120	16	16	120	24	29	48	9,5	M10	M10x10	28	9	04400-638001
04400-520120	16	20	120	30	29	48	9,5	M10	M10x10	28	9	04400-638001

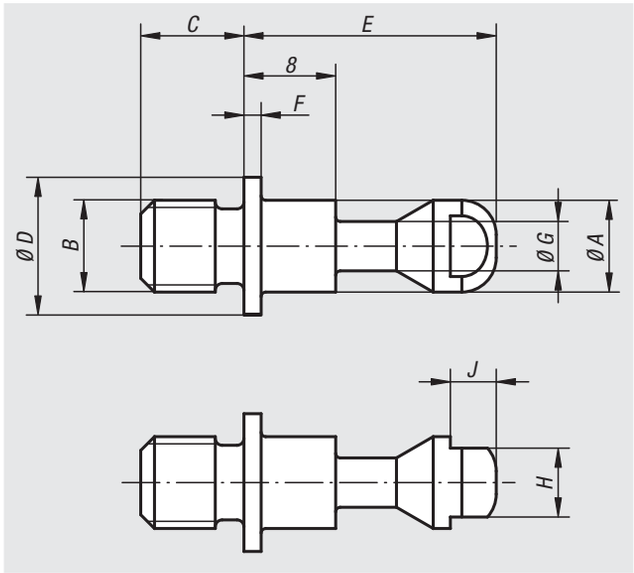
Clamping screws

Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 04400-105060





Order No.	A	B	C	D	E	F	G	H	J	Suitable for
04400-105060	5	M5	6	8	17	1,2	3	4	2,5	04400-3240...
04400-106070	5	M6	7	8	17	1,2	3	4	2,5	04400-3240...
04400-108090	8	M8	9	12	22	1,5	4,3	6	4	04400-4050...
04400-110110	8	M10	11	12	22	1,5	4,3	6	4	04400-4050...

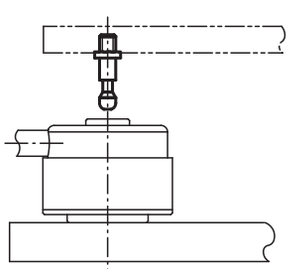
04400

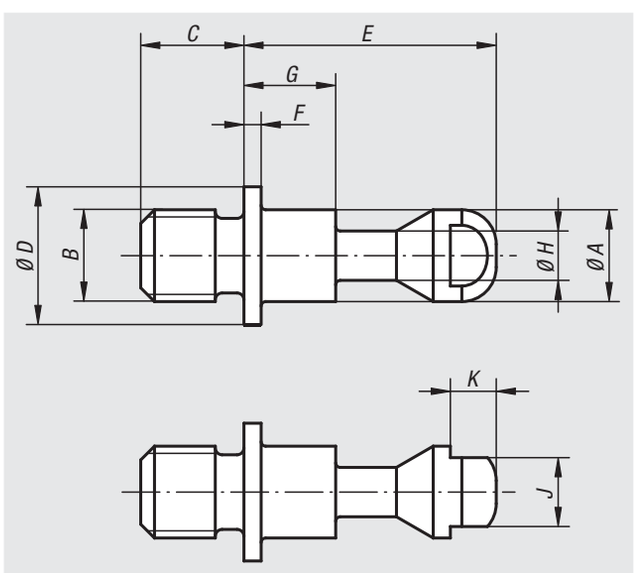
Clamping screws (high force)

Material:
Carbon steel.

Version:
Tempered and black oxidised.

Sample order:
nlm 04400-1412013



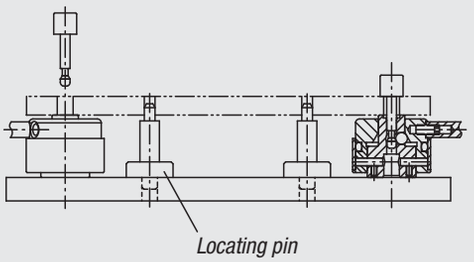


Order No.	A	B	C	D	E	F	G	H	J	K	Suitable for
04400-1412013	12	M12	13	20	38	2	21,5	6,5	10	4	04400-506501
04400-1416017	12	M16	17	20	38	2	21,5	6,5	10	4	04400-506501
04400-1516017	16	M16	17	25	48	2,5	28	9,5	13	5	04400-638001
04400-1520021	16	M20	21	25	48	2,5	28	9,5	13	5	04400-638001

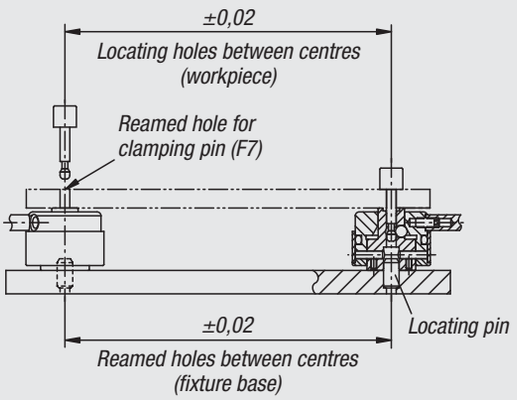
Technical Information for Pull Clamps

Workpiece positioning

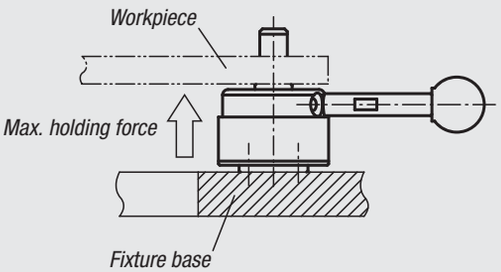
Clamping using a pull clamp and clamping pin



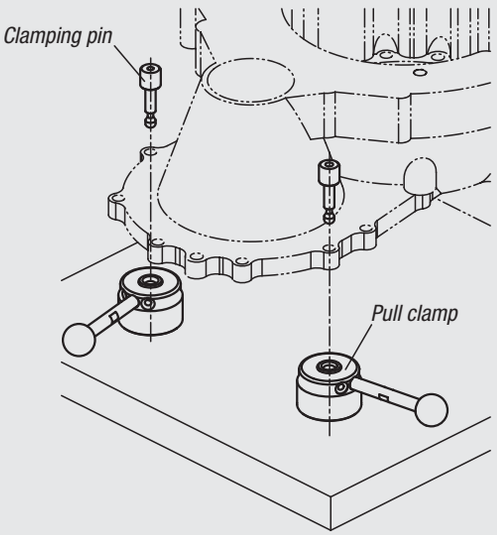
Simultaneous clamping and positioning of a workpiece



Holding forces for workpiece processing

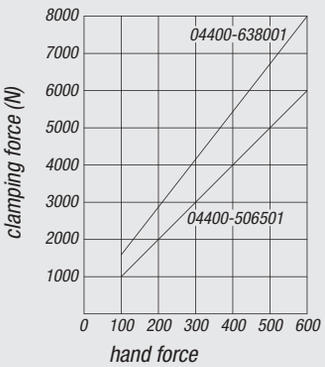


Make sure that no force on the underside of the workpiece exceeds the values given in the table.



Example using pull clamps

Performance curve



Pull clamps

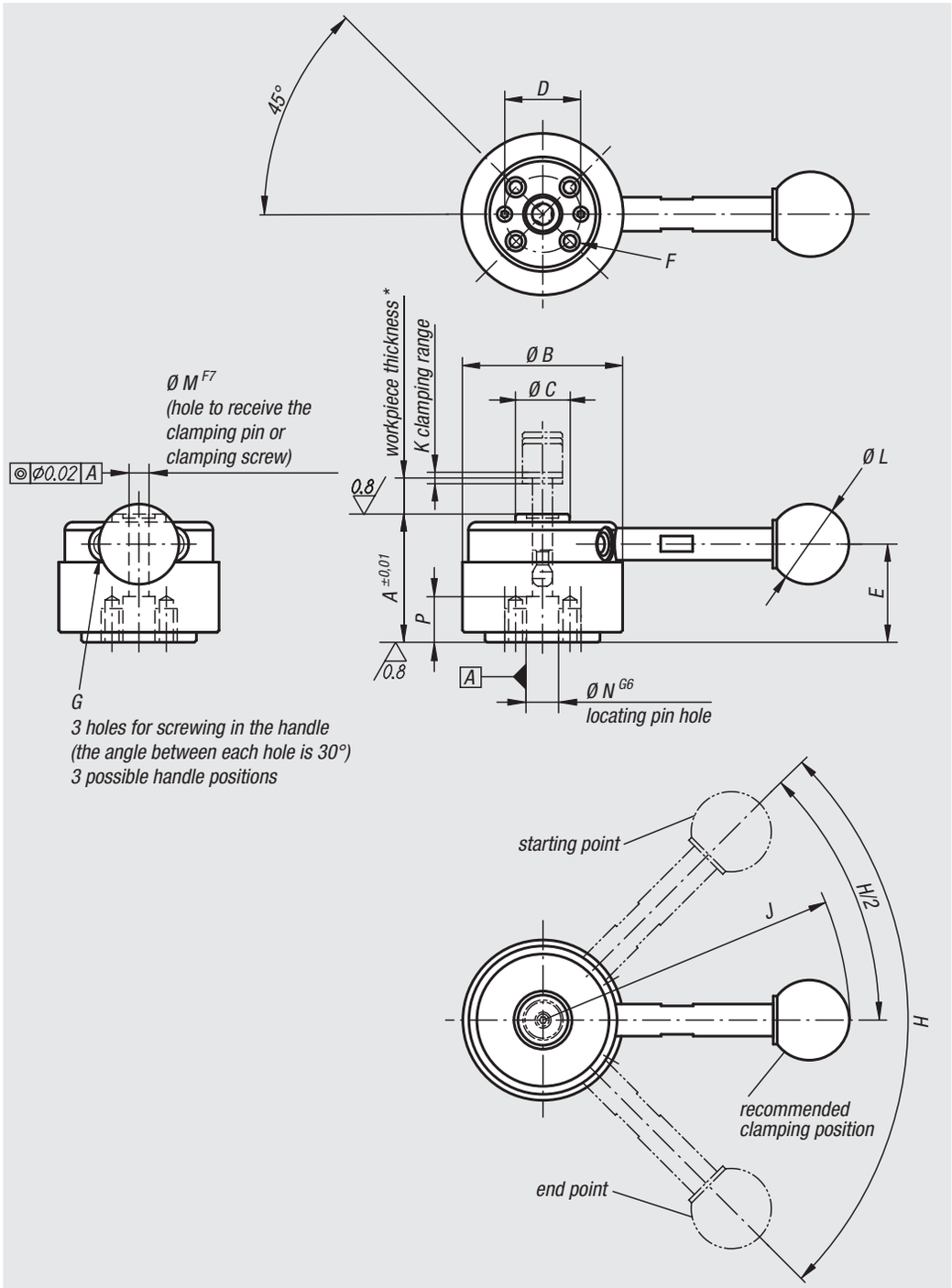
Material:
Housing and cam tool steel.
Grip carbon steel.
Ball knob Duroplast PF 31.

Version:
Housing and cam hardened and black oxidised.
Grip black oxidised.
Ball knob black.

Sample order:
nlm 04400-324001

Note:
* Max. workpiece thickness see clamping pin 04400 (dimension C).
** Admissible hand force for the handle.

Accessories:
Standard handles 06355.
Screw-in handles with adjustable torque 06357.



Order No.	Version	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Clamping force N	Recommended workpiece thickness tolerance	Hand force N	Holding force N
04400-324000	without handle	32	40	13,5	18	24,5	M4x8	M5	90°	-	1,5	-	5	8	10	900	±0,3*	150**	2000
04400-324001	with handle	32	40	13,5	18	24,5	M4x8	M5	90°	76,5	1,5	20	5	8	10	900	±0,3*	150**	2000
04400-405000	without handle	40	50	18	25	30,7	M6x9	M6	110°	-	2	-	8	12	13	2500	±0,5*	200**	5500
04400-405001	with handle	40	50	18	25	30,7	M6x9	M6	110°	111,5	2	25	8	12	13	2500	±0,5*	200**	5500

Pull clamps (high force)

Material:
Housing, clamping ring and handles, carbon steel.
Grip Duroplast PF 31.

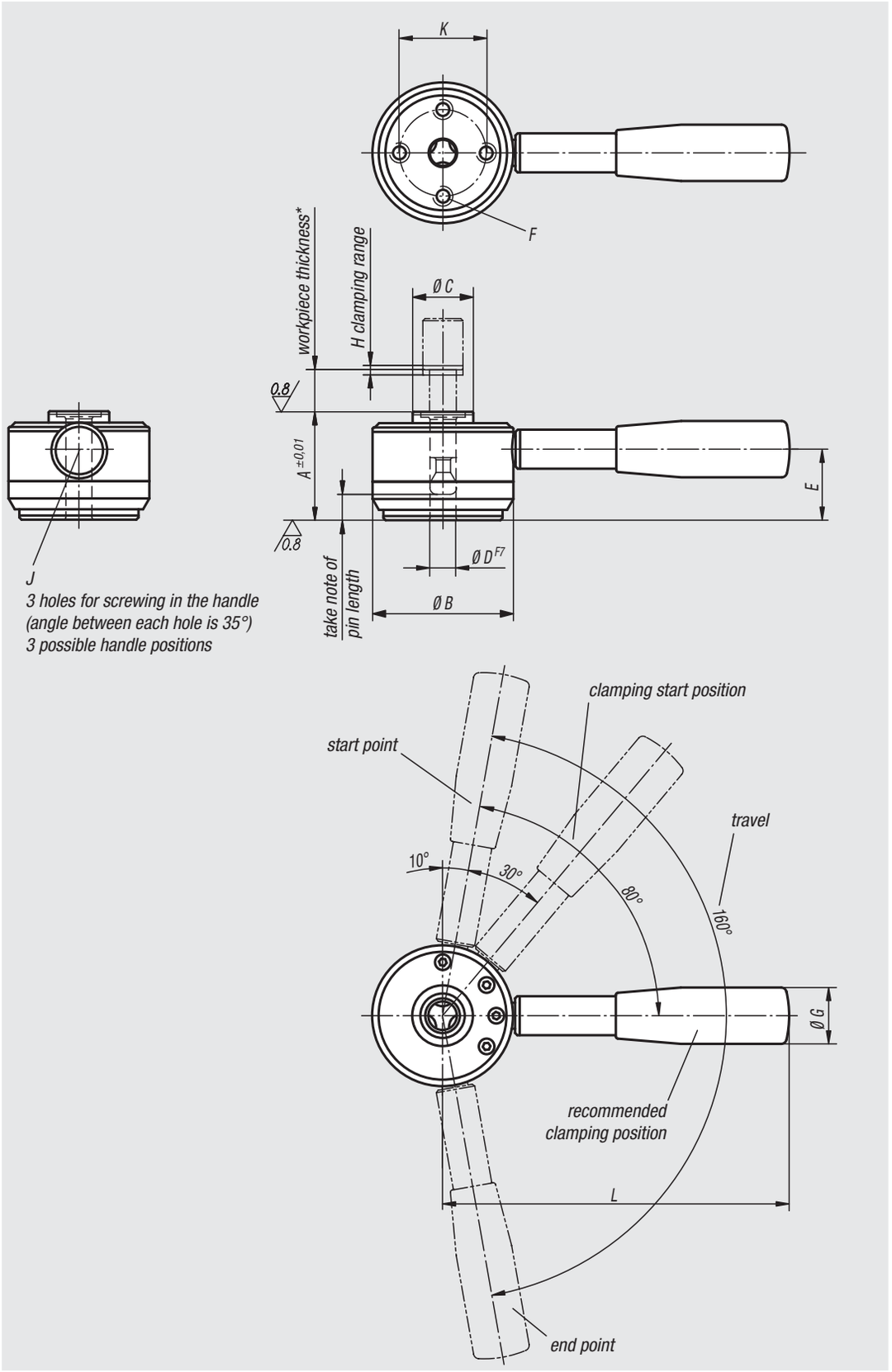
Version:
Housing and clamping ring hardened and black oxidised.
Handles black oxidised.
Grip black.

Sample order:
nlm 04400-506501

Note:
When clamping with a high force clamping pin the recommended workpiece tolerances must be maintained. The grip lever must be lay between the recommended clamping position and end point for safe clamping.

* Max. workpiece thickness see clamping pin 04400 (dimension C).

** Permitted manual force for handle.



Order No.	A	B	C	D	E	F	G	H	J	K	L	Clamping force N	Recommended workpiece thickness tolerance	Hand force N	Holding force N
04400-506501	50	65	28	12	36	M8x14	26	2	10	40	160	6000	±0,5*	600**	8000
04400-638001	63	80	34	16	45	M10x18	28	2,5	12	50	180	8000	±0,8*	600**	14000

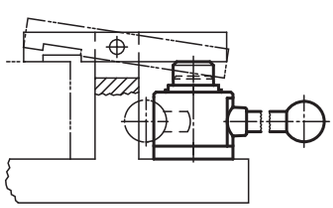
Clamping element „actima“

Material:
Steel.
Housing thermoplastic.
Ball knob Duroplast PF 31.
Accessories steel.

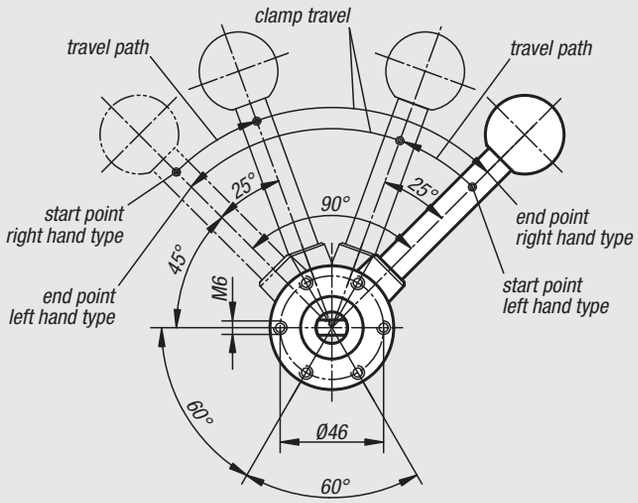
Version:
Black oxidised.
Housing black.
Ball knob, red.
Accessories black oxidised.

Sample order:
nlm 04410-10

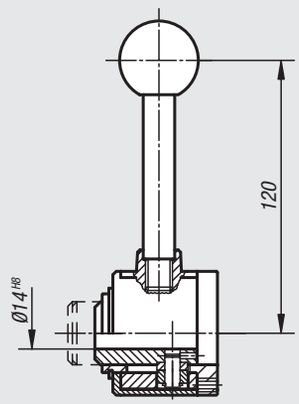
Note:
The travel path is 10 mm. Self-locking occurs in any position within only 2 mm of clamp travel. Thus workpieces with tolerances of up to 1.5 mm can be safely clamped. The „actima“ clamping device can be fitted in any horizontal or vertical position.
Standard parts allow further applications. They are available as optional accessories.
All parts of the cam system subject to heavy loads are case-hardened (pressure sleeve and accessories only if specified).
The maximum permissible clamping force is approximately 4905 N.



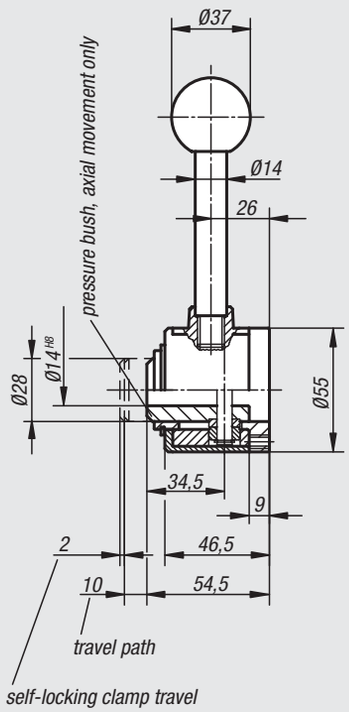
View from below



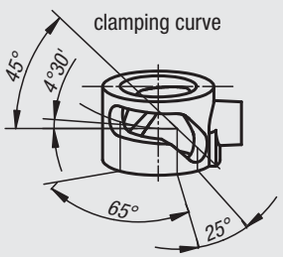
drilled through

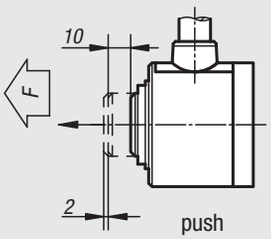


with transverse axis in bore

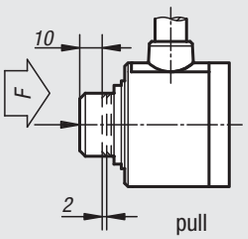


clamping curve



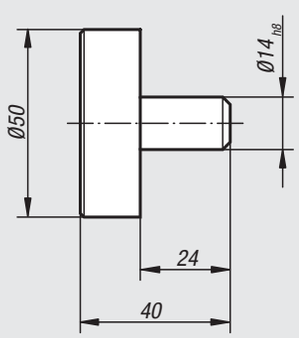


push

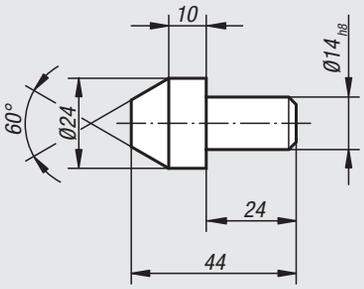


pull

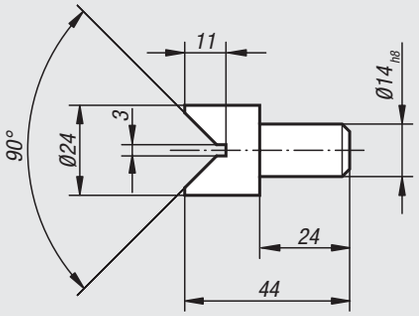
Clamping element „actima“



disc



taper



prism

„actima“ clamping device with transverse axis in the hole

Order No.	Version
04410-10	right-hand / push
04410-15	right-hand / pull
04410-20	left-hand / push
04410-25	left-hand / pull

„actima“ clamping device with through hole

Order No.	Version
04410-30	right-hand / push
04410-35	right-hand / pull
04410-40	left-hand / push
04410-45	left-hand / pull

„actima“ accessories

Order No.	Article description
04410-02	DISK FOR ACTIMA
04410-03	TAPER FOR ACTIMA
04410-04	PRISM FOR ACTIMA

Floating clamp

Material:
Base body and jaws steel.
Housing aluminium.

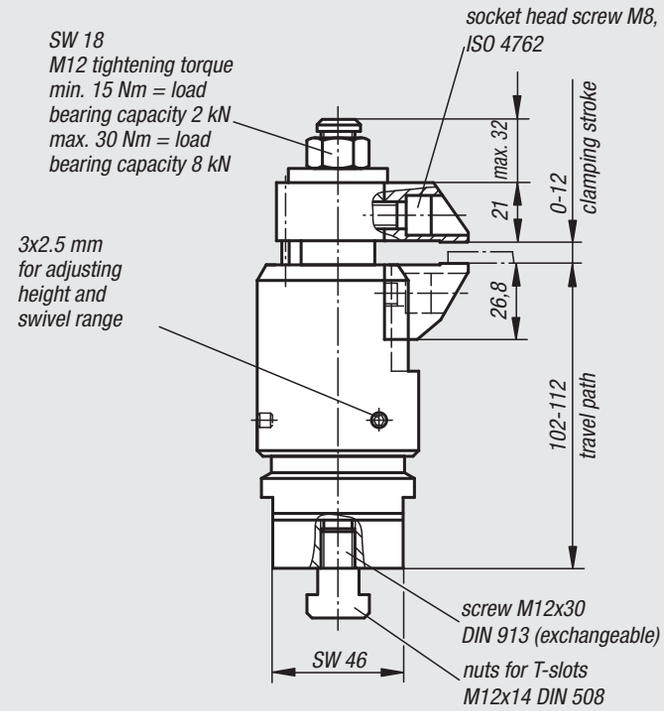
Version:
Body nitrided, black oxidised and ground.
Jaws nitrided and black oxidised.
Housing red anodized.

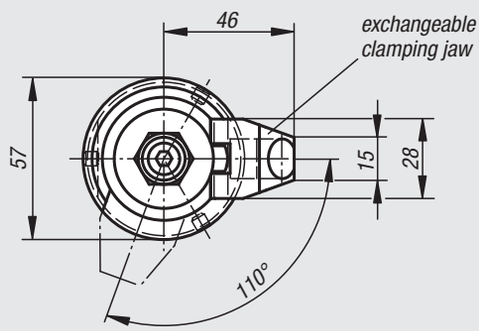
Sample order:
nlm 04420-100812

Note:
The floating clamp is used to clamp and support overhanging clamping points on components. It prevents vibrations and deflection during machining.

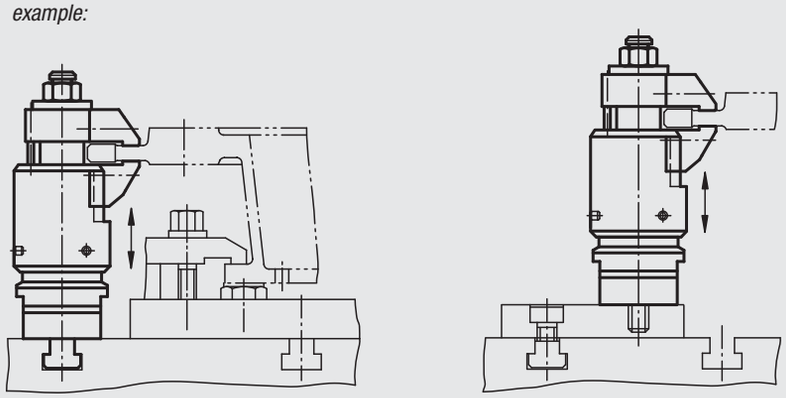
Method of operation:
1. Push the floating clamp down.
2. Pivot the jaws to the stop. The floating clamp contacts the bottom of the workpiece with a light spring force.
3. Tighten the floating clamp with the SW 18 hexagon nut (note the min. and max. torque). During clamping the workpiece is clamped and simultaneously supported.
4. Reverse the process to release.

Assembly:
Fasten the floating clamp to the fixture with the M12 screw.
Adjust the height stop and swivel range using the red sleeve and lock with the 3x2.5 mm grub screws. When setting the height leave generous clearance above.
For safe operation the M12 tapped hole must always be closed.
For specific clamping applications the standard jaws can be altered or replaced.





example:



Order No.	Travel path	max. clamping stroke	Load capacity N	Clamping force N
04420-100812	10	12	8000	8000

Floating clamp

with separate workpiece clamp and interlock

Material:
Base body and jaws steel.
Housing aluminium.

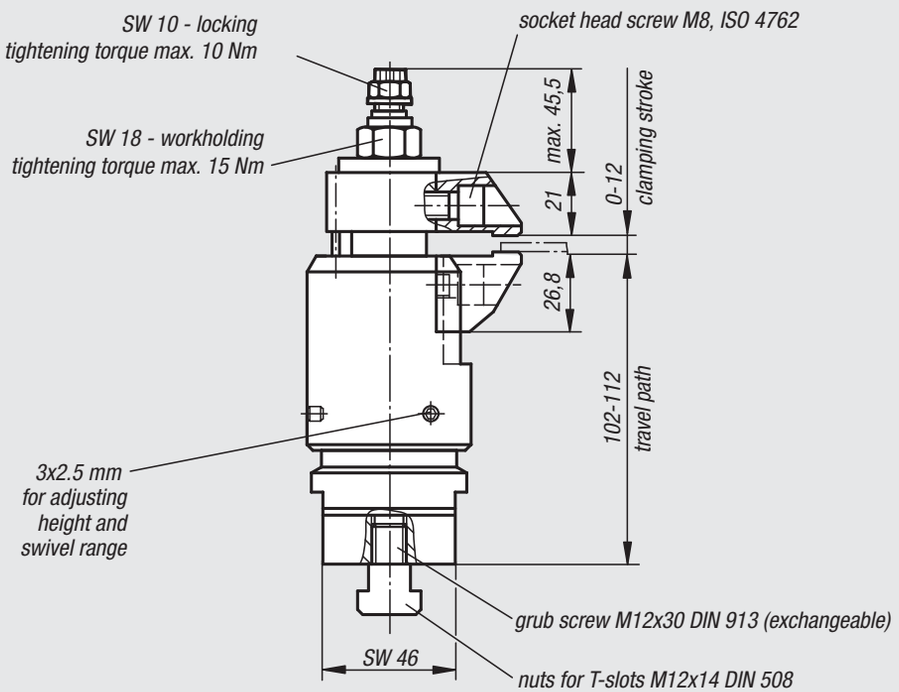
Version:
Body nitrided, black oxidised and ground.
Jaws nitrided and black oxidised.
Housing blue anodized.

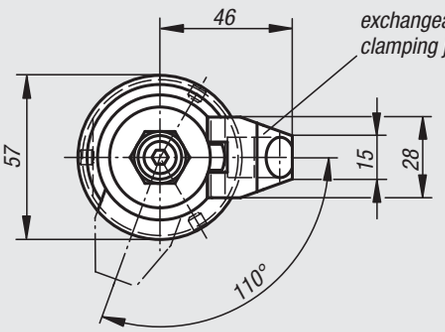
Sample order:
nlm 04421-100812

Note:
This floating clamp is used to clamp and support overhanging clamping points on thin components. It prevents vibrations and deflection during machining.

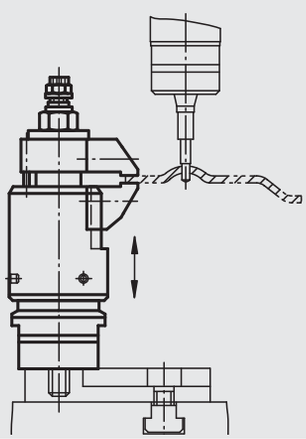
Method of operation:
1. Push the floating clamp down.
2. Pivot the jaws. The lower jaw contacts the workpiece with a light spring force.
3. Tighten the SW 18 hexagon nut. The jaws clamp the workpiece, the clamp is still floating.
4. Tighten the SW 10 hexagon nut. The clamping process is completed.
5. Reverse the process to release.

Assembly:
Fasten the floating clamp to the fixture with the M12 screw.
Adjust the height stop and the swivel range using the blue sleeve and lock with the 3x2.5 mm grub screws. When setting the height leave generous clearance above.
For safe operation the M12 tapped hole must always be closed.
For specific clamping applications the standard jaws can be altered or replaced.





example:



Order No.	Travel path	max. clamping stroke	Load capacity N	Clamping force N
04421-100812	10	12	8000	8000

Clamping jaws

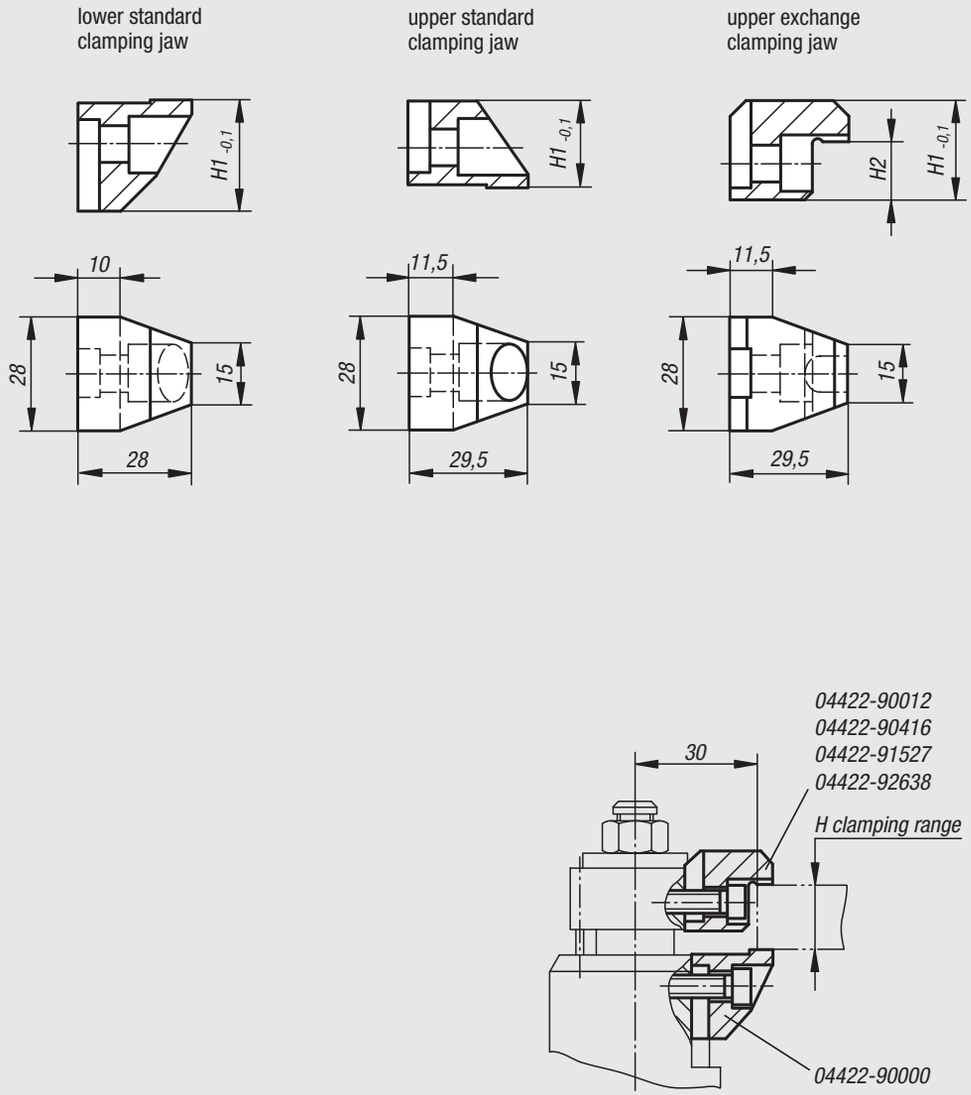
for floating clamps

Material:
Steel.

Version:
Nitrided and black oxidised.

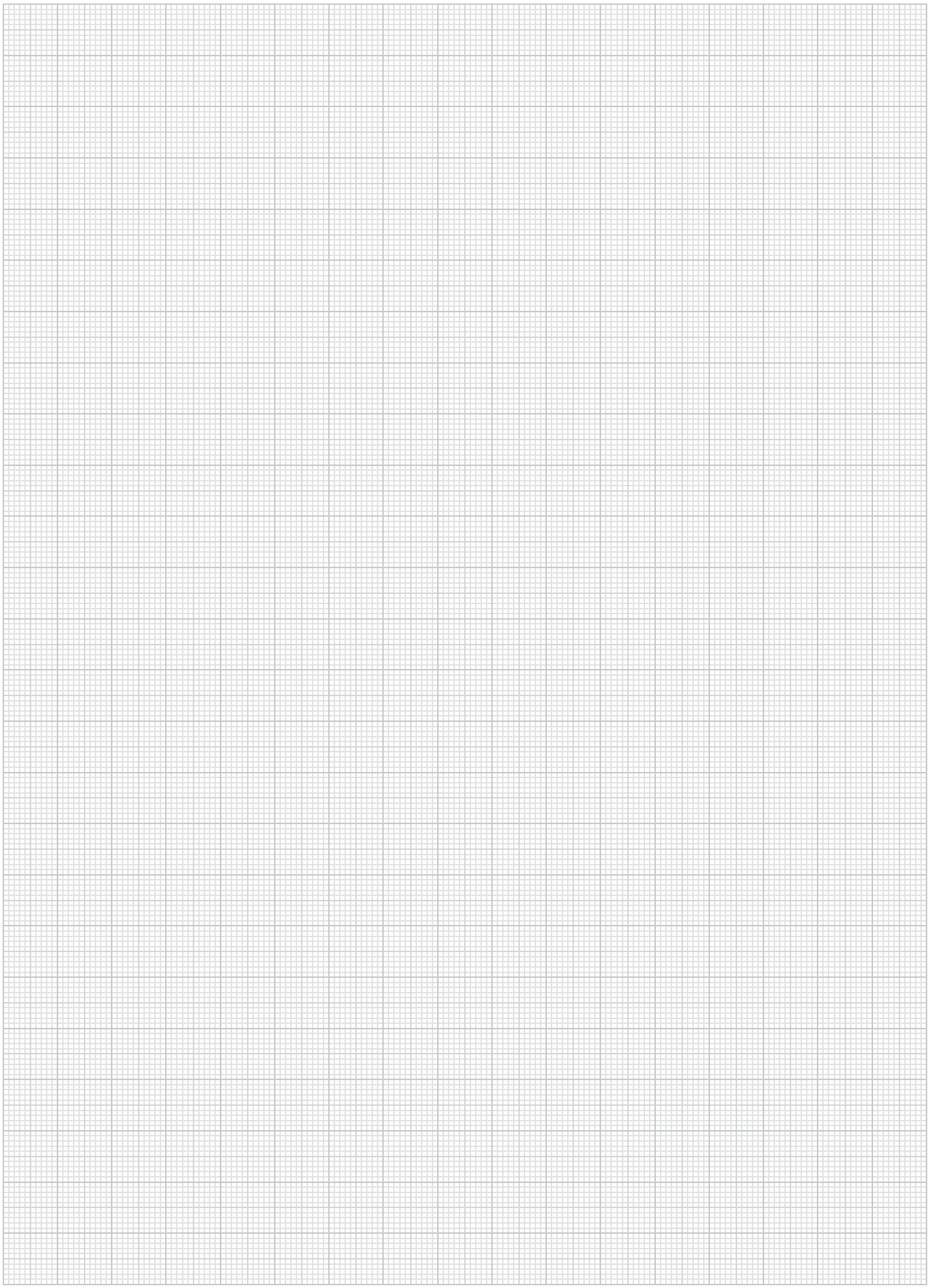
Sample order:
nlm 04422-90000

Note:
The clamping jaws can be used for floating clamps to increase the clamping range.



Order No.	Version	H clamping range	H1	H2
04422-90000	lower standard clamping jaw	-	26,8	-
04422-90012	upper standard clamping jaw	0 - 12	21	-
04422-90416	upper exchange clamping jaw	4 - 16	24,5	3,5
04422-91527	upper exchange clamping jaw	15 - 27	24,5	14,5
04422-92638	upper exchange clamping jaw	26 - 38	35,5	25,5

Notes



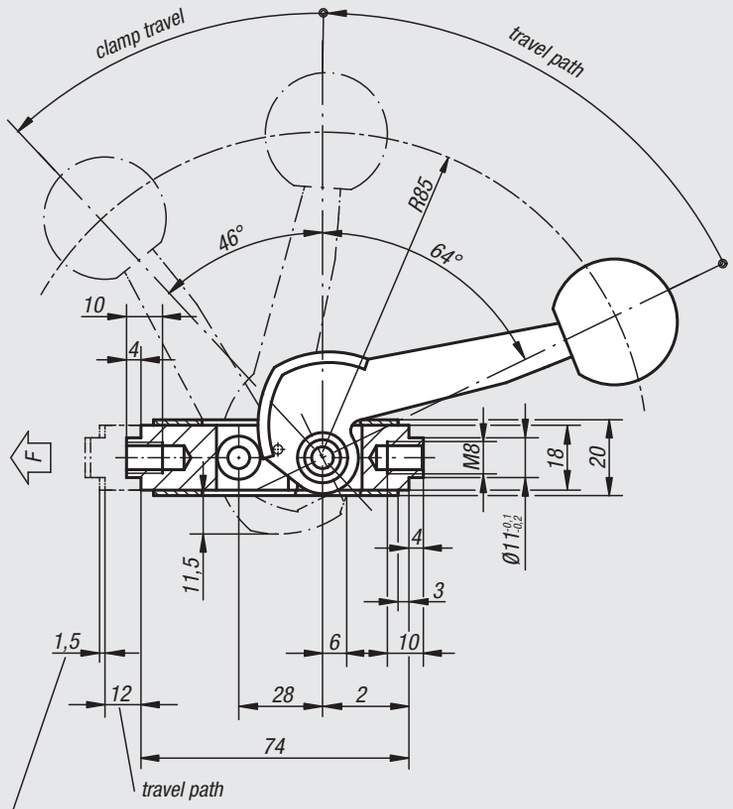
Clamping element „arness“

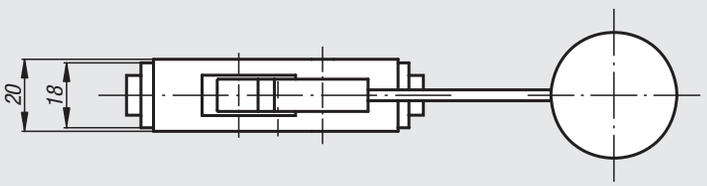
Material:
Steel.
Ball knob Duroplast PF 31

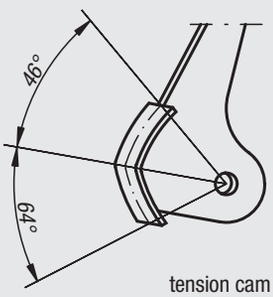
Version:
Housing painted silver-grey hammertone.
All other parts and accessories black oxidised.
Ball knob red.

Sample order:
nlm 04430-01

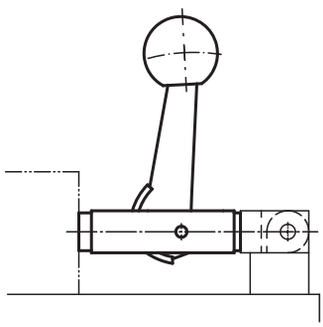
Note:
The travel path is 12 mm. Self-locking occurs in any position within only 1.5 mm of clamp travel, allowing workpieces with tolerances of up to 1 mm to be securely clamped. The „arness“ clamping element can be fitted in any horizontal or vertical position.
Several standard parts have been developed to achieve individual adaptation for various circumstances and are available as optional accessories.
The thrust pad and all parts of the cam system subject to heavy loads are case-hardened.
The maximum permissible clamping force is approximately 4905 N.







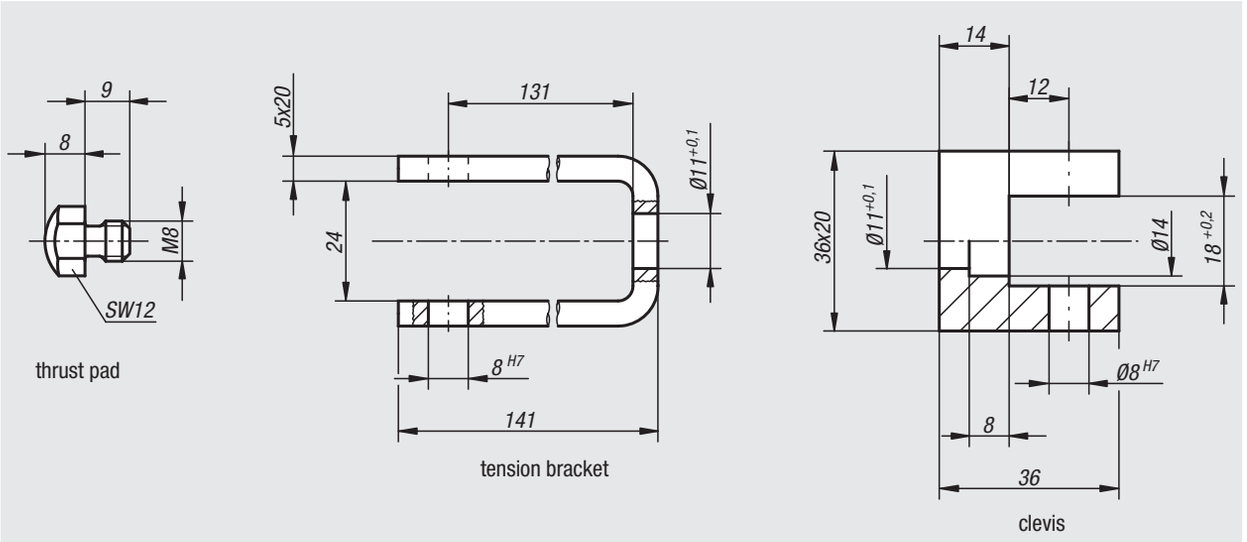
tension cam



Clamping element „arness“

Order No.	Dimensions
04430-01	see drawing

Clamping element „arness“



„arness“ accessories

Order No.	Article description
04430-02	CLEVIS FOR ARNESS
04430-03	TENSION BRACKET FOR ARNESS
04430-04	THRUST PAD FOR ARNESS

04431

Fixture clamps machinable

Material:
Cam screw alloyed steel.
Clamping disc steel.

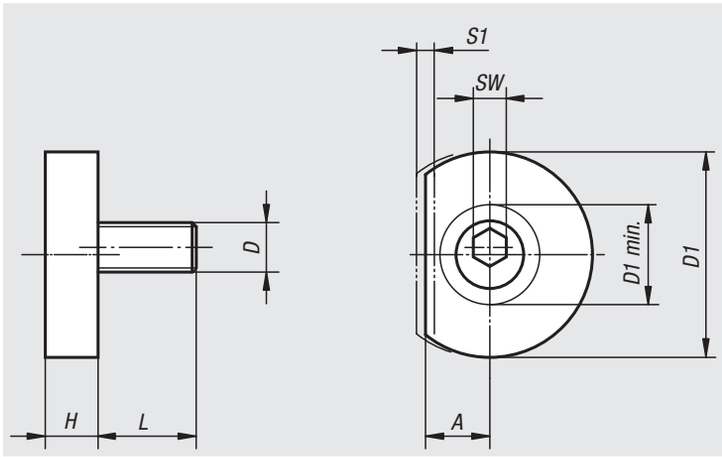
Version:
Cam screw and clamping disc black oxidised.

Sample order:
nlm 04431-06

Note:
These fixture clamps have a round washer that can be machined to suit the contour of the workpiece being clamped. This allows positive clamping for round, contoured or fragile workpieces. The flat edge is the same distance from the screw centre as our hexagonal fixture clamps 04435 allowing an interchange between the two.

„A“ = distance from workpiece to screw centre (cam screw).
„D1 min.“ = maximum depth of contour.

On request:
Replacement cam screws.



Order No.	A	D	D1	D1 min.	H	L	SW	S1 (travel)	Clamping force kN
04431-06	7,8	M6	24,9	12,1	6,4	11,9	4	1,01	3,3
04431-10	10,2	M10	31,2	17,2	8,9	18	7	1,52	8,9
04431-12	12,7	M12	37,6	22,4	11,4	22,9	8	2,03	17,8
04431-16	15	M16	43,9	26,1	14	28,6	12	2,54	26,7

04432

Fixture clamps unequal hexagon

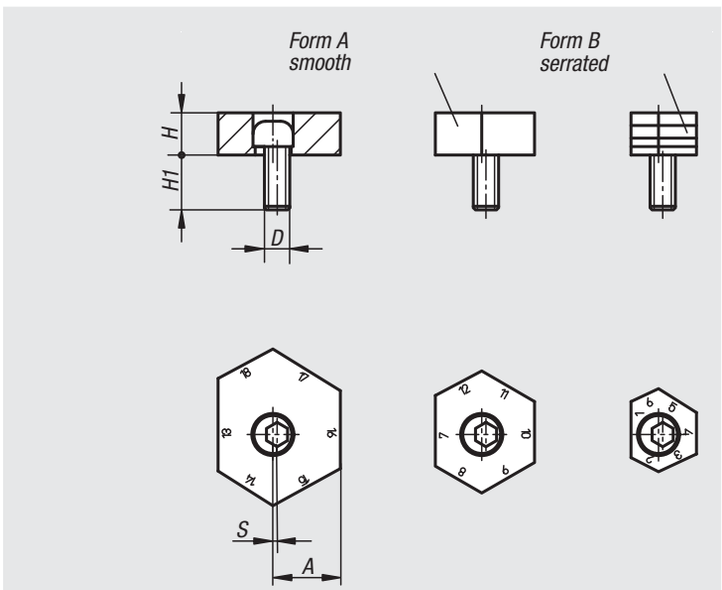
Material:
Cam screw steel tempered to 10.9.
Hexagon washer mild steel.

Version:
Cam screw black oxidised.
Hexagon washer hardened and black oxidised.

Sample order:
nlm 04432-13

Note:
Theses unequal hexagon fixture clamps can minimise the cost of clamping in fixtures. The clamping range can be altered up to 17 mm from the same tapped hole. Simply rotate the hexagon washer.
The washers are available with smooth edges for machined faces or with serrated edges for rough faces.

On request:
Replacement cam screws.



Order No. Form A	Order No. Form B	Distance A by face No.	D	H	H1	S (cam travel)	Clamping force kN
04432-09	**04432-13**	1/12, 2/13, 3/14, 4/15, 5/16, 6/17	M12	10	22	1	18
04432-10	**04432-14**	7/18, 8/19, 9/20, 10/21, 11/22, 12/23	M12	10	22	1	18
04432-11	**04432-15**	13/24, 14/25, 15/26, 16/27, 17/28, 18/29	M12	10	22	1	18

Spiral cam screws

Material:
Steel.

Version:
Case-hardened (56 ±1 HRC) and blue galvanized.

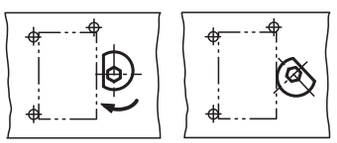
Sample order:
nlm 04433-04012

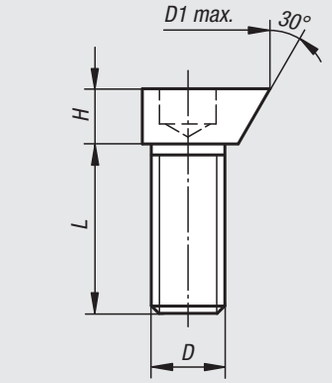
Note:
Robust, compact spiral cam clamping screws that exert a positive down force on diverse workpiece forms.

Assembly:
Drill and tap several holes at a distance X or Z (see diagram). Screw the cam screw into the required height and position with the flat side to the workpiece. Position the workpiece and tighten the cam screw with a hexagon key. Full clamping is achieved with approximately a 1/3 rotation. Lubricate the tapped hole regularly.

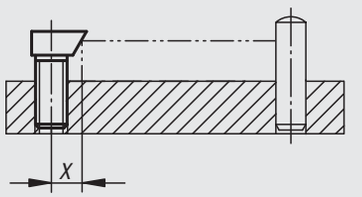
Place stops on the face towards which the screw turns to prevent the workpiece rotating away.

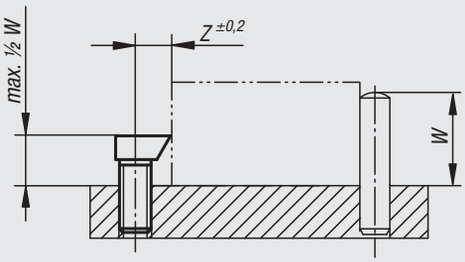
On request:
Spiral cam screws with LH thread.

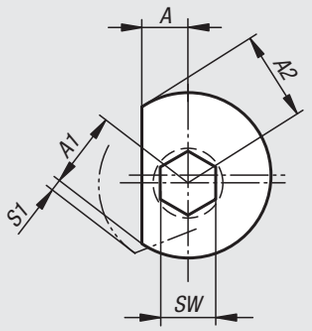


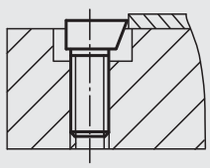


mounting dimensions

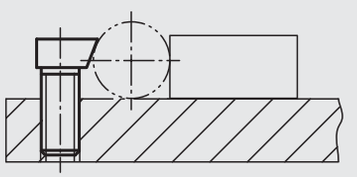








clamping sheet metal



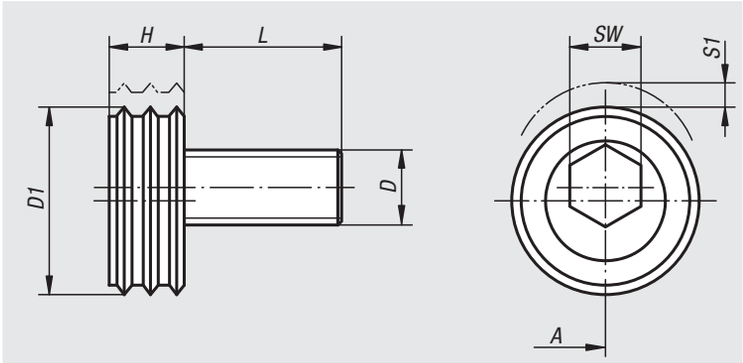
clamping round parts

Order No.	A	A1	A2	D	D1 max.	H	L	SW	S1 (travel)	X	Z	Clamping force kN	Tightening torque max. Nm
04433-04012	2,6	4,8	5,5	M4	11	4	12	3	0,7	4	5	0,1	2
04433-06016	5	6,7	7,8	M6	15,6	5,5	16	5	1,1	5,9	7	0,4	6
04433-08020	5,8	8,3	9,6	M8	19,1	6,5	20	6	1,3	7,1	8,6	3	20
04433-10024	6,3	9,8	11,8	M10	23,7	8	24	8	2	8,5	10,3	4,5	32
04433-12018	8,5	11,7	13,6	M12	27,3	9	18	10	1,9	10,1	12,2	6	55
04433-12030	8,5	11,7	13,6	M12	27,3	9	30	10	1,9	10,1	12,2	5	45
04433-16024	10,7	15,6	17,7	M16	35,4	12	24	14	2,1	13,2	16,2	10	90
04433-16040	10,7	15,6	17,7	M16	35,4	12	40	14	2,1	13,2	16,2	7,5	70

04434

Cam screws

with knife edge washer



Material:
Knife edge washer.
Cam screw carbon steel.

Version:
Cam screw tempered to 10.9 and black oxidised.
Knife edge washer hardened and anodized.

Sample order:
nlm 04434-16

Note:
The hardened knife edge washer is suitable for clamping rough cut stock, castings, forgings etc.

„A“ = distance from workpiece to screw centre (cam screw).

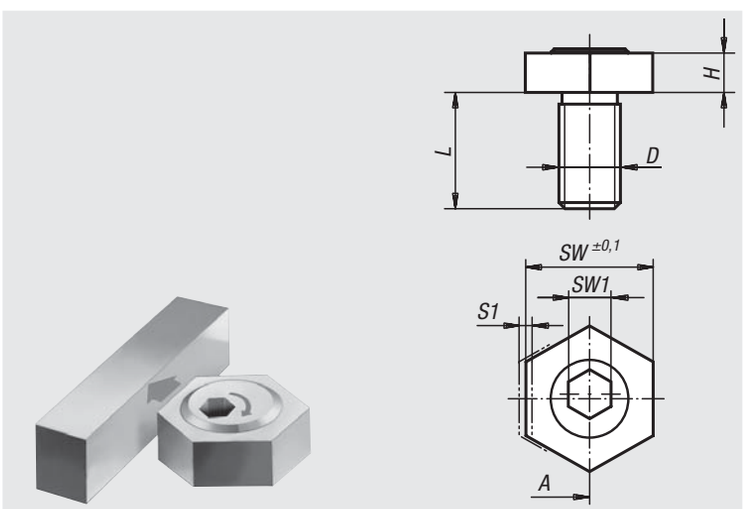
On request:
Replacement cam screws.

Order No.	A	D	D1	L	H	SW	S1 (travel)	Clamping force kN	Tightening torque max. Nm
04434-12	12,7	M12	25,4	22,5	9,6	8	2	18	88
04434-16	15	M16	30,1	26,8	12,7	12	2,5	27	135

04435

Cam screws

with hexagon washer



Material:
Cam screw carbon steel.
Hex washer brass.

Version:
Cam screw tempered to 10.9 and black oxidised.

Sample order:
nlm 04435-12

Note:
The minimal height of the cam clamp allows numerous clamping problems in fixture and equipment construction to be solved. The brass hex washer offers a gentle yet extremely stable and safe clamping of workpieces. By using several fixture clamps entire pallets can be set-up.

„A“ = distance from workpiece to screw centre (cam screw).

On request:
Replacement cam screws.

Order No.	A	D	H	L	SW	SW1	S1 (travel)	Clamping force kN	Tightening torque max. Nm
04435-04	3,8	M4	2,8	10	8	3	0,8	0,9	2,2
04435-06	7,8	M6	4,8	12	16	4	1,3	3,4	8,5
04435-08	10,2	M8	4,8	15	20	5	1	3,6	11,3
04435-10	10,2	M10	6,4	20	20	7	1,6	9,0	28,06
04435-12	12,7	M12	9,5	25	25	8	2	18,0	88
04435-16	15	M16	12,7	30	30	12	2,5	27,0	135

Cam screws

with hexagon washer, for T-slots

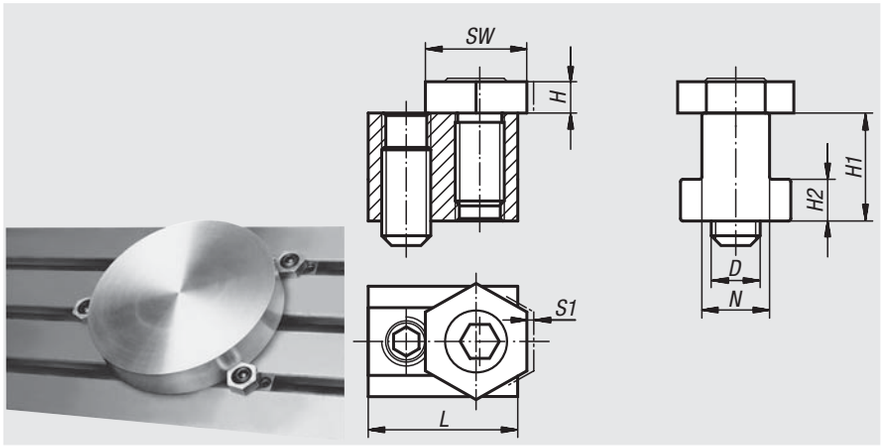
Material:
Carbon steel.
Hex washer brass.

Version:
Tempered to 10.9 and black oxidised.

Sample order:
nlm 04436-12

Note:
These fixture clamps can be used directly on machine tables or other tables with T-slots. The grub screw at the rear locks the T-nut in the slot. Thin shims are recommended to prevent marking the bottom of the T-slot.

On request:
Replacement cam screws.



Order No.	D	N	H	H1	H2	L	SW	S1 (travel)	Clamping force kN
04436-08	M6	8	4,8	9,6	3,3	23	16	1	3,4
04436-10	M6	10	4,8	14	4,5	23	16	1	3,4
04436-12	M8	12	4,8	15,5	6,5	28	21	1	3,6
04436-14	M10	14	6,4	22	8,5	30,5	21	1,6	9
04436-16	M12	16	9,5	22,5	9	30,5	25	2	18
04436-18	M12	18	9,5	28,5	10	34,5	25	2	18
04436-20	M16	20	12,7	32	12	39	30	2,5	27
04436-22	M16	22	12,7	38,2	14	44	30	2,5	27

Application using fixture clamps

04437

Cam clamps

with riser

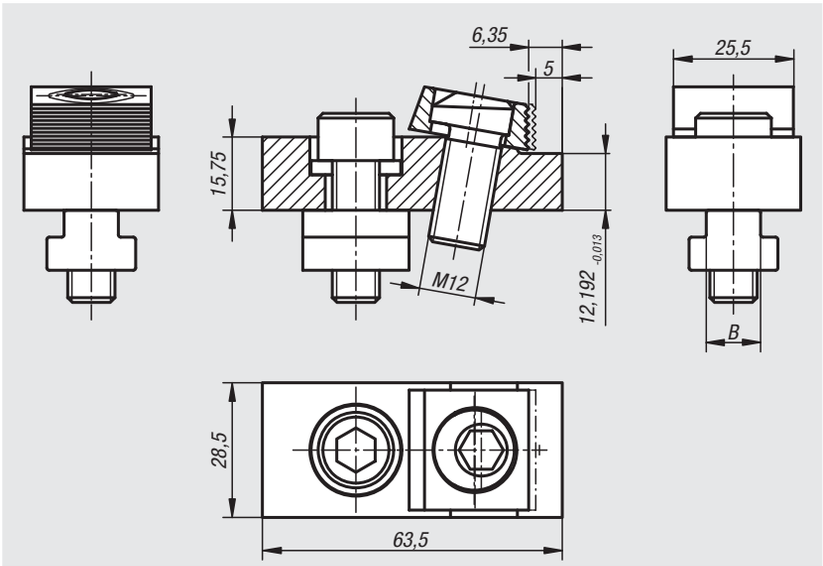
Material:
Steel.

Version:
Body tempered and black oxidised.
Square washer case hardened and brass-plated.

Sample order:
nlm 04437-16

Note:
These cam clamps with riser can be used directly on machine tables. A positive down force is exerted during clamping.

On request:
Replacement cam screws.



Order No.	B Slot width	Clamping force kN
04437-12	12	12
04437-14	14	12
04437-16	16	12
04437-18	18	12

04439

Toe clamps for T-slots

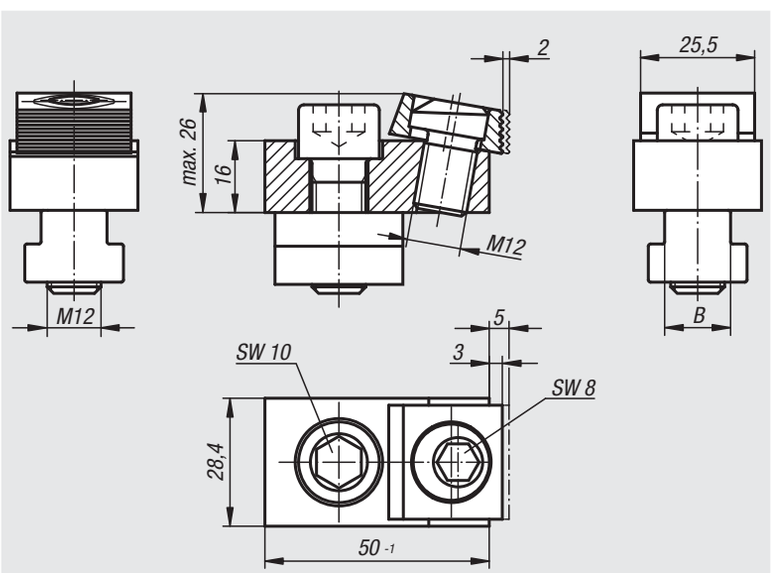
Material:
Steel.

Version:
Body tempered and black oxidised.
Square washer case hardened and brass-plated.

Sample order:
nlm 04439-14

Note:
These toe clamps can be used on machine tables or adapter plates. The positive down force holds the workpiece down on the supporting surface. The square washer can adapt slightly to an angular position i.e. the workpiece does not have to be exactly parallel. The clamping washer has a smooth side for machined surfaces and a serrated side for rough faces.

On request:
Replacement cam screws.



Order No.	B Slot width	Clamping force kN
04439-00	without T-nut and fastening screw	18
04439-14	14	18
04439-16	16	18
04439-18	18	18

Talon grips

Material:
Steel.

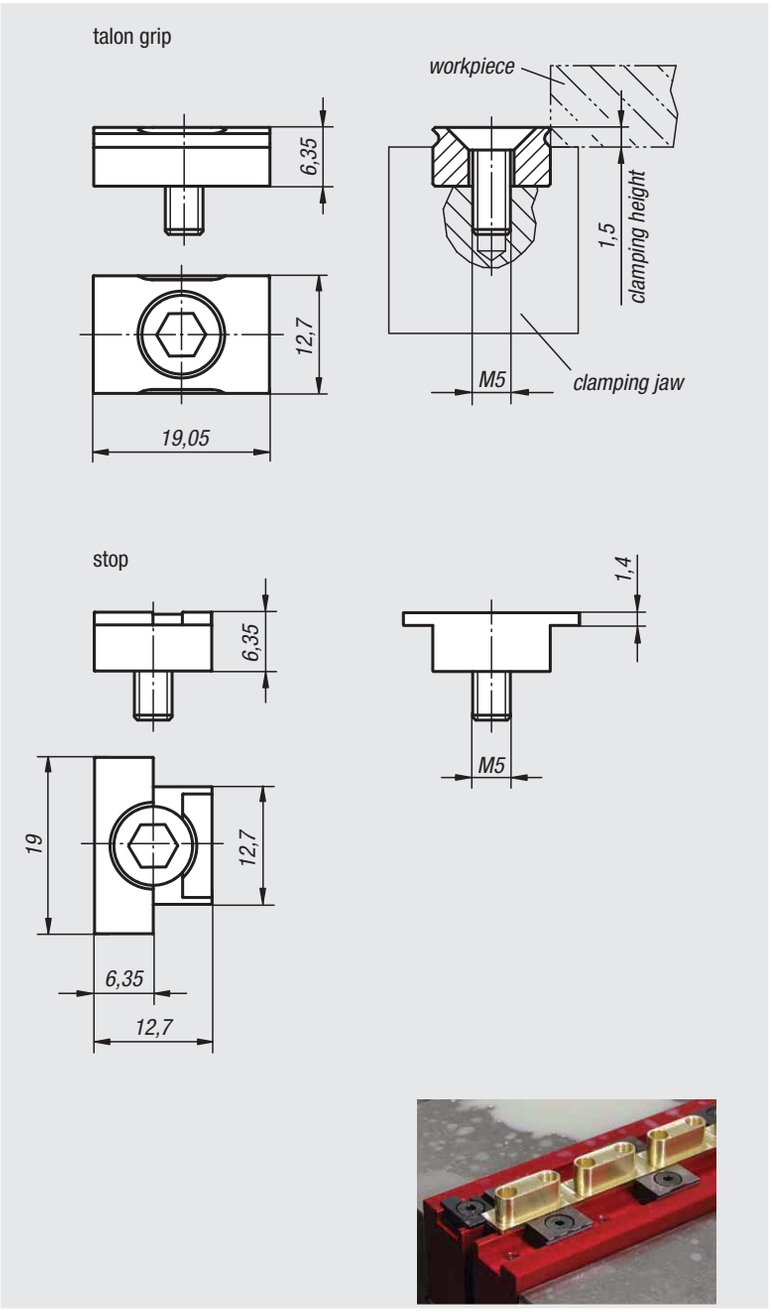
Version:
Hardened (52+2 HRC) and black oxidised.

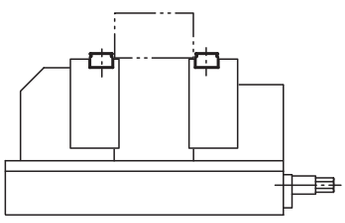
Sample order:
nlm 04440-1219

Note:
Talon grips are meant for installing into vice jaw plates. A slot with tapped hole is sufficient for mounting. The sharp edges on the talons bite into the workpiece and prevent lateral and horizontal movement.

- Positive clamping for high cutting speeds.
- Low clamping height of 1.5 mm (saves material costs).
- The contour of the talons produces a slight pull-down effect.

A matching stop is available as an accessory.





Order No.	Version
04440-1219	talon grip
04440-12	stop

Talon grips round

Material:
Steel.

Version:
Hardened (52+2 HRC) and black oxidised.

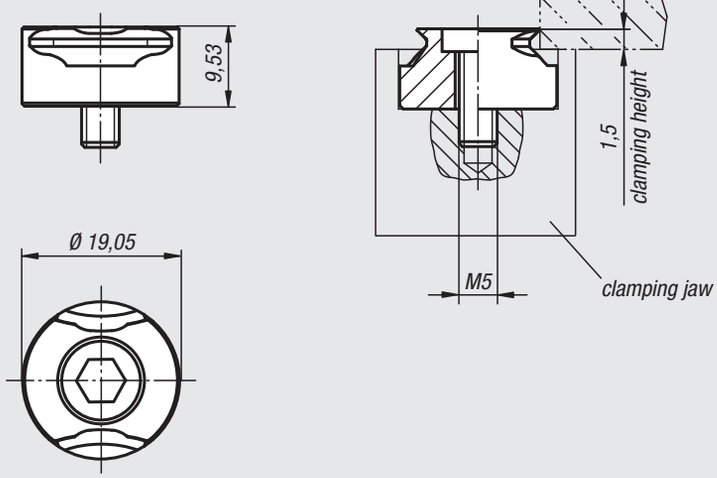
Sample order:
nlm 04440-0919

Note:
Talon grips are meant for installing into vice jaw plates. A tapped hole with counterbore is sufficient for the mounting. The sharp edges on the talons bite into the workpiece and prevent lateral and horizontal movement.

- Positive clamping for high cutting speeds.
- Low clamping height of 1.5 mm (saves material costs).
- The contour of the talons produces a slight pull-down effect.

Talon grips expand the application possibilities of your machine vice. Round, contoured and oversized workpieces can be quickly and securely clamped by using talon grips.

talon grip



special components

round components

Order No.	Version
04440-0919	talon grip

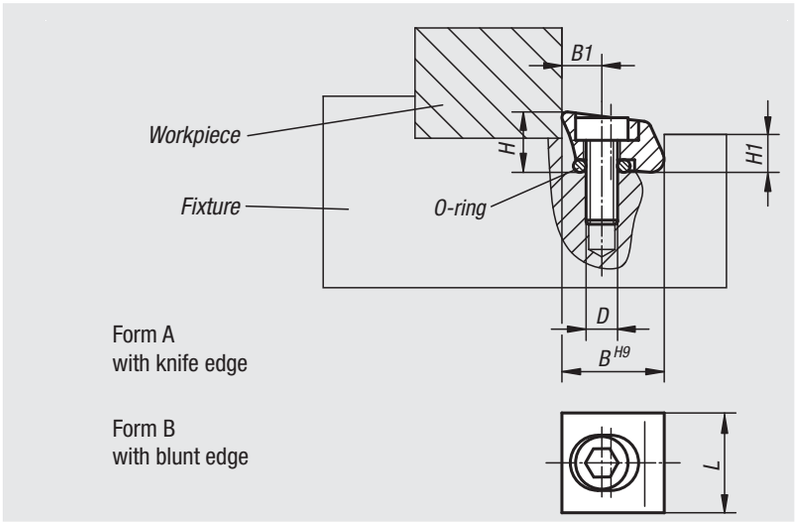
Chock clamps

Material:
Clamping element steel or brass.

Version:
Steel hardened.

Sample order:
nlm 04441-113

Note:
Extremely space-saving design.
No protruding edges due to lateral clamping.
Positive down force.



Order No.	Form	Material	D	B	B1	H	H1	L	Clamping width	Clamping travel	Clamping force kN	Tightening torque max. Nm
04441-110	A	steel	M2,5x8	9,5	3,8	6	3,6	9,5	9,5	0,15	2,8	1,8
04441-113	A	steel	M4x12	12,7	5,1	8	4,8	13	12,7	0,4	6,6	5,6
04441-119	A	steel	M6x16	19,05	7,6	11,5	7,2	19	19,1	0,6	16	22,5
04441-210	B	steel	M2,5x8	9,5	3,8	6	3,6	9,5	9,5	0,15	2,8	1,8
04441-213	B	steel	M4x12	12,7	5,1	8	4,8	13	12,7	0,4	6,6	5,6
04441-219	B	steel	M6x16	19,05	7,6	11,5	7,2	19	19,1	0,6	16	22,5
04441-310	B	brass	M2,5x8	9,5	3,8	6	3,6	9,5	9,5	0,15	0,9	0,56
04441-313	B	brass	M4x12	12,7	5,1	8	4,8	13	12,7	0,4	1,8	2,8
04441-319	B	brass	M6x16	19,05	7,6	11,5	7,2	19	19,1	0,6	4,2	5,6

Cam clamps adjustable

with riser

Material:
Steel.

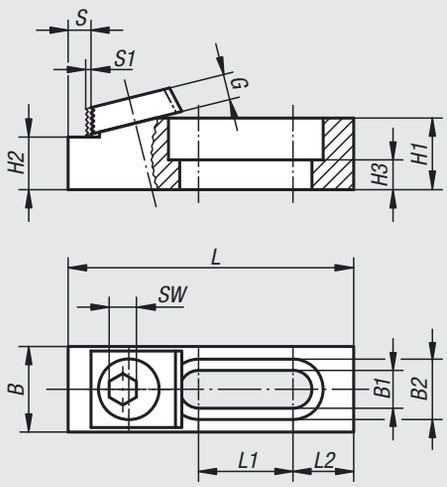
Version:
Body tempered, black oxidised, riser faces ground.
Square washer case hardened and brass-plated.

Sample order:
nlm 04444-12

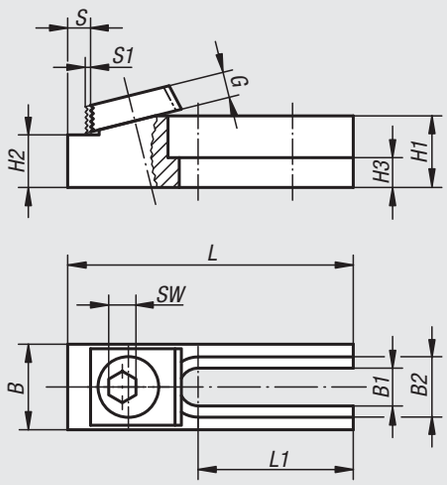
Note:
Cost-effective custom made clamping fixtures can be produced using the adjustable riser cam clamps together with the matching riser stops.

On request:
Replacement cam screws.

04444-08, 04444-12



04444-16



Order No.	suitable fastening screw	L	L1	L2	B	B1	B2	H1	H2	H3	S	S1	G	SW	Oblong hole	Clamping force kN	Tightening torque max. Nm
04444-08	M8	63,5	21	13,5	19	8,4	13,4	15,9	11,684 -0,013	6,6	6,3	1,2	5,3	7	closed	8,9	28
04444-12	M12	95,1	42,7	12,7	28,5	13	19,8	15,9	12,192 -0,013	6,9	7,1	2	9,5	8	closed	17,8	88
04444-16	M16	107	46,3	-	38	17	24,8	41	35,001 ±0,006	21	8,3	2,5	12,7	12	open	26,7	135

Riser stops

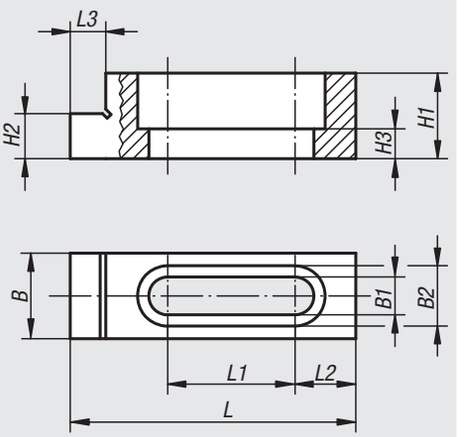
Material:
Steel.

Version:
Tempered, black oxidised.
Riser faces ground.

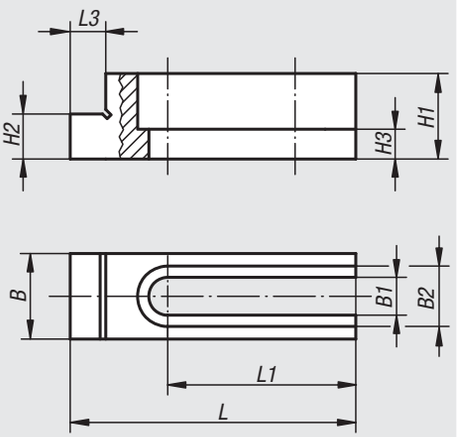
Sample order:
nlm 04445-12

Note:
Cost-effective custom made clamping fixtures can be produced using the adjustable riser cam clamps together with the matching riser stops.

04445-08, 04445-12



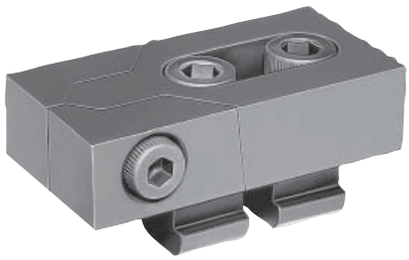
04445-16

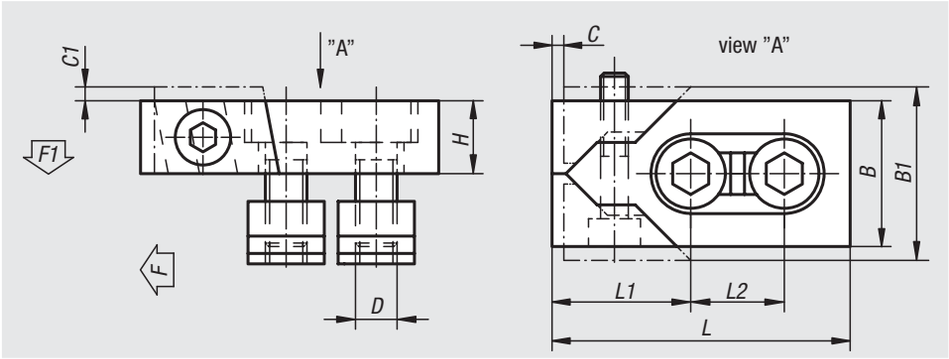


Order No.	suitable fastening screw	L	L1	L2	L3	B	B1	B2	H1	H2	H3	Oblong hole
04445-08	M8	63,5	28,3	13,5	7,9	19	8,4	13,4	19	11,684 -0,013	6,6	closed
04445-12	M12	95,2	42,7	12,7	7,9	28,5	13,4	19,8	22	12,192 -0,013	6,9	closed
04445-16	M16	107	46,2	-	9,5	38	17	24,8	50,7	35,001 ±0,006	21,3	open

04450

Low-profile clamps





Material:
Steel.

Version:
Hardened, black oxidised.

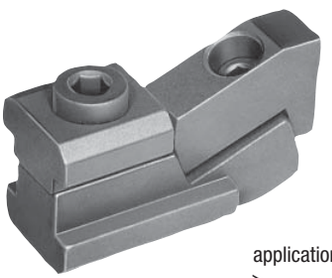
Sample order:
nlm 04450-16

Note:
These handy low-profile clamp jaws are ideal for machining most workpiece sizes. The hardened wedge operated jaws also provide positive down force.

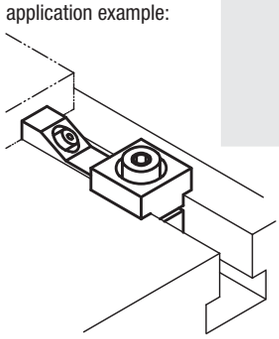
Order No.	Slot width	L	L1	L2	B	B1	H	C	C1	D	F kN	F1 kN	Tightening torque max. Nm
04450-12	12	80	39	26	40	47	20	3	2,5	M10	16	0,6	15
04450-14	14	80	39	26	40	47	20	3	2,5	M12	22	0,9	18
04450-16	16	80	39	26	40	47	20	3	3	M12	22	0,9	18
04450-161	16	100	46	34	50	59	25	4	2,5	M14	32	1,2	25
04450-18	18	100	46	34	50	60	25	4	3	M16	36	1,4	35
04450-20	20	100	46	34	50	60	25	4	3	M16	36	1,4	35
04450-22	22	140	65	50	78	95	30	5	4	M20	36	1,4	45

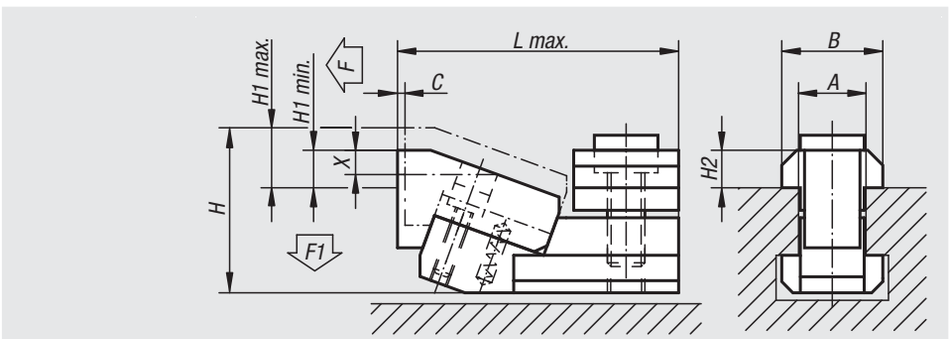
04470

T-slot clamps



application example:





Material:
Steel.

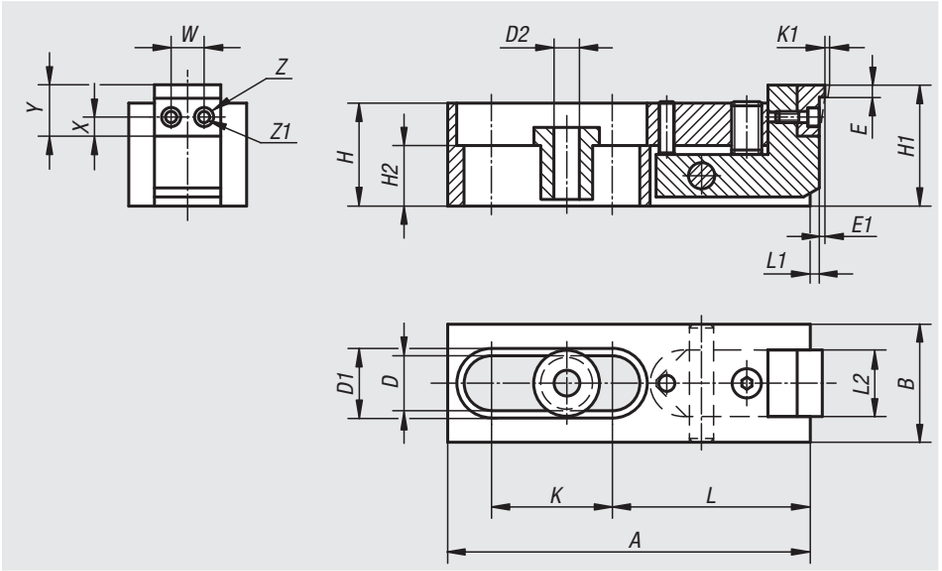
Version:
Hardened, black oxidised.

Sample order:
nlm 04470-12

Note:
These T-slot clamps are especially useful for clamping low profile workpieces. The wedge operated jaws also provide positive down force.
Dimensions „H1“ and „X“ depend on the max. T-slot depth acc. to DIN 650.
To achieve the minimal clamping height by the minimal slot depth, the jaw can be ground down by the dimension „X“.

Order No.	A	C	L max.	B	H	H1 min.	H1 max.	X	H2	F (N)	F1 (N)
04470-12	12	1,8	52	18	31	3,5	8,5	5	7	5000	600
04470-14	14	1,8	55	22	34	2,5	7,5	5	8	5500	700
04470-16	16	2,5	68	25	41	4	11	6	9	8000	900
04470-18	18	2,5	71	28	43	2	9	6	10	9000	1000
04470-22	22	3	89	35	53	5	14	9	14	16000	1900

Side clamps



Material:
Body steel.
Jaw mild steel.
Centring bush with collar carbon steel.

Version:
Black oxidised.
Jaws case-hardened.

Sample order:
nlm 04480-006

Note:
These flat design side clamps are ideal for machining low profile workpieces. The hardened jaws also provide positive down force.

Order No.	A	B	D	D1	D2	E	E1	H	H1	H2	K	K1	L	L1	L2	W	X	Y	Z	Z1	Clamping force kN
04480-006	80	24	12,2	16	6,5	2,5	0,6	21	25,5	9	25,5	2	44,5	2,5	13,5	7	4,5	11	5	3	3
04480-010	120	39	18,2	24	10,5	4	1	34	40	20	40,5	2,5	65,5	4	21,5	10	6	15	8	4,5	16
04480-016	186	60	26,2	35	17	7	1,5	51	59	22	60,5	4	105	6,5	35,5	16	9	24	14	9	31

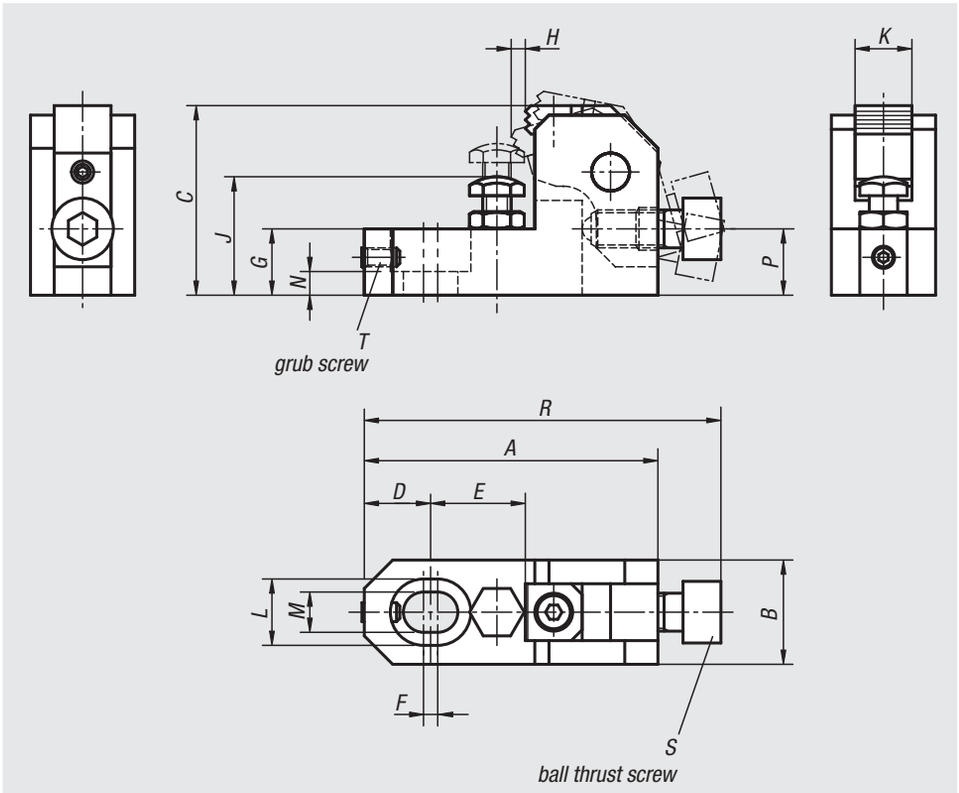
Side clamps

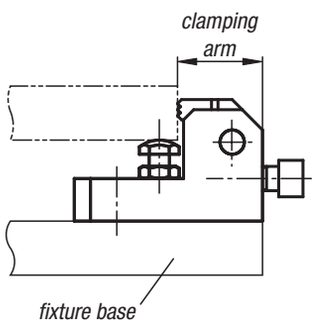
with rest pad

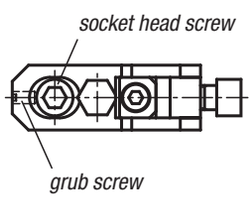
Material:
Housing and arm carbon steel.
Jaw tool steel.

Version:
Housing tempered and black oxidised.
Arm black oxidised.
Jaw tempered and black oxidised.

Sample order:
nlm 04485-02508

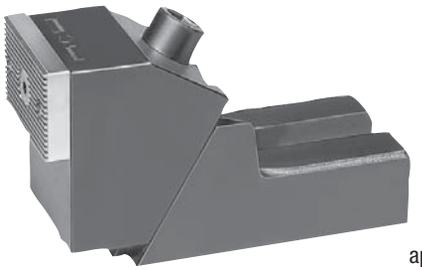




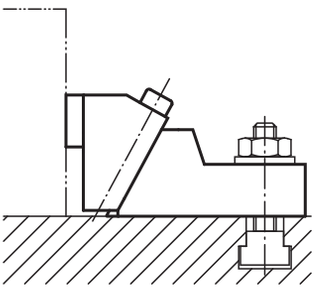


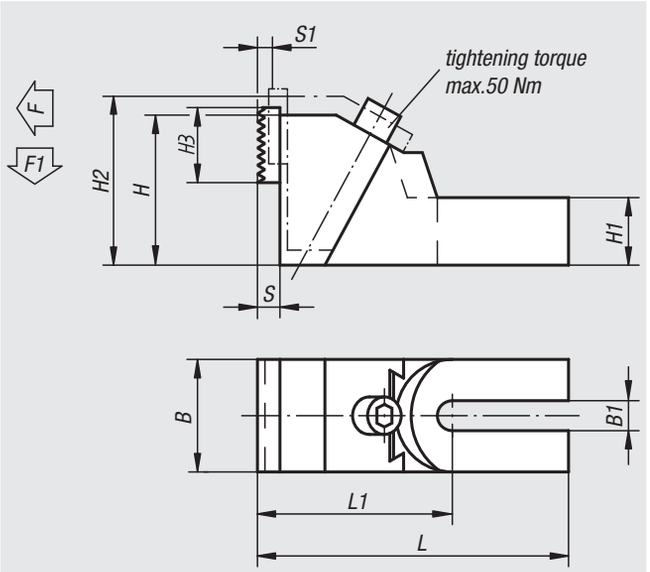
Order No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	Clamping force N	Tightening torque Nm
04485-02508	62	22	40	14	20	3	14	3	25-32	12	14	8,5	5	14	75,5	M8x20	M4x8	6000	15
04485-03210	78	25	50	18	25	4	18	3,7	32-40	16	17,5	11	7	17,5	95	M10x25	M5x10	10000	30
04485-04012	93	32	60	21	30	5	21	4,5	40-48	20	20	13	8	21	113	M12x30	M6x12	17000	65
04485-04816	124	38	80	28	40	6	27	6	48-63	25	26	17	10	28	151	M16x40	M8x16	25000	130

Side clamps robust



application example:





Material:
Body malleable iron.
Jaws mild steel.

Version:
Black oxidised.
Jaws case-hardened.

Sample order:
nlm 04500-26

Note:
The jaws are reversible, smooth side for machined parts, serrated side for rough surfaces. We recommend using two bolts to mount the clamp to the machine table!
The T-slot bolts 07040 can be used for mounting (order separately).

Order No.	suitable for slot width	L	L1	B	B1	H	H1	H2	H3	S	S1	F kN	F1 kN
04500-19	12, 14, 16, 18	177,5	112,5	65	19	85	37	99	40	12	8	18,8	2,26
04500-26	20, 22, 24, 28, 30	226,5	136,5	75	26	100	45	118	40	12	11	23,05	2,77
04500-38	32, 36, 42	262,5	157,5	90	38	120	55	145	40	12	15	29,4	3,33

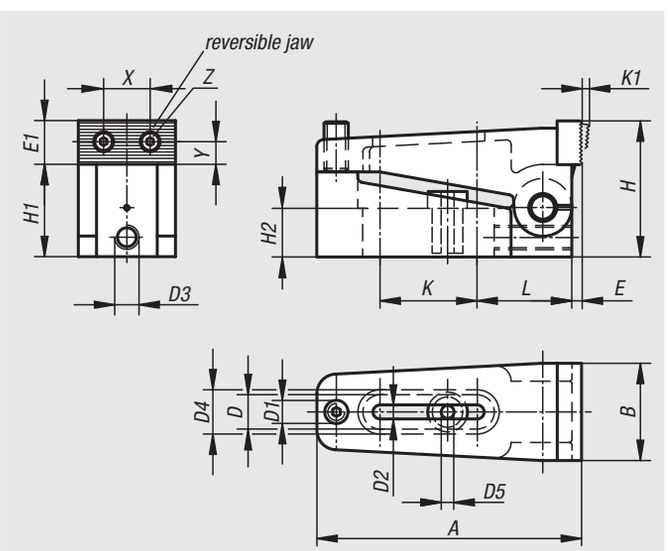
Side clamps

Material:
Body steel.
Jaw mild steel.
Centring bush carbon steel

Version:
Black oxidised.
Jaws case-hardened.

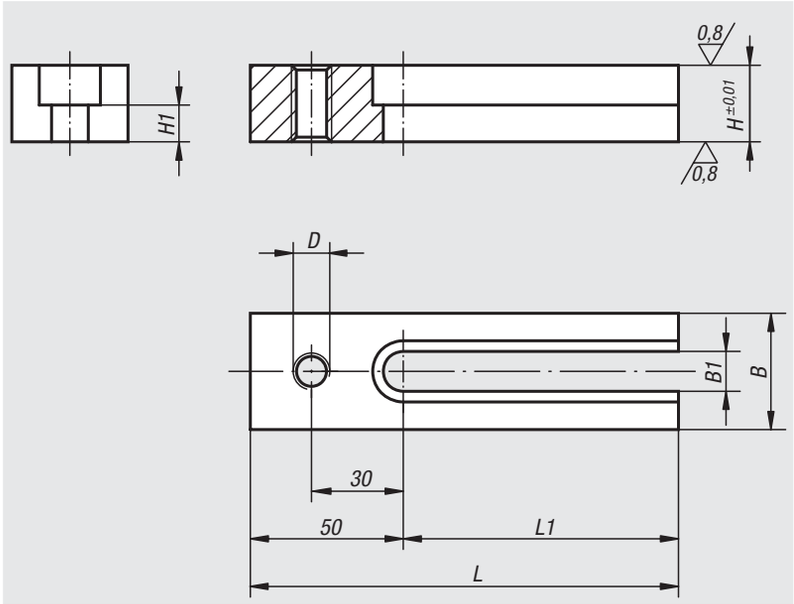
Sample order:
nlm 04509-006

Note:
The jaws are reversible - smooth side for machined surfaces, serrated side for rough surfaces. A positive down force is also exerted during clamping.



Order No.	A	B	D	D1	D2	D3	D4	D5	E	E1	H	H1	H2	K	K1	L	X	Y	Z	Clamping force kN
04509-006	73	25	12,2	M6	7	M6	16	6,5	2,5	11	35	24	12,4	25,5	2,5	27	12	4,5	M3	10
04509-010	110	39	18,2	M10	11	M10	24	10,5	4	18	56	38	20	40,5	4	39	20,5	8	M5	40
04509-016	170	58	26,2	M16	17	M10	35	17	7	27	85	60	30	60,5	7	61	32	13	M8	100

Seating blocks adjustable

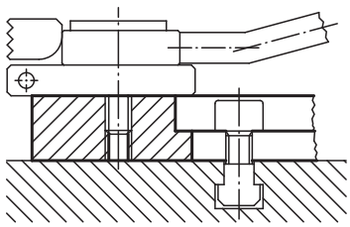


Material:
Carbon steel.

Version:
Tempered, black oxidised.
Contact faces ground.

Sample order:
nlm 04512-12125

Note:
The tapped hole is for mounting fixture components.
The slot allows the riser to be set in any desired position.



Order No.	D	L	L1	B	B1	H	H1
04512-12025	M12	90	40	38	13	25	12
04512-12032	M12	90	40	38	13	32	19
04512-12040	M12	90	40	38	13	40	27
04512-12050	M12	90	40	38	13	50	37
04512-12125	M12	140	90	38	13	25	12
04512-12132	M12	140	90	38	13	32	19
04512-12140	M12	140	90	38	13	40	27
04512-12150	M12	140	90	38	13	50	37
04512-16032	M16	90	40	50	17	32	15
04512-16040	M16	90	40	50	17	40	23
04512-16050	M16	90	40	50	17	50	33
04512-16132	M16	140	90	50	17	32	15
04512-16140	M16	140	90	50	17	40	23
04512-16150	M16	140	90	50	17	50	33

Side clamps

Material:
Steel.

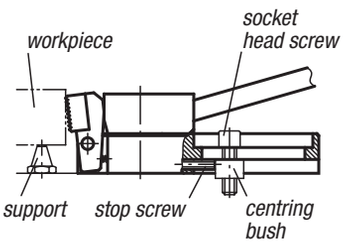
Version:
Case-hardened and black oxidised.

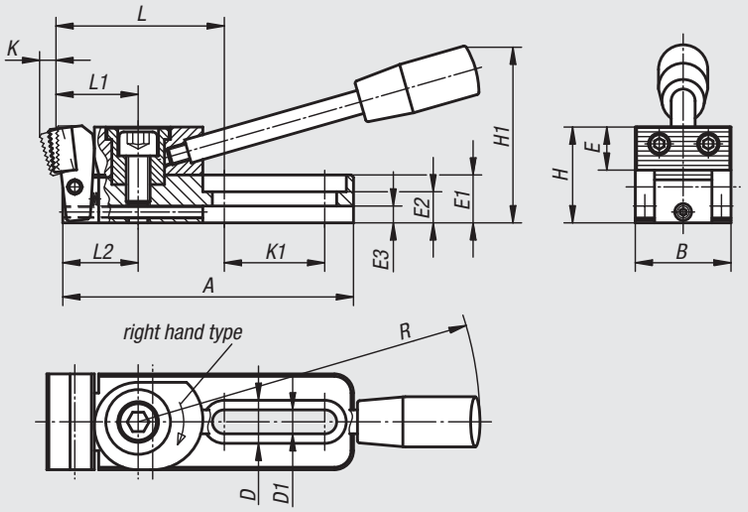
Sample order:
nlm 04516-006010

Note:
This is a quick-action side clamp where workpieces are clamped by rotating a cam wheel which exerts pressure on the swivel jaw, simultaneously producing a positive down force. Using the stop screw and centring bush (see diagram), the side clamp can be mounted and positioned on a modular grid system.

The versions 04516-006010, 04516-006015, 04516-006030 and 04516-006035 have 2 round carbide inserts.

Clamping force:
04516-006... = 3800 N
04516-010... = 7200 N



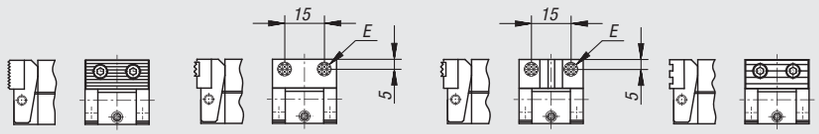


Form A
steel jaw
serrated

Form B
jaw with 2 round
carbide inserts

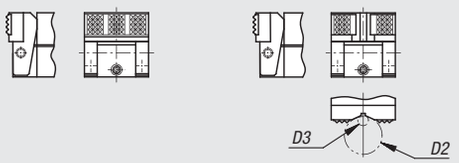
Form C
jaw with 2 round
carbide inserts
and central prism

Form D
POM jaw
serrated



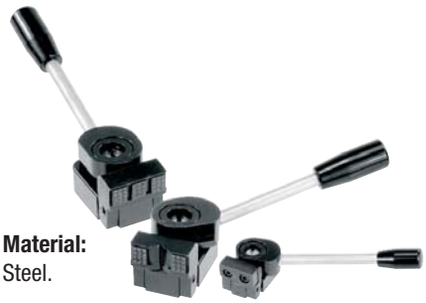
3 rectangular
carbide inserts

2 rectangular carbide
inserts and central prism



Order No.	Form	Version	A	B	D	D1	D2 max.	D3 min.	E	E1	E2	E3	H	H1	K	K1	L	L1	L2	R	Clamping force kN
04516-006005	A	right-hand type	78	25	12	6,2	-	-	11	12	8	4	25	45	4	26	46,5	22	20	110	3,8
04516-010005	A	right-hand type	121,5	40	18	10,2	-	-	18	20	13	7	40	74	6	42	71	35	31,5	143	7,2
04516-006025	A	left-hand type	78	25	12	6,2	-	-	11	12	8	4	25	45	4	26	46,5	22	20	110	3,8
04516-010025	A	left-hand type	121,5	40	18	10,2	-	-	18	20	13	7	40	74	6	42	71	35	31,5	143	7,2
04516-006010	B	right-hand type	78	25	12	6,2	-	-	ø 8	12	8	4	24	45	3,5	26	46,5	22	20	110	3,8
04516-010010	B	right-hand type	121,5	40	18	10,2	-	-	12,7	20	13	7	39	74	5,5	42	73	35	31,5	143	7,2
04516-006030	B	left-hand type	78	25	12	6,2	-	-	ø 8	12	8	4	24	45	3,5	26	46,5	22	20	110	3,8
04516-010030	B	left-hand type	121,5	40	18	10,2	-	-	12,7	20	13	7	39	74	5,5	42	73	35	31,5	143	7,2
04516-006015	C	right-hand type	78	25	12	6,2	9,5	2,5	ø 8	12	8	4	24	45	3,5	26	46,5	22	20	110	3,8
04516-010015	C	right-hand type	121,5	40	18	10,2	27	4,5	12,7	20	13	7	39	74	5,5	42	73	35	31,5	143	7,2
04516-006035	C	left-hand type	78	25	12	6,2	9,5	2,5	ø 8	12	8	4	24	45	3,5	26	46,5	22	20	110	3,8
04516-010035	C	left-hand type	121,5	40	18	10,2	27	4,5	12,7	20	13	7	39	74	5,5	42	73	35	31,5	143	7,2
04516-006020	D	right-hand type	78	25	12	6,2	-	-	11	12	8	4	25	45	4,5	26	46,5	22	20	110	3,8
04516-010020	D	right-hand type	121,5	40	18	10,2	-	-	18	20	13	7	40	74	7	42	70,5	35	31,5	143	7,2
04516-006040	D	left-hand type	78	25	12	6,2	-	-	11	12	8	4	25	45	4,5	26	46,5	22	20	110	3,8
04516-010040	D	left-hand type	121,5	40	18	10,2	-	-	18	20	13	7	40	74	7	42	70,5	35	31,5	143	7,2

Side clamps



Material:
Steel.

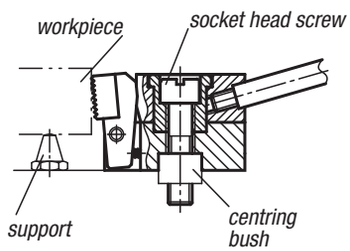
Version:
Case-hardened and black oxidised.

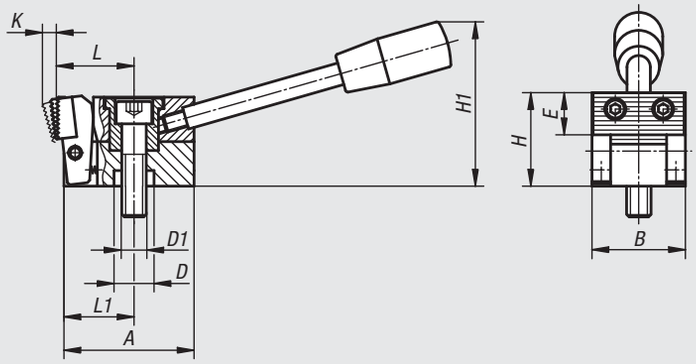
Sample order:
nlm 04518-006005

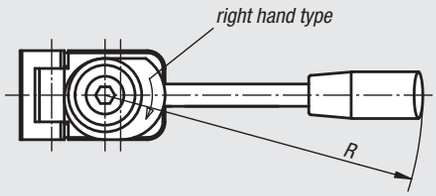
Note:
This is a quick-action side clamp where workpieces are clamped by rotating a cam wheel which exerts pressure on the swivel jaw, simultaneously producing a positive down force.
Using the centring bush (see diagram), the side clamp can be mounted and positioned on a modular grid system.

The versions 04518-006010, 04518-006015, 04518-006030 and 04518-006035 have 2 round carbide inserts.

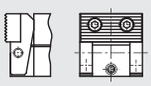
Clamping force:
04518-006... = 3800 N
04518-010... = 7200 N



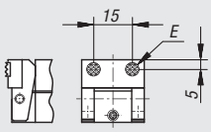




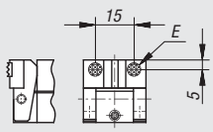
Form A
steel jaw
serrated



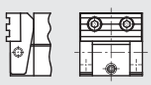
Form B
jaw with 2 round
carbide inserts



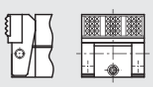
Form C
jaw with 2 round
carbide inserts
and central prism



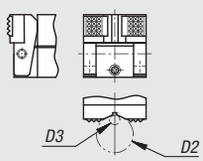
Form D
POM jaw
serrated



3 rectangular
carbide inserts

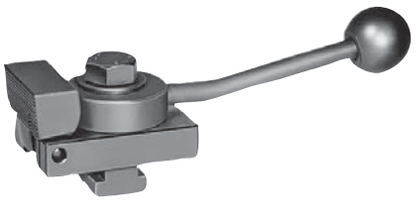


2 rectangular carbide
inserts and central prism



Order No.	Form	Version	A	B	D	D1	D2 max.	D3 min.	E	H	H1	K	L	L1	R	Clamping force kN
04518-006005	A	right-hand type	38,5	25	12	M6	-	-	11	25	45	4	22	20	110	3,8
04518-010005	A	right-hand type	58,5	40	18	M10	-	-	18	40	74	6	35	31,5	143	7,2
04518-006025	A	left-hand type	38,5	25	12	M6	-	-	11	25	45	4	22	20	110	3,8
04518-010025	A	left-hand type	58,5	40	18	M10	-	-	18	40	74	6	35	31,5	143	7,2
04518-006010	B	right-hand type	38,5	25	12	M6	-	-	ø 8	24	45	3,5	22	20	110	3,8
04518-010010	B	right-hand type	58,5	40	18	M10	-	-	12,7	39	74	5,5	37	31,5	143	7,2
04518-006030	B	left-hand type	38,5	25	12	M6	-	-	ø 8	24	45	3,5	22	20	110	3,8
04518-010030	B	left-hand type	58,5	40	18	M10	-	-	12,7	39	74	5,5	37	31,5	143	7,2
04518-006015	C	right-hand type	38,5	25	12	M6	9,5	2,5	ø 8	24	45	3,5	22	20	110	3,8
04518-010015	C	right-hand type	58,5	40	18	M10	27	4,5	12,7	39	74	5,5	37	31,5	143	7,2
04518-006035	C	left-hand type	38,5	25	12	M6	9,5	2,5	ø 8	24	45	3,5	22	20	110	3,8
04518-010035	C	left-hand type	58,5	40	18	M10	27	4,5	12,7	39	74	5,5	37	31,5	143	7,2
04518-006020	D	right-hand type	38,5	25	12	M6	-	-	11	25	45	4,5	22	20	110	3,8
04518-010020	D	right-hand type	58,5	40	18	M10	-	-	18	40	74	7	34,5	31,5	143	7,2
04518-006040	D	left-hand type	38,5	25	12	M6	-	-	11	25	45	4,5	22	20	110	3,8
04518-010040	D	left-hand type	58,5	40	18	M10	-	-	18	40	74	7	34,5	31,5	143	7,2

Side clamps

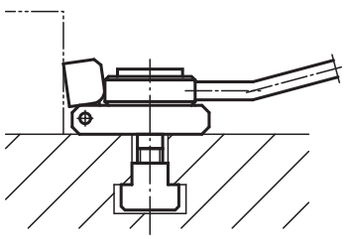


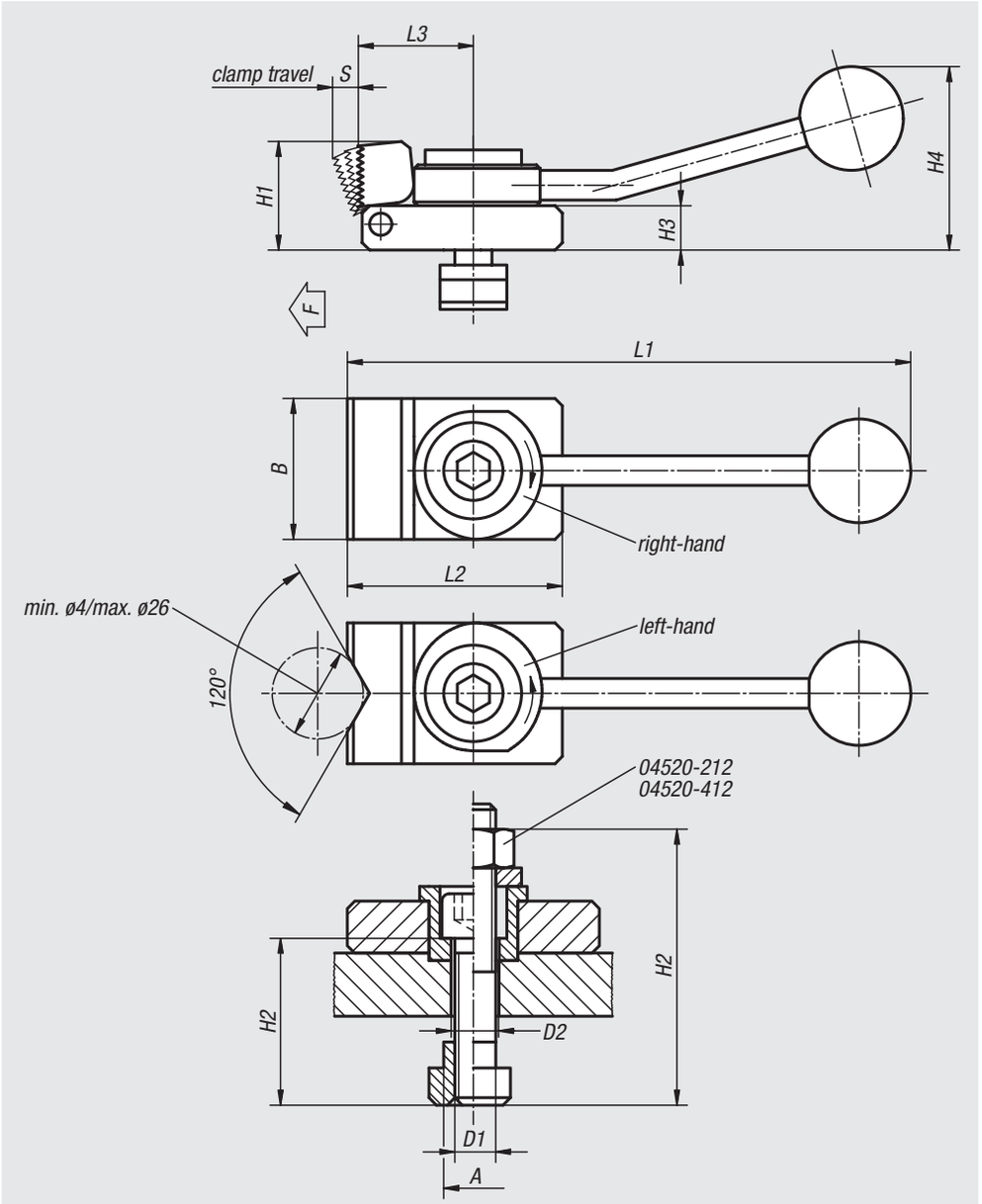
Material:
Steel.

Version:
Case-hardened and black oxidised.

Sample order:
nlm 04520-114X2

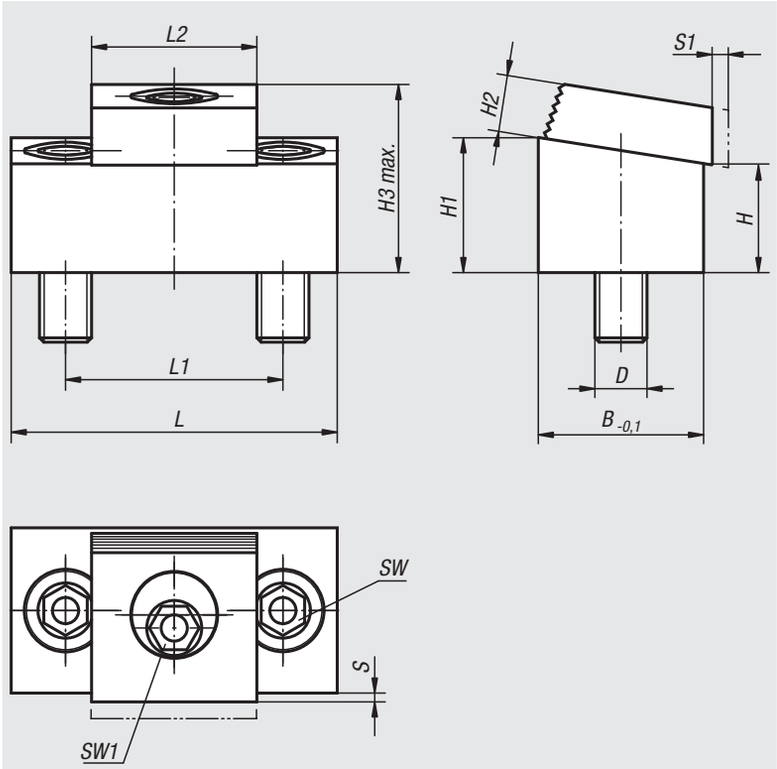
Note:
This is a quick-action side clamp where workpieces are clamped by rotating a cam wheel which exerts pressure on the swivel jaw, simultaneously producing a positive down force. The low-profile design allows workpieces to be machined over the entire top surface without the need to move the the clamp. A spring withdraws the jaw when opened.
The clamp can be positioned parallel to the T-slot by mounting on the seating block 04512.





Order No. right-hand	Order No. left-hand	Version	slot dimension A	D1	D2	L1	L2	L3	B	H1	H2	H3	H4	S	F max. kN
04520-310X2	**04520-110X2**	prism jaw	10	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-310X1	**04520-110X1**	flat jaw	10	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-312X2	**04520-112X2**	prism jaw	12	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-312X1	**04520-112X1**	flat jaw	12	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-412X2	**04520-212X2**	prism jaw	12	M12	12,5	190	72	40	48	38	60	16	62	4	7
04520-412X1	**04520-212X1**	flat jaw	12	M12	12,5	190	72	40	48	38	60	16	62	4	7
04520-314X2	**04520-114X2**	prism jaw	14	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-314X1	**04520-114X1**	flat jaw	14	M8	8,4	132	50	32	32	20	30	8	40	3	3,5
04520-414X2	**04520-214X2**	prism jaw	14	M12	12,5	190	72	40	48	38	40	16	62	4	7
04520-414X1	**04520-214X1**	flat jaw	14	M12	12,5	190	72	40	48	38	40	16	62	4	7
04520-416X2	**04520-216X2**	prism jaw	16	M12	12,5	190	72	40	48	38	40	16	62	4	7
04520-416X1	**04520-216X1**	flat jaw	16	M12	12,5	190	72	40	48	38	40	16	62	4	7
04520-418X2	**04520-218X2**	prism jaw	18	M12	12,5	190	72	40	48	38	40	16	62	4	7
04520-418X1	**04520-218X1**	flat jaw	18	M12	12,5	190	72	40	48	38	40	16	62	4	7

Toe clamps compact



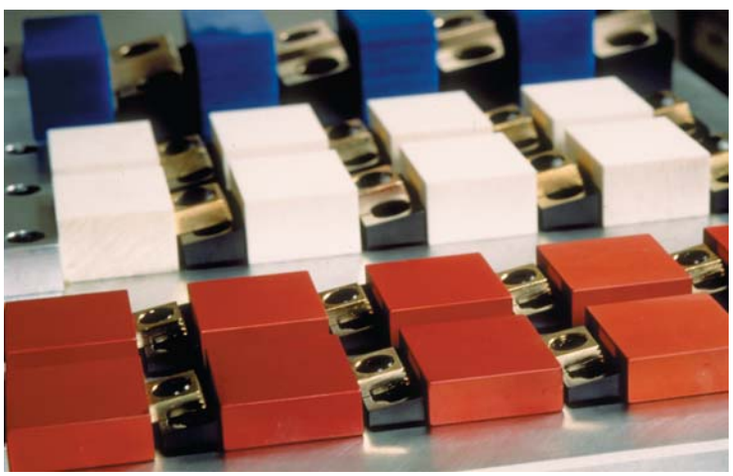
Material:
Steel.

Version:
Body tempered and black oxidised.
Square washer case-hardened and brass-plated.

Sample order:
nlm 04521-10

Note:
This cam action compact toe clamp requires very little space to produce multi-fixture clamping.
Workpieces can be clamped in series by using the back side of a clamp as a stop for the next row.
Mount preferably in slots with B +0.05 mm. The height of the clamp can be adjusted by altering the slot depth.

Example of series clamping using compact toe clamps



Order No.	L	L1	L2	B	H	H1	H2	H3 max.	S	D	S1 (travel)	SW	SW1	Clamping force kN	Tightening torque max. Nm
04521-08	43,2	25,4	19	19	12,7	15,7	6,4	21,4	1,5	M8	1,6	5	7	8,9	28
04521-10	54	33,5	25,4	25,4	11,4	15,4	9,7	24,5	1,8	M10	2	7	8	17,8	88
04521-12	75	50,8	38	38,1	25,5	31,5	13	43	2,05	M12	2,5	10	12	26,7	135

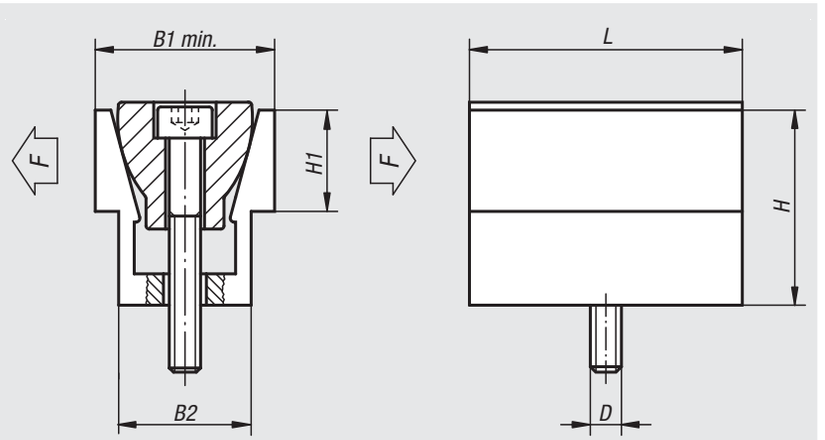
Wedge clamps

Material:
Channel aluminium profile.
Wedge hardened steel.

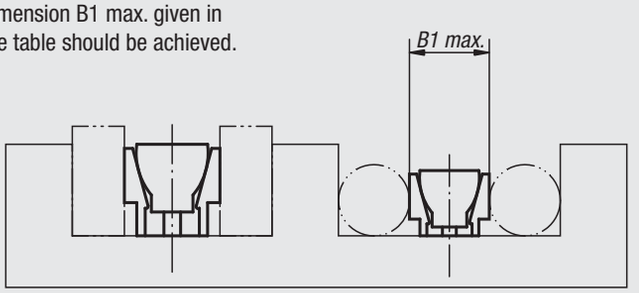
Version:
Channel anodized.
Wedge black oxidised.

Sample order:
nlm 04522-08

Note:
Two workpieces can be held simultaneously with the wedge clamp. They are ideal for clamping round or rectangular pieces. The compact design allows space-saving series clamping.



In clamped position
dimension B1 max. given in
the table should be achieved.



Order No.	D	L	B1 min. - max.	B2	H	H1	F kN	Tightening torque max. Nm
04522-04	M4	15,9	12,3 - 13,1	10,4	12,7	5,6	2,2	3,4
04522-06	M6	23,8	18,6 - 19,9	16,1	19	9,5	6,7	14,3
04522-08	M8	31,7	24,8 - 26,6	20,8	25,4	12,7	8,9	14,5
04522-12	M12	47,6	37,3 - 39,7	30,8	38,1	19	15,6	38,4
04522-16	M16	63,5	49,7 - 52,8	41,2	50,8	25,4	26,7	74,6

Wedge clamps

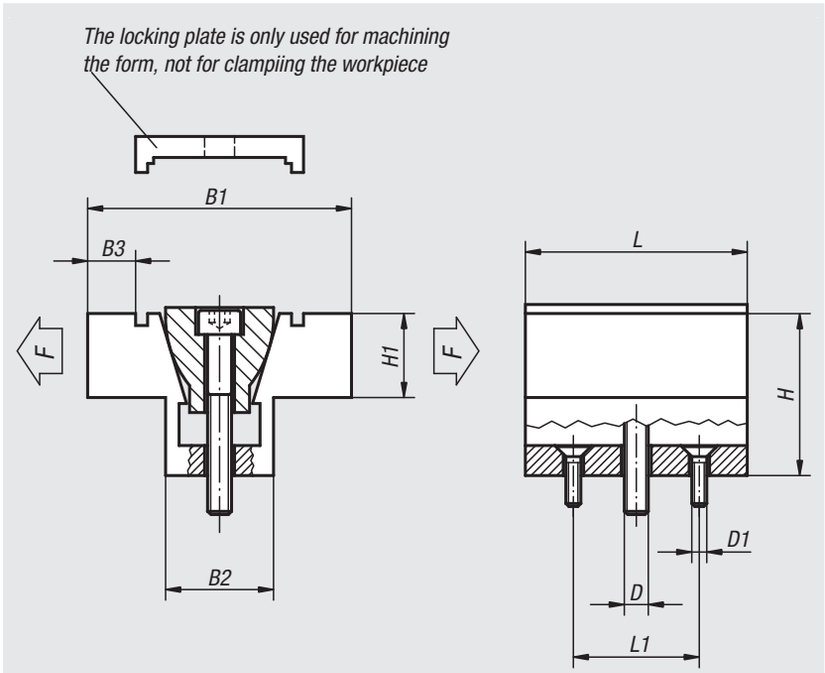
machinable

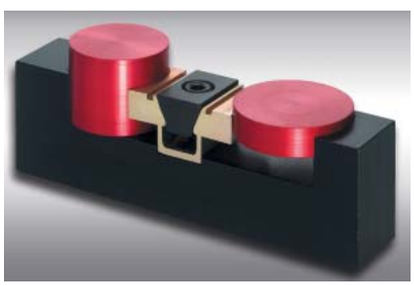
Material:
Channel aluminium profile.
Wedge hardened steel.

Version:
Channel anodized.
Wedge black oxidised.

Sample order:
nlm 04523-08

Note:
Two workpieces can be held simultaneously with the wedge clamp. The jaws have extra material allowing them to be machined to conform to the shape of the workpiece. The compact design allows space-saving series clamping.

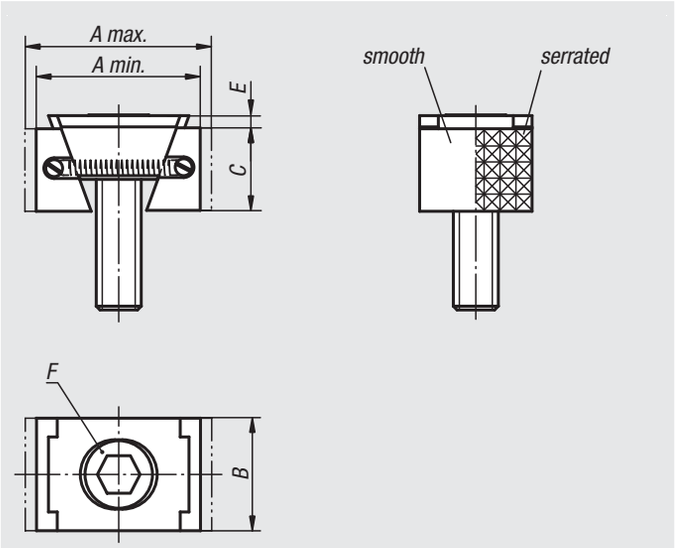




Order No.	D	D1	L	L1	B1 min. - max.	B2	B3	H	H1	F kN	Tightening torque max. Nm
04523-04	M4	M2	15,7	10,16	28,6 - 29,1	10,6	4,6	12,7	6,3	2,2	3,4
04523-06	M6	M4	23,9	15,9	38,1 - 39	16,1	6,6	19,1	9,4	6,7	14,3
04523-08	M8	M4	31,8	20,6	50,8 - 52	20,8	9,9	25,4	12,7	8,9	14,5
04523-12	M12	M5	47,5	30,5	76,2 - 78	30,9	15,7	38,1	19	15,6	38,4
04523-16	M16	M6	63,5	41,28	101,6 - 103,9	41,3	20,3	50,8	25,4	26,7	74,6

Wedge clamps

jaw face smooth or serrated



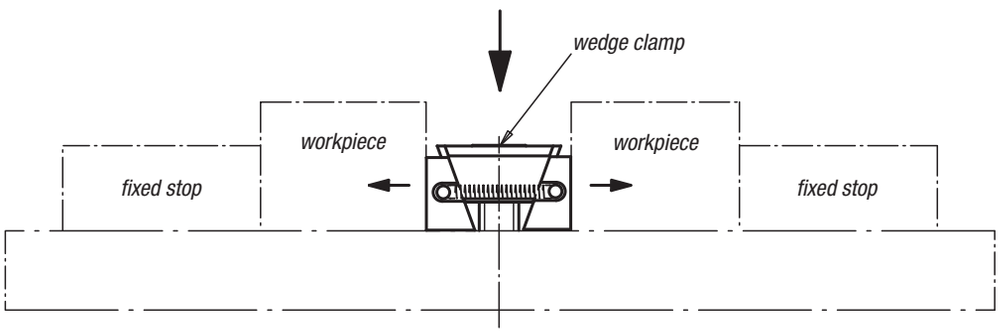
Material:
Wedge and jaw segments carbon steel.

Version:
Wedge and jaw segments hardened, black.

Sample order:
nlm 04524-2208

Note:
The functioning principle make the wedge clamps ideal for series clamping. The wedge form can exert high clamping forces.
These wedge clamps can be mounted in grid holes or T-slots.
Tightening the socket screw moves the wedge down and the jaws out pressing the workpieces against the fixtures fixed stops.
The wedge has a slightly elongated hole allowing for movement to compensate for tolerances.

Spread width:
M8 = ±0.5 mm
M10 = ±1.0 mm
M12 = ±1.0 mm
M16 = ±1.5 mm



Wedge clamps, narrow version

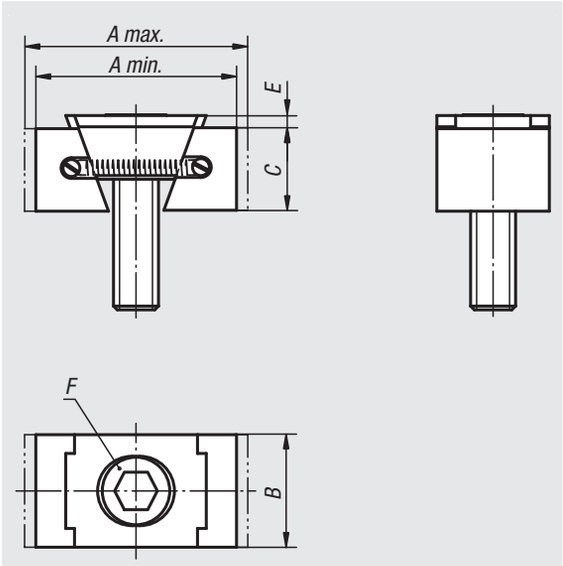
Order No. jaw face smooth	Order No. jaw face serrated	A min.	A max.	B	C	E	F Socket head screw DIN 6912	Clamping force kN	Tightening torque Nm
04524-1108	**04524-2108**	30,5	33,5	24	15	2	M8x25	15	25
04524-1110	**04524-2110**	32	37	28	19	3,5	M10x25	20	49
04524-1112	**04524-2112**	44	49,5	30	22	3,5	M12x40	30	85
04524-1116	**04524-2116**	55	62	40	29	4	M16x60	50	210

Wedge clamps, wide version

Order No. jaw face smooth	Order No. jaw face serrated	A min.	A max.	B	C	E	F Socket head screw DIN 6912	Clamping force kN	Tightening torque Nm
04524-1208	**04524-2208**	30,5	33,5	30	15	2	M8x25	15	25
04524-1210	**04524-2210**	32	37	38	19	3,5	M10x25	20	49
04524-1212	**04524-2212**	44	49,5	48	22	3,5	M12x40	30	85
04524-1216	**04524-2216**	55	62	48	29	4	M16x60	50	210

Wedge clamps

machinable



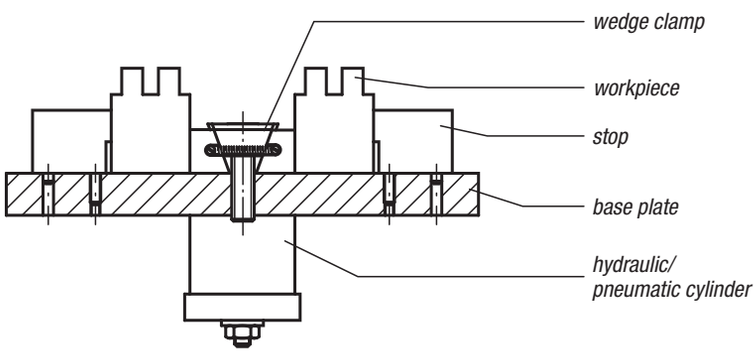
Material:
Wedge and jaw segments carbon steel.

Version:
Wedge and jaw segments tempered, black.

Sample order:
nlm 04524-3110

Note:
These wedge clamps have extra long jaws. This extra material allows the jaws to machined to suit the form of the workpiece. The functioning principle make the wedge clamps ideal for series clamping. The wedge form can exert high clamping forces. These wedge clamps can be mounted in grid holes or T-slots. Tightening the socket screw moves the wedge down and the jaws out pressing the workpieces against the fixtures fixed stops. The wedge has a slightly elongated hole allowing for movement to compensate for tolerances.

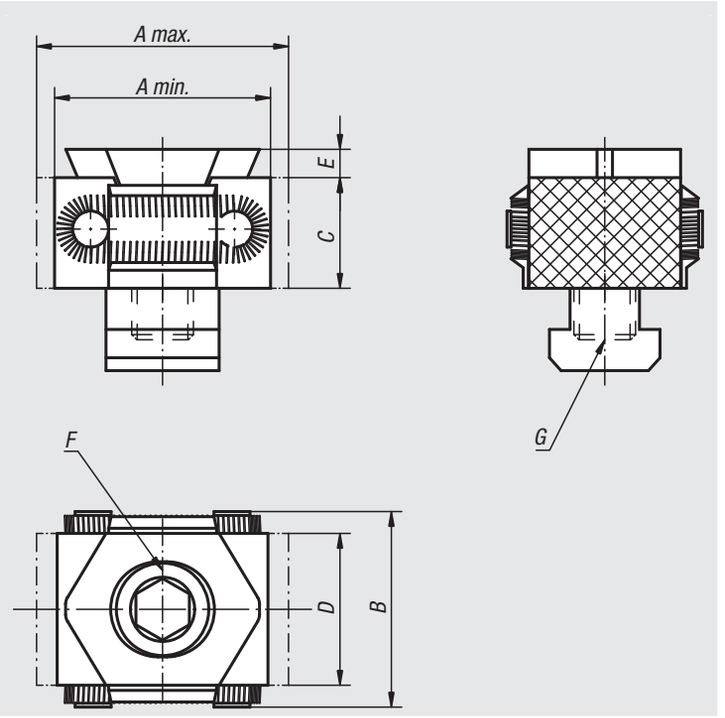
Spread width:
M8 = ±0.5 mm
M10 = ±1.0 mm
M12 = ±1.0 mm
M16 = ±1.5 mm



Order No.	Version	A min.	A max.	B	C	E	F Socket head screw DIN 6912	Clamping force kN	Tightening torque Nm
04524-3108	narrow	36,5	39,5	24	15	2	M8x25	11	19
04524-3110	narrow	42	47	28	19	3,5	M10x25	15	37
04524-3112	narrow	54	59,5	30	22	3,5	M12x40	23	65
04524-3116	narrow	65	72	40	29	4	M16x60	38	160
04524-3208	wide	36,5	39,5	30	15	2	M8x25	11	19
04524-3210	wide	42	47	38	19	3,5	M10x25	15	37
04524-3212	wide	54	59,5	48	22	3,5	M12x40	23	65
04524-3216	wide	65	72	48	29	4	M16x60	38	160

Wedge clamps

jaw faces serrated



Material:
Body and clamping segments tool steel.

Version:
Body hardened.
Jaw segments hardened (49-51 HRC) black oxidised.
Wedge faces ground.

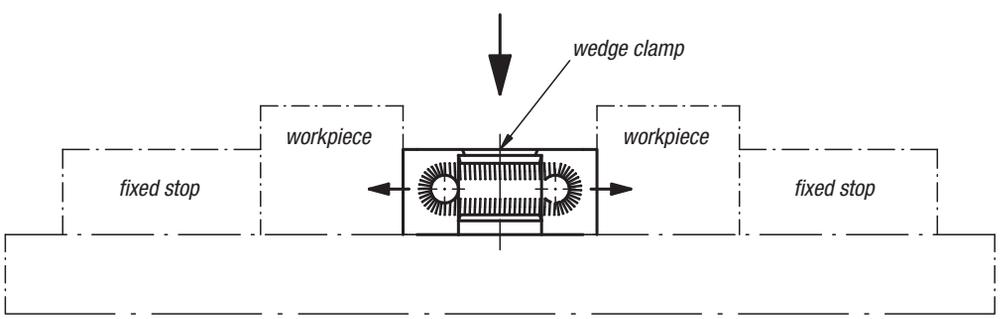
Sample order:
nlm 04525-1618

Note:
The compact design makes these wedge clamps ideal for horizontal and vertical series clamping. The hardened and ground wedge faces can exert high clamping forces. These wedge clamps can be mounted in grid holes or T-slots. Tightening the DIN 912 socket screw moves the wedge down and the jaws out pressing the workpieces against the fixtures fixed stops.

The jaws of version 04525-08 are not serrated.

The wedge has a slightly elongated hole allowing for movement.

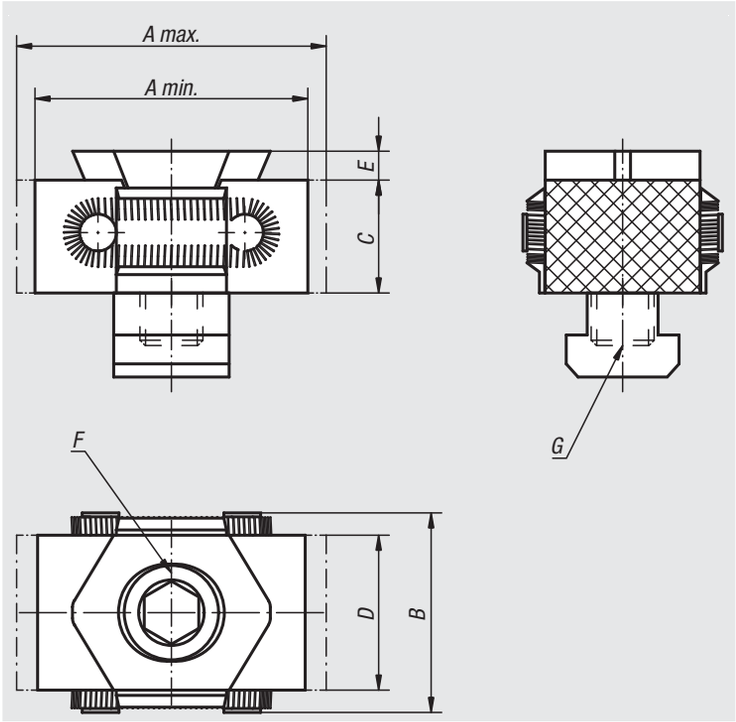
Spread width:
04525-08 = ±0.5 mm
04525-12 = ±1.0 mm
04525-16 = ±1.5 mm



Order No.	A min.	A max.	B	C	D	E	F Socket head screw DIN 912	G	Clamping force kN	Tightening torque Nm
04525-08	27	31	29	15	21	2,5	M8x25	for threaded hole	15	25
04525-0810	27	31	29	15	21	2,5	M8x25	for T-slot 10	15	25
04525-12	42	49	41	22	30	4	M12x40	for threaded hole	30	85
04525-1214	42	49	41	22	30	4	M12x30	for T-slot 14	30	85
04525-16	57	66	56	29	42	5	M16x60	for threaded hole	50	210
04525-1618	57	66	56	29	42	5	M16x50	for T-slot 18	50	210

Wedge clamps

machinable



Material:
Body tool steel.
Jaw segments tool steel (30 HRC).

Version:
Body hardened.
Jaw segments black oxidised.
Wedge faces ground.

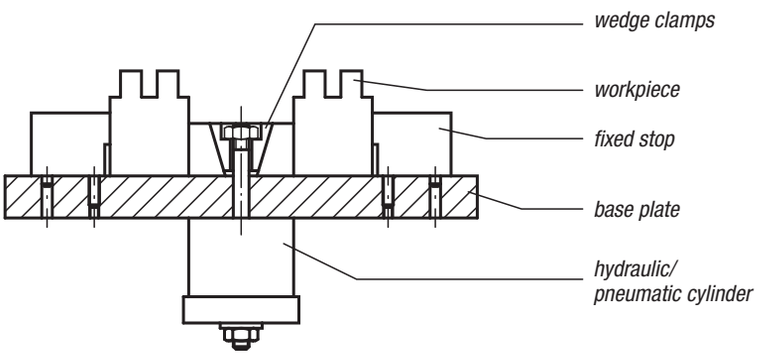
Sample order:
nlm 04526-12

Note:
The special feature of the wedge clamp lies in the machining allowance per vice jaw of 3 mm for version 04526-08 and 5 mm for versions 04526-12 and 04526-16.
This extra length allows for forms adjusted to the workpiece geometry to be incorporated (see illustration).

Vice jaws version 04526-08 do not have a diamond grip.

Travel acc. to order No.:
04526-08 = ±0.5 mm
04526-12 = ±1.0 mm
04526-16 = ±1.5 mm

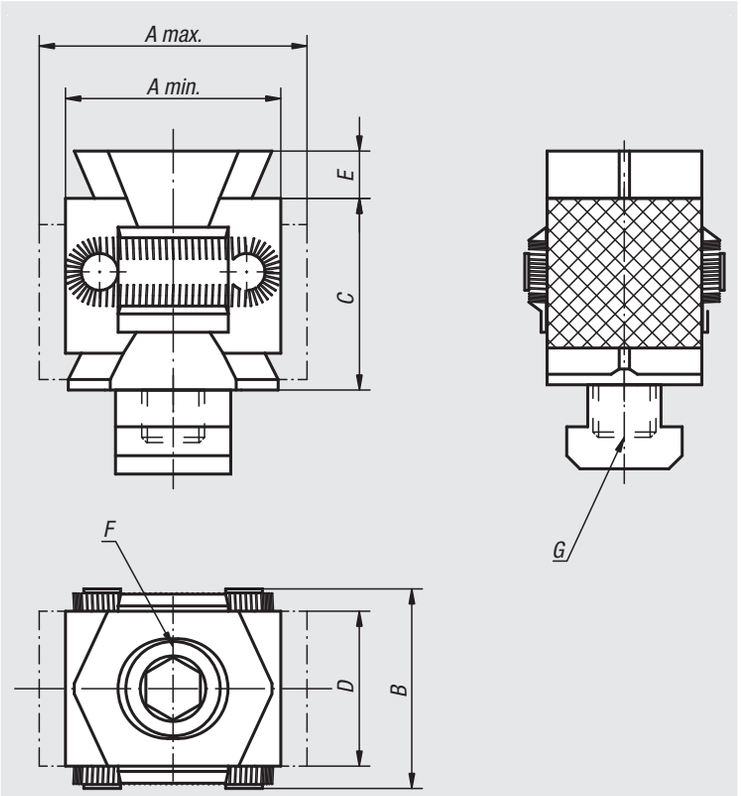
On request:
Pre-formed jaw segments or other hardness grades.



Order No.	A min.	A max.	B	C	D	E	F Socket head screw DIN 912	G	Clamping force kN	Tightening torque Nm
04526-08	33	37	29	15	21	2,5	M8x25	for threaded hole	15	25
04526-0810	33	37	29	15	21	2,5	M8x25	for T-slot 10	15	25
04526-12	52	59	41	22	30	4	M12x40	for threaded hole	30	85
04526-1214	52	59	41	22	30	4	M12x30	for T-slot 14	30	85
04526-16	67	76	56	29	42	5	M16x60	for threaded hole	50	210
04526-1618	67	76	56	29	42	5	M16x50	for T-slot 18	50	210

Wedge clamps double

jaw faces serrated



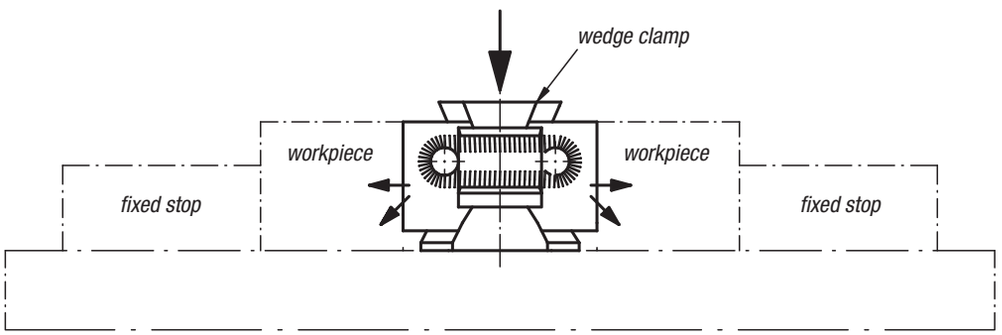
Material:
Body and jaw segments tool steel.

Version:
Body hardened.
Jaw segments hardened (49-51 HRC) and black oxidised.
Wedge faces ground.

Sample order:
nlm 04527-1214

Note:
Because of their compact design, the double wedge clamps are especially suitable for horizontal and vertical multiple clamping. The hardened and ground wedge surfaces make high clamping forces possible.
Optionally, the appropriate wedge clamp can be mounted either in a grid hole or T-slot. Inserting a socket head screw DIN 912 moves the two clamping segments outwards and presses the workpieces against a fixed stop.
The so-called „draw-down effect“ is caused by the double wedge of this version.

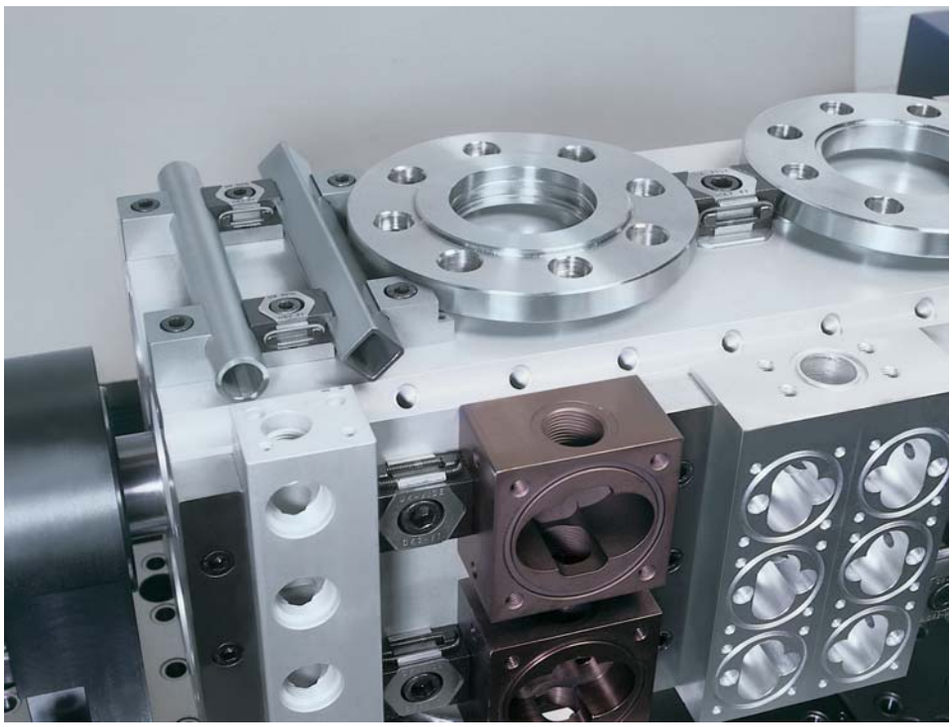
Travel acc. to order No.:
04527-12 = ±1.0 mm
04527-16 = ±1.5 mm



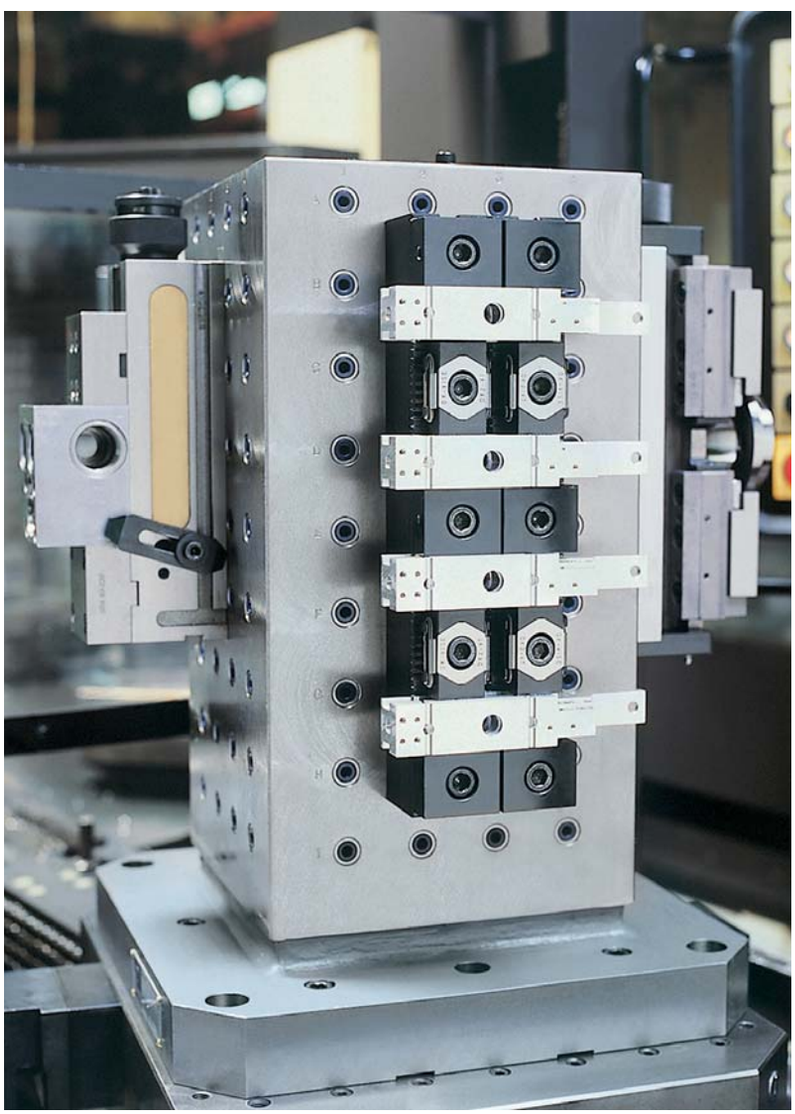
Order No.	A min.	A max.	B	C	D	E	F Socket head screw DIN 912	G	Clamping force kN	Tightening torque Nm
04527-12	42	49	41	36	30	5	M12x60	for threaded hole	40	85
04527-1214	42	49	41	36	30	5	M12x50	for T-slot 14	40	85
04527-16	57	67	56	50	42	5	M16x80	for threaded hole	60	210
04527-1618	57	67	56	50	42	5	M16x70	for T-slot 18	60	210

Example of wedge clamps in use

Wedge clamps
04525



Double wedge clamps
04527



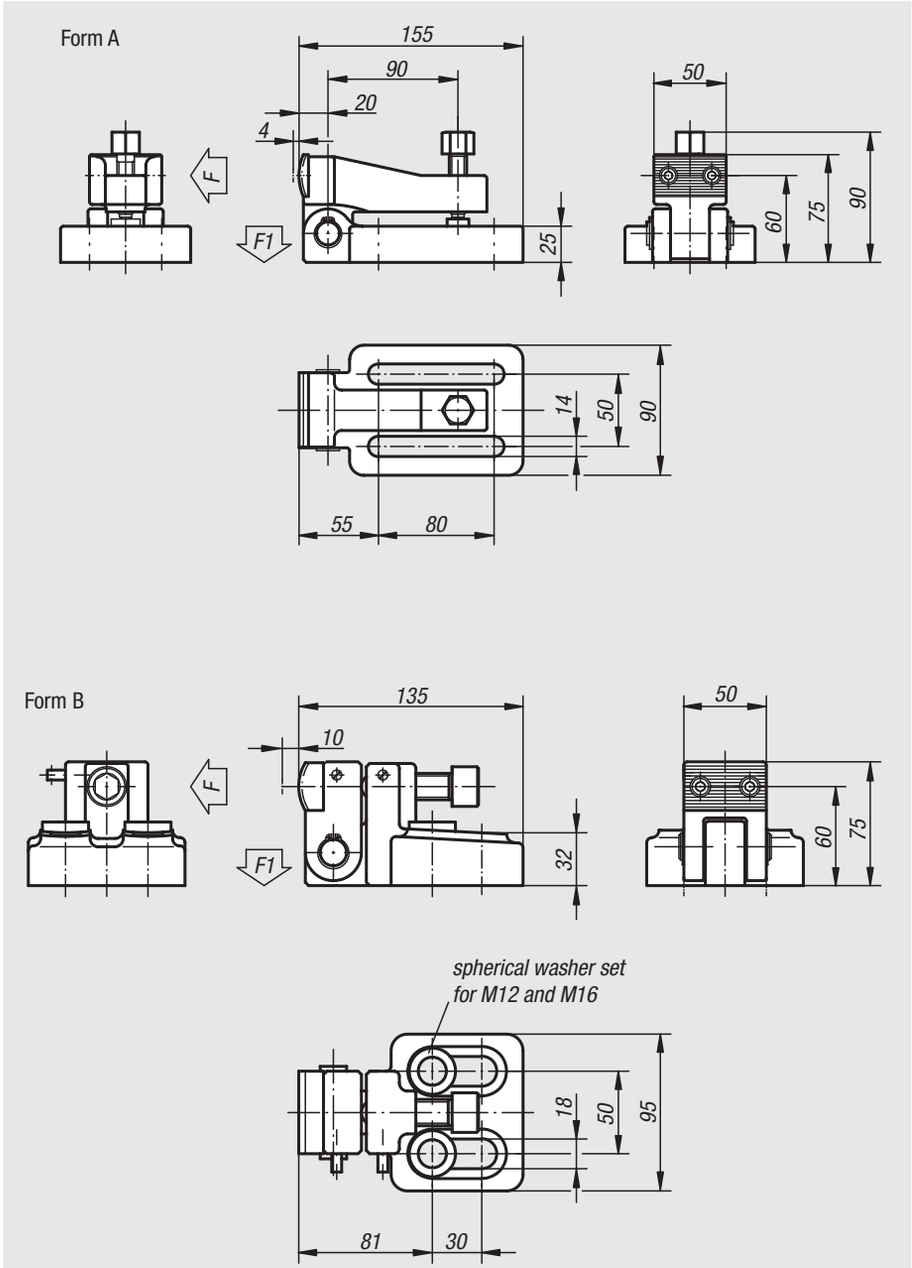
Side clamps

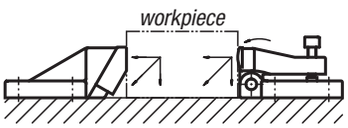
Material:
Body ductile iron (SG iron).
Jaw hardened carbon steel.

Version:
Painted black.
Jaw bright.

Sample order:
nlm 04530-03

Note:
The workpiece is clamped between side clamps and the side stops, simultaneously producing a positive down force.
Side clamps and stops are secured with DIN 912 cylinder screws. A secure clamping is ensured when side clamps and side stops are used together.





Order No.	Form	F kN	F1 kN	Tightening torque Nm
04530-01	A	29	1,3	38
04530-03	B	58	2,4	150

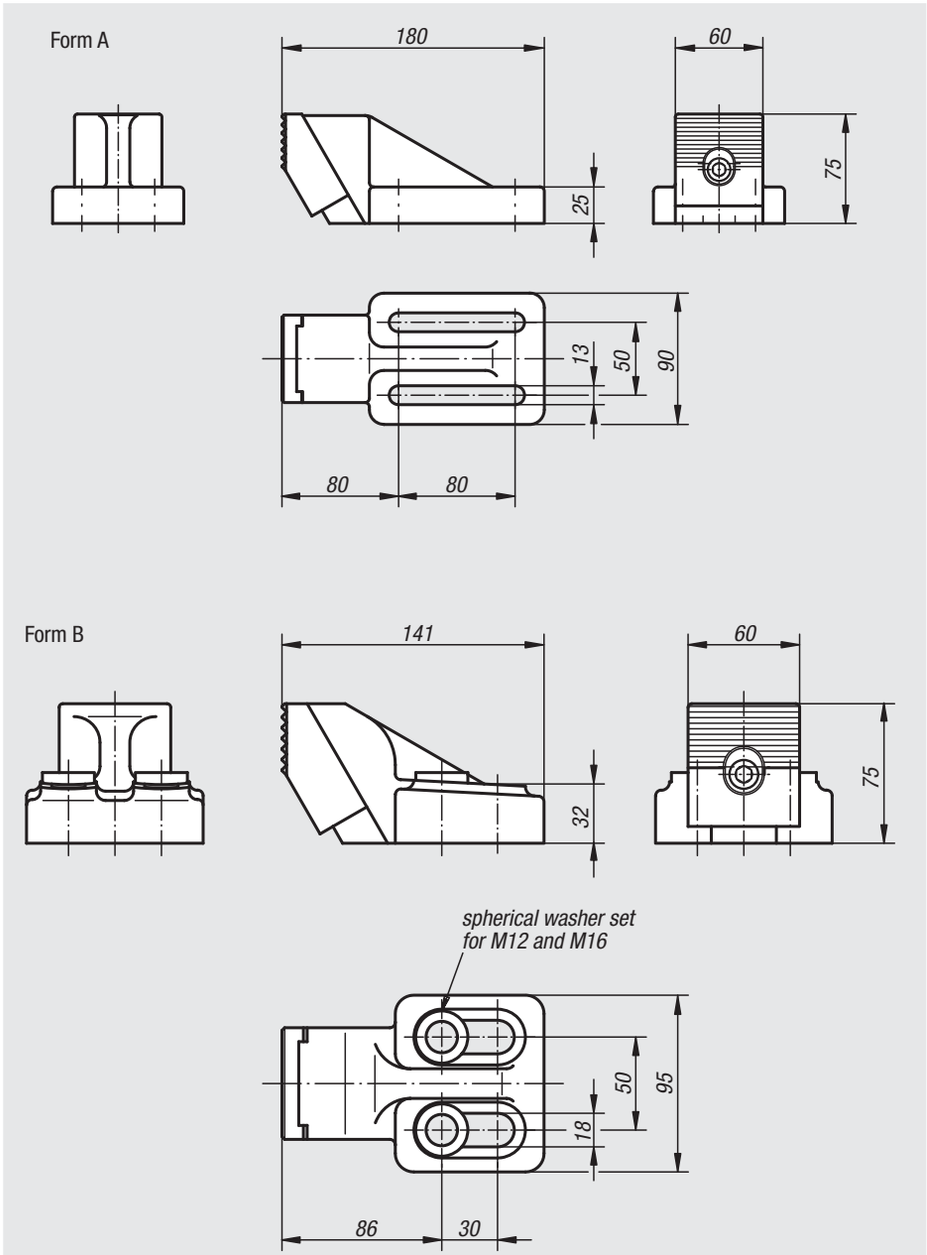
Side stops

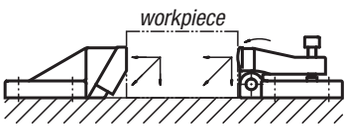
Material:
Body ductile iron (SG iron).
Jaw hardened carbon steel.

Version:
Painted black.
Jaw bright.

Sample order:
nlm 04540-01

Note:
The workpiece is clamped between side clamps and the side stops, simultaneously producing a positive down force.
Side clamps and stops are secured with DIN 912 cylinder screws. A secure clamping is ensured when side clamps and side stops are used together.





Order No.	Form
04540-01	A
04540-02	B

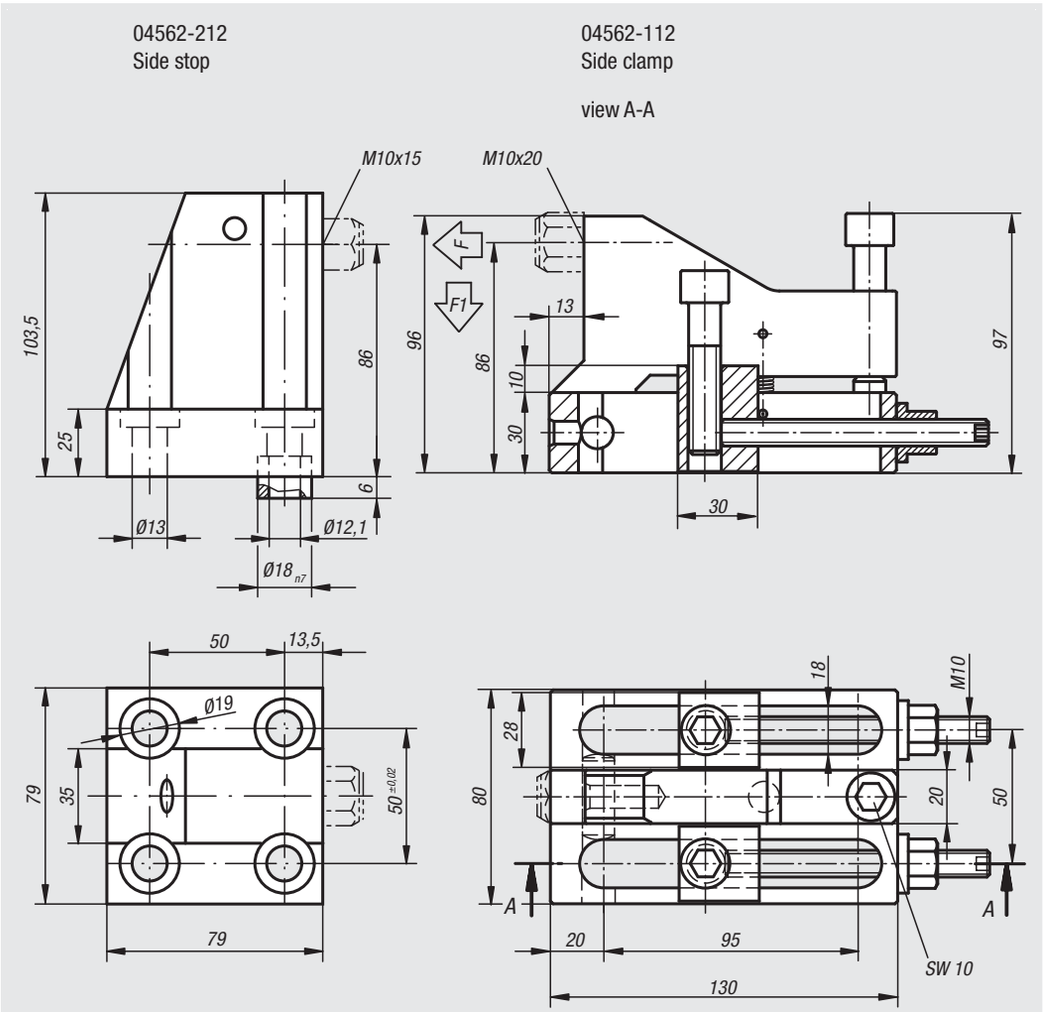
Side clamps

Material:
Body steel 1.1191.

Version:
Black oxidised.
Centring bush hardened.

Sample order:
nlm 04562-112
(self-aligning pads not supplied)

Note:
The unit comprises of an adjustable side clamp and a side stop and are used to clamp workpieces with a simultaneous positive down force. The side clamp has two DIN 913 grub screws which can be set to prevent backward slippage during clamping.



Order No.	F kN	F1 kN
04562-112	25	5
04562-212	22,5	4,5

Side clamps

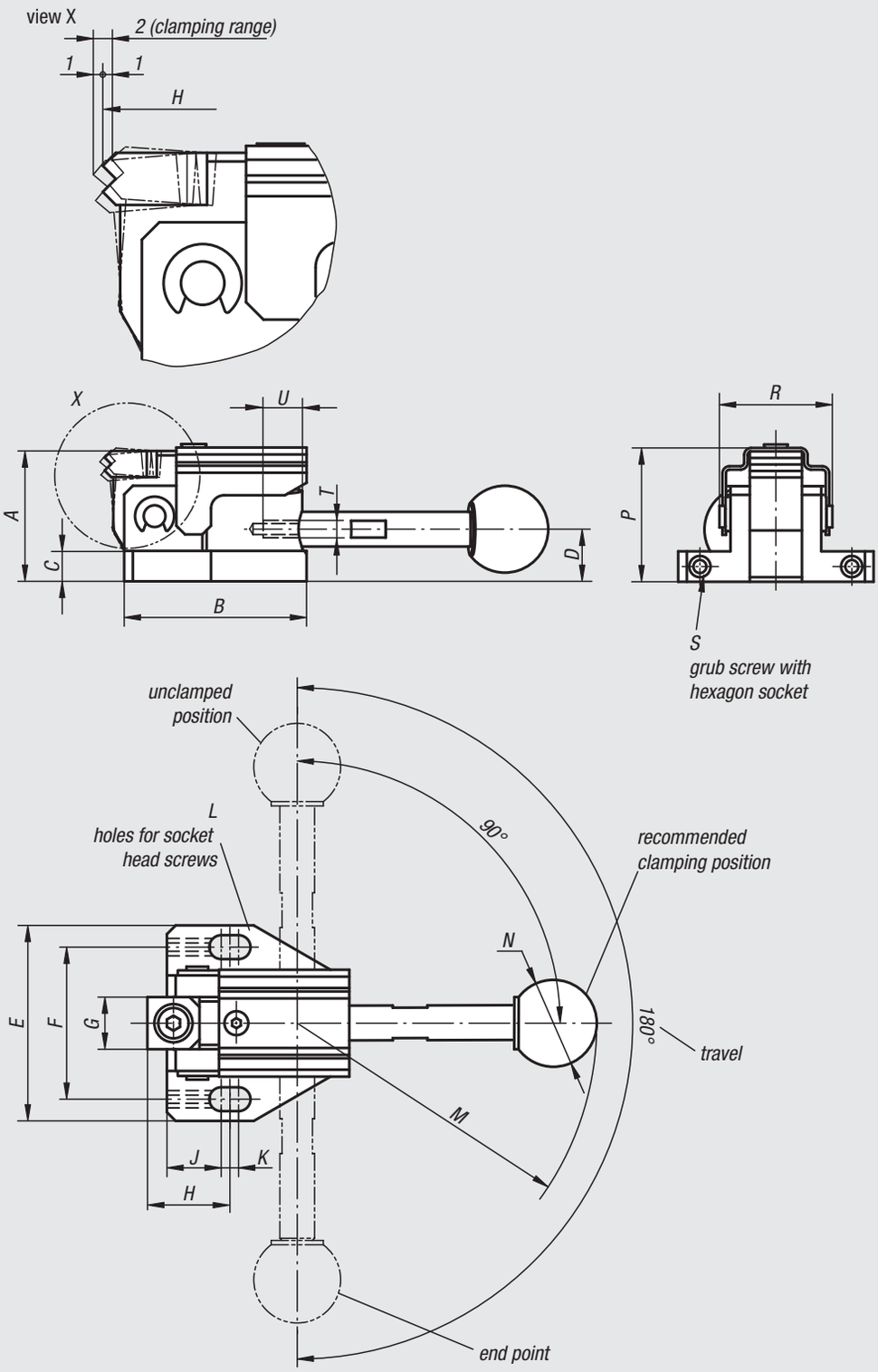
Material:
Body and grip carbon steel.
Jaw and cam tool steel.
Ball knob Duroplast PF 31.

Version:
Body, jaw and cam hardened and black oxidised.
Grip black oxidised.
Ball knob black.

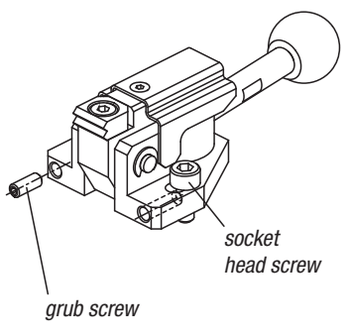
Sample order:
nlm 04565-0501

Note:
* Permitted hand force for grip.

Accessories:
Standard grips 06355.
Screw-in grips with torque limit 06357.



Technical information:



The slots allow final adjustment of the clamping range. Tightening the grub screws in the front of the body prevents the clamp sliding back during clamping.

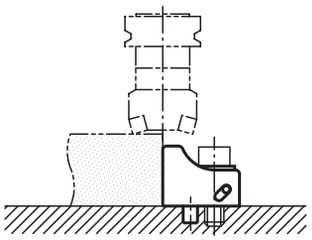
Order No.	Version	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	Clamping force N	Hand force N
04565-0500	without grip	30	42	7	12	45	35	12	19	12,5	4	M5	69	20	31	26	M4x10	M5	7	3000	150*
04565-0501	with grip	30	42	7	12	45	35	12	19	12,5	4	M5	69	20	31	26	M4x10	M5	7	3000	150*
04565-0800	without grip	40	62	10	16	65	50	16	28	18,5	5	M8	104	25	41	38	M4x15	M6	9,5	4000	200*
04565-0801	with grip	40	62	10	16	65	50	16	28	18,5	5	M8	104	25	41	38	M4x15	M6	9,5	4000	200*

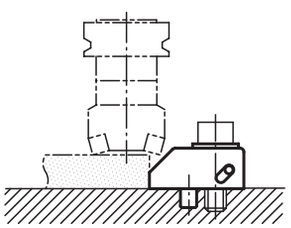
Toe clamps

Material:
Carbon steel.

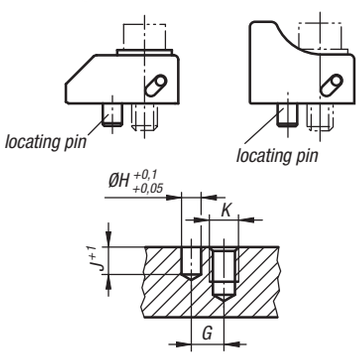
Version:
Tempered and black oxidised.

Sample order:
nlm 04570-0806

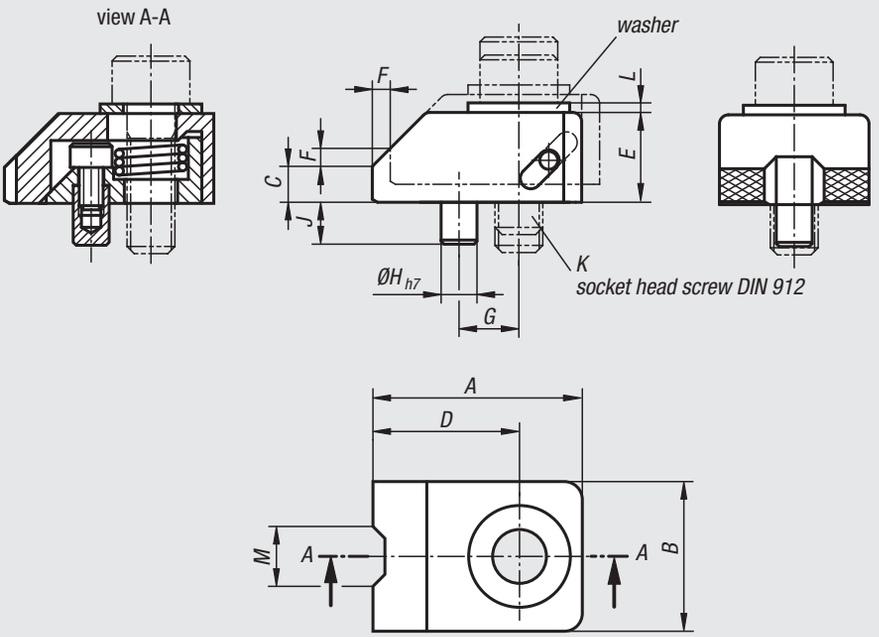




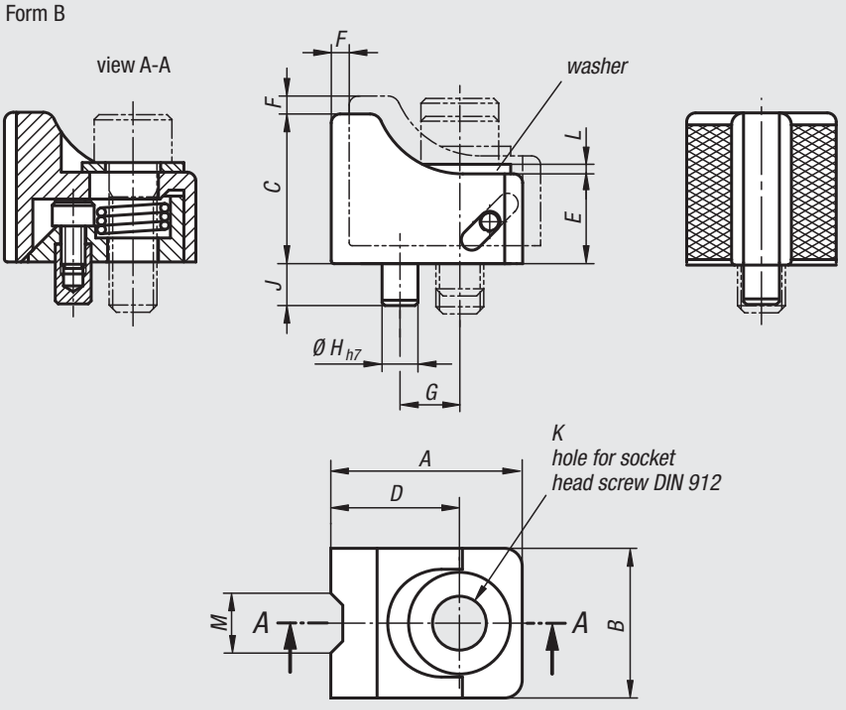
mounting instructions:



Form A



Form B



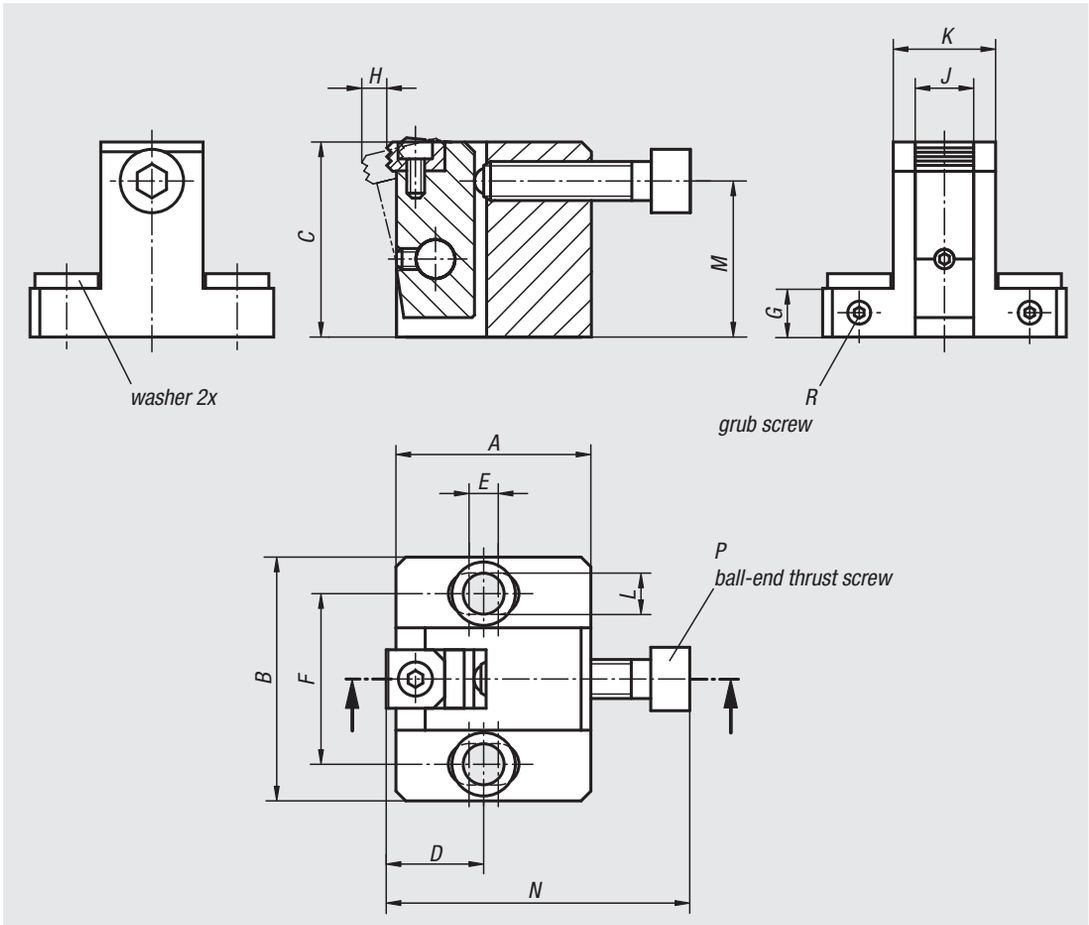
Order No.	Form	A	B	C	D	E	F	G	H	J	K	L	M	Clamping force N	Tightening torque Nm
04570-0806	A	35	25	6	24,5	15	3	10	6	7	M8	1,6	10	7000	25
04570-1008	A	43	30	8	29	19	4	12	6	7	M10	2	11	8500	50
04570-1209	A	54	35	9	37	23	5	16	8	10	M12	2,3	12	20000	90
04570-1610	A	65	40	10	45	25	6	20	10	10	M16	3,2	14	40000	200
04570-0825	B	32	25	25	21,5	15	3	10	6	7	M8	1,6	10	7000	25
04570-1032	B	40	30	32	26	19	4	12	6	7	M10	2	11	8500	50
04570-1238	B	50	35	38	33	23	5	16	8	10	M12	2,3	12	20000	90
04570-1645	B	60	40	45	40	25	6	20	10	10	M16	3,2	14	40000	200

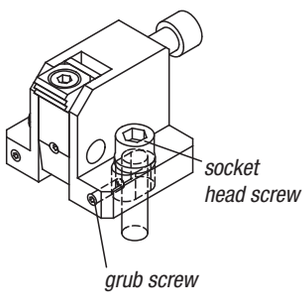
Side clamps

Material:
Housing and arm carbon steel.
Jaw tool steel.

Version:
Housing, black oxidised.
Arm and jaw tempered and black oxidised.

Sample order:
nlm 04575-080400





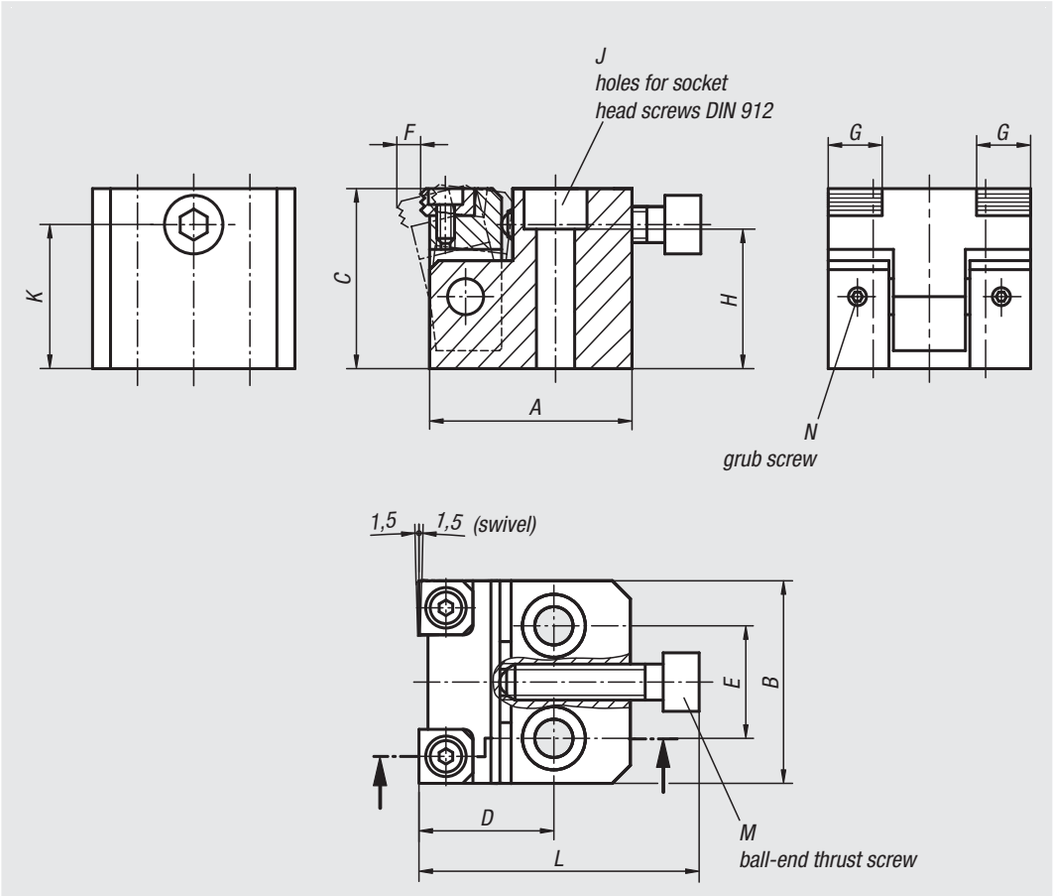
Order No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	Clamping force N	Tightening torque Nm
04575-080400	40	50	40	20	6	35	10	5,3	12	21	8,5	32	62,5	M8x35	M4x10	15000	25
04575-100500	50	65	50	25	8	45	12	7,1	16	27	11	40	74	M10x40	M4x12	27000	50
04575-120600	60	70	60	30	10	50	15	8	20	31	13	48	91	M12x50	M5x15	38000	90
04575-160800	80	90	80	40	15	65	20	10,2	25	39	17	64	115	M16x60	M6x20	46000	130

Side clamps

Material:
Body and arm carbon steel.
Jaw tool steel.

Version:
Body black oxidised.
Arm and jaw tempered and black oxidised.

Sample order:
nlm 04578-080400



Order No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Clamping force N	Tightening torque Nm
04578-080400	45	45	40	30	25	5,3	12	31	M8	32	62,5	M8x35	M4x4	15000	25
04578-100500	55	55	50	40	30	7,1	16	39	M10	40	74	M10x40	M4x4	27000	50
04578-120600	65	65	60	45	35	8	20	47	M12	48	91	M12x50	M5x5	38000	90

Swivel hold-down clamps

mini, with cam lever

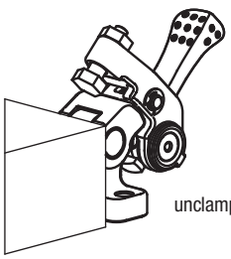
Material:
Carbon steel.

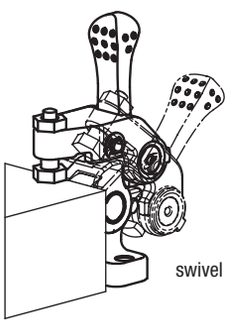
Version:
Tempered and black oxidised.

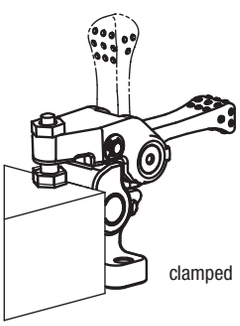
Sample order:
nlm 04610-100

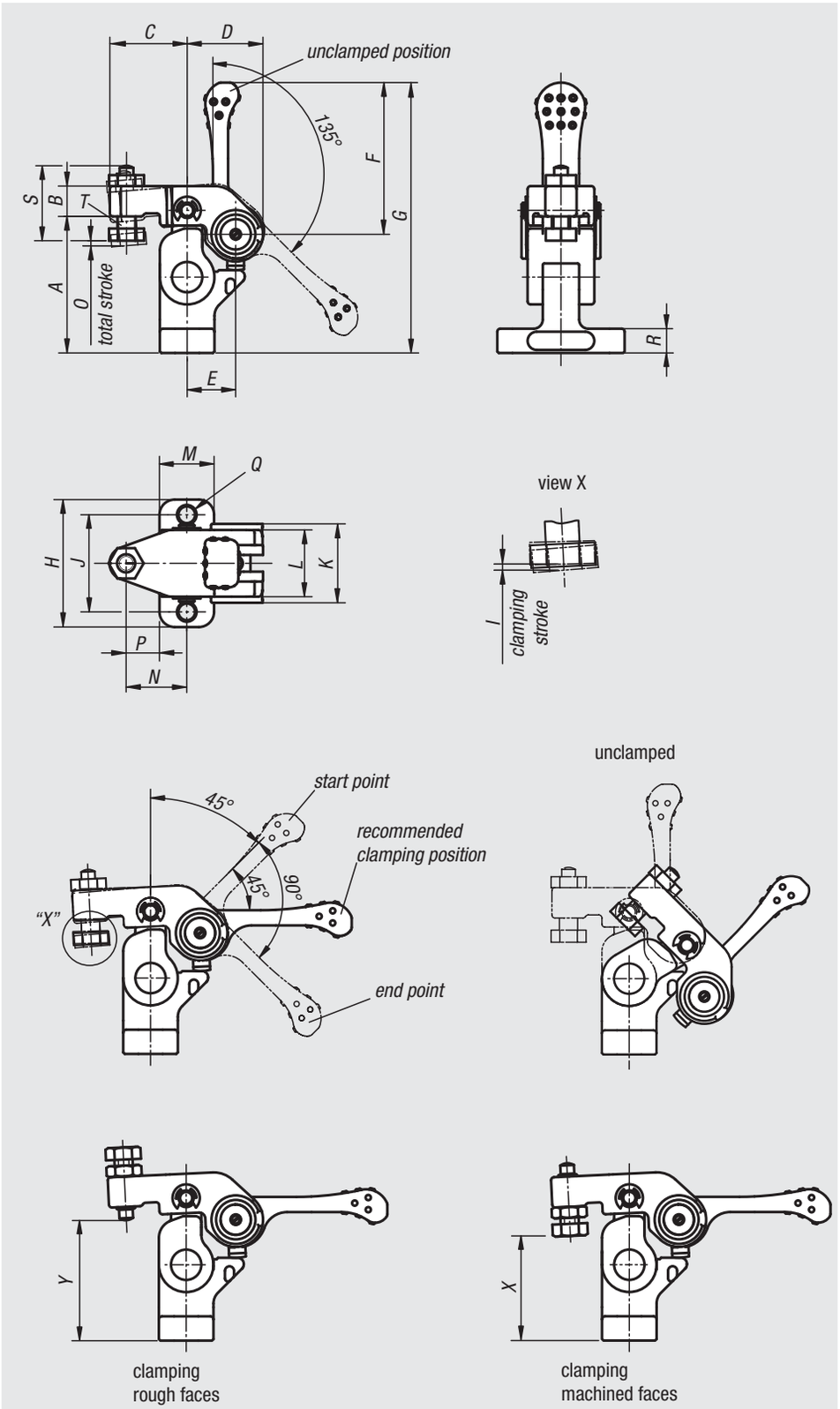
Note:
Swing clamps are used where the clamping points must be free when the workpiece is loaded or removed.

* Admissible hand force for the handle.









Order No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	X min.	X max.	Y min.	Y max.	Clamping force N	Hand force N
04610-100	45	10	25,5	25	16	50	89	42	1	32	26	22	18	20	1,5	11	5,5	8	24	M6	31,5	40,5	34,5	43,5	700	100*
04610-150	55	12	32	31	20	63	109	52	1,2	40	32	28	22	25	1,8	14	6,6	10	30,5	M8	36,4	48,6	41,4	53,6	1100	150*

Down-thrust clamps

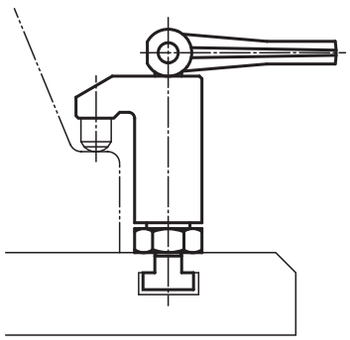
Material:
Steel.

Version:
Case-hardened, black oxidised and ground.

Sample order:
nlm 04620-23

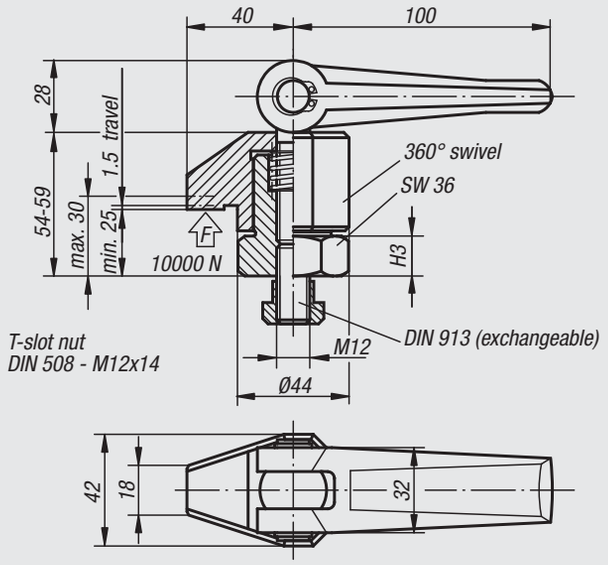
Note:
The clamping heights can be increased with riser bars 04378 and for 04620-12 to 04620-14 and 04620-22 to 04620-24 reduced by self-aligning pads 02000.
The clamps have the following advantages:
- rapid clamping by hand via threaded spindle and spiral cam.
- quick and easy workpiece exchange by pivoting the clamp arm.
- compact design, small clamping space required.
- simple adaptation to tall clamping heights using the riser cylinders.

The clamps can be mounted in two ways:
1) in a T-slot.
2) by the M12 screw directly in a fixture base.



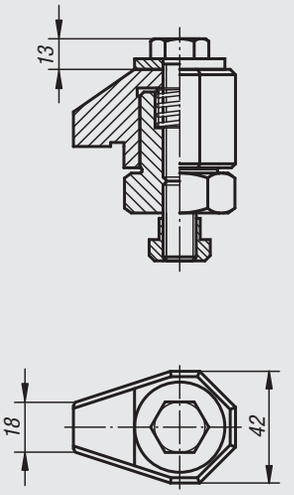
04620-11

Form A
with cam lever



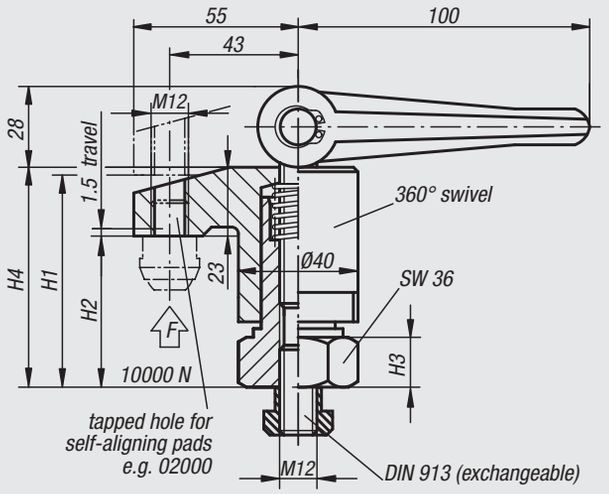
04620-21

Form B
with clamping screw



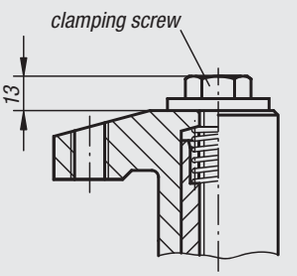
04620-12 to 04620-14

Form A
with cam lever

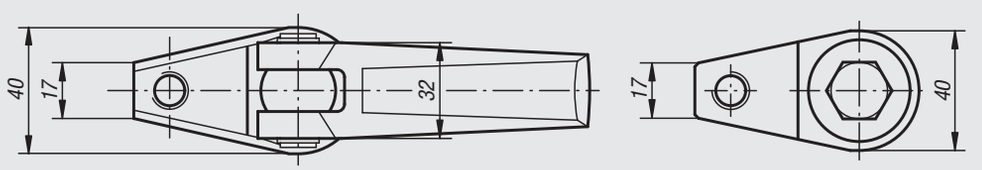


04620-22 up to 04620-24

Form B
with clamping screw

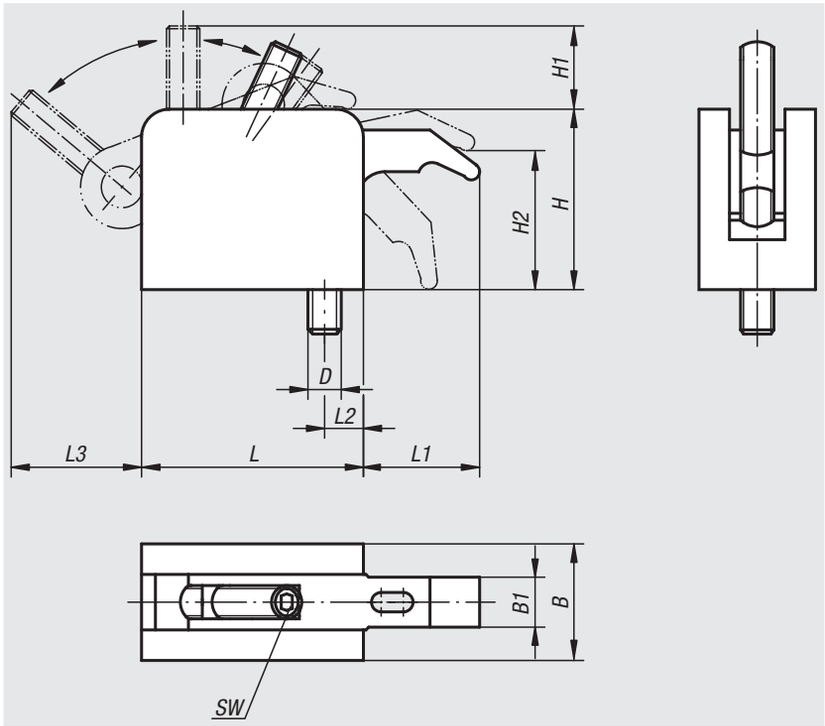


T-slot nut
DIN 508 - M12x14



Order No. Form A	Order No. Form B	Clamping height max. H1	Clamping height min. H2	H3	H4
04620-11	**04620-21**	30	25	15	54-59
04620-12	**04620-22**	70	50	15	73-93
04620-13	**04620-23**	98	68	15	91-121
04620-14	**04620-24**	135	95	22	118-158

Compact clamps



Material:
Housing aluminium.
Clamping lever hardened steel.
Clamping screw grade 10.9.

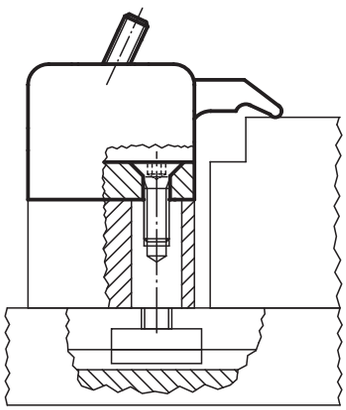
Version:
Housing bright, clamping lever ground and black oxidised.

Sample order:
nlm 04625-108

Note:
The clamping arm of this compact clamp is fully retractable.
Technical benefits:
- unhindered workpiece changes.
- infinitely variable adjustment.
- high self-locking clamping force.
- variable height assembly (riser blocks see 04626).
- high clamping force without great effort.
- clamp also suitable as stop.

On request:
Longer tightening arm (L1).

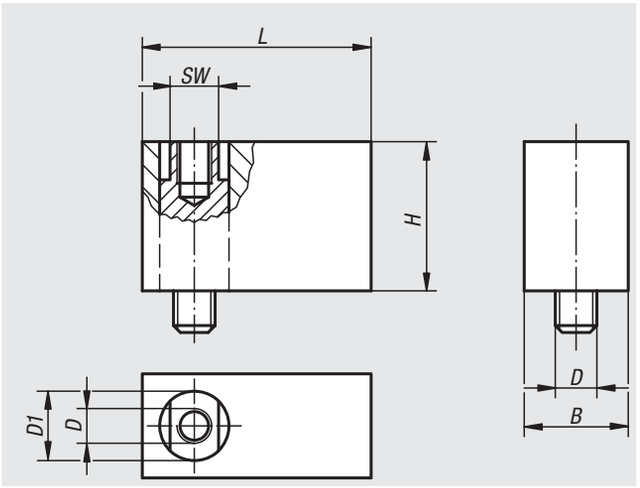
application example:



Order No.	Size	L	L1	L2	L3	B	B1	H	H1	H2	D	SW	Clamping force kN
04625-106	1	53	27	11	29	32	11	43	17	30	M6	4	5
04625-108	1	53	27	11	29	32	11	43	17	30	M8	4	5
04625-210	2	80	40	17	45	42	18	65	30	50	M10	6	10
04625-212	2	80	40	17	45	42	18	65	30	50	M12	6	10
04625-312	3	107	53	22	57	53	25	87	32	67	M12	8	15

Riser blocks

with draw bolt



Material:
Riser block aluminium.
Draw bolt steel.

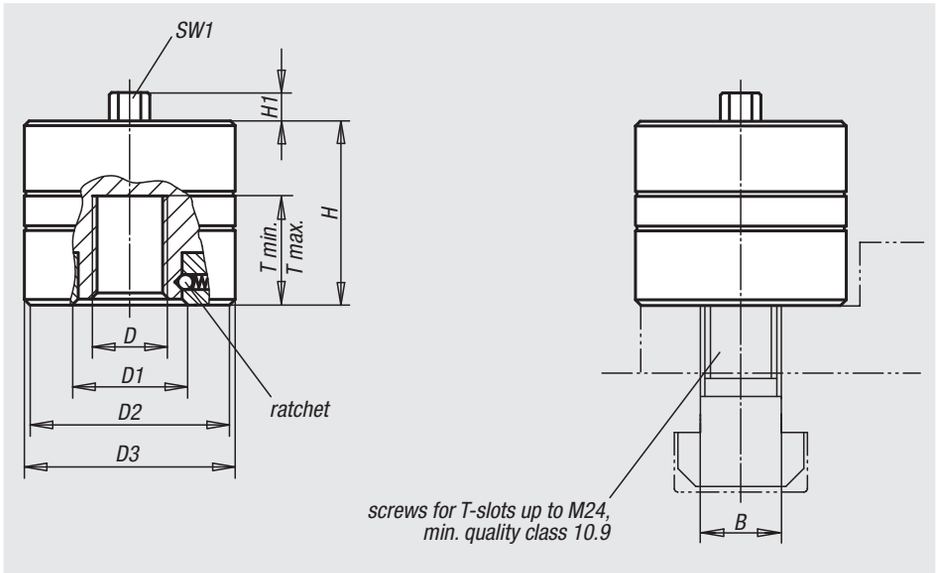
Version:
Riser block bright, draw bolt black oxidised.

Sample order:
nlm 04626-108

Note:
The riser blocks are the height adjustment elements for the compact clamps (04625).

Order No.	Size	L	B	H	D	D1	SW
04626-106	1	53	32	30	M6	15	13
04626-108	1	53	32	30	M8	15	13
04626-210	2	80	42	50	M10	25	19
04626-212	2	80	42	50	M12	25	19
04626-312	3	107	53	70	M12	30	24

Clamp nuts



Material:
Housing carbon steel, cover aluminium.

Version:
Carbonitrided

Sample order:
nlm 04750-6012

Note:
The main feature of the mechanical clamp nut is an integrated planetary gear to simplify the manual clamping torque. After manually adjusting the clamp nut up to the workpiece the drive pinion of the planetary gear is engaged by turning the hexagonal spigot „SW1“ to the right. The clamp nut is self-locking in every position. The clamp nut can be used for many clamping tasks throughout the machining field, especially for clamping parts in presses and punches.
Suitable bolts for t-slots see 07040.

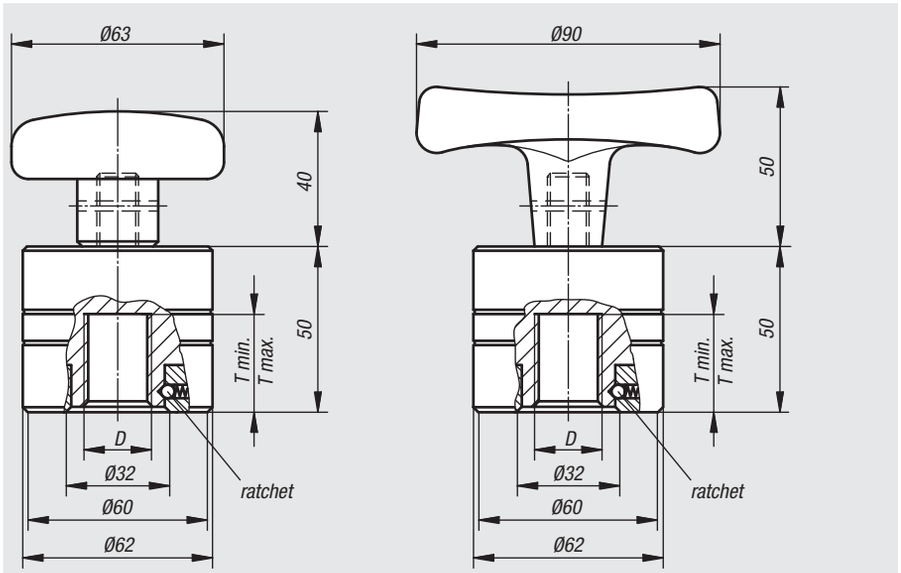
The clamp nuts are supplied without t-slot bolts.

Clamp nut clamping chain gears during milling

Order No.	D	D1	D2	D3	H	H1	T min.	T max.	B	SW1	Clamping force max. kN	Max. static stress kN	Tightening torque max. Nm
04750-6012	M12	32	60	62	50	10	16	24	14	13	60	70	20
04750-6016	M16	32	60	62	50	10	16	24	18	13	60	120	25
04750-6020	M20	32	60	62	50	10	16	24	22	13	60	120	30
04750-10016	M16	42	71	73	70	10	25	35	18	15	100	130	35
04750-10020	M20	42	71	73	70	10	25	35	22	15	100	200	40
04750-10024	M24	42	71	73	70	10	25	35	28	15	100	200	45

Clamp nuts

with star or T-grip



Material:
Housing carbon steel, cover aluminium, star grip thermoplastic, T-grip Duroplast.

Version:
Carbonitrided; star and T-shaped grips: black

Sample order:
nlm 04751-4010

Note:
The clamp nut with star or T-grip are an improvement based on the tried and tested clamp nut 04750. A star or T-grip replaces the operating hexagon and an added indexing mechanism complements it. An integrated planetary gear serves as the force multiplier, the indexing mechanism triggers the automatic switch from the placing movement to the actual application of force. As a result, considerable clamping forces can be achieved with the simplest manual operation, with no additional ring or socket spanner. The robust construction and self-limiting function guarantee a high level of operating safety. Clamp nuts are used far beyond mechanical engineering for purposes in which high tension and clamping forces are required with the least possible expense. Clamp nuts are maintenance-free under normal operating conditions (max. 120 °C).

The threaded bolt must have a minimum grade 10.9. With thread diameters less than M16, bolts grade 12.9 should be used or the maximum admissible static load must be reduced.

Advantages:
- simple, manual operation.
- high tension forces due to force reinforcement.
- rapid adjustment due to automatic conversion.
- high-level operating safety due to self-limitation.

Order No.	Version	D	T min.	T max.	Clamping force max. kN	Max. static stress kN	Tightening torque max. Nm
04751-4010	Tightening nut with star grip	M10	16	24	40	50	15
04751-4012	Tightening nut with star grip	M12	16	24	40	70	15
04751-4016	Tightening nut with star grip	M16	16	24	40	120	15
04751-4020	Tightening nut with star grip	M20	16	24	40	120	15
04751-40102	Tightening nut with T-grip	M10	16	24	40	50	25
04751-40122	Tightening nut with T-grip	M12	16	24	40	70	25
04751-40162	Tightening nut with T-grip	M16	16	24	40	120	25
04751-40202	Tightening nut with T-grip	M20	16	24	40	120	25

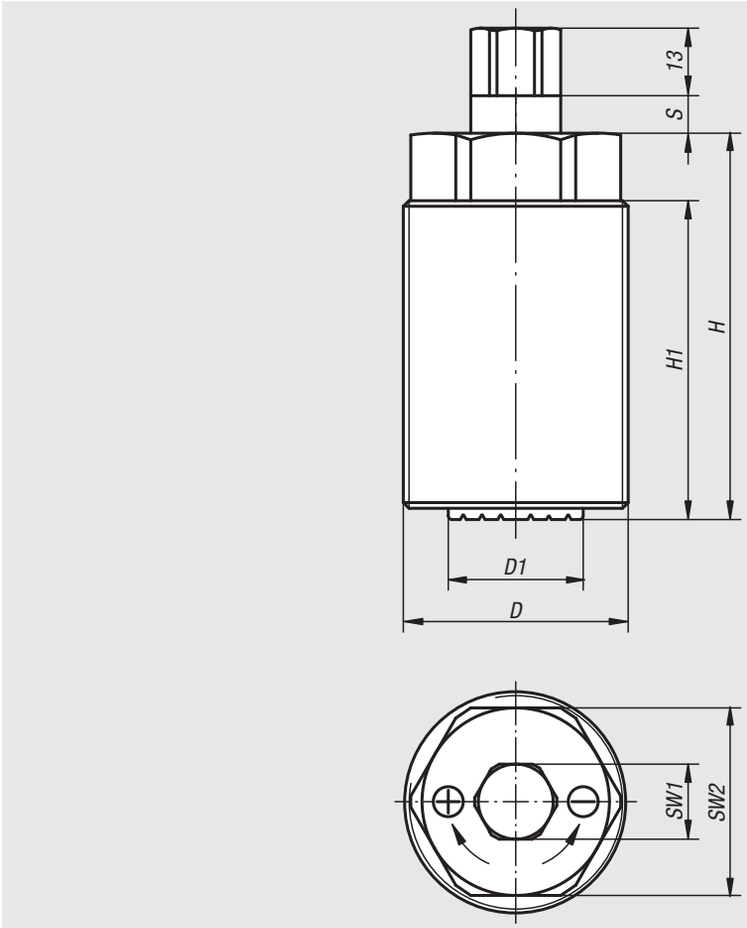
Tightening screws

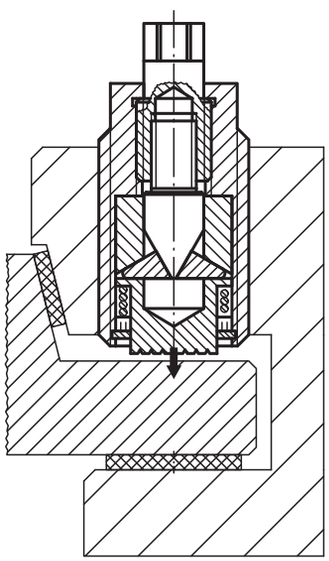
Material:
Carbon steel.

Version:
Black oxidised.

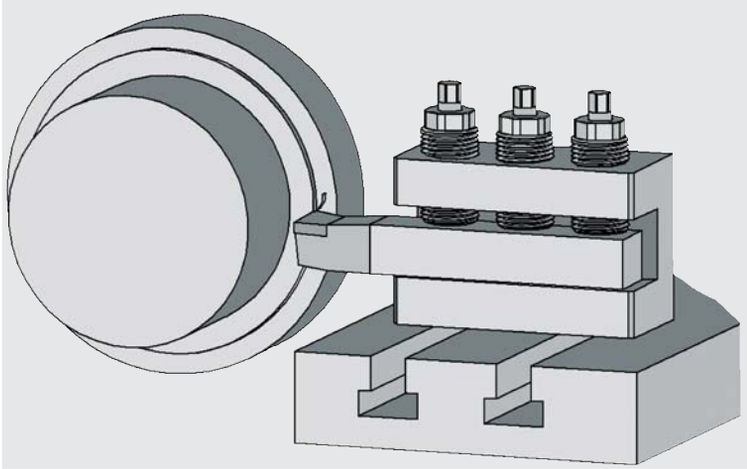
Sample order:
nlm 04752-48

Note:
The tightening screws are fitted with a patented wedge clamping system. This system allows the greatest clamping forces to be achieved at low torques with a simple manual operation. The wedge clamping system is self-limiting in every clamping position. A longer path can be quickly traversed via the external thread of the tightening screw before the wedge clamping system (stroke up to 2.2 mm) is used for clamping. Tightening screws are used for many purposes, primarily in presses, punches, production machines, fixtures and equipment production.





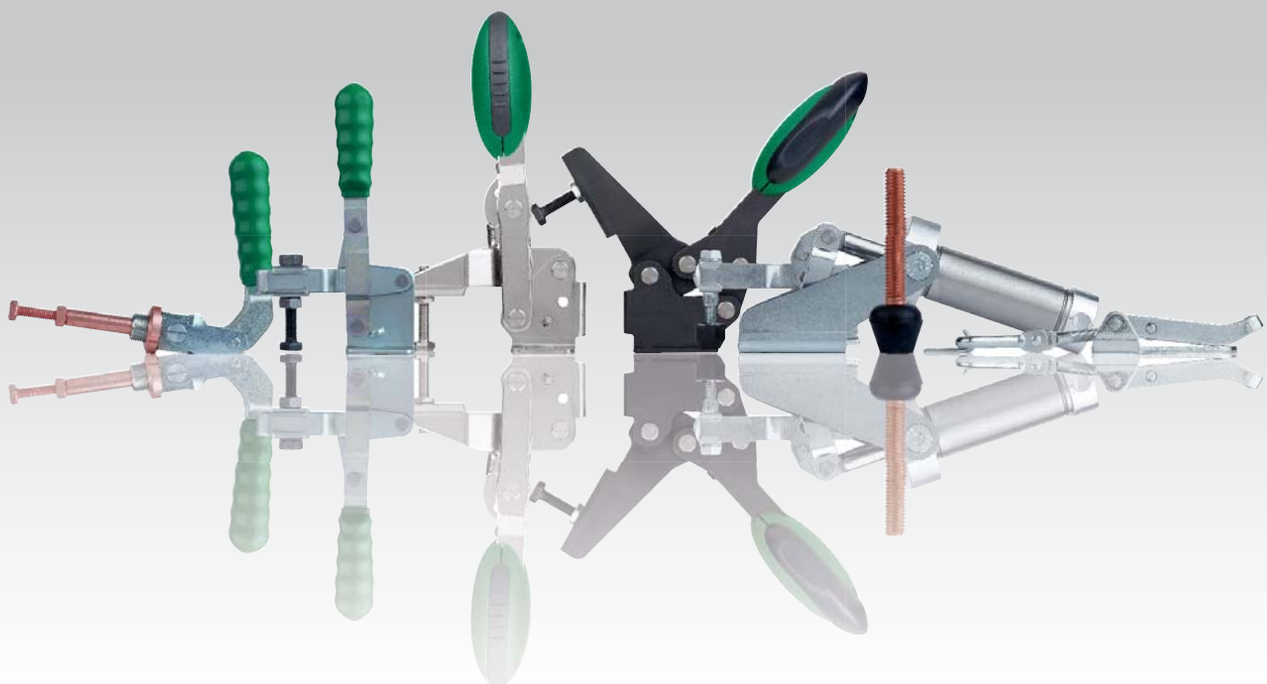
Clamping of turning tool on turning centre



Order No.	D	D1	H	H1	S	SW1	SW2	max. clamping stroke	Nominal clamping force kN	Max. static stress kN	Max. tightening torque at SW1 Nm
04752-36	M36x3	19	73	62	5	13	30	1,5	40	80	45
04752-48	M48x3	28	90	75	7,5	17	41	2,2	80	160	90

05000

Toggle clamps
Pneumatic clamps
Clamp accessories
Latches



Toggle clamps

Toggle clamps offer effective solutions where quick and economical clamping or positioning is required.

Toggle clamps work according to the knee-lever principle and can be operated with very little expenditure of force.

Self-locking is guaranteed when the dead centre position (alignment of the three joints) is exceeded.

Toggle clamps are an optimal clamping solution in drilling, welding, grinding and inspection fixtures etc. In the timber industry extreme deformations are avoided by using toggle clamps when bonding or assembling fragile sheets as the clamping force is controllable.

Principle of the knee lever

It is generally known that a person can support himself against a wall to shift a heavy piece of furniture. If the person has bent his knees and tries to move the furniture with the force of his legs, this is associated with the expenditure of considerable force.

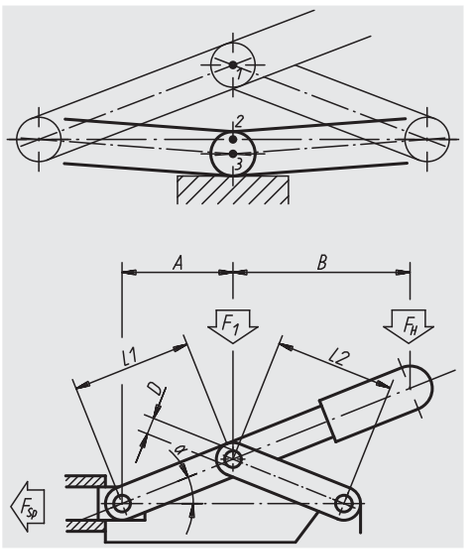
However, if the person has his legs in the position as shown in the picture above, and presses on the knee joint from above with a force, the move is much easier to achieve.

As soon as the 3 points of the joint A, B and C are in a line (knees straightened), it is no longer possible for the piece of furniture to be pressed back by a counterforce.

This principle is used with the toggle clamps.

Operating method:

1. Position before clamping.
2. Dead centre position (points of the joint in line).
3. By exceeding the dead centre secure clamping is guaranteed (self-locking).



Calculating the clamping force

Calculation variables

A: Distance between the centres (mm)
B: Distance to the point of force application (mm)
D: Diameter of the axle bolt (mm)
FH: Hand force (N)
F1: Force on the point of the joint (N)
Fsp: Clamping force (N)
L1, L2: Length of the lever arm (mm)
α: Inclination angle of the lever (degrees)
β: Friction angle in the joints (degrees)
δ: Angle of repose at the connecting rod (degrees)
μ: Coefficient of friction = 0,1 => δ 5,73°

$$F_{sp} = \frac{F_1}{2} \left[\frac{1}{\tan(\alpha + \beta)} - \tan\delta \right]; \quad F_1 = \frac{F_H \cdot (A + B)}{A} \quad ; \quad \beta = \arcsin\left(\frac{2D}{L_1 + L_2} \cdot \mu \right)$$

Very high clamping forces can be achieved with toggle clamps. The full potential force cannot be used. Adhering to the retaining forces F recommended in the catalogue guarantees a long life.

The the clamping force must be attuned to the retaining force, which can be done by setting the thrust screw.

Toggle clamps vertical

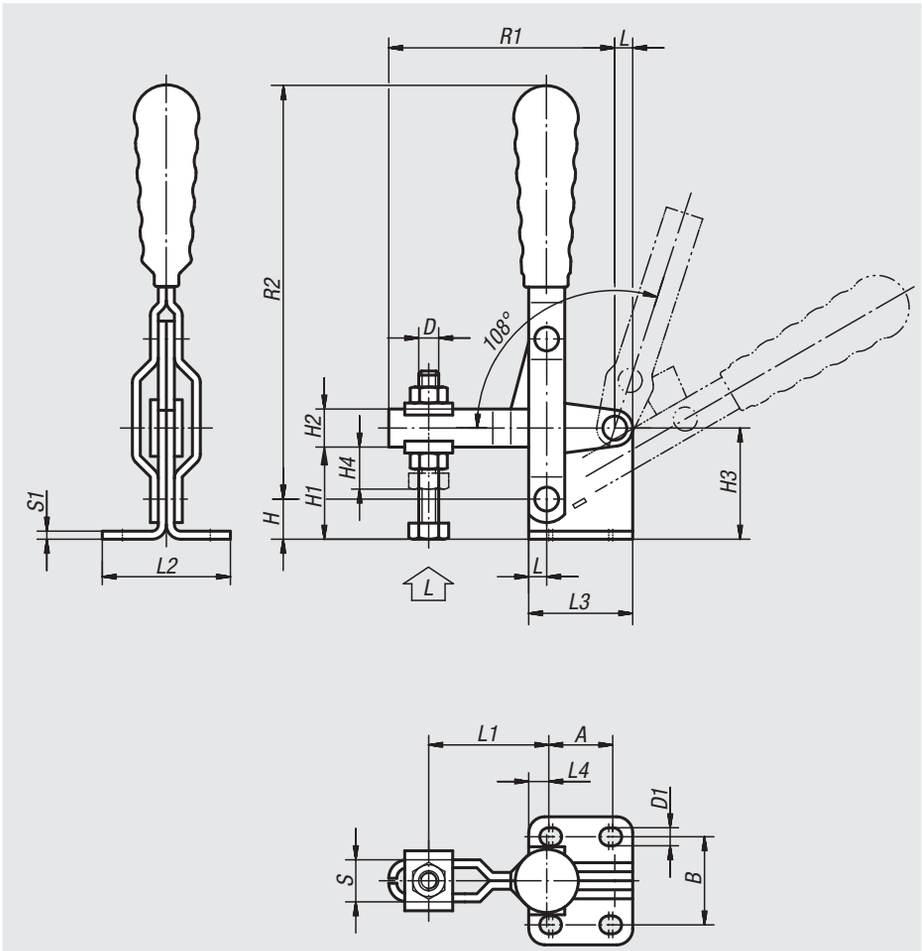
with horizontal foot

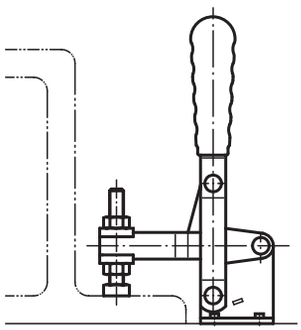
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05020-08

Note:
See 05200 – 05280 for accessories.





Order No.	L	L1 min.	L1 max.	L2	L3	L4	B	H	H1	H2	H3	H4	A min.	A max.	D	D1	R1	R2	S	S1	F kN	Plastic grips
05020-05	4,5	16	35	32	26	5	22	10	23	9,5	28	10	14	16	M5x35	4,5	56,5	96	10,5	2	0,8	05200-100
05020-06	5,5	23	46	38	32	9	27	13	29	11,5	35	11	12	14	M6x50	5,5	70,5	121	13,5	3	1	05200-105
05020-08	7	27	55	45	39	9	32	16	35	14	42	14	19	21	M8x50	6,5	86	143	16	3	2,3	05200-115
05020-10	8	33	74	56	43	7,5	38	20	39	18	48	18	26	28	M10x70	8,5	110	177	18	3,5	3,5	05200-120
05020-12	10	45	100	68	50	9	45	25	45	22	56	21	32	32	M12x80	8,5	140	215	23	4	4	05200-135

Toggle clamps vertical

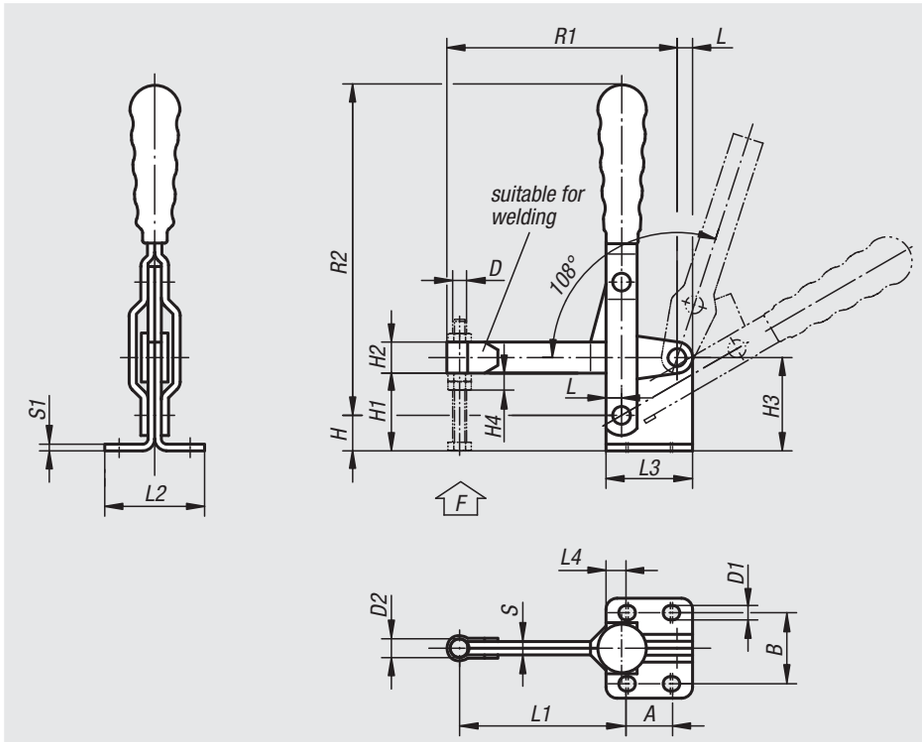
with horizontal foot and full clamping lever

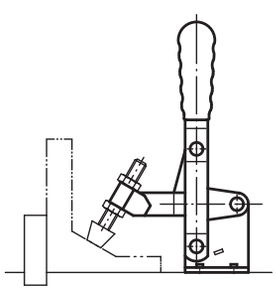
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05020-101

Note:
Bolts are not supplied.
See 05200 – 05280 for accessories.

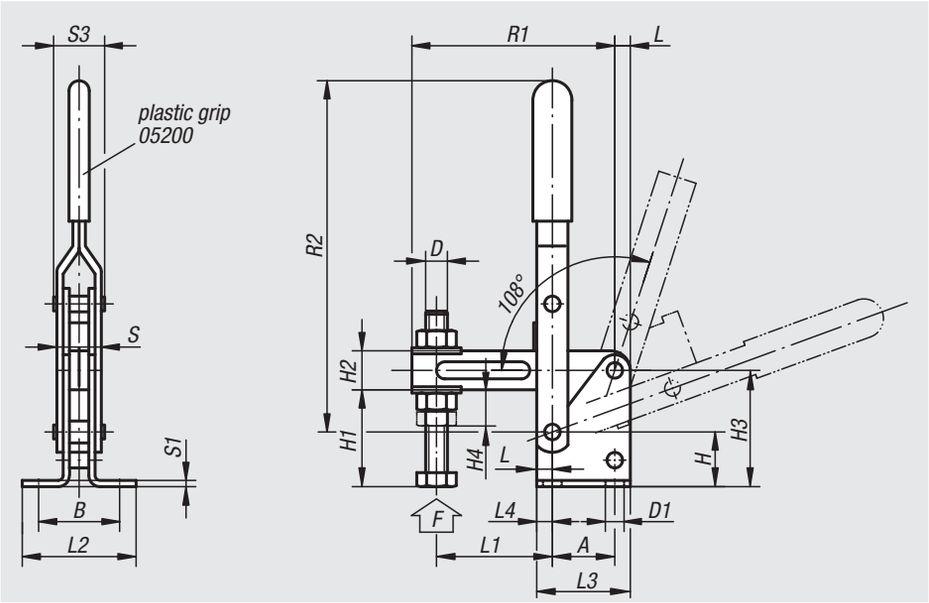




Order No.	L	L1	L2	L3	L4	B	H	H1	H2	H3	H4	A min.	A max.	D	D1	D2	R1	R2	S	S1	F kN	Plastic grips
05020-081	7	75	45	39	9	32	16	35	14	42	12	19	21	M8	6,5	8,5	103	143	6	3	2,2	05200-115
05020-101	8	92	56	43	7,5	38	20	39	18	48	16	26	28	M10	8,5	10,5	125	177	7	3,5	3,4	05200-120
05020-121	10	122	68	50	9	45	25	45	22	56	19	32	32	M12	8,5	12,5	159	215	8	4	4,5	05200-135

Toggle clamps vertical

with horizontal foot, large version

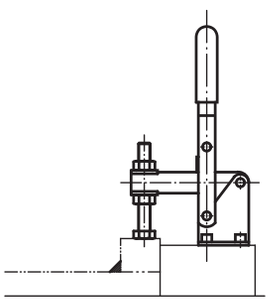


Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05020-14

Note:
See 05200 – 05280 for accessories.



Order No.	L	L1 min.	L1 max.	L2	L3	L4	B	H	H1	H2	H3	H4	A	D	D1	R1	R2	S	S1	S3	F kN	Plastic grips
05020-14	10	50	165	73	60	10	52	35	62,5	25	75	21	40	M14x90	8,5	225	230	30	4	34	4,6	05200-135
05020-16	15	55	215	100	90	20	70	58	101	30	116	27	50	M16x140	12,5	300	305	39	5	44	6	05200-140

Toggle clamps vertical

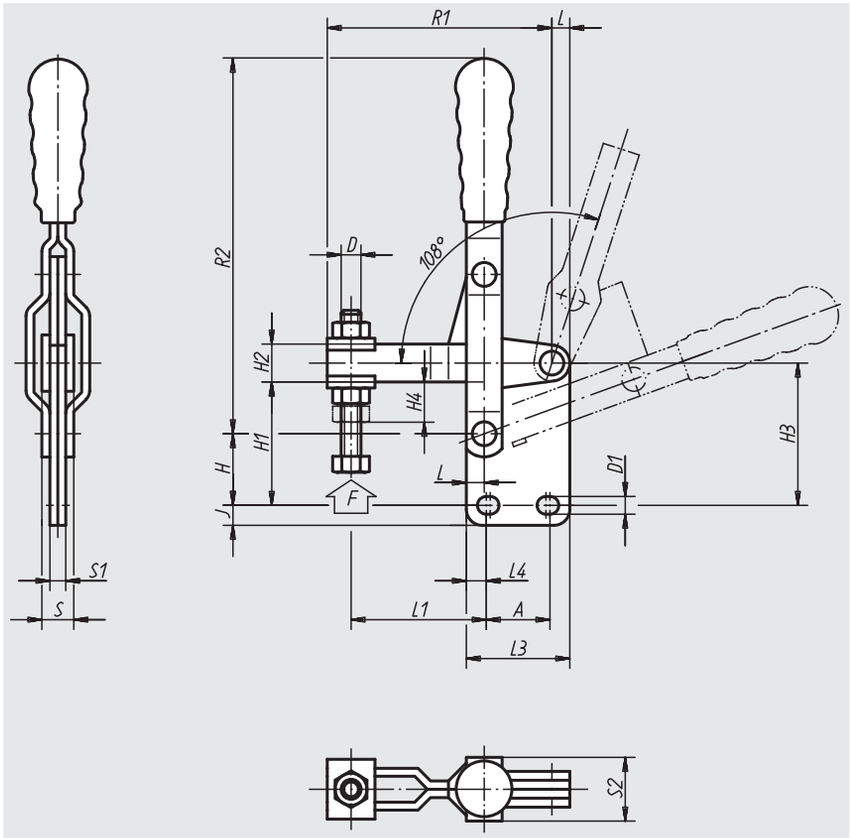
with straight foot

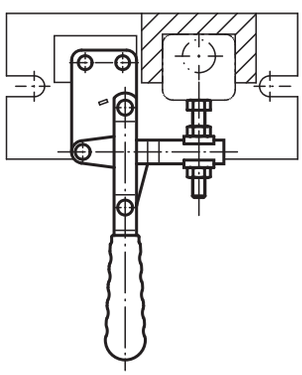
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05040-12

Note:
See 05200 – 05280 for accessories.





Order No.	L	L1 min.	L1 max.	L3	L4	H	H1	H2	H3	H4	A min.	A max.	D	D1	J	R1	R2	S	S1	S2	F kN	Plastic grips
05040-05	4,5	16	35	26	5	18	31	9,5	36	10	14	16	M5x35	4,5	5	56,5	96	10,5	4	16	0,8	05200-100
05040-06	5,5	23	46	32	9	21	37	11,5	43	11	12	14	M6x50	5,5	5,5	70,5	121	13,5	6	23	1	05200-105
05040-08	7	27	55	39	9	26,5	45,5	14	52,5	14	19	21	M8x50	6,5	6,5	86	143	16	6	23	2,3	05200-115
05040-10	8	33	74	43	7,5	33	52	18	61	18	26	28	M10x70	8,5	9	110	177	18	7	26	3,5	05200-120
05040-12	10	45	100	50	9	41	61	22	72	21	32	32	M12x80	8,5	11,5	140	215	23	8	30	4,6	05200-135

Toggle clamps vertical

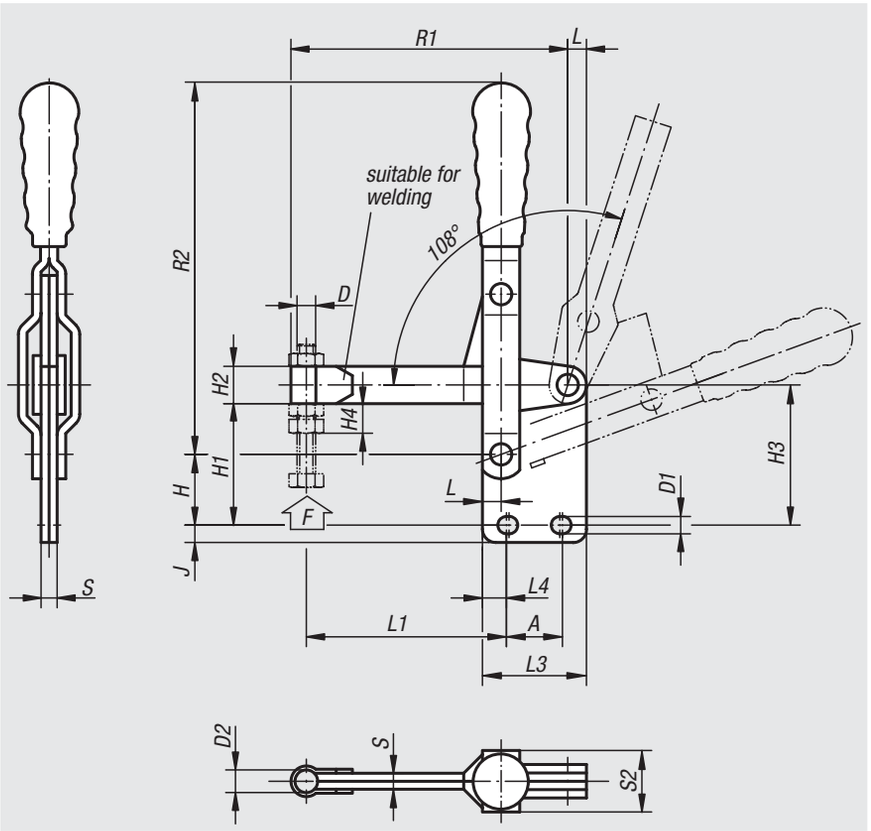
with straight foot and full clamping lever

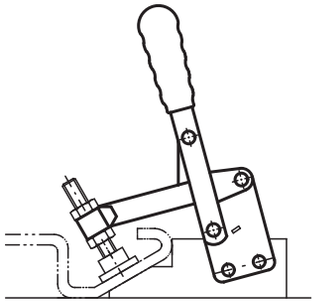
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05040-121

Note:
Bolts are not supplied.
See 05200 – 05280 for accessories.





Order No.	L	L1	L3	L4	H	H1	H2	H3	H4	A min.	A max.	D	D1	D2	J	R1	R2	S	S2	F kN	Plastic grips
05040-081	7	75	39	9	26,5	45,5	14	52,5	12	19	21	M8	7	8,5	6,5	103	143	6	23	2,2	05200-115
05040-101	8	92	43	7,5	33	52	18	61	16	26	28	M10	8,5	10,5	9	125	177	7	26	3,4	05200-120
05040-121	10	122	50	9	41	61	22	72	19	32	32	M12	8,5	12,5	11,5	159	215	8	30	4,5	05200-135

Toggle clamps vertical

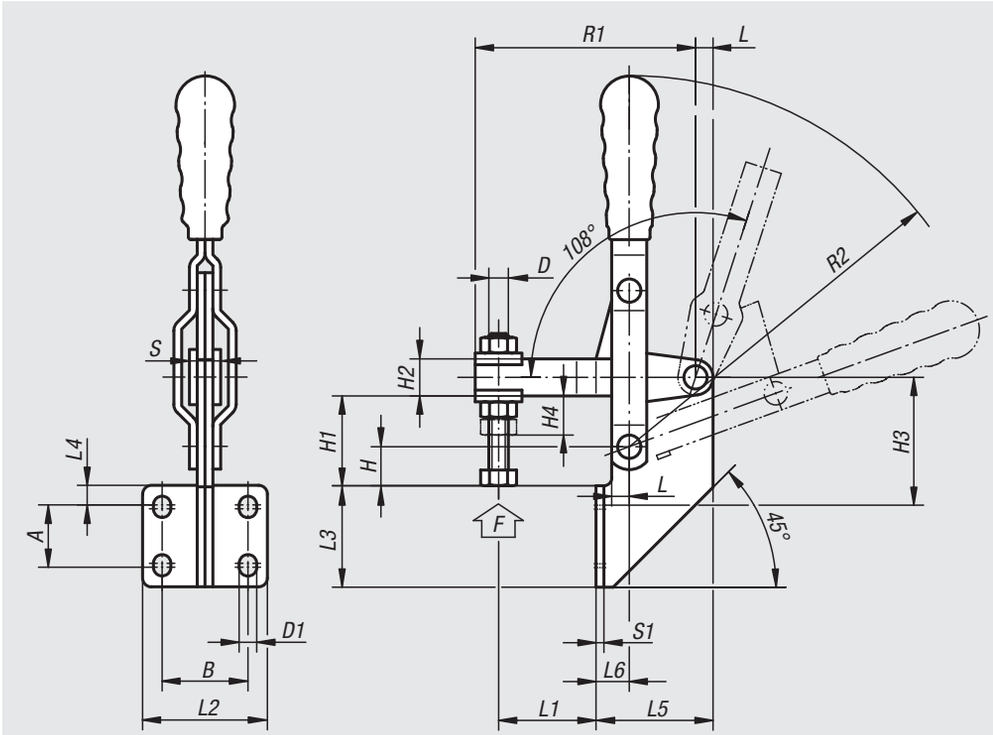
with angled foot

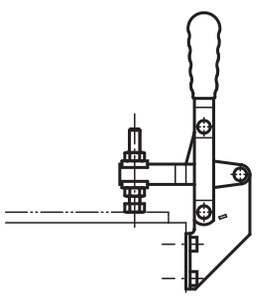
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05060-06

Note:
See 05200 – 05280 for accessories.





Order No.	L	L1 min.	L1 max.	L2	L3	L4	L5	L6	B	H	H1	H2	H3	H4	A min.	A max.	D	D1	R1	R2	S	S1	F kN	Plastic grips
05060-05	4,5	7	26	32	26	5	30	8,5	22	10	23	9,5	33	10	14	16	M5x35	4,5	56,5	96	10,5	2	0,8	05200-100
05060-06	5,5	8	31	38	32	9	38	11,5	27	13	29	11,5	44	11	12	14	M6x50	5,5	70,5	121	13,5	3	1	05200-105
05060-08	7	12	40	45	39	9	45	13	32	16	35	14	51	14	19	21	M8x50	6,5	86	151	16	3	2,3	05200-115
05060-10	8	18,5	59,5	56	43	7,5	50	15	38	20	39	18	55,5	18	26	28	M10x70	8,5	110	177	18	3,5	3,5	05200-120

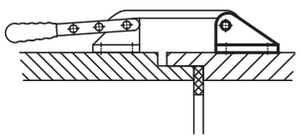
Toggle hook clamps

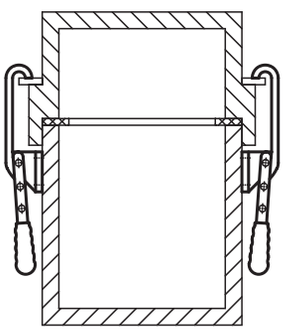
and catch plate

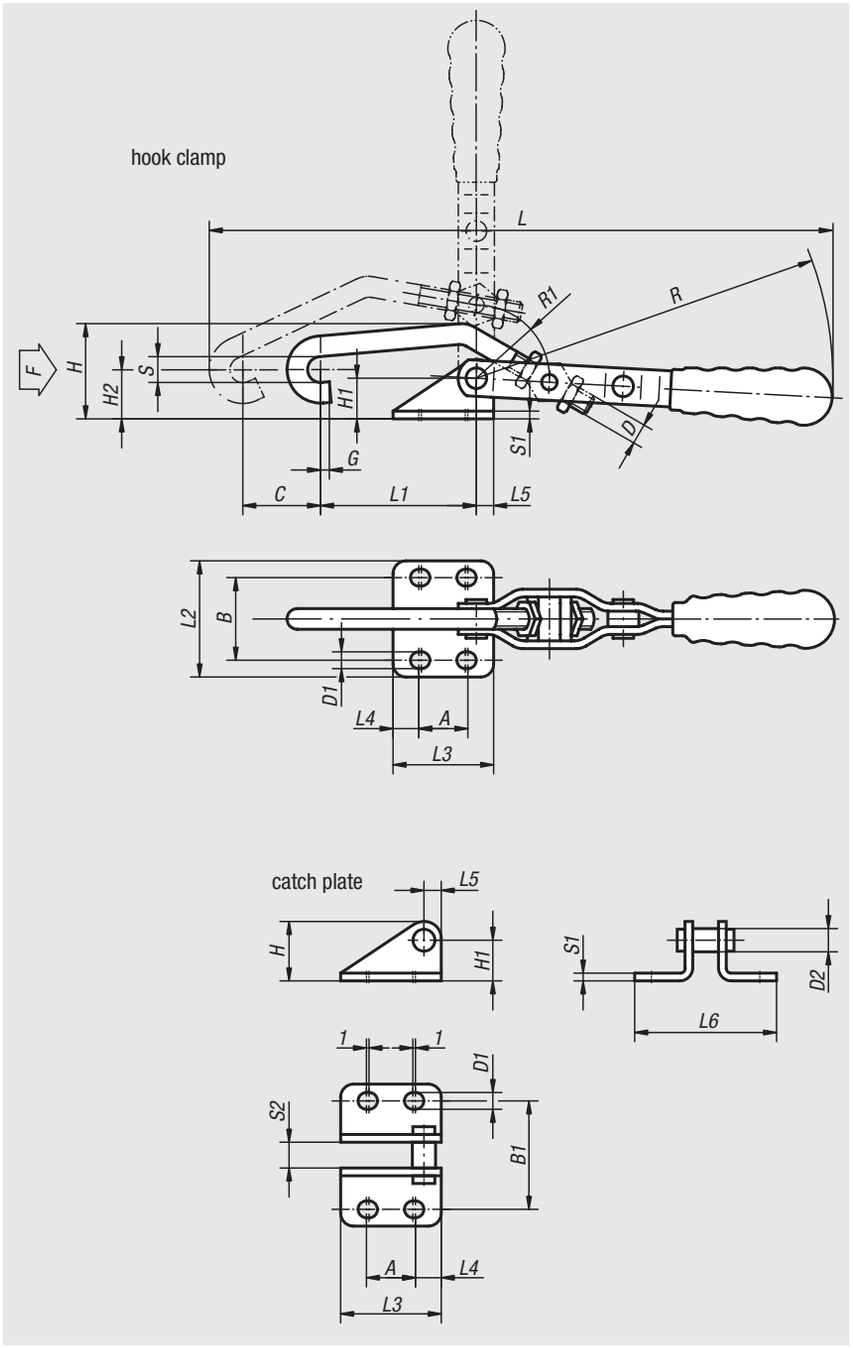
Material:
Lever, foot and catch plate sheet metal DD11 1.0332.
Hinge pins and hook carbon steel 1.0501.

Version:
Steel parts galvanised.
Hinge pins and hook tempered.
Grip plastic, oil-resistant.

Sample order:
nlm 05080-01 (hook clamp)
nlm 05080-011 (catch plate)







Toggle hook clamps

Order No.	L	L1	L2	L3	L4	L5	B	H	H1	H2	A min.	A max.	C	D	D1	G	R	R1	S	S1	F kN	Plastic grips
05080-01	231	60	45	39	10	7	32	36	16	17	17	19	25	M8	6,5	3	151	29	10	3	1	05200-115
05080-03	349	90	68	50	9	10	45	64	30	31	30	32	30	M12	8,5	5	215	36,5	14	4	3	05200-135

Catch plate

Order No.	L3	L4	L5	L6	B1	H	H1	A min.	A max.	D1	D2	S1	S2
05080-011	39	10	7	55	42	23	16	17	19	6,5	9	3	10
05080-031	50	9	10	82	59	40	30	30	32	8,5	13	4	14

Toggle clamps horizontal

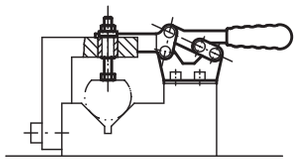
with horizontal foot

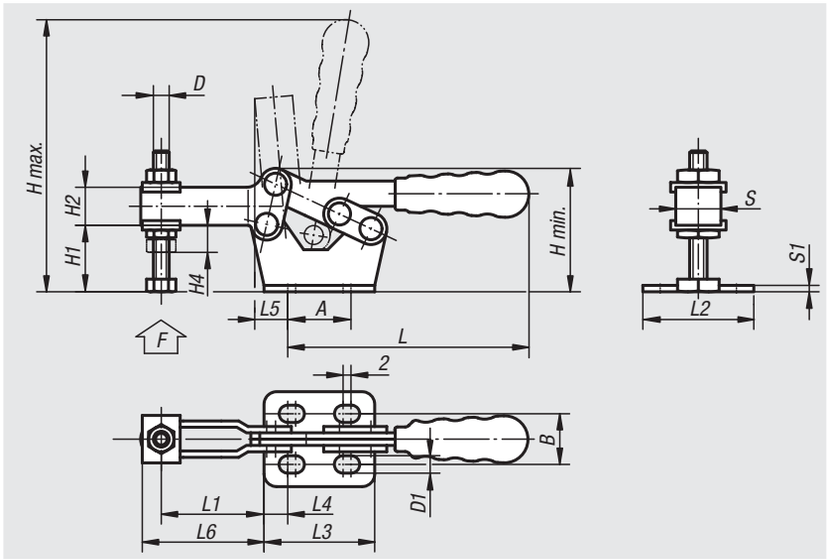
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05120-10

Note:
See 05200 – 05280 for accessories.





Order No.	L	L1 min.	L1 max.	L2	L3	L4	L5	L6	B	H min.	H max.	H1	H2	H4	A min.	A max.	D	D1	S	S1	F kN	Plastic grips
05120-05	76	12	32,5	30	35	7,5	9,5	39	16	39	91	20	12	10	16	20	M5x35	5,5	11	2	0,8	05200-200
05120-06	106	15,5	46	35,5	45	8,5	11,5	53,5	22	53	130	30	14	11	24	28	M6x48	5,5	14	3	1	05200-205
05120-08	140	19,5	61	40,5	55,5	14	19	71	24	67	165	40	16	14	24	28	M8x60	7	16	3	2,3	05200-210
05120-10	172	33	84	61	65,5	10,5	20	92	42	85	200	50	20	18	40	44	M10x70	9	19	3,5	3,5	05200-215
05120-12	215	31	104	64,5	80	18,5	25,5	119	42	99	250	60	24	21	40	44	M12x80	9	22	4	4,6	05200-220

05120

Toggle clamps horizontal

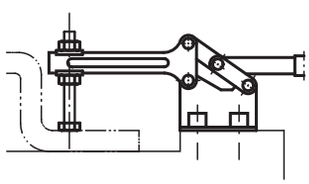
large version

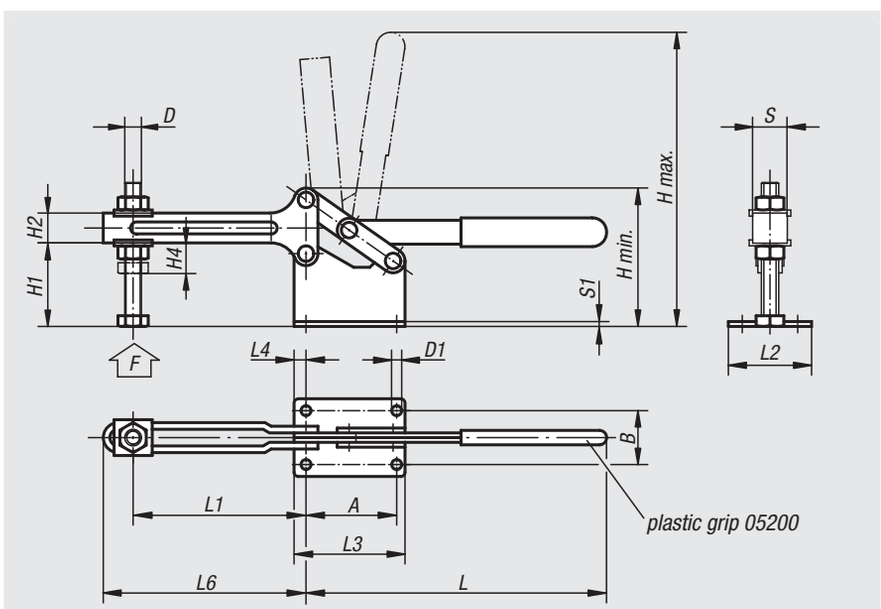
Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05120-14

Note:
See 05200 – 05280 for accessories.

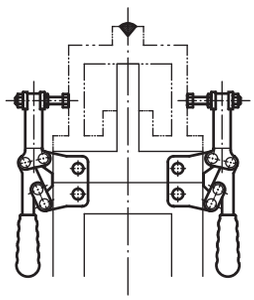


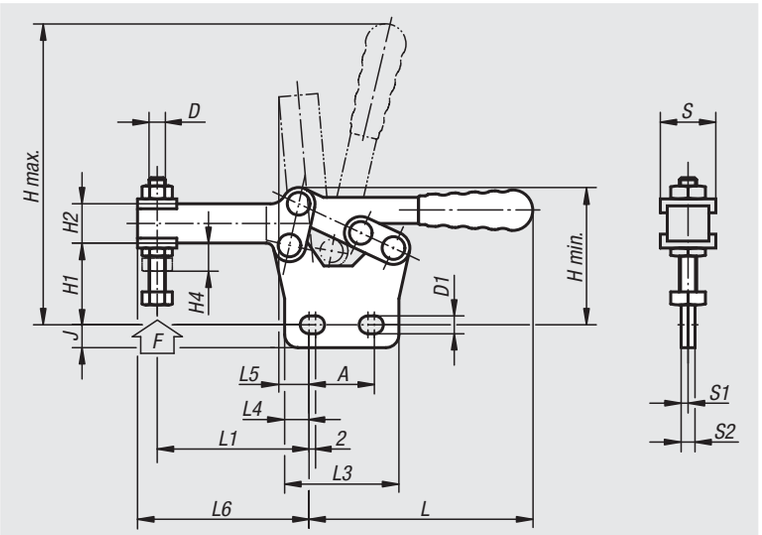


Order No.	L	L1 max.	L1 min.	L2	L3	L4	L6	B	H min.	H max.	H1	H2	H4	A	D	D1	S	S1	F kN	Plastic grips
05120-14	252	145	45	65	96	10	160	45	116	310	70	25	21	76	M14x90	9	24	4	4,5	05200-145
05120-16	325	205	55	85	132	15	225	55	173	425	110,5	35	27	102	M16x140	12,5	39	5	6	05200-140

Toggle clamps horizontal

with straight foot





Material:
Sheet metal DD11 1.0332.

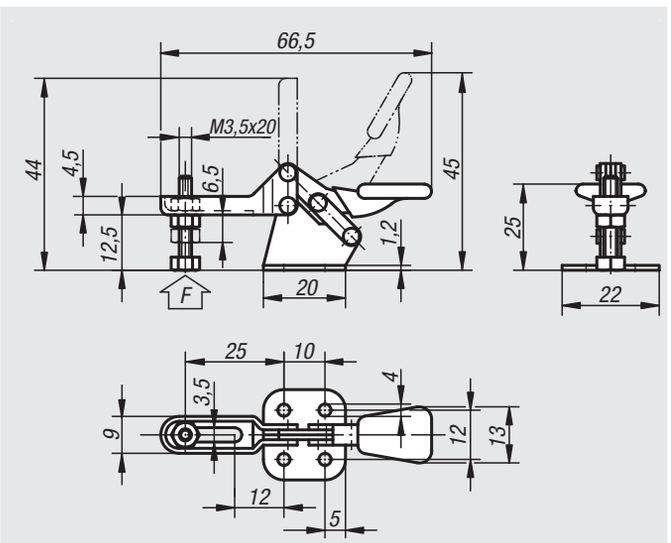
Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05130-08

Note:
See 05200 – 05280 for accessories.

Order No.	L	L1 min.	L1 max.	L3	L4	L5	L6	H min.	H max.	H1	H2	H4	A min.	A max.	D	D1	J	S	S1	S2	F kN	Plastic grips
05130-05	76	18	39	35	7,5	10	44	42	93	25	12	10	16	20	M5x35	5,5	7	16	2	4	0,8	05200-200
05130-06	106	26	51	45	8,5	14	60	58	132	36	14	11	24	28	M6x48	5,5	6,5	19	3	6	1	05200-205
05130-08	140	34	74	55	13,5	20	82	74	168	44	16	14	24	28	M8x60	7	8	22	3	6	2,3	05200-210
05130-10	172,5	40	90	65	10,5	20,5	100	96	213	61	20	18	40	44	M10x70	9	9	26	3,5	7	3,5	05200-215
05130-12	215	54	113	80	18	29	130	112	270	70	24	21	40	44	M12x80	9	12	30	4	8	4,6	05200-220

Toggle mini clamps

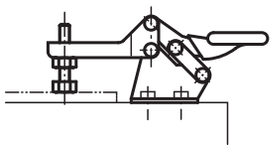


Material:
Stainless steel

Version:
Bright.
Handle with plastic sleeve, oil-resistant.

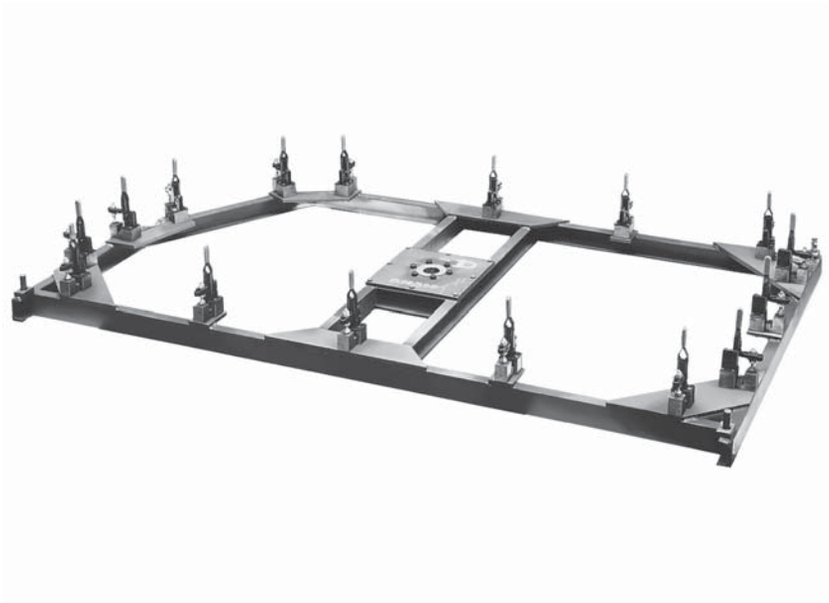
Sample order:
nlm 05140-01

Note:
The handle lies horizontal when clamped.



Order No.	F (N)
05140-01	250

Application: welding fixture with norelem toggle clamps



05160

Toggle clamps horizontal

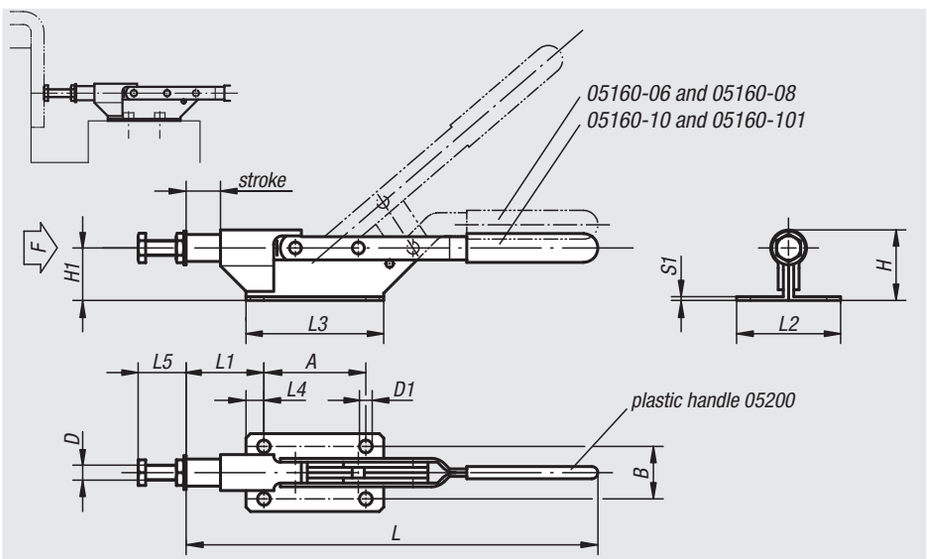
with push rod

Material:
Sheet metal DD11 1.0332.

Version:
Steel parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05160-10

Note:
The 05160-06 and 05160-08 versions have a swan-necked clamping lever.
See 05200 – 05280 for accessories.



Order No.	L	L1	L2	L3	L4	L5 min.	L5 max.	B	H	H1	A	Travel	D	D1	S1	F kN	Plastic grips
05160-06	178	40	40	75	10	13	23	28	33	25	55	15	M6	6	2	1	05200-110
05160-08	255	49	45	85	12,5	14	26	30	42	31,5	60	22	M8	6,5	2,5	2	05200-125
05160-10	275	52	52	92	12	25	35	35	47	35,5	68	22	M10	8,5	2,5	3	05200-125
05160-101	300	62	58	100	12,5	25	36	40	59	46	75	26	M10	9	3	4	05200-135

Toggle clamps with push rod

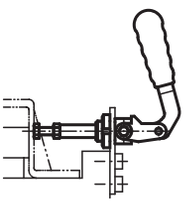
push-pull operation, bracket mounting

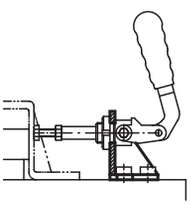
Material:
Body and push-rod 1.0501 carbon steel,
levers sheet metal DD11 1.0332.

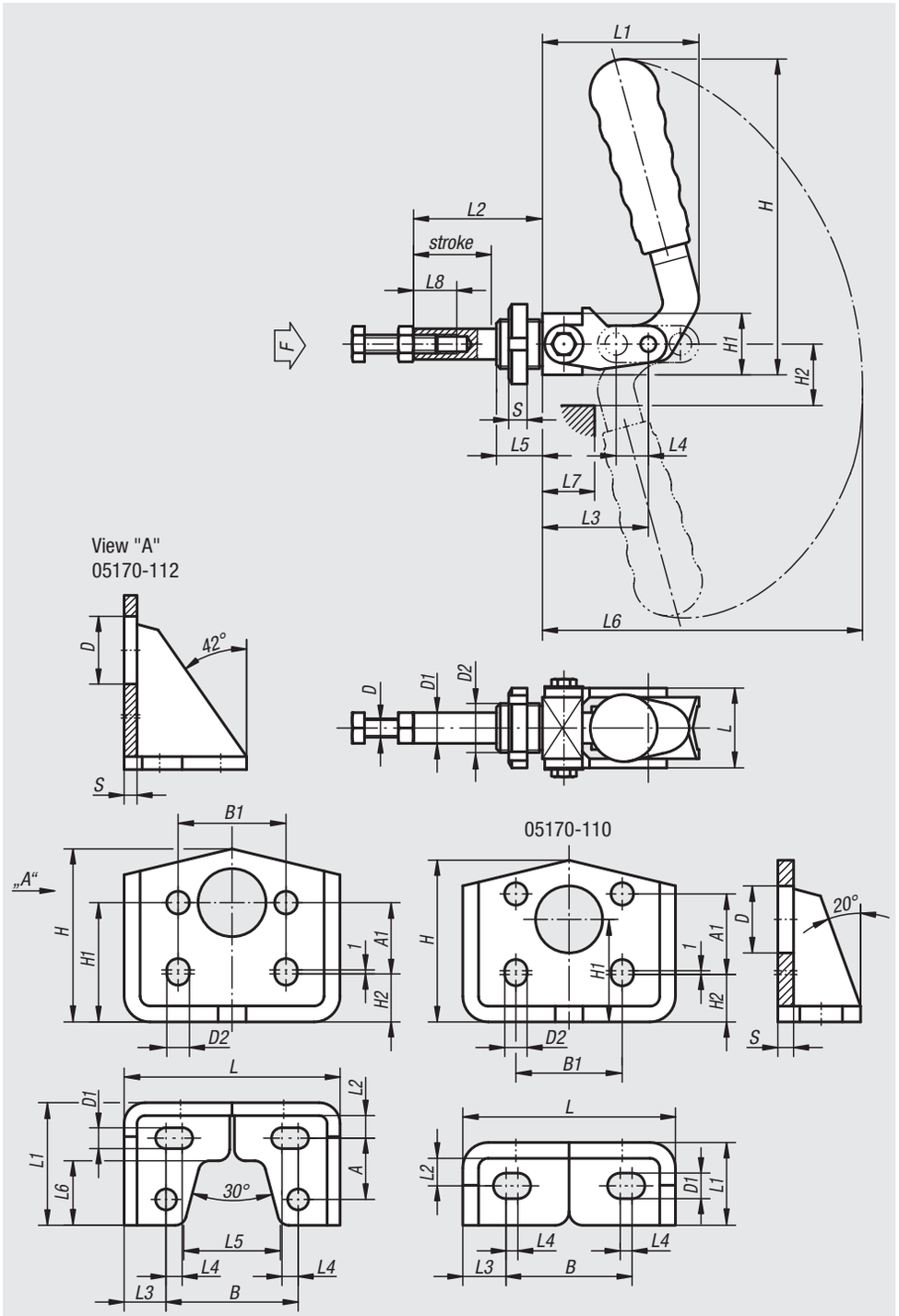
Version:
Body and lever parts galvanised,
hinge pins tempered,
plastic handle oil-resistant.

Sample order:
nlm 05170-012 (toggle clamp)
nlm 05170-110 (bracket)

Note:
The clamp can be mounted with a bracket or into fixtures using the screw on the face.







Toggle clamps

Order No.	L	L1	L2	L3	L4	L5	L6	L7	L8	H	H1	H2	D	D1	D2	Travel	S	F kN	Plastic grips
05170-010	26	52	42	34	13	15	130	18	20	101	20	20	M6x30	10	M16x1,5	26	6	1	05200-205
05170-012	32	75	60	50	20	18	170	30	30	139	25	28	M8x40	12	M20x1,5	40	8	1,5	05200-120
05170-016	40	105	92	78	35	20	213	60	35	155	32	44	M10x50	16	M27x1,5	70	8	3,5	05200-135

Bracket

Order No.	L	L1	L2	L3	L4	L5	L6	B	B1	H	H1	H2	A	A1	D	D1	D2	S	matching toggle clamp
05170-110	54	21	7	11	3	-	-	32	27	42,5	26	14	-	14	17	6,5	5,5	4	05170-010
05170-112	67	38	7	13	5	30	20	41	32	55	37	16	19	21	21	6,5	6,5	4	05170-012

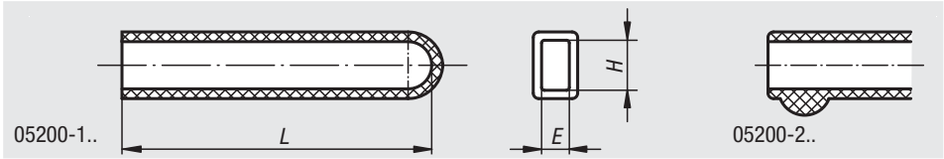
05200

Plastic grips

Material:
Plastic

Version:
Oil-resistant

Sample order:
nlm 05200-130 (with boss)
05200-210 (without boss)



Order No.	L	H	E
05200-100	33	9	4
05200-105	43	11	6
05200-110	55	12	5
05200-115	55	14	6
05200-120	75	16	7
05200-125	90	16	4
05200-130	85	19	6
05200-135	90	20	8
05200-140	115	30	9
05200-145	120	20	8
05200-200	33	8	4
05200-205	48	12	6
05200-210	65	14	6
05200-215	90	16	7
05200-220	120	20	8

05220

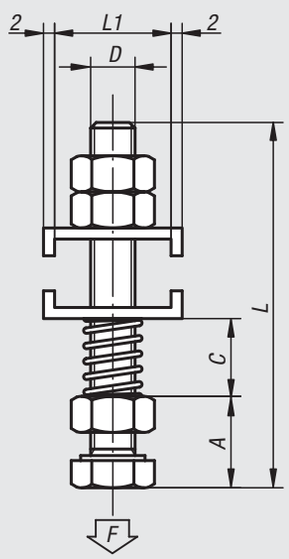
Thrust spindles spring mounted

Material:
Screw and clamping plates steel.
Nut steel.
Spring class C spring wire.

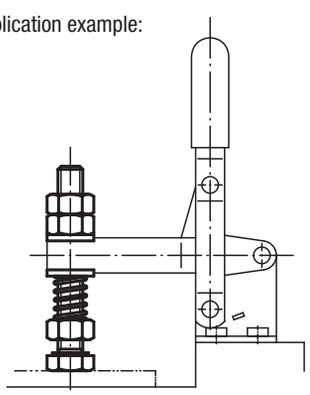
Version:
Screw and clamping plates galvanized.
Nut black oxidised.

Sample order:
nlm 05220-10

Note:
For use with 05020, 05040, 05060, 05120 and 05130.



application example:

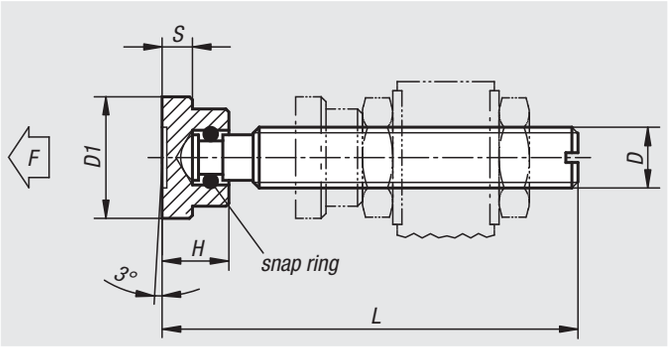


Order No.	L	L1	D	A	C min.	C max.	F max. N
05220-08	65,5	16	M8x60	12	9	30	25
05220-10	87,5	20,5	M10x80	15	14	35	35

05240

Thrust screws

with thrust pad



Material:
Screw and thrust pad free-cutting steel.

Version:
Screw black.
Thrust pad black oxidised.
Screw pin and thrust pad case-hardened.

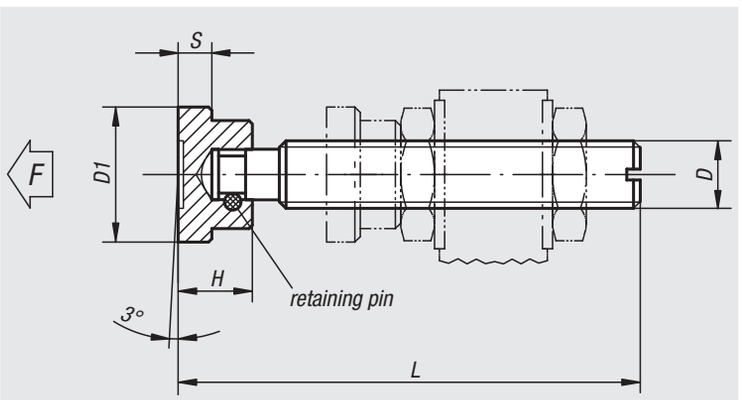
Sample order:
nlm 05240-10X63

Order No.	L	H	D	D1	S	F max. kN
05240-06X	32/37/42/52	7	M6	12	2,5	1
05240-08X	38/43/48/53/63	9	M8	16	4	2,3
05240-10X	53,5/58,5/63,5/68,5/83,5	11	M10	20	5	3,5
05240-12X	64,5/69,5/74,5/84,5/104,5	13	M12	25	6	4,6
05240-16X	70,3/75,3/85,3/105,3/130,3	15	M16	32	7	6

05241

Thrust screws

with thrust pad



Material:
Screw and thrust pad free-cutting steel.

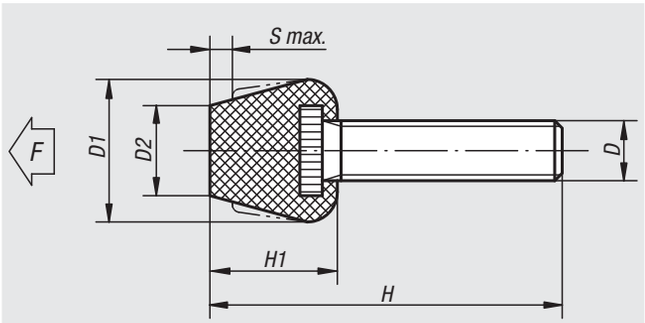
Version:
Screw black.
Thrust pad black oxidised.
Screw pin and thrust pad case-hardened.

Sample order:
nlm 05241-10X84

Order No.	L	H	D	D1	S	F max. kN
05241-06X52	52	7	M6	12	2,5	1
05241-08X63	63	9	M8	16	4	2,3
05241-10X84	84	11	M10	20	5	3,5
05241-12X104	104	13	M12	25	6	4,6
05241-14X105	105	14	M14	28	6	5
05241-16X130	130	15	M16	32	7	6

05260

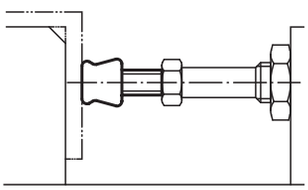
Thrust screws neoprene



Material:
Screw steel.
Thrust pad neoprene.

Version:
Neoprene pad moulded onto screw end.
Screw copper-plated.

Sample order:
nlm 05260-08

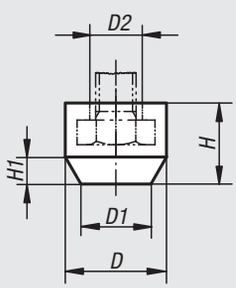


Order No.	H	H1	D	D1	D2	S max.	F max. N
05260-08	63	17	M8x46	19	12	3	750
05260-081	43	17	M8x26	19	12	3	750
05260-10	80	19	M10x61	19	14	3,5	1000
05260-101	55	19	M10x36	19	14	3,5	1000

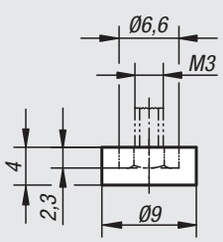
05280

Protective caps

05280-01 - 05280-05
05280-07



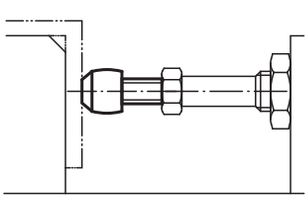
05280-06



Material:
05280-01 to 05280-05 and 05280-07: oil-resistant rubber; 05280-06: polyamide

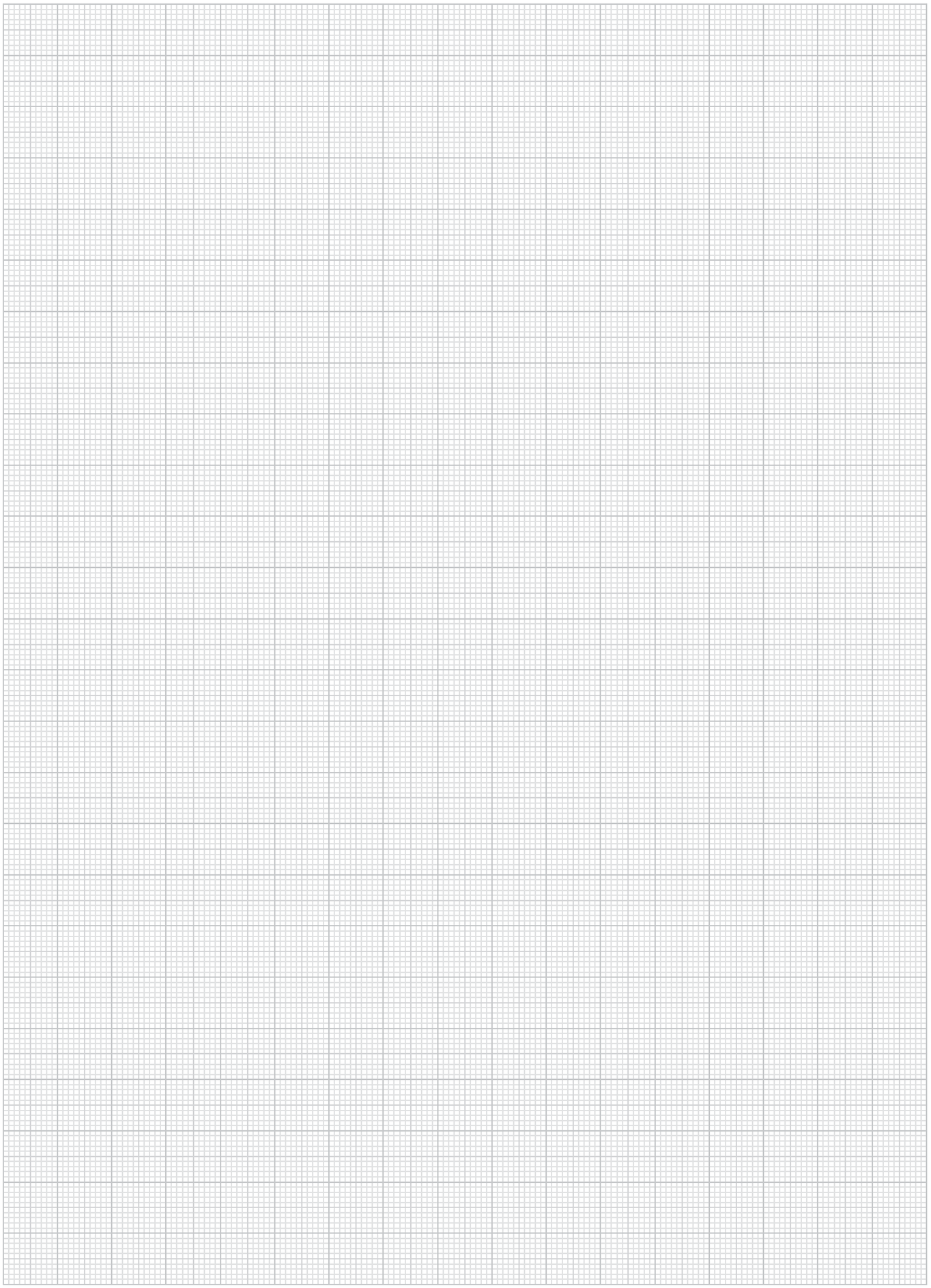
Version:
Rubber: black; polyamide: white

Sample order:
nlm 05280-03



Order No.	D	D1	D2	H	H1	for screws
05280-06	-	-	-	-	-	M3
05280-01	11	7	5,5	8,5	4	M4
05280-02	12,5	8	6,8	10	4	M5
05280-03	15	10	8,5	12	4	M6
05280-04	19	13	11,3	15	6	M8
05280-07	23	15	14,5	18	7	M10
05280-05	26	19	16,5	20	7	M12

Notes

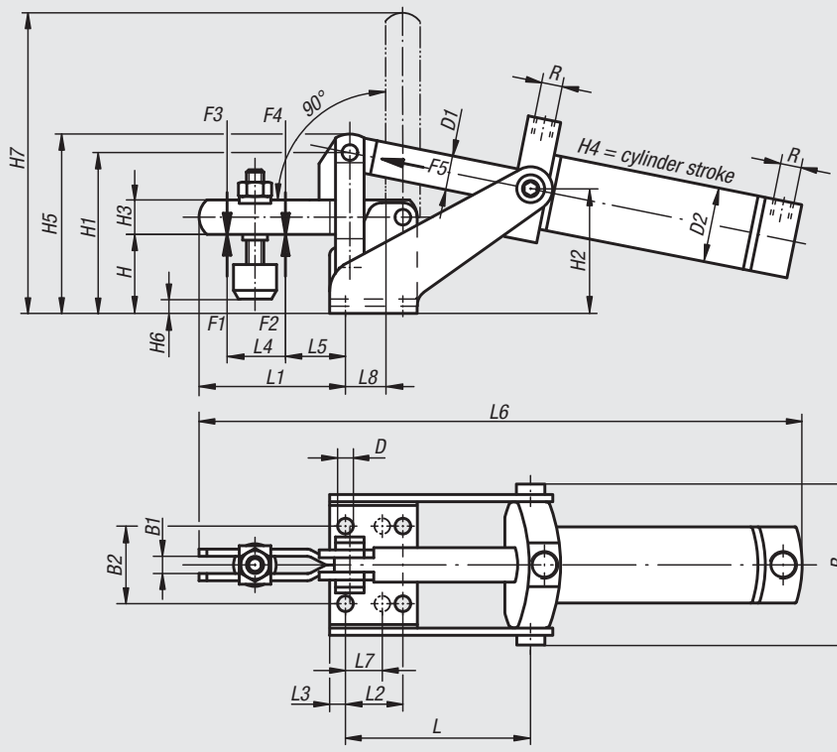


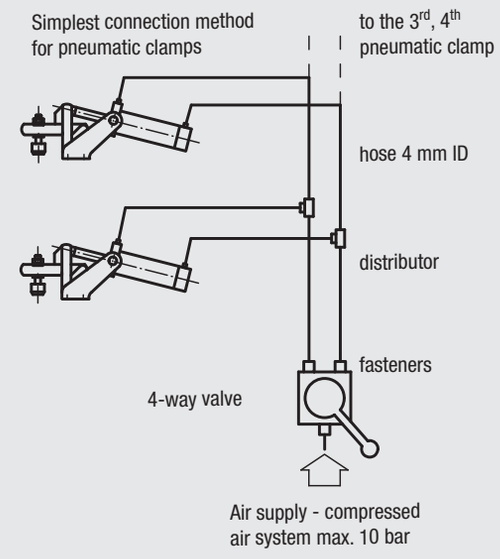
Pneumatic clamps

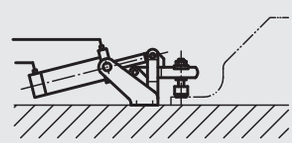
Material:
Levers steel plate.
Hinge pins stainless steel.

Version:
Levers galvanised. Festo pneumatic cylinder, double-acting, anodized.
Clamp galvanised and passivated.
Complete with tempered, galvanised and passivated press-on bolt and protective cap.

Sample order:
nlm 05330-03







Order No.	L	L1	L2	L3	L4	L5	L6	L7	L8	B	B1	B2	H	H1	H2	H3	H4 stroke
05330-01	58	38	16	6	19	14	175	-	12	50	5	24	22	47	32	10	34
05330-02	53	51	20	5,5	27	18	200	12,5	13	62	6	27	27	56	41	12	42
05330-03	63	80	20	7,5	43	27	260	-	16	62,5	8	32	36	74	56	18	52
05330-04	86	100	32	8	52	35	315	-	22	84	10	45	45	87	64	20	62

Order No.	H5	H6	H7	D	D1	D2	R	F1 kN	F2 kN	F3 kN	F4 kN	F5 kN	VL	suitable thrust screws
05330-01	52	-2 up to 5	85	4,5	6	16	M5	0,8	1,1	0,2	0,3	0,1	0,08	M5x30
05330-02	66	-1 up to 8	106	5,5	12	25	M5	1	1,2	0,7	1	0,3	0,26	M6x35
05330-03	85	2 up to 14	157	7,1	12	32	G1/8	1,4	2,5	0,65	1,1	0,5	0,35	M8x45
05330-04	100	-5 up to 24	194	8,5	16	40	G1/8	2	3	1,5	2,2	0,75	0,8	M8x65

Pneumatic clamps

Note:
Compared to hand clamps, pneumatic clamps have the following advantages: The operator is relieved of frequent clamping. Several clamps can be activated at the same time and can be closed in a specific sequence.
Single or multiple clamps can be activated from varying positions by machine control or hand control.
As a result of the knee-operated lever system:
– the clamp remains closed if the air supply fails.
– the compressed air consumption is low as a result of the large end transfer.
– pivoting the clamping arm achieves a large opening travel.
– optimum force and movement ratios are achieved.

VL = compressed air consumption per complete cycle in dm^3 at 6 bar.

Selection criteria:
To select the correct size of clamp in the case of pneumatic clamps, the possible clamping force at 6 bar (any compressed media are permissible, maximum pressure 10 bar), is specified besides the bracing force. F3 is the possible clamping force that the clamp exerts on the end of the clamping arm, F4 the force it exerts on the fulcrum side.

Control:
The piping diagram for the simplest control of one or several pneumatic clamps is shown adjacent. When constructing complete switching systems consult the well-known manufacturers of pneumatic valves, who also supply all the required connectors and fittings.

Attention:
The forces F1 and F2 specified in the table are holding forces; F3 and F4 are clamping forces.

Pneumatic clamps push-rod

Material:
Base malleable iron.
Levers and push-rod carbon steel.

Version:
Body: painted; bracket, levers and push-rod galvanised and passivated

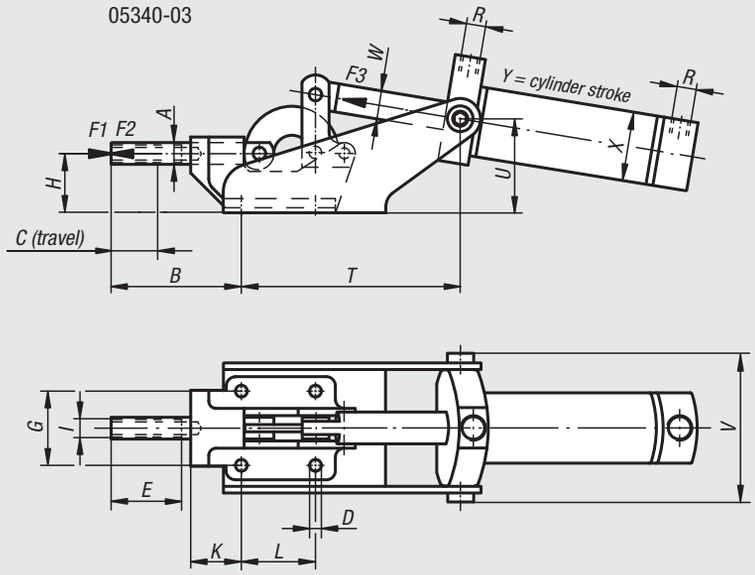
Sample order:
nlm 05340-07

Note:
The pneumatic clamp can be used as a push and pull clamp. The heavy-duty design and the dual-acting FESTO pneumatic cylinder guarantee a long life.
A tempered, galvanised and passivated thrust screw with protective cap is also supplied.

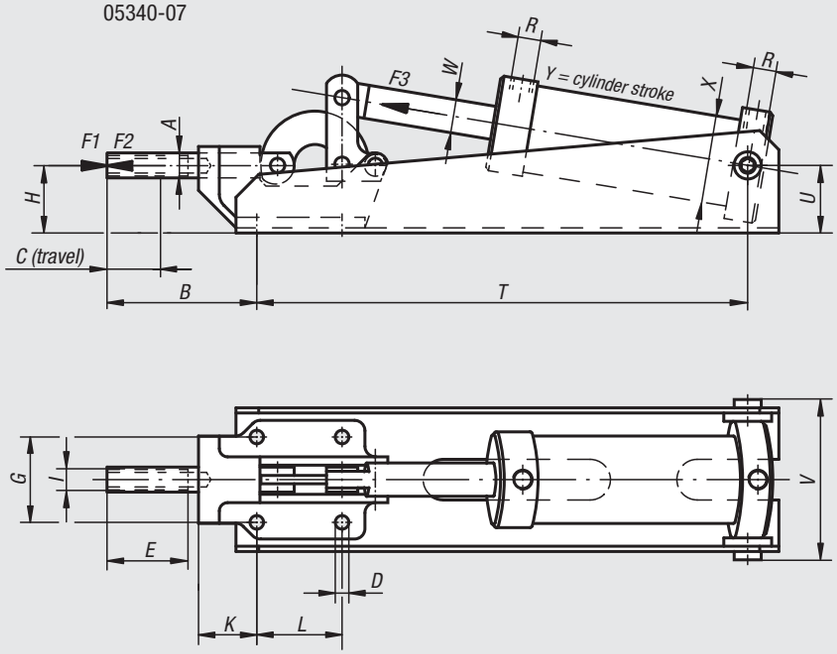
VL = compressed air consumption per complete cycle in dm^3 at 6 bar.

Attention:
The forces F1 specified in the table are holding forces; F2 are clamping forces.

05340-03



05340-05
05340-07

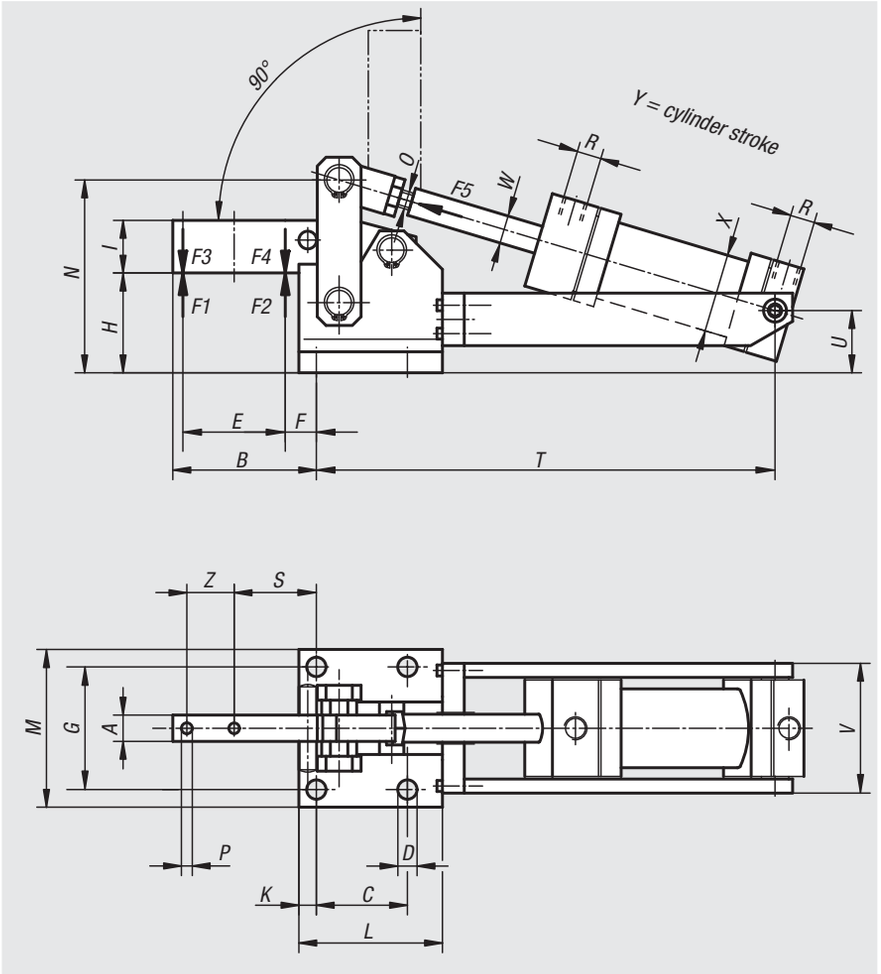


Order No.	A	B	C (travel)	D	E	G	H	I	K	L	T	U	V	W
05340-03	12	72	20	6,5	30	41	33	M8	28	41	125	56	84	16
05340-05	16	97	32	8,5	50	41	41	M12	45	41	322	38	84	16
05340-07	22	105	40	11	50	57	59	M12	44	70	404	49	114	16

Order No.	X	Y	R	F1 kN	F2 kN	F3 kN	VL	total height	total length	suitable thrust screws
05340-03	40	62	G1/8	4	2,5	0,75	0,8	91	328	M8x35
05340-05	50	100	G1/8	10	5	1	2,2	110	437	M12x50
05340-07	63	125	G1/4	25	10	1,8	4,5	150	533	M12x50

Pneumatic clamps vertical

heavy-duty version



Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 05350-06

Note:
The double-acting FESTO pneumatic cylinder guarantees a long life.
The fastening screws for the hinges are secured with LOCTITE.
The magnetic shaft is fitted for electrical end position feedback.

VL = air consumption per cycle in dm^3 by 6 bar.

Attention:
The forces F1 and F2 specified in the table are holding forces; F3 and F4 are clamping forces.

Order No.	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S	T
05350-04	15	82	52	11	54	20	70	57	30	10	77	90	109	M12x1,25	6,2	G¼	47	277
05350-06	20	90	55	11	60	21	83	61	40	11	85	105	129	M16x1,5	8,2	G¼	53	315
05350-08	30	128	80	13	95	22	111	86	60	12,5	112,5	135	176	M16x1,5	13,2	G¼	69,5	383

Order No.	U	V	W	X	Y	Z	total height	total length	F1 kN	F2 kN	F3 kN	F4 kN	F5 kN	VL
05350-04	35,5	82	16	40	80	27	122	380	6	9	1,5	2,2	0,75	1
05350-06	40	101	16	50	100	26	147	435	12	18	2,5	3,5	1	1,8
05350-08	54	123	20	63	120	40	196	540	20	30	4	6	1,8	4,3

Pneumatic clamps vertical

with vertical mounted cylinder

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 05360-08

Note:
The clamps 05350 and 05360 are suitable for fitting in special machines and transfer machines. The tempered and ground bearing pins that run in Teflon bearings make them maintenance-free. The heavy-duty design and the double-acting FESTO pneumatic cylinder guarantee a long life.
The fastening screws for the hinges are secured with LOCTITE.
The magnetic piston is prepared for electric end position feedback.

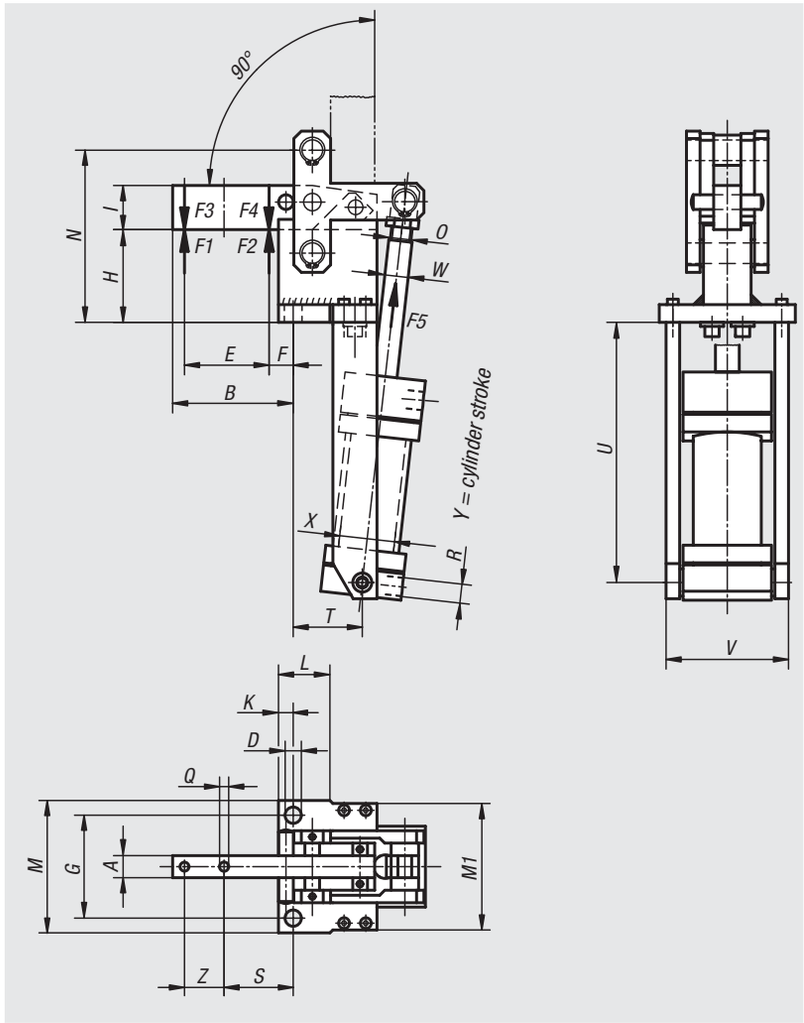
VL = compressed air consumption per complete cycle in dm^3 at 6 bar.

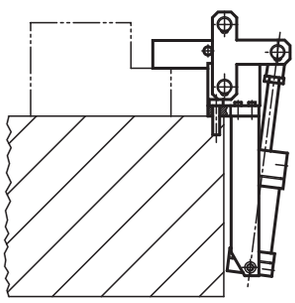
Clamping and retaining forces
The selection of the correct clamp size is dependant on the force (see table). It is distinguish between retaining force F1 or F2 and clamping force F3 or F4.

The clamping force F3 and F4 is the force exerted by the clamping arm on the part to be machined when the clamp is closed.

The retaining force F1 and F2 is the force with which the closed clamping arm opposes the machining forces occurring on the part to be machined and which it resists with no permanent deformation. It is greater than the clamping force because the dead point of the lever has to be overcome with the clamp closed when being pushed back.

On request:
Clamps without cylinder.





Order No.	A	B	D	E	F	G	H	I	K	L	M	M1	N	O	Q	S	T
05360-04	15	82	11	54	20	70	65	30	10	35	90	90	117	M12x1,25	6,2	47	46
05360-06	20	91	13	60	22	83	69	40	12	32	107	100	137	M16x1,5	8,2	54	48
05360-08	30	125	17	95	24,5	115	94	60	15	49	145	123	184	M16x1,5	13,2	67	77

Order No.	U	V	W	X	Y	R	Z	total height	total length	F1 kN	F2 kN	F3 kN	F4 kN	F5 kN	VL
05360-04	193	82	16	40	74	G¼	27	172	340	6	9	1,5	2,2	0,75	1
05360-06	221	101	16	50	87	G¼	26	195	386	12	18	2,5	3,5	1	1,8
05360-08	255	123	16	63	120	G¼	40	272	470	20	30	4	6	1,8	4,3

Toggle clamps heavy duty

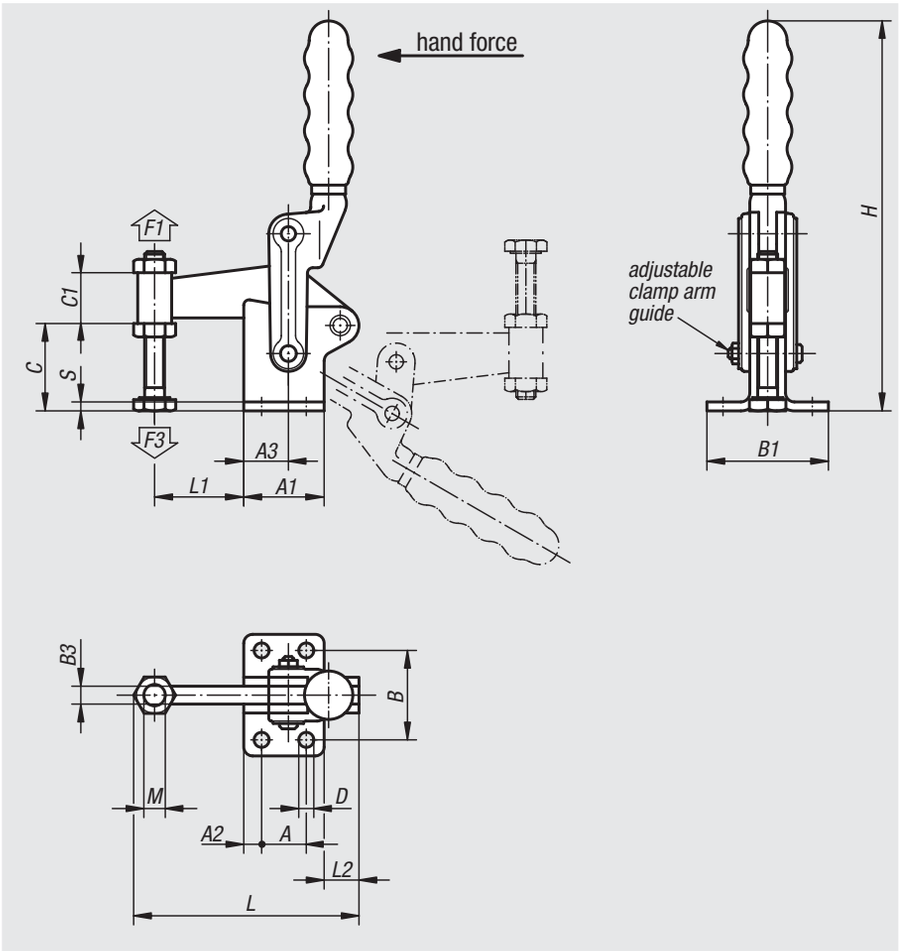
vertical

Material:
Steel.

Version:
Black oxidised. Thrust spindle and nuts phosphated.
Hinge pins and hinge bushes case-hardened.
Plastic grip oil-resistant.

Sample order:
nlm 05400-04

Note:
Oil all joints regularly.



Order No.	Opening angle of holding arm	Opening angle of handle	Hand force N	Retaining force F1 N	Clamping force F3 N	Matching plastic grip
05400-02	180°	120°	340	6000	1400	05520-02
05400-04	180°	125°	500	8000	1400	05520-04
05400-06	195°	130°	500	15000	1850	05520-06

Order No.	A	A1	A2	A3	B	B1	B3	C	C1	D	H	L	L1	L2	M	S
05400-02	25	45	10	25	50	68	10	45	30	8,3	215	124	50	20	M12x100	5
05400-04	30	51	10	25	60	86,5	12	58	30	8,3	250	144	60	23	M12x100	6
05400-06	40	64	12	40	75	103	16	70	38	10,3	295	188	75	37	M16x150	8

05420

Toggle clamps heavy duty version

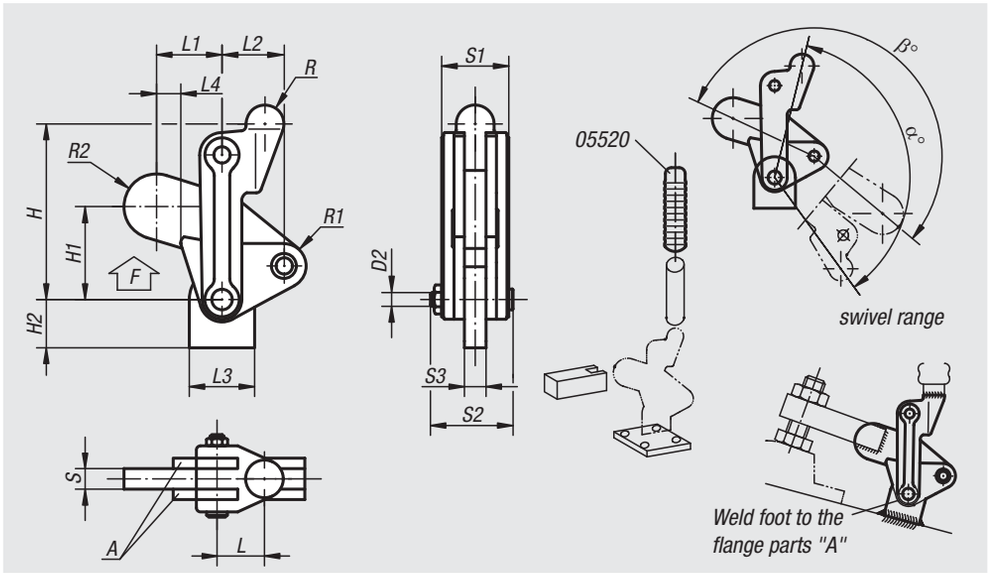
straight foot

Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 05420-02

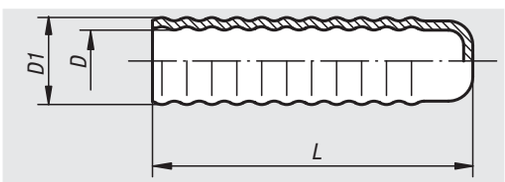
Note:
The axial bolts must be frequently lubricated.
Avoid splashing welding material in the joints while assembling components (lever, arm).
The toggle clamp can be assembled without the central base, directly on another support.
To do so, unscrew bolt D2, remove the base and re-assemble the toggle clamp on the support located at D2.
Do not forget to weld plates A onto the new support.



Order No.	L	L1	L2	L3	L4	H	H1	H2	D2	S	S1	S2	S3	R	R1	R2	α	β	F kN
05420-02	23	26,5	29	29	1,5	84	38,5	20	8,2	10	32	41	10	10	10	13,5	134°	205°	7
05420-04	25	38	36	38	13	100	54	28	9,5	12	38	48	12	11	13	19	134°	203°	12
05420-06	35	51	44	51	10	129	69	33	12,6	16	50	62	16	15	17	22	132°	200°	24

05520

Plastic grips



Material:
Plastic

Version:
Green

Sample order:
nlm 05520-04

Order No.	L	D	D1
05520-09	80	10	14,6
05520-00	80	12	16,5
05520-01	90	16	21
05520-02	90	19	25
05520-04	100	22	27
05520-06	100	25	29

Latches

with spring clip

Material:
Steel or stainless steel 1.4301.

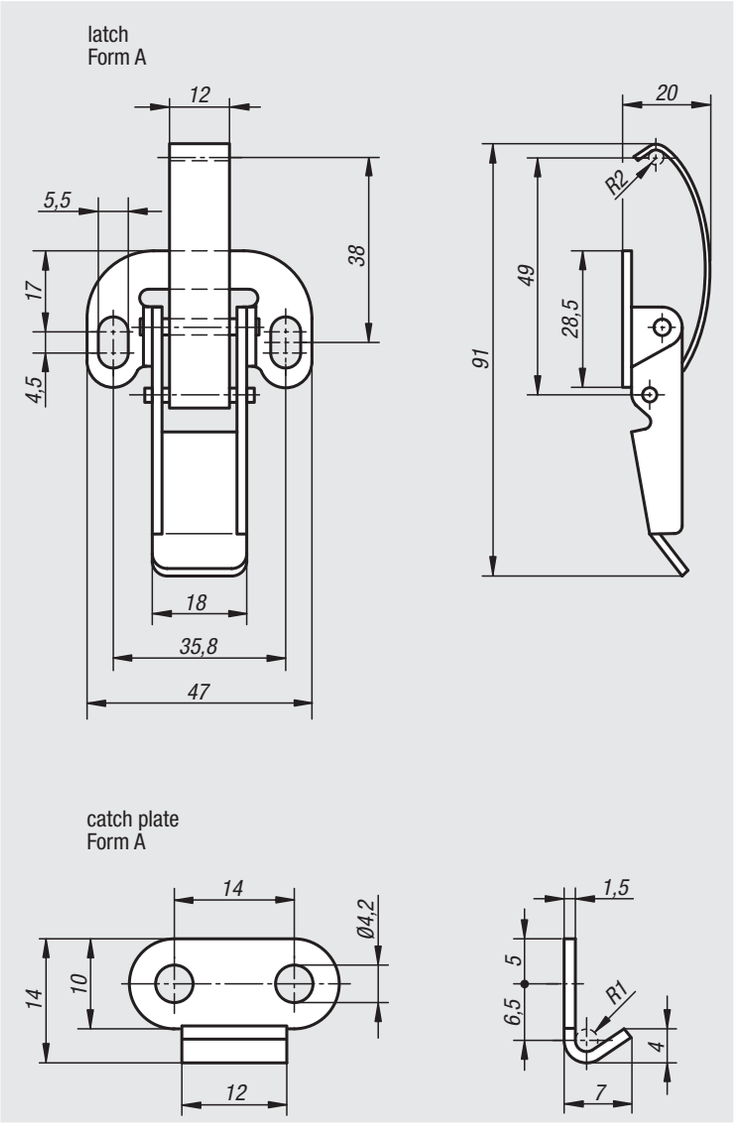
Version:
Galvanized, thick-film passivated and top coat sealed.
Stainless steel, bright.

Sample order:
nlm 05526-1550911 Latch
nlm 05526-91420141 Catch plate

Note:
Latches with spring clips for securing and locking hatches, container lids, machine cladding etc. By exceeding the dead centre they resist vibration.
The locking force is applied by tensioning a spring clip.

The latches can be screwed down or riveted.

Order catch plates separately.



Latches with spring clip

Order No. steel	Order No. stainless steel	Form
05526-1550911	05526-1550912	A

Catch plate

Order No. steel	Order No. stainless steel	Form
05526-91420141	05526-91420142	A

Latches

with draw bail

Material:
Steel or stainless steel 1.4301

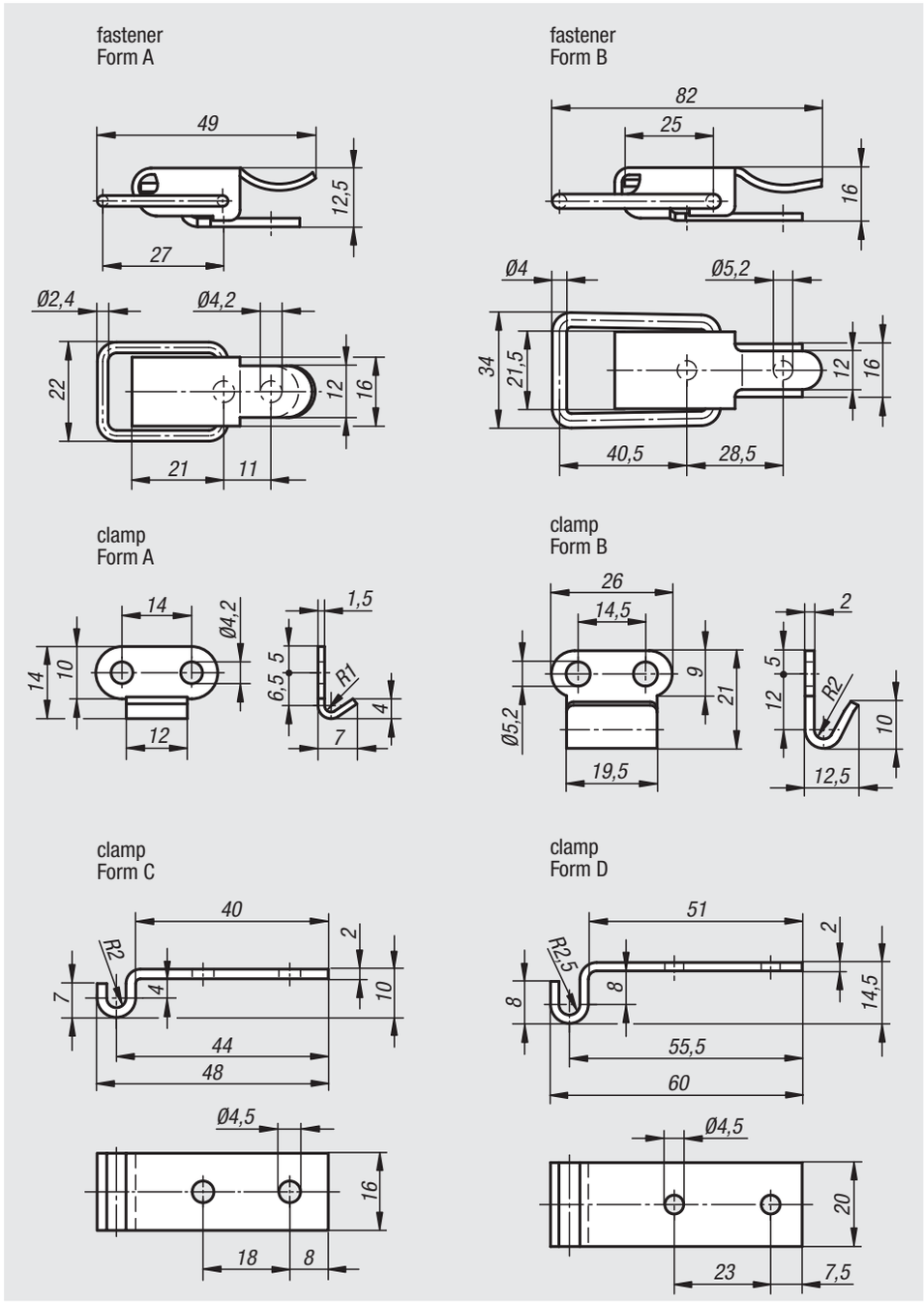
Version:
Galvanized, thick-film passivated and top coat sealed.
Stainless steel, bright.

Sample order:
nlm 05531-1420491 Latch
nlm 05531-92520211 Catch plate

Note:
Latches with draw bail for securing and locking hatches, container lids, machine cladding etc. By exceeding the dead centre they resist vibration. The locking force is applied by drawing on the bail.

The latches can be screwed down or riveted.

Order catch plates separately.



Latches with draw bail

Order No. steel	Order No. stainless steel	Form	Retaining force F1 N
05531-1420491	05531-1420492	A	250
05531-2520821	05531-2520822	B	300

Catch plate

Order No. steel	Order No. stainless steel	Form
05526-91420141	05526-91420142	A
05531-92520211	05531-92520212	B
05531-93450481	05531-93450482	C
05531-94450601	05531-94450602	D

Latches

with draw bail

Material:
Steel or stainless steel 1.4301

Version:
Galvanized, thick-film passivated and top coat sealed.
Stainless steel, bright.

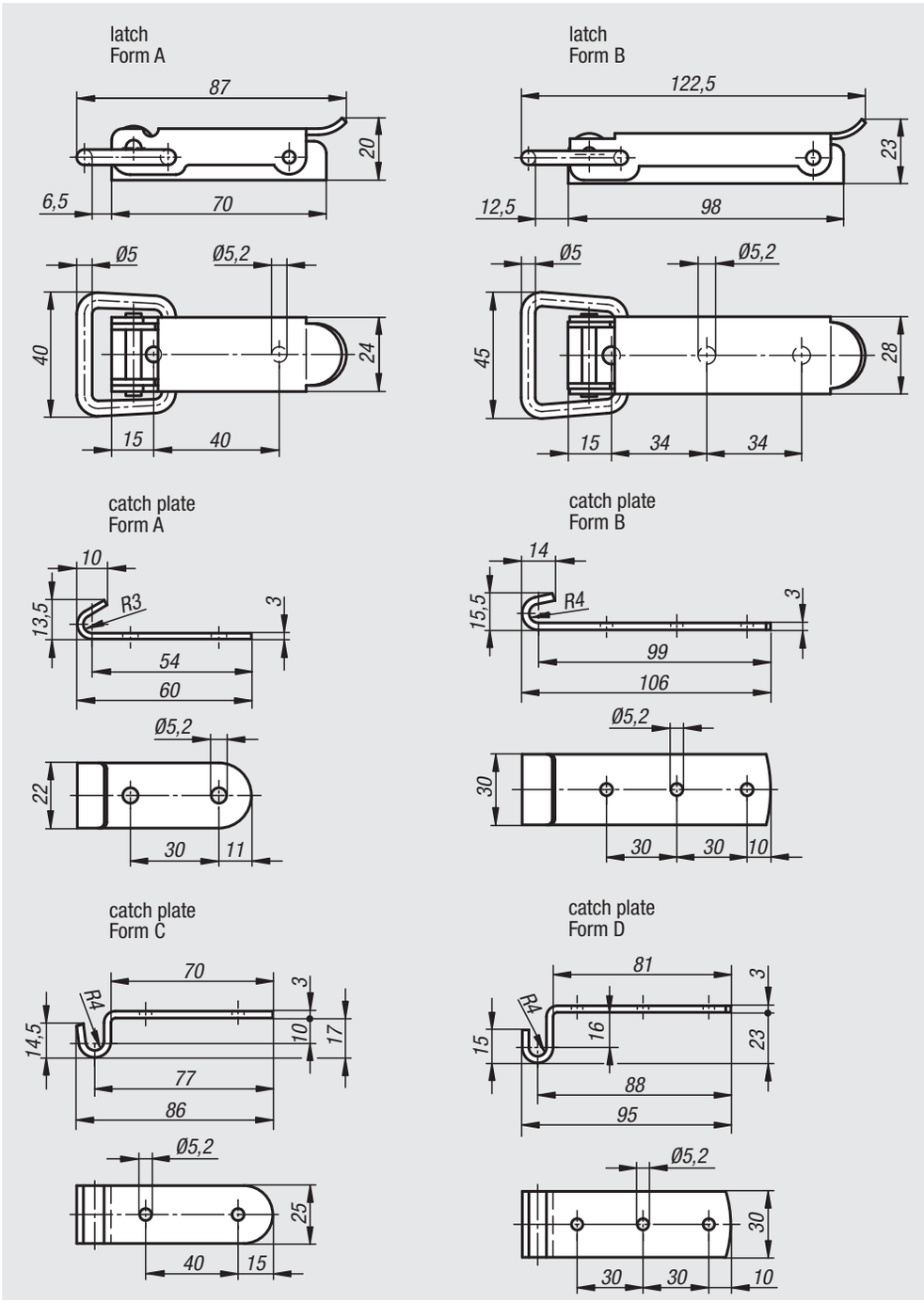
Sample order:
nlm 05536-1520871 Latch
nlm 05536-91520601 Catch plate

Note:
Latches with draw bail for securing and locking hatches, container lids, machine cladding etc. By exceeding the dead centre they resist vibration.
The locking force is applied by drawing on the bail.

The latches can be screwed down or riveted.

Order catch plates separately.

On request:
Lockable version with padlock bracket.



Latches with draw bail

Order No. steel	Order No. stainless steel	Form
05536-1520871	05536-1520872	A
05536-2521221	05536-2521222	B

Catch plate

Order No. steel	Order No. stainless steel	Form
05536-91520601	05536-91520602	A
05536-92521061	05536-92521062	B
05536-93520861	05536-93520862	C
05536-94520951	05536-94520952	D

Latches adjustable

with swing bail

Material:
Steel or stainless steel 1.4301

Version:
Galvanized and blue chromed.
Stainless steel bright.

Sample order:
nlm 05550-1421121 Latch
nlm 05550-9135211 Catch plate

Note:
Adjustable latches are safe locking systems for industrial applications. By exceeding the dead centre they resist vibration. To compensate for tolerances the latch has a swing mounted bail.

After the bail is engaged with the catch plate, by pushing the lever down the parts to be locked can be drawn together by up to 15 mm. To compensate for tolerances or to create enough tension the bail length can be adjusted by the M6 threaded spindle.

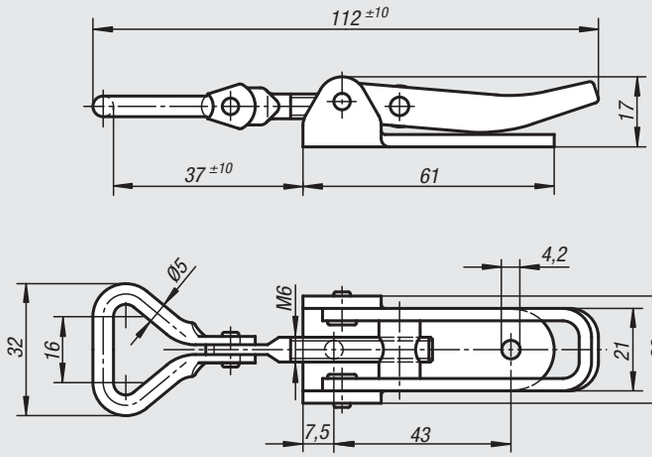
The latches can be screwed down or riveted.

Order catch plates separately.

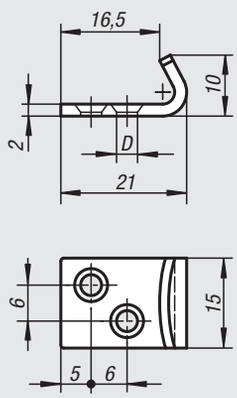
The retaining force F1 applies to the latch, not the catch plate.

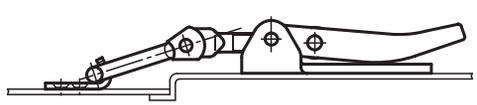
On request:
Available with safeguard against unintentional opening.

latch
Form A



catch plate
Form A





Latches adjustable, with swing bail

Order No. steel	Order No. stainless steel	Form	Retaining force F1 N
05550-1421121	05550-1421122	A	1000

Catch plate

Order No. steel	Order No. stainless steel	Form	D
05550-9135211	05550-9135212	A	3,7

Latches adjustable

Material:
Steel or stainless steel 1.4301

Version:
Galvanized and blue chromed.
Stainless steel bright.

Sample order:
nlm 05552-1611451 Latch
nlm 05552-9143381 Catch plate

Note:
Adjustable latches are safe locking systems for industrial applications. By exceeding the dead centre they resist vibration.

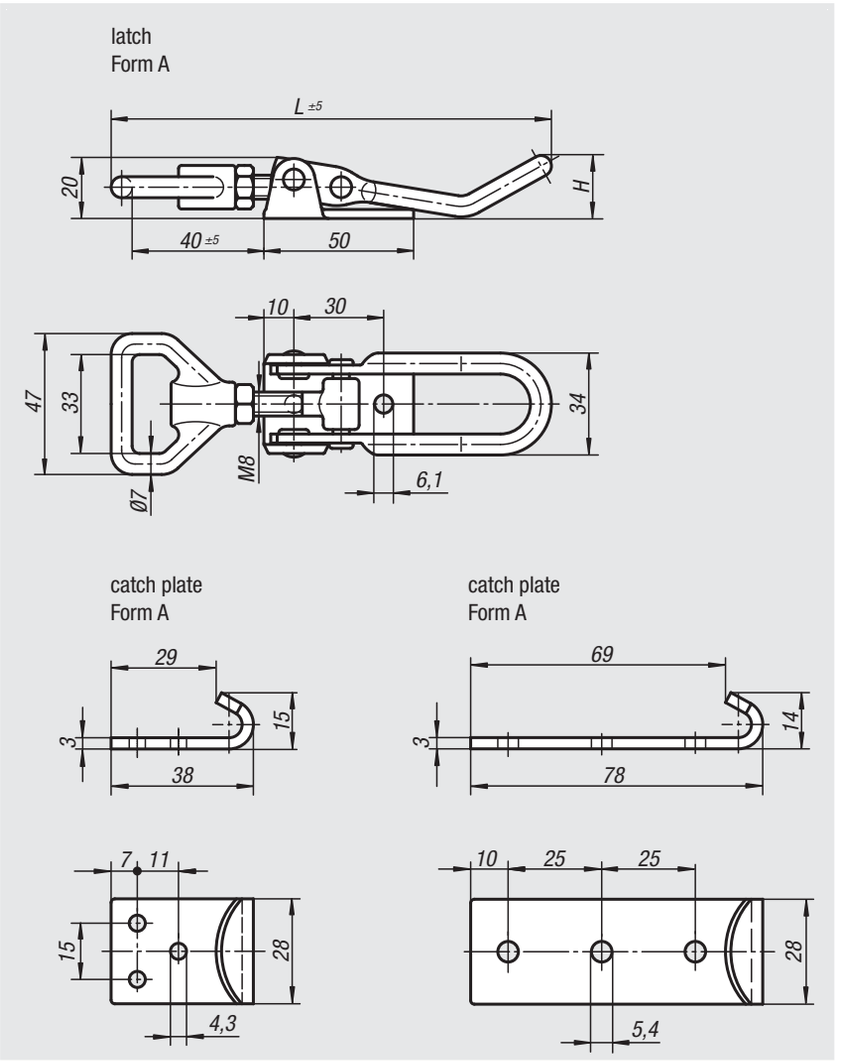
After the bail engages with the catch plate, by pushing the lever down the parts to be locked can be drawn together by up to 15 mm. To compensate for tolerances or to create enough tension the bail length can be adjusted using the M8 spindle.

The latches can be screwed down or riveted.

Order the required catch plate version separately.

The retaining force F1 applies to the latch, not the catch plate.

On request:
Lockable version with padlock bracket.



Latches adjustable

Order No. steel	Order No. stainless steel	Form	H	L	Retaining force F1 N
05552-1611451	**05552-1611452**	A	21	145	6500
05552-1611681	**05552-1611682**	A	36	168	6500

Catch plates

Order No. steel	Order No. stainless steel	Form
05552-9143381	**05552-9143382**	A
05552-9254781	**05552-9254782**	B

Adjustable latches

heavy-duty version

Material:
Steel.

Version:
Galvanized and blue chromed.
Catch plate Form B (weldable) bright.

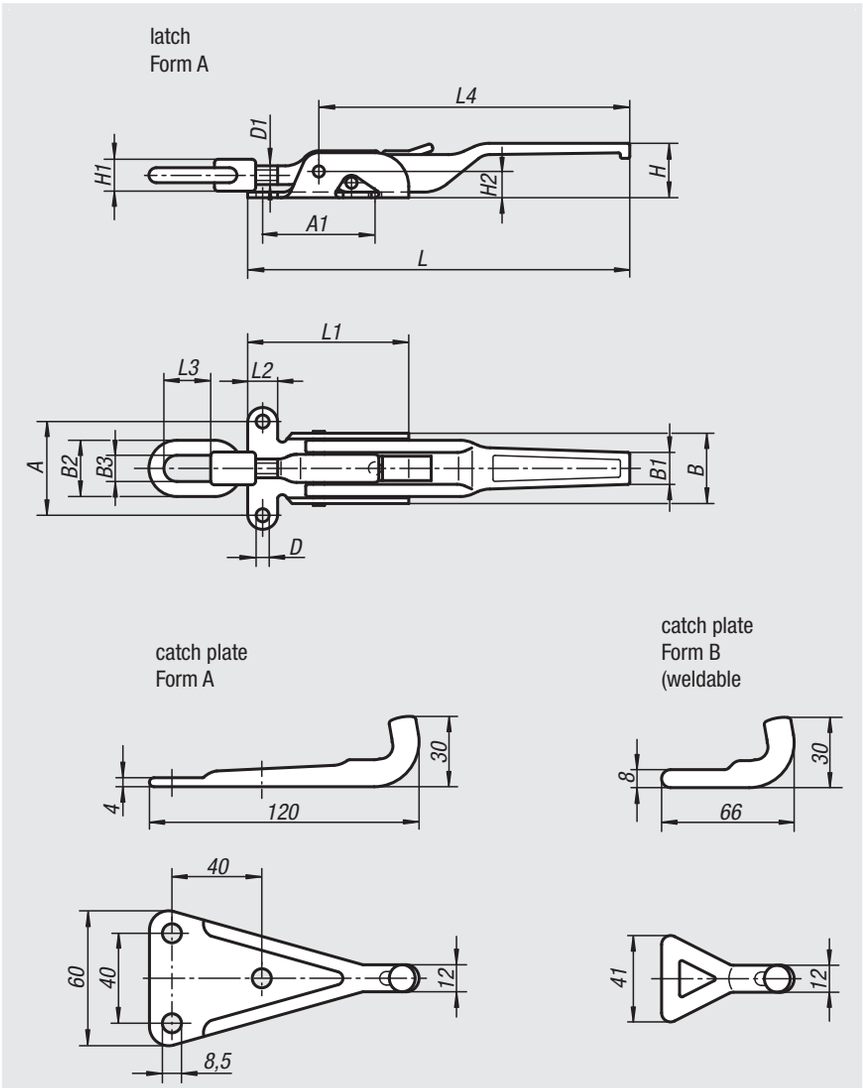
Sample order:
nlm 05560-1702041 Latch
nlm 05560-91851201 Catch plate

Note:
Heavy, forged latches for high tensile loads. Primarily used on utility vehicles, agricultural and construction machinery. A ratchet prevents unintentional opening when closed.

To compensate for tolerances or to create enough tension the bail can be adjusted using the spindle D1.

Order required catch plate version separately.

The retaining force F1 applies to the latch, not the catch plate.



Latches adjustable, heavy-duty version

Order No.	Form	A	A1	B	B1	B2	B3	D	D1	H	H1	H2	L	L1	L2	L3	L4	Retention force F kN
05560-1702041	A	50	62	37	18	30	14	7	M10	30	17	14	204	86	16	25	165	20000
05560-1852371	A	65	82	50	20	36	15	8,5	M14x1,5	32	20	18	237	104	21	40	190	30500

Catch plate

Order No.	Form
05560-91851201	A
05560-92000601	B

C-clamp

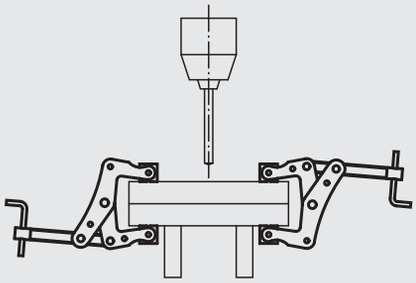
Material:
Steel.

Version:
Black oxidised or nickel-plated.

Sample order:
nlm 05600-075

Note:
A clamping element which exerts parallel clamping forces outwards or inwards. The spindle drive allows very sensitive clamping and yet very high forces. The jaws can pivot and have smooth and V-groove serrated faces allowing rough or sensitive workpieces to be correctly clamped. Parts to be machined can thus be clamped in the correct way, even if they are pressure-sensitive. The C-clamp lies in the same plane as the clamped part to be machined and therefore hardly impinges on the workspace. Every C-clamp clamps from zero to the maximum width. The low weight makes work easier.

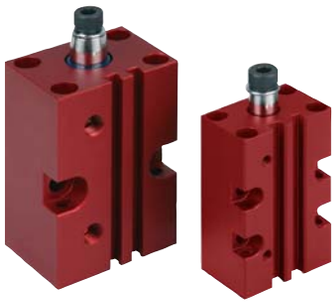
application example:



Order No. black oxide finish	Order No. nickel-plated	Material of jaw	A opening for pressure	B Opening for traction	C clamping depth	Clamping force kN
05600-050	**05600-0502**	steel	0 - 50	32 - 82	30	2
05600-051	-	plastic	0 - 50	32 - 82	30	2
05600-075	**05600-0752**	steel	0 - 75	40 - 115	50	2,5
05600-100	**05600-1002**	steel	0 - 100	50 - 150	60	3
05600-150	**05600-1502**	steel	0 - 150	50 - 200	100	3

Swing clamps

pneumatic



Material:
Body aluminium.Double-acting piston rod stainless steel.

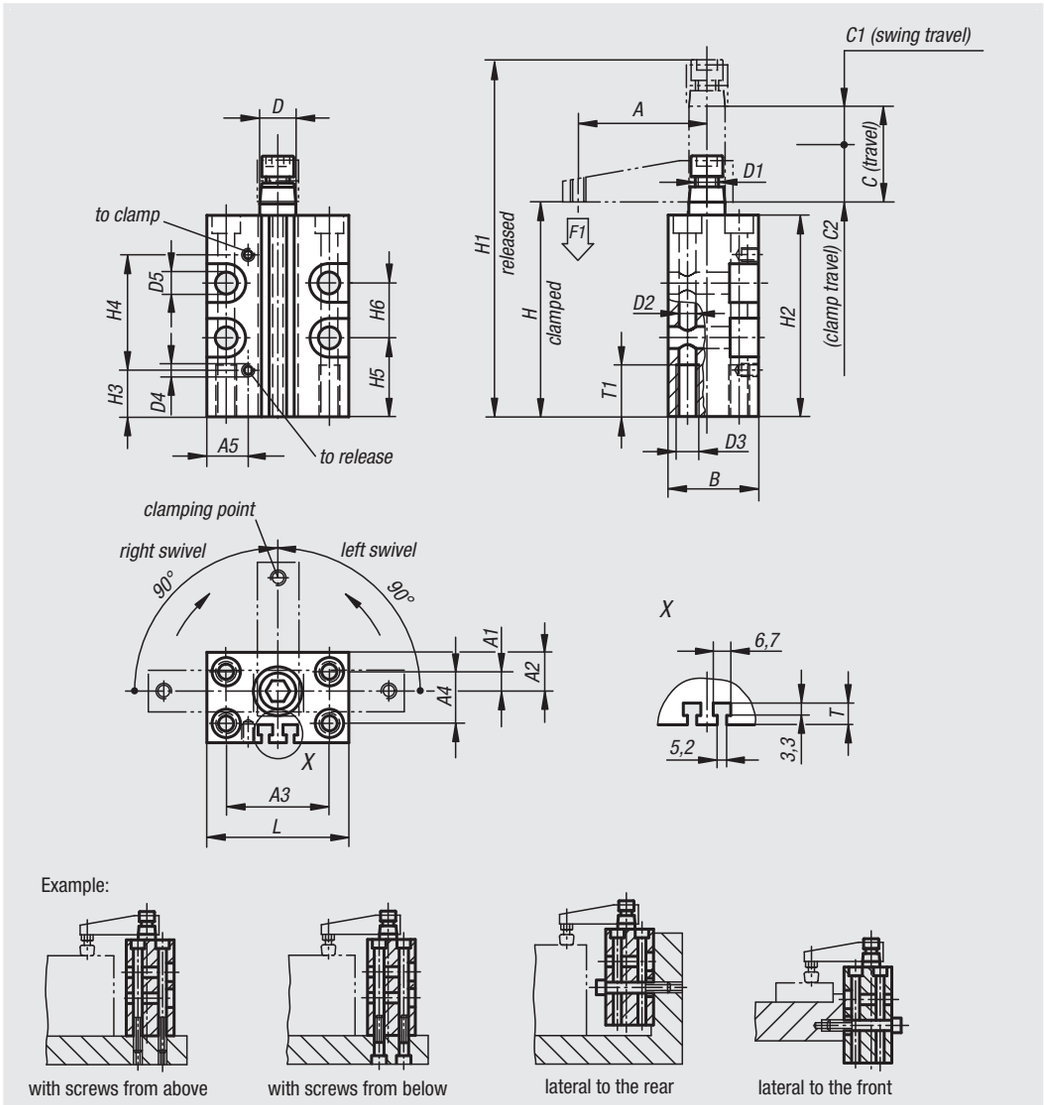
Version:
Body, red anodized.
Double acting piston rod, polished.

Sample order:
nlm 05610-112

Note:
Swing clamps are used where low clamping forces suffice or where the clamping point must be free when mounting and removing the workpiece. The block form of the housing offers universal fastening possibilities. The magnetic piston is primed for electrical end position feedback.
Including screw and lock washer for fastening the clamping arms (accessories).
The swing action of the clamp should not be blocked.
F1 = at 6 bar (max. operating pressure).

On request:
Proximitiy switch.

Accessories:
- Clamping arm 05620
- Adapter 05625



Swing clamps

pneumatic

Order No. swivel to the right	Order No. swivel to the left	Size	A	A1	A2	A3	A4	A5	B	C (travel)	C1	C2	D	D1	D2	D3
05610-112	**05610-212**	12	35	0	10	31	-	20	24	16	7	9	8	M5	4,3	M5
05610-116	**05610-216**	16	41	-2	11	31	-	21	28	16	7	9	8	M5	4,3	M5
05610-120	**05610-220**	20	48	8	13	36	20	11,5	30	27	12	15	12	M8	5,5	M6
05610-125	**05610-225**	25	50	7,5	15	40	20	17	35	27	15	12	14	M8	6,5	M8
05610-132	**05610-232**	32	60	12,5	20	45	30	18	45	30	16	14	16	M8	6,5	M8
05610-140	**05610-240**	40	70	15,5	24,5	52	37	22	55	31	16	15	16	M8	8,5	M10
05610-150	**05610-250**	50	80	21,5	31	66	46	25	65	30	15	15	20	M10	8,5	M10
05610-163	**05610-263**	63	90	27,5	37,5	80	60	30	80	30	15	15	20	M10	10,5	M12

Order No. swivel to the right	Order No. swivel to the left	Size	D4	D5	H	H1	H2	H3	H4	H5	H6	L	T	T1	F1 kN
05610-112	**05610-212**	12	M5	4,3	75	104	70	11	51	26	21	40	5	15	0,03
05610-116	**05610-216**	16	M5	4,3	75	104	70	11	51	26	21	42	4,5	15	0,06
05610-120	**05610-220**	20	M5	5,5	79	124	74	17	44,5	24	22	46	4,5	20	0,08
05610-125	**05610-225**	25	M5	8,5	82	125	78	17	44,5	32	-	55	5	20	0,17
05610-132	**05610-232**	32	G1/8	8,5	96	145	90	22	50	43	-	60	6,5	20	0,27
05610-140	**05610-240**	40	G1/8	8,5	95	145	90	20	52	40	-	70	8	25	0,45
05610-150	**05610-250**	50	G1/8	10,5	106	162	100	25	53,5	45	-	85	6,5	30	0,7
05610-163	**05610-263**	63	G1/8	10,5	106	162	100	28	53,5	36	-	100	8,5	30	1,1

05620

Clamping arm

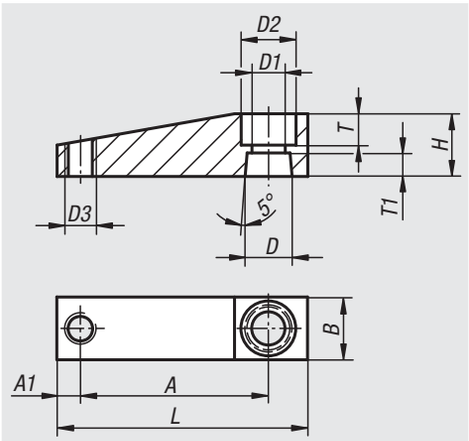
for swing clamp

Material:
High-strength aluminium alloy

Version:
Coated with hart-coat®

Sample order:
nlm 05620-12

Note:
Hard wearing surface, repels welding particles. Suitable for pneumatic swing clamp 05610, in respective sizes.



Order No.	Size	A	A1	B	D	D1	D2	D3	H	L	T	T1
05620-12	12	35	4	12	8	5,5	9	M4	12	45	5	5
05620-16	16	41	4	12	8	5,5	9	M4	12	51	4	5
05620-20	20	48	6	16	12	8,5	14	M6	16	64	8	6
05620-25	25	50	6	16	14	9	14	M6	16	66	6	6
05620-32	32	60	9	20	16	9	14	M8	20	80	7	9
05620-40	40	70	9	20	16	9	14	M8	20	90	7	9
05620-50	50	80	10	25	20	11	17	M12	25	105	9	10
05620-63	63	90	10	25	20	11	17	M12	25	115	9	10

05625

Adapters

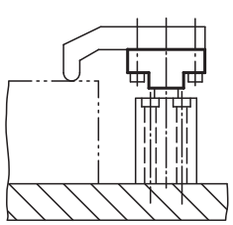
for swing clamp

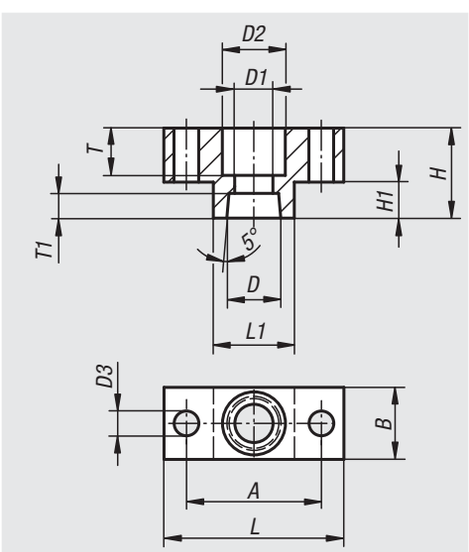
Material:
High-strength aluminium alloy

Version:
Coated with hart-coat®

Sample order:
nlm 05625-1216

Note:
Hard wearing surface, repels welding particles. Holds matching clamping arms. Suitable for pneumatic swing clamp 05610 in respective sizes.





Order No.	Size	A	B	D	D1	D2	D3	H	H1	L	L1	T	T1
05625-1216	12/16	22	12	8	5,5	10	4,5	14	6	30	13	7	5
05625-2000	20	30	16	12	8,5	14	5,5	20	8	40	18	10,5	5,5
05625-2500	25	38	16	14	8,5	14	5,5	20	8	50	25	8	6,5
05625-3240	32/40	45	19	16	8,5	14	7	25	10	60	30	11	9
05625-5063	50/63	48	25	20	10,5	17	9	30	12	65	30	14	10

Pneumatic toggle lever clamps

Tünkers system

Pneumatic toggle lever clamps are used for economic manufacturing in transfer lines, machine tools, fixtures and specialist machines.

Functional principle:
High clamping forces are achieved at low air pressure and air consumption because of the knee-operated lever clamp. The clamping arm is laterally stable and solidly bearing-mounted against rotation, torsion and angular shift. The clamping forces engendered by the knee-operated lever are taken up by thrust bearings.

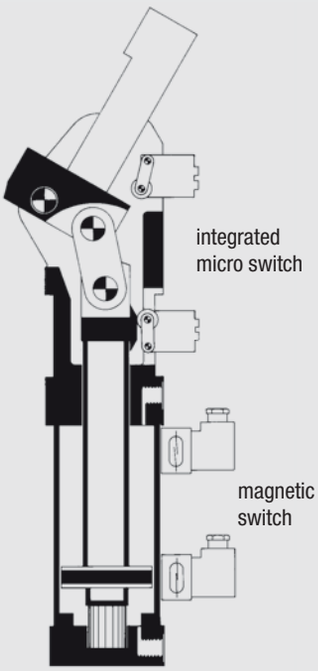
Particular design features:

Clamp design:
Hardened bushes and guide rails, roller-mounted thrust bearings. Maintenance-free due to permanent lubrication and specialist bearing bushes.

Retaining clamps:
Are completely self-inhibiting. The clamping force is safely guaranteed, even if the pressure is removed. Clip position in the top dead centre position:

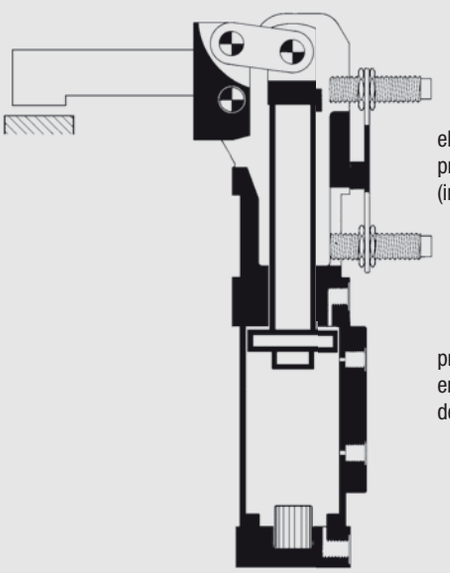
Note:
The clamping arm can always be moved from the top dead centre position if the acting retention force does not exceed the clamping force created (e.g. by slippage of the clamped machined part).

Possibilities of querying the end position:

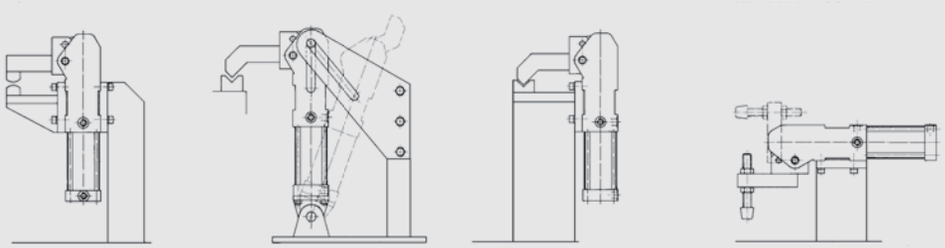


Control:
When building complete switches consult the known manufacturers of pneumatic valves, who also supply all the connecting components and fittings.

Selection criteria:
In order to be able to select the proper clamp size, in the case of pneumatic clamps, in addition to the retention force, the possible clamping force at 5 bar air pressure (max. possible air pressure 8 bar) is also specified.



mounting example



Mini clamps

Tünkers system

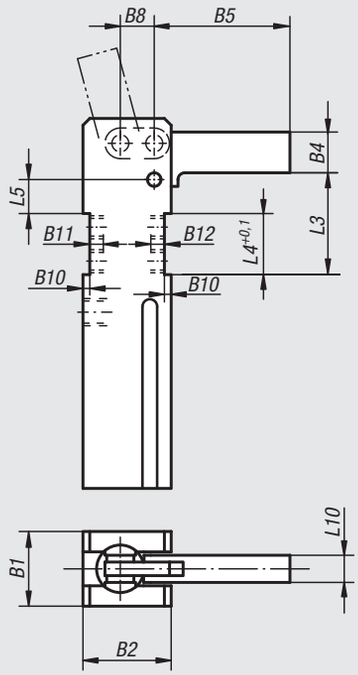
Material:
Casing: high-resistance aluminium;
clamping arm: steel

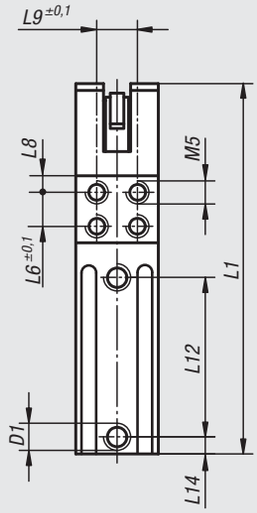
Version:
Housing anodized, clamping arm black oxidised.

Sample order:
nlm 05650-090011

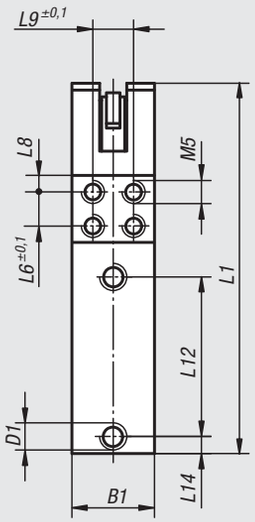
Note:
The mini clamp is characterised by its small dimensions, positioning accuracy of the clamping arm and its light construction. Mini clamps are fully self-limiting. The clamping force is guaranteed, even if the pressure is removed, because the lknee-operated lever built into the clamping arm reaches beyond the dead-centre point. Mini clamps are maintenance-free as a result of constant lubrication. They can be operated using dry, oil-free air.

electrical end-stop detector

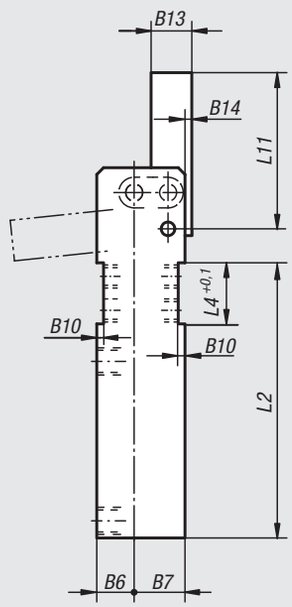


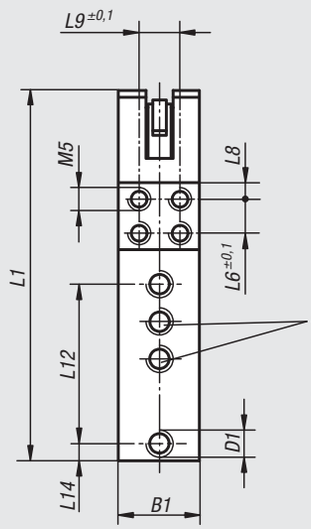


no end-stop detector



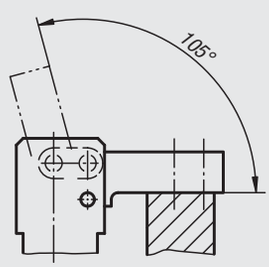
pneumatic end-stop detector



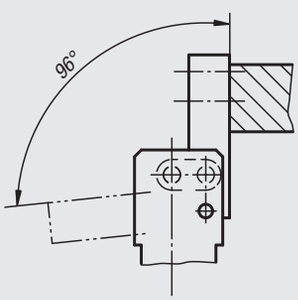


pneumatic detector
at cylinder tube connection M5
adjustable range
opening angle 75° bis 105°

Form A
vertical clamping force
max. opening angle 105°



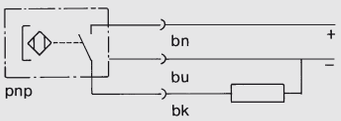
Form B
horizontal clamping force
max. opening angle 96°



Mini clamps

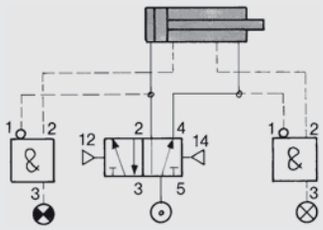
Tünkers system

Electrical
connection diagram



Connection type	PICO
Operating voltage (V)	10...30 VDC
Residual ripple (%)	≦ 10
Own electricity consumption (mA)	≦ 2,0
Constant current (mA)	≦ 120
Switching hysteresis (mm)	≦ 1
Condition display	LED
Permissible environmental temperature (°C)	-25...+70
Protection class (DIN 40 050)	IP 67

Pneumatic
end position feedback



signal
clamp open

Mini clamp with electrical end position feedback

Order No. Form A	Order No. Form B	Size	Clamping force N	Holding force N	B1	B2	B4	B5	B6	B7	B8	B10	B11	B12	B13	B14
05650-050011	05650-050012	2	160	500	26	32	15	50	14	18	12	2,5	5	7	12	2
05650-090011	05650-090012	3	250	900	30	39	18	60	17	22	15	3	6	8	16	3
05650-100011	05650-100012	4	330	1000	35	45	22	75	20	25	18	4	6	8	18	4

Order No. Form A	Order No. Form B	Size	D1	L1	L2	L3	L4	L5	L6	L8	L9	L10	L11	L12	L14
05650-050011	05650-050012	2	M5	123	96	27,5	20	7,5	10	5	16	10	50	57	12
05650-090011	05650-090012	3	G 1/8	158	120	40	25	14	15	5	20	12	60	69	15
05650-100011	05650-100012	4	G 1/8	182	136	47	28	17	18	5	25	16	75	80	17,5

Mini clamp with pneumatic end position feedback

Order No. Form A	Order No. Form B	Size	Clamping force N	Holding force N	B1	B2	B4	B5	B6	B7	B8	B10	B11	B12	B13	B14
05650-050021	05650-050022	2	160	500	26	32	15	50	14	18	12	2,5	5	7	12	2
05650-090021	05650-090022	3	250	900	30	39	18	60	17	22	15	3	6	8	16	3
05650-100021	05650-100022	4	330	1000	35	45	22	75	20	25	18	4	6	8	18	4

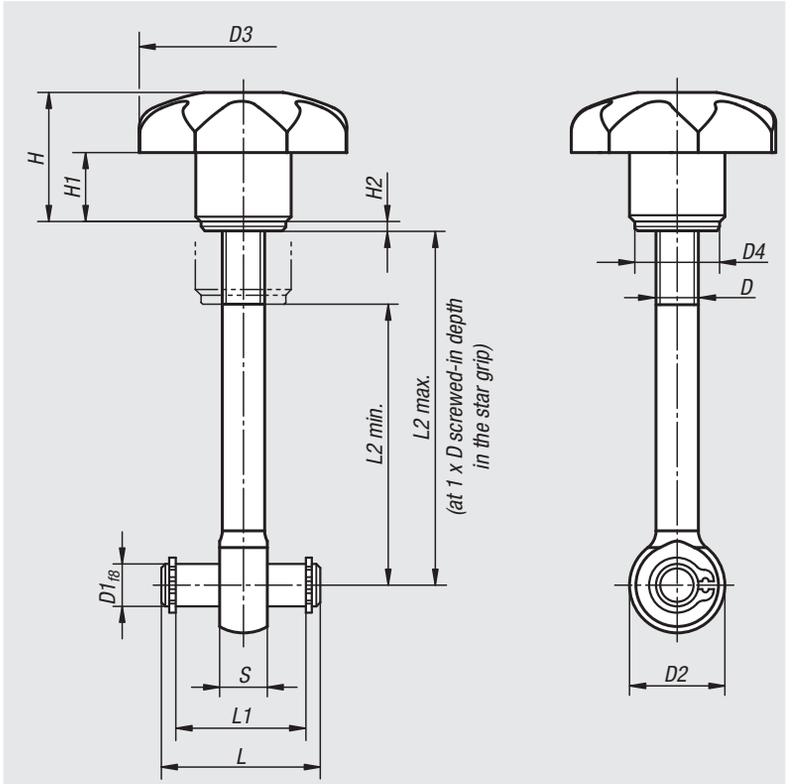
Order No. Form A	Order No. Form B	Size	D1	L1	L2	L3	L4	L5	L6	L8	L9	L10	L11	L12	L14
05650-050021	05650-050022	2	M5	123	96	27,5	20	7,5	10	5	16	10	50	57	12
05650-090021	05650-090022	3	G 1/8	158	120	40	25	14	15	5	20	12	60	69	15
05650-100021	05650-100022	4	G 1/8	182	136	47	28	17	18	5	25	16	75	80	17,5

Mini clamp without end position feedback

Order No. Form A	Order No. Form B	Size	Clamping force N	Holding force N	B1	B2	B4	B5	B6	B7	B8	B10	B11	B12	B13	B14
05650-050041	05650-050042	2	160	500	26	32	15	50	14	18	12	2,5	5	7	12	2
05650-090041	05650-090042	3	250	900	30	39	18	60	17	22	15	3	6	8	16	3
05650-100041	05650-100042	4	330	1000	35	45	22	75	20	25	18	4	6	8	18	4

Order No. Form A	Order No. Form B	Size	D1	L1	L2	L3	L4	L5	L6	L8	L9	L10	L11	L12	L14
05650-050041	05650-050042	2	M5	123	96	27,5	20	7,5	10	5	16	10	50	57	12
05650-090041	05650-090042	3	G 1/8	158	120	40	25	14	15	5	20	12	60	69	15
05650-100041	05650-100042	4	G 1/8	182	136	47	28	17	18	5	25	16	75	80	17,5

Swing screws

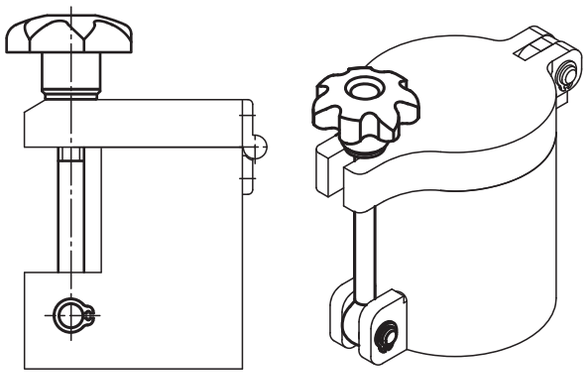


Material:
Star grip: thermoplastic.
Bush steel.
Washer: steel 140 HV.
Eye bolt: steel, grade 8.8.
Hinge pins: carbon steel 1.1181.

Version:
Star grip black.
Bush galvanized and blue chromed.
Washer bright.
Eye bolt black oxidised.
Hinge pins, tempered, ground, bright.

Sample order:
nlm 05660-06050

Note:
The swing screws are supplied unassembled.
Suitable circlips are enclosed.



Order No.	D	D1	D2	D3	D4	H	H1	H2	L	L1	L2 min.	L2 max.	S
05660-06050	M6	6	14	32	12	20	10	1,6	22	17	32	44	7
05660-06075	M6	6	14	32	12	20	10	1,6	22	17	57	69	7
05660-08050	M8	8	18	40	16	24	13	1,6	30	25	28	42	9
05660-08075	M8	8	18	40	16	24	13	1,6	30	25	53	67	9
05660-10075	M10	10	20	50	20	31	17	2	37	32	49	65	12
05660-10100	M10	10	20	50	20	31	17	2	37	32	74	90	12

Push-pull clamps

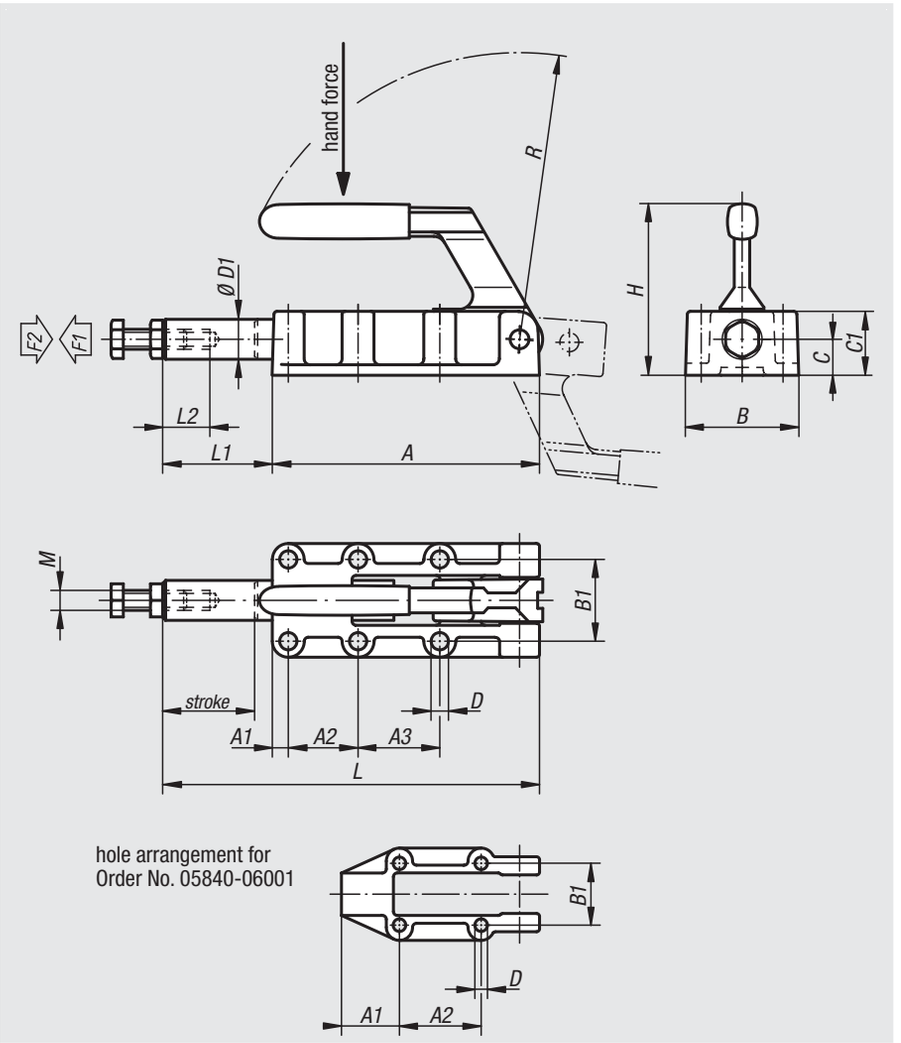
heavy-duty version with handle

Material:
Steel;
body and handle in spheroidal graphite cast iron (GJS)

Version:
Phosphated, plastic handle oil-resistant

Sample order:
nlm 05840-25001

Note:
The clamps lock in the open and closed handle positions. They can be used for thrust or tension clamping.
The clamps have a stroke limitation for advance and retraction.



Order No.	Opening angle of handle	Hand force N	Retaining force F2 N	Clamping force F1 N
05840-06001	185°	140	6000	3000
05840-12001	185°	150	12000	5000
05840-25001	185°	170	25000	5000
05840-50001	185°	200	50000	7000

Order No.	A	A1	A2	A3	B	B1	C	C1	D	D1	H	L	L1	L2	M	R	Travel
05840-06001	89	25	36,5	-	46	33,4	12	23	5,5	14	63	127	38	30	M8	95	32
05840-12001	133	8	35	41	61	41	18	32	8,5	20	88	188	55	40	M10	143	50
05840-25001	197	11	45	45	82	54	22	41	10,3	25	108	300	103	60	M12	200	75
05840-50001	254	10	70	70	85	57	28	50	10,3	30	127	390	136	60	M16	245	100

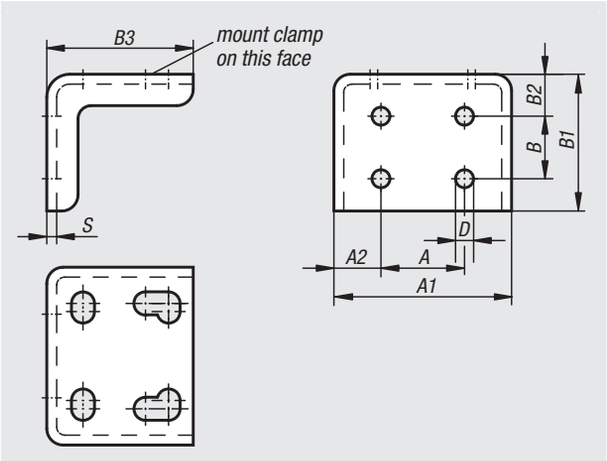
05880

Angle bracket

Material:
Steel.

Version:
Galvanized and chromed

Sample order:
nlm 05880-02



Order No.	A	A1	A2	B	B1	B2	B3	D	S
05880-02	18	43	12,5	15	36,5	13,5	29,5	5	2
05880-04	25,4	54	14,2	19	41,5	12,7	44,5	5,5	3
05880-06	44	76	16	32	62	21	66	8,6	4

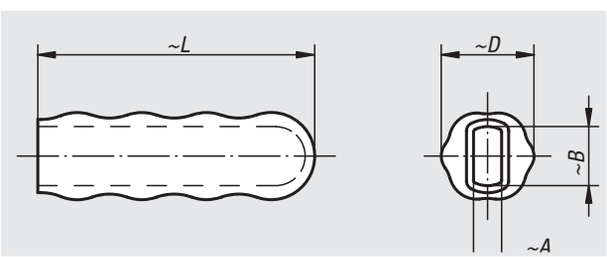
05882

Plastic grips

Material:
Plastic

Version:
Orange, oil-resistant

Sample order:
nlm 05882-30



Order No.	~A	~B	~D	~L
05882-16	4	8	15	45
05882-19	6	10	19	53
05882-20	5	10	20	60
05882-22	4	13	22	58
05882-23	5	13	22	60
05882-28	6	15	26	85
05882-30	8	17	31	105
05882-32	8	19	31	105
05882-33	8	22	32	115
05882-34	10	22	32	95
05882-35	10	25	35	120

Technical information

Quick clamping - reliable fastening

Durable and reliable
Now even more durable, more user-friendly and safer. This is the design aim that has been achieved in the new generation. You, the user, will notice the difference immediately: On first contact, the new toggle clamp has a good grip and is robust. It delivers fast, reliable and safe operation. High quality material ensures the necessary holding power.

Secure fixation and locking with safety lock:
The inner locking system is a completely revolutionary development. Nothing gets caught or stuck. Operation is easy even when wearing work gloves.

Advantages:

Impressively stable:
All models can easily withstand 300,000 clamping cycles

Durable:
High-quality bushings - without scoring

Extremely robust:
Corrosion-resistant NITROX COATING or stainless steel

Simple design
The fixed top nut eases spindle adjustment

Reliable:
Uniform force during opening and closing

Ideal where space is restricted:
Slim design supports safe operation

Optimum stability:
Conical clamping arm with U-profile

Safe application:
Nothing catches on the smooth edges

Fast and flexible:
Easy retrofitting thanks to a wide range of accessories

Ergonomic and slip-resistant:
Easy to operate wearing work gloves

Non-reflecting
The NITROX-SURFACE is ideal for use with laser devices

Safe when opening:
More space between clamping arm and grip prevents pinching

Extremely compatible:
Oblong holes allows assembly on existing boreholes

Operating principle of the safety locking mechanism:

Fig. 1:
Engaged.
No risk of injury thanks to revolutionary grip - no pinching or interfering contours.

Fig. 2:
Disengaged.
Pulling the grip releases the internal locking pin.

Toggle clamps horizontal

with flat foot and adjustable clamping spindle

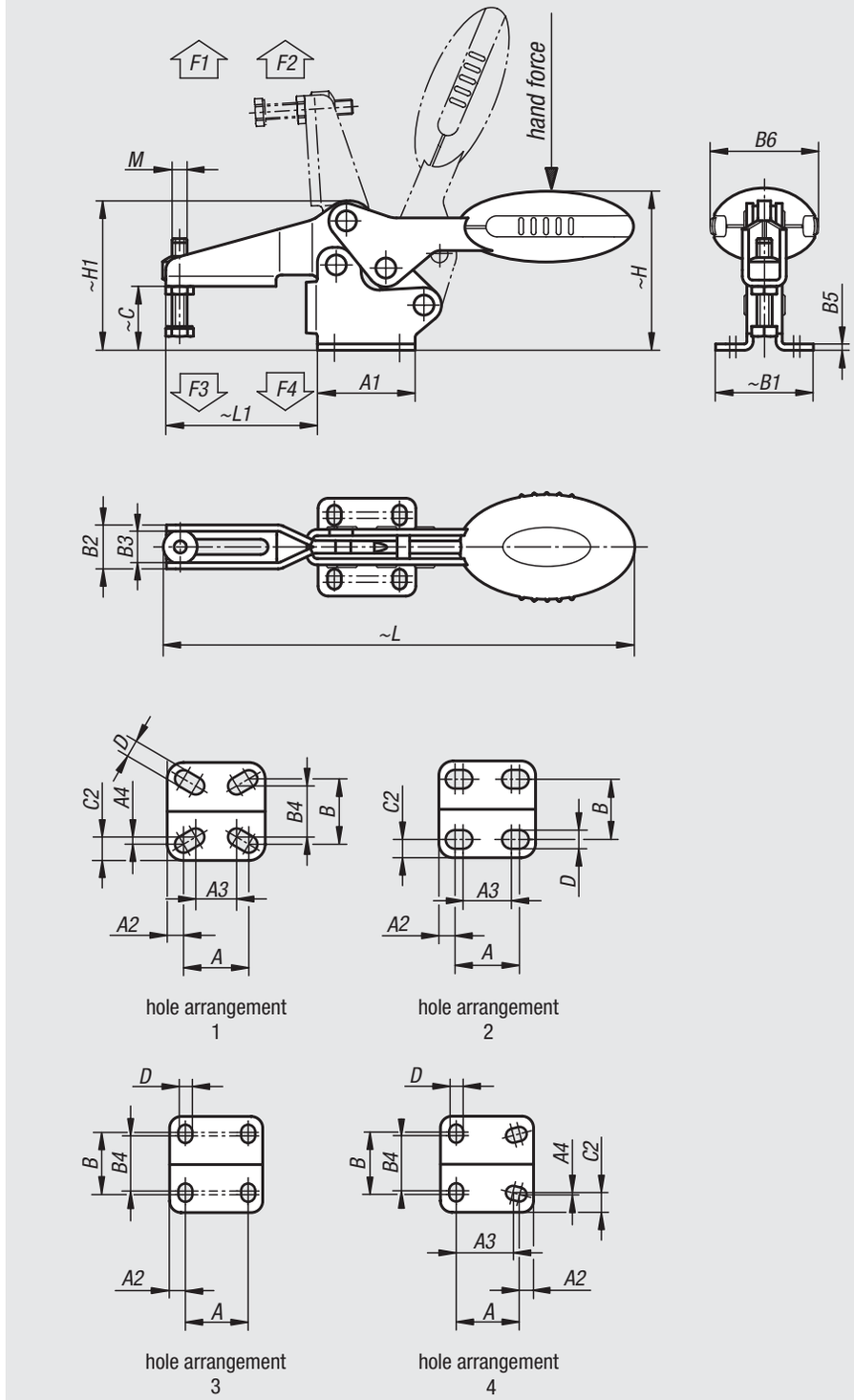
Material:
Steel;
Grip polyamide.

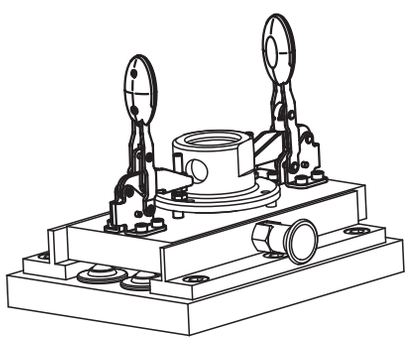
Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05900-004002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
05880 Angle brackets
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads





Toggle clamps horizontal

with flat foot and adjustable clamping spindle

Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N	Order No. Angle Bracket
05900-004002	1	87°	69°	80	400	500	250	300	05880-02
05900-005002	2	86°	67°	100	650	900	550	620	05880-02
05900-006002	3	86°	67°	160	1.350	1.900	720	1.200	05880-04
05900-008002	3	86°	67°	200	2.000	2.800	830	1.400	05880-04
05900-010002	3	90°	67°	250	2.200	4.500	1.200	2.800	05880-06
05900-012002	4	88°	67°	280	2.400	5.500	1.000	2.800	05880-06

Order No.	M	A	A1	A2	A3	A4	B	~B1	B2	B3	B4	B5	B6	~C	C2	D	~H	~H1	~L	~L1
05900-004002	M4x16	16	24	4	12,74	1,75	16	24	10,2	7,1	14,1	1,5	20	11,7	5,75	4,2	29,3	26,3	91,8	23,7
05900-005002	M5x25	18	27	4,5	13,5	-	16,8	27	13,2	9,1	-	2	22,5	17,2	5,1	5,5	43,3	38,9	125,7	41,8
05900-006002	M6x35	26	39	6,5	-	-	28	39	17,5	12,4	24,6	2,5	43,5	25,4	-	5,5	63,7	59,5	186,6	60,5
05900-008002	M8x45	26	44	9	-	-	31	45	21	15,7	26,1	2,5	41,5	32,2	-	6,2	73,9	70	223,1	74,9
05900-010002	M10x55	41,5	59	9	-	-	43	59	26	18,7	39	3,5	47	40	-	8,8	94,8	87,9	279,3	103,9
05900-012002	M12x70	44	65	10	40	1	42	67	28	20,9	40	3,5	47	52,3	13,5	8,5	104,8	101,6	314,7	122

Toggle clamps horizontal

with flat foot and adjustable clamping spindle, stainless steel

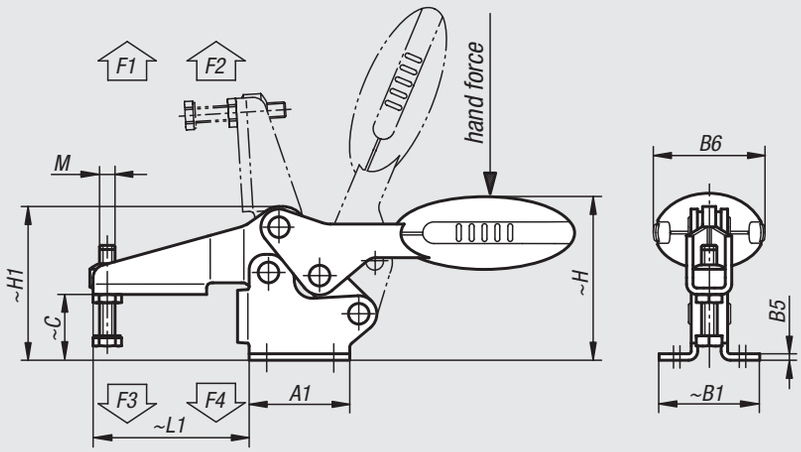
Material:
Stainless steel
Grip polyamide.

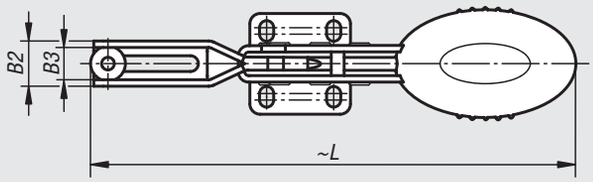
Version:
Bright.

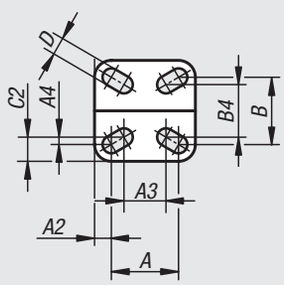
Sample order:
nlm 05900-104002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

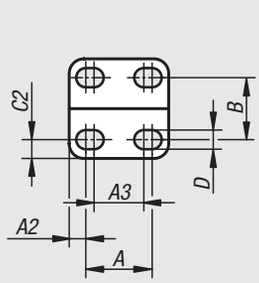
Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311



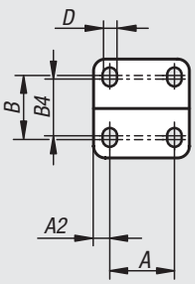




hole arrangement 1



hole arrangement 2



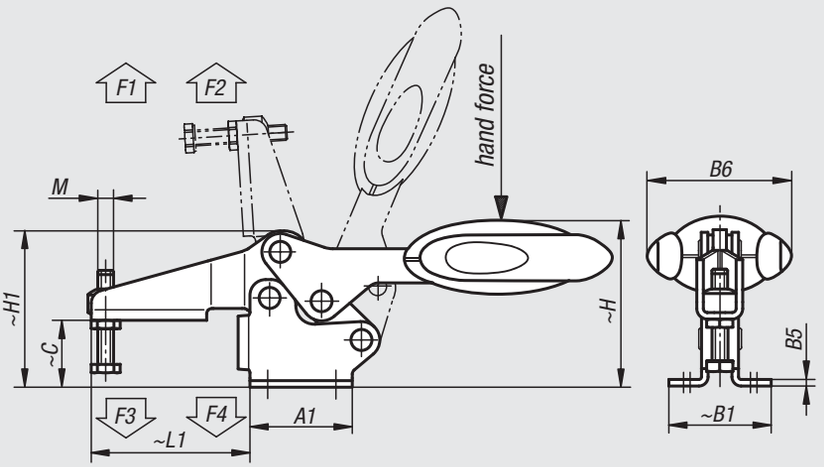
hole arrangement 3

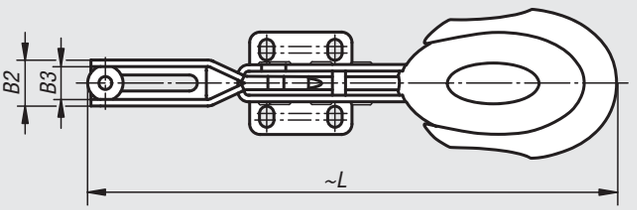
Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05900-104002	1	87°	69°	80	400	500	250	300
05900-105002	2	86°	67°	100	650	900	550	620
05900-106002	3	86°	67°	160	1.350	1.900	720	1.200
05900-108002	3	86°	67°	200	2.000	2.800	830	1.400

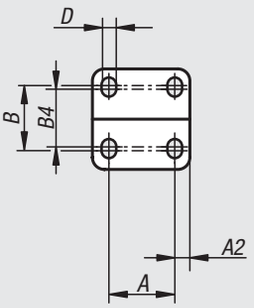
Order No.	M	A	A1	A2	A3	A4	B	~B1	B2	B3	B4	B5	B6	~C	C2	D	~H	~H1	~L	~L1
05900-104002	M4x16	16	24	4	12,74	1,75	16	24	10,2	7,1	14,1	1,5	20	11,7	5,75	4,2	29,3	26,3	91,8	23,7
05900-105002	M5x25	18	27	4,5	13,5	-	16,8	27	13,2	9,1	-	2	22,5	17,2	5,1	5,5	43,4	38,9	125,7	41,8
05900-106002	M6x35	26	39	6,5	-	-	28	39	17,5	12,4	24,6	2,5	43,5	25,4	-	5,5	63,7	59,5	186,6	60,5
05900-108002	M8x45	26	44	9	-	-	31	45	21	15,7	26,1	2,5	41,5	32,2	-	6,2	73,9	70	223,1	74,9

Toggle clamps horizontal with safety interlock

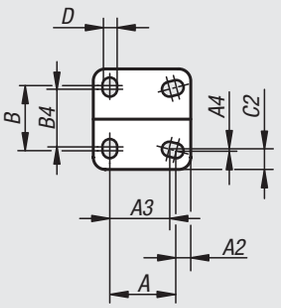
with flat foot and adjustable clamping spindle







hole arrangement 3



hole arrangement 4

Material:
Steel;
Grip polyamide;
TPE unlocking bracket

Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05900-006102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
05880 Angle brackets
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads

Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N	Order No. Angle Bracket
05900-006102	3	86°	67°	160	1.350	1.900	720	1.200	05880-04
05900-008102	3	86°	67°	200	2.000	2.800	830	1.400	05880-04
05900-010102	3	90°	71°	250	2.200	4.500	1.200	2.800	05880-06
05900-012102	4	88°	68°	280	2.400	5.500	1.000	2.800	05880-06

Order No.	M	A	A1	A2	A3	A4	B	~B1	B2	B3	B4	B5	B6	~C	C2	D	~H	~H1	~L	~L1
05900-006102	M6x35	26	39	6,5	-	-	28	39	17,5	12,4	24,6	2,5	53,4	25,4	-	5,5	63,7	59,5	193,3	60,5
05900-008102	M8x45	26	44	9	-	-	31	45	21	15,7	26,1	2,5	51,1	32,2	-	6,2	73,9	70	230,3	74,9
05900-010102	M10x55	41,5	59	9	-	-	43	59	26	18,7	39	3,5	56,5	40	-	8,8	94,8	87,9	286	103,9
05900-012102	M12x70	44	65	10	40	1	42	67	28	20,9	40	3,5	56,5	52,3	13,5	8,5	104,8	101,6	321,3	122

Toggle clamps horizontal with safety interlock

with flat foot and adjustable clamping spindle, stainless steel

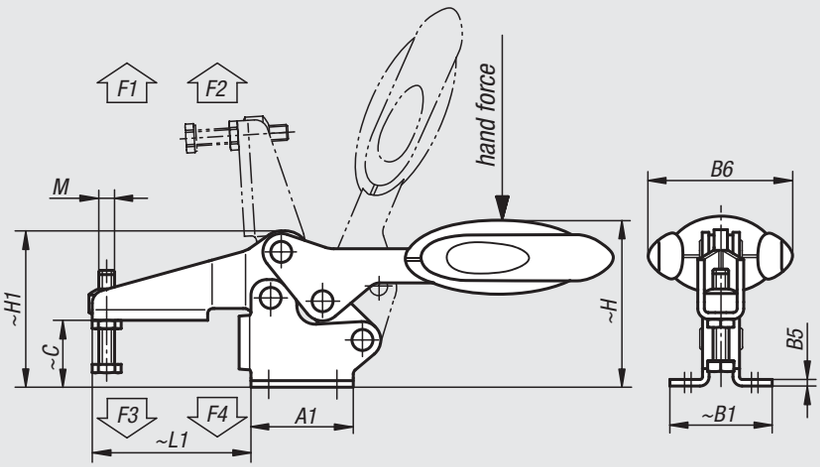
Material:
Stainless steel
Grip polyamide.
Unlocking bracket TPE.

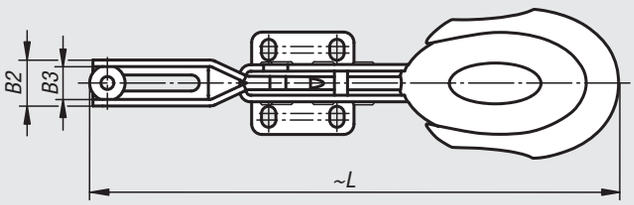
Version:
Bright.

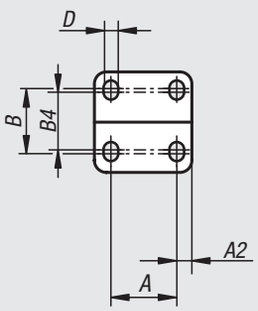
Sample order:
nlm 05900-106102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

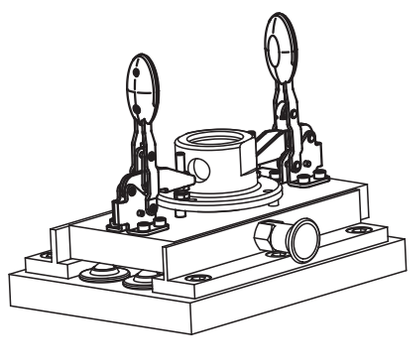
Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311







hole arrangement
3



Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05900-106102	3	86°	67°	160	1.350	1.900	720	1.200
05900-108102	3	86°	67°	200	2.000	2.800	830	1.400

Order No.	M	A	A1	A2	B	~B1	B2	B3	B4	B5	B6	~C	D	~H	~H1	~L	~L1
05900-106102	M6x35	26	39	6,5	28	39	17,5	12,4	24,6	2,5	53,4	25,4	5,5	63,7	59,5	193,3	60,5
05900-108102	M8x45	26	44	9	31	45	21	15,7	26,1	2,5	51,1	32,2	6,2	73,9	70	230,3	74,9

Toggle clamps horizontal

with straight foot and adjustable clamping spindle

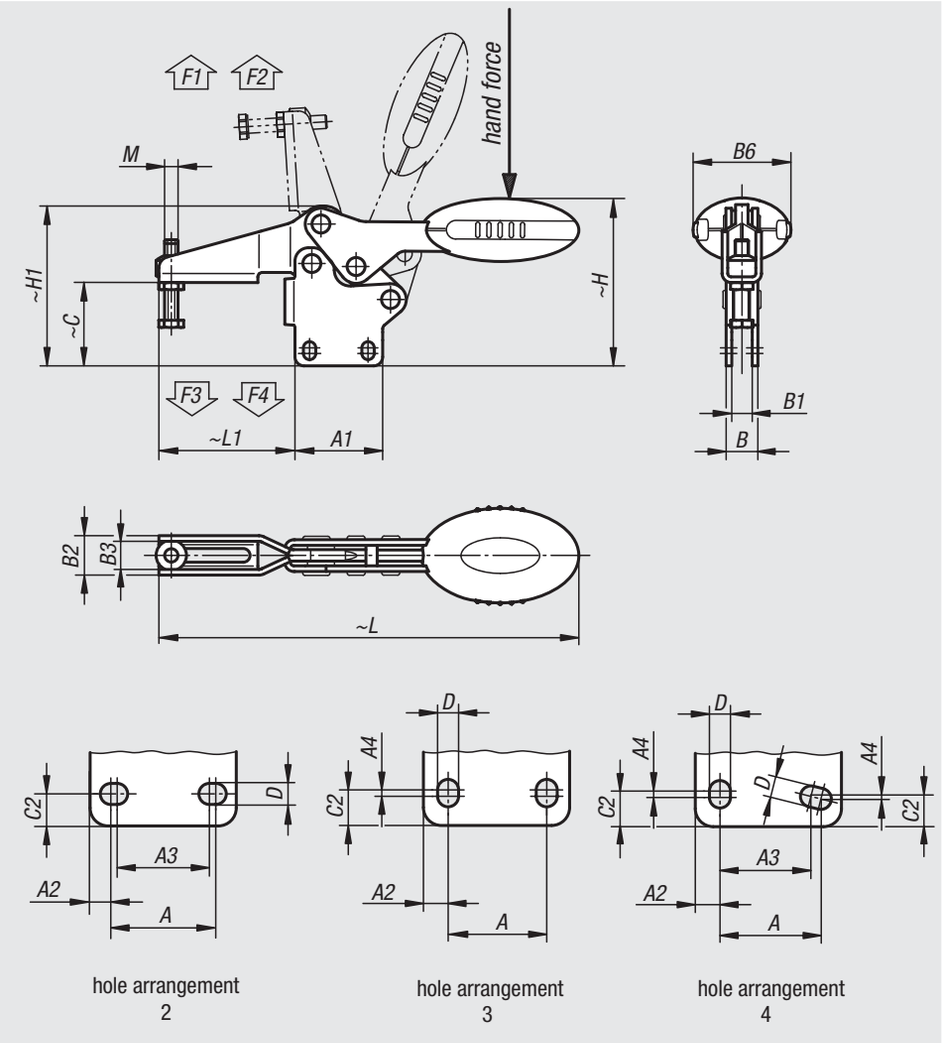
Material:
Steel;
Grip polyamide.

Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05904-005002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads

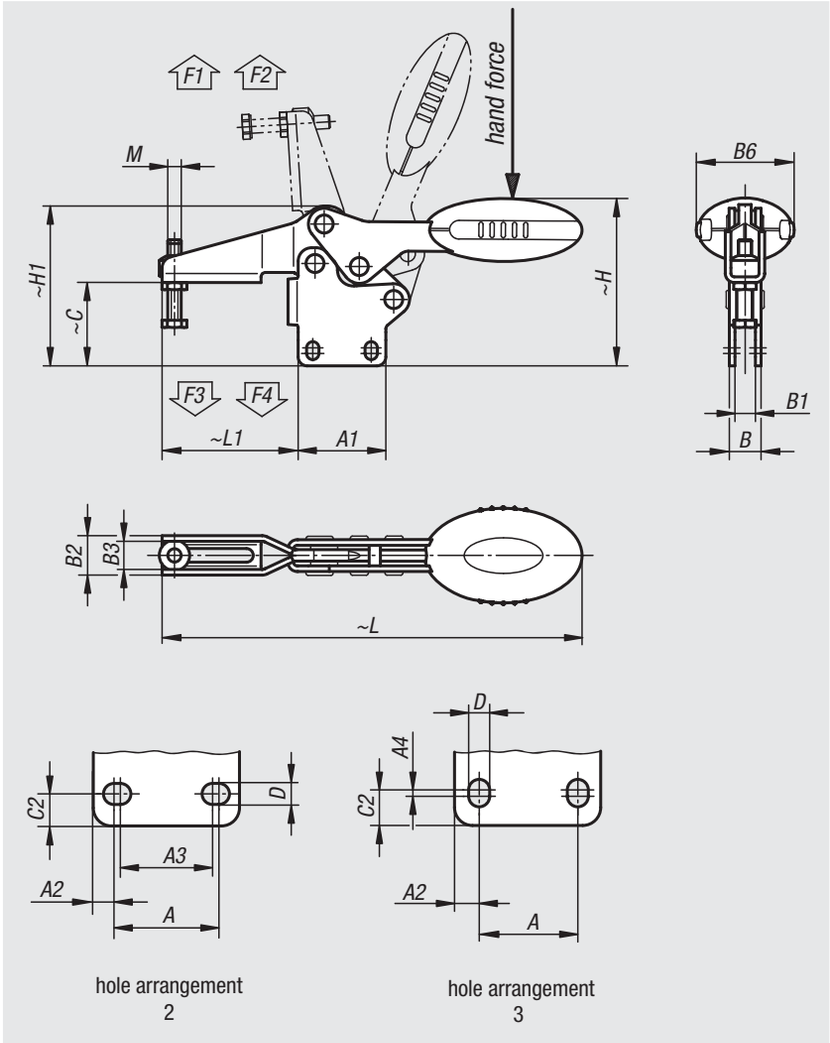


Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05904-005002	2	86°	67°	100	650	900	550	620
05904-006002	3	86°	67°	160	1.350	1.900	720	1.200
05904-008002	3	86°	67°	200	2.000	2.800	830	1.400
05904-010002	3	90°	71°	250	2.200	4.500	1.200	2.800
05904-012002	4	88°	68°	280	2.400	5.500	1.000	2.800

Order No.	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~H1	~L	~L1
05904-005002	M5x25	18	27	4,5	13,5	-	8,1	4,1	13,2	9,1	22,5	26,2	5,1	5,5	52,2	47,9	125,7	41,8
05904-006002	M6x35	26	39	6,5	-	2,5	14,1	9,1	17,5	12,4	43,5	36,9	5,5	5,5	75,2	71	186,6	60,5
05904-008002	M8x45	26	44	9	-	3,5	14,1	9,1	21	15,7	41,5	46,5	7	6,2	88,2	84,3	223,1	74,9
05904-010002	M10x55	41,5	59	9	-	2	16,2	9,2	26	18,7	47	59,6	8	8,8	114,3	107,5	279,3	103,9
05904-012002	M12x70	44	65	11	40	1	16,2	9,2	28	20,9	47	75,9	13,5	8,5	128,4	125,2	314,7	122

Toggle clamps horizontal

with straight foot and adjustable clamping spindle, stainless steel



Material:
Stainless steel
Grip polyamide.

Version:
Bright.

Sample order:
nlm 05904-105002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311

Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05904-105002	2	86°	67°	100	650	900	550	620
05904-106002	3	86°	67°	160	1.350	1.900	720	1.200
05904-108002	3	86°	67°	200	2.000	2.800	830	1.400

Order No.	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~H1	~L	~L1
05904-105002	M5x25	18	27	4,5	13,5	-	8,1	4,1	13,2	9,1	22,5	26,2	5,1	5,5	52,2	47,9	125,7	41,8
05904-106002	M6x35	26	39	6,5	-	2,5	14,1	9,1	17,5	12,4	43,5	36,9	5,5	5,5	75,2	71	186,6	60,5
05904-108002	M8x45	26	44	9	-	3,5	14,1	9,1	21	15,7	41,5	46,5	7	6,2	88,2	84,3	223,1	74,9

Toggle clamps horizontal with safety interlock

with straight foot and adjustable clamping spindle

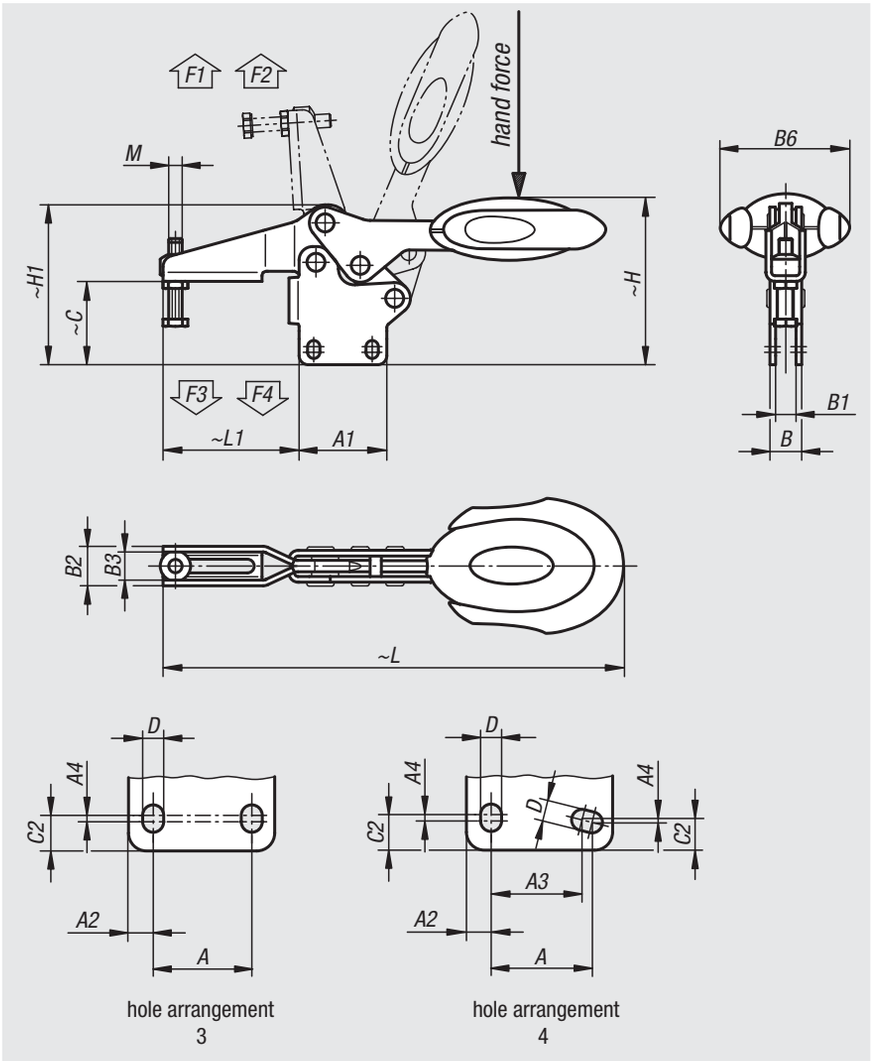
Material:
Steel;
Grip polyamide;
TPE unlocking bracket

Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05904-006102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads



hole arrangement 3

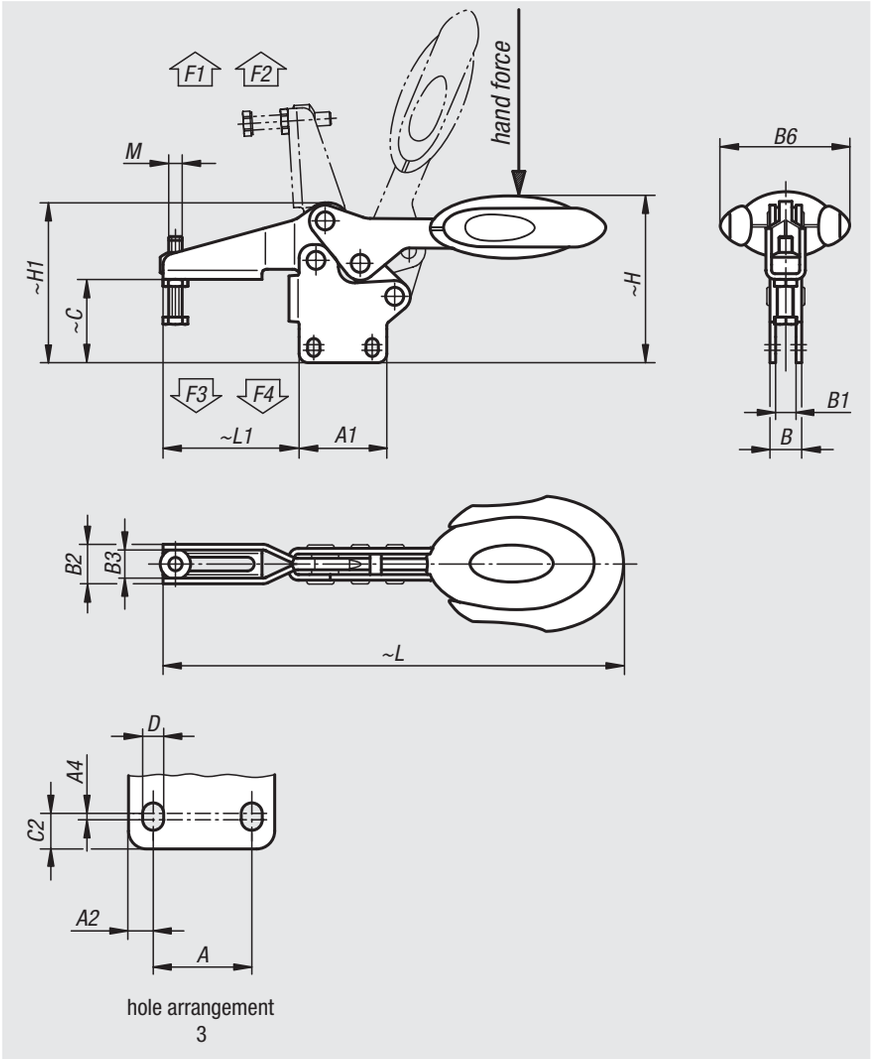
hole arrangement 4

Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05904-006102	3	86°	67°	160	1.350	1.900	720	1.200
05904-008102	3	86°	67°	200	2.000	2.800	830	1.400
05904-010102	3	90°	71°	250	2.200	4.500	1.200	2.800
05904-012102	4	88°	68°	280	2.400	5.500	1.000	2.800

Order No.	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~H1	~L	~L1
05904-006102	M6x35	26	39	6,5	-	2,5	14,1	9,1	17,5	12,4	53,4	36,9	5,5	5,5	75,2	71	193,7	60,5
05904-008102	M8x45	26	44	9	-	3,5	14,1	9,1	21	15,7	51,1	46,5	7	6,2	88,2	84,3	230,3	74,9
05904-010102	M10x55	41,5	59	9	-	2	16,2	9,2	26	18,7	56,5	59,6	8	8,8	114,3	107,5	286,4	103,9
05904-012102	M12x70	44	65	11	40	1	16,2	9,2	28	20,9	56,5	75,9	13,5	8,5	128,4	125,2	321,3	122

Toggle clamps horizontal with safety interlock

with straight foot and adjustable clamping spindle, stainless steel



hole arrangement
3

Material:
Stainless steel
Grip polyamide.
Unlocking bracket TPE.

Version:
Bright.

Sample order:
nlm 05904-106102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311

Order No.	hole arrangement	Opening angle of holding arm ~	Opening angle of handle ~	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05904-106102	3	86°	67°	160	1.350	1.900	720	1.200
05904-108102	3	86°	67°	200	2.000	2.800	830	1.400

Order No.	M	A	A1	A2	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~H1	~L	~L1
05904-106102	M6x35	26	39	6,5	2,5	14,1	9,1	17,5	12,4	53,4	36,9	5,5	5,5	75,2	71	193,7	60,5
05904-108102	M8x45	26	44	9	3,5	14,1	9,1	21	15,7	51,1	46,5	7	6,2	88,2	84,3	230,3	74,9

Toggle clamps vertical

with flat foot and adjustable clamping spindle

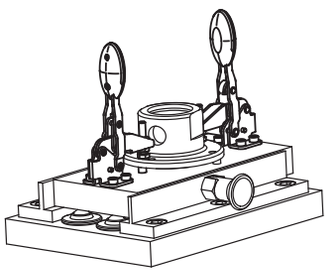
Material:
Steel;
Grip polyamide.

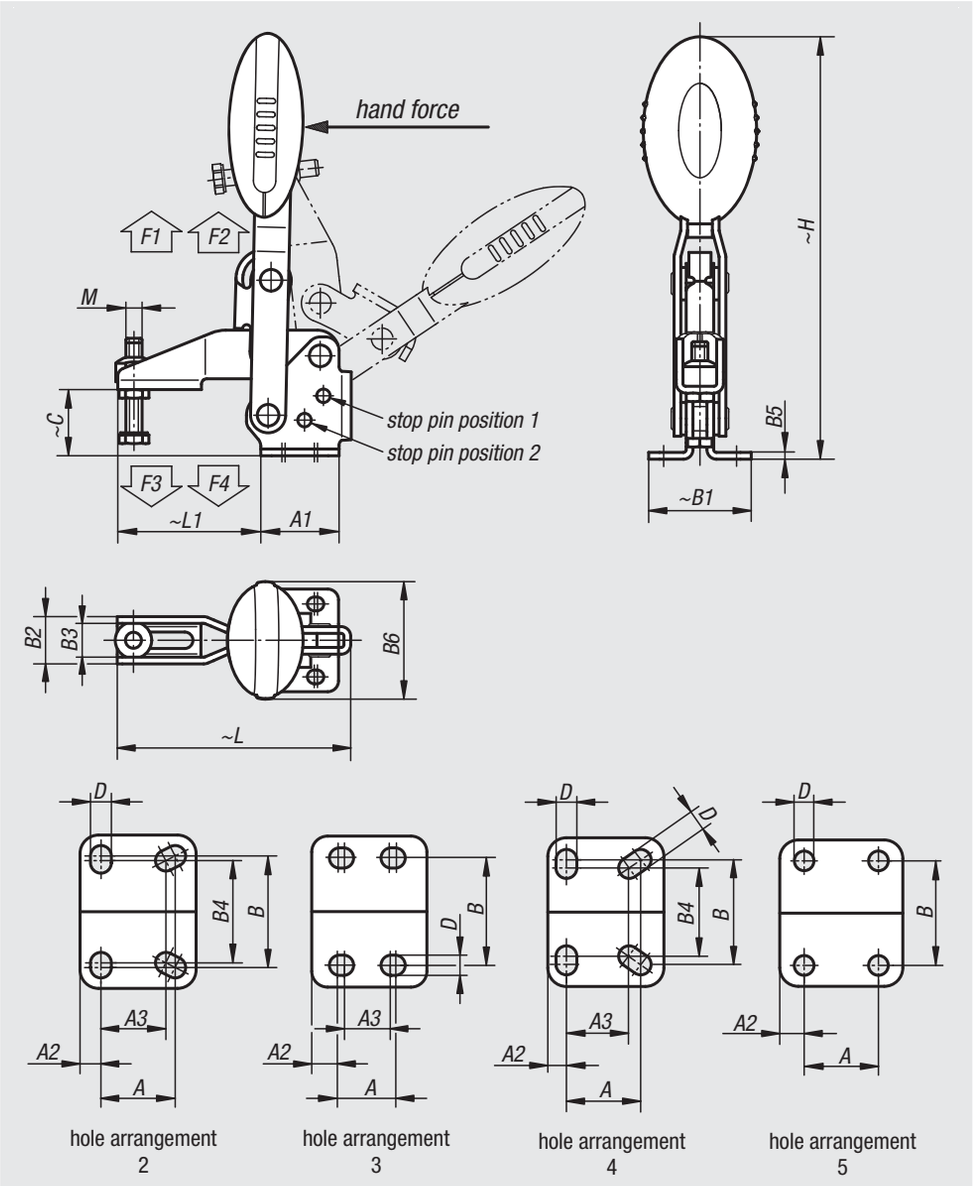
Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05908-005002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
05880 Angle brackets
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads





Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Opening angle handle ~ stop pin removed	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05908-005002	100°	-	147°	64°	-	83°	100	750	1.050	620	750
05908-006002	56°	83°	152°	46°	56°	83°	160	1.350	1.650	920	1.050
05908-008002	13°	93°	158°	26°	61°	86°	190	2.000	2.800	940	1.350
05908-010002	6°	97°	176°	19°	59°	91°	250	2.500	4.500	1.500	2.800
05908-012002	11°	88°	164°	24°	60°	91°	280	3.000	5.500	1.400	2.800

Order No.	hole arrangement	M	A	A1	A2	A3	B	~B1	B2	B3	B4	B5	B6	~C	D	~H	~L	~L1	Order No. Angle Bracket
05908-005002	2	M5x25	16	25	4,5	14	24	33	13,2	9,1	22	2	22,5	19,1	4,5	108,5	66,5	35	05880-02
05908-006002	3	M6x35	14	29	7	12	27	38	17,5	12,4	-	2,5	43,5	24,7	5,5	156,1	87,5	53	05880-02
05908-008002	3	M8x45	21	39	9	19	32	45	20,6	15,5	-	2,5	41,5	32,7	6,8	184,2	107,5	62	05880-04
05908-010002	4	M10x55	32	50	8	27	45	64	25,5	18,4	38	3,5	47	38,7	9	223,9	153	95	05880-06
05908-012002	5	M12x70	32	53	10,5	-	45	63	28	20,9	-	3,5	47	46,7	8,8	242,4	173,5	113,5	05880-06

Toggle clamps vertical

with flat foot and adjustable clamping spindle, stainless steel

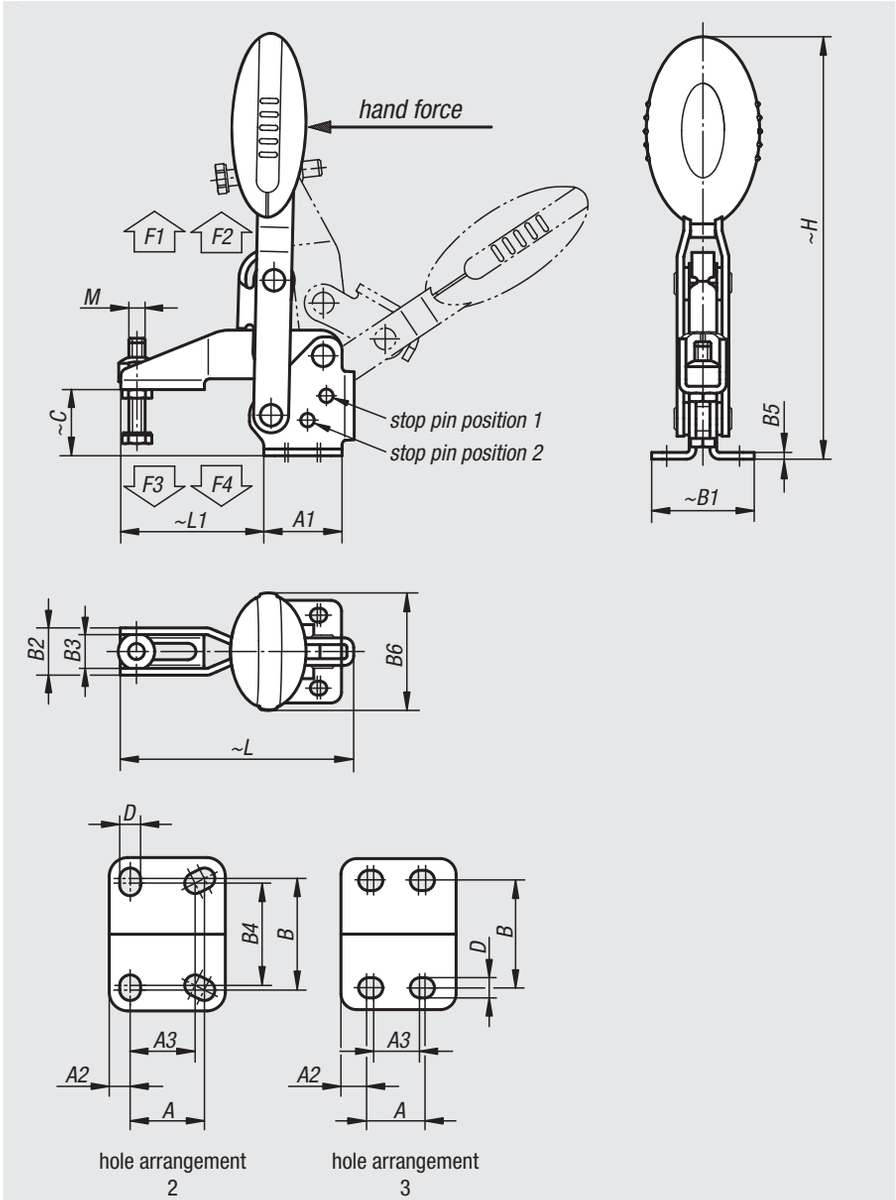
Material:
Stainless steel
Grip polyamide.

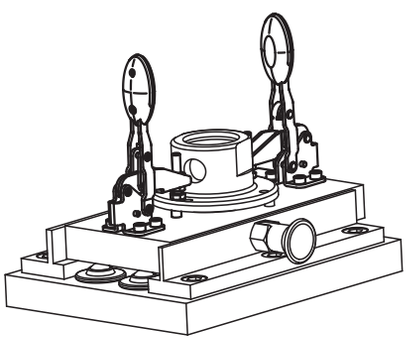
Version:
Bright.

Sample order:
nlm 05908-105002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311





Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Opening angle handle ~ stop pin removed	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05908-105002	100°	-	147°	64°	-	83°	100	750	1.050	620	750
05908-106002	56°	83°	152°	46°	56°	83°	160	1.350	1.650	920	1.050
05908-108002	13°	93°	158°	26°	61°	86°	190	2.000	2.800	940	1.350

Order No.	hole arrangement	M	A	A1	A2	A3	B	~B1	B2	B3	B4	B5	B6	~C	D	~H	~L	~L1
05908-105002	2	M5x25	16	25	4,5	14	24	33	13,2	9,1	22	2	22,5	19,1	4,5	108,5	66,5	35
05908-106002	3	M6x35	14	29	7	12	27	38	17,5	12,4	-	2,5	43,5	24,7	5,5	156,1	87,5	53
05908-108002	3	M8x45	21	39	9	19	32	45	20,6	15,5	-	2,5	41,5	32,7	6,8	184,2	107,5	62

Toggle clamps vertical with safety interlock

with flat foot and adjustable clamping spindle

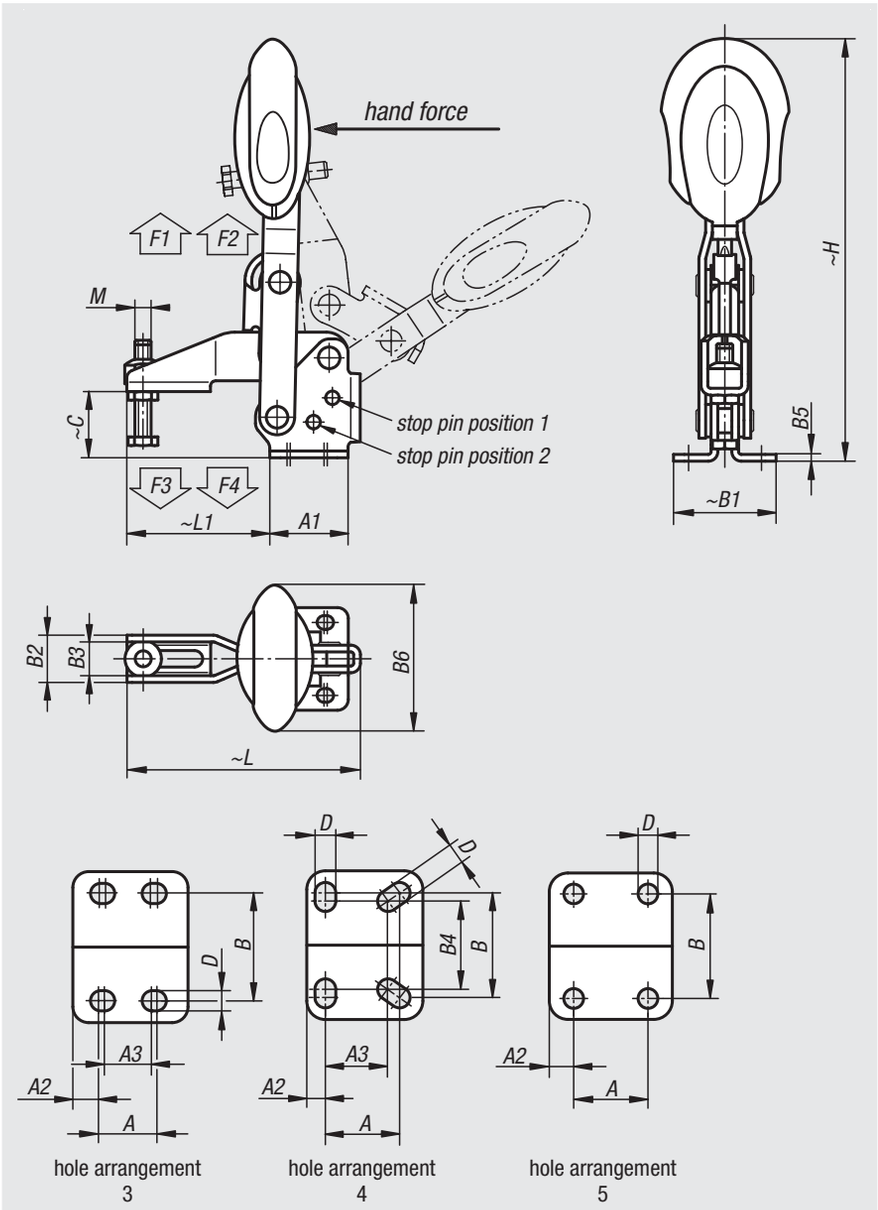
Material:
Steel;
Grip polyamide;
TPE unlocking bracket

Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05908-006102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
05880 Angle brackets
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads



Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Opening angle handle ~ stop pin removed	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05908-006102	56°	83°	152°	46°	56°	83°	160	1.350	1.650	920	1.050
05908-008102	13°	93°	158°	26°	61°	86°	190	2.000	2.800	940	1.350
05908-010102	6°	97°	176°	19°	59°	91°	250	2.500	4.500	1.500	2.800
05908-012102	11°	88°	164°	24°	60°	91°	280	3.000	5.500	1.400	2.800

Order No.	hole arrangement	M	A	A1	A2	A3	B	~B1	B2	B3	B4	B5	B6	~C	D	~H	~L	~L1	Order No. Angle Bracket
05908-006102	3	M6x35	14	29	7	12	27	38	17,5	12,4	-	2,5	53,4	24,7	5,5	162,8	87,5	53	05880-02
05908-008102	3	M8x45	21	39	9	19	32	45	20,6	15,5	-	2,5	51,1	32,7	6,8	191,4	107,5	62	05880-04
05908-010102	4	M10x55	32	50	8	27	45	64	25,5	18,4	38	3,5	56,5	38,7	9	230,5	153	95	05880-06
05908-012102	5	M12x70	32	53	10,5	-	45	63	28	20,9	-	3,5	56,5	46,7	8,8	249,1	173,5	113,5	05880-06

Toggle clamps vertical with safety interlock

with flat foot and adjustable clamping spindle, stainless steel

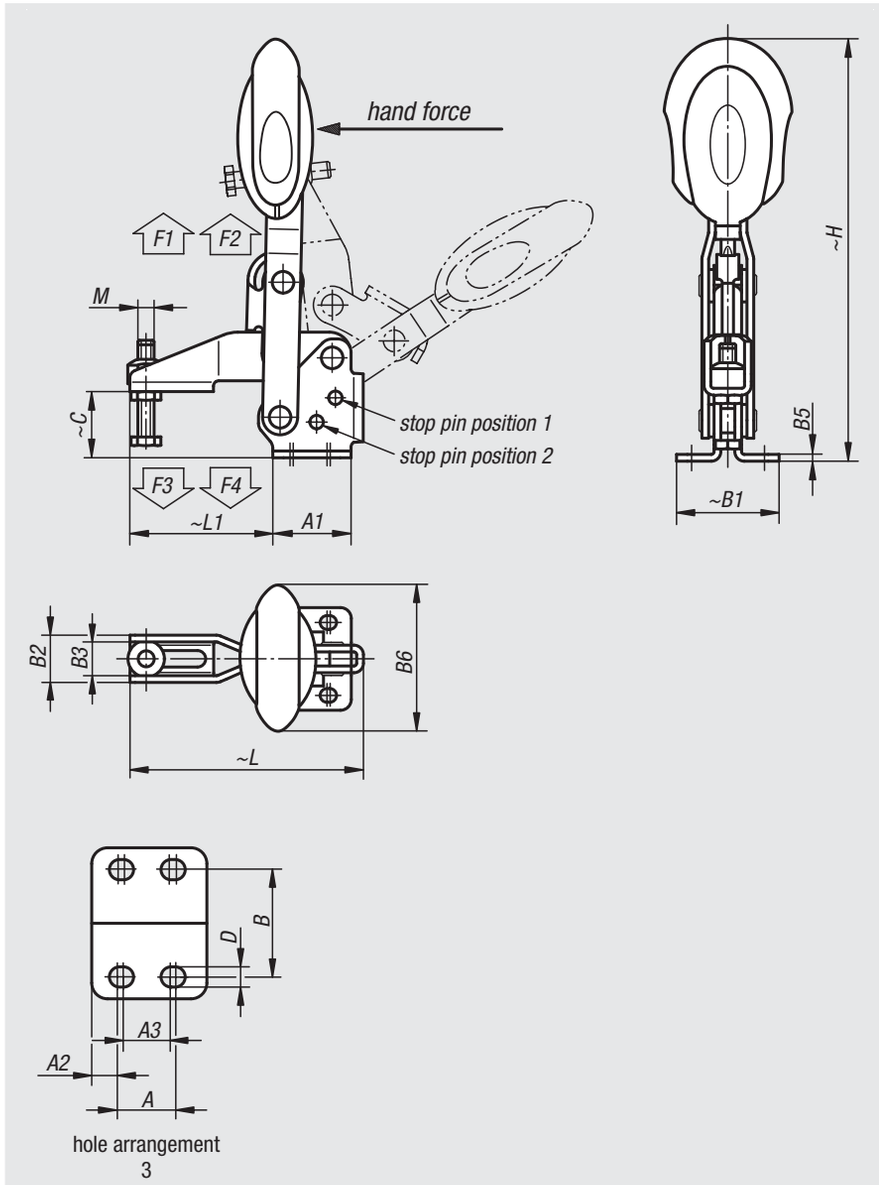
Material:
Stainless steel
Grip polyamide.
Unlocking bracket TPE.

Version:
Bright.

Sample order:
nlm 05908-106102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311



Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Opening angle handle ~ stop pin removed	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05908-106102	56°	83°	152°	46°	56°	83°	160	1.350	1.650	920	1.050
05908-108102	13°	93°	158°	26°	61°	86°	190	2.000	2.800	940	1.350

Order No.	hole arrangement	M	A	A1	A2	A3	B	~B1	B2	B3	B5	B6	~C	D	~H	~L	~L1
05908-106102	3	M6x35	14	29	7	12	27	38	17,5	12,4	2,5	53,4	24,7	5,5	162,8	87,5	53
05908-108102	3	M8x45	21	39	9	19	32	45	20,6	15,5	2,5	51,1	32,7	6,8	191,4	107,5	62

Toggle clamps vertical

with straight foot and adjustable clamping spindle

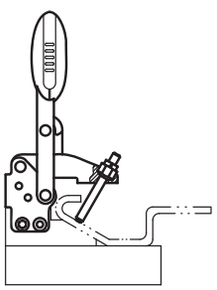
Material:
Steel;
Grip polyamide.

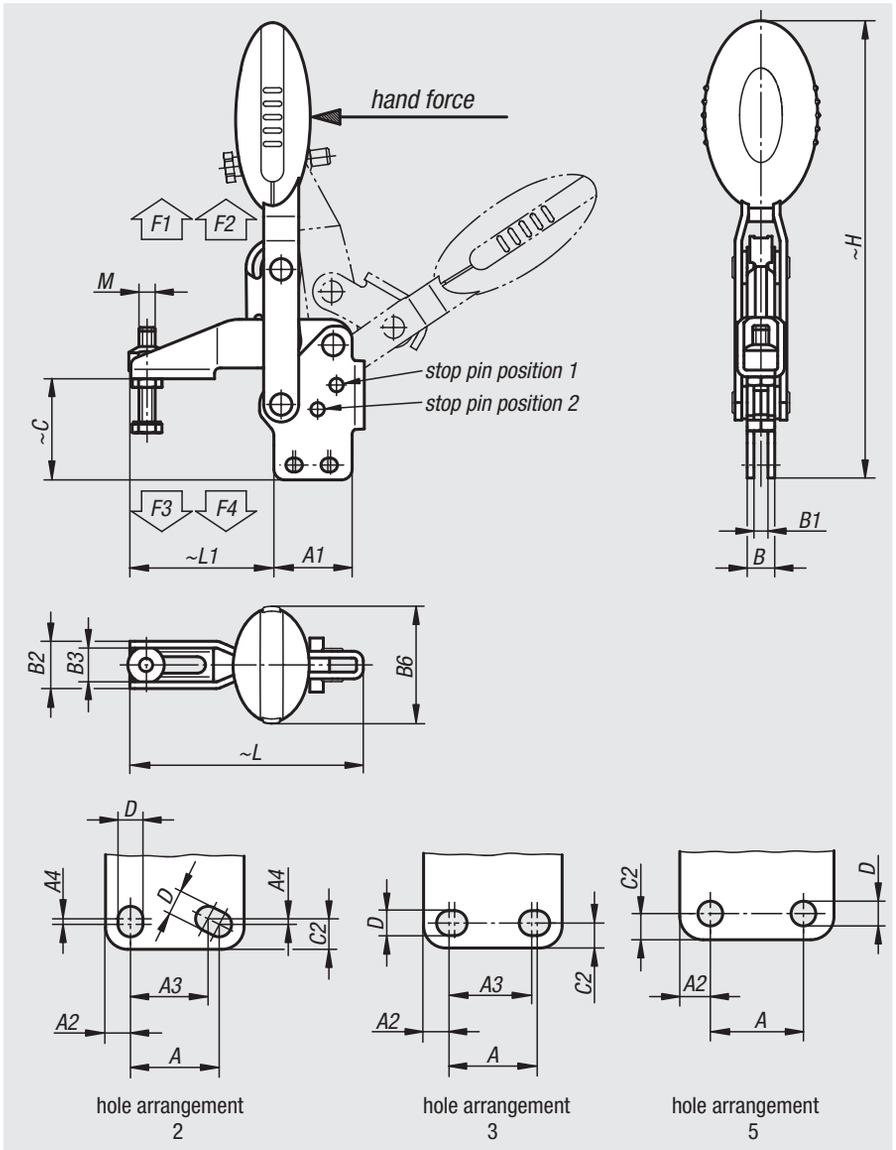
Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05912-005002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads





Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05912-005002	100°	-	129°	64°	-	100	750	1.050	620	750
05912-006002	56°	83°	141°	46°	56°	160	1.350	1.650	920	1.050
05912-008002	13°	93°	158°	26°	61°	190	2.000	2.800	940	1.350
05912-010002	6°	97°	176°	19°	59°	250	2.500	4.500	1.500	2.800
05912-012002	11°	88°	164°	24°	60°	280	3.000	5.500	1.400	2.800

Order No.	hole arrangement	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~L	~L1
05912-005002	2	M5x25	16	25	4,5	14	1	8,1	4,1	13,2	9,1	22,5	30,9	5,5	4,5	120,3	63,5	35
05912-006002	3	M6x35	14	29	7	12	-	10,2	5,2	17,5	12,4	43,5	37,6	5,5	5,5	169	86,5	53
05912-008002	3	M8x45	21	39	9	19	-	10,2	5,2	20,6	15,5	41,5	49	6,5	6,8	200,3	107	62
05912-010002	2	M10x55	32	50	8	27	3,5	14,1	7,1	25,5	18,4	47	62,3	13	9	247,4	153	95
05912-012002	5	M12x70	32	53	10,5	-	-	14,1	7,1	28	20,9	47	69,8	9	8,8	265,5	173,5	113,5

Toggle clamps vertical

with straight foot and adjustable clamping spindle, stainless steel

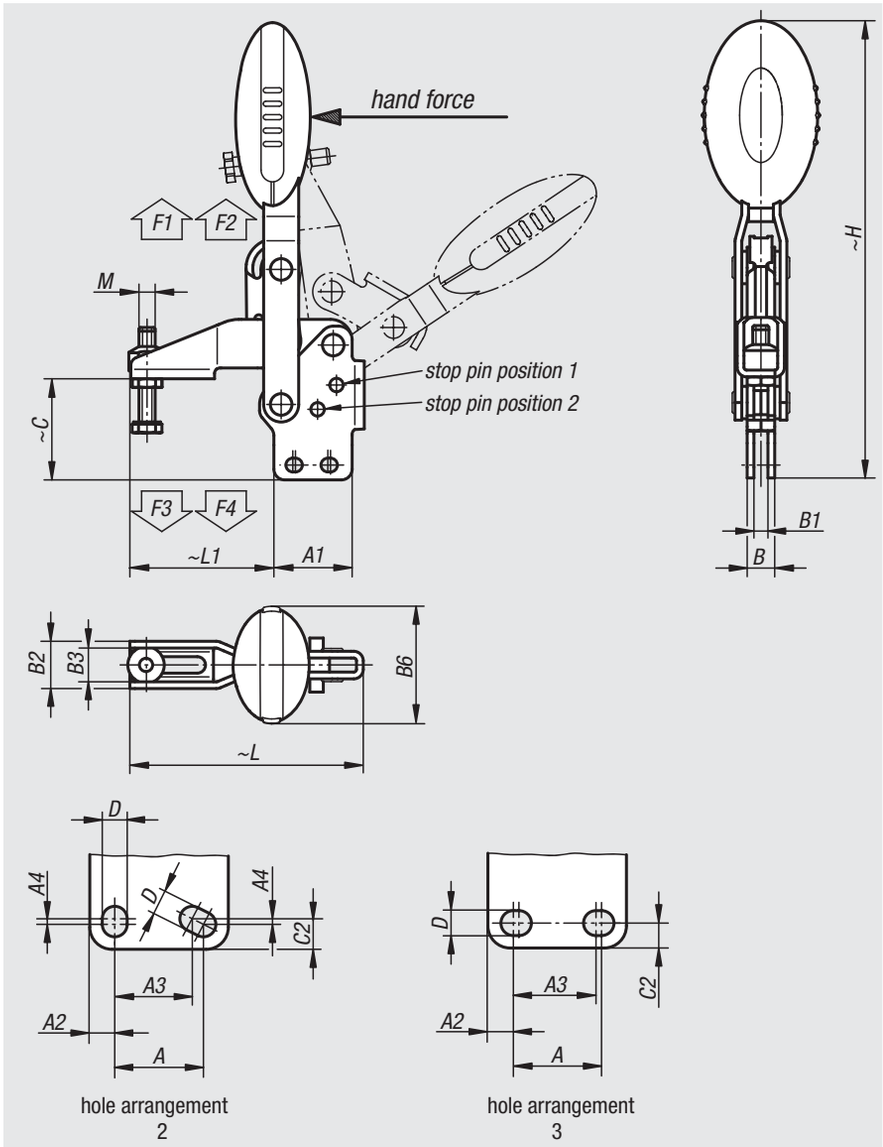
Material:
Stainless steel
Grip polyamide.

Version:
Bright.

Sample order:
nlm 05912-105002

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311



Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05912-105002	100°	-	129°	64°	-	100	750	1.050	620	750
05912-106002	56°	83°	141°	46°	56°	160	1.350	1.650	920	1.050
05912-108002	13°	93°	158°	16°	61°	190	2.000	2.800	940	1.350

Order No.	hole arrangement	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~L	~L1
05912-105002	2	M5x25	16	25	4,5	14	1	8,1	4,1	13,2	9,1	22,5	30,9	5,5	4,5	120,3	63,5	35
05912-106002	3	M6x35	14	29	7	12	-	10,2	5,2	17,5	12,4	43,5	37,6	5,5	5,5	169	86,5	53
05912-108002	3	M8x45	21	39	9	19	-	10,2	5,2	20,6	15,5	41,5	49	6,5	6,8	200,3	107	62

Toggle clamps vertical with safety interlock

with straight foot and adjustable clamping spindle

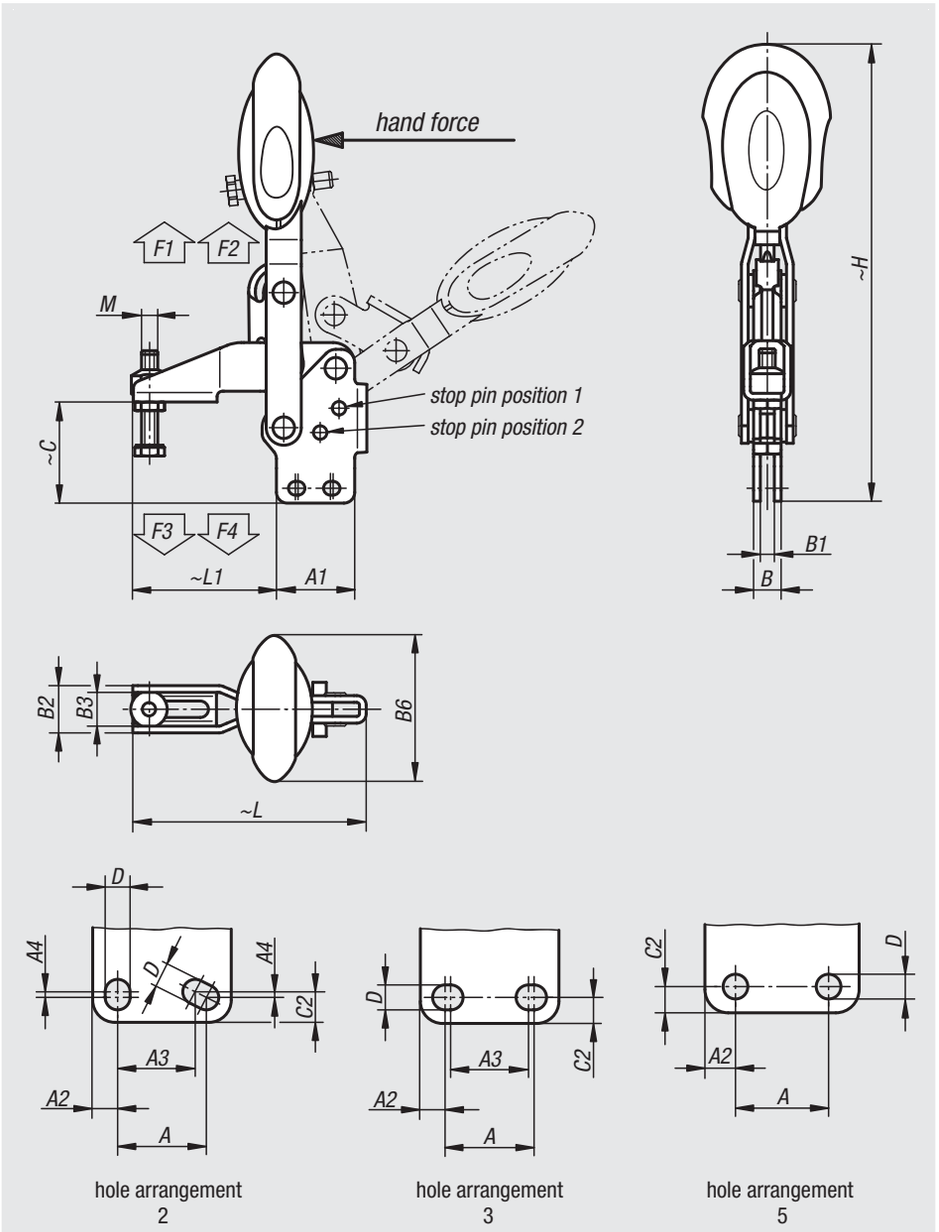
Material:
Steel;
Grip polyamide;
TPE unlocking bracket

Version:
Nitro-carburized and black oxidized

Sample order:
nlm 05912-006102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
07110 Ball-end thrust screws
07117 Grippers, adjustable
07120 Grub screws with thrust point DIN 6332
07121 Grub screws with ball thrust point
07140 Thrust pads DIN 6311
07142 Thrust pads



hole arrangement 2 | hole arrangement 3 | hole arrangement 5

Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05912-006102	56°	83°	152°	46°	56°	160	1.350	1.650	920	1.050
05912-008102	13°	93°	158°	26°	61°	190	2.000	2.800	940	1.350
05912-010102	6°	97°	176°	19°	59°	250	2.500	4.500	1.500	2.800
05912-012102	11°	88°	163°	24°	60°	280	3.000	5.500	1.400	2.800

Order No.	hole arrangement	M	A	A1	A2	A3	A4	B	B1	B2	B3	B6	~C	C2	D	~H	~L	~L1
05912-006102	3	M6x35	14	29	7	12	-	10,2	5,2	17,5	12,4	53,4	37,6	5,5	5,5	175,7	87,5	53
05912-008102	3	M8x45	21	39	9	19	-	10,2	5,2	20,6	15,5	51,1	49	6,5	6,8	207,6	107,5	62
05912-010102	2	M10x55	32	50	8	27	3,5	14,1	7,1	25,5	18,4	56,5	62,3	13	9	254	153	95
05912-012102	5	M12x70	32	53	10,5	-	-	14,1	7,1	28	20,9	56,5	69,8	9	8,8	271,1	173,5	113,5

Toggle clamps vertical with safety interlock

with straight foot and adjustable clamping spindle, stainless steel

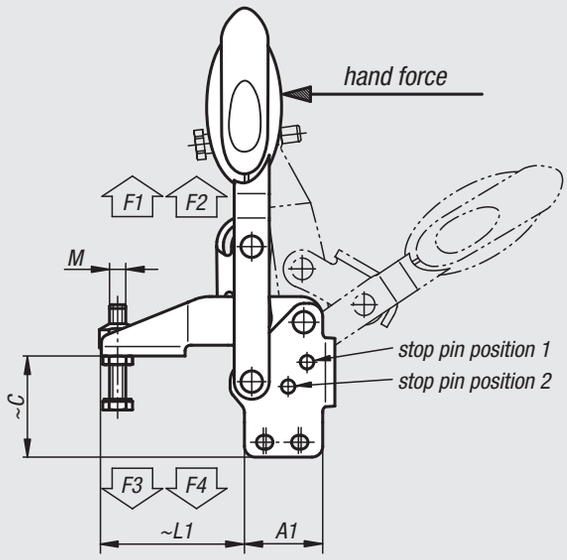
Material:
Stainless steel
Grip polyamide.
Unlocking bracket TPE.

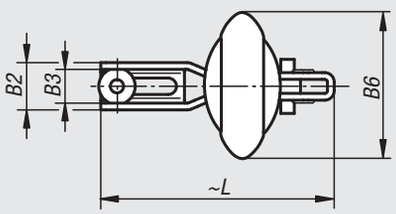
Version:
Bright.

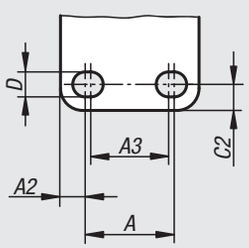
Sample order:
nlm 05912-106102

Note:
Maintenance-free high quality link bushings. Sustainable constant force during opening and closing. Optimum stability through the conical, U-profile clamping arm. Including internal bar lock with automatic safety catch.

Accessories:
05280 Protective caps
07111 Ball-end thrust screws, stainless steel
07119 Thrust screws, stainless steel
07120 Grub screws with thrust point DIN 6332
07140 Thrust pads DIN 6311





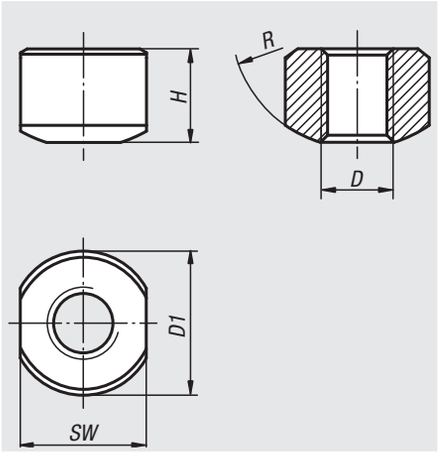


hole arrangement
3

Order No.	Opening angle holding arm ~ position 1	Opening angle holding arm ~ position 2	Opening angle holding arm ~ stop pin removed	Opening angle handle ~ position 1	Opening angle handle ~ position 2	Hand force N	Retaining force F1 N	Retaining force F2 N	Clamping force F3 N	Clamping force F4 N
05912-106102	56°	83°	141°	46°	56°	160	1.350	1.650	920	1.050
05912-108102	13°	93°	158°	16°	61°	190	2.000	2.800	940	1.350

Order No.	hole arrangement	M	A	A1	A2	A3	B	B1	B2	B3	B6	~C	C2	D	~H	~L	~L1
05912-106102	3	M6x35	14	29	7	12	10,2	5,2	17,5	12,4	53,4	37,6	5,5	5,5	175,7	86,5	53
05912-108102	3	M8x45	21	39	9	19	10,2	5,2	20,6	15,5	51,1	49	6,5	6,8	207,6	107	62

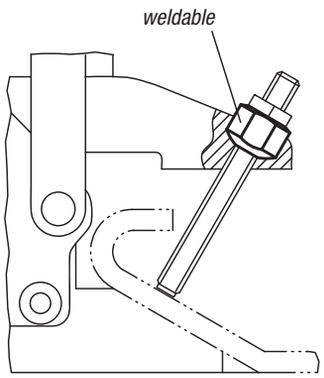
Spherical seating nuts



Material:
Steel or stainless steel

Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 05990-04



Order No. Steel	Order No. Stainless steel	D	H	D1	SW	R
05990-04	**05990-104**	M4	5,2	8	7	7
05990-05	**05990-105**	M5	6,7	10	9	9
05990-06	**05990-106**	M6	9,5	13,5	12,2	10
05990-08	**05990-108**	M8	12,8	18	15,3	12
05990-10	**-**	M10	12,1	20	18,2	14
05990-12	**-**	M12	14,8	23	20	16

Notes

06000

Operating parts

Knurled nuts

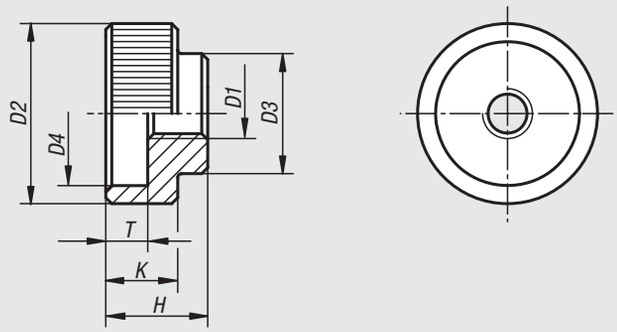
steel and stainless steel, DIN 6303

Material:
Free-cutting steel 1.0718.
Stainless steel 1.4305.

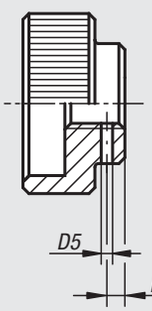
Version:
Free-cutting steel, black oxidised.
Stainless steel bright.

Sample order:
nlm 06010-108

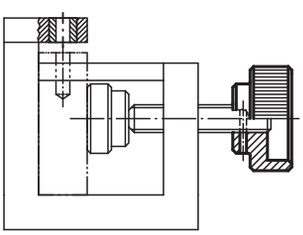
Form A
without pin hole



Form B
with pin hole



Drill through and ream pin hole on assembly

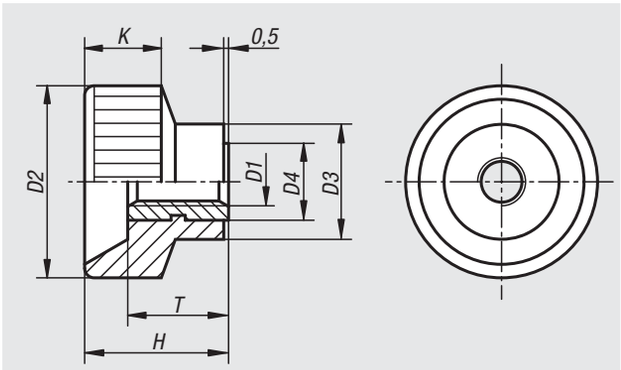


Order No.	Form	Material	D1	D2	D3	D4	D5 predrilled	E	H	K	T	suitable dowel pin ISO 2338
06010-105	A	steel	M5	20	14	15	-	-	12	8	5	-
06010-106	A	steel	M6	24	16	18	-	-	14	10	6	-
06010-108	A	steel	M8	30	20	24	-	-	17	12	7	-
06010-110	A	steel	M10	36	28	30	-	-	20	14	8	-
06010-112	A	steel	M12	40	32	34	-	-	24	16	10	-
06010-1052	A	stainless steel	M5	20	14	15	-	-	12	8	5	-
06010-1062	A	stainless steel	M6	24	16	18	-	-	14	10	6	-
06010-1082	A	stainless steel	M8	30	20	24	-	-	17	12	7	-
06010-1102	A	stainless steel	M10	36	28	30	-	-	20	14	8	-
06010-1122	A	stainless steel	M12	40	32	34	-	-	24	16	10	-
06010-205	B	steel	M5	20	14	15	1,4	2,5	12	8	5	1,5 m6 x 14
06010-206	B	steel	M6	24	16	18	1,4	2,5	14	10	6	1,5 m6 x 16
06010-208	B	steel	M8	30	20	24	1,9	3	17	12	7	2 m6 x 20
06010-210	B	steel	M10	36	28	30	2,9	4	20	14	8	3 m6 x 28
06010-212	B	steel	M12	40	32	34	3,9	4	24	16	10	4 m6 x 32

06013

Knurled nuts

plastic



Material:
Black Duroplast PF 31.
Tapped bush brass.

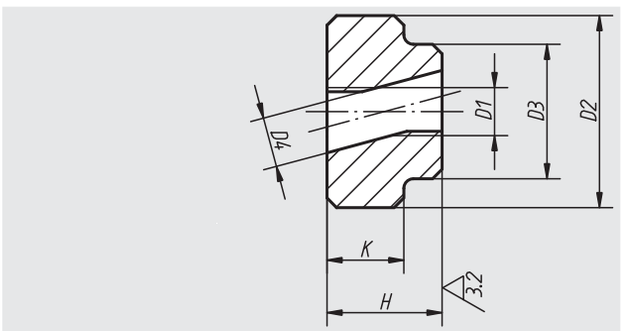
Version:
Tapped bush nickel-plated.

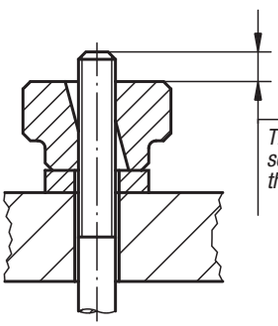
Sample order:
nlm 06013-08

Order No.	D1	D2	D3	D4	H	K	T
06013-04	M4	18	10	7	13	8	9
06013-05	M5	20	12	8	14	8	10
06013-06	M6	24	13	9	16	9	10
06013-08	M8	30	15	11	18	11	11
06013-10	M10	35	18	14	19	12	11

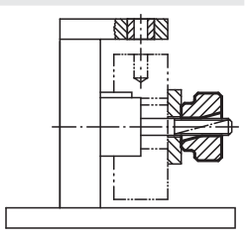
06030

Knurled nuts quick-acting





The stud should be several mm longer than height "H"



Material:
Carbon steel.

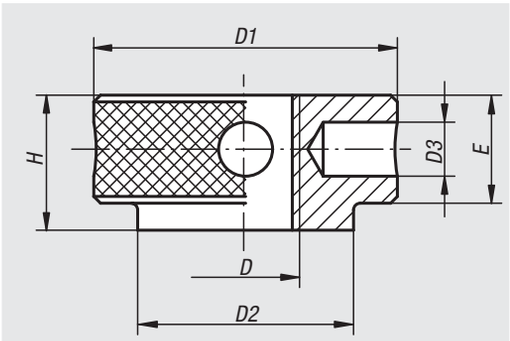
Version:
Tempered and black oxidised.

Sample order:
nlm 06030-08

Note:
Quick-acting knurled nuts are mainly used in applications where no high clamping pressures are required.
Tilt the nut to slide on, then straighten it to engage the threads.

Order No.	D1	D2	D3	D4	H	K
06030-05	M5	20	14	5,2	12	8
06030-06	M6	24	16	6,2	14	10
06030-08	M8	30	20	8,2	17	12
06030-10	M10	36	28	10,3	20	14
06030-12	M12	40	32	12,3	24	16

Knurled nuts



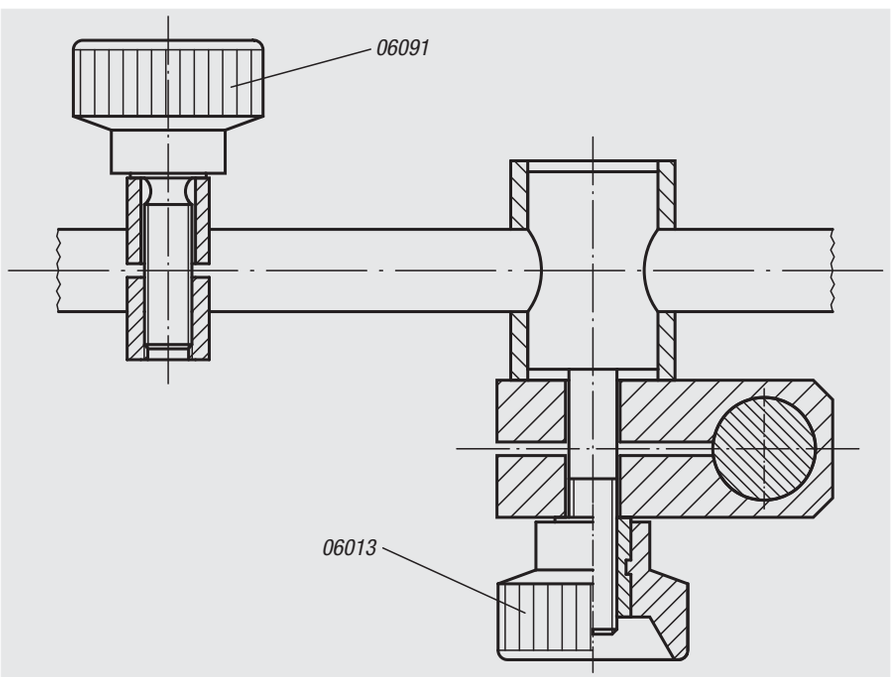
Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 06070-100

Order No.	D	D1	D2	D3	E	H
06070-100	M10	32	22	4	10	12
06070-120	M12	36	25	5	13,5	16
06070-140	M14	40	28	6	15	18
06070-160	M16	45	32	8	16	20

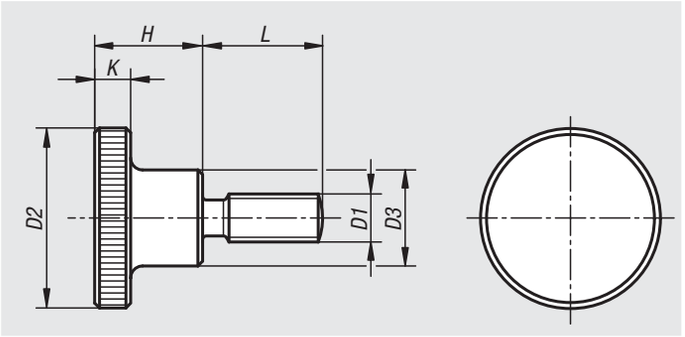
Application example of a shaft cross clamp and stop fitted with norelem parts

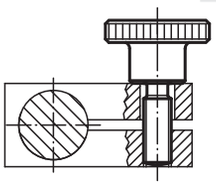


06090

Knurled screws high

steel and stainless steel DIN 464





Material:
Free-cutting steel 1.0718.
Stainless steel 1.4305.

Version:
Free-cutting steel, black oxidised.
Stainless steel bright.

Sample order:
nlm 06090-06X20 (include length L)

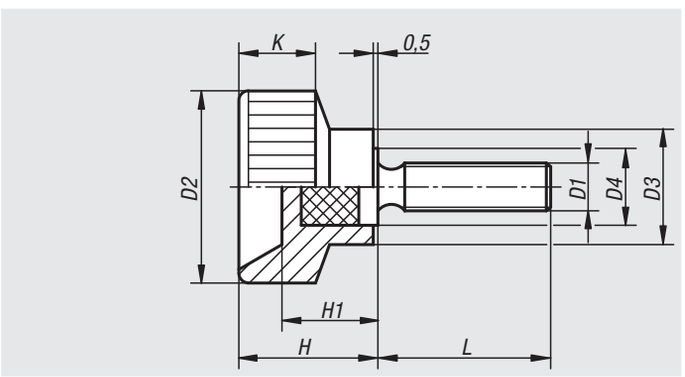
Note:
* By these lengths the thread has no undercut at the shoulder.

Order No. steel	Order No. stainless steel	D1	D2	D3	L	H	K
06090-04X	**06090-042X**	M4	16	8	10/16/20*	9,5	3,5
06090-05X	**06090-052X**	M5	20	10	10/16/20*	11,5	4
06090-06X	**06090-062X**	M6	24	12	10/16/20/25*	15	5
06090-08X	**06090-082X**	M8	30	16	16/20/25/30*	18	6
06090-10X	**06090-102X**	M10	36	20	20/25/30/40*	23	8

06091

Knurled thumb screws

plastic



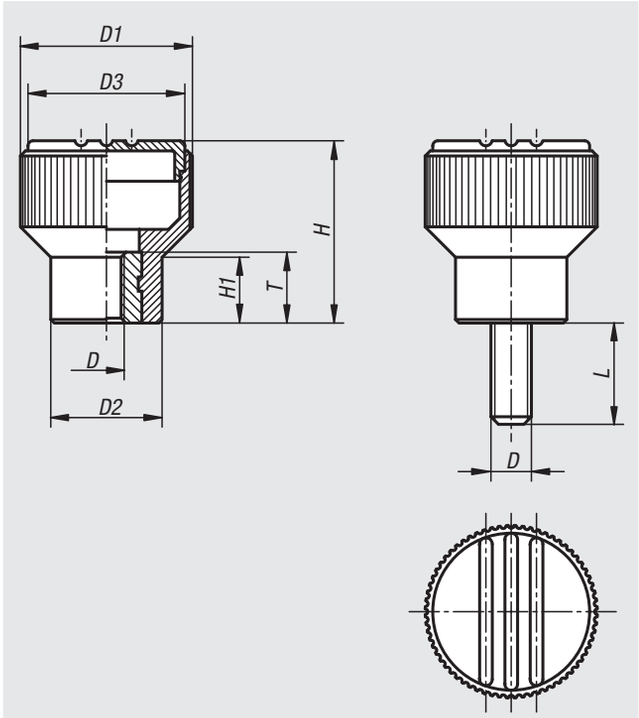
Material:
Black Duroplast PF 31.
Screw steel.

Version:
Screw galvanized.

Sample order:
nlm 06091-05X25 (include length L)

Order No.	L	D1	D2	D3	D4	H	H1	K
06091-04X	15/20	M4	18	10	7	13,5	9	8
06091-05X	10/18/25	M5	20	12	8	14,5	10	8
06091-06X	20/28	M6	24	13	10	15	9,5	9
06091-08X	25/32	M8	30	15	12	18	11	11
06091-10X	30	M10	35	18	14	18,5	11	12

Knurled knobs



Material:
Thermoplastic, black grey.
Bush and threaded pin steel 5.8 or stainless steel 1.4305.

Version:
Steel blue chromed.
Stainless steel bright.

Sample order:
nlm 06092-01056X20
(Cap colour traffic red. Include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

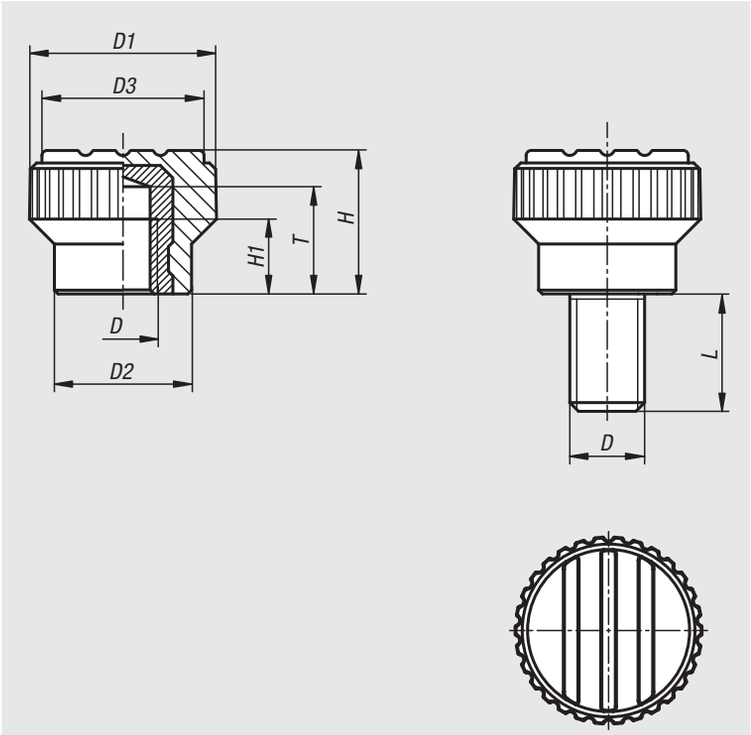
Knurled knobs with internal thread

Order No. bush steel	Order No. bush stainless steel	Size	D	D1	D2	D3	H	H1	T
06092-104Δ	**06092-0104Δ**	1	M4	21	14	19	22	8	10
06092-105Δ	**06092-0105Δ**	1	M5	21	14	19	22	8	10
06092-106Δ	**06092-0106Δ**	1	M6	21	14	19	22	8	10
06092-208Δ	**06092-0208Δ**	2	M8	26	18	23	26	9,5	14
06092-308Δ	**06092-0308Δ**	3	M8	34	22	31	36	13	14
06092-310Δ	**06092-0310Δ**	3	M10	34	22	31	36	13	14

Knurled knobs with external thread

Order No. screw steel	Order No. screw stainless steel	Size	D	D1	D2	D3	H	H1	L
06092-105ΔX	**06092-0105ΔX**	1	M5	21	14	19	22	8	10/12/15/20/25
06092-106ΔX	**06092-0106ΔX**	1	M6	21	14	19	22	8	15/20/25/30
06092-208ΔX	**06092-0208ΔX**	2	M8	26	18	23	26	9,5	20/25/30/40
06092-310ΔX	**06092-0310ΔX**	3	M10	34	22	31	36	13	20/30/40

Knurled knobs



Material:
Grip black grey thermoplastic.
Bush brass or stainless steel 1.4305.
Screw steel 5.8 or stainless steel 1.4305.

Version:
Steel blue chromed.
Stainless steel bright.

Sample order:
nlm 06094-005X12

On request:
Other colours.

Knurled knobs with internal thread

Order No.	Version	D	D1	D2	D3	H	H1	T
06094-003	bush brass	M3	15	11	13	11,5	4,5	8,6
06094-004	bush brass	M4	15	11	13	11,5	6	8,6
06094-005	bush brass	M5	15	11	13	11,5	6	8,6
06094-0003	bush stainless steel	M3	15	11	13	11,5	4,5	8,6
06094-0004	bush stainless steel	M4	15	11	13	11,5	6	8,6
06094-0005	bush stainless steel	M5	15	11	13	11,5	6	8,6

Knurled knobs with external thread

Order No.	Version	D	D1	D2	D3	H	L
06094-003X	screw steel	M3	15	11	13	11,5	8/10/12/15
06094-004X	screw steel	M4	15	11	13	11,5	8/10/12/15
06094-005X	screw steel	M5	15	11	13	11,5	10/12/15/20
06094-006X	screw steel	M6	15	11	13	11,5	10/15/20/25
06094-0003X	screw stainless steel	M3	15	11	13	11,5	8/10/12/15
06094-0004X	screw stainless steel	M4	15	11	13	11,5	8/10/12/15
06094-0005X	screw stainless steel	M5	15	11	13	11,5	10/12/15/20
06094-0006X	screw stainless steel	M6	15	11	13	11,5	10/15/20/25

Control knobs

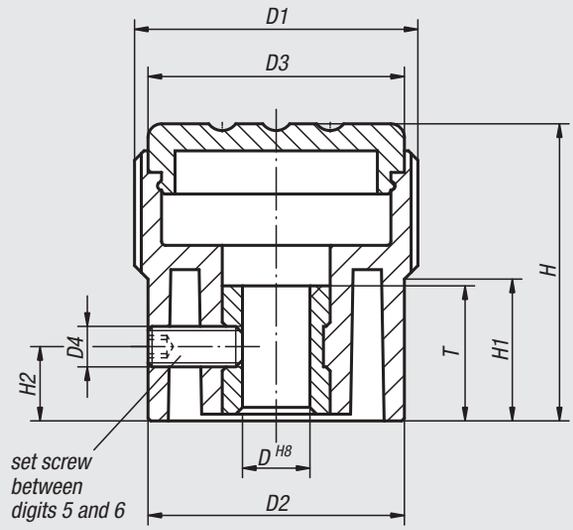
Material:
Thermoplastic, black grey.
Bush steel.

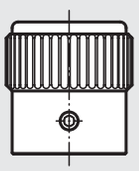
Version:
Steel blue chromed.

Sample order:
nlm 06100-11055 (cap colour light grey)

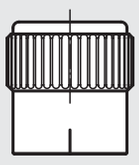
Note:
Available without graduations, with one scale line or with 20 graduations and 10 digits.
Δ Add the desired cap colour here; no colour code is required for black grey caps.

On request:
Special graduations.

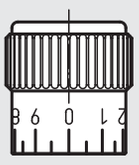




Form A
without
graduations



Form B
with one scale
line



Form C
with standard
graduations

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No.	Form	Size	D	D1	D2	D3	D4	H	H1	H2	T
06100-1105Δ	A	1	5	21	19	19	M3	22	10,5	5	10
06100-1206Δ	A	2	6	26	23	23	M3	26	12	6	10
06100-1308Δ	A	3	8	34	31	31	M4	36	17,5	7	14
06100-2105Δ	B	1	5	21	19	19	M3	22	10,5	5	10
06100-2206Δ	B	2	6	26	23	23	M3	26	12	6	10
06100-2308Δ	B	3	8	34	31	31	M4	36	17,5	7	14
06100-3105Δ	C	1	5	21	19	19	M3	22	10,5	5	10
06100-3206Δ	C	2	6	26	23	23	M3	26	12	6	10
06100-3308Δ	C	3	8	34	31	31	M4	36	17,5	7	14

Control knobs

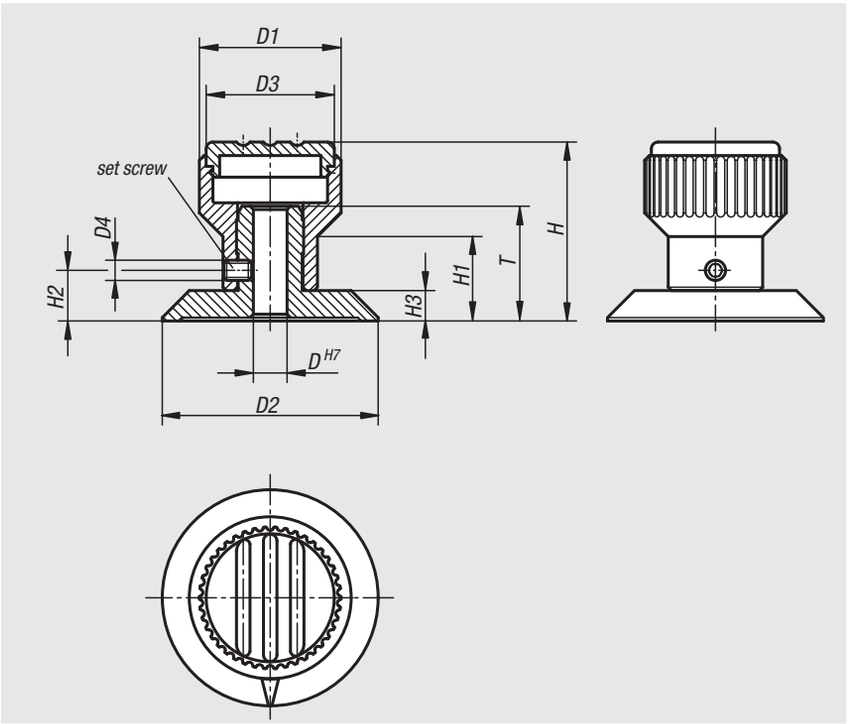
Material:
Knurled knob thermoplastic, black grey.
Washer aluminium.

Version:
Aluminium black anodized.

Sample order:
nlm 06105-1055 (cap colour light grey)

Note:
The arrow is engraved after anodizing. The set screw secures both the hub and the pressed-in washer. The H7 hole in the hub ensures a good tight fit on the shaft.

Δ Add the desired cap colour here. No colour code is required for black grey caps.



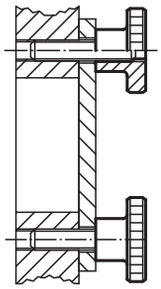
black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

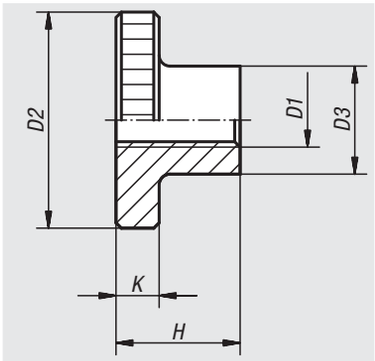
Order No.	Size	D	D1	D2	D3	D4	H	H1	H2	H3	T
06105-105Δ	1	5	21	32	19	M3	26,5	12,5	7,5	4,5	17
06105-206Δ	2	6	26	40	23	M4	31,5	15	9,5	5,5	20,5
06105-308Δ	3	8	34	52	31	M4	43	20	12	7	22

06110

Knurled nuts high

steel and stainless steel, DIN 466





Material:
Free-cutting steel 1.0718.
Stainless steel 1.4305.

Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 06110-04

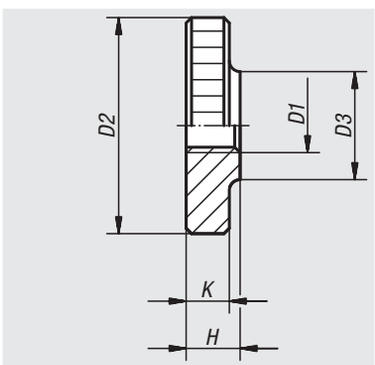
Note:
M12 high knurled nuts are not included in the official standards sheet.

Order No. steel	Order No. stainless steel	D1	D2	D3	H	K
06110-04	**06110-042**	M4	16	8	9,5	3,5
06110-05	**06110-052**	M5	20	10	11,5	4
06110-06	**06110-062**	M6	24	12	15	5
06110-08	**06110-082**	M8	30	16	18	6
06110-10	**06110-102**	M10	36	20	23	8
06110-12	**06110-122**	M12	36	20	23	8

06120

Knurled nuts flat

steel and stainless steel, DIN 467



Material:
Free-cutting steel 1.0718.
Stainless steel 1.4305.

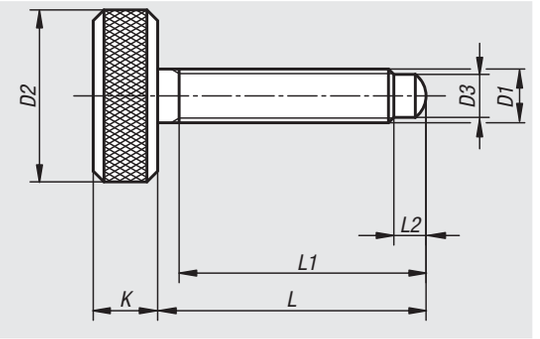
Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 06120-042

Note:
M12 flat knurled nuts are not included in the official standards sheet.

Order No. steel	Order No. stainless steel	D1	D2	D3	H	K
06120-04	**06120-042**	M4	16	8	4	3,5
06120-05	**06120-052**	M5	20	10	5	4
06120-06	**06120-062**	M6	24	12	6	5
06120-08	**06120-082**	M8	30	16	8	6
06120-10	**06120-102**	M10	36	20	10	8
06120-12	**06120-122**	M12	36	20	10	8

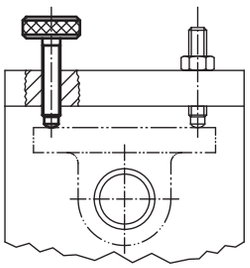
Knurled screws



Material:
Carbon steel.

Version:
Tempered and black oxidised.

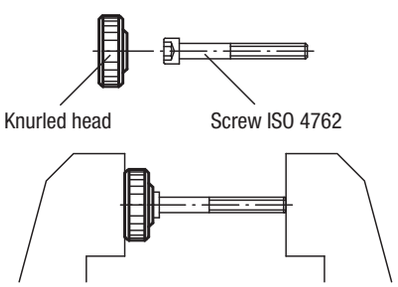
Sample order:
nlm 06130-061X50



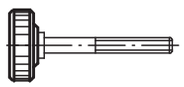
Order No.	D1	D2	D3	K	L	L1	L2
06130-05X25	M5	16	4	6	25	23	3
06130-051X40	M5	16	4	6	40	38	3
06130-06X35	M6	18	4,5	7	35	33	3,5
06130-061X50	M6	18	4,5	7	50	48	3,5
06130-062X70	M6	18	4,5	7	70	68	3,5
06130-08X45	M8	20	6	8	45	42	5
06130-081X60	M8	20	6	8	60	57	5
06130-10X45	M10	25	7,5	10	45	42	5,5
06130-101X60	M10	25	7,5	10	60	57	5,5

Knurled heads

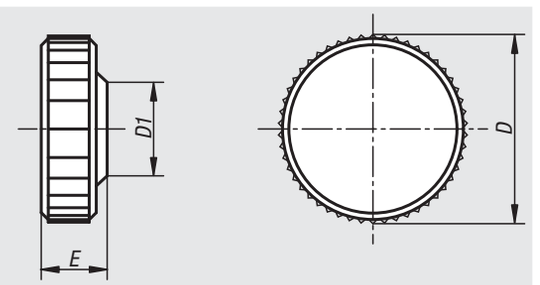
for hexagon socket screw



Press the screw into the head



Knurled head with screw



Material:
Thermoplastic.

Version:
Black, grey or red.

Sample order:
nlm 06132-0506 (knurled head colour red)
Colour Code:
5 = grey
6 = red

Note:
Suitable screws ISO 4762.

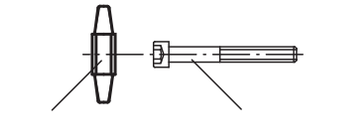
Δ Add the desired knurled head colour here; no colour code is required with black knurled head.

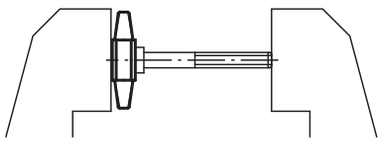
Order No.	D	D1	E	for hexagon socket screw
06132-030Δ	9,5	8,3	4,5	M3
06132-040Δ	13	9,6	5,5	M4
06132-050Δ	16	11,5	6,5	M5
06132-060Δ	19	13	7,5	M6
06132-061Δ	26	13	7,8	M6
06132-080Δ	26	16	9,8	M8

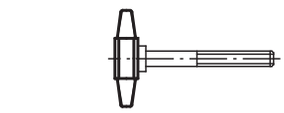
06133

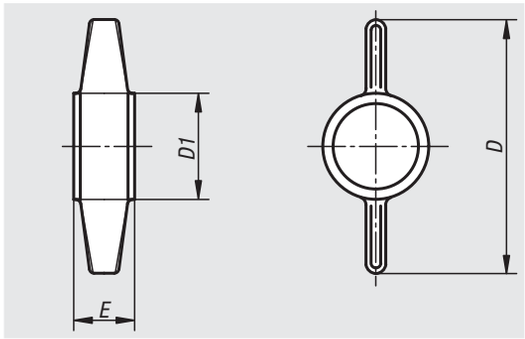
Wing grips

for hexagon socket screws









Material:
Thermoplastic.

Version:
Black, grey or red.

Sample order:
nlm 06133-0506 (wing grip colour red)
Colour code:
5 = grey
6 = red

Note:
Suitable screws ISO 4762.

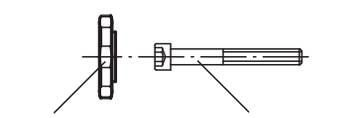
Δ Add the desired wing grip colour here; no colour code is required with black grips.

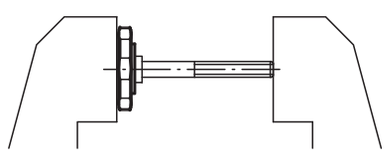
Order No.	D	D1	E	for hexagon socket screw
06133-050Δ	26	12	6,6	M5
06133-060Δ	30	13,5	7,8	M6
06133-080Δ	38	16,5	10	M8
06133-100Δ	45	20	12,5	M10

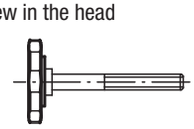
06134

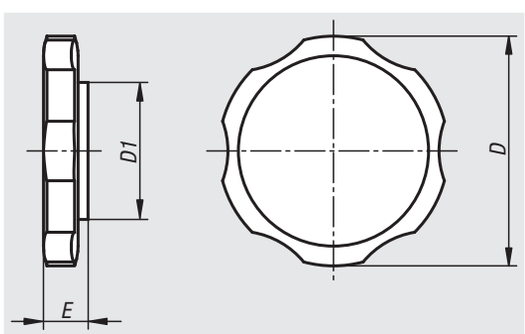
Disc grips

for hex sockets screw









Material:
Thermoplastic

Version:
Black or grey

Sample order:
nlm 06134-0805 (disc grip colour grey)
Colour Code:
5 = grey

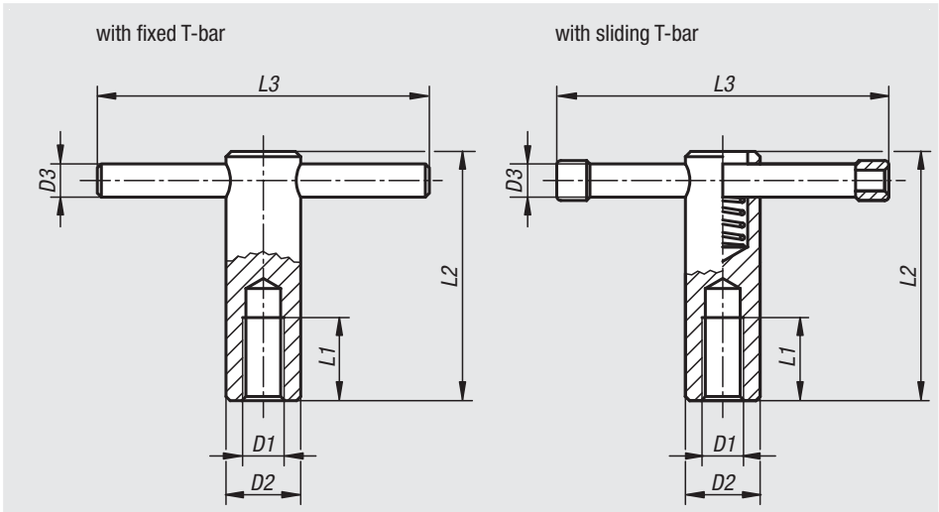
Note:
Suitable screws see ISO 4762.

Δ Add the desired disc grip colour here; no colour code is required with black disc grip

Order No.	D	D1	E	for hexagon socket screw
06134-060Δ	38	14	12	M6
06134-080Δ	38	17	10	M8
06134-100Δ	38	20	13	M10

Tommy bars

with fixed or sliding T-bar, DIN 6305 or DIN 6307

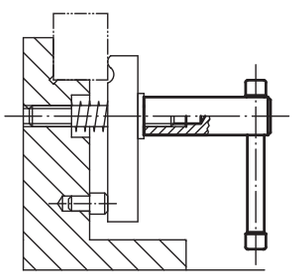


Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 06140-210

Note:
By the version with sliding T-bar the bar is held in any desired position by a spring in the body. End stops prevent the bar falling out.
By the version with fixed T-bar the bar is pressed in.



Order No.	Version	D1	D2	D3	L1	L2	L3
06140-110	fixed T-bar	M10	18	8	20	60	80
06140-112	fixed T-bar	M12	20	10	25	70	100
06140-116	fixed T-bar	M16	24	12	35	85	120
06140-120	fixed T-bar	M20	30	16	40	95	140
06140-210	sliding T-bar	M10	18	8	20	60	80
06140-212	sliding T-bar	M12	20	10	25	70	100
06140-216	sliding T-bar	M16	24	13	35	85	120
06140-220	sliding T-bar	M20	30	16	40	95	140

T-thrust screws

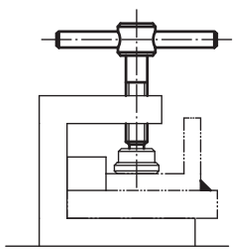
with fixed or sliding T-bar, DIN 6304 or DIN 6306

Material:
Steel.

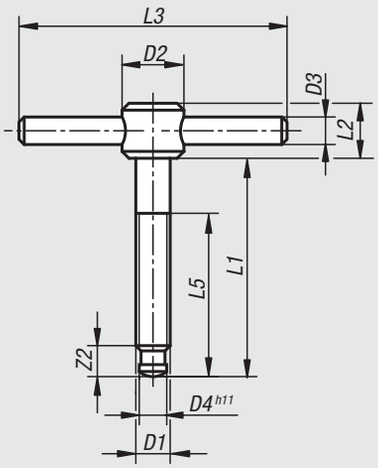
Version:
Black oxidised. Thrust pin hardened.

Sample order:
nlm 06150-116X90

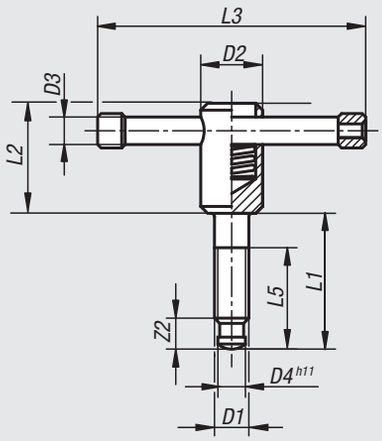
Note:
By the thrust screws with sliding T-bar the bar is held in any desired position by a spring in the body. End stops prevent the bar falling out. By the fixed handles the T-bar is pressed in.

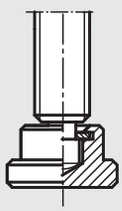


with fixed T-bar



with sliding T-bar





thrust pads DIN 6311 see 07140, 07141

Order No.	Version	L1	D1	D2	D3	D4	L2	L3	L5	Z2
06150-106X40	fixed T-bar	40	M6	12	5	4,5	10	50	30	6
06150-106X50	fixed T-bar	50	M6	12	5	4,5	10	50	40	6
06150-108X50	fixed T-bar	50	M8	14	6	6	12	60	35	7,5
06150-108X60	fixed T-bar	60	M8	14	6	6	12	60	45	7,5
06150-110X60	fixed T-bar	60	M10	18	8	8	14	80	40	9
06150-110X70	fixed T-bar	70	M10	18	8	8	14	80	50	9
06150-112X70	fixed T-bar	70	M12	20	10	8	18	100	50	10
06150-112X80	fixed T-bar	80	M12	20	10	8	18	100	60	10
06150-116X75	fixed T-bar	75	M16	24	12	12	20	120	55	12
06150-116X90	fixed T-bar	90	M16	24	12	12	20	120	70	12
06150-116X110	fixed T-bar	110	M16	24	12	12	20	120	90	12
06150-120X75	fixed T-bar	75	M20	30	16	15,5	28	140	55	14
06150-120X90	fixed T-bar	90	M20	30	16	15,5	28	140	70	14
06150-120X110	fixed T-bar	110	M20	30	16	15,5	28	140	90	14
06150-210X40	sliding T-bar	40	M10	18	8	8	32	80	30	9
06150-210X50	sliding T-bar	50	M10	18	8	8	32	80	40	9
06150-212X50	sliding T-bar	50	M12	20	10	8	35	100	40	10
06150-212X60	sliding T-bar	60	M12	20	10	8	35	100	50	10
06150-216X55	sliding T-bar	55	M16	24	13	12	40	120	45	12
06150-216X70	sliding T-bar	70	M16	24	13	12	40	120	60	12
06150-216X90	sliding T-bar	90	M16	24	13	12	40	120	80	12
06150-220X55	sliding T-bar	55	M20	30	16	15,5	45	140	45	14
06150-220X70	sliding T-bar	70	M20	30	16	15,5	45	140	60	14
06150-220X90	sliding T-bar	90	M20	30	16	15,5	45	140	80	14

Palm grips

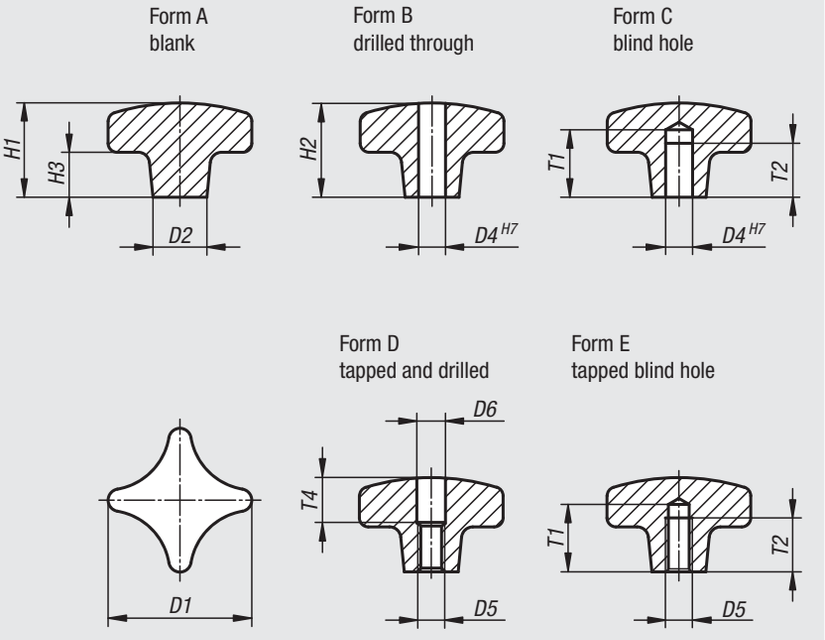
aluminium, similar to DIN 6335

Material:
Aluminium.

Version:
Vibratory ground or ground and polished.

Sample order:
nlm 06156-104008

On request:
Blank palm grips (not tumbled).



Order No.	Version	Form	D1	D2	H1	H3
06156-104008	tumbled	A	40	14	26	14
06156-105010	tumbled	A	50	18	34	20
06156-106312	tumbled	A	63	25	42	25
06156-108016	tumbled	A	80	25	52	30

Order No. tumbled	Order No. polished	Form	D1	D2	D4	H2	H3
06156-204008	**06156-2040082**	B	40	14	8	25	14
06156-205010	**06156-2050102**	B	50	18	10	32	20
06156-206312	**06156-2063122**	B	63	25	12	40	25
06156-208016	**06156-2080162**	B	80	25	16	50	30

Order No. tumbled	Order No. polished	Form	D1	D2	D4	H1	H3	T1	T2
06156-304008	**06156-3040082**	C	40	14	8	26	14	18	15
06156-305010	**06156-3050102**	C	50	18	10	34	20	21	18
06156-306312	**06156-3063122**	C	63	25	12	42	25	25	22
06156-308016	**06156-3080162**	C	80	25	16	52	30	32	28

Order No. tumbled	Order No. polished	Form	D1	D2	D5	D6	H2	H3	T4
06156-404008	**06156-4040082**	D	40	14	M8	8,4	25	14	12
06156-405010	**06156-4050102**	D	50	18	M10	10,5	32	20	16
06156-406312	**06156-4063122**	D	63	25	M12	13	40	25	20
06156-408016	**06156-4080162**	D	80	25	M16	17	50	30	30

Order No. tumbled	Order No. polished	Form	D1	D2	D5	H1	H3	T1	T2
06156-504008	**06156-5040082**	E	40	14	M8	26	14	18	15
06156-505010	**06156-5050102**	E	50	18	M10	34	20	21	18
06156-506312	**06156-5063122**	E	63	25	M12	42	25	25	22
06156-508016	**06156-5080162**	E	80	25	M16	52	30	32	28

Palm grips

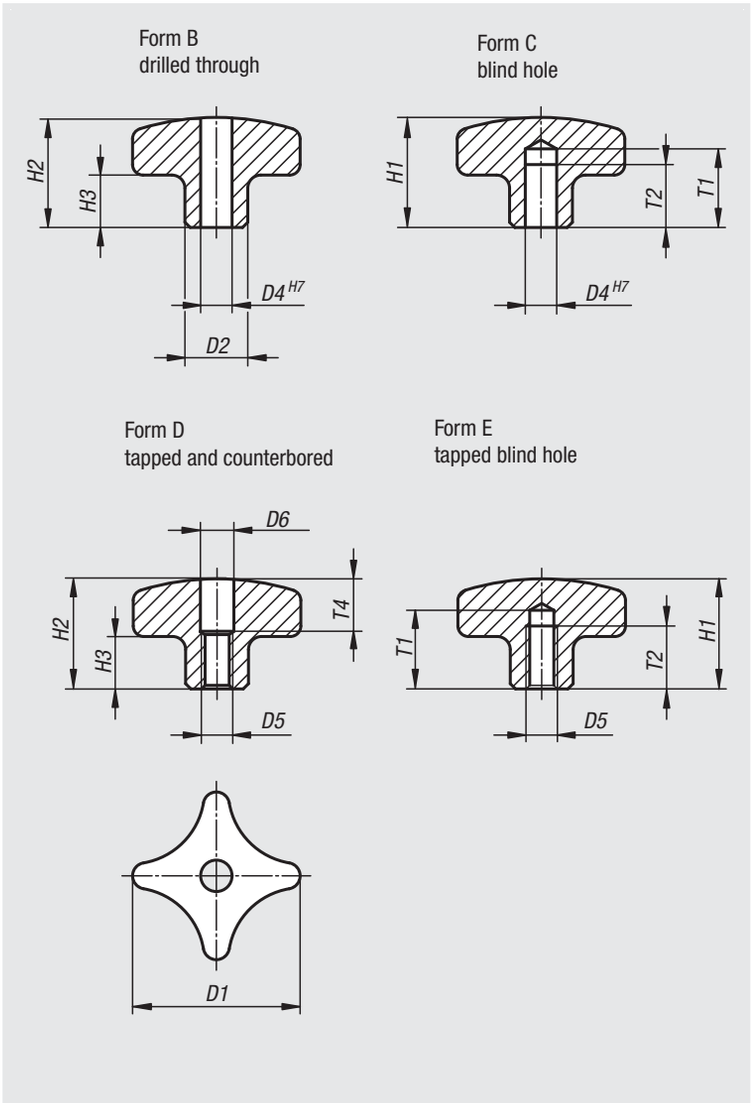
stainless steel, similar to DIN 6335

Material:
Stainless steel 1.4308.

Version:
Ground and polished.

Sample order:
nlm 06158-2032062

On request:
With external thread.



Order No. Form B	Order No. Form C	Version	D1	D2	D4	H1	H2	H3	T1	T2
06158-2032062	**06158-3032062**	polished	32	12	6	-/21	20/-	10	-/15	-/12
06158-2040082	**06158-3040082**	polished	40	14	8	-/26	25/-	13	-/18	-/15
06158-2050102	**06158-3050102**	polished	50	18	10	-/34	32/-	17	-/21	-/18
06158-2063122	**06158-3063122**	polished	63	20	12	-/42	40/-	21	-/25	-/22

Order No. Form D	Order No. Form E	Version	D1	D2	D5	D6	H1	H2	H3	T1	T2	T4
06158-4032062	**06158-5032062**	polished	32	12	M6	6,4/-	-/21	20/-	10	-/15	-/12	10/-
06158-4040082	**06158-5040082**	polished	40	14	M8	8,4/-	-/26	25/-	13	-/18	-/15	12/-
06158-4050102	**06158-5050102**	polished	50	18	M10	10,5/-	-/34	32/-	17	-/21	-/18	16/-
06158-4063122	**06158-5063122**	polished	63	20	M12	13/-	-/42	40/-	21	-/25	-/22	20/-

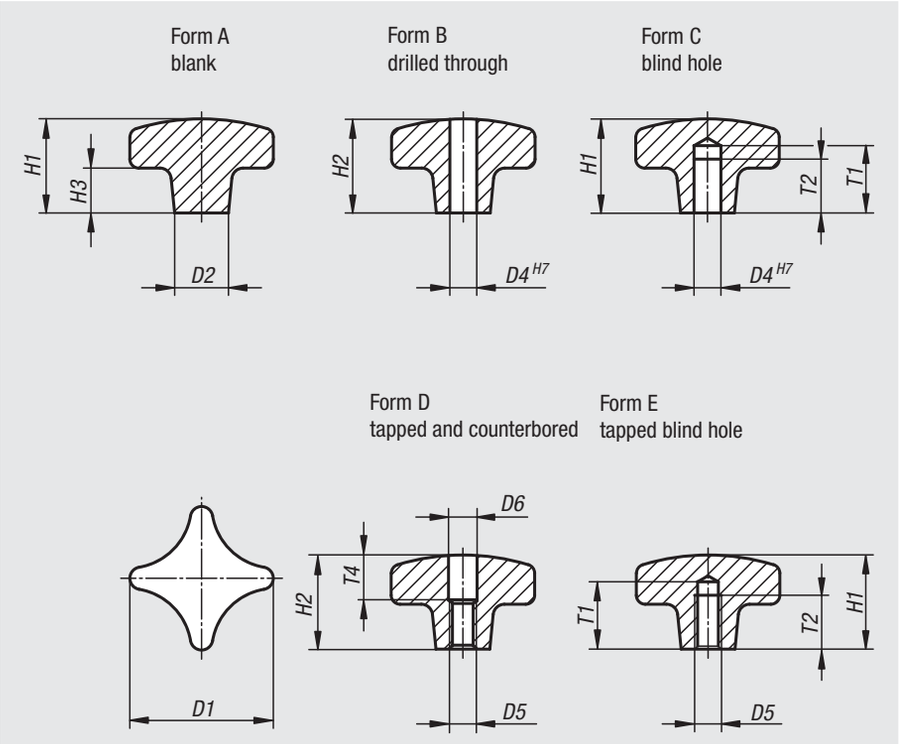
Palm grips

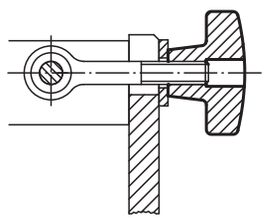
grey cast iron DIN 6335

Material:
Grey cast iron GJL 200.

Version:
Vibratory ground.
bright.

Sample order:
nlm 06160-106





Order No. Form A	Order No. Form B	Version	D1	D2	D4	H1	H2	H3
06160-106	**06160-206**	tumbled	32	12	-/6	21/-	-/20	10
06160-108	**06160-208**	tumbled	40	14	-/8	26/-	-/25	14
06160-110	**06160-210**	tumbled	50	18	-/10	34/-	-/32	20
06160-112	**06160-212**	tumbled	63	20	-/12	42/-	-/40	25
06160-116	**06160-216**	tumbled	80	25	-/16	52/-	-/50	30
06160-120	**06160-220**	tumbled	100	32	-/20	65/-	-/63	38

Order No. Form C	Order No. Form D	Order No. Form E	Version	D1	D2	D4	D5	D6	H1	H2	H3	T1	T2	T4
06160-306	**06160-406**	**06160-506**	tumbled	32	12	6/-/-	-/M6/M6	-/6,4/-	21/-/21	-/20/-	10	15/-/15	12/-/12	-/10/-
06160-308	**06160-408**	**06160-508**	tumbled	40	14	8/-/-	-/M8/M8	-/8,4/-	26/-/26	-/25/-	14	18/-/18	15/-/15	-/12/-
06160-310	**06160-410**	**06160-510**	tumbled	50	18	10/-/-	-/M10/M10	-/10,5/-	32/-/32	-/32/-	20	21/-/21	18/-/18	-/16/-
06160-312	**06160-412**	**06160-512**	tumbled	63	20	12/-/-	-/M12/M12	-/13/-	42/-/42	-/40/-	25	25/-/25	22/-/22	-/20/-
06160-316	**06160-416**	**06160-516**	tumbled	80	25	16/-/-	-/M16/M16	-/17/-	52/-/52	-/50/-	30	32/-/32	28/-/28	-/30/-
06160-320	**06160-420**	**06160-520**	tumbled	100	32	20/-/-	-/M20/M20	-/21/-	65/-/65	-/63/-	38	40/-/40	36/-/36	-/38/-

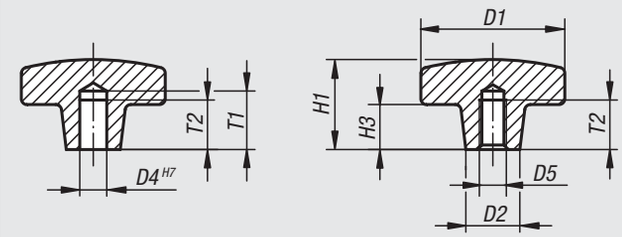
06161

Palm grips

plastic coated grey cast iron, DIN 6335

Form C
blind hole

Form E
tapped blind hole



Material:
Grey cast iron GJL 200.

Version:
Plastic coated.

Sample order:
nlm 06161-212

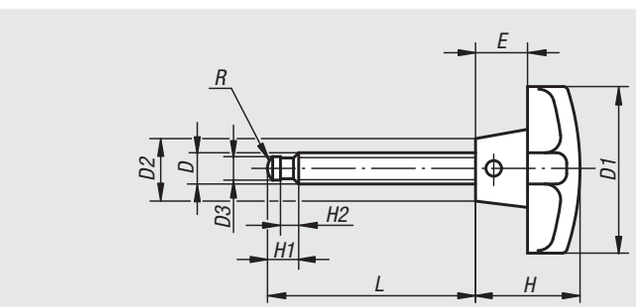
Note:
Pure orange RAL 2004.
Jet black RAL 9005.

Order No. Colour orange	Order No. Colour black	Form	D1	D2	D4	D5	H1	H3	T1	T2
06161-108	**06161-208**	C	40	14	8	-	26	14	18	15
06161-110	**06161-210**	C	50	18	10	-	34	20	21	18
06161-112	**06161-212**	C	63	20	12	-	42	25	25	22
06161-116	**06161-216**	C	80	25	16	-	52	30	32	28
06161-308	**06161-408**	E	40	14	-	M8	26	14	-	15
06161-310	**06161-410**	E	50	18	-	M10	34	20	-	18
06161-312	**06161-412**	E	63	20	-	M12	42	25	-	22
06161-316	**06161-416**	E	80	25	-	M16	52	30	-	28

06170

Palm grips

with threaded spindle



Material:
Palm grip grey cast iron;
Grup screw steel

Version:
Palm grip painted.
Grub screw black oxidised.

Sample order:
nlm 06170-100064

Note:
The grub screw is screwed and pinned into the palm grip.

Order No.	D	D1	D2	D3	E	H	H1	H2	L	R
06170-060020	M6	32	12	4,5	10	20	6	2,5	20	3
06170-060040	M6	32	12	4,5	10	20	6	2,5	40	3
06170-080027	M8	40	14	6	14	25	7,5	3	27	5
06170-080047	M8	40	14	6	14	25	7,5	3	47	5
06170-100044	M10	50	18	8	20	32	9	4,5	44	6
06170-100064	M10	50	18	8	20	32	9	4,5	64	6
06170-120040	M12	63	20	8	25	40	10	4,5	40	6
06170-120060	M12	63	20	8	25	40	10	4,5	60	6
06170-120080	M12	63	20	8	25	40	10	4,5	80	6
06170-160052	M16	80	25	12	30	50	12	5	52	9
06170-160072	M16	80	25	12	30	50	12	5	72	9
06170-160097	M16	80	25	12	30	50	12	5	97	9

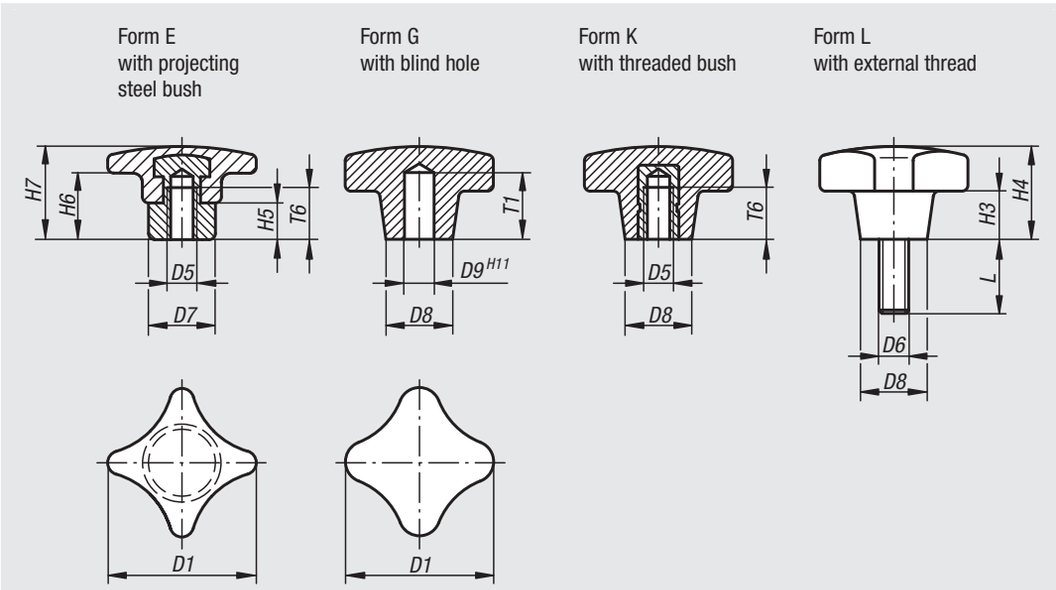
Palm grips

similar to DIN 6335

Material:
Black Duroplast PF 31.
Bush and screw galvanized steel.

Version:
High-gloss polished.

Sample order:
nlm 06180-505X30
(include length L)



Order No.	Form	D1	D5	D7	H5	H6	H7	T6
06180-306	E	32	M6	12	9	12	23	12
06180-308	E	40	M8	14	10	13	26	15
06180-310	E	50	M10	18	12	18	32	18
06180-312	E	63	M12	20	14	23	40	22
06180-316	E	80	M16	25	17	28	50	28

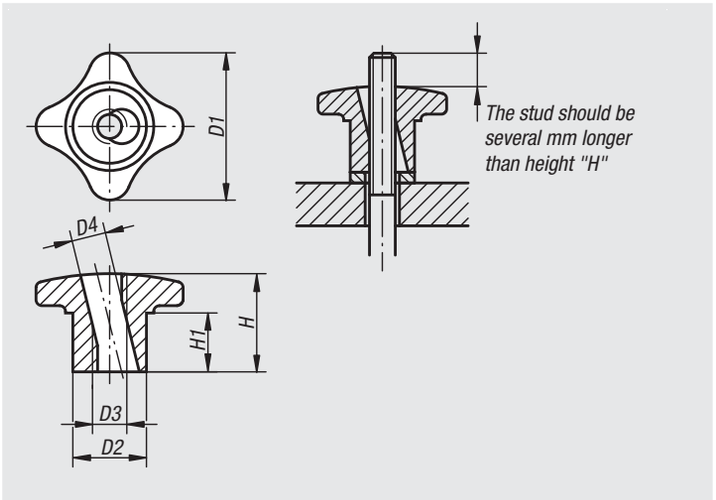
Order No.	Form	D1	D8	D9	H3	H4	T1
06180-405	G	25	12	5	8	16	12
06180-406	G	32	14	6	10	20	15
06180-408	G	40	18	8	13	25	18
06180-410	G	50	22	10	20	32	21
06180-412	G	63	26	12	25	40	25

Order No.	Form	D1	D5	D8	H3	H4	T6
06180-205	K	25	M5	12	8	16	9,5
06180-206	K	32	M6	14	10	20	12
06180-208	K	40	M8	18	13	25	14
06180-210	K	50	M10	22	20	32	18
06180-212	K	63	M12	26	25	40	22
06180-216	K	80	M16	35	30	50	30

Order No.	Form	D1	D6	D8	H3	H4	L
06180-505X	L	25	M5	12	8	16	15/20/25/30/40/50
06180-506X	L	32	M6	14	10	20	15/20/25/30/40/50
06180-508X	L	40	M8	18	13	25	20/25/30/35/40/45/50
06180-510X	L	50	M10	22	20	32	20/25/30/35/40/45/50
06180-512X	L	63	M12	26	25	40	20/30/40/50/60

Palm grips quick-acting

grey cast iron

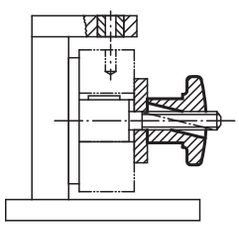


Material:
Grey cast iron GJL 300

Version:
Vibratory ground.

Sample order:
nlm 06190-08

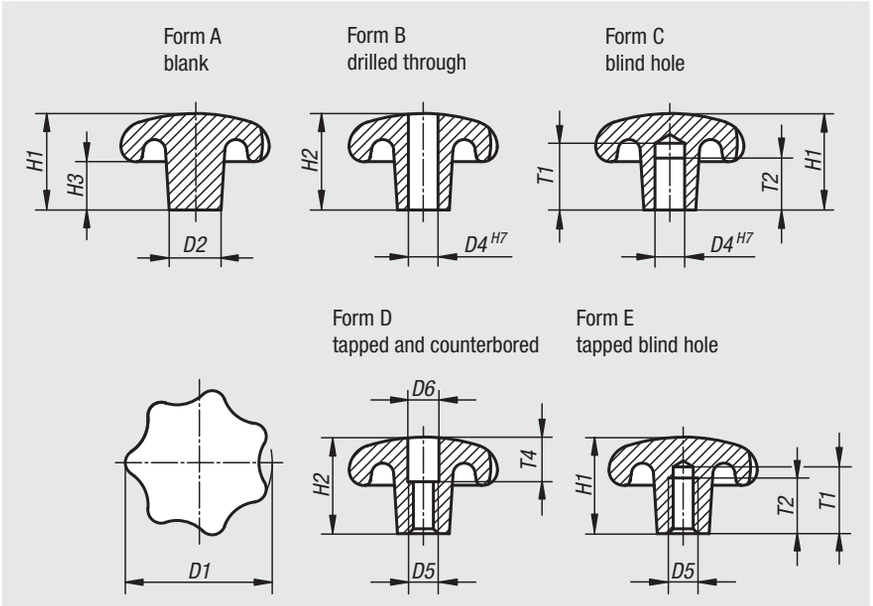
Note:
Quick-acting palm grips can be used on all fixtures that do not require a high clamping force.
Tilt the grip to slide on, then straighten it to engage the threads.



Order No.	D1	D2	D3	D4	H	H1
06190-06	30	15	M6	7	20	10
06190-08	40	18	M8	9,4	25	14
06190-10	50	21	M10	11,3	30	16
06190-12	60	26	M12	13,1	35	19
06190-14	70	30	M14	15,6	40	22
06190-16	80	34	M16	17,6	45	25

Star grips

aluminium, similar to DIN 6336



Material:
Aluminium.

Version:
Vibratory ground or ground and polished.

Sample order:
nlm 06192-14008

On request:
Blank star grips (not tumbled).

Order No.	Version	Form	D1	D2	H1	H3
06192-14008	tumbled	A	40	14	26	13
06192-15010	tumbled	A	50	18	34	17
06192-16312	tumbled	A	63	20	42	21
06192-18016	tumbled	A	80	25	52	25

Order No. tumbled	Order No. polished	Form	D1	D2	D4	H2	H3
06192-24008	**06192-240082**	B	40	14	8	25	13
06192-25010	**06192-250102**	B	50	18	10	32	17
06192-26312	**06192-263122**	B	63	20	12	40	21
06192-28016	**06192-280162**	B	80	25	16	50	25

Order No. tumbled	Order No. polished	Form	D1	D2	D4	H1	H3	T1	T2
06192-34008	**06192-340082**	C	40	14	8	26	13	18	15
06192-35010	**06192-350102**	C	50	18	10	34	17	21	18
06192-36312	**06192-363122**	C	63	20	12	42	21	25	22
06192-38016	**06192-380162**	C	80	25	16	52	25	32	28

Order No. tumbled	Order No. polished	Form	D1	D2	D5	D6	H2	H3	T4
06192-44008	**06192-440082**	D	40	14	M8	8,4	25	13	12
06192-45010	**06192-450102**	D	50	18	M10	10,5	32	17	16
06192-46312	**06192-463122**	D	63	20	M12	13	40	21	20
06192-48016	**06192-480162**	D	80	25	M16	17	50	25	30

Order No. tumbled	Order No. polished	Form	D1	D2	D5	H1	H3	T1	T2
06192-54008	**06192-540082**	E	40	14	M8	26	13	18	15
06192-55010	**06192-550102**	E	50	18	M10	34	17	21	18
06192-56312	**06192-563122**	E	63	20	M12	42	21	25	22
06192-58016	**06192-580162**	E	80	25	M16	52	25	32	28

Star grips

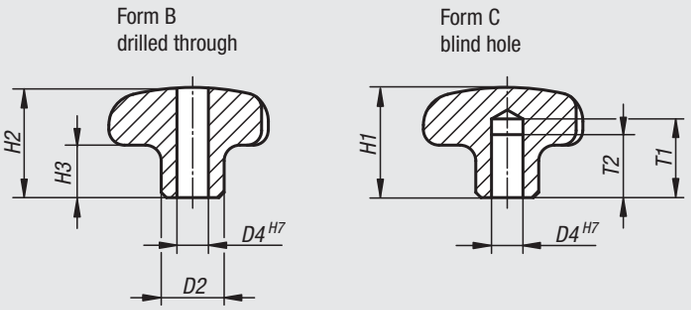
stainless steel, similar to DIN 6336

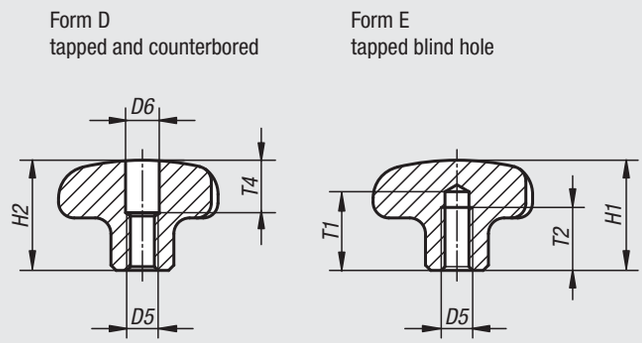
Material:
Stainless steel 1.4308.

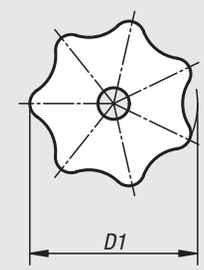
Version:
Ground and polished.

Sample order:
nlm 06194-232062

On request:
With external thread.







Order No. Form B	Order No. Form C	Version	D1	D2	D4	H1	H2	H3	T1	T2
06194-232062	**06194-332062**	polished	32	12	6	-/21	20/-	10	-/15	-/12
06194-240082	**06194-340082**	polished	40	14	8	-/26	25/-	13	-/18	-/15
06194-250102	**06194-350102**	polished	50	18	10	-/34	32/-	17	-/21	-/18
06194-263122	**06194-363122**	polished	63	20	12	-/42	40/-	21	-/25	-/22

Order No. Form D	Order No. Form E	Version	D1	D2	D5	D6	H1	H2	H3	T1	T2	T4
06194-432062	**06194-532062**	polished	32	12	M6	6,4/-	-/21	20/-	10	-/15	-/12	10/-
06194-440082	**06194-540082**	polished	40	14	M8	8,4/-	-/26	25/-	13	-/18	-/15	12/-
06194-450102	**06194-550102**	polished	50	18	M10	10,5/-	-/34	32/-	17	-/21	-/18	16/-
06194-463122	**06194-563122**	polished	63	20	M12	13/-	-/42	40/-	21	-/25	-/22	20/-

Star grips

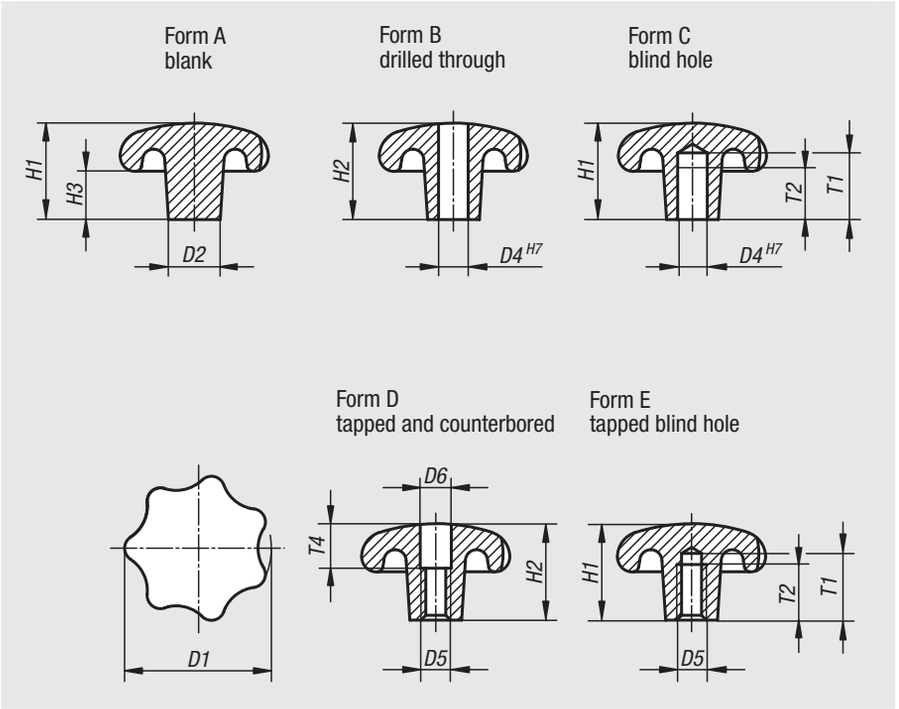
grey cast iron, DIN 6336

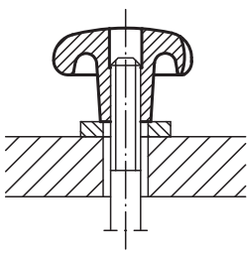
Material:
Grey cast iron GJL 200.

Version:
Vibratory ground.
bright.

Sample order:
nlm 06200-106

On request:
Grips with a plastic coating.





Order No. Form A	Order No. Form B	Version	D1	D2	D4	H1	H2	H3
06200-106	**06200-206**	tumbled	32	12	-/6	21/-	-/20	10
06200-108	**06200-208**	tumbled	40	14	-/8	26/-	-/25	13
06200-110	**06200-210**	tumbled	50	18	-/10	34/-	-/32	17
06200-112	**06200-212**	tumbled	63	20	-/12	42/-	-/40	21
06200-116	**06200-216**	tumbled	80	25	-/16	52/-	-/50	25

Order No. Form C	Order No. Form D	Order No. Form E	Version	D1	D2	D4	D5	D6	H1	H2	H3	T1	T2	T4
06200-306	**06200-406**	**06200-506**	tumbled	32	12	6/-/-	-/M6/M6	-/6,4/-	21/-/21	-/20/-	10	15/-/15	12/-/12	-/10/-
06200-308	**06200-408**	**06200-508**	tumbled	40	14	8/-/-	-/M8/M8	-/8,4/-	26/-/26	-/25/-	13	18/-/18	15/-/15	-/12/-
06200-310	**06200-410**	**06200-510**	tumbled	50	18	10/-/-	-/M10/M10	-/10,5/-	34/-/34	-/32/-	17	21/-/21	18/-/18	-/16/-
06200-312	**06200-412**	**06200-512**	tumbled	63	20	12/-/-	-/M12/M12	-/13/-	42/-/42	-/40/-	21	25/-/25	22/-/22	-/20/-
06200-316	**06200-416**	**06200-516**	tumbled	80	25	16/-/-	-/M16/M16	-/17/-	52/-/52	-/50/-	25	32/-/32	28/-/28	-/30/-

Star grips

similar to DIN 6336

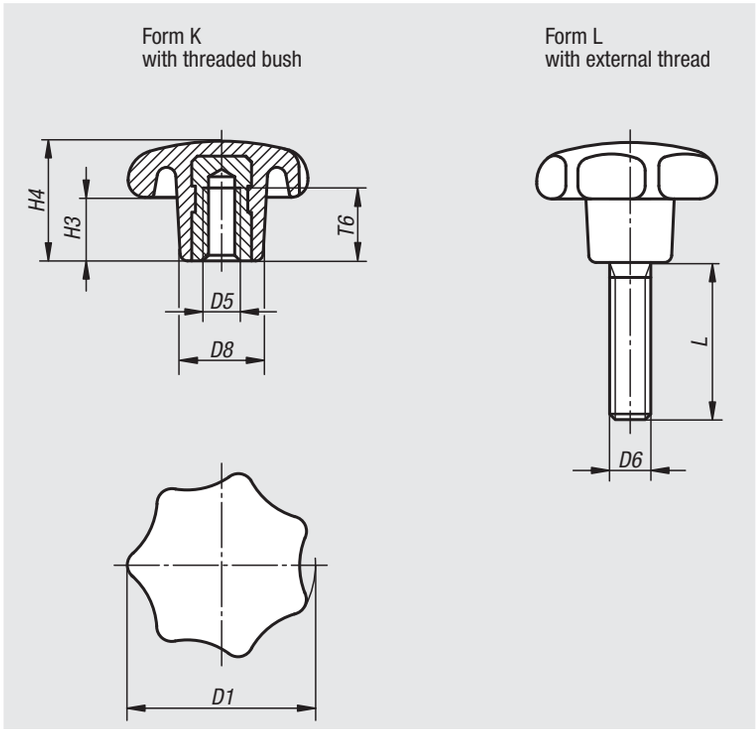
Material:
Duroplast PF 31, black.
Bush and screw steel, galvanized and blue chromed.

Version:
High-gloss polished.

Sample order:
nlm 06208-42505X15 (include length L)

Note:
The version 06208-22004 has a brass bush.

On request:
Other colours.



Star grips similar to DIN 6336 with internal thread, Form K

Order No.	Form	D1	D5	D8	H3	H4	T6
06208-22004	K	20	M4	10	7	13	6,5
06208-22505	K	25	M5	12	8	16	9,5
06208-23206	K	32	M6	14	10	20	12
06208-24008	K	40	M8	18	13	25	14
06208-25010	K	50	M10	22	17	32	18
06208-26312	K	63	M12	26	21	40	22
06208-28016	K	80	M16	35	25	50	30

Star grips similar to DIN 6336 with external thread, Form L

Order No.	Form	D1	D6	D8	H3	H4	L
06208-42505X	L	25	M5	12	8	16	15/20/25
06208-43206X	L	32	M6	14	10	20	15/20/25/30
06208-44008X	L	40	M8	18	13	25	20/25/30/35/40
06208-45010X	L	50	M10	22	17	32	25/30/35/40/50
06208-46312X	L	63	M12	26	21	40	30/35/40/50/60
06208-48016X	L	80	M16	35	25	50	30/40/50/60

Star grips

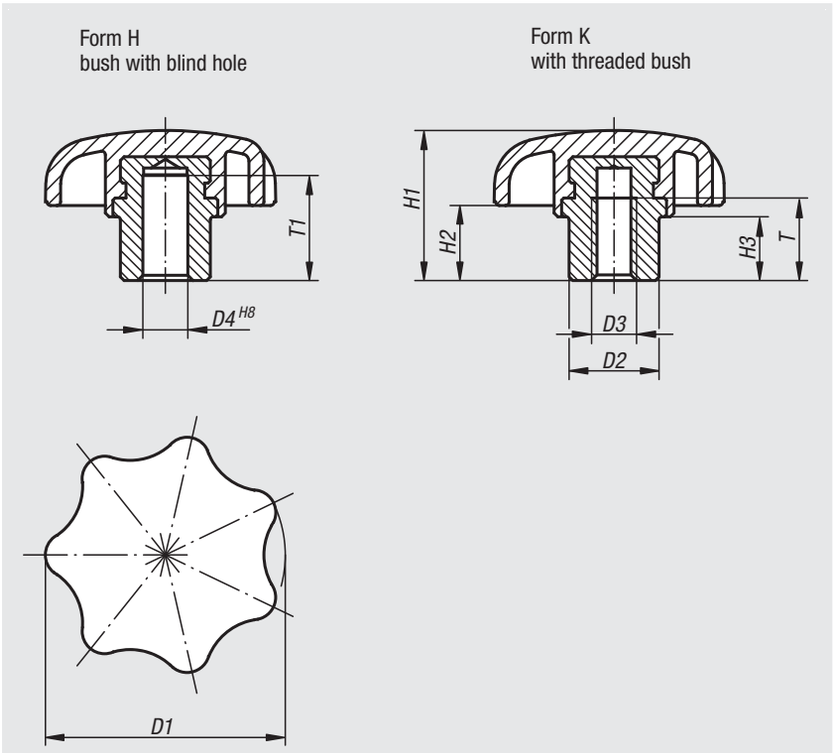
with projecting steel bush

Material:
Black thermoplastic.
Steel grade 5.8 or stainless steel 1.4305.

Version:
Metal parts blue chromed steel or bright stainless steel.

Sample order:
nlm 06210-2081

Note:
The projecting steel bush make these star grips especially suitable for cross pinning.



Star grips with projecting steel bush, Form H

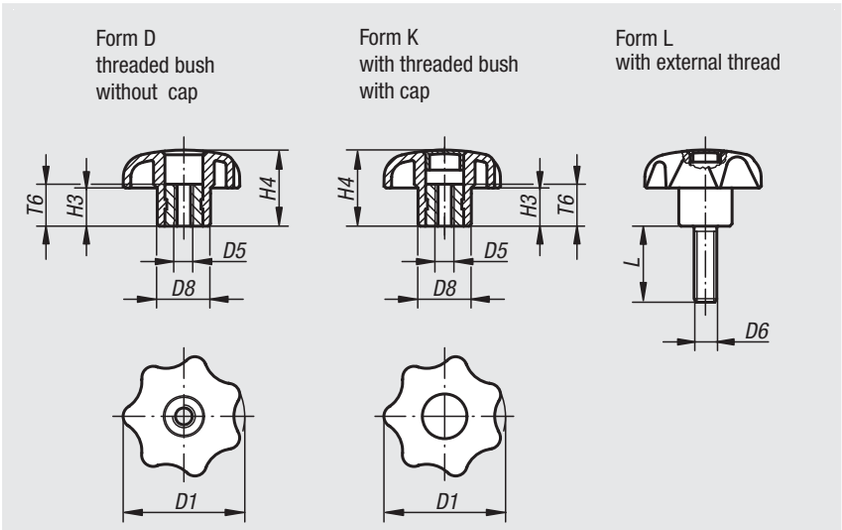
Order No.	Version	Form	D4	T1	D1	D2	H1	H2	H3
06210-105	bush in steel	H	5	9,5	25	10	16	8	6
06210-106	bush in steel	H	6	12	32	12	20	10	8,5
06210-1061	bush in steel	H	6	14	40	13,5	25	13	10
06210-108	bush in steel	H	8	14	40	13,5	25	13	10
06210-1081	bush in steel	H	8	18	50	19	32	17	12
06210-110	bush in steel	H	10	18	50	19	32	17	12
06210-1101	bush in steel	H	10	22	63	19	40	21	15
06210-112	bush in steel	H	12	22	63	19	40	21	15
06210-116	bush in steel	H	16	22	63	23	40	21	15

Star grips with projecting steel bush, Form K

Order No. bush in steel	Order No. bush in stainless steel	Form	D3	T	D1	D2	H1	H2	H3
06210-205	**06210-305**	K	M5	8,5	25	10	16	8	6
06210-206	**06210-306**	K	M6	12	32	12	20	10	8,5
06210-2061	**06210-3061**	K	M6	14	40	13,5	25	13	10
06210-208	**06210-308**	K	M8	14	40	13,5	25	13	10
06210-2081	**06210-3081**	K	M8	18	50	19	32	17	12
06210-210	**06210-310**	K	M10	18	50	19	32	17	12
06210-2101	**06210-3101**	K	M10	22	63	19	40	21	15
06210-212	**06210-312**	K	M12	22	63	19	40	21	15
06210-216	**06210-316**	K	M16	22	63	23	40	21	15

Star grips

metal parts stainless steel, similar to DIN 6336



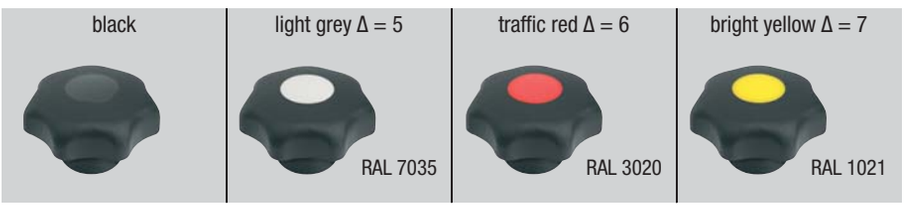
Material:
Black thermoplastic.
Bush and screw stainless steel 1.4305.

Version:
Bush and screw bright.

Sample order:
nlm 06212-4067X30
(cap colour bright yellow; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black caps.

On request:
Other colours or designs, such as company logo.



Star grips similar to DIN 6336, metal parts stainless steel, with internal thread, Form D

Order No.	Form	D1	D5	D8	H3	H4	T6
06212-505	D	25	M5	12	8	16	10
06212-506	D	32	M6	14	10	20	10
06212-508	D	40	M8	18	13	25	14
06212-510	D	50	M10	22	17	32	14
06212-512	D	63	M12	26	21	40	18

Star grips similar to DIN 6336, metal parts stainless steel, with internal thread, Form K

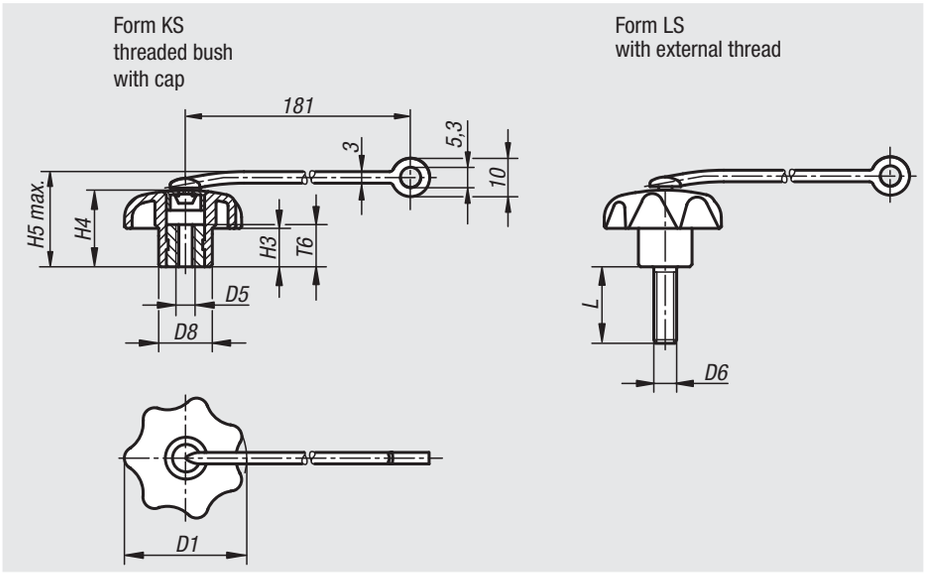
Order No.	Form	D1	D5	D8	H3	H4	T6
06212-205Δ	K	25	M5	12	8	16	10
06212-206Δ	K	32	M6	14	10	20	10
06212-208Δ	K	40	M8	18	13	25	14
06212-210Δ	K	50	M10	22	17	32	14
06212-212Δ	K	63	M12	26	21	40	18

Star grips similar to DIN 6336, metal parts stainless steel, with external thread, Form L

Order No.	Form	D1	D6	D8	H3	H4	L
06212-405ΔX	L	25	M5	12	8	16	15/20
06212-406ΔX	L	32	M6	14	10	20	20/30
06212-408ΔX	L	40	M8	18	13	25	15/20/25/30/40/60
06212-410ΔX	L	50	M10	22	17	32	25/30/40/50/60

Star grips with safety band

metal parts stainless steel, similar to DIN 6336



Material:
Grip thermoplastic.
Bush and screw stainless steel 1.4305.
Safety band elastic TPU.

Version:
Bush and screw bright.

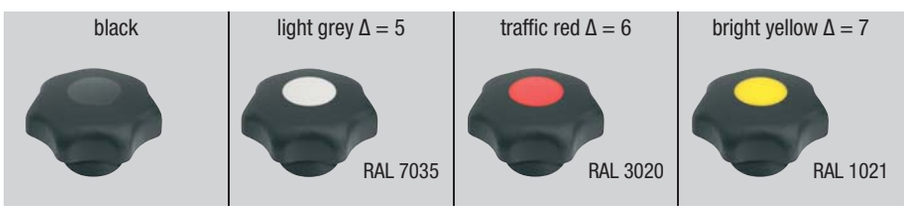
Sample order:
nlm 06212-7056X15 (cap colour: traffic red; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black caps.

Attach the safety band to a base to make the star grip unlosable. The star grip cannot be moved far from the object to which it belongs, simplifying screwing and unscrewing of the grip and ensuring against loss.

Assembly:
Do not stretch the band during assembly.
Make sure that the anchor is not too far from where the star grip is to be used.

Accessories:
The safety band is also available as an accessory, see 03198-04190.



Order No.	Form	D1	D5	D8	H3	H4	H5 max.	T6
06212-605Δ	KS	25	M5	12	8	16	22	10
06212-606Δ	KS	32	M6	14	10	20	26	10
06212-608Δ	KS	40	M8	18	13	25	31	14
06212-610Δ	KS	50	M10	22	17	32	38	14
06212-612Δ	KS	63	M12	26	21	40	46	18

Order No.	Form	D1	D6	D8	H3	H4	H5 max.	L
06212-705ΔX	LS	25	M5	12	8	16	22	15/20
06212-706ΔX	LS	32	M6	14	10	20	26	20/30
06212-708ΔX	LS	40	M8	18	13	25	31	15/20/25/30/40/60
06212-710ΔX	LS	50	M10	22	17	32	38	25/30/40/50/60

Star grips

similar to DIN 6336

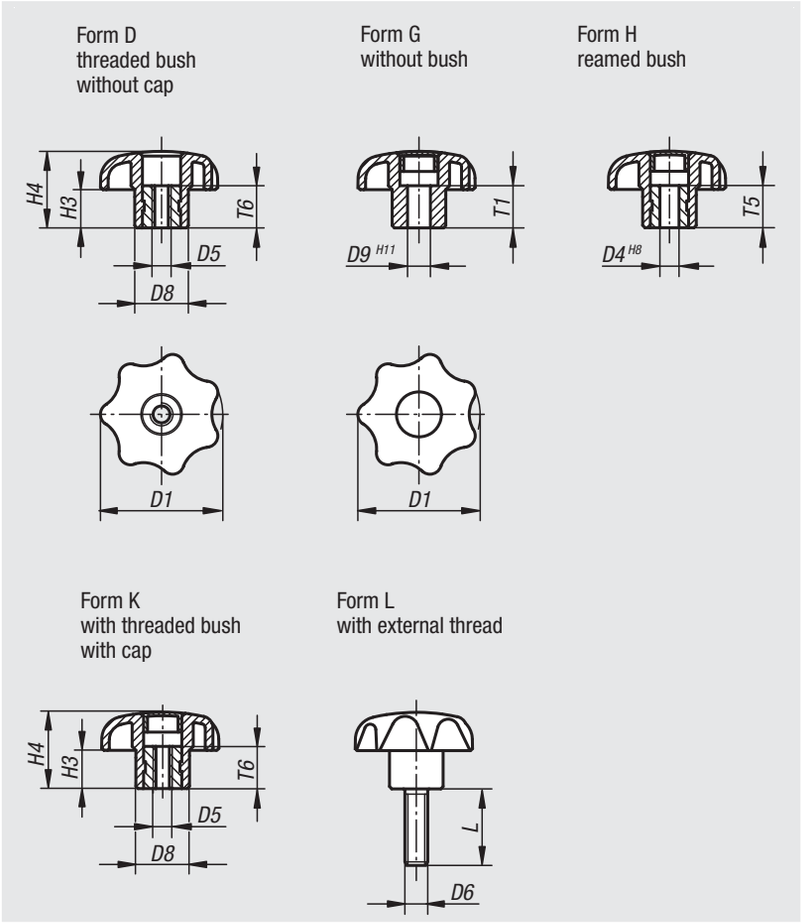
Material:
Black thermoplastic.
Bush and screw steel.

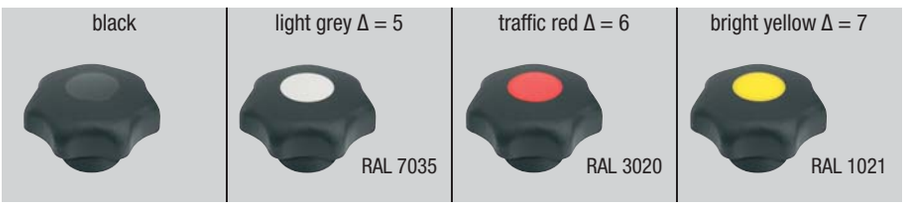
Version:
Bush and screw galvanized and blue chromed.

Sample order:
nlm 06220-4127X30 (cap colour bright yellow; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black caps.

On request:
Other colours or designs, such as company logo.





Star grips similar to DIN 6336 with internal thread, Form D

Order No.	Form	D1	D5	D8	H3	H4	T6
06220-504	D	25	M4	12	8	16	10
06220-505	D	25	M5	12	8	16	10
06220-5061	D	25	M6	12	8	16	10
06220-5051	D	32	M5	14	10	20	10
06220-506	D	32	M6	14	10	20	10
06220-508	D	40	M8	18	13	25	14
06220-5101	D	40	M10	18	13	25	14
06220-5081	D	50	M8	22	17	32	14
06220-510	D	50	M10	22	17	32	14
06220-5121	D	50	M12	22	17	32	18
06220-5102	D	63	M10	26	21	40	14
06220-512	D	63	M12	26	21	40	18
06220-516	D	63	M16	26	21	40	18

Star grips

similar to DIN 6336

examples of grip cap designs

Star grips similar to DIN 6336 with internal thread, Form K

Order No.	Form	D1	D5	D8	H3	H4	T6
06220-204Δ	K	25	M4	12	8	16	10
06220-205Δ	K	25	M5	12	8	16	10
06220-2061Δ	K	25	M6	12	8	16	10
06220-2051Δ	K	32	M5	14	10	20	10
06220-206Δ	K	32	M6	14	10	20	10
06220-208Δ	K	40	M8	18	13	25	14
06220-2101Δ	K	40	M10	18	13	25	14
06220-2081Δ	K	50	M8	22	17	32	14
06220-210Δ	K	50	M10	22	17	32	14
06220-2121Δ	K	50	M12	22	17	32	18
06220-2102Δ	K	63	M10	26	21	40	14
06220-212Δ	K	63	M12	26	21	40	18
06220-216Δ	K	63	M16	26	21	40	18

Star grips similar to DIN 6336 with reamed hole, Form G and H

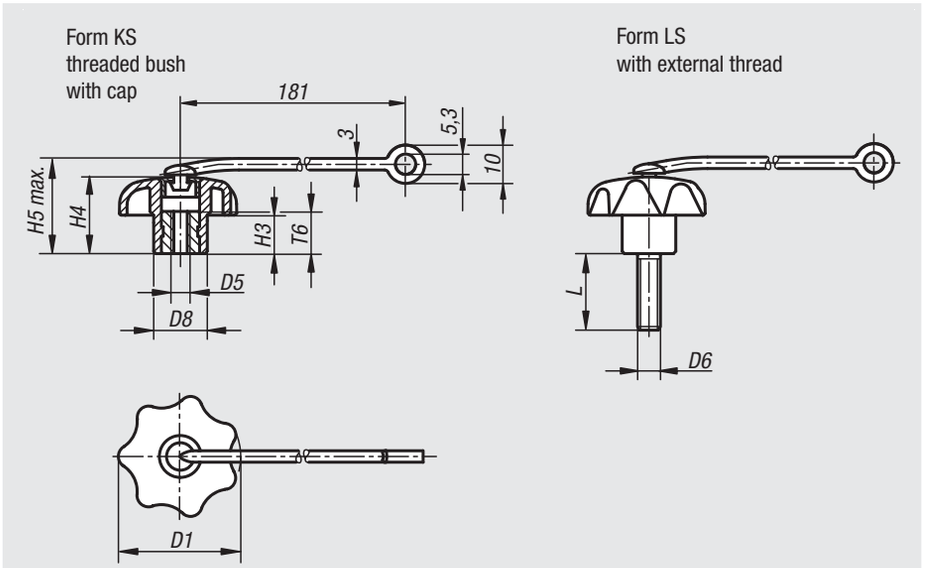
Order No. Form G	Order No. Form H	D1	D4	D8	D9	H3	H4	T1	T5
06220-305Δ	**06220-105Δ**	25	-/5	12	5/-	8	16	10/-	-/10
06220-306Δ	**06220-106Δ**	32	-/6	14	6/-	10	20	10/-	-/10
06220-308Δ	**06220-108Δ**	40	-/8	18	8/-	13	25	14/-	-/14
06220-310Δ	**06220-110Δ**	50	-/10	22	10/-	17	32	14/-	-/14
-	**06220-1101Δ**	63	10	26	-	21	40	-	14
06220-312Δ	**06220-112Δ**	63	-/12	26	12/-	21	40	18/-	-/18

Star grips similar to DIN 6336 with external thread, Form L

Order No.	Form	D1	D6	D8	H3	H4	L
06220-405ΔX	L	25	M5	12	8	16	10/15/20/25/30/35/40/45/50/60
06220-406ΔX	L	25	M6	12	8	16	10/15/20/25/30/35/40/45/50/60
06220-4061ΔX	L	32	M6	14	10	20	10/15/20/25/30/35/40/45/50/60
06220-408ΔX	L	32	M8	14	10	20	15/20/25/30/35/40/45/50/60
06220-4081ΔX	L	40	M8	18	13	25	15/20/25/30/35/40/45/50/60
06220-410ΔX	L	40	M10	18	13	25	15/20/25/30/35/40/45/50/60
06220-4101ΔX	L	50	M10	22	17	32	15/20/25/30/35/40/45/50/60
06220-412ΔX	L	50	M12	22	17	32	15/20/25/30/35/40/45/50/60
06220-4102ΔX	L	63	M10	26	21	40	20/25/30/35/40/45/50/60
06220-4121ΔX	L	63	M12	26	21	40	20/25/30/35/40/45/50/60
06220-416ΔX	L	63	M16	26	21	40	30/35/40/45/50/60

Star grips with safety band

similar to DIN 6336



Material:
Grip thermoplastic.
Bush and screw steel.
Safety band elastic TPU.

Version:
Bush and screw bright.

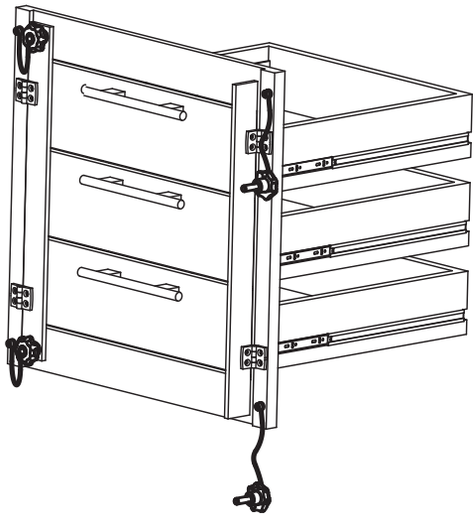
Sample order:
nlm 06220-7056X15
(cap colour traffic red; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black caps.

Attach the safety band to a base to make the star grip unlosable. The star grip cannot be moved far from the object to which it belongs, simplifying screwing and unscrewing of the grip and ensuring against loss.

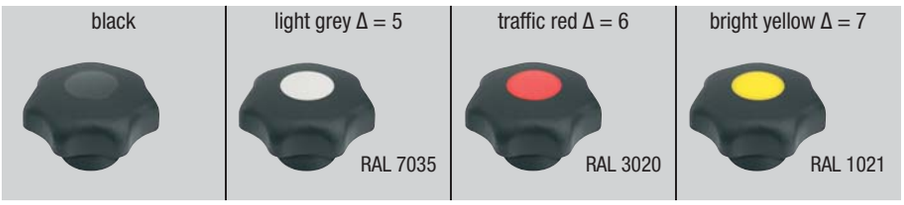
Assembly:
Do not stretch the band during assembly.
Make sure that the anchor is not too far from where the star grip is to be used.

Accessories:
The safety band is also available as an accessory, see 03198-04190.



Star grips with safety band

similar to DIN 6336



Order No.	Form	D1	D5	D8	H3	H4	H5 max.	T6
06220-604Δ	KS	25	M4	12	8	16	22	10
06220-605Δ	KS	25	M5	12	8	16	22	10
06220-6061Δ	KS	25	M6	12	8	16	22	10
06220-6051Δ	KS	32	M5	14	10	20	26	10
06220-606Δ	KS	32	M6	14	10	20	26	10
06220-608Δ	KS	40	M8	18	13	25	31	14
06220-6101Δ	KS	40	M10	18	13	25	31	14
06220-6081Δ	KS	50	M8	22	17	32	38	14
06220-610Δ	KS	50	M10	22	17	32	38	14
06220-6121Δ	KS	50	M12	22	17	32	38	14
06220-6102Δ	KS	63	M10	26	21	40	46	14
06220-612Δ	KS	63	M12	26	21	40	46	14
06220-616Δ	KS	63	M16	26	21	40	46	14

Order No.	Form	D1	D6	D8	H3	H4	H5 max.	L
06220-705ΔX	LS	25	M5	12	8	16	22	10/15/20/25/30/35/40/45/50/60
06220-706ΔX	LS	25	M6	12	8	16	22	10/15/20/25/30/35/40/45/50/60
06220-7061ΔX	LS	32	M6	14	10	20	26	10/15/20/25/30/35/40/45/50/60
06220-708ΔX	LS	32	M8	14	10	20	26	15/20/25/30/35/40/45/50/60
06220-7081ΔX	LS	40	M8	18	13	25	31	15/20/25/30/35/40/45/50/60
06220-710ΔX	LS	40	M10	18	13	25	31	15/20/25/30/35/40/45/50/60
06220-7101ΔX	LS	50	M10	22	17	32	38	15/20/25/30/35/40/45/50/60
06220-712ΔX	LS	50	M12	22	17	32	38	15/20/25/30/35/40/45/50/60
06220-7102ΔX	LS	63	M10	26	21	40	46	20/25/30/35/40/45/50/60
06220-7121ΔX	LS	63	M12	26	21	40	46	20/25/30/35/40/45/50/60
06220-716ΔX	LS	63	M16	26	21	40	46	30/35/40/45/50/60

06222

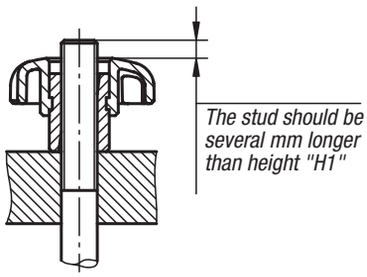
Star grips quick-acting

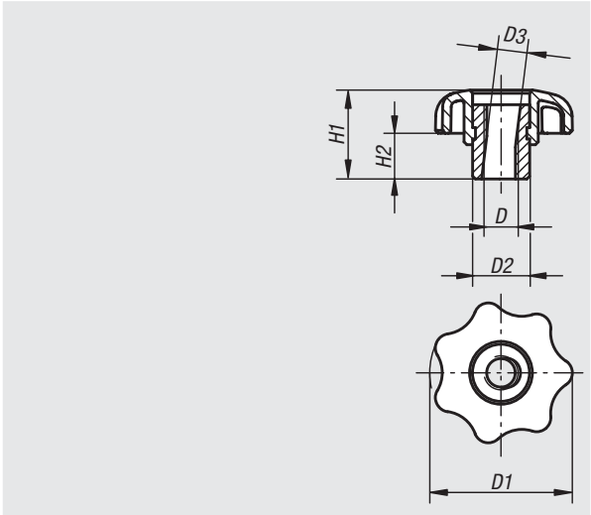
Material:
Black thermoplastic.
Bush steel.

Version:
Bush galvanized and blue chromed.

Sample order:
nlm 06222-06

Note:
Quick-acting star grips can be used on all fixtures that do not require a high clamping force.
Tilt the grip to slide on, then straighten it to engage the threads.

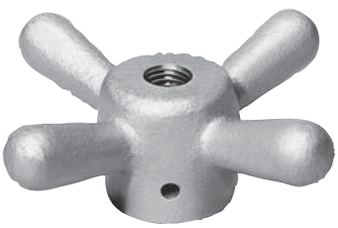




Order No.	D	D1	D2	D3	H1	H2
06222-05	M5	25	10	5,2	15,5	8
06222-06	M6	32	12	6,2	19,5	10
06222-08	M8	40	13,5	8,3	24,5	13
06222-10	M10	50	19	10,3	31	17
06222-12	M12	63	19	12,3	39,5	21

06230

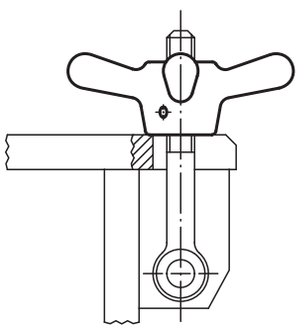
Four-spoked nuts

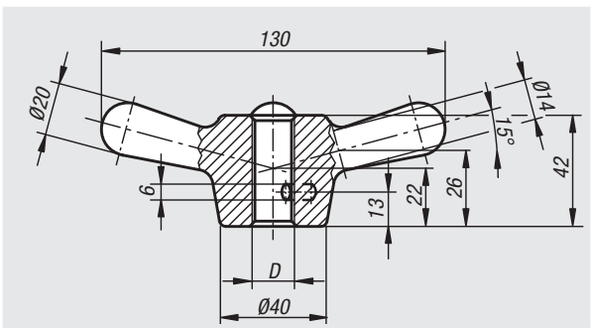


Material:
GJMW 350 malleable cast iron

Version:
Deburred and sand-blasted

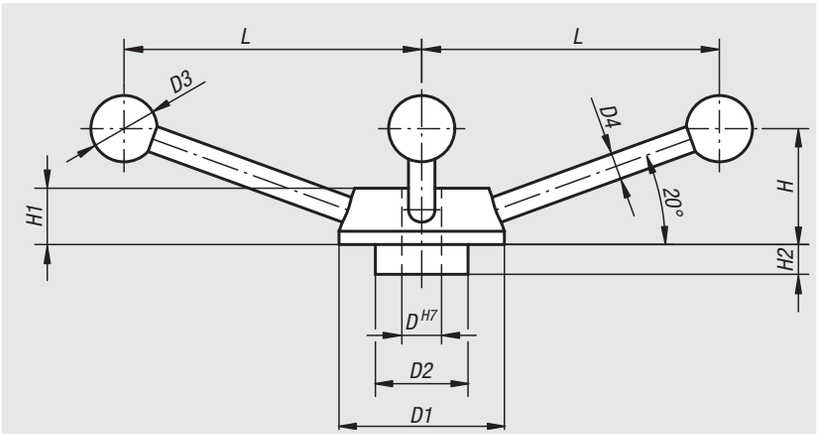
Sample order:
nlm 06230-20





Order No.	D
06230-16	M16
06230-20	M20
06230-24	M24

Capstan wheel



Material:
Wheel steel.
Ball knop thermoplastic

Version:
Wheel black oxidised.
Ball knob black.

Sample order:
nlm 06235-160

Order No.	D	D1	D2	D3	D4	H	H1	H2	L
06235-120	12	50	28	20	8	35	17	9	90
06235-140	14	55	30	25	10	38	18	10	99
06235-160	16	65	35	30	12	45	20	12	119
06235-200	20	80	44	40	14	56	24	16	150

Notes

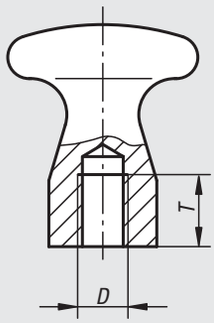
Knobs flat

Material:
Steel.

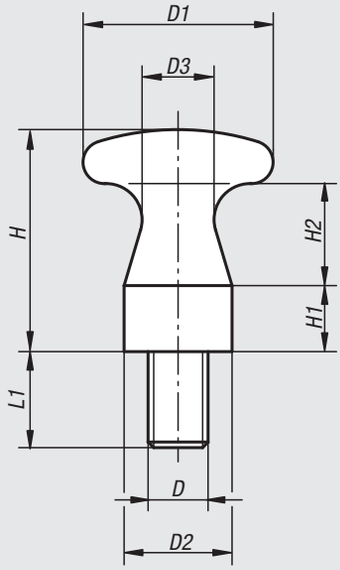
Version:
Black oxidised.

Sample order:
nlm 06237-08

Flat knob
with internal thread



Flat knob
with external thread



Knobs flat, internal thread

Order No.	D	D1	D2	D3	H	H1	H2	T
06237-05	M5	16	10	6	18	5	9	7
06237-06	M6	25	14	10	29	9	13	9
06237-08	M8	32	18	12	37	11	17	12
06237-10	M10	36	20	13	42	12	20	15

Knobs flat, external thread

Order No.	D	D1	D2	D3	H	H1	H2	L1
06237-06010	M6	16	10	6	18	5	9	10
06237-08014	M8	25	14	10	29	9	13	14
06237-10016	M10	32	18	12	37	11	17	16
06237-12018	M12	36	20	13	42	12	20	18

Mushroom knobs

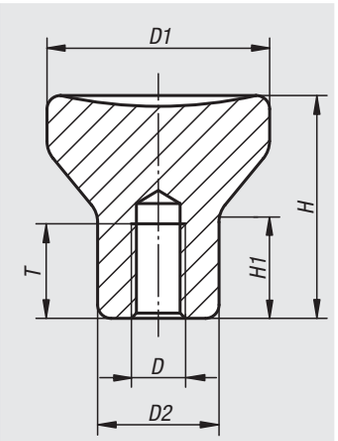
internal thread, steel or stainless steel

Material:
Steel, Stainless steel, and Aluminium.

Version:
Steel, galvanised and blue chromed.
Stainless steel, electropolished.
Aluminium, natural tone anodized.

Sample order:
nlm 06240-104

On request:
With external threads.



Order No. steel	Order No. stainless steel	Order No. Aluminium	D	D1	D2	H	H1	T
06240-0902	06240-902	06240-1902	M2	14	8	14	6,7	4
06240-0003	06240-003	06240-1003	M3	18	10	18	8,6	7,5
06240-0104	06240-104	06240-1104	M4	21	12	21	10	10
06240-0105	06240-105	06240-1105	M5	21	12	21	10	12,5
06240-0206	06240-206	06240-1206	M6	25	14	25	12	12
06240-0308	06240-308	06240-1308	M8	33	18	33	16	16
06240-0410	06240-410	06240-1410	M10	40	24	40	18,7	20

Mushroom knobs

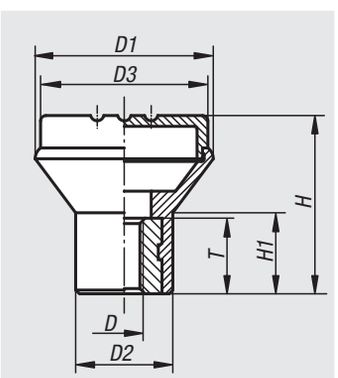
internal thread

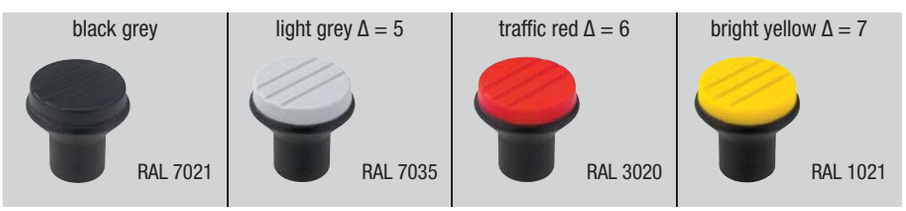
Material:
Thermoplastic, black grey.
Bush steel 5.8 or
stainless steel 1.4305.

Version:
Blue-chromed steel or bright stainless steel.

Sample order:
nlm 06241-046 (cap colour traffic red)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

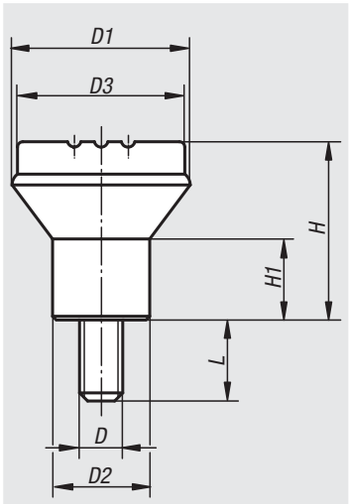




Order No. bush steel	Order No. bush stainless steel	Size	D	D1	D2	D3	H	H1	T
06241-04Δ	06241-004Δ	1	M4	21	12	19	21	10	10
06241-05Δ	06241-005Δ	1	M5	21	12	19	21	10	10
06241-06Δ	06241-006Δ	2	M6	25	14	23	25	12	10
06241-08Δ	06241-008Δ	3	M8	33	19	31	33	15	14

Mushroom knobs

external thread



Material:
Thermoplastic, black grey.
Screw steel 5.8 or
stainless steel 1.4305.

Version:
Steel blue-chromed or
stainless steel bright.

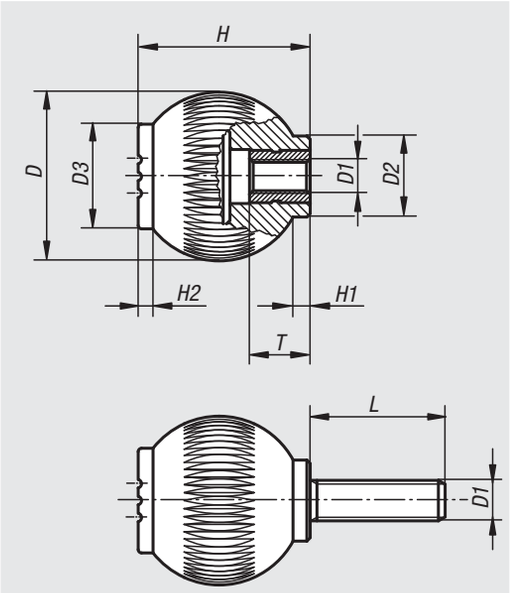
Sample order:
nlm 06242-046X10
(cap colour traffic red, include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No. bolts steel	Order No. bolts stainless steel	Size	D	D1	D2	D3	H	H1	L
06242-04ΔX10	**06242-004ΔX10**	1	M4	21	12	19	21	10	10
06242-05ΔX10	**06242-005ΔX10**	1	M5	21	12	19	21	10	10
06242-06ΔX15	**06242-006ΔX15**	2	M6	25	14	23	25	12	15
06242-08ΔX15	**06242-008ΔX15**	3	M8	33	19	31	33	15	15

Spherical knobs



Material:
Thermoplastic, black grey.
Bush and screw steel 5.8 or stainless steel 1.4305.

Version:
Steel blue-chromed or stainless steel bright.

Sample order:
nlm 06245-1066X15
(cap colour traffic red; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

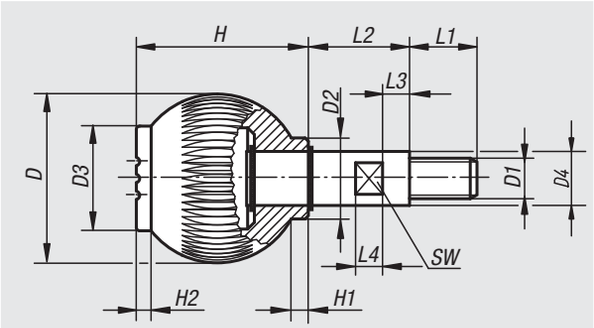
black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No. bush steel	Order No. bush stainless steel	Size	D	D1	D2	D3	H	H1	H2	T
06245-106Δ	**06245-0106Δ**	1	25	M6	12	17	25	2,5	2,2	10
06245-208Δ	**06245-0208Δ**	2	32	M8	15,5	19	33	3,2	2,8	14
06245-310Δ	**06245-0310Δ**	3	40	M10	19	23	41,5	4	3,5	14
06245-410Δ	**06245-0410Δ**	4	50	M10	24	31	51	5	4,4	14
06245-412Δ	**06245-0412Δ**	4	50	M12	24	31	51	5	4,4	18

Order No. screw steel	Order No. screw stainless steel	Size	D	D1	D2	D3	H	H1	H2	L
06245-106ΔX	**06245-0106ΔX**	1	25	M6	12	17	25	2,5	2,2	15/20/25/30
06245-208ΔX	**06245-0208ΔX**	2	32	M8	15,5	19	33	3,2	2,8	20/25/30/40
06245-310ΔX	**06245-0310ΔX**	3	40	M10	19	23	41,5	4	3,5	20/30/40
06245-410ΔX	**06245-0410ΔX**	4	50	M10	24	31	51	5	4,4	20/30/40
06245-412ΔX	**06245-0412ΔX**	4	50	M12	24	31	51	5	4,4	20/30/40

Spherical knobs

revolving

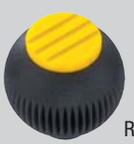


Material:
Thermoplastic, black grey.
Axis steel 5.8 or stainless steel 1.4305.

Version:
Steel blue-chromed or stainless steel bright.
Circlips galvanized, including stainless steel version.

Sample order:
nlm 06246-1066 (cap colour traffic red)

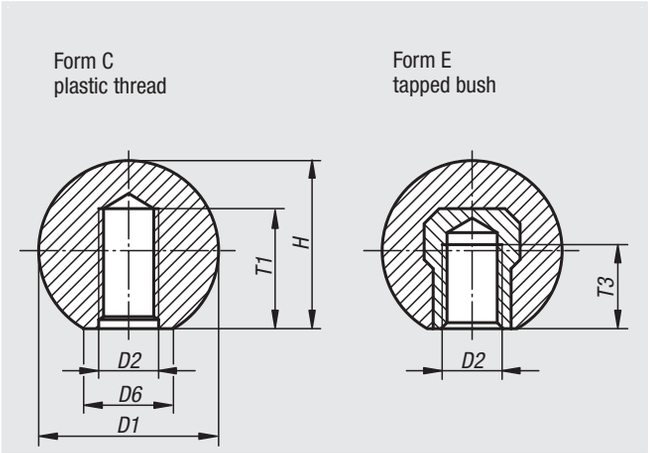
Note:
Δ Add the desired cap colour here.
No colour code is required for black grey caps.

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	 RAL 1021

Order No. pin steel	Order No. pin stainless steel	Size	D	D1	D2	D3	D4	H	H1	H2	L1	L2	L3	L4	SW
06246-106Δ	**06246-0106Δ**	1	25	M6	12	17	8	25	2,5	2,2	10	15	5	5	7
06246-208Δ	**06246-0208Δ**	2	32	M8	15,5	19	10	33	3,2	2,8	12	20	6	6	8
06246-310Δ	**06246-0310Δ**	3	40	M10	19	23	13	41,5	4	3,5	15	25	7	9	10
06246-412Δ	**06246-0412Δ**	4	50	M12	24	31	16	51	5	4,4	20	30	8	8	13

Ball knobs

thermoplastic DIN 319 enhanced



Material:
Black thermoplastic.
Bush steel.

Version:
Steel galvanized.

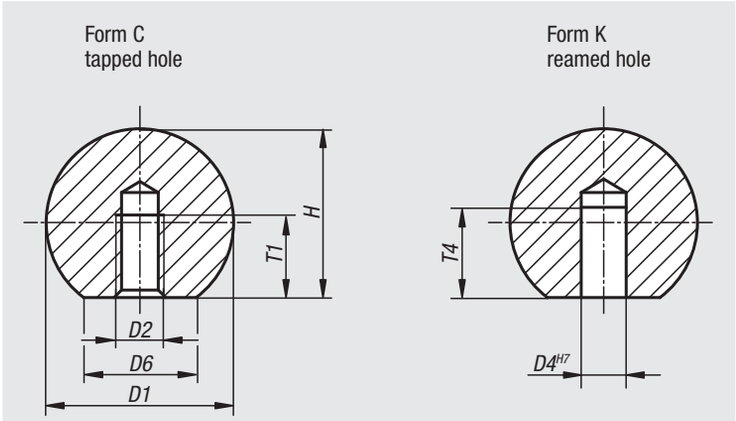
Sample order:
nlm 06247-11604

On request:
Other colours.

Order No.	Form	D1	D2	~D6	~H	T1 min.	T3 min.
06247-11604	C	16	M4	8	15	6	-
06247-11605	C	16	M5	8	15	7,5	-
06247-12005	C	20	M5	12	18	7,5	-
06247-12006	C	20	M6	12	18	9	-
06247-12506	C	25	M6	15	22,5	9	-
06247-12508	C	25	M8	15	22,5	12	-
06247-13208	C	32	M8	18	29	12	-
06247-13210	C	32	M10	18	29	15	-
06247-22005	E	20	M5	12	18	-	7,5
06247-22006	E	20	M6	12	18	-	7,5
06247-22506	E	25	M6	15	22,5	-	9
06247-22508	E	25	M8	15	22,5	-	9
06247-23208	E	32	M8	18	29	-	12
06247-23210	E	32	M10	18	29	-	12

Ball knobs

stainless steel or aluminium DIN 319



Material:
Stainless steel 1.4305 or aluminium.

Version:
Polished.

Sample order:
nlm 06247-116043

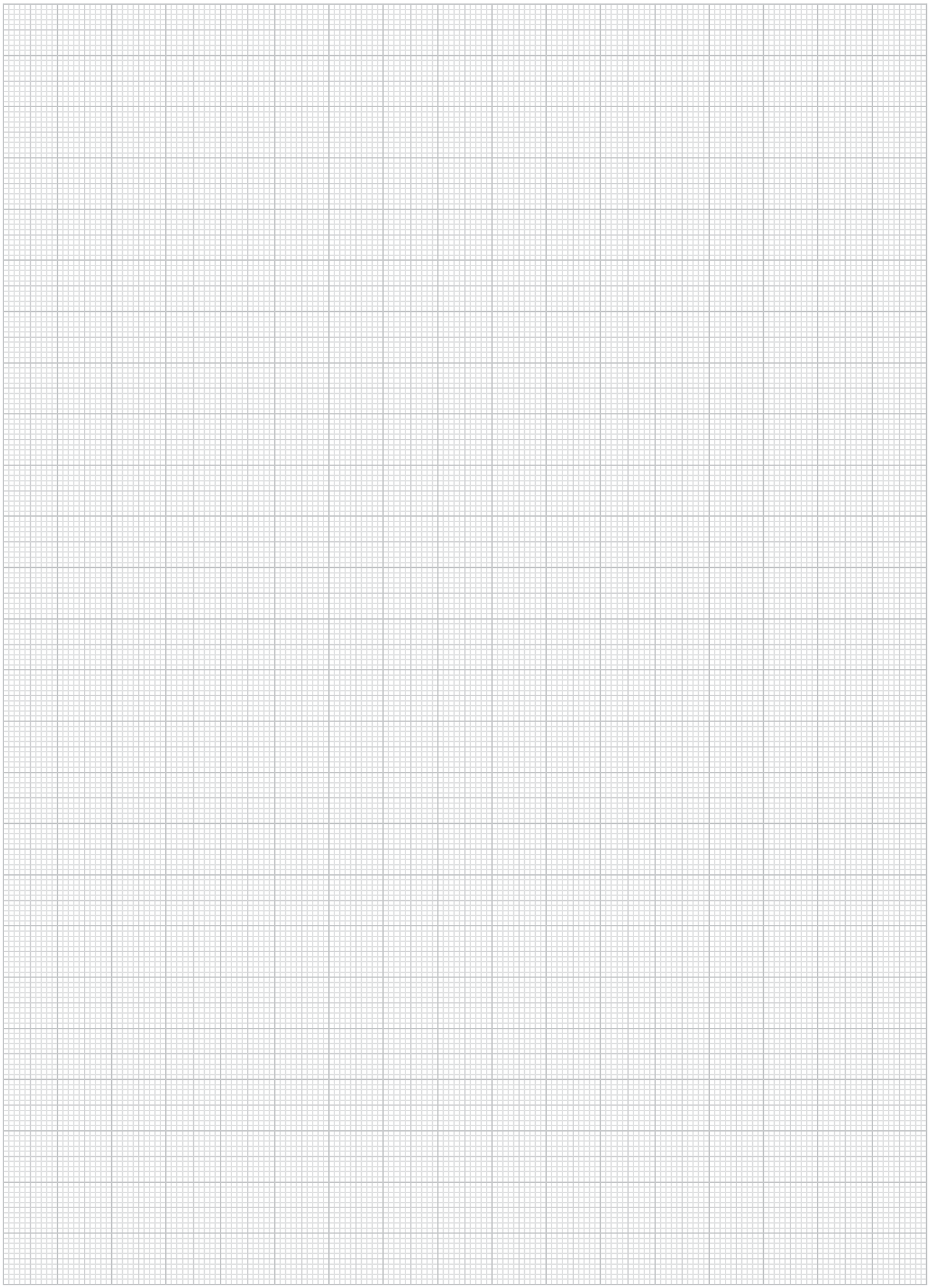
Ball knobs stainless steel DIN 319

Order No. Form C	Order No. Form K	D1	D2	D4	~D6	~H	T1 min.	T4 min.
06247-116042	**06247-316042**	16	M4/-	-/6	8	15	7,2/-	-/10
06247-120052	**06247-320052**	20	M5/-	-/8	12	18	9,1/-	-/12
06247-125062	**06247-325062**	25	M6/-	-/10	15	22,5	11/-	-/16
06247-132082	**06247-332082**	32	M8/-	-/12	18	29	14,5/-	-/20
06247-140102	**06247-340102**	40	M10/-	-/16	22	37	18/-	-/25
06247-150122	**06247-350122**	50	M12/-	-/20	28	46	21/-	-/32

Ball knobs aluminium DIN 319

Order No. Form C	Order No. Form K	D1	D2	D4	~D6	~H	T1 min.	T4 min.
06247-116043	**06247-316043**	16	M4/-	-/6	8	15	7,2/-	-/10
06247-120053	**06247-320053**	20	M5/-	-/8	12	18	9,1/-	-/12
06247-125063	**06247-325063**	25	M6/-	-/10	15	22,5	11/-	-/16
06247-132083	**06247-332083**	32	M8/-	-/12	18	29	14,5/-	-/20
06247-140103	**06247-340103**	40	M10/-	-/16	22	37	18/-	-/25
06247-150123	**06247-350123**	50	M12/-	-/20	28	46	21/-	-/32

Notes



Ball knobs smooth

DIN 319 enhanced

Material:
Black duroplastic PF 31, bush in galvanized steel

Version:
High-gloss polished.

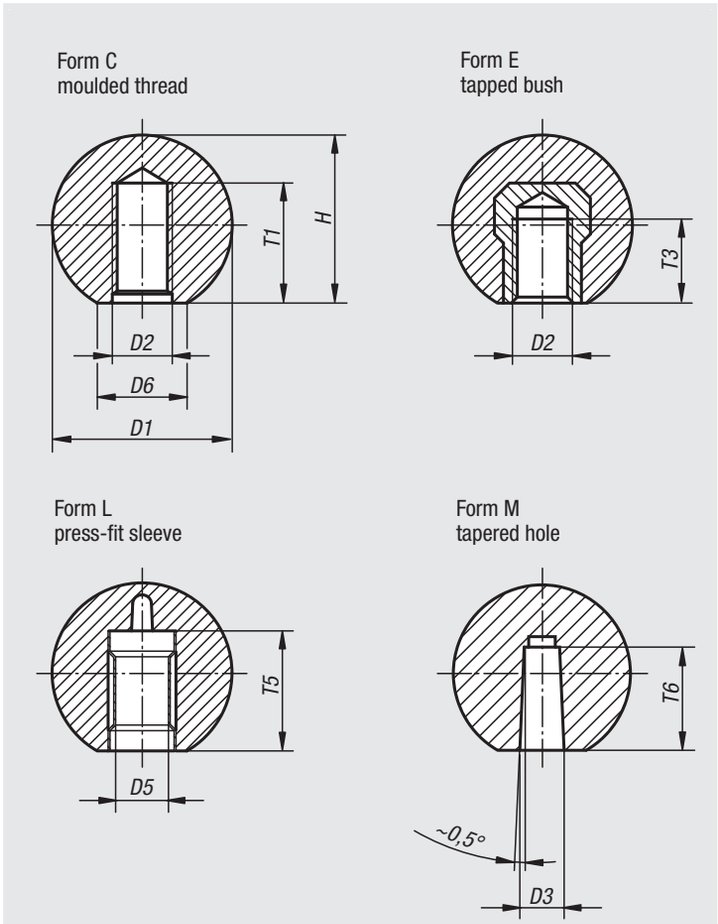
Sample order:
nlm 06250-11604

Note:
Assembly Form L: The ball knobs are mounted firmly by tapping a hammer lightly. Please only use a rubber or plastic hammer, with a weight up to 200 g!

The version 06250-21604 has a brass bush.
The versions 06250-23008, 06250-23508 and 06250-24008 have copper-plated steel bushes.

On request:
* These versions are available from stock in dark red at extra charge.

Shank tolerance:
Ball knobs with press-fit sleeve can be mounted on standard shafts with tolerance h9. The supplied press-fit sleeve assures a firm and reliable fit.



Order No.	Form	D1	D2	~D6	~H	T1 min.
06250-11604	C	16	M4	8	15	6
06250-11605	C	16	M5	8	15	7,5
06250-11606	C	16	M6	8	15	9
06250-12005*	C	20	M5	12	18	7,5
06250-12006	C	20	M6	12	18	9
06250-12506*	C	25	M6	15	23	9
06250-12508	C	25	M8	15	23	12
06250-13008*	C	30	M8	16	28	12
06250-13208*	C	32	M8	18	29	12
06250-13210	C	32	M10	18	29	15
06250-13508	C	36	M8	17	33	18
06250-13510*	C	36	M10	17	33	15
06250-14008	C	40	M8	20	37,5	12
06250-14010*	C	40	M10	20	37,5	15
06250-14012	C	40	M12	20	37,5	18
06250-14510	C	45	M10	20	43	15
06250-14512	C	45	M12	20	43	18
06250-15010	C	50	M10	22	48	15
06250-15012*	C	50	M12	22	48	18

Ball knobs smooth

DIN 319 enhanced

Order No.	Form	D1	D2	~D6	~H	T3 min.
06250-21604	E	16	M4	8	15	6
06250-22005*	E	20	M5	12	18	7,5
06250-22006	E	20	M6	12	18	9
06250-22506*	E	25	M6	15	23	9
06250-22508	E	25	M8	15	23	12
06250-23008*	E	30	M8	16	28	12
06250-23208	E	32	M8	18	29	12
06250-23210	E	32	M10	18	29	15
06250-23508	E	36	M8	17	33	14
06250-23510	E	36	M10	17	33	14
06250-24008	E	40	M8	20	37,5	14
06250-24010*	E	40	M10	20	37,5	15
06250-24012	E	40	M12	20	37,5	18
06250-24510	E	45	M10	20	43	22
06250-24512	E	45	M12	20	43	21
06250-25010	E	50	M10	22	48	15
06250-25012*	E	50	M12	22	48	18

Order No.	Form	D1	D5	~D6	~H	T5
06250-42005	L	20	5	12	18	13
06250-42506	L	25	6	15	23	16
06250-42508	L	25	8	15	23	15
06250-43208	L	32	8	18	29	15
06250-43210	L	32	10	18	29	20
06250-44010	L	40	10	20	37,5	20
06250-44012	L	40	12	20	37,5	23
06250-45012	L	50	12	22	48	20

Order No.	Form	D1	D3	~D6	~H	T6
06250-31604	M	16	4	8	15	9
06250-32005	M	20	5	12	18	12
06250-32506	M	25	6	15	23	15
06250-32508	M	25	8	15	23	15
06250-33208	M	32	8	18	29	15
06250-33210	M	32	10	18	29	15
06250-34010	M	40	10	20	37,5	20
06250-34012	M	40	12	20	37,5	20
06250-35012	M	50	12	22	48	22

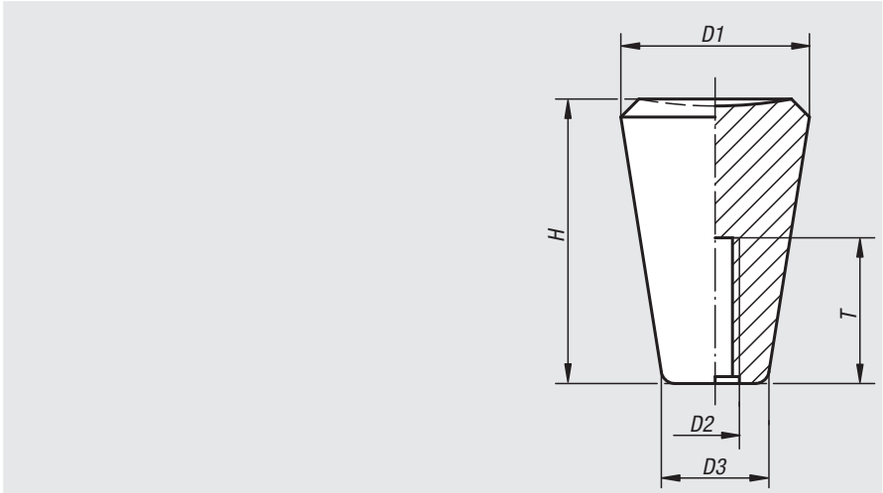
06251

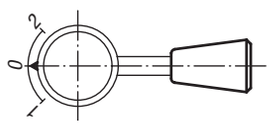
Tapered knobs

Material:
Black Duroplast PF 31

Version:
pressed thread

Sample order:
nlm 06251-06





Order No.	D1	D2	D3	H	T
06251-05	20	M5	12	31	15
06251-06	25	M6	15	38	19
06251-08	30	M8	18	46	16
06251-10	35	M10	21	53	19

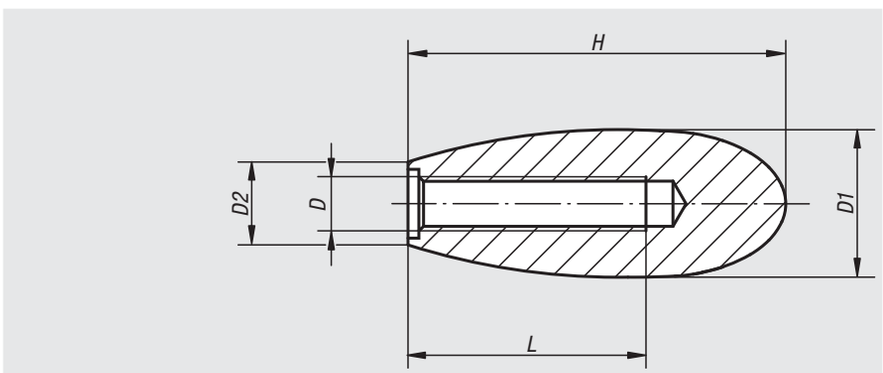
06252

Conical knobs

Material:
Black Duroplast PF 31

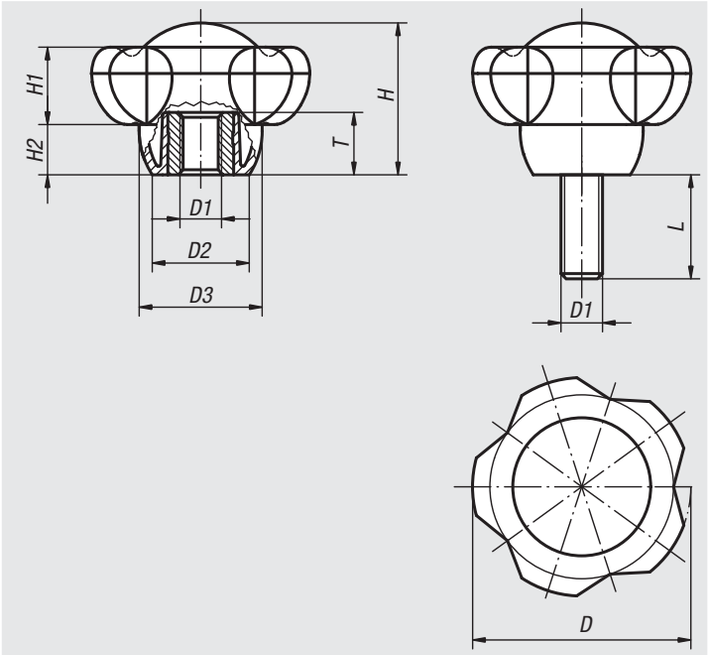
Version:
High-gloss polished.

Sample order:
nlm 06252-120



Order No.	D	D1	D2	H	L min.
06252-050	M5	14	7	34	25
06252-080	M8	22	14	60	25
06252-100	M10	27	15,5	70	25
06252-120	M12	27	15,5	70	25
06252-160	M16	35	22	85	30

Clamp grips



Material:
Thermoplastic, black grey.
Bush and screw steel 5.8 or stainless steel 1.4305.

Version:
Blue-chromed steel or bright stainless steel.

Sample order:
nlm 06253-50106X30
(cap colour traffic red; include length L)

Note:
The screw lengths 15, 35 and 45 are not available in stainless steel.
Δ Add the desired cap colour here. No colour code is required for black grey caps.

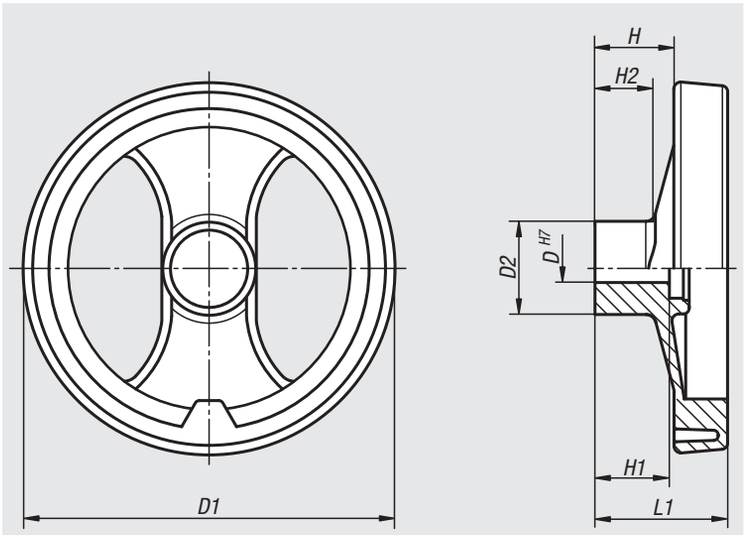
black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No. bush steel	Order No. bush stainless steel	D	D1	D2	D3	H	H1	H2	T
06253-5008Δ	**06253-50081Δ**	50	M8	22,2	28,2	34,8	17,8	11,5	14
06253-5010Δ	**06253-50101Δ**	50	M10	22,2	28,2	34,8	17,8	11,5	14
06253-5012Δ	**06253-50121Δ**	50	M12	22,2	28,2	34,8	17,8	11,5	18
06253-6310Δ	**06253-63101Δ**	63	M10	28	35,5	44	22,5	14,5	14
06253-6312Δ	**06253-63121Δ**	63	M12	28	35,5	44	22,5	14,5	18
06253-6316Δ	-	63	M16	28	35,5	44	22,5	14,5	18

Order No. screw steel	Order No. screw stainless steel	D	D1	D2	D3	H	H1	H2	L
06253-5010ΔX	**06253-50101ΔX**	50	M10	22,2	28,2	34,8	17,8	11,5	15/20/25/30/35/40/45/50/60
06253-5012ΔX	-	50	M12	22,2	28,2	34,8	17,8	11,5	15/20/25/30/35/40/45/50/60
06253-6310ΔX	**06253-63101ΔX**	63	M10	28	35,5	44	22,5	14,5	20/25/30/35/40/45/50/60
06253-6312ΔX	-	63	M12	28	35,5	44	22,5	14,5	20/25/30/35/40/45/50/60

Handwheels 2-spoke

plastic



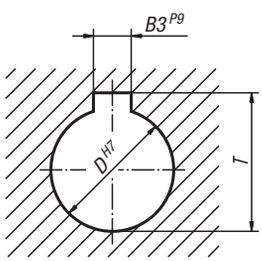
Material:
Handwheel reinforced and stabilised polyamide.
Centre plugs polyamide.
Tapped bush steel.

Version:
Handwheel oil and grease resistant, black (RAL 9011), satin finish.
Centre plugs, grey (RAL 7035 cod. 13).
Through bush black oxidised.

Sample order:
nlm 06255-0080X08

On request:
Other cap colours,
special versions.

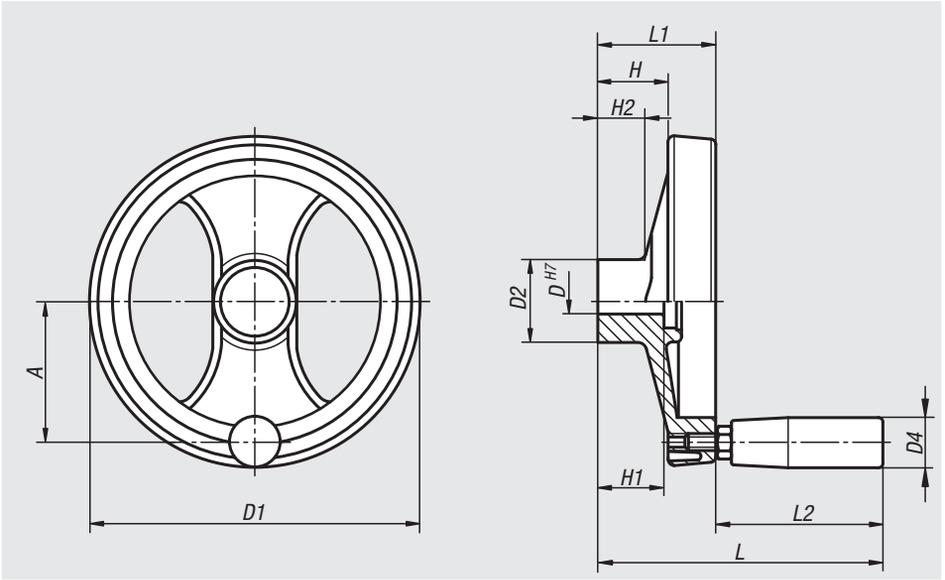
keyway DIN 6885-1



Order No. hub without slot	Order No. hub with slot	D	D1	D2	H	H1	H2	L1	B3	T
06255-0080X08	**06255-1080X08**	8	80	24,5	20	20	16	34	-/2	-/9
06255-0080X10	**06255-1080X10**	10	80	24,5	20	20	16	34	-/3	-/11,4
06255-0100X10	**06255-1100X10**	10	99	28	25,5	24	20	42	-/3	-/11,4
06255-0100X12	**06255-1100X12**	12	99	28	25,5	24	20	42	-/4	-/13,8
06255-0130X12	**06255-1130X12**	12	129	32	30	24	21	50	-/3	-/13,8
06255-0130X14	**06255-1130X14**	14	129	32	30	24	21	50	-/5	-/16,3
06255-0160X14	**06255-1160X14**	14	159	40	33	32	22	57	-/5	-/16,3
06255-0160X16	**06255-1160X16**	16	159	40	33	32	22	57	-/5	-/18,3
06255-0200X16	**06255-1200X16**	16	198	51	31	32	17,5	60	-/5	-/18,3
06255-0200X20	**06255-1200X20**	20	198	51	31	32	17,5	60	-/6	-/22,8
06255-0250X20	**06255-1250X20**	20	252	55,5	39,5	36	24	71	-/6	-/22,8
06255-0250X24	**06255-1250X24**	24	252	55,5	39,5	36	24	71	-/8	-/27,3
06255-0345X20	**06255-1345X20**	20	346	67,5	42	32	24	79	-/6	-/22,8

Handwheels 2-spoke

plastic, with revolving grip



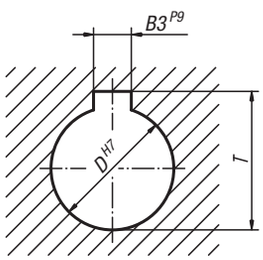
Material:
Handwheel reinforced and stabilised polyamide.
Centre plugs polyamide.
Tapped bush steel.
Tapped insert for cylinder grip brass.

Version:
Handwheel oil and grease resistant, black (RAL 9011), satin finish.
Centre plugs, grey (RAL 7035 cod. 13).
Through bush black oxidised.

Sample order:
nlm 06255-4080X08

On request:
Other cap colours,
special versions.

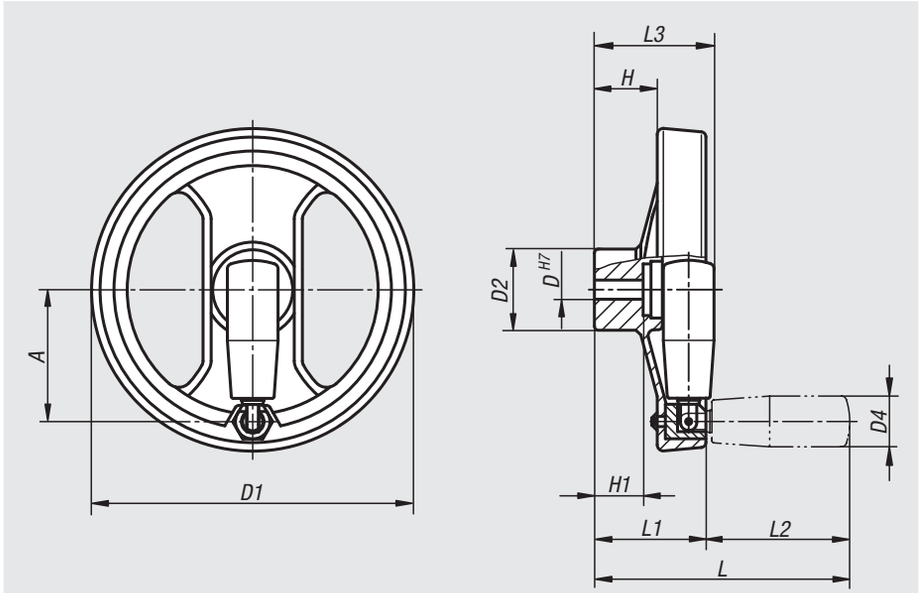
keyway DIN 6885-1



Order No. hub without slot	Order No. hub with slot	D	D1	D2	D4	H	H1	H2	A	L	L1	L2	B3	T
06255-4080X08	**06255-5080X08**	8	80	24,5	20	20	20	16	30	85	34	51	-/2	-/9
06255-4080X10	**06255-5080X10**	10	80	24,5	20	20	20	16	30	85	34	51	-/3	-/11,4
06255-4100X10	**06255-5100X10**	10	99	28	20	25,5	24	20	38	93	43	51	-/3	-/11,4
06255-4100X12	**06255-5100X12**	12	99	28	20	25,5	24	20	38	93	43	51	-/4	-/13,8
06255-4130X12	**06255-5130X12**	12	129	32	23	30	24	21	55	112	50	62	-/3	-/13,8
06255-4130X14	**06255-5130X14**	14	129	32	23	30	24	21	55	112	50	62	-/5	-/16,3
06255-4160X14	**06255-5160X14**	14	159	40	23	33	32	22	66	119	57	62	-/5	-/16,3
06255-4160X16	**06255-5160X16**	16	159	40	23	33	32	22	66	119	57	62	-/5	-/18,3
06255-4200X16	**06255-5200X16**	16	198	51	26	31	32	17,5	82	141	60	81	-/5	-/18,3
06255-4200X20	**06255-5200X20**	20	198	51	26	31	32	17,5	82	141	60	81	-/6	-/22,8
06255-4250X20	**06255-5250X20**	20	252	55,5	27	39,5	36	24	113	163	71	92	-/6	-/22,8
06255-4250X24	**06255-5250X24**	24	252	55,5	27	39,5	36	24	113	163	71	92	-/8	-/27,3
06255-4345X20	**06255-5345X20**	20	346	67,5	27	42	32	24	146	171	79	92	-/6	-/22,8

Handwheels 2-spoke

plastic, with folding grip



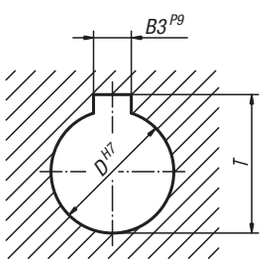
Material:
Handwheel reinforced and stabilised polyamide.
Centre plugs polyamide.
Tapped bush and insert for cylinder grip steel.

Version:
Handwheel oil and grease resistant, black (RAL 9011), satin finish.
Centre plugs, grey (RAL 7035 cod. 13).
Tapped bush and insert for folding grip black oxidised.

Sample order:
nlm 06255-6130X12

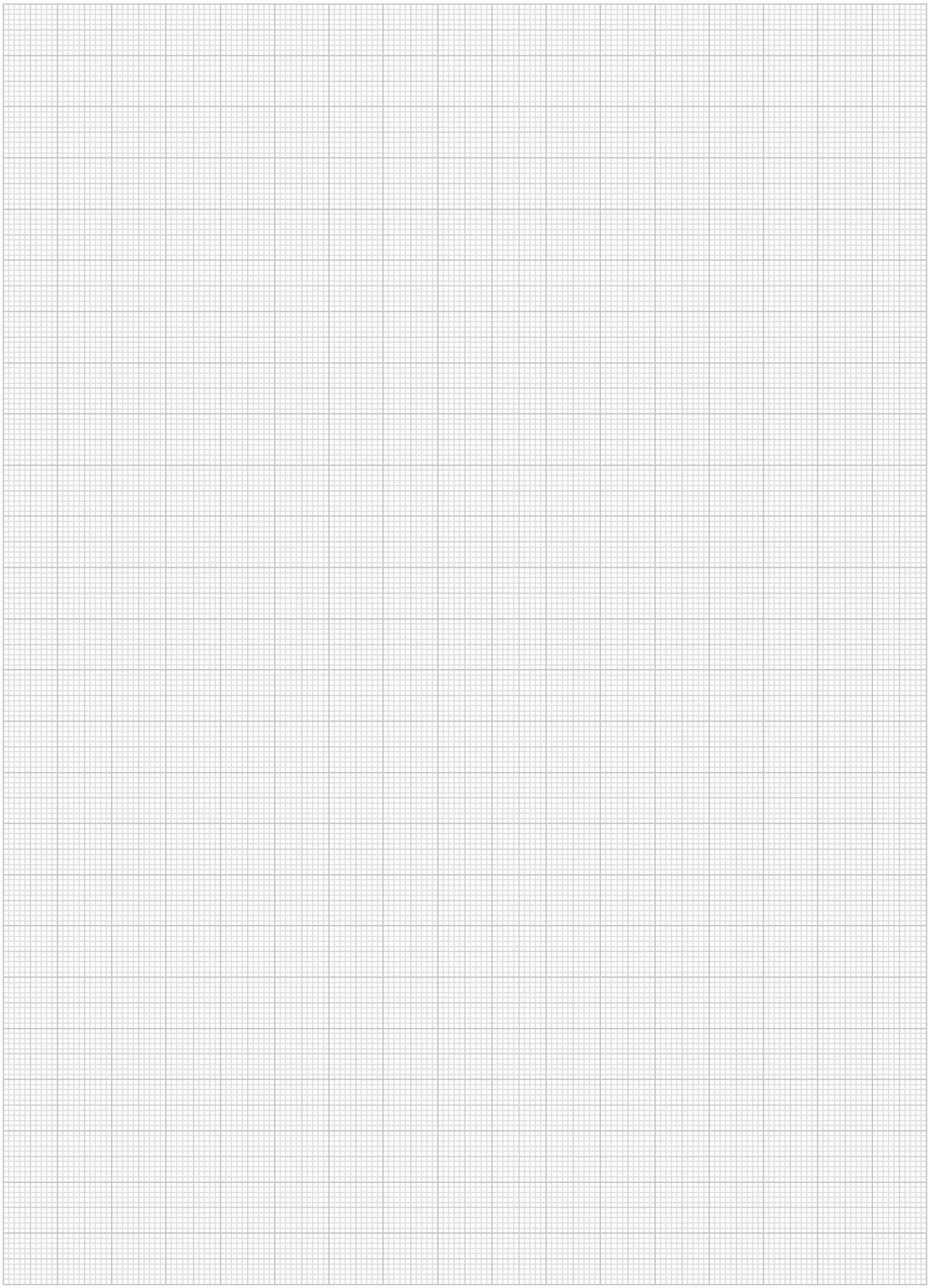
On request:
Other cap colours,
special versions.

keyway DIN 6885-1



Order No. hub without slot	Order No. hub with slot	D	D1	D2	D4	A	H	H1	L	L1	L2	L3	B3	T
06255-6130X12	**06255-7130X12**	12	129	32	20	51	29	20	111	52	59	53	-/4	-/13,8
06255-6130X14	**06255-7130X14**	14	129	32	20	51	29	20	111	52	59	53	-/5	-/16,3
06255-6160X14	**06255-7160X14**	14	159	40	25	65	31	24	126	55	71	59	-/5	-/16,3
06255-6160X16	**06255-7160X16**	16	159	40	25	65	31	24	126	55	71	59	-/5	-/18,3
06255-6200X16	**06255-7200X16**	16	200	54,5	27	80	33	28	160	69	91	69	-/5	-/18,3
06255-6200X20	**06255-7200X20**	20	200	54,5	27	80	33	28	160	69	91	69	-/6	-/22,8
06255-6345X20	**06255-7345X20**	20	346	67,5	27	148	43,5	32	144	80	91	80	-/6	-/22,8

Notes



Handwheels

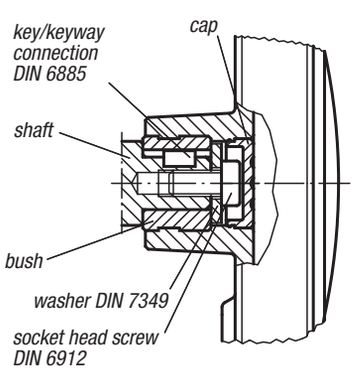
Material:
Black grey thermoplastic.

Version:
Steel parts black oxidised.

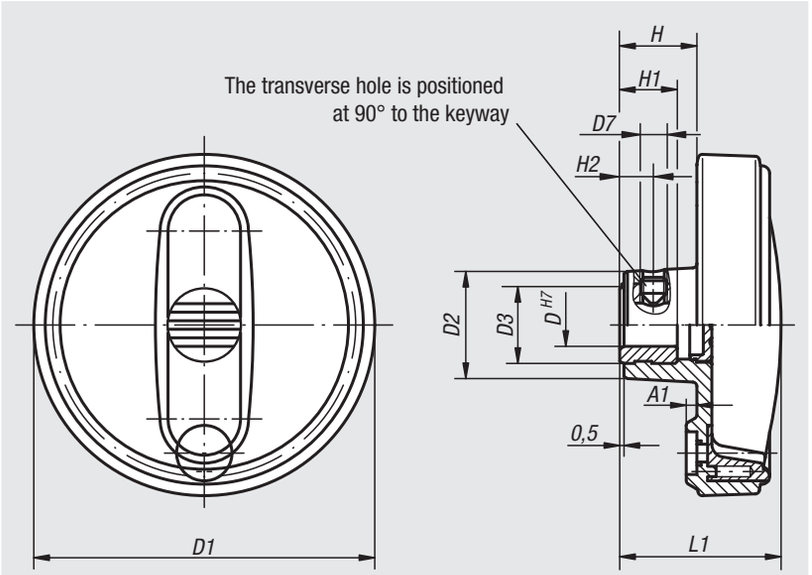
Sample order:
nlm 06262-108008

Note:
The hub cap is supplied loose.
The handwheels can be secured using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.
Versions with transverse bore are fastened using the ISO 4026 (DIN 913) grub screws.

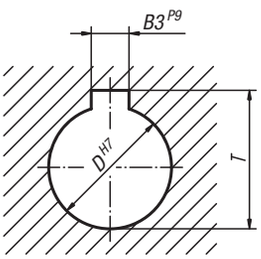
assembly example



Handwheels



keyway DIN 6885-1



Order No. without keyway	Order No. with keyway	Size	D	D1	D2	D3	A1	H	H1	L1	B3	T
06262-108008	**06262-10800802**	1	8	80	25	19	2,5	17,5	13	37,5	-/2	-/9
06262-108010	**06262-10801003**	1	10	80	25	19	2,5	17,5	13	37,5	-/3	-/11,4
06262-108012	**06262-10801204**	1	12	80	25	19	2,5	17,5	13	37,5	-/4	-/13,8
06262-210010	**06262-21001003**	2	10	100	28	19	3	20	13	44	-/3	-/11,4
06262-210012	**06262-21001204**	2	12	100	28	19	3	20	13	44	-/4	-/13,8
06262-312512	**06262-31251204**	3	12	125	35	25	4	23,5	18,5	53	-/4	-/13,8
06262-312514	**06262-31251405**	3	14	125	35	25	4	23,5	18,5	53	-/5	-/16,3
06262-312516	**06262-31251605**	3	16	125	35	25	4	23,5	18,5	53	-/5	-/18,3
06262-416014	**06262-41601405**	4	14	160	45	25	5,6	28	18,5	64,5	-/5	-/16,3
06262-416016	**06262-41601605**	4	16	160	45	25	5,6	28	18,5	64,5	-/5	-/18,3

Order No. without keyway	Order No. with keyway	Version	Size	D	D1	D2	D3	D7	A1	H	H1	H2	L1	B3	T
06262-1080086	**06262-108008026**	with transverse bore	1	8	80	25	19	M6	2,5	17,5	13	7,5	37,5	-/2	-/9
06262-1080106	**06262-108010036**	with transverse bore	1	10	80	25	19	M6	2,5	17,5	13	7,5	37,5	-/3	-/11,4
06262-1080126	**06262-108012046**	with transverse bore	1	12	80	25	19	M6	2,5	17,5	13	7,5	37,5	-/4	-/13,8
06262-2100106	**06262-210010036**	with transverse bore	2	10	100	28	19	M6	3	20	13	7,5	44	-/3	-/11,4
06262-2100126	**06262-210012046**	with transverse bore	2	12	100	28	19	M6	3	20	13	7,5	44	-/4	-/13,8
06262-3125126	**06262-312512046**	with transverse bore	3	12	125	35	25	M6	4	23,5	18,5	7,5	53	-/4	-/13,8
06262-3125146	**06262-312514056**	with transverse bore	3	14	125	35	25	M6	4	23,5	18,5	7,5	53	-/5	-/16,3
06262-3125166	**06262-312516056**	with transverse bore	3	16	125	35	25	M6	4	23,5	18,5	7,5	53	-/5	-/18,3
06262-4160146	**06262-416014056**	with transverse bore	4	14	160	45	25	M6	5,6	28	18,5	7,5	64,5	-/5	-/16,3
06262-4160166	**06262-416016056**	with transverse bore	4	16	160	45	25	M6	5,6	28	18,5	7,5	64,5	-/5	-/18,3

Handwheels

with revolving grip

Material:
Black grey thermoplastic.

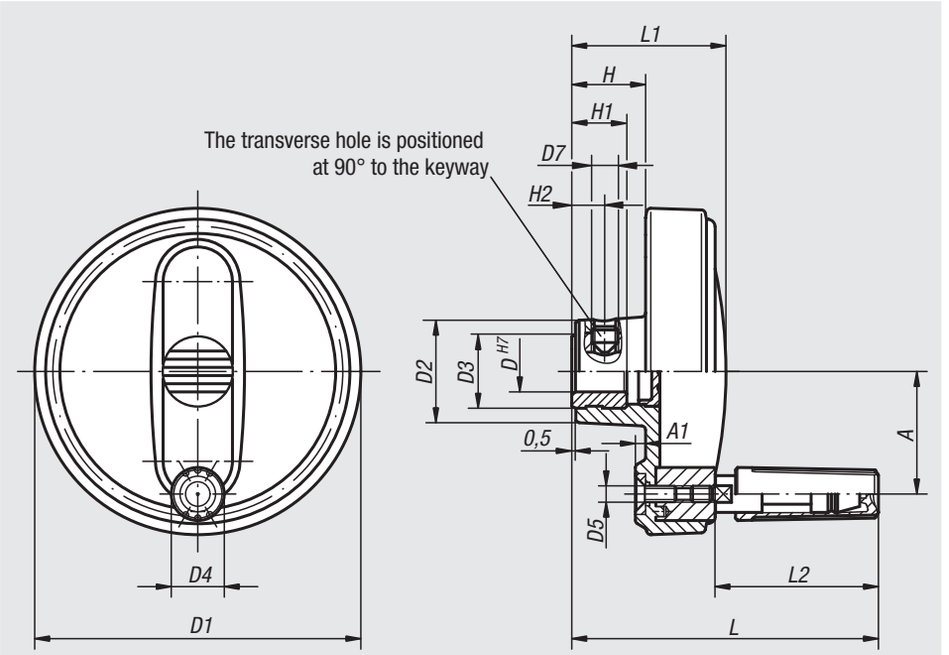
Version:
Steel parts black oxidised.

Sample order:
nlm 06263-108008

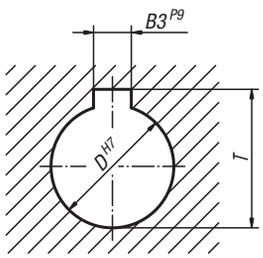
Note:
The hub cover and the revolving cylinder grip are supplied unassembled. To assemble, screw the grip into the tapped hole. The handwheels can be secured using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.
Versions with transverse bore are secured using the ISO 4026 (DIN 913) grub screw.
For assembly example, see 06262.

Handwheels

with revolving grip



keyway DIN 6885-1



Order No. without keyway	Order No. with keyway	Size	D	D1	D2	D3	D4	D5	A	A1	H	H1	L	L1	L2	B3	T
06263-108008	**06263-10800802**	1	8	80	25	19	13	M4	30	2,5	17,5	13	75	37,5	40	-/2	-/9
06263-108010	**06263-10801003**	1	10	80	25	19	13	M4	30	2,5	17,5	13	75	37,5	40	-/3	-/11,4
06263-108012	**06263-10801204**	1	12	80	25	19	13	M4	30	2,5	17,5	13	75	37,5	40	-/4	-/13,8
06263-210010	**06263-21001003**	2	10	100	28	19	16	M5	38	3	20	13	90	44	49,5	-/3	-/11,4
06263-210012	**06263-21001204**	2	12	100	28	19	16	M5	38	3	20	13	90	44	49,5	-/4	-/13,8
06263-312512	**06263-31251204**	3	12	125	35	25	20	M6	47,5	4	23,5	18,5	109	53	60	-/4	-/13,8
06263-312514	**06263-31251405**	3	14	125	35	25	20	M6	47,5	4	23,5	18,5	109	53	60	-/5	-/16,3
06263-312516	**06263-31251605**	3	16	125	35	25	20	M6	47,5	4	23,5	18,5	109	53	60	-/5	-/18,3
06263-416014	**06263-41601405**	4	14	160	45	25	25	M8	62	5,6	28	18,5	144	64,5	83,5	-/5	-/16,3
06263-416016	**06263-41601605**	4	16	160	45	25	25	M8	62	5,6	28	18,5	144	64,5	83,5	-/5	-/18,3

Order No. without keyway	Order No. with keyway	Version	Size	D	D1	D2	D3	D4	D5	D7	A	A1	H	H1	H2	L	L1	L2	B3	T
06263-1080086	**06263-108008026**	with transverse bore	1	8	80	25	19	13	M4	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/2	-/9
06263-1080106	**06263-108010036**	with transverse bore	1	10	80	25	19	13	M4	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/3	-/11,4
06263-1080126	**06263-108012046**	with transverse bore	1	12	80	25	19	13	M4	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/4	-/13,8
06263-2100106	**06263-210010036**	with transverse bore	2	10	100	28	19	16	M5	M6	38	3	20	13	7,5	90	44	49,5	-/3	-/11,4
06263-2100126	**06263-210012046**	with transverse bore	2	12	100	28	19	16	M5	M6	38	3	20	13	7,5	90	44	49,5	-/4	-/13,8
06263-3125126	**06263-312512046**	with transverse bore	3	12	125	35	25	20	M6	M6	47,5	4	23,5	18,5	7,5	109	53	60	-/4	-/13,8
06263-3125146	**06263-312514056**	with transverse bore	3	14	125	35	25	20	M6	M6	47,5	4	23,5	18,5	7,5	109	53	60	-/5	-/16,3
06263-3125166	**06263-312516056**	with transverse bore	3	16	125	35	25	20	M6	M6	47,5	4	23,5	18,5	7,5	109	53	60	-/5	-/18,3
06263-4160146	**06263-416014056**	with transverse bore	4	14	160	45	25	25	M8	M6	62	5,6	28	18,5	7,5	144	64,5	83,5	-/5	-/16,3
06263-4160166	**06263-416016056**	with transverse bore	4	16	160	45	25	25	M8	M6	62	5,6	28	18,5	7,5	144	64,5	83,5	-/5	-/18,3

Handwheels

with fold-away grip

Material:
Black grey thermoplastic.

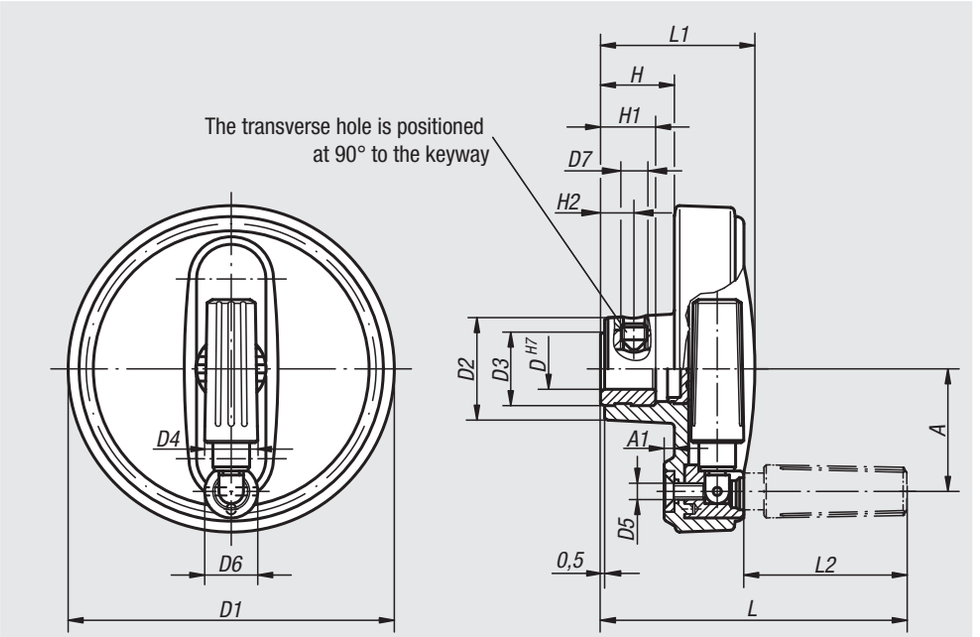
Version:
Steel parts black oxidised.

Sample order:
nlm 06264-108008

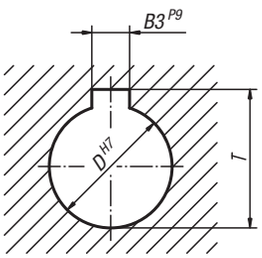
Note:
The hub cover is supplied loose.
The handwheels can be secured using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.
Versions with transverse bore are secured using the ISO 4026 (DIN 913) grub screw.
For assembly example, see 06262.

Handwheels

with fold-away grip



keyway DIN 6885-1



Order No. without keyway	Order No. with keyway	Size	D	D1	D2	D3	D4	D5	D6	A	A1	H	H1	L	L1	L2	B3	T
06264-108008	**06264-10800802**	1	8	80	25	19	13	M4	13	30	2,5	17,5	13	75	37,5	40	-/2	-/9
06264-108010	**06264-10801003**	1	10	80	25	19	13	M4	13	30	2,5	17,5	13	75	37,5	40	-/3	-/11,4
06264-108012	**06264-10801204**	1	12	80	25	19	13	M4	13	30	2,5	17,5	13	75	37,5	40	-/4	-/13,8
06264-210010	**06264-21001003**	2	10	100	28	19	16	M5	16	38	3	20	13	90	44	49	-/3	-/11,4
06264-210012	**06264-21001204**	2	12	100	28	19	16	M5	16	38	3	20	13	90	44	49	-/4	-/13,8
06264-312512	**06264-31251204**	3	12	125	35	25	20	M6	20	47,5	4	23,5	18,5	109	53	59,5	-/4	-/13,8
06264-312514	**06264-31251405**	3	14	125	35	25	20	M6	20	47,5	4	23,5	18,5	109	53	59,5	-/5	-/16,3
06264-312516	**06264-31251605**	3	16	125	35	25	20	M6	20	47,5	4	23,5	18,5	109	53	59,5	-/5	-/18,3
06264-416014	**06264-41601405**	4	14	160	45	25	25	M8	26	62	5,6	28	18,5	144	64,5	83,5	-/5	-/16,3
06264-416016	**06264-41601605**	4	16	160	45	25	25	M8	26	62	5,6	28	18,5	144	64,5	83,5	-/5	-/18,3

Order No. without keyway	Order No. with keyway	Version	Size	D	D1	D2	D3	D4	D5	D6	D7	A	A1	H	H1	H2	L	L1	L2	B3	T
06264-1080086	**06264-108008026**	with transverse bore	1	8	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/2	-/9
06264-1080106	**06264-108010036**	with transverse bore	1	10	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/3	-/11,4
06264-1080126	**06264-108012046**	with transverse bore	1	12	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	75	37,5	40	-/4	-/13,8
06264-2100106	**06264-210010036**	with transverse bore	2	10	100	28	19	16	M5	16	M6	38	3	20	13	7,5	90	44	49	-/3	-/11,4
06264-2100126	**06264-210012046**	with transverse bore	2	12	100	28	19	16	M5	16	M6	38	3	20	13	7,5	90	44	49	-/4	-/13,8
06264-3125126	**06264-312512046**	with transverse bore	3	12	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	109	53	59,5	-/4	-/13,8
06264-3125146	**06264-312514056**	with transverse bore	3	14	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	109	53	59,5	-/5	-/16,3
06264-3125166	**06264-312516056**	with transverse bore	3	16	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	109	53	59,5	-/5	-/18,3
06264-4160146	**06264-416014056**	with transverse bore	4	14	160	45	25	25	M8	26	M6	62	5,6	28	18,5	7,5	144	64,5	83,5	-/5	-/16,3
06264-4160166	**06264-416016056**	with transverse bore	4	16	160	45	25	25	M8	26	M6	62	5,6	28	18,5	7,5	144	64,5	83,5	-/5	-/18,3

Handwheels

with safety grip

Material:
Black grey thermoplastic.

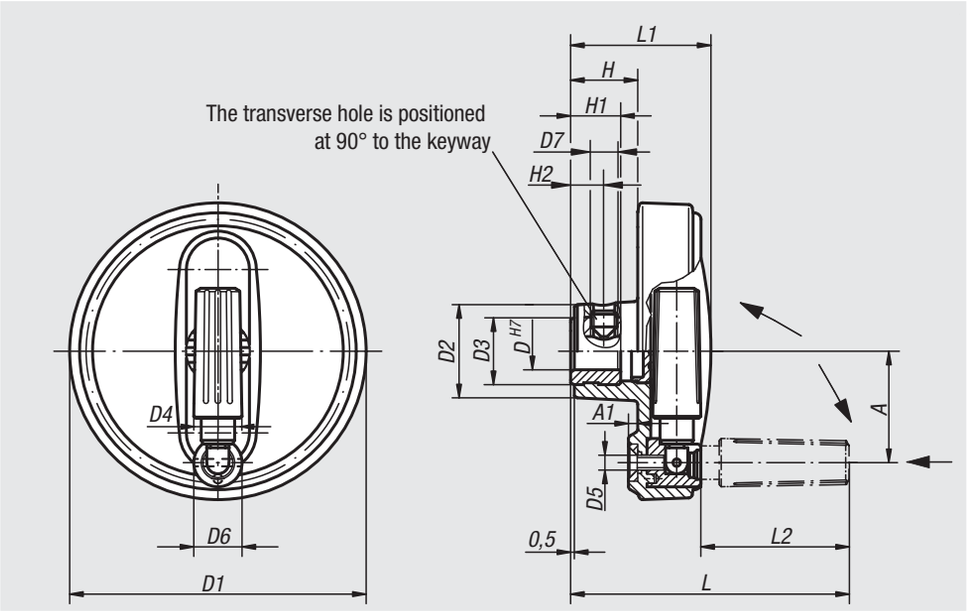
Version:
Steel parts black oxidised.

Sample order:
nlm 06265-108008

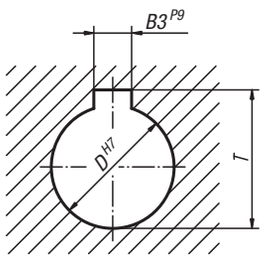
Note:
The hub cover is supplied unassembled.
The handwheels can be secured using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.Two actions must be made to bring the cylindrical safety grip into an operating position:
- Swing the grip out up to the stop (90°).
- Push the grip in an axial direction into the lock position.
The pushed-in position is the most comfortable for cranking. The grip swings back automatically after releasing.
Versions with transverse bore are secured using the ISO 4026 (DIN 913) grub screw.
For assembly example, see 06262.

Handwheels

with safety grip



keyway DIN 6885-1



Order No. without keyway	Order No. with keyway	Size	D	D1	D2	D3	D4	D5	D6	A	A1	H	H1	L	L1	L2	B3	T
06265-108008	**06265-10800802**	1	8	80	25	19	13	M4	13	30	2,5	17,5	13	73	37,5	38	-/2	-/9
06265-108010	**06265-10801003**	1	10	80	25	19	13	M4	13	30	2,5	17,5	13	73	37,5	38	-/3	-/11,4
06265-108012	**06265-10801204**	1	12	80	25	19	13	M4	13	30	2,5	17,5	13	73	37,5	38	-/4	-/13,8
06265-210010	**06265-21001003**	2	10	100	28	19	16	M5	16	38	3	20	13	88,5	44	47,5	-/3	-/11,4
06265-210012	**06265-21001204**	2	12	100	28	19	16	M5	16	38	3	20	13	88,5	44	47,5	-/4	-/13,8
06265-312512	**06265-31251204**	3	12	125	35	25	20	M6	20	47,5	4	23,5	18,5	108	53	58,5	-/4	-/13,8
06265-312514	**06265-31251405**	3	14	125	35	25	20	M6	20	47,5	4	23,5	18,5	108	53	58,5	-/5	-/16,3
06265-312516	**06265-31251605**	3	16	125	35	25	20	M6	20	47,5	4	23,5	18,5	108	53	58,5	-/5	-/18,3
06265-416014	**06265-41601405**	4	14	160	45	25	25	M8	26	62	5,6	28	18,5	142,5	64,5	82	-/5	-/16,3
06265-416016	**06265-41601605**	4	16	160	45	25	25	M8	26	62	5,6	28	18,5	142,5	64,5	82	-/5	-/18,3

Order No. without keyway	Order No. with keyway	Version	Size	D	D1	D2	D3	D4	D5	D6	D7	A	A1	H	H1	H2	L	L1	L2	B3	T
06265-1080086	**06265-108008026**	with transverse bore	1	8	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	73	37,5	38	-/2	-/9
06265-1080106	**06265-108010036**	with transverse bore	1	10	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	73	37,5	38	-/3	-/11,4
06265-1080126	**06265-108012046**	with transverse bore	1	12	80	25	19	13	M4	13	M6	30	2,5	17,5	13	7,5	73	37,5	38	-/4	-/13,8
06265-2100106	**06265-210010036**	with transverse bore	2	10	100	28	19	16	M5	16	M6	38	3	20	13	7,5	88,5	44	47,5	-/3	-/11,4
06265-2100126	**06265-210012046**	with transverse bore	2	12	100	28	19	16	M5	16	M6	38	3	20	13	7,5	88,5	44	47,5	-/4	-/13,8
06265-3125126	**06265-312512046**	with transverse bore	3	12	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	108	53	58,5	-/4	-/13,8
06265-3125146	**06265-312514056**	with transverse bore	3	14	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	108	53	58,5	-/5	-/16,3
06265-3125166	**06265-312516056**	with transverse bore	3	16	125	35	25	20	M6	20	M6	47,5	4	23,5	18,5	7,5	108	53	58,5	-/5	-/18,3
06265-4160146	**06265-416014056**	with transverse bore	4	14	160	45	25	25	M8	26	M6	62	5,6	28	18,5	7,5	142,5	64,5	82	-/5	-/16,3
06265-4160166	**06265-416016056**	with transverse bore	4	16	160	45	25	25	M8	26	M6	62	5,6	28	18,5	7,5	142,5	64,5	82	-/5	-/18,3

Knurled knobs

Material:
Thermoplastic, black grey.
Bush or screw steel 5.8.

Version:
Blue chromed steel.

Sample order:
nlm 06266-41067 (wheel cap colour bright yellow)

Note:
Δ Add the desired cap colour here.
No colour code is required for black grey caps.

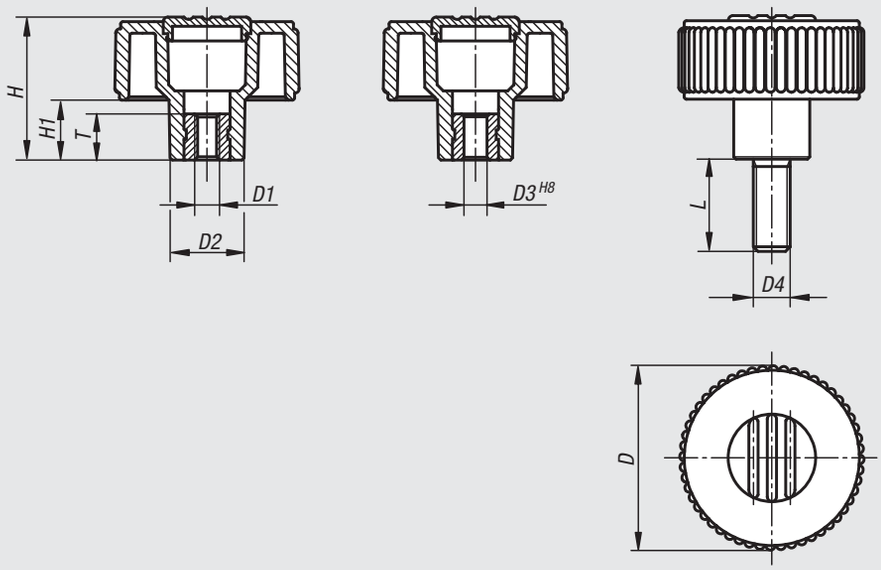
Form D
tapped bush
without cap

Form E
reamed bush
without cap

Form K
tapped bush
with cap

Form H
reamed bush
with cap

Form L
external thread



black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No.	Form	Version	Size	D	D1	D2	H	H1	T
06266-1105	D	bush steel	1	40	M5	16,5	31	13	10
06266-1106	D	bush steel	1	40	M6	16,5	31	13	10
06266-1108	D	bush steel	1	40	M8	16,5	31	13	14
06266-1208	D	bush steel	2	50	M8	18	36	15	14
06266-1210	D	bush steel	2	50	M10	18	36	15	14
06266-1310	D	bush steel	3	63	M10	22	41	17	14
06266-1312	D	bush steel	3	63	M12	22	41	17	18

Knurled knobs

Order No.	Form	Version	Size	D	D1	D2	H	H1	T
06266-2105Δ	K	bush steel	1	40	M5	16,5	31	13	10
06266-2106Δ	K	bush steel	1	40	M6	16,5	31	13	10
06266-2108Δ	K	bush steel	1	40	M8	16,5	31	13	14
06266-2208Δ	K	bush steel	2	50	M8	18	36	15	14
06266-2210Δ	K	bush steel	2	50	M10	18	36	15	14
06266-2310Δ	K	bush steel	3	63	M10	22	41	17	14
06266-2312Δ	K	bush steel	3	63	M12	22	41	17	18

Order No.	Form	Version	Size	D	D2	D3	H	H1	T
06266-3106	E	bush steel	1	40	16,5	6	31	13	10
06266-3208	E	bush steel	2	50	18	8	36	15	14
06266-3310	E	bush steel	3	63	22	10	41	17	14

Order No.	Form	Version	Size	D	D2	D3	H	H1	T
06266-4106Δ	H	bush steel	1	40	16,5	6	31	13	10
06266-4208Δ	H	bush steel	2	50	18	8	36	15	14
06266-4310Δ	H	bush steel	3	63	22	10	41	17	14

Order No.	Form	Version	Size	D	D2	D4	H	H1	L
06266-5105ΔX	L	screw steel	1	40	16,5	M5	31	13	10/20/40
06266-5106ΔX	L	screw steel	1	40	16,5	M6	31	13	10/20/40
06266-5108ΔX	L	screw steel	1	40	16,5	M8	31	13	15/30/60
06266-5208ΔX	L	screw steel	2	50	18	M8	36	15	15/30/60
06266-5210ΔX	L	screw steel	2	50	18	M10	36	15	20/30/60
06266-5310ΔX	L	screw steel	3	63	22	M10	41	17	20/30/60
06266-5312ΔX	L	screw steel	3	63	22	M12	41	17	30/60

Knurled knobs

metal parts stainless steel

Material:
Thermoplastic, black grey.
Bush and screw stainless steel 1.4305.

Version:
Stainless steel bright.

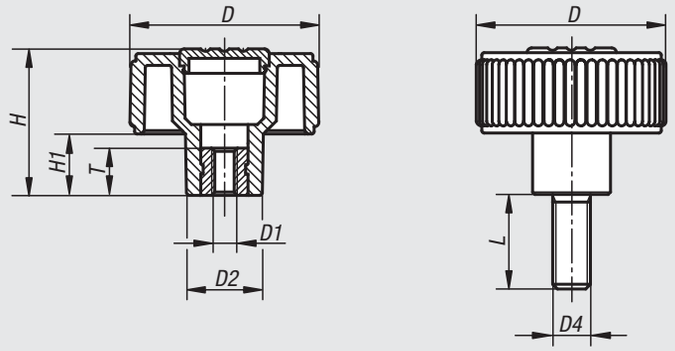
Sample order:
nlm 06267-51056X10
(cap colour traffic red; include length L)

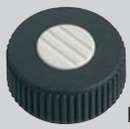
Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

Form D
tapped bush
without cap

Form K
tapped bush
with cap

Form L
external thread



black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	 RAL 7035	RAL 3020	RAL 1021

Order No.	Form	Version	Size	D	D1	D2	H	H1	T
06267-1105	D	bush stainless steel	1	40	M5	16,5	31	13	10
06267-1106	D	bush stainless steel	1	40	M6	16,5	31	13	10
06267-1108	D	bush stainless steel	1	40	M8	16,5	31	13	14
06267-1208	D	bush stainless steel	2	50	M8	18	36	15	14
06267-1210	D	bush stainless steel	2	50	M10	18	36	15	14
06267-1310	D	bush stainless steel	3	63	M10	22	41	17	14
06267-1312	D	bush stainless steel	3	63	M12	22	41	17	18

Order No.	Form	Version	Size	D	D1	D2	H	H1	T
06267-2105Δ	K	bush stainless steel	1	40	M5	16,5	31	13	10
06267-2106Δ	K	bush stainless steel	1	40	M6	16,5	31	13	10
06267-2108Δ	K	bush stainless steel	1	40	M8	16,5	31	13	14
06267-2208Δ	K	bush stainless steel	2	50	M8	18	36	15	14
06267-2210Δ	K	bush stainless steel	2	50	M10	18	36	15	14
06267-2310Δ	K	bush stainless steel	3	63	M10	22	41	17	14
06267-2312Δ	K	bush stainless steel	3	63	M12	22	41	17	18

Order No.	Form	Version	Size	D	D2	D4	H	H1	L
06267-5105ΔX	L	screw stainless steel	1	40	16,5	M5	31	13	10/20
06267-5106ΔX	L	screw stainless steel	1	40	16,5	M6	31	13	10/20/40
06267-5108ΔX	L	screw stainless steel	1	40	16,5	M8	31	13	15/30/60
06267-5208ΔX	L	screw stainless steel	2	50	18	M8	36	15	15/30/60
06267-5210ΔX	L	screw stainless steel	2	50	18	M10	36	15	20/30/60
06267-5310ΔX	L	screw stainless steel	3	63	22	M10	41	17	20/30/60

Positioning wheels

Material:
Thermoplastic, black grey.
Bush steel 5.8.

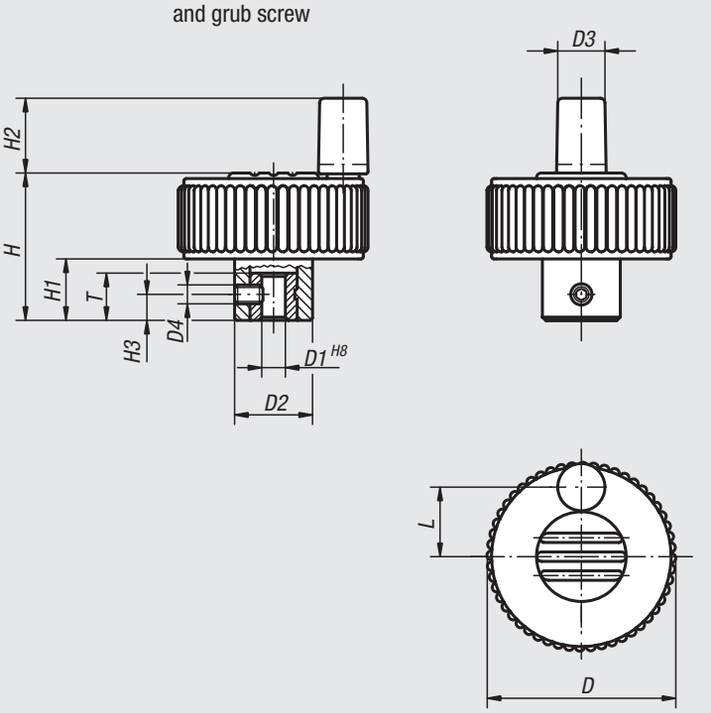
Version:
Blue chromed steel.

Sample order:
nlm 06268-21066 (cap colour traffic red)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

Form H
without transverse hole

Form M
with transverse hole
and grub screw

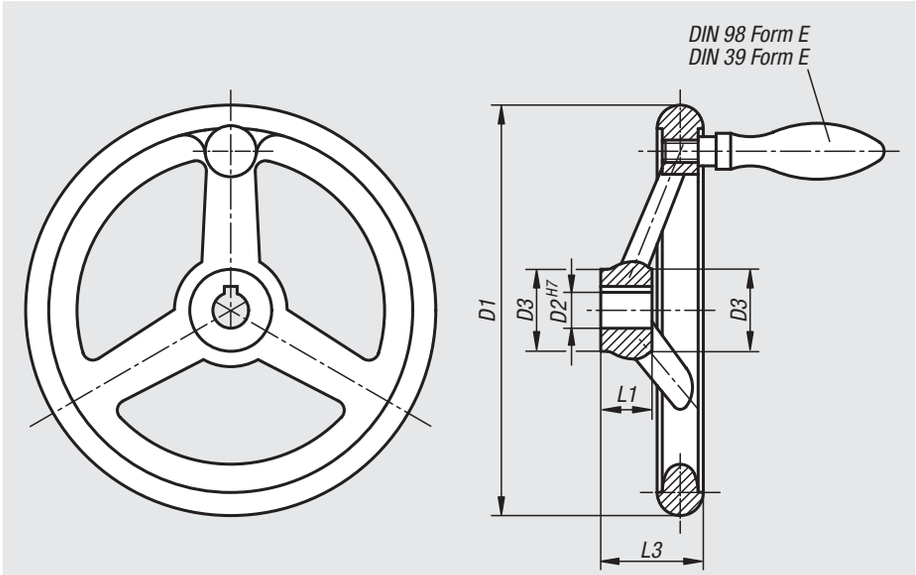


black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Order No.	Form	Size	D	D1	D2	D3	D4	H	H1	H2	H3	L	T
06268-2106Δ	H	1	40	6	16,5	10	-	31	13	16	-	15	10
06268-2206Δ	H	2	50	6	18	10	-	36	15	16	-	18,5	10
06268-2308Δ	H	3	63	8	22	10	-	41	17	16	-	25	14
06268-1106Δ	M	1	40	6	16,5	10	M4	31	13	16	5,5	15	10
06268-1206Δ	M	2	50	6	18	10	M4	36	15	16	5,5	18,5	10
06268-1308Δ	M	3	63	8	22	10	M4	41	17	16	8	25	14

Handwheels

DIN 950, grey cast iron



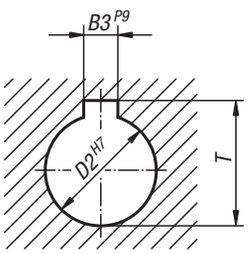
Material:
Handwheel grey cast iron.
Grip steel.

Version:
Wheel rim turned and polished.
Radial and axial run-out of rim < IT 12.

Sample order:
nlm 06271-4080X10

On request:
Hubs with square socket or plastic-coated handwheels.

keyway DIN 6885-1



Handwheels DIN 950 grey cast iron, without grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes
06271-0080X10	**06271-1080X10**	80	10	-	25	16	29	3	-	11,4	-	3
06271-0080X12	**06271-1080X12**	80	-	12	25	16	29	-	4	-	13,8	3
06271-0100X10	**06271-1100X10**	100	10	-	26	17	33	3	-	11,4	-	3
06271-0100X12	**06271-1100X12**	100	-	12	26	17	33	-	4	-	13,8	3
06271-0125X12	**06271-1125X12**	125	12	-	33	18	36	4	-	13,8	-	3
06271-0125X14	**06271-1125X14**	125	-	14	33	18	36	-	5	-	16,3	3
06271-0140X14	**06271-1140X14**	140	14	-	33	19	39	5	-	16,3	-	3
06271-0140X16	**06271-1140X16**	140	-	16	33	19	39	-	5	-	18,3	3
06271-0160X14	**06271-1160X14**	160	14	-	37	20	40	5	-	16,3	-	3
06271-0160X16	**06271-1160X16**	160	-	16	37	20	40	-	5	-	18,3	3
06271-0180X16	**06271-1180X16**	180	16	-	36	22	43	5	-	18,3	-	3
06271-0180X18	**06271-1180X18**	180	-	18	36	22	43	-	6	-	20,8	3
06271-0200X18	**06271-1200X18**	200	18	-	38	24	45	6	-	20,8	-	3
06271-0200X22	**06271-1200X22**	200	-	22	38	24	45	-	6	-	24,8	3
06271-0250X22	**06271-1250X22**	250	22	-	46	28	50	6	-	24,8	-	5
06271-0250X26	**06271-1250X26**	250	-	26	46	28	50	-	8	-	29,3	5
06271-0315X26	**06271-1315X26**	315	26	-	54	33	56	8	-	29,3	-	5
06271-0315X30	**06271-1315X30**	315	-	30	54	33	56	-	8	-	33,3	5
06271-0400X30	**06271-1400X30**	400	30	-	68	38	63	8	-	33,3	-	5
06271-0400X34	**06271-1400X34**	400	-	34	68	38	63	-	10	-	37,3	5
06271-0500X34	**06271-1500X34**	500	34	-	79	45	72	10	-	37,3	-	5
06271-0500X40	**06271-1500X40**	500	-	40	79	45	72	-	12	-	43,3	5

Handwheels

DIN 950, grey cast iron

Handwheels DIN 950 grey cast iron, with fixed grip

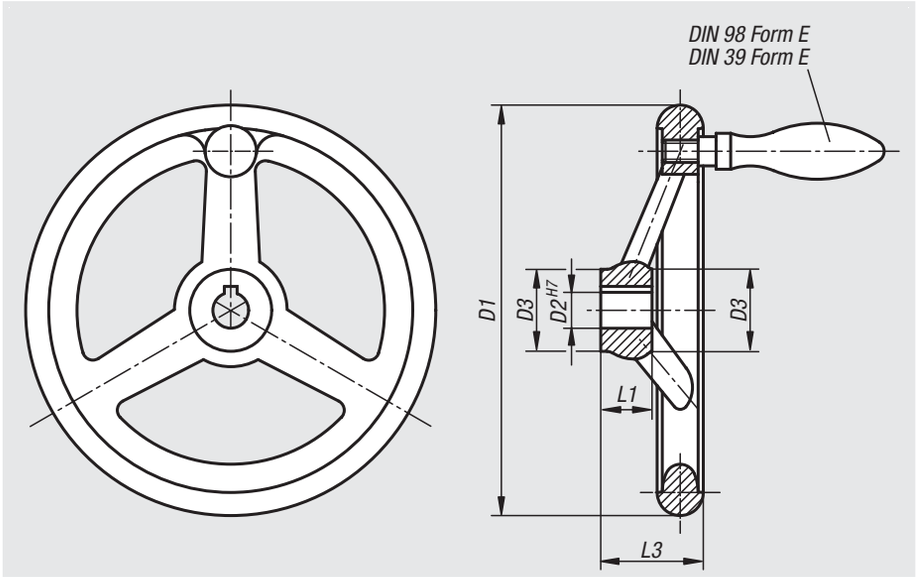
Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes	fixed grip DIN 39 Form E
06271-2080X10	06271-3080X10	80	10	-	25	16	29	3	-	11,4	-	3	ø16 x M6 x 50
06271-2080X12	06271-3080X12	80	-	12	25	16	29	-	4	-	13,8	3	ø16 x M6 x 50
06271-2100X10	06271-3100X10	100	10	-	26	17	33	3	-	11,4	-	3	ø16 x M6 x 50
06271-2100X12	06271-3100X12	100	-	12	26	17	33	-	4	-	13,8	3	ø16 x M6 x 50
06271-2125X12	06271-3125X12	125	12	-	33	18	36	4	-	13,8	-	3	ø20 x M8 x 64
06271-2125X14	06271-3125X14	125	-	14	33	18	36	-	5	-	16,3	3	ø20 x M8 x 64
06271-2140X14	06271-3140X14	140	14	-	33	19	39	5	-	16,3	-	3	ø20 x M8 x 64
06271-2140X16	06271-3140X16	140	-	16	33	19	39	-	5	-	18,3	3	ø20 x M8 x 64
06271-2160X14	06271-3160X14	160	14	-	37	20	40	5	-	16,3	-	3	ø25 x M10 x 80
06271-2160X16	06271-3160X16	160	-	16	37	20	40	-	5	-	18,3	3	ø25 x M10 x 80
06271-2180X16	06271-3180X16	180	16	-	36	22	43	5	-	18,3	-	3	ø25 x M10 x 80
06271-2180X18	06271-3180X18	180	-	18	36	22	43	-	6	-	20,8	3	ø25 x M10 x 80
06271-2200X18	06271-3200X18	200	18	-	38	24	45	6	-	20,8	-	3	ø25 x M10 x 80
06271-2200X22	06271-3200X22	200	-	22	38	24	45	-	6	-	24,8	3	ø25 x M10 x 80
06271-2250X22	06271-3250X22	250	22	-	46	28	50	6	-	24,8	-	5	ø32 x M12 x 100
06271-2250X26	06271-3250X26	250	-	26	46	28	50	-	8	-	29,3	5	ø32 x M12 x 100
06271-2315X26	06271-3315X26	315	26	-	54	33	56	8	-	29,3	-	5	ø32 x M12 x 100
06271-2315X30	06271-3315X30	315	-	30	54	33	56	-	8	-	33,3	5	ø32 x M12 x 100
06271-2400X30	06271-3400X30	400	30	-	68	38	63	8	-	33,3	-	5	ø36 x M16 x 112
06271-2400X34	06271-3400X34	400	-	34	68	38	63	-	10	-	37,3	5	ø36 x M16 x 112
06271-2500X34	06271-3500X34	500	34	-	79	45	72	10	-	37,3	-	5	ø36 x M16 x 112
06271-2500X40	06271-3500X40	500	-	40	79	45	72	-	12	-	43,3	5	ø36 x M16 x 112

Handwheels DIN 950 grey cast iron, with revolving grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes	revolving grip DIN 98 Form E
06271-4080X10	06271-5080X10	80	10	-	25	16	29	3	-	11,4	-	3	ø16 x M6 x 54,5
06271-4080X12	06271-5080X12	80	-	12	25	16	29	-	4	-	13,8	3	ø16 x M6 x 54,5
06271-4100X10	06271-5100X10	100	10	-	26	17	33	3	-	11,4	-	3	ø16 x M6 x 54,5
06271-4100X12	06271-5100X12	100	-	12	26	17	33	-	4	-	13,8	3	ø16 x M6 x 54,5
06271-4125X12	06271-5125X12	125	12	-	33	18	36	4	-	13,8	-	3	ø20 x M8 x 67
06271-4125X14	06271-5125X14	125	-	14	33	18	36	-	5	-	16,3	3	ø20 x M8 x 67
06271-4140X14	06271-5140X14	140	14	-	33	19	39	5	-	16,3	-	3	ø20 x M8 x 67
06271-4140X16	06271-5140X16	140	-	16	33	19	39	-	5	-	18,3	3	ø20 x M8 x 67
06271-4160X14	06271-5160X14	160	14	-	37	20	40	5	-	16,3	-	3	ø25 x M10 x 83
06271-4160X16	06271-5160X16	160	-	16	37	20	40	-	5	-	18,3	3	ø25 x M10 x 83
06271-4180X16	06271-5180X16	180	16	-	36	22	43	5	-	18,3	-	3	ø25 x M10 x 83
06271-4180X18	06271-5180X18	180	-	18	36	22	43	-	6	-	20,8	3	ø25 x M10 x 83
06271-4200X18	06271-5200X18	200	18	-	38	24	45	6	-	20,8	-	3	ø25 x M10 x 83
06271-4200X22	06271-5200X22	200	-	22	38	24	45	-	6	-	24,8	3	ø25 x M10 x 83
06271-4250X22	06271-5250X22	250	22	-	46	28	50	6	-	24,8	-	5	ø32 x M12 x 105,5
06271-4250X26	06271-5250X26	250	-	26	46	28	50	-	8	-	29,3	5	ø32 x M12 x 105,5
06271-4315X26	06271-5315X26	315	26	-	54	33	56	8	-	29,3	-	5	ø32 x M12 x 105,5
06271-4315X30	06271-5315X30	315	-	30	54	33	56	-	8	-	33,3	5	ø32 x M12 x 105,5
06271-4400X30	06271-5400X30	400	30	-	68	38	63	8	-	33,3	-	5	ø36 x M16 x 117
06271-4400X34	06271-5400X34	400	-	34	68	38	63	-	10	-	37,3	5	ø36 x M16 x 117
06271-4500X34	06271-5500X34	500	34	-	79	45	72	10	-	37,3	-	5	ø36 x M16 x 117
06271-4500X40	06271-5500X40	500	-	40	79	45	72	-	12	-	43,3	5	ø36 x M16 x 117

Handwheels

DIN 950, aluminium



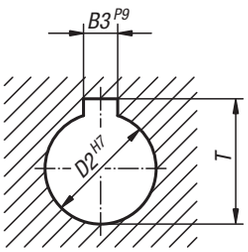
Material:
Handwheel aluminium.
Fixed grip aluminium, axle part steel, black oxidised.
Revolving grip aluminium, axle part steel, galvanized and blue chromed.

Version:
Wheel rim turned and polished.
Radial and axial run-out of rim < IT 12.

Sample order:
nlm 06273-4080X10

On request:
Hubs with square socket or plastic-coated handwheels.

keyway DIN 6885-1



Handwheels DIN 950 aluminium, without grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes
06273-0080X10	**06273-1080X10**	80	10	-	25	16	29	3	-	11,4	-	3
06273-0080X12	**06273-1080X12**	80	-	12	25	16	29	-	4	-	13,8	3
06273-0100X10	**06273-1100X10**	100	10	-	29	17	33	3	-	11,4	-	3
06273-0100X12	**06273-1100X12**	100	-	12	29	17	33	-	4	-	13,8	3
06273-0125X12	**06273-1125X12**	125	12	-	31	18	36	4	-	13,8	-	3
06273-0125X14	**06273-1125X14**	125	-	14	31	18	36	-	5	-	16,3	3
06273-0140X14	**06273-1140X14**	140	14	-	36	19	39	5	-	16,3	-	3
06273-0140X16	**06273-1140X16**	140	-	16	36	19	39	-	5	-	18,3	3
06273-0160X14	**06273-1160X14**	160	14	-	36	20	40	5	-	16,3	-	3
06273-0160X16	**06273-1160X16**	160	-	16	36	20	40	-	5	-	18,3	3
06273-0180X16	**06273-1180X16**	180	16	-	37	22	43	5	-	18,3	-	3
06273-0180X18	**06273-1180X18**	180	-	18	37	22	43	-	6	-	20,8	3
06273-0200X18	**06273-1200X18**	200	18	-	43	24	45	6	-	20,8	-	3
06273-0200X22	**06273-1200X22**	200	-	22	43	24	45	-	6	-	24,8	3
06273-0250X22	**06273-1250X22**	250	22	-	49	28	50	6	-	24,8	-	5
06273-0250X26	**06273-1250X26**	250	-	26	49	28	50	-	8	-	29,3	5
06273-0315X26	**06273-1315X26**	315	26	-	54	33	56	8	-	29,3	-	5
06273-0315X30	**06273-1315X30**	315	-	30	54	33	56	-	8	-	33,3	5
06273-0400X30	**06273-1400X30**	400	30	-	65	38	63	8	-	33,3	-	5
06273-0400X34	**06273-1400X34**	400	-	34	65	38	63	-	10	-	37,3	5
06273-0500X34	**06273-1500X34**	500	34	-	79	45	72	10	-	37,3	-	5
06273-0500X40	**06273-1500X40**	500	-	40	79	45	72	-	12	-	43,3	5

Handwheels

DIN 950, aluminium

Handwheels DIN 950 aluminium, with fixed grip

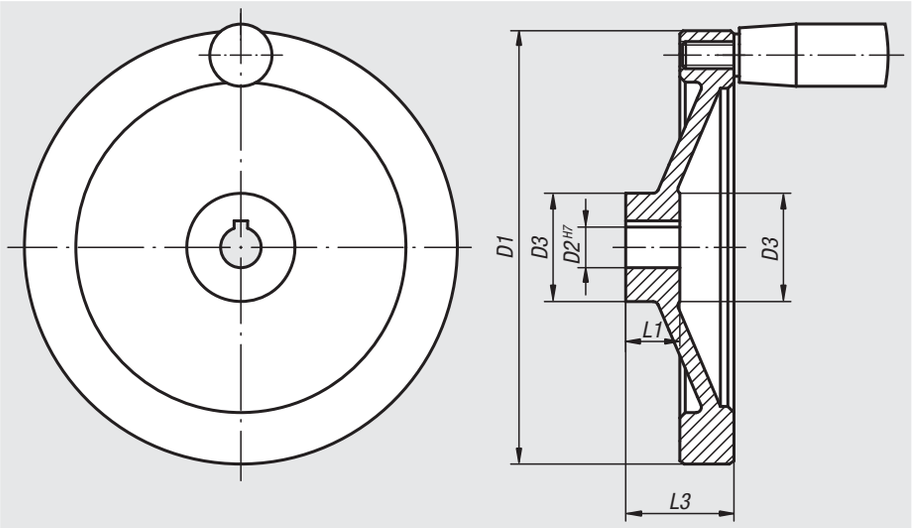
Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes	fixed grip DIN 39 Form E
06273-2080X10	06273-3080X10	80	10	-	25	16	29	3	-	11,4	-	3	ø16 x M6 x 50
06273-2080X12	06273-3080X12	80	-	12	25	16	29	-	4	-	13,8	3	ø16 x M6 x 50
06273-2100X10	06273-3100X10	100	10	-	29	17	33	3	-	11,4	-	3	ø16 x M6 x 50
06273-2100X12	06273-3100X12	100	-	12	29	17	33	-	4	-	13,8	3	ø16 x M6 x 50
06273-2125X12	06273-3125X12	125	12	-	31	18	36	4	-	13,8	-	3	ø20 x M8 x 64
06273-2125X14	06273-3125X14	125	-	14	31	18	36	-	5	-	16,3	3	ø20 x M8 x 64
06273-2140X14	06273-3140X14	140	14	-	36	19	39	5	-	16,3	-	3	ø20 x M8 x 64
06273-2140X16	06273-3140X16	140	-	16	36	19	39	-	5	-	18,3	3	ø20 x M8 x 64
06273-2160X14	06273-3160X14	160	14	-	36	20	40	5	-	16,3	-	3	ø25 x M10 x 80
06273-2160X16	06273-3160X16	160	-	16	36	20	40	-	5	-	18,3	3	ø25 x M10 x 80
06273-2180X16	06273-3180X16	180	16	-	37	22	43	5	-	18,3	-	3	ø25 x M10 x 80
06273-2180X18	06273-3180X18	180	-	18	37	22	43	-	6	-	20,8	3	ø25 x M10 x 80
06273-2200X18	06273-3200X18	200	18	-	43	24	45	6	-	20,8	-	3	ø25 x M10 x 80
06273-2200X22	06273-3200X22	200	-	22	43	24	45	-	6	-	24,8	3	ø25 x M10 x 80
06273-2250X22	06273-3250X22	250	22	-	49	28	50	6	-	24,8	-	5	ø32 x M12 x 100
06273-2250X26	06273-3250X26	250	-	26	49	28	50	-	8	-	29,3	5	ø32 x M12 x 100
06273-2315X26	06273-3315X26	315	26	-	54	33	56	8	-	29,3	-	5	ø32 x M12 x 100
06273-2315X30	06273-3315X30	315	-	30	54	33	56	-	8	-	33,3	5	ø32 x M12 x 100
06273-2400X30	06273-3400X30	400	30	-	65	38	63	8	-	33,3	-	5	ø36 x M16 x 112
06273-2400X34	06273-3400X34	400	-	34	65	38	63	-	10	-	37,3	5	ø36 x M16 x 112
06273-2500X34	06273-3500X34	500	34	-	79	45	72	10	-	37,3	-	5	ø36 x M16 x 112
06273-2500X40	06273-3500X40	500	-	40	79	45	72	-	12	-	43,3	5	ø36 x M16 x 112

Handwheels DIN 950 aluminium, with revolving grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	No.of spokes	revolving grip DIN 98 Form E
06273-4080X10	06273-5080X10	80	10	-	25	16	29	3	-	11,4	-	3	ø16 x M6 x 54,5
06273-4080X12	06273-5080X12	80	-	12	25	16	29	-	4	-	13,8	3	ø16 x M6 x 54,5
06273-4100X10	06273-5100X10	100	10	-	29	17	33	3	-	11,4	-	3	ø16 x M6 x 54,5
06273-4100X12	06273-5100X12	100	-	12	29	17	33	-	4	-	13,8	3	ø16 x M6 x 54,5
06273-4125X12	06273-5125X12	125	12	-	31	18	36	4	-	13,8	-	3	ø20 x M8 x 67
06273-4125X14	06273-5125X14	125	-	14	31	18	36	-	5	-	16,3	3	ø20 x M8 x 67
06273-4140X14	06273-5140X14	140	14	-	36	19	39	5	-	16,3	-	3	ø20 x M8 x 67
06273-4140X16	06273-5140X16	140	-	16	36	19	39	-	5	-	18,3	3	ø20 x M8 x 67
06273-4160X14	06273-5160X14	160	14	-	36	20	40	5	-	16,3	-	3	ø25 x M10 x 83
06273-4160X16	06273-5160X16	160	-	16	36	20	40	-	5	-	18,3	3	ø25 x M10 x 83
06273-4180X16	06273-5180X16	180	16	-	37	22	43	5	-	18,3	-	3	ø25 x M10 x 83
06273-4180X18	06273-5180X18	180	-	18	37	22	43	-	6	-	20,8	3	ø25 x M10 x 83
06273-4200X18	06273-5200X18	200	18	-	43	24	45	6	-	20,8	-	3	ø25 x M10 x 83
06273-4200X22	06273-5200X22	200	-	22	43	24	45	-	6	-	24,8	3	ø25 x M10 x 83
06273-4250X22	06273-5250X22	250	22	-	49	28	50	6	-	24,8	-	5	ø32 x M12 x 105,5
06273-4250X26	06273-5250X26	250	-	26	49	28	50	-	8	-	29,3	5	ø32 x M12 x 105,5
06273-4315X26	06273-5315X26	315	26	-	54	33	56	8	-	29,3	-	5	ø32 x M12 x 105,5
06273-4315X30	06273-5315X30	315	-	30	54	33	56	-	8	-	33,3	5	ø32 x M12 x 105,5
06273-4400X30	06273-5400X30	400	30	-	65	38	63	8	-	33,3	-	5	ø36 x M16 x 117
06273-4400X34	06273-5400X34	400	-	34	65	38	63	-	10	-	37,3	5	ø36 x M16 x 117
06273-4500X34	06273-5500X34	500	34	-	79	45	72	10	-	37,3	-	5	ø36 x M16 x 117
06273-4500X40	06273-5500X40	500	-	40	79	45	72	-	12	-	43,3	5	ø36 x M16 x 117

Handwheels disc

aluminium



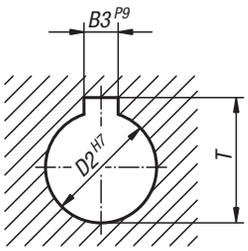
Material:
Disc handwheel aluminium.
Cylinder grip black Duroplast PF 31-DIN 7708.
Hub galvanized steel.

Version:
Wheel rim turned and polished.
Radial and axial run-out of rim < IT 12.

Sample order:
nlm 06275-4080X10

On request:
Hubs with square socket or plastic-coated handwheels.

keyway DIN 6885-1



Handwheels disc, aluminium, without grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2
06275-0080X10	**06275-1080X10**	80	10	-	26	16	31	3	-	11,4	-
06275-0080X12	**06275-1080X12**	80	-	12	26	16	31	-	4	-	13,8
06275-0100X10	**06275-1100X10**	100	10	-	31	17	34	3	-	11,4	-
06275-0100X12	**06275-1100X12**	100	-	12	31	17	34	-	4	-	13,8
06275-0125X12	**06275-1125X12**	125	12	-	30	18	37	4	-	13,8	-
06275-0125X14	**06275-1125X14**	125	-	14	30	18	37	-	5	-	16,3
06275-0140X14	**06275-1140X14**	140	14	-	34	19	34	5	-	16,3	-
06275-0140X15	**06275-1140X15**	140	-	15	34	19	34	-	5	-	17,3
06275-0160X15	**06275-1160X15**	160	15	-	40	20	40	5	-	17,3	-
06275-0160X16	**06275-1160X16**	160	-	16	40	20	40	-	5	-	18,3
06275-0200X18	**06275-1200X18**	200	18	-	50	24	46	6	-	20,8	-
06275-0200X20	**06275-1200X20**	200	-	20	50	24	46	-	6	-	22,8
06275-0250X22	**06275-1250X22**	250	22	-	50	28	49	6	-	24,8	-
06275-0250X24	**06275-1250X24**	250	-	24	50	28	49	-	8	-	27,3

Handwheels disc

aluminium

Handwheels disc, aluminium, with fixed cylinder grip

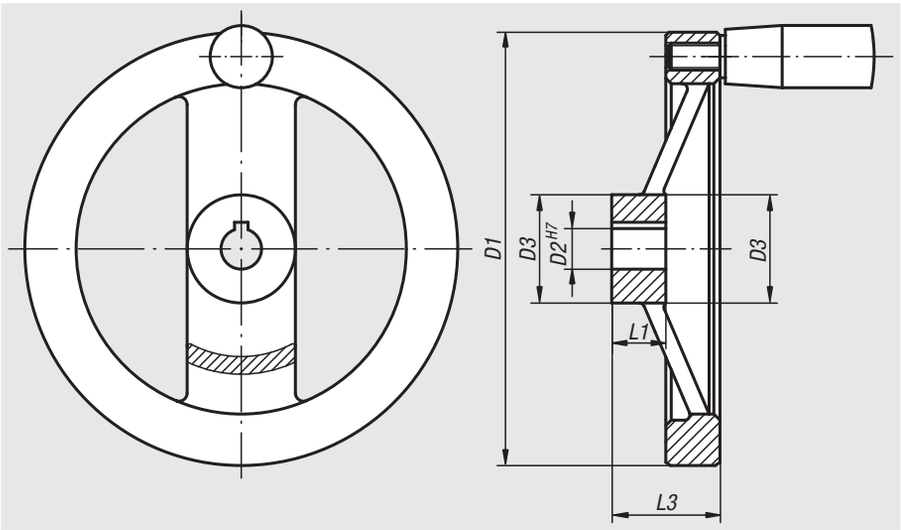
Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	Fixed cylinder grip
06275-2080X10	**06275-3080X10**	80	10	-	25	16	31	3	-	11,4	-	ø18 x M6 x 40
06275-2080X12	**06275-3080X12**	80	-	12	25	16	31	-	4	-	13,8	ø18 x M6 x 40
06275-2100X10	**06275-3100X10**	100	10	-	31	17	34	3	-	11,4	-	ø18 x M6 x 40
06275-2100X12	**06275-3100X12**	100	-	12	31	17	34	-	4	-	13,8	ø18 x M6 x 40
06275-2125X12	**06275-3125X12**	125	12	-	30	18	37	4	-	13,8	-	ø21 x M8 x 50
06275-2125X14	**06275-3125X14**	125	-	14	30	18	37	-	5	-	16,3	ø21 x M8 x 50
06275-2140X14	**06275-3140X14**	140	14	-	34	19	34	5	-	16,3	-	ø21 x M8 x 50
06275-2140X15	**06275-3140X15**	140	-	15	34	19	34	-	5	-	17,3	ø21 x M8 x 50
06275-2160X15	**06275-3160X15**	160	15	-	40	20	40	5	-	17,3	-	ø26 x M10 x 80
06275-2160X16	**06275-3160X16**	160	-	16	40	20	40	-	5	-	18,3	ø26 x M10 x 80
06275-2200X18	**06275-3200X18**	200	18	-	50	24	46	6	-	20,8	-	ø26 x M10 x 80
06275-2200X20	**06275-3200X20**	200	-	20	50	24	46	-	6	-	22,8	ø26 x M10 x 80
06275-2250X22	**06275-3250X22**	250	22	-	50	28	49	6	-	24,8	-	ø28 x M12 x 90
06275-2250X24	**06275-3250X24**	250	-	24	50	28	49	-	8	-	27,3	ø28 x M12 x 90

Handwheels disc, aluminium, with revolving cylinder grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	Revolving cylinder grip
06275-4080X10	**06275-5080X10**	80	10	-	25	16	31	3	-	11,4	-	ø18 x M6 x 40
06275-4080X12	**06275-5080X12**	80	-	12	25	16	31	-	4	-	13,8	ø18 x M6 x 40
06275-4100X10	**06275-5100X10**	100	10	-	31	17	34	3	-	11,4	-	ø18 x M6 x 40
06275-4100X12	**06275-5100X12**	100	-	12	31	17	34	-	4	-	13,8	ø18 x M6 x 40
06275-4125X12	**06275-5125X12**	125	12	-	30	18	37	4	-	13,8	-	ø22 x M8 x 56
06275-4125X14	**06275-5125X14**	125	-	14	30	18	37	-	5	-	16,3	ø22 x M8 x 56
06275-4140X14	**06275-5140X14**	140	14	-	34	19	34	5	-	16,3	-	ø22 x M8 x 56
06275-4140X15	**06275-5140X15**	140	-	15	34	19	34	-	5	-	17,3	ø22 x M8 x 56
06275-4160X15	**06275-5160X15**	160	15	-	40	20	40	5	-	17,3	-	ø26 x M10 x 80
06275-4160X16	**06275-5160X16**	160	-	16	40	20	40	-	5	-	18,3	ø26 x M10 x 80
06275-4200X18	**06275-5200X18**	200	18	-	50	24	46	6	-	20,8	-	ø26 x M10 x 80
06275-4200X20	**06275-5200X20**	200	-	20	50	24	46	-	6	-	22,8	ø26 x M10 x 80
06275-4250X22	**06275-5250X22**	250	22	-	50	28	49	6	-	24,8	-	ø31 x M12 x 102
06275-4250X24	**06275-5250X24**	250	-	24	50	28	49	-	8	-	27,3	ø31 x M12 x 102

Handwheels 2-spoke

aluminium, flat wheel rim



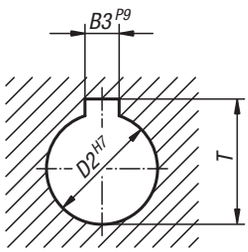
Material:
Handwheels aluminium.
Cylinder grip black Duroplast PF 31-DIN 7708.
Hub galvanized steel.

Version:
Wheel rim turned and polished.
Radial and axial run-out of rim < IT 12.

Sample order:
nlm 06277-4080X10

On request:
Hubs with square socket or plastic-coated handwheels.

keyway DIN 6885-1



Handwheels 2-spoke, aluminium, flat wheel rim, without grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2
06277-0080X10	**06277-1080X10**	80	10	-	24	16	28	3	-	11,4	-
06277-0080X12	**06277-1080X12**	80	-	12	24	16	28	-	4	-	13,8
06277-0100X10	**06277-1100X10**	100	10	-	26	17	33	3	-	11,4	-
06277-0100X12	**06277-1100X12**	100	-	12	26	17	33	-	4	-	13,8
06277-0125X12	**06277-1125X12**	125	12	-	31	18	33,5	4	-	13,8	-
06277-0125X14	**06277-1125X14**	125	-	14	31	18	33,5	-	5	-	16,3
06277-0160X14	**06277-1160X14**	160	14	-	36	20	39	5	-	16,3	-
06277-0160X16	**06277-1160X16**	160	-	16	36	20	39	-	5	-	18,3
06277-0200X18	**06277-1200X18**	200	18	-	42	24	45	6	-	20,8	-
06277-0200X20	**06277-1200X20**	200	-	20	42	24	45	-	6	-	22,8
06277-0250X22	**06277-1250X22**	250	22	-	48	28	51	6	-	24,8	-
06277-0250X26	**06277-1250X26**	250	-	26	48	28	51	-	8	-	29,3

Handwheels 2-spoke

aluminium, flat wheel rim

Handwheels 2-spoke, aluminium, flat wheel rim, with fixed cylinder grip

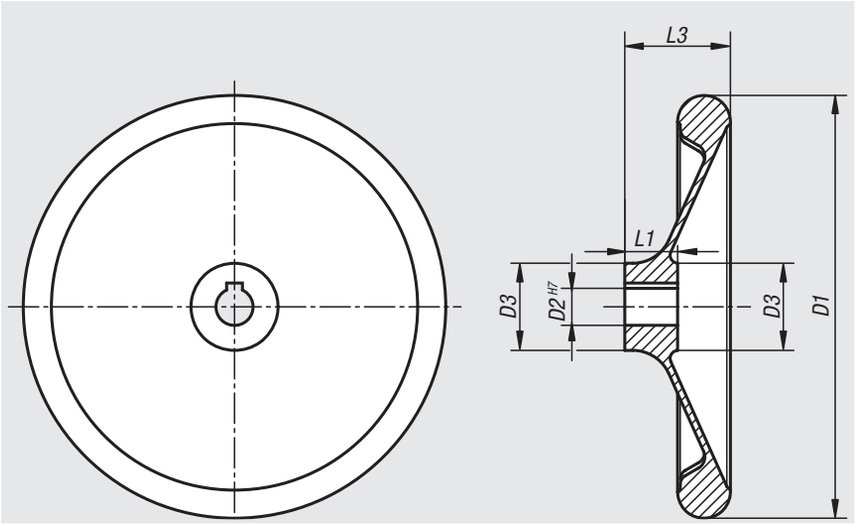
Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	Fixed cylinder grip
06277-2080X10	**06277-3080X10**	80	10	-	24	16	28	3	-	11,4	-	ø18 x M6 x 40
06277-2080X12	**06277-3080X12**	80	-	12	24	16	28	-	4	-	13,8	ø18 x M6 x 40
06277-2100X10	**06277-3100X10**	100	10	-	26	17	33	3	-	11,4	-	ø18 x M6 x 40
06277-2100X12	**06277-3100X12**	100	-	12	26	17	33	-	4	-	13,8	ø18 x M6 x 40
06277-2125X12	**06277-3125X12**	125	12	-	31	18	33,5	4	-	13,8	-	ø21 x M8 x 50
06277-2125X14	**06277-3125X14**	125	-	14	31	18	33,5	-	5	-	16,3	ø21 x M8 x 50
06277-2160X14	**06277-3160X14**	160	14	-	36	20	39	5	-	16,3	-	ø26 x M10 x 80
06277-2160X16	**06277-3160X16**	160	-	16	36	20	39	-	5	-	18,3	ø26 x M10 x 80
06277-2200X18	**06277-3200X18**	200	18	-	42	24	45	6	-	20,8	-	ø26 x M10 x 80
06277-2200X20	**06277-3200X20**	200	-	20	42	24	45	-	6	-	22,8	ø26 x M10 x 80
06277-2250X22	**06277-3250X22**	250	22	-	48	28	51	6	-	24,8	-	ø28 x M12 x 90
06277-2250X26	**06277-3250X26**	250	-	26	48	28	51	-	8	-	29,3	ø28 x M12 x 90

Handwheels 2-spoke, aluminium, flat wheel rim, with revolving cylinder grip

Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2	Revolving cylinder grip
06277-4080X10	**06277-5080X10**	80	10	-	24	16	28	3	-	11,4	-	ø18 x M6 x 40
06277-4080X12	**06277-5080X12**	80	-	12	24	16	28	-	4	-	13,8	ø18 x M6 x 40
06277-4100X10	**06277-5100X10**	100	10	-	26	17	33	3	-	11,4	-	ø18 x M6 x 40
06277-4100X12	**06277-5100X12**	100	-	12	26	17	33	-	4	-	13,8	ø18 x M6 x 40
06277-4125X12	**06277-5125X12**	125	12	-	31	18	33,5	4	-	13,8	-	ø22 x M8 x 56
06277-4125X14	**06277-5125X14**	125	-	14	31	18	33,5	-	5	-	16,3	ø22 x M8 x 56
06277-4160X14	**06277-5160X14**	160	14	-	36	20	39	5	-	16,3	-	ø26 x M10 x 80
06277-4160X16	**06277-5160X16**	160	-	16	36	20	39	-	5	-	18,3	ø26 x M10 x 80
06277-4200X18	**06277-5200X18**	200	18	-	42	24	45	6	-	20,8	-	ø26 x M10 x 80
06277-4200X20	**06277-5200X20**	200	-	20	42	24	45	-	6	-	22,8	ø26 x M10 x 80
06277-4250X22	**06277-5250X22**	250	22	-	48	28	51	6	-	24,8	-	ø31 x M12 x 102
06277-4250X26	**06277-5250X26**	250	-	26	48	28	51	-	8	-	29,3	ø31 x M12 x 102

Handwheels disc

similar to DIN 950, aluminium



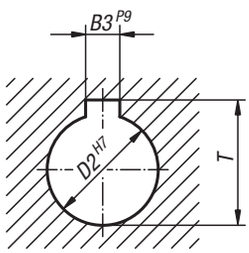
Material:
Handwheel aluminium.

Version:
Wheel rim turned and polished.
Radial and axial run-out of rim < IT 12.

Sample order:
nlm 06279-0080X10

On request:
Hubs with square socket or plastic-coated handwheels.

keyway DIN 6885-1



Order No. hub without slot	Order No. hub with slot	D1	D2 line 1	D2 line 2	D3	L1	L3	B3 line 1	B3 line 2	T line 1	T line 2
06279-0080X10	**06279-1080X10**	80	10	-	25	16	30	3	-	11,4	-
06279-0080X12	**06279-1080X12**	80	-	12	25	16	30	-	4	-	13,8
06279-0100X10	**06279-1100X10**	100	10	-	28	17	31	3	-	11,4	-
06279-0100X12	**06279-1100X12**	100	-	12	28	17	31	-	4	-	13,8
06279-0120X12	**06279-1120X12**	120	12	-	27	18	30	4	-	13,8	-
06279-0120X14	**06279-1120X14**	120	-	14	27	18	30	-	5	-	16,3
06279-0160X14	**06279-1160X14**	160	14	-	34	20	40	5	-	16,3	-
06279-0160X16	**06279-1160X16**	160	-	16	34	20	40	-	5	-	18,3
06279-0200X18	**06279-1200X18**	200	18	-	40	24	44	6	-	20,8	-
06279-0200X22	**06279-1200X22**	200	-	22	40	24	44	-	6	-	24,8
06279-0250X22	**06279-1250X22**	250	22	-	49	28	61	6	-	24,8	-
06279-0250X26	**06279-1250X26**	250	-	26	49	28	61	-	8	-	29,3
06279-0280X24	**06279-1280X24**	280	24	-	51	30	38	8	-	27,3	-
06279-0280X28	**06279-1280X28**	280	-	28	51	30	38	-	8	-	31,3
06279-0360X28	**06279-1360X28**	360	28	-	63	35	73	8	-	31,3	-
06279-0360X32	**06279-1360X32**	360	-	32	63	35	73	-	10	-	35,3

Handwheels disc

with revolving grip

Material:
Duroplast PF 31, black.
Hubs nickel-plated steel or bright stainless steel 1.4305.
Revolving grip, metal parts nickel-plated or stainless steel 1.4305, bright.

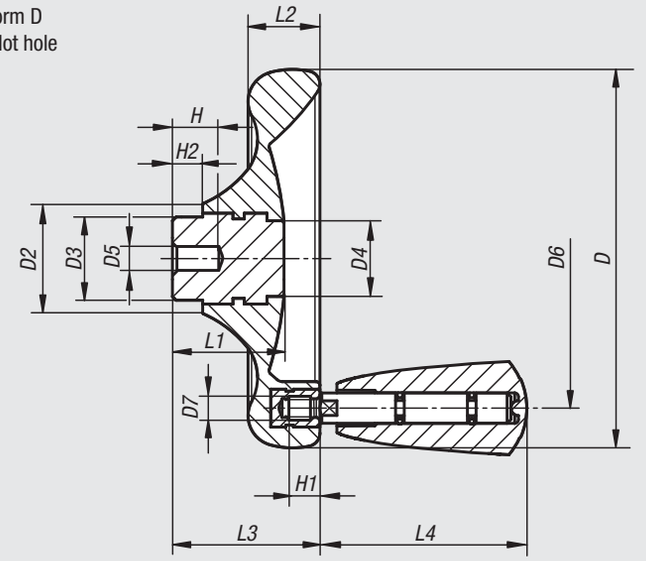
Version:
High-gloss polished.

Sample order:
nlm 06287-0125X08

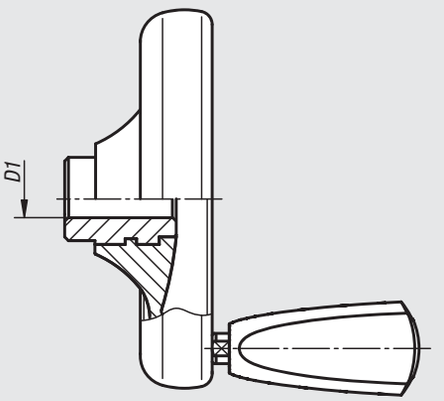
Note:
The handwheel is supplied with the grip loose.

On request:
Other reamed holes.

Form D
pilot hole



Form E
reamed hole



Handwheels disc, with revolving grip

Order No. Form D	Order No. Form E	Size	D	D1	D2	D3	D4	D5	D6	D7	H	H1	H2	L1	L2	L3	L4
06287-0100X06	**06287-1100X10**	1	100	-/10 H8	29	22	20	6/ -	79	M6	12/ -	9	8	29,5	19	39	54,7
06287-0125X08	**06287-1125X12**	2	125	-/12 H8	34	26	21	8/ -	101	M6	15/ -	9	8	34	24	46	54,7
06287-0140X08	**06287-1140X14**	3	140	-/14 H8	39	30	25	8/ -	110	M8	16/ -	12	8	38,5	27	52	82,2
06287-0160X10	**06287-1160X16**	4	160	-/16 H8	43	33	30	10/ -	128	M8	20/ -	12	8	41,3	30,1	57	82,2
-	**06287-1160X18**	4	160	18 H8	43	33	30	-	128	M8	-	12	8	41,3	30,1	57	82,2

Handwheels disc, with revolving grip, metal parts stainless steel

Order No. Form D	Order No. Form E	Size	D	D1	D2	D3	D4	D5	D6	D7	H	H1	H2	L1	L2	L3	L4
06287-2100X06	**06287-3100X10**	1	100	-/10 H7	29	22	20	6/ -	79	M6	12/ -	9	8	29,5	19	39	54,7
06287-2125X08	**06287-3125X12**	2	125	-/12 H7	34	26	21	8/ -	101	M6	15/ -	9	8	34	24	46	54,7
06287-2140X08	**06287-3140X14**	3	140	-/14 H7	39	30	25	8/ -	110	M8	16/ -	12	8	38,5	27	52	82,2
06287-2160X10	**06287-3160X16**	4	160	-/16 H7	43	33	30	10/ -	128	M8	20/ -	12	8	41,3	30,1	57	82,2
-	**06287-3160X18**	4	160	18 H7	43	33	30	-	128	M8	-	12	8	41,3	30,1	57	82,2

Handwheels disc

without grip

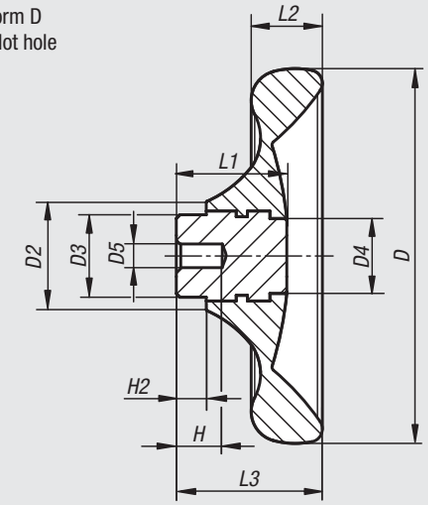
Material:
Black Duroplast PF 31.
Hub nickel-plated steel or bright stainless steel 1.4305.

Version:
High-gloss polished.

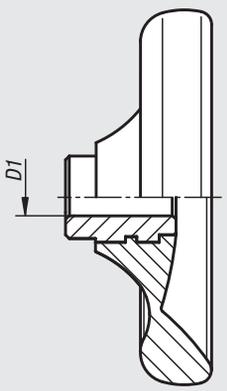
Sample order:
nlm 06288-0100X06

On request:
Other reamed holes.

Form D
pilot hole



Form E
reamed hole



Handwheels disc, without grip, bush steel

Order No. Form D	Order No. Form E	Size	D	D1	D2	D3	D4	D5	H	H2	L1	L2	L3
06288-0100X06	**06288-1100X10**	1	100	-/10 H8	29	22	20	6/ -	12/ -	8	29,5	19	39
06288-0125X08	**06288-1125X12**	2	125	-/12 H8	34	26	21	8/ -	15/ -	8	34	24	46
06288-0140X08	**06288-1140X14**	3	140	-/14 H8	39	30	25	8/ -	16/ -	8	38,5	27	52
06288-0160X10	**06288-1160X16**	4	160	-/16 H8	43	33	30	10/ -	20/ -	8	41,3	30,1	57
-	**06288-1160X18**	4	160	18 H8	43	33	30	-	-	8	41,3	30,1	57

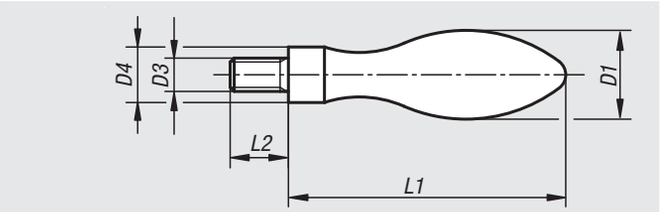
Handwheels disc, without grip, bush stainless steel

Order No. Form D	Order No. Form E	Size	D	D1	D2	D3	D4	D5	H	H2	L1	L2	L3
06288-2100X06	**06288-3100X10**	1	100	-/10 H7	29	22	20	6/ -	12/ -	8	29,5	19	39
06288-2125X08	**06288-3125X12**	2	125	-/12 H7	34	26	21	8/ -	15/ -	8	34	24	46
06288-2140X08	**06288-3140X14**	3	140	-/14 H7	39	30	25	8/ -	16/ -	8	38,5	27	52
06288-2160X10	**06288-3160X16**	4	160	-/16 H7	43	33	30	10/ -	20/ -	8	41,3	30,1	57
-	**06288-3160X18**	4	160	18 H7	43	33	30	-	-	8	41,3	30,1	57

06290

Machine handles fixed

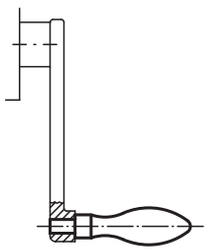
steel, similar to DIN 39



Material:
Steel.

Version:
Polished.

Sample order:
nlm 06290-216

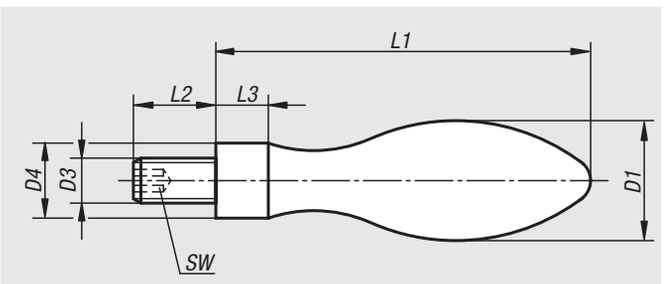


Order No.	D1	D3	D4	L1	L2
06290-213	13	M5	8	40	10
06290-216	16	M6	10	50	13
06290-220	20	M8	13	64	15
06290-225	25	M10	16	80	18
06290-232	32	M12	20	100	20

06291

Machine handles fixed

steel, DIN 39 Form E



Material:
Grip and screw steel.

Version:
Grip and screw galvanized and blue chromed.

Sample order:
nlm 06291-0616050

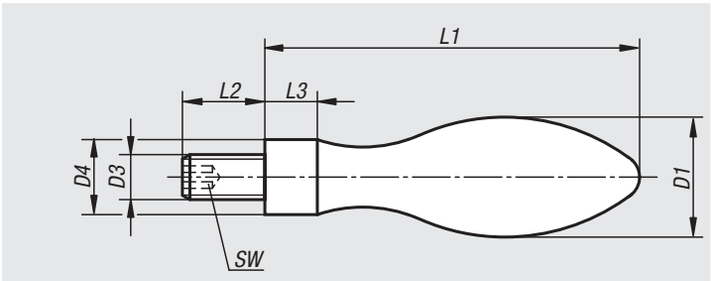
Note:
Machine handle suitable for DIN 950 handwheels.

Order No.	D1	D3	D4	L1	L2	L3	SW
06291-0616050	16	M6	10	50	11	7	3
06291-0820064	20	M8	13	64	13	8	4
06291-1025080	25	M10	16	80	14	10	5
06291-1232100	32	M12	20	100	21	13	6
06291-1636112	36	M16	22	112	26	14	8

06292

Machine handles fixed

aluminium, DIN 39 Form E



Material:
Grip aluminium.
Screw steel.

Version:
Grip polished.
Screw black.

Sample order:
nlm 06292-0616050

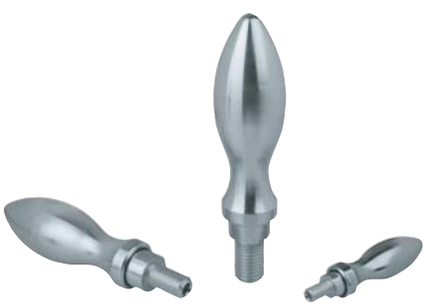
Note:
Machine handle suitable for DIN 950 handwheels.

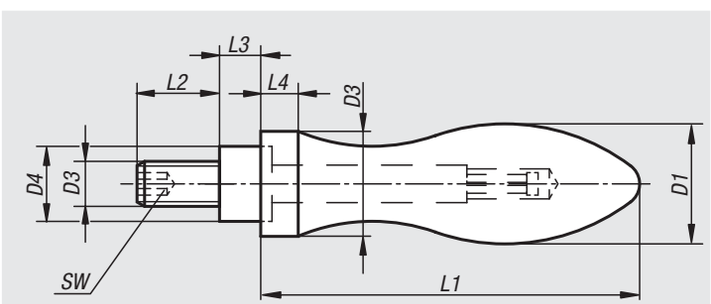
Order No.	D1	D3	D4	L1	L2	L3	SW
06292-0616050	16	M6	10	50	11	7	3
06292-0820064	20	M8	13	64	13	8	4
06292-1025080	25	M10	16	80	14	10	5
06292-1232100	32	M12	20	100	21	13	6
06292-1636112	36	M16	22	112	26	14	8

06308

Machine handles revolving

steel, DIN 98 Form E





Material:
Grip and screw steel.

Version:
Grip and screw galvanized and blue chromed.

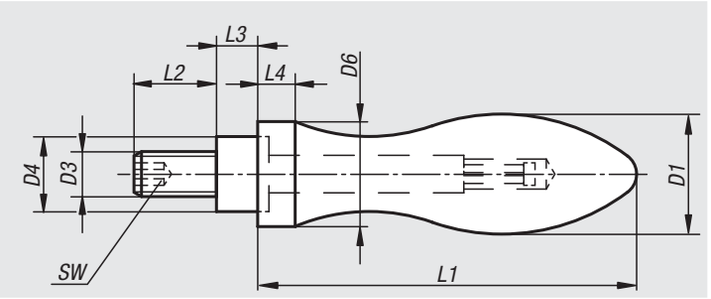
Sample order:
nlm 06308-0616055

Note:
Machine handle suitable for DIN 950 handwheels.

Order No.	D1	D3	D4	D6	L1	L2	L3	L4	SW
06308-0616055	16	M6	10	14	49	11	5,5	5	3
06308-0820067	20	M8	13	18	61	13	6	6	4
06308-1025083	25	M10	16	21	75	14	8	6,5	5
06308-1232105	32	M12	20	26	95	21	10,5	8	6
06308-1636117	36	M16	22	29	106	26	11	9	8

Machine handles revolving

aluminium, DIN 98 Form E



Material:
Grip aluminium.
Screw steel.

Version:
Grip polished.
Axle part galvanized and blue chromed.

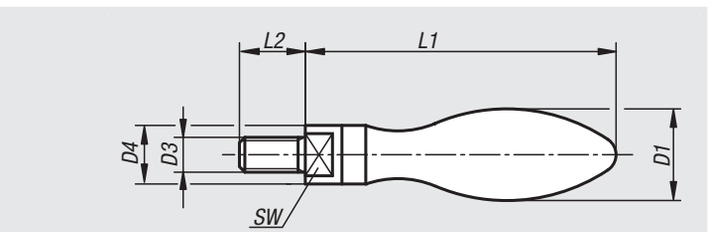
Sample order:
nlm 06309-0616055

Note:
Machine handle suitable for DIN 950 handwheels.

Order No.	D1	D3	D4	D6	L1	L2	L3	L4	SW
06309-0616055	16	M6	10	14	49	11	5,5	5	3
06309-0820067	20	M8	13	18	61	13	6	6	4
06309-1025083	25	M10	16	21	75	14	8	6,5	5
06309-1232105	32	M12	20	26	95	21	10,5	8	6
06309-1636117	36	M16	22	29	106	26	11	9	8

Machine handles revolving

steel, similar to DIN 98



Material:
Steel.

Version:
Polished.

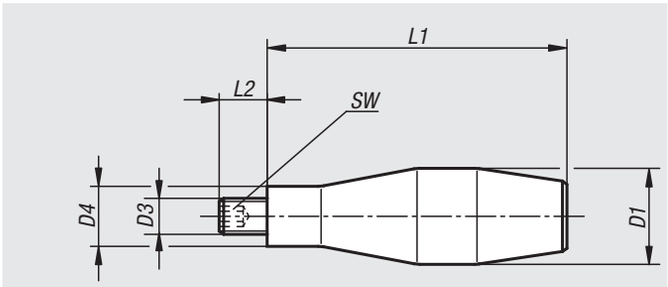
Sample order:
nlm 06310-225

Order No.	D1	D3	D4	L1	L2	SW
06310-216	16	M6	10	53	13	8
06310-220	20	M8	13	66	15	10
06310-225	25	M10	16	85	18	13
06310-232	32	M12	20	107	20	17

06311

Machine handles fixed

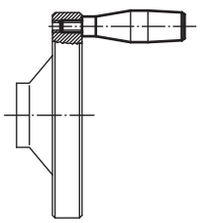
straight form, similar to DIN 39



Material:
aluminium,
threaded bolt in steel

Version:
Polished handle, glossy finish.

Sample order:
nlm 06311-20

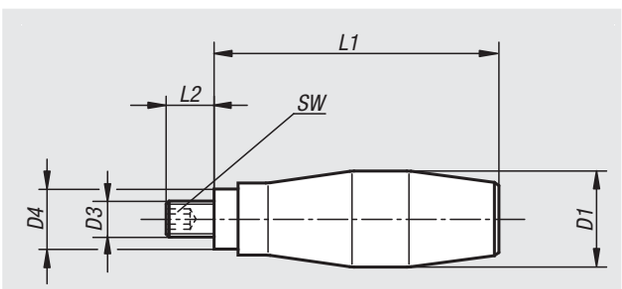


Order No.	D1	D3	D4	L1	L2	SW
06311-16	16	M6	10	52	11	3
06311-20	20	M8	13	66	13	4
06311-25	25	M10	16	80	14	5
06311-29	32	M12	20	100	16	6

06312

Machine handles revolving

straight form, similar to DIN 98



Material:
aluminium,
axle part in steel

Version:
Polished handle, glossy finish

Sample order:
nlm 06312-24

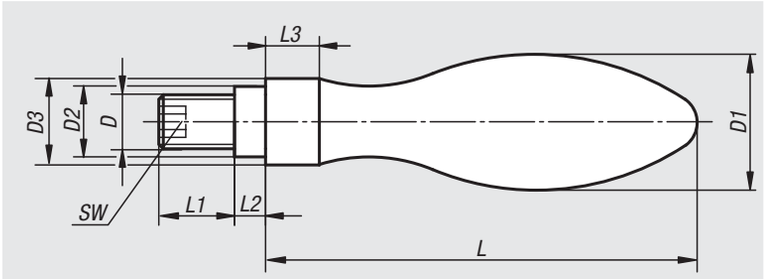
Order No.	D1	D3	D4	L1	L2	SW
06312-20	20	M8	13	64	13	4
06312-24	24	M10	16	75	13	5
06312-31	31	M12	20	95	16	6

Machine handles revolving

Material:
Thermoplastic or Duroplast machine handle.
Axle part in steel.

Version:
Black machine handle.
Steel chromed.

Sample order:
nlm 06313-208



Order No.	Material	D	D1	D2	D3	~L	L1	L2	L3	SW
06313-206	Duroplast	M6	16	10	14	49	11	5,5	5	3
06313-208	Duroplast	M8	20	13	18	61	13	6	6	4
06313-210	Thermoplastic	M10	25	16	21	75	14	8	6,5	5
06313-212	Thermoplastic	M12	32	20	26	95	21	10,5	8	6

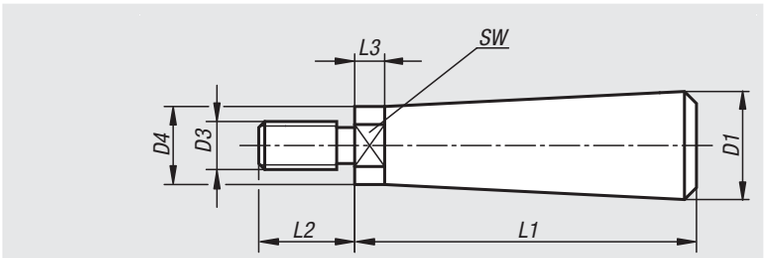
Conical grip

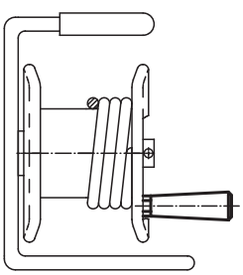
revolving

Material:
Black duroplastic PF 31;
axle part in steel

Version:
Axle part galvanized

Sample order:
nlm 06314-18

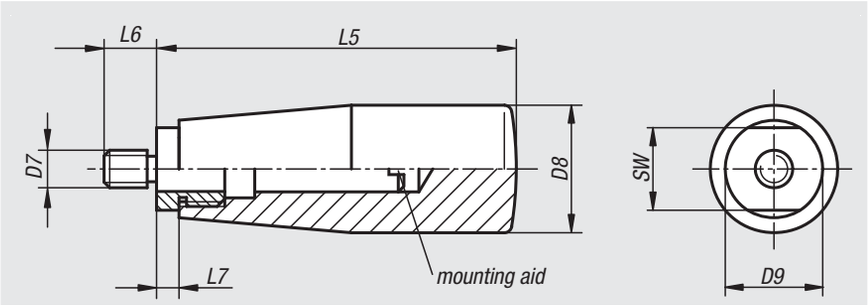




Order No.	D1	D3	D4	L1	L2	L3	SW
06314-18	18	M8	13	57	16	5	11
06314-23	20	M10	16	69	20	5	13

Taper grips

revolving



Material:
Black Duroplast PF 31.
Axle and threaded bush galvanized steel or bright stainless steel.

Version:
High-gloss polished.

Sample order:
nlm 06316-105007

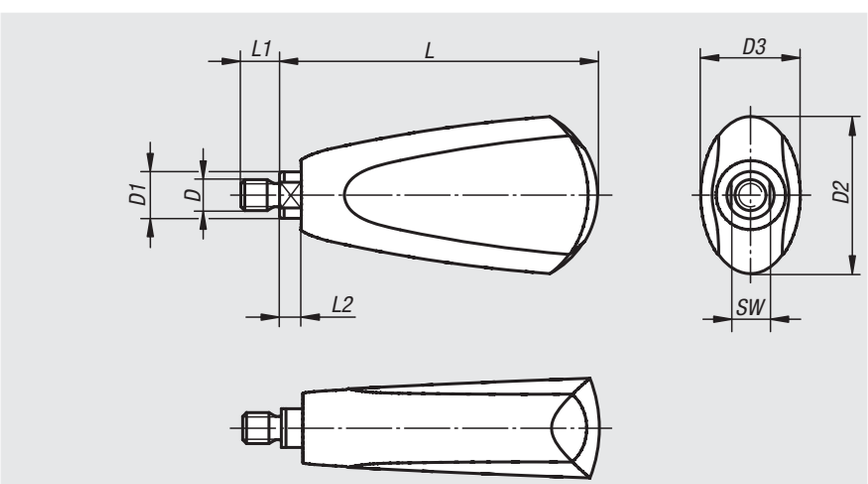
Note:
To mount unscrew the axle.

Order No. axle steel	Order No. axle stainless steel	Size	D7	D8	D9	L5	L6	L7	SW
06316-105007	**06316-1105007**	1	M5	17	15	51	7	5	13
06316-206008	**06316-1206008**	2	M6	23	18	68	8	6	16
06316-208009	**06316-1208009**	2	M8	23	18	68	9	6	16
06316-310011	**06316-1310011**	3	M10	28	21	77	11	7	19

06316

Taper grips

revolving



Material:
Duroplast PF 31, black.
Axle steel, nickel-plated or bright stainless steel 1.4305.
Snap ring stainless steel 1.4310.

Version:
High-gloss polished.

Sample order:
nlm 06316-106009

Note:
The grips are suitable for disc handwheels with revolving taper grip 06287.

Order No. axle steel	Order No. axle stainless steel	Size	D	D1	D2	D3	L	L1	L2	SW
06316-106009	**06316-1106009**	1	M6	8	25	18	54,7	9	4,5	7
06316-208010	**06316-1208010**	2	M8	12	41	26	82,2	10	5,5	10

Taper grips

Material:
Duroplast PF 31, black.
Bush and stud galvanized steel.

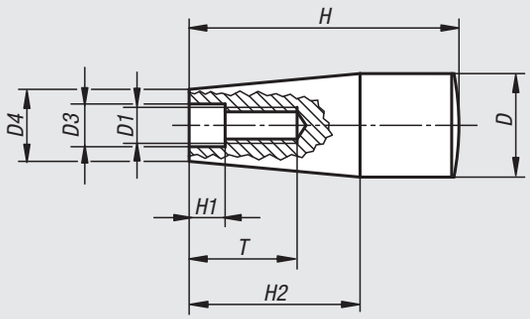
Version:
High-gloss polished.

Sample order:
nlm 06320-106

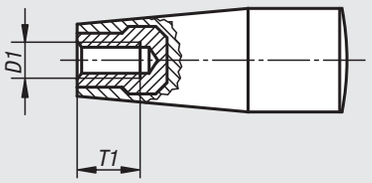
Note:
The versions 06320-205 and 06320-206 have a brass bush.
The versions 06320-208 and 06320-2081 have copper-plated steel bushes.

On request:
Other colours.

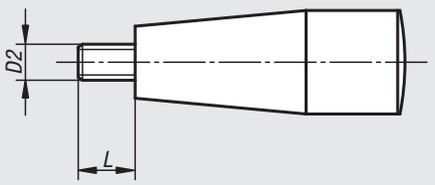
Form C
with moulded thread



Form E
with threaded bush



Form F
with external thread



Taper grips with internal thread

Order No.	Form	D	D1	D3	D4	H	H1	H2	T	T1
06320-106	C	17	M6	6,2	15	45	2	26	14	-
06320-108	C	17	M8	8,2	13	45	2	26	16	-
06320-1081	C	23	M8	8,5	18	61	2	38	24	-
06320-110	C	29	M10	10,5	21	71	3,5	42	28	-
06320-205	E	17	M5	-	15	45	-	26	-	10
06320-206	E	17	M6	-	15	45	-	26	-	9
06320-208	E	23	M8	-	18	61	-	38	-	14
06320-2081	E	28	M8	-	21	71	-	42	-	14

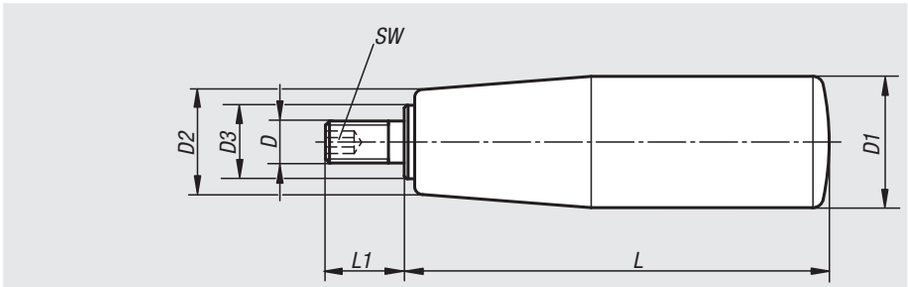
Taper grips with external thread

Order No.	Form	D	D2	D4	H	H2	L
06320-306	F	17	M6	15	45	26	18
06320-308	F	23	M8	18	61	38	12
06320-310	F	29	M10	21	71	42	20

06321

Cylindrical grips revolving

with hexagon socket



Material:
Grip thermoplastic.
Steel parts galvanized.

Version:
Black satin finished.

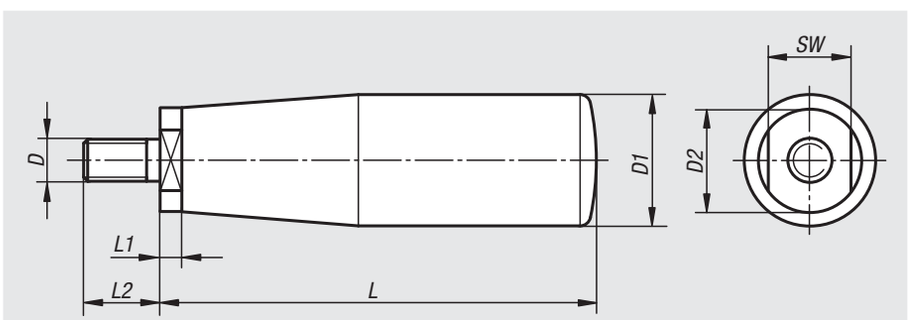
Sample order:
nlm 06321-06200520

Note:
Cylindrical grips can be screwed onto our handwheels, crank handles etc.

Order No.	D	D1	D2	D3	L	L1	SW
06321-06200520	M6	20	15	10	51	12	3
06321-06230620	M6	23	18	10	62	12	3
06321-08230620	M8	23	18	10	62	15	4
06321-08250720	M8	25	19	10	71	15	4
06321-10250720	M10	25	19	10	71	15	4
06321-08250810	M8	26	22	14	81	15	4
06321-10250810	M10	26	22	14	81	15	5
06321-12260820	M12	26	22	14	81	15	5
06321-10270930	M10	27	22	14	92	15	5
06321-12270930	M12	27	22	14	92	15	5

06322

Cylindrical grips revolving



Material:
Grip thermoplastic.
Steel parts galvanized.

Version:
Black satin finished.

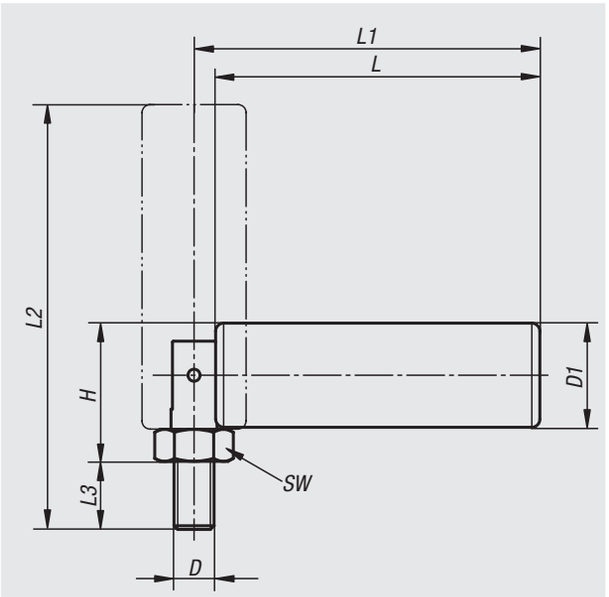
Sample order:
nlm 06322-06200500

Note:
Cylindrical grips can be screwed onto our handwheels, crank handles etc.

Order No.	D	D1	D2	L	L1	L2	SW
06322-06200500	M6	20	12	55	5	12	10
06322-08230600	M8	23	14	67	7	15	13
06322-08250690	M8	25	14	77	7	15	13
06322-10250690	M10	25	14	77	7	15	13
06322-10250800	M10	26	18	86	7	15	16
06322-10270890	M10	27	18	97	7	15	16
06322-12250800	M12	26	18	86	7	15	16
06322-12270890	M12	27	18	97	7	15	16

06323

Cylindrical grips fold-down



Material:
Grip thermoplastic grip.
Steel parts black oxidised.

Version:
Black satin finished.

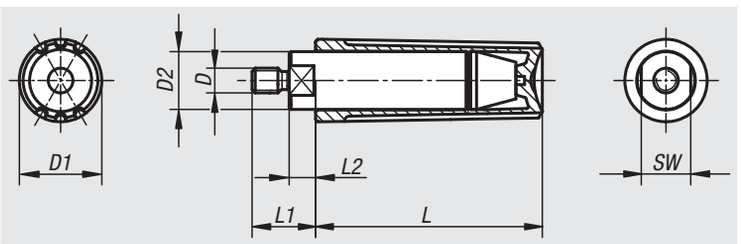
Sample order:
nlm 06323-06200490

Note:
Cylindrical grips can be screwed onto our handwheels, crank handles etc.

Order No.	D	D1	SW	L	L1	L2	L3	H
06323-06200490	M6	20	10	49	53	63,0	9	24,5
06323-08250690	M8	25	13	70	74	87,5	11	28,0
06323-10260890	M10	26	17	90	96	114,0	16	34,0

06325

Cylindrical grips revolving



Material:
Black grey thermoplastic.

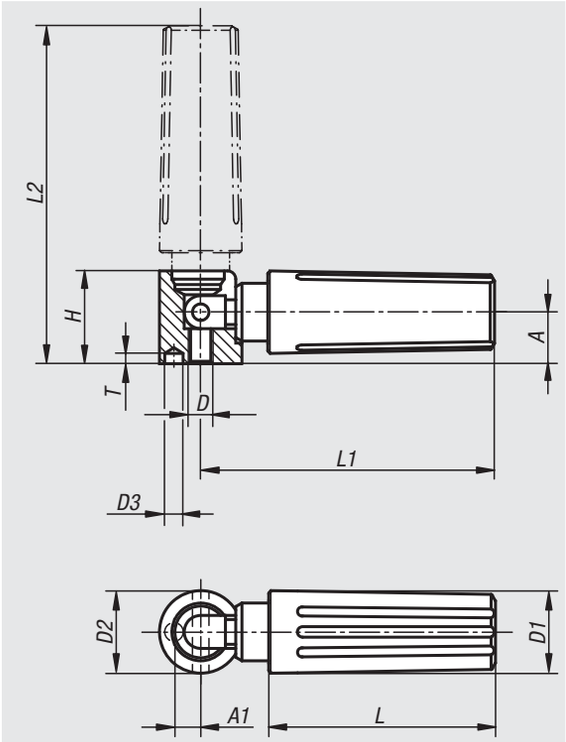
Version:
Steel parts black oxidised.

Sample order:
nlm 06325-104

Note:
Cylindrical grips are supplied assembled and can be screwed onto our handwheels, crank handles etc.

Order No.	Size	D	D1	D2	L	L1	L2	SW
06325-104	1	M4	13	9	35	11	5	8
06325-205	2	M5	16	11	44	13	5,5	10
06325-306	3	M6	20	14	55	14	5	12
06325-408	4	M8	25	18	70,5	25	13	15

Cylindrical grips fold-down



Material:
Black grey thermoplastic.

Version:
Steel parts black oxidised.

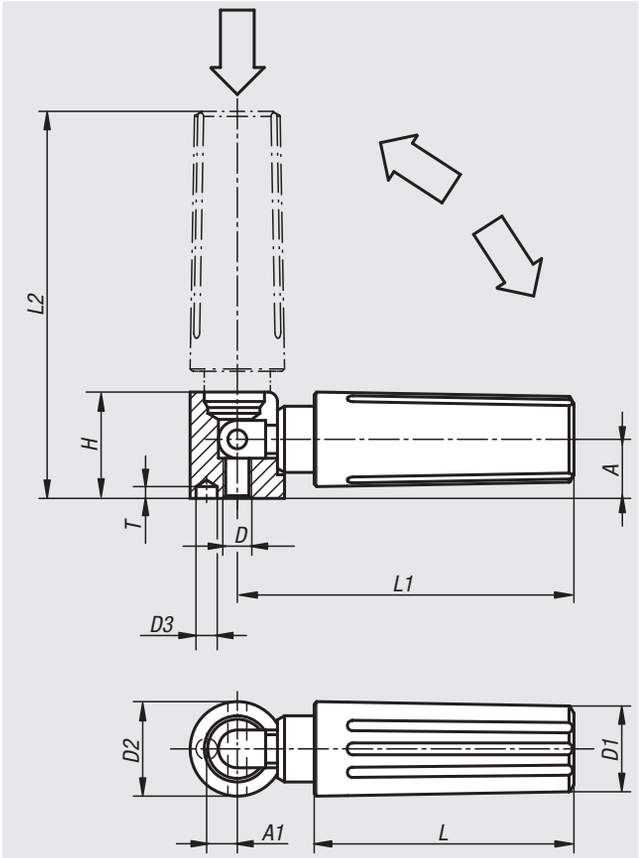
Sample order:
nlm 06326-104

Note:
Cylindrical grips are supplied assembled and can be screwed to our handwheels, crank handles etc.
The hole D3 is used for positioning.

Order No.	Size	D	D1	D2	D3	A	A1	H	L	L1	L2	T
06326-104	1	M4	13	13	2,5	8	4,3	14,5	35	47	54,5	4,5
06326-205	2	M5	16	16	3,5	10	5,3	18	44	58	67	4,5
06326-306	3	M6	20	20	4,5	12,5	6,5	22,5	55	71,5	82	6
06326-408	4	M8	25	26	5,5	16	9	29	70,5	98,5	112,5	6,5

Cylindrical grips

safety automatic return



Material:
Grip black grey thermoplastic.

Version:
Steel parts black oxidised.

Sample order:
nlm 06328-104

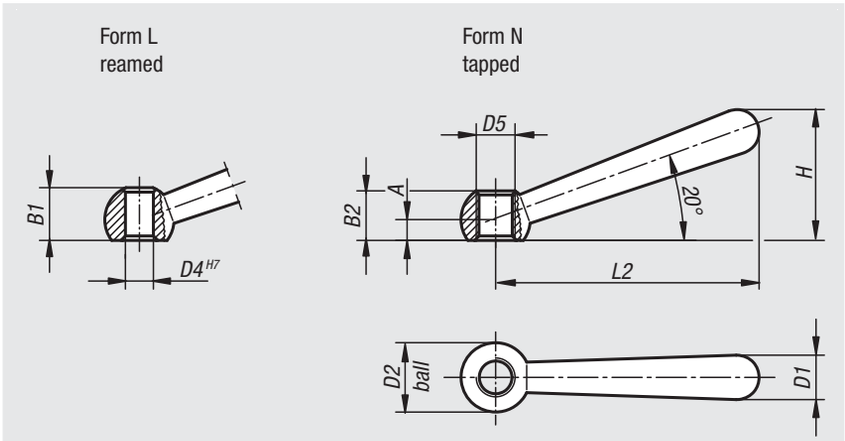
Note:
Two actions must be made to bring the safety grip into an operating position:
- Swing the grip out until it stops (90°).
- Push the grip in until it locks.

The pushed-in position is the most comfortable for cranking. The grip swings back automatically after releasing.
Cylindrical grips are supplied assembled and can be screwed onto our handwheels, crank handles etc.
The hole D3 is used for positioning.

Order No.	Size	D	D1	D2	D3	A	A1	H	L	L1	L2	T
06328-104	1	M4	13	13	2,5	8	4,3	14,5	35	47	52,5	4,5
06328-205	2	M5	16	16	3,5	10	5,3	18	44	58	65,5	4,5
06328-306	3	M6	20	20	4,5	12,5	6,5	22,5	55	71,5	81	6
06328-408	4	M8	25	26	5,5	16	9	29	70,5	98,5	111	6,5

Levers 20°

DIN 99

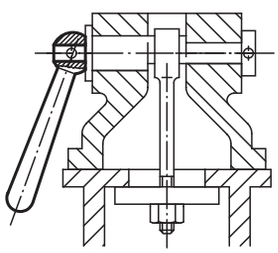


Material:
Steel.

Version:
Polished.

Sample order:
nlm 06330-212

Note:
To fix the lever to another element, gluing is often more cost-effective than pinning.



Order No. Form L	Order No. Form N	A	D4	D5	B1	B2	D1	D2 ball	L2	H
06330-106	**06330-206**	4	6/-	-/M6	9,5/-	-/9,5	8	12	48	24
06330-108	**06330-208**	5	8/-	-/M8	12/-	-/12	10	16	60	30,5
06330-110	**06330-210**	6	10/-	-/M10	14,5/-	-/14,5	13	20	76	38
06330-112	**06330-212**	7,5	12/-	-/M12	18,5/-	-/18,5	16	25	95	47
06330-116	**06330-216**	10	16/-	-/M16	24/-	-/24	20	32	119	59,5
06330-120	**06330-220**	12,5	20/-	-/M20	30/-	-/30	25	40	152	75,5

Control handles

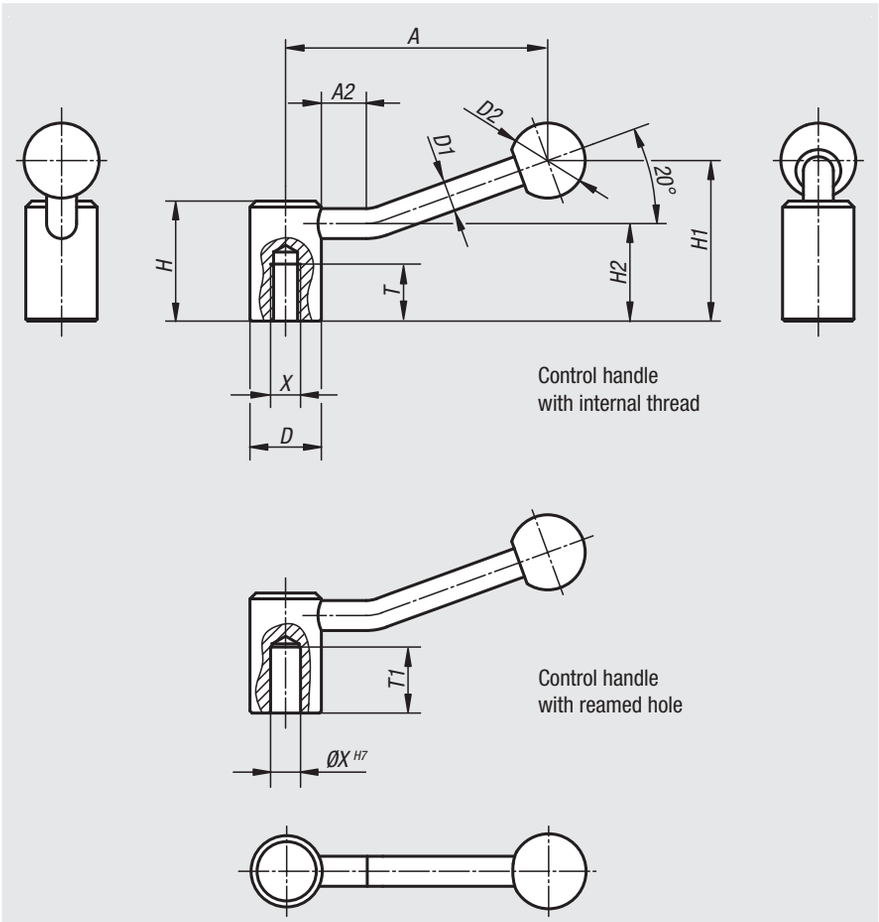
Material:
Steel parts grade 5.8.
Ball knob black plastic.

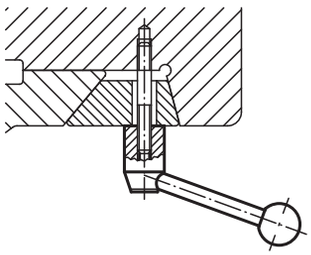
Version:
Black oxidised.

Sample order:
nlm 06340-208

Note:
Control handles can be used for simple clamping applications and switching operations.
Generally there must be enough space so that the handle can be turned 360°.

On request:
Other internal threads, reamed holes and special versions.
Dimension „A“ available in other lengths at extra charge.





Order No.	Version	Size	X	T	T1	D	D1	D2	H	H1	H2	A	A2
06340-208	internal thread	1	M8	18	-	24	10	25	40	52,5	32,5	84,5	15
06340-210	internal thread	1	M10	19	-	24	10	25	40	52,5	32,5	84,5	15
06340-212	internal thread	2	M12	20	-	28	12	32	46	61	36,5	100	15
06340-216	internal thread	3	M16	23	-	33	13	32	52	72	41	121	15
06340-220	internal thread	4	M20	26	-	41	13	32	61	80	49	123	15
06340-108	reamed hole	1	8	-	22	24	10	25	40	52,5	32,5	84,5	15
06340-110	reamed hole	1	10	-	22	24	10	25	40	52,5	32,5	84,5	15
06340-112	reamed hole	2	12	-	25	28	12	32	46	61	36,5	100	15
06340-114	reamed hole	2	14	-	25	28	12	32	46	61	36,5	100	15
06340-116	reamed hole	3	16	-	28	33	13	32	52	72	41	121	15
06340-118	reamed hole	3	18	-	28	33	13	32	52	72	41	121	15
06340-120	reamed hole	4	20	-	32	41	13	32	61	80	49	123	15

Control handles flat

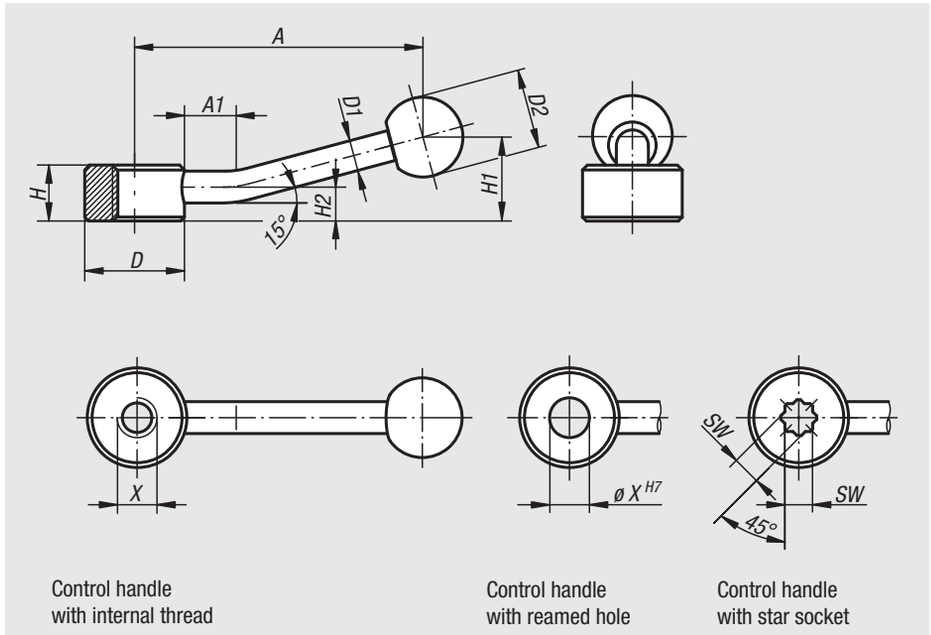
Material:
Steel parts grade 5.8.
Ball knob black duroplastic PF 31

Version:
Black oxidised.

Sample order:
nlm 06342-206

Note:
Flat control handles can be used for simple clamping applications and switching operations. Generally there must be enough space so that the handle can be turned 360°.
The version with star socket is designed to allow turning in steps of 45°.

On request:
Other internal threads, reamed holes and star sockets.
Dimension „A“ available in other lengths at extra charge.



Control handle with internal thread

Control handle with reamed hole

Control handle with star socket

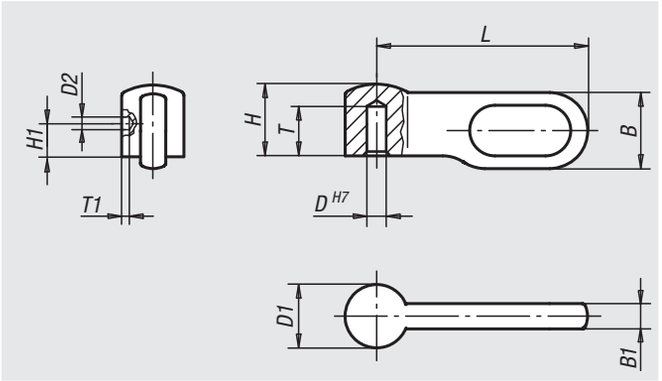
Order No.	Version	Size	X	D	D1	D2	H	H1	H2	A	A1
06342-206	internal thread	1	M6	25	8	20	14	22	8,5	75	15
06342-208	internal thread	1	M8	25	8	20	14	22	8,5	75	15
06342-210	internal thread	1	M10	25	8	20	14	22	8,5	75	15
06342-212	internal thread	2	M12	33	10	25	17	27	10	100	15
06342-216	internal thread	2	M16	33	10	25	17	27	10	100	15
06342-220	internal thread	3	M20	41	12	30	20	36	11,5	128	15
06342-224	internal thread	3	M24	41	12	30	20	36	11,5	128	15

Order No.	Version	Size	X	D	D1	D2	H	H1	H2	A	A1
06342-106	reamed hole	1	6	25	8	20	14	22	8,5	75	15
06342-108	reamed hole	1	8	25	8	20	14	22	8,5	75	15
06342-110	reamed hole	1	10	25	8	20	14	22	8,5	75	15
06342-112	reamed hole	2	12	33	10	25	17	27	10	100	15
06342-116	reamed hole	2	16	33	10	25	17	27	10	100	15
06342-120	reamed hole	3	20	41	12	30	20	36	11,5	128	15
06342-124	reamed hole	3	24	41	12	30	20	36	11,5	128	15

Order No.	Version	Size	SW	D	D1	D2	H	H1	H2	A	A1
06342-305	star socket	1	5,5	25	8	20	14	22	8,5	75	15
06342-307	star socket	1	7	25	8	20	14	22	8,5	75	15
06342-309	star socket	2	9	33	10	25	17	27	10	100	15
06342-311	star socket	2	11	33	10	25	17	27	10	100	15
06342-314	star socket	3	14	41	12	30	20	36	11,5	128	15
06342-319	star socket	3	19	41	12	30	20	36	11,5	128	15

06349

Lock grips



Material:
Stainless steel 1.4308 or steel.

Version:
Stainless steel bright.
Steel black oxidised.

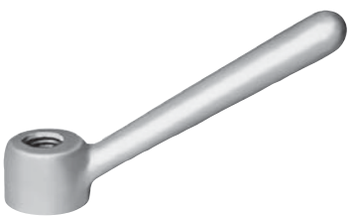
Sample order:
nlm 06349-1040

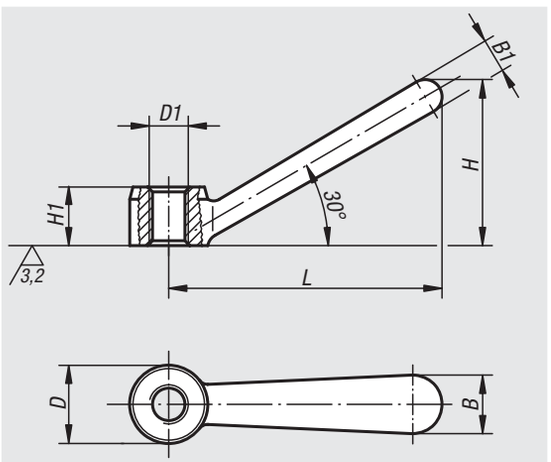
Note:
Lock grips can be used as required. The styled design with recessed grip gives fingers a good purchase and is well suited to modern requirements. High clamping forces can be easily attained. Use the pilot hole in the side to secure the grip by pinning or screw.

Order No.	Version	Size	B	B1	D	D1	D2	H	H1	L	T	T1
06349-1040	stainless steel	1	9	3	4	7,5	1,5	8,5	3	25	5,5	0,5
06349-2050	stainless steel	2	10,8	3,6	5	9	2	10,2	4	30	6,5	1
06349-3060	stainless steel	3	14,4	4,8	6	12	2	13,6	5	40	8,7	1
06349-4080	stainless steel	4	18	6	8	15	3	17	6	50	10,2	1
06349-1041	steel	1	9	3	4	7,5	1,5	8,5	3	25	5,5	0,5
06349-2051	steel	2	10,8	3,6	5	9	2	10,2	4	30	6,5	1
06349-3061	steel	3	14,4	4,8	6	12	2	13,6	5	40	8,7	1
06349-4081	steel	4	18	6	8	15	3	17	6	50	10,2	1

06350

Tension levers

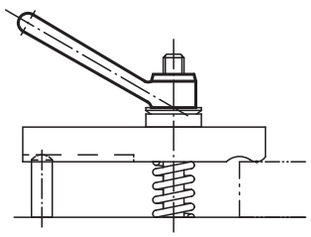




Material:
GJMW 400 malleable cast iron

Version:
Vibratory ground.
bright.

Sample order:
nlm 06350-16



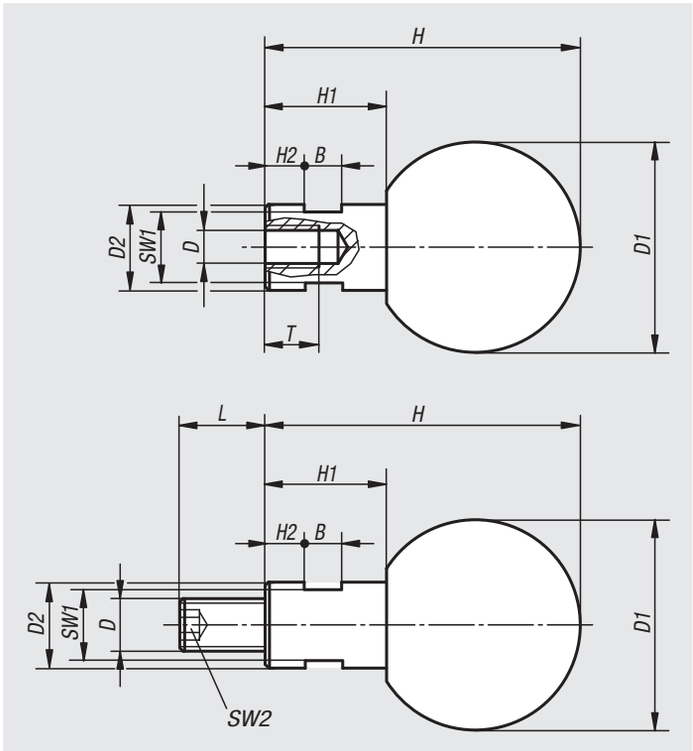
Order No.	D	D1	B	B1	H	H1	L
06350-08	16	M8	12	7	34	12	56
06350-10	20	M10	14	9	42,5	14	70
06350-12	25	M12	18	11	53	18	87
06350-16	32	M16	22	15	66,5	24	109
06350-20	40	M20	28	18	84,5	28	140

Ball grips revolving

Material:
Ball Duroplast PF 31.
Bush and screw steel or stainless steel 1.4305.

Version:
Ball glossy black.
Steel blue chromed.
Stainless steel bright.

Sample order:
nlm 06353-061



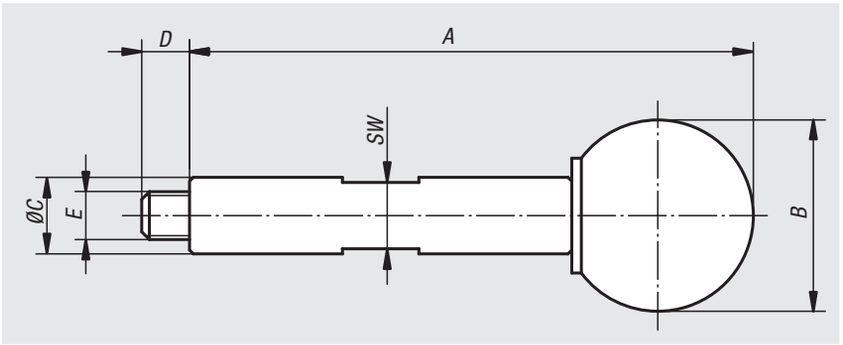
Ball grips revolving with internal thread

Order No. steel shaft	Order No. stainless steel shaft	D	D1	D2	T	H	H1	H2	B	SW1
06353-060	**06353-1060**	M6	25	10	12,5	37,5	15	5	5	8
06353-080	**06353-1080**	M8	32	13	15	48,5	19	6	6	10
06353-100	**06353-1100**	M10	40	16	19	61	24	8	8	13
06353-120	**06353-1120**	M12	50	20	21,5	78	31	12	10	17

Ball grips revolving with external thread

Order No. steel shaft	Order No. stainless steel shaft	D	D1	D2	L	H	H1	H2	B	SW1	SW2
06353-061	**06353-1061**	M6	25	10	11	37,5	15	5	5	8	3
06353-081	**06353-1081**	M8	32	13	13	48,5	19	6	6	10	4
06353-101	**06353-1101**	M10	40	16	14	61	24	8	8	13	5
06353-121	**06353-1121**	M12	50	20	21	78	31	12	10	17	6

Handles screw-in



Material:
Grip carbon steel.
Ball knob Duroplast PF 31.

Version:
Grip, black oxidised.
Ball knob, black.

Sample order:
nlm 06355-05059

Order No.	A	B	C	D	E	SW
06355-05059	59	20	8	5	M5	7
06355-06089	89	25	10	6	M6	8

Handles screw-in

with torque limit

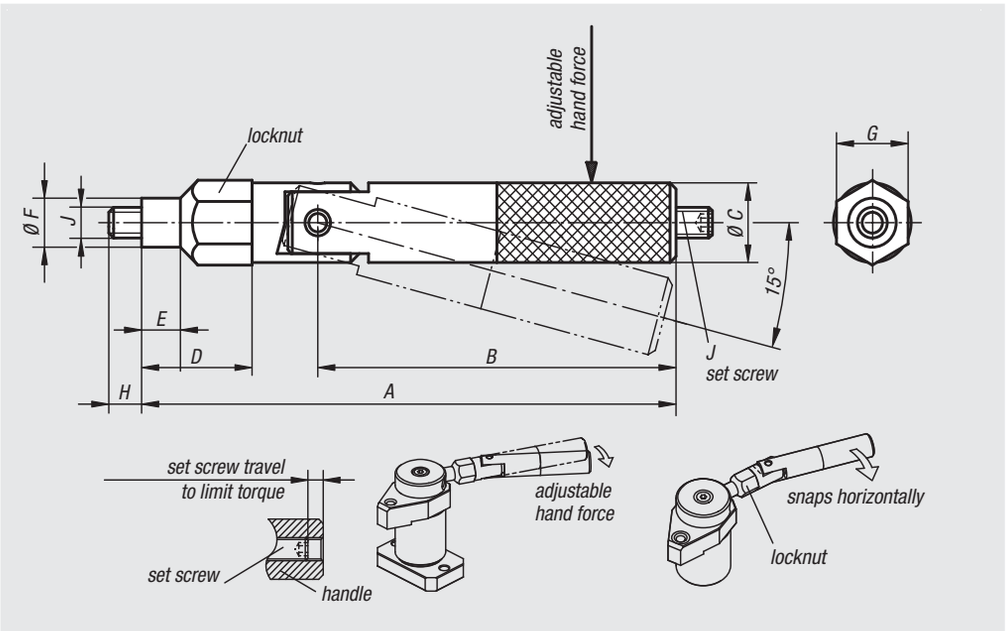
Material:
Carbon steel.

Version:
Hardened, black oxidised.

Sample order:
nlm 06357-05090

Note:
The desired clamping force can be set by using the set screw to alter the torque. The handle snaps 15° when the set torque is achieved.

Note:
Ensure that the handle is set to snap horizontally.



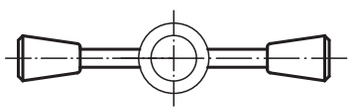
Order No.	A	B	C	D	E	F	G	H	J	K	Hand force N
06357-05090	89,5	60	13	18,5	6,5	8	12	5,5	M5	M5x16	0-150
06357-06119	119	84	15	23	8	10	14	6,5	M6	M6x20	0-200

Handles

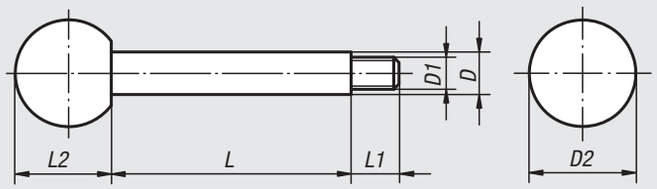
Material:
Knobs Duroplast PF 31.
Rod steel 1.0718 or stainless steel 1.4305.

Version:
Duroplast black, high-gloss polished.
Steel black oxidised or bright stainless steel.

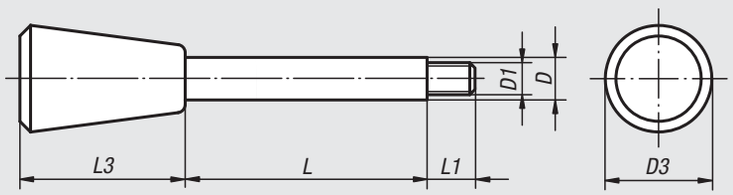
Sample order:
nlm 06360-208X35 (include length L)



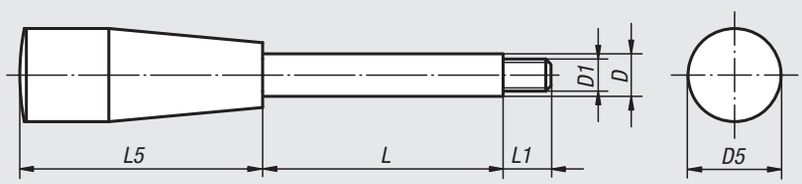
Form A



Form C



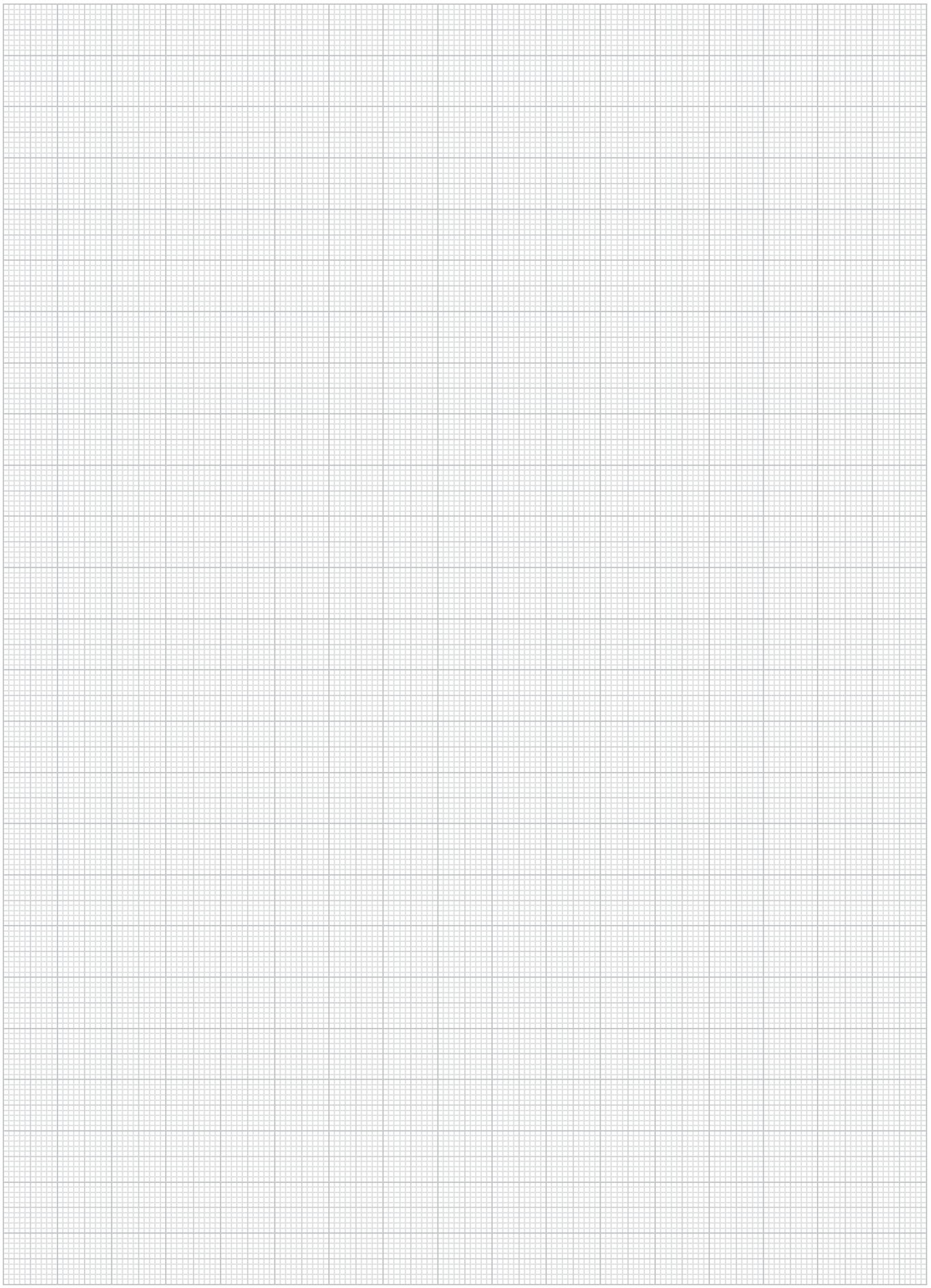
Form E



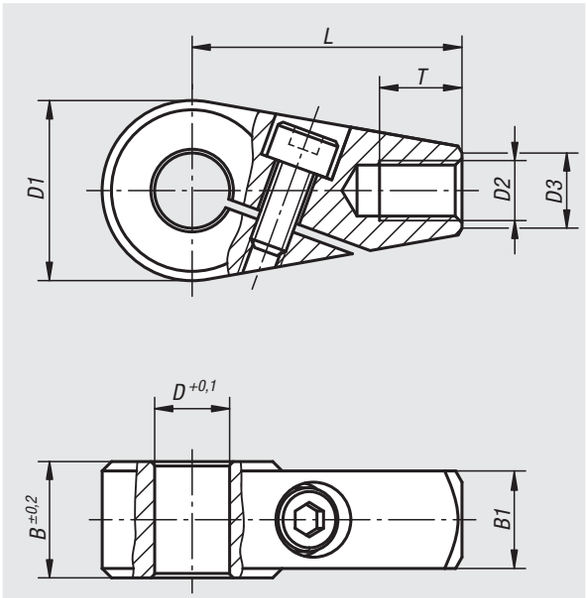
Order No.	Version	Form	D	D1	D2	D3	D5	L	L1	L2	L3	L5
06360-208X	Steel	A	8	M6	20	-	-	35/50/65	9	18	-	-
06360-210X	Steel	A	10	M8	25	-	-	50/65/80/100	13	22,5	-	-
06360-212X	Steel	A	12	M10	32	-	-	65/80/100/125	15	29	-	-
06360-214X	Steel	A	14	M12	35	-	-	80/100/125/160	16	32,5	-	-
06360-408X	Steel	C	8	M6	-	20	-	35/50/65	9	-	30	-
06360-410X	Steel	C	10	M8	-	25	-	50/65/80/100	13	-	38	-
06360-412X	Steel	C	12	M10	-	30	-	65/80/100/125	15	-	46	-
06360-414X	Steel	C	14	M12	-	35	-	80/100/125/160	16	-	53	-
06360-608X	Steel	E	8	M6	-	-	17	35/50/65	9	-	-	45
06360-610X	Steel	E	10	M8	-	-	23	50/65/80/100	13	-	-	60
06360-612X	Steel	E	12	M10	-	-	28	65/80/100/125	15	-	-	70
06360-614X	Steel	E	14	M12	-	-	28	80/100/125/160	16	-	-	70

Order No.	Version	Form	D	D1	D2	D3	D5	L	L1	L2	L3	L5
06360-1208X	Stainless steel	A	8	M6	20	-	-	35/50/65	9	18	-	-
06360-1210X	Stainless steel	A	10	M8	25	-	-	50/65/80/100	13	22,5	-	-
06360-1212X	Stainless steel	A	12	M10	32	-	-	65/80/100/125	15	29	-	-
06360-1214X	Stainless steel	A	14	M12	35	-	-	80/100/125/160	16	32,5	-	-
06360-1408X	Stainless steel	C	8	M6	-	20	-	35/50/65	9	-	30	-
06360-1410X	Stainless steel	C	10	M8	-	25	-	50/65/80/100	13	-	38	-
06360-1412X	Stainless steel	C	12	M10	-	30	-	65/80/100/125	15	-	46	-
06360-1414X	Stainless steel	C	14	M12	-	35	-	80/100/125/160	16	-	53	-
06360-1608X	Stainless steel	E	8	M6	-	-	17	35/50/65	9	-	-	45
06360-1610X	Stainless steel	E	10	M8	-	-	23	50/65/80/100	13	-	-	60
06360-1612X	Stainless steel	E	12	M10	-	-	28	65/80/100/125	15	-	-	70
06360-1614X	Stainless steel	E	14	M12	-	-	28	80/100/125/160	16	-	-	70

Notes



Clamp hubs

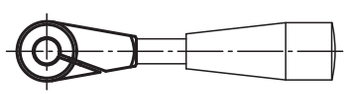


Material:
Carbon steel 1.1206.

Version:
Black oxidised.

Sample order:
nlm 06362-1012

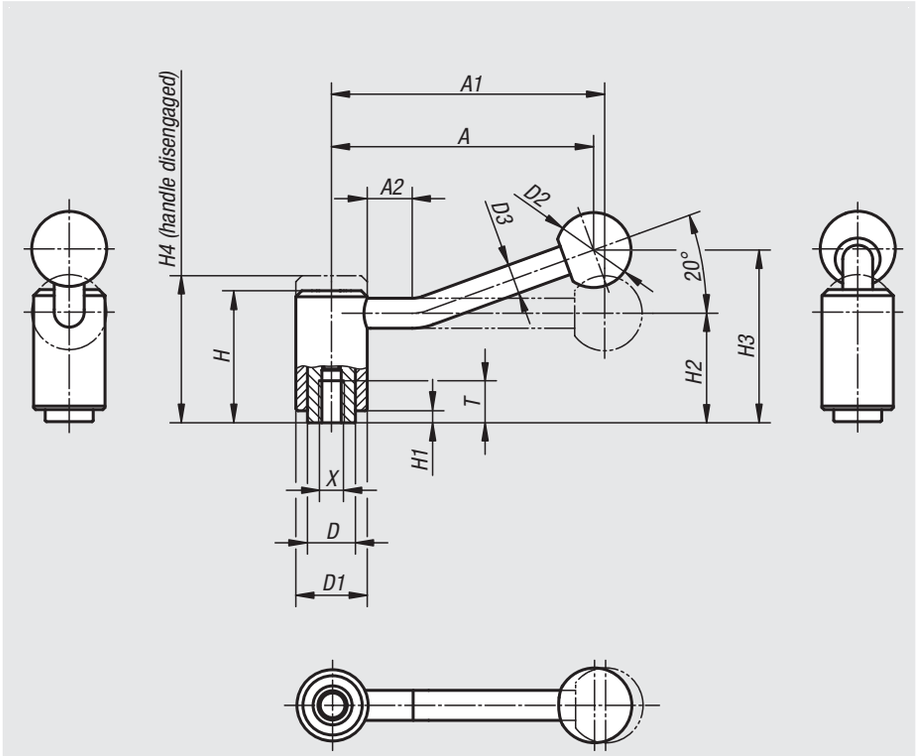
Note:
Clamp hubs can be quickly and easily attached to shafts, adjusted in the proper operating position and then locked. For secure transmission of torque, shaft tolerance should not exceed h11.
At fastening thread (D2), handles can be screwed on.



Order No.	D	D1	D2	D3	B	B1	L	T
06362-0810	10	24	M8	10	15,5	13	36	11
06362-0812	12	24	M8	10	15,5	13	36	11
06362-1012	12	28	M10	12	17,5	15	41	14
06362-1014	14	28	M10	12	17,5	15	41	14
06362-1214	14	32	M12	14	19,5	17	45	16
06362-1216	16	32	M12	14	19,5	17	45	16

Tension levers

internal thread



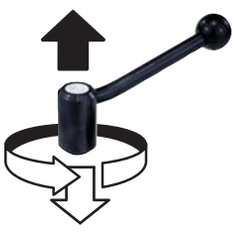
Material:
Steel parts grade 5.8.
Ball knob black plastic.

Version:
Plastic-coated with fine texture, black

Sample order:
nlm 06370-1082

On request:
Other internal threads and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.

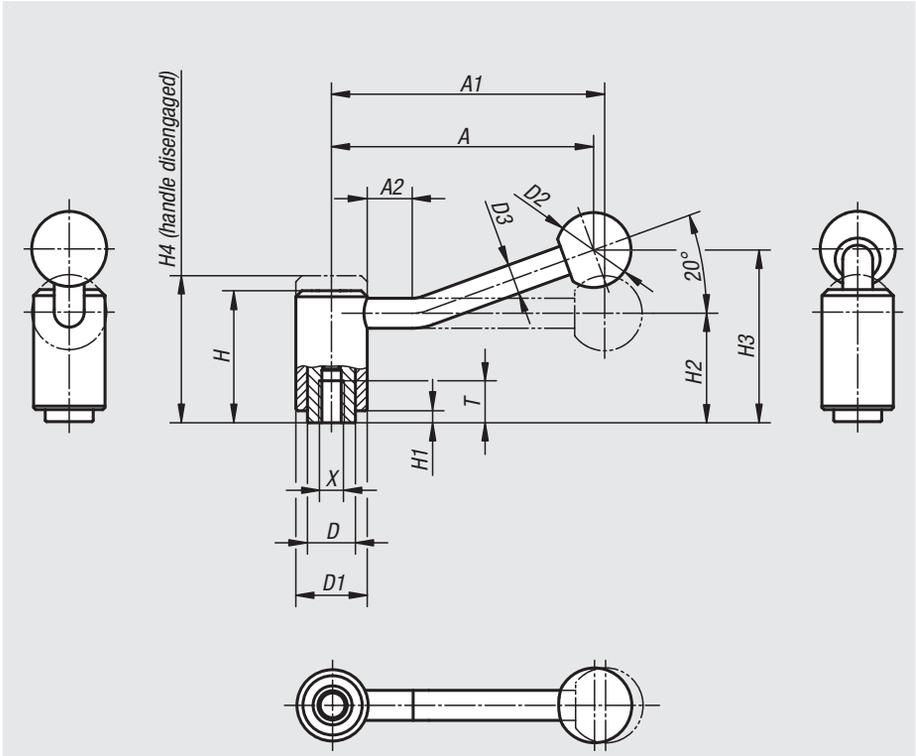
lift to disengage



Order No. 0 degree	Order No. 20 degrees	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	A2	No. of teeth
06370-1082	**06370-1081**	1	M8	14	16	24	25	10	44,5	4,5	37	-/58,5	49,5	-/88	92/-	-/15	22
06370-1102	**06370-1101**	1	M10	14	16	24	25	10	44,5	4,5	37	-/58,5	49,5	-/88	92/-	-/15	22
06370-2102	**06370-2101**	2	M10	17	19	28	32	12	51,5	5,5	42	-/68,5	57,5	-/106	111/-	-/15	24
06370-2122	**06370-2121**	2	M12	17	19	28	32	12	51,5	5,5	42	-/68,5	57,5	-/106	111/-	-/15	24
06370-3122	**06370-3121**	3	M12	23	23	33	32	13	58	6	47	-/81	65	-/128,5	134,5/-	-/15	26
06370-3162	**06370-3161**	3	M16	23	23	33	32	13	58	6	47	-/81	65	-/128,5	134,5/-	-/15	26
06370-4162	**06370-4161**	4	M16	27	30	41	32	13	68,5	7,5	56,5	-/89,5	76,5	-/128,5	134/-	-/15	36
06370-4202	**06370-4201**	4	M20	27	30	41	32	13	68,5	7,5	56,5	-/89,5	76,5	-/128,5	134/-	-/15	36
06370-4242	**06370-4241**	4	M24	27	30	41	32	13	68,5	7,5	56,5	-/89,5	76,5	-/128,5	134/-	-/15	36

Tension levers

internal thread, stainless steel



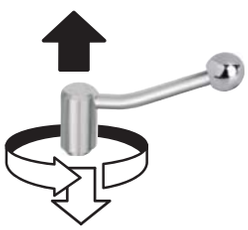
Material:
Steel parts in stainless steel, 1.4305,
black plastic ball knob

Version:
Steel parts bright.
Ball knob polished.

Sample order:
nlm 06371-1082

On request:
Other internal threads and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.

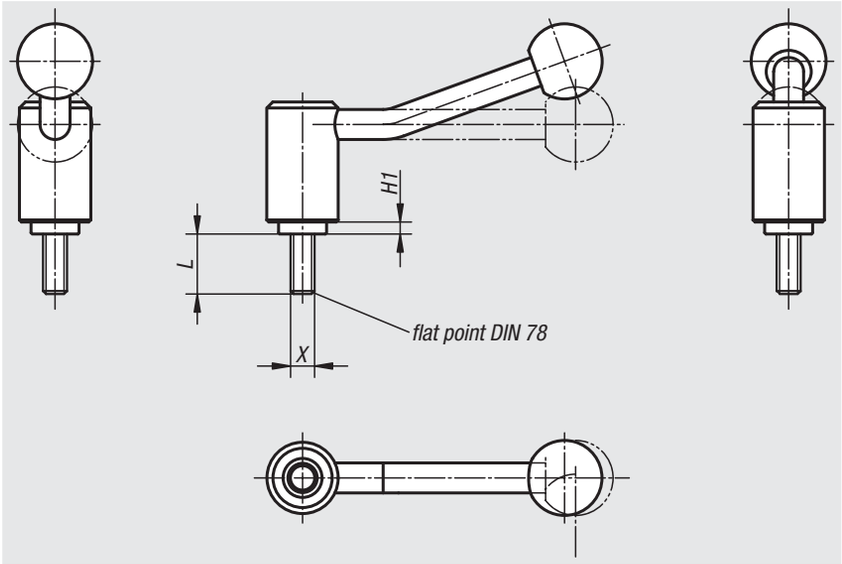
lift to
disengage



Order No. 0 degree	Order No. 20 degrees	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	A2	No. of teeth
06371-1082	**06371-1081**	1	M8	14	16	24	25	10	44,5	4,5	37	-/58,5	49,5	-/88	92/ -	-/15	22
06371-1102	**06371-1101**	1	M10	14	16	24	25	10	44,5	4,5	37	-/58,5	49,5	-/88	92/ -	-/15	22
06371-2102	**06371-2101**	2	M10	17	19	28	32	12	51,5	5,5	42	-/68,5	57,5	-/106	111/ -	-/15	24
06371-2122	**06371-2121**	2	M12	17	19	28	32	12	51,5	5,5	42	-/68,5	57,5	-/106	111/ -	-/15	24
06371-3122	**06371-3121**	3	M12	23	23	33	32	13	58	6	47	-/81	65	-/128,5	134,5/ -	-/15	26
06371-3162	**06371-3161**	3	M16	23	23	33	32	13	58	6	47	-/81	65	-/128,5	134,5/ -	-/15	26
06371-4162	**06371-4161**	4	M16	27	30	41	32	13	68,5	7,5	56,5	-/89,5	76,5	-/128,5	134/ -	-/15	36
06371-4202	**06371-4201**	4	M20	27	30	41	32	13	68,5	7,5	56,5	-/89,5	76,5	-/128,5	134/ -	-/15	36

Tension levers

external thread



Material:
Steel parts grade 5.8.
Ball knob black plastic.

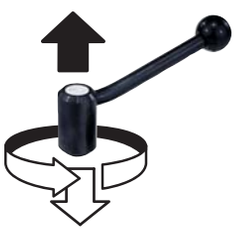
Version:
Plastic-coated with fine texture, black

Sample order:
nlm 06380-1082X30 (include length L)

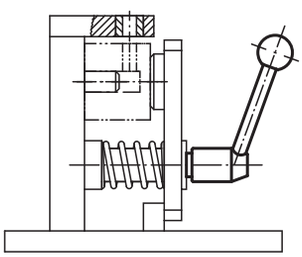
Note:
Missing dimensions see 06370.

On request:
Other external threads, screw lengths and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.

lift to disengage



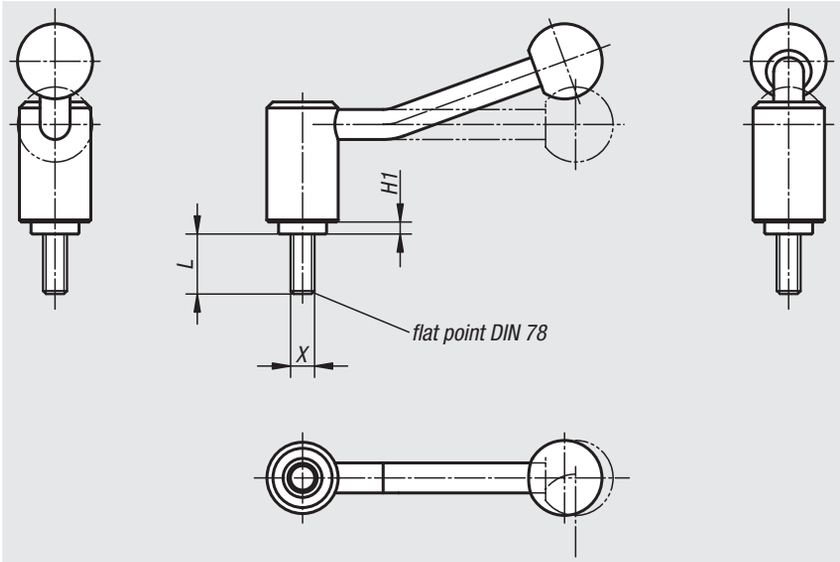
example:



Order No. 0 degree	Order No. 20 degrees	Size	X	H1	L
06380-1082X	**06380-1081X**	1	M8	4,5	15/20/25/30/40/50/60
06380-1102X	**06380-1101X**	1	M10	4,5	15/20/25/30/40/50/60
06380-1122X	**06380-1121X**	1	M12	4,5	15/20/25/30/40/50/60
06380-2122X	**06380-2121X**	2	M12	5,5	20/25/30/40/50/60
06380-3122X	**06380-3121X**	3	M12	6	20/25/30/40/50/60/70/80/90
06380-3162X	**06380-3161X**	3	M16	6	20/25/30/40/50/60/70/80/90
06380-4162X	**06380-4161X**	4	M16	7,5	30/40/50/60/70/80/90
06380-4202X	**06380-4201X**	4	M20	7,5	30/40/50/60/70/80/90
06380-4242X	**06380-4241X**	4	M24	7,5	30/40/50/60/70/80/90

Tension levers

external thread, stainless steel



Material:
Steel parts in stainless steel, 1.4305,
black plastic ball knob

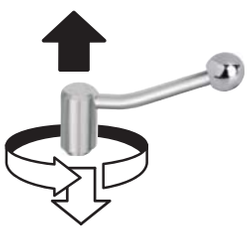
Version:
Steel parts bright.
Ball knob polished.

Sample order:
nlm 06381-1082X30 (include length L)

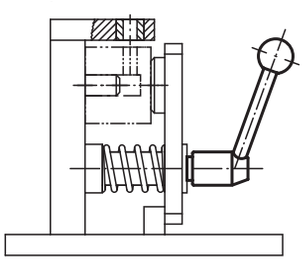
Note:
Missing dimensions see 06371.

On request:
Other external threads, screw lengths and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.

lift to disengage



example:



Order No. 0 degree	Order No. 20 degrees	Size	X	H1	L
06381-1082X	**06381-1081X**	1	M8	4,5	15/20/25/30/40/50/60
06381-1102X	**06381-1101X**	1	M10	4,5	15/20/25/30/40/50/60
06381-1122X	**06381-1121X**	1	M12	4,5	15/20/25/30/40/50/60
06381-2122X	**06381-2121X**	2	M12	5,5	20/25/30/40/50/60
06381-3122X	**06381-3121X**	3	M12	6	20/25/30/40/50/60/70/80/90
06381-3162X	**06381-3161X**	3	M16	6	20/25/30/40/50/60/70/80/90
06381-4162X	**06381-4161X**	4	M16	7,5	30/40/50/60/70/80/90
06381-4202X	**06381-4201X**	4	M20	7,5	30/40/50/60/70/80/90

Tension levers safety

internal thread

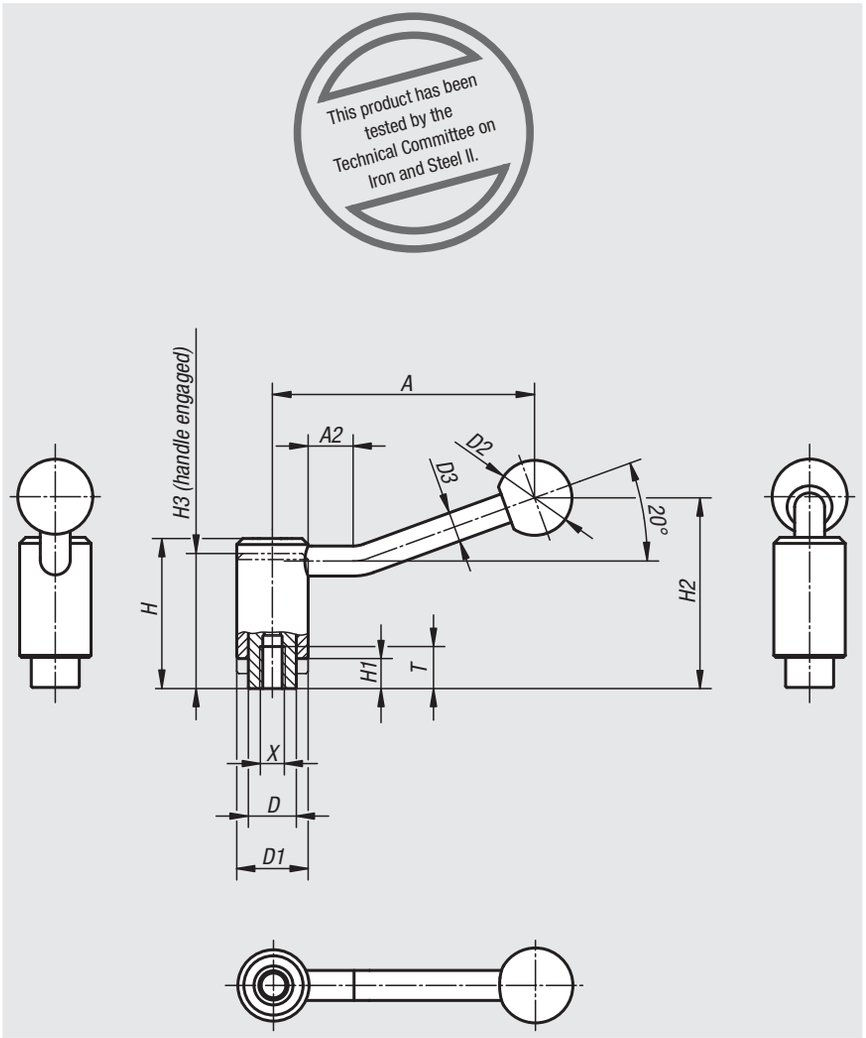
Material:
Steel parts grade 5.8.
Ball knob black plastic.

Version:
Plastic-coated with fine texture, black

Sample order:
nlm 06382-1108

Method of operation:
To operate safety tension levers, press the handle down until the teeth are fully engaged. The object concerned can now be clamped or released. Spring pressure releases the locking mechanism immediately, thereby restoring the safety function (handle can be turned effortlessly).

On request:
Special versions.
Dimensions „H1“ and „A“ available in other lengths at extra charge.

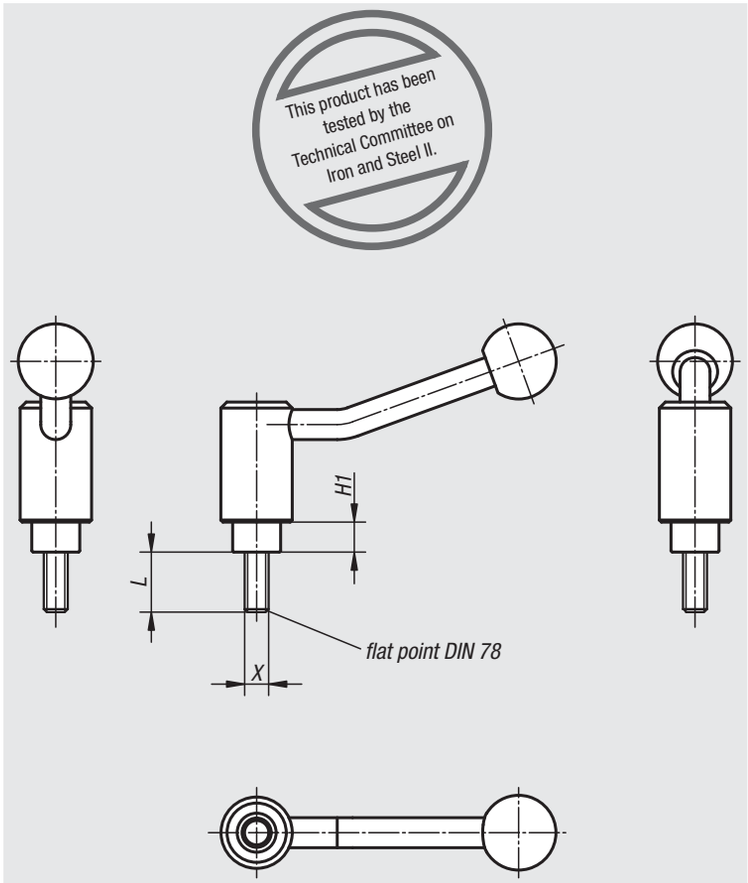


press to engage (safety function)

Order No.	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	A	A2	No. of teeth
06382-1108	1	M8	14	16	24	25	10	49,5	9,5	63,5	44,5	88	15	22
06382-1110	1	M10	14	16	24	25	10	49,5	9,5	63,5	44,5	88	15	22
06382-1210	2	M10	17	19	28	32	12	56,5	10,5	74	51	106	15	24
06382-1212	2	M12	17	19	28	32	12	56,5	10,5	74	51	106	15	24
06382-1312	3	M12	23	23	33	32	13	64,5	12,5	87,5	57,5	128,5	15	26
06382-1316	3	M16	23	23	33	32	13	64,5	12,5	87,5	57,5	128,5	15	26

Tension levers safety

external thread



Material:
Steel parts grade 5.8.
Ball knob black plastic.

Version:
Plastic-coated with fine texture, black

Sample order:
nlm 06383-1108X30 (include length L)

Note:
Missing dimensions see safety tension levers with internal thread.

Method of operation:
To operate safety tension levers, press the handle down until the teeth are fully engaged. The object concerned can now be clamped or released. Spring pressure releases the locking mechanism immediately, thereby restoring the safety function (handle can be turned effortlessly).

On request:
Other external threads, screw lengths and special versions. Dimensions „H1“ and „A“ available in other lengths at extra charge.

press to
engage
(safety function)

Order No.	X	Size	H1	L
06383-1108X	M8	1	9,5	20/25/30/40/50/60
06383-1110X	M10	1	9,5	20/25/30/40/50/60
06383-1112X	M12	1	9,5	20/25/30/40/50/60
06383-1212X	M12	2	10,5	20/25/30/40/50/60
06383-1312X	M12	3	12,5	25/30/40/50/60
06383-1316X	M16	3	12,5	25/30/40/50/60

Tension levers flat

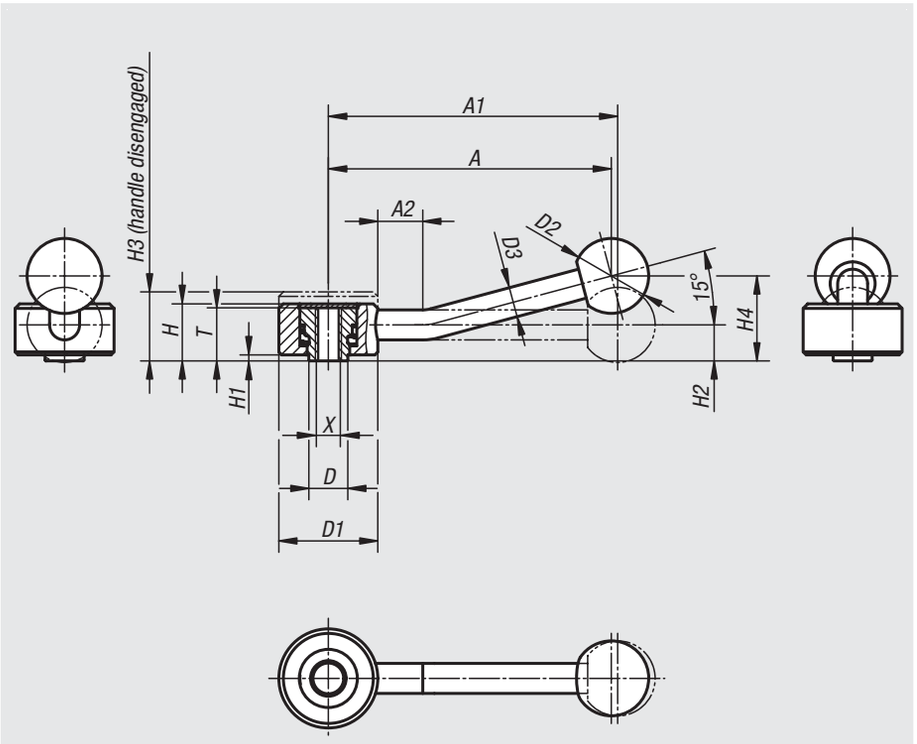
internal thread

Material:
Steel parts grade 5.8.
Ball knob black plastic.

Version:
Black oxidised.

Sample order:
nlm 06390-1061

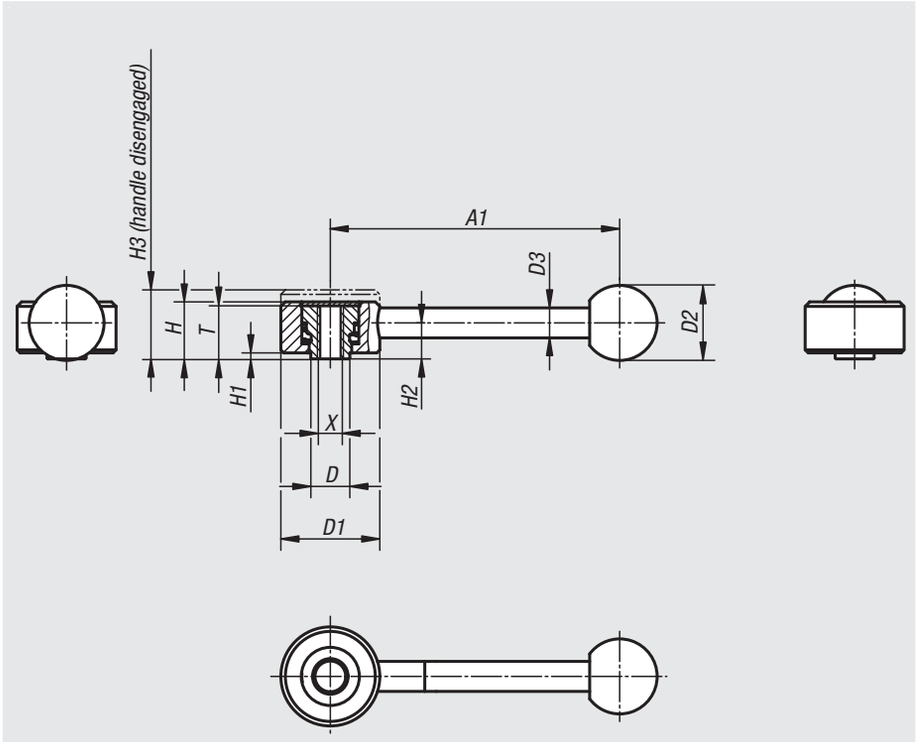
On request:
Other internal threads and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.



Order No. 0 degree	Order No. 15 degrees	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	A2	No. of teeth
06390-1061	**06390-1062**	1	M6	18	13,5	33	25	10	19	2	12	23	-/29	-/100	102/-	-/15	26
06390-1081	**06390-1082**	1	M8	18	13,5	33	25	10	19	2	12	23	-/29	-/100	102/-	-/15	26
06390-2101	**06390-2102**	2	M10	21	19	41	30	12	22	2	13,5	26	-/38	-/127	131/-	-/15	30
06390-2121	**06390-2122**	2	M12	21	19	41	30	12	22	2	13,5	26	-/38	-/127	131/-	-/15	30
06390-3121	**06390-3122**	3	M12	27	23	45	37	14	28	2	17	33	-/48	-/145	148/-	-/15	36
06390-3161	**06390-3162**	3	M16	27	23	45	37	14	28	2	17	33	-/48	-/145	148/-	-/15	36

Tension levers flat

internal thread, stainless steel



Material:
Steel parts in stainless steel, 1.4305,
black plastic ball knob.

Version:
Steel parts bright.

Sample order:
nlm 06391-1081

On request:
Other internal threads and special versions.
Dimensions „H1“ and „A1“ available in other lengths at extra charge.

Order No.	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	A1	No. of teeth
06391-1081	1	M8	18	13,5	33	25	10	19	2	12	23	102	26
06391-2101	2	M10	21	19	41	30	12	22	2	13,5	26	131	30
06391-2121	2	M12	21	19	41	30	12	22	2	13,5	26	131	30
06391-3161	3	M16	27	23	45	37	14	28	2	17	33	148	36

Tension levers flat

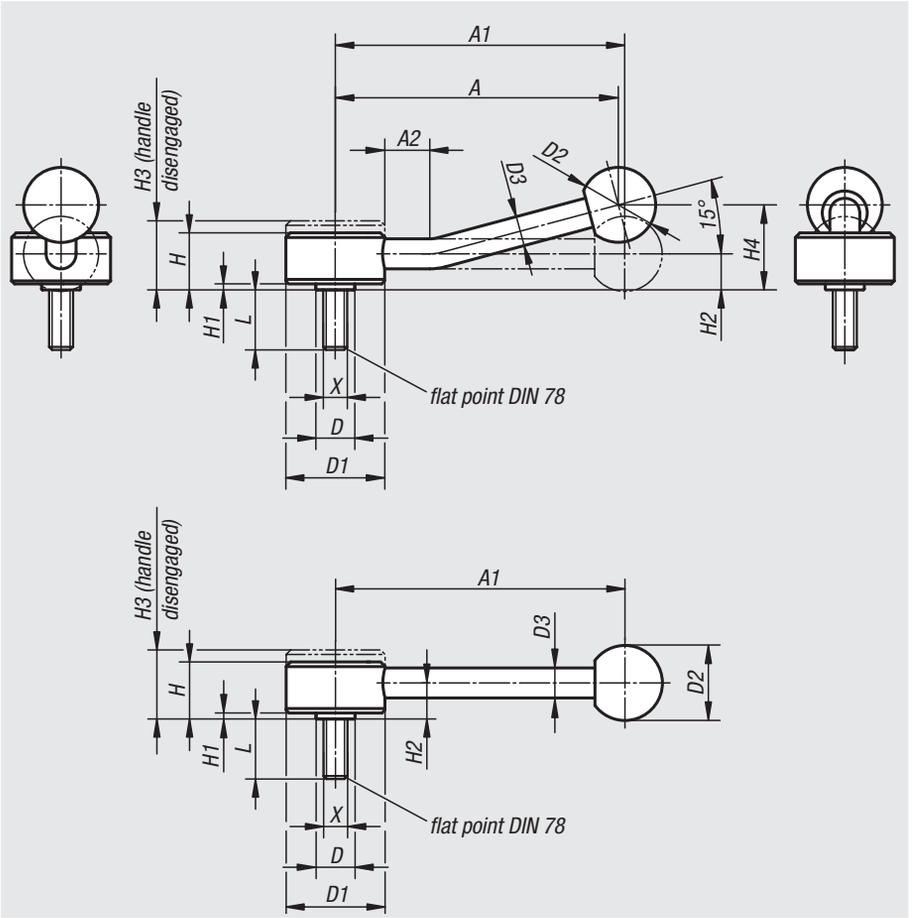
external thread

Material:
Steel parts grade 5.8.
Ball knob black plastic.

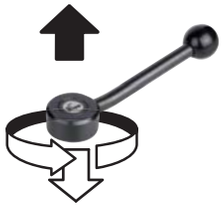
Version:
Black oxidised.

Sample order:
nlm 06400-1081X30 (include length L)

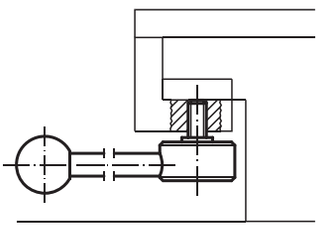
On request:
Other external threads, screw lengths and special versions.
Dimensions „H1“, „A“ and „A1“ available in other lengths at extra charge.



lift to disengage



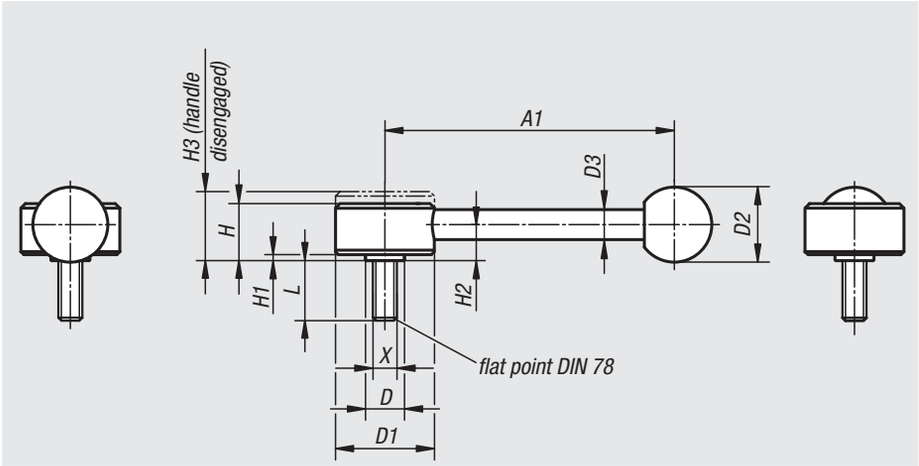
example:



Order No. 0 degree	Order No. 15 degrees	Size	X	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	A2	No. of teeth	L
06400-1081X	**06400-1082X**	1	M8	13,5	33	25	10	19	2	12	23	-/29	-/100	102/-	-/15	20	15/20/25/30/40/50/60
06400-1101X	**06400-1102X**	1	M10	13,5	33	25	10	19	2	12	23	-/29	-/100	102/-	-/15	20	15/20/25/30/40/50/60
06400-2101X	**06400-2102X**	2	M10	19	41	30	12	22	2	13,5	26	-/38	-/127	131/-	-/15	24	20/25/30/40/50/60
06400-2121X	**06400-2122X**	2	M12	19	41	30	12	22	2	13,5	26	-/38	-/127	131/-	-/15	24	20/25/30/40/50/60
06400-3121X	**06400-3122X**	3	M12	23	45	37	14	28	2	17	33	-/48	-/145	148/-	-/15	26	20/25/30/40/50/60
06400-3161X	**06400-3162X**	3	M16	23	45	37	14	28	2	17	33	-/48	-/145	148/-	-/15	26	20/25/30/40/50/60

Tension levers flat

external thread, stainless steel



Material:
Steel parts in stainless steel, 1.4305,
black plastic ball knob.

Version:
Steel parts bright.

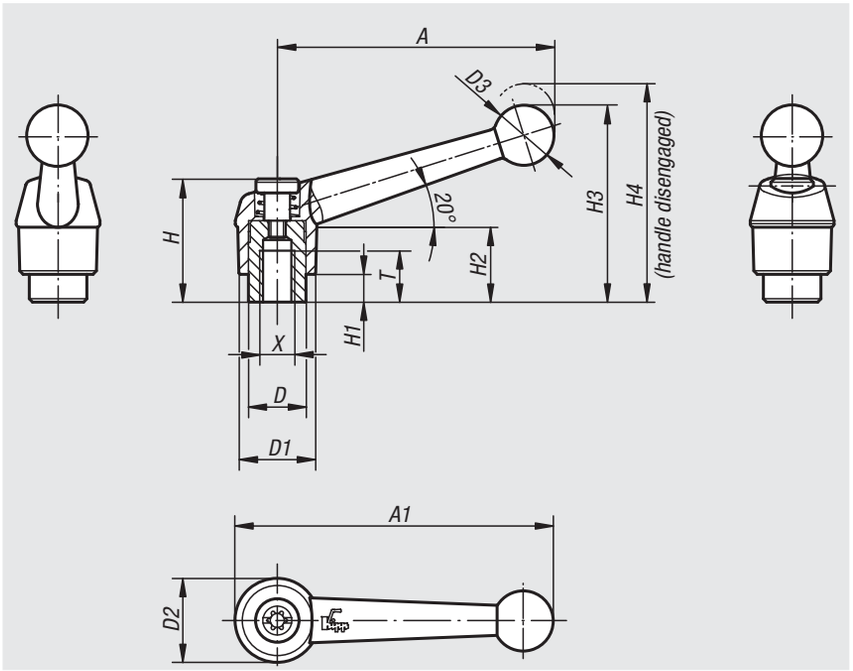
Sample order:
nlm 06401-1081X40 (include length L)

On request:
Other external threads, screw lengths and special versions.
Dimensions „H1“ and „A1“ available in other lengths at extra charge.

Order No.	Size	X	D	D1	D2	D3	H	H1	H2	H3	A1	No. of teeth	L
06401-1081X	1	M8	13,5	33	25	10	19	2	12	23	102	26	30/40/50
06401-2101X	2	M10	19	41	30	12	22	2	13,5	26	131	30	30/40/50/60
06401-2121X	2	M12	19	41	30	12	22	2	13,5	26	131	30	30/40/50/60
06401-3161X	3	M16	23	45	37	14	28	2	17	33	148	36	40/50/60

Clamping levers

internal thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated,
steel parts black oxidised.

Sample order:
nlm 06410-4103

Note:
Standard colours are:
black satin finish, silver metallic.

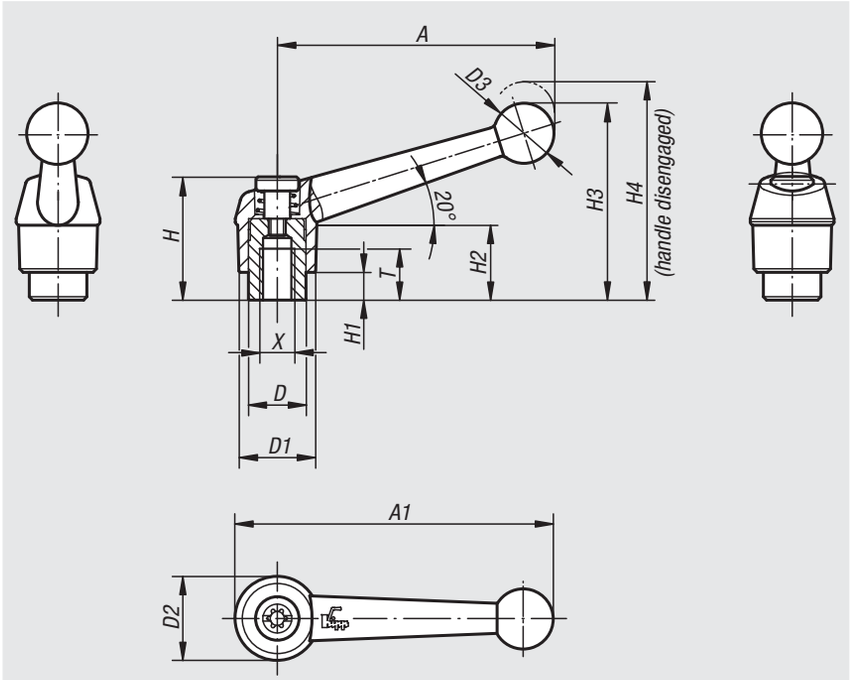
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to
disengage

Order No. black satin finish	Order No. silver metallic	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	No. of teeth
06410-1041	**06410-1043**	1	M4	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06410-1051	**06410-1053**	1	M5	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06410-1061	**06410-1063**	1	M6	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06410-2061	**06410-2063**	2	M6	12	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
06410-2081	**06410-2083**	2	M8	12	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
06410-3081	**06410-3083**	3	M8	14	16	21	22	17	37	10	23	57,5	61,5	79	90	22
06410-3101	**06410-3103**	3	M10	14	16	21	22	17	37	10	23	57,5	61,5	79	90	22
06410-4101	**06410-4103**	4	M10	17	19	25	26	19	42,5	10	26	67	72	95	108	24
06410-4121	**06410-4123**	4	M12	17	19	25	26	19	42,5	10	26	67	72	95	108	24
06410-5121	**06410-5123**	5	M12	23	23	30	31	22	49	12	32	79	84	110	126	26
06410-5161	**06410-5163**	5	M16	23	23	30	31	22	49	12	32	79	84	110	126	26

Clamping levers

internal thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts bright.

Sample order:
nlm 06411-2061

Note:
Standard colours are:
black satin finish, silver metallic.

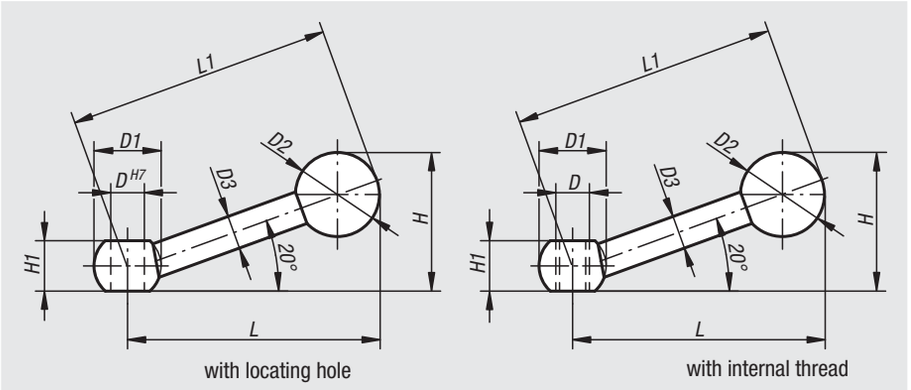
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to
disengage

Order No. black satin finish	Order No. silver metallic	Size	X	T	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	No. of teeth
06411-1041	**06411-1043**	1	M4	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06411-1051	**06411-1053**	1	M5	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06411-1061	**06411-1063**	1	M6	9	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
06411-2061	**06411-2063**	2	M6	12	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
06411-2081	**06411-2083**	2	M8	12	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
06411-3081	**06411-3083**	3	M8	14	16	21	22	17	37	10	23	57,5	61,5	79	90	22
06411-3101	**06411-3103**	3	M10	14	16	21	22	17	37	10	23	57,5	61,5	79	90	22
06411-4101	**06411-4103**	4	M10	17	19	25	26	19	42,5	10	26	67	72	95	108	24
06411-4121	**06411-4123**	4	M12	17	19	25	26	19	42,5	10	26	67	72	95	108	24
06411-5121	**06411-5123**	5	M12	23	23	30	31	22	49	12	32	79	84	110	126	26
06411-5161	**06411-5163**	5	M16	23	23	30	31	22	49	12	32	79	84	110	126	26

Ball handles

DIN 6337



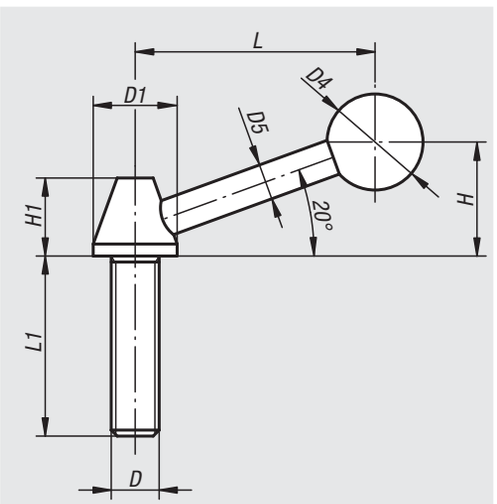
Material:
Steel,
Ball handle: Duroplast

Version:
Black oxidised, ball knob black.

Sample order:
nlm 06420-112

Order No. locating hole	Order No. Internal thread	D	D1	D2	D3	~H	H1	~L	L1
06420-108	**06420-208**	M8	16	20	8	23	12	63	63
06420-110	**06420-210**	M10	20	20	9	30	14,5	80	80
06420-112	**06420-212**	M12	25	25	11	37,5	18,5	100	100
06420-116	**06420-216**	M16	32	32	15	47	24	125	125

Clamping levers



Material:
Steel,
Ball handle: Duroplast

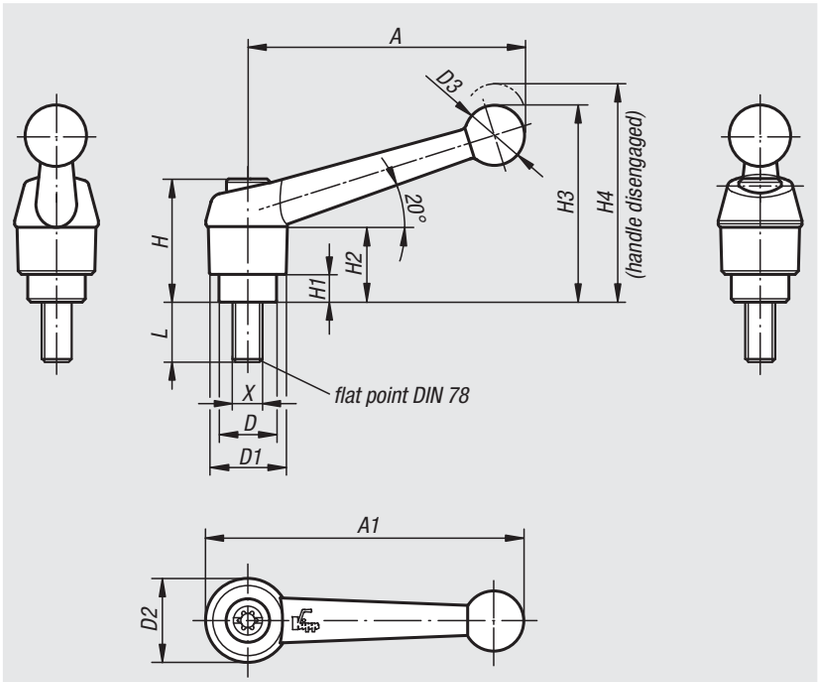
Version:
steel black oxidised.
Ball knob black.

Sample order:
nlm 06430-112

Order No.	D	D1	D4	D5	H	H1	L	L1
06430-108	M8	14	16	6	19	13	40	45
06430-110	M10	18	20	6	24	17	54	60
06430-112	M12	22	30	10	42	19	82	70
06430-116	M16	25	32	12	55	23	110	75

Clamping levers

external thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated.
Steel black oxidised.

Sample order:
nlm 06430-1051X20 (include length L)

Note:
Standard colours are:
black satin finish, silver metallic.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

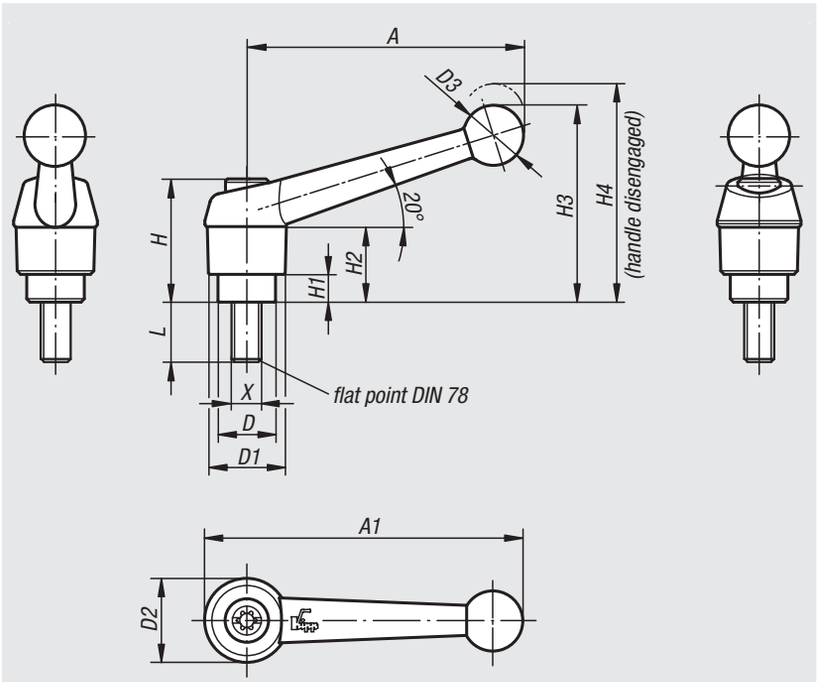
Specifications

Size	X	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	No. of teeth
1	M5/M6	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
2	M6/M8/M10	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
3	M8/M10	16	21	22	17	37	10	23	57,5	61,5	79	90	22
4	M10/M12	19	25	26	19	42,5	10	26	67	72	95	108	24
5	M12/M16	23	30	31	22	49	12	32	79	84	110	126	26

Order No. black satin finish	Order No. silver metallic	Size	X	L
06430-1051X	**06430-1053X**	1	M5	10/15/20/25/30/35/40/45/50
06430-1061X	**06430-1063X**	1	M6	10/15/20/25/30/35/40/45/50
06430-2061X	**06430-2063X**	2	M6	15/20/25/30/35/40/45/50/55/60
06430-2081X	**06430-2083X**	2	M8	15/20/25/30/35/40/45/50/55/60
06430-2101X	**06430-2103X**	2	M10	15/20/25/30/35/40/45/50/55/60
06430-3081X	**06430-3083X**	3	M8	15/20/25/30/35/40/45/50/55/60
06430-3101X	**06430-3103X**	3	M10	15/20/25/30/35/40/45/50/55/60
06430-4101X	**06430-4103X**	4	M10	20/25/30/35/40/45/50/55/60/70/80/90
06430-4121X	**06430-4123X**	4	M12	20/25/30/35/40/45/50/55/60/70/80/90
06430-5121X	**06430-5123X**	5	M12	25/30/35/40/45/50/55/60/70/80/90
06430-5161X	**06430-5163X**	5	M16	25/30/35/40/45/50/55/60/70/80/90

Clamping levers

external thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated.
Stainless steel bright.

Sample order:
nlm 06431-1051X20 (include length L)

Note:
Standard colours are:
black satin finish, silver metallic.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

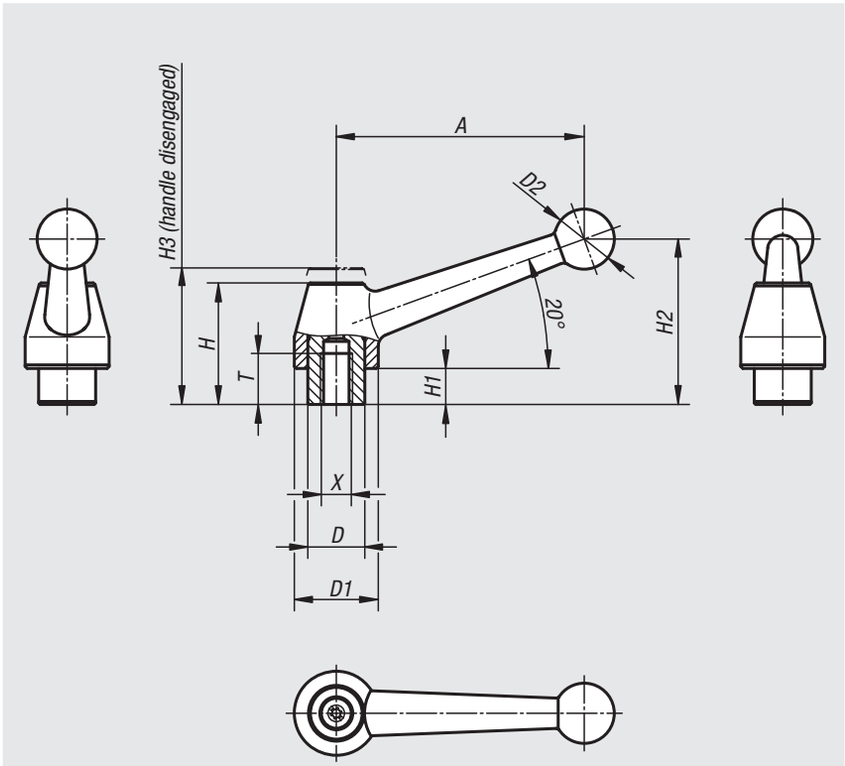
Specifications

Size	X	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	No. of teeth
1	M5/M6	10	13	14	10,5	24,5	4	15	32,5	35,5	39	46	16
2	M6/M8/M10	13,5	18	18,5	15,5	28,5	6,5	16,5	45,5	49,5	64	73	20
3	M8/M10	16	21	22	17	37	10	23	57,5	61,5	79	90	22
4	M12	19	25	26	19	42,5	10	26	67	72	95	108	24
5	M16	23	30	31	22	49	12	32	79	84	110	126	26

Order No. black satin finish	Order No. silver metallic	Size	X	L
06431-1051X	**06431-1053X**	1	M5	10/15/20/25
06431-1061X	**06431-1063X**	1	M6	10/15/20/25/30/40/50
06431-2061X	**06431-2063X**	2	M6	15/20/25/30/40/50/60
06431-2081X	**06431-2083X**	2	M8	15/20/25/30/40/50/60
06431-2101X	**06431-2103X**	2	M10	20/25/30/40/50/60
06431-3081X	**06431-3083X**	3	M8	20/25/30/40/50/60
06431-3101X	**06431-3103X**	3	M10	20/25/30/40/50/60
06431-4121X	**06431-4123X**	4	M12	25/30/40/50/60
06431-5161X	**06431-5163X**	5	M16	30/40/50/60

Clamping levers

internal thread, steel



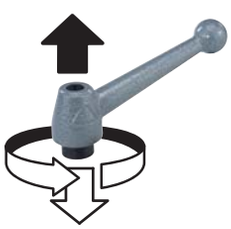
Material:
Handle 1.0401.
All other steel parts grade 5.8.

Version:
Handle painted silver-grey hammertone.
Steel parts black oxidised.

Sample order:
nlm 06440-108

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

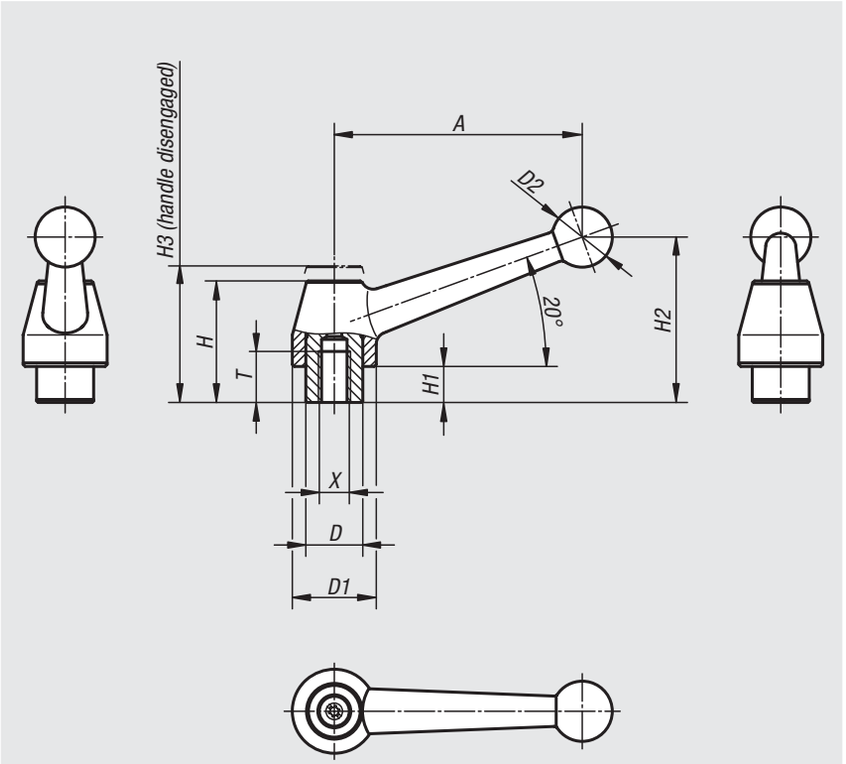
lift to disengage



Order No.	Version	Size	X	T	D	D1	D2	H	H1	H2	H3	A	No. of teeth
06440-108	steel silver-grey	1	M8	17	19	28	20	41	12	54	49	83	24
06440-110	steel silver-grey	1	M10	17	19	28	20	41	12	54	49	83	24
06440-112	steel silver-grey	1	M12	17	19	28	20	41	12	54	49	83	24
06440-212	steel silver-grey	2	M12	23	23	35	25	50	12	69	56	108	26
06440-216	steel silver-grey	2	M16	23	23	35	25	50	12	69	56	108	26
06440-316	steel silver-grey	3	M16	27	30	43	30	58,5	12	78	65	132	36
06440-320	steel silver-grey	3	M20	27	30	43	30	58,5	12	78	65	132	36

Clamping levers

internal thread, stainless steel



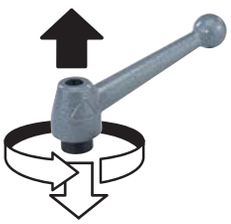
Material:
Handle stainless steel 1.4308.
All other metal parts stainless steel 1.4305

Version:
Handle stainless steel electrolytic polished.
Steel parts bright.

Sample order:
nlm 06440-1108

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

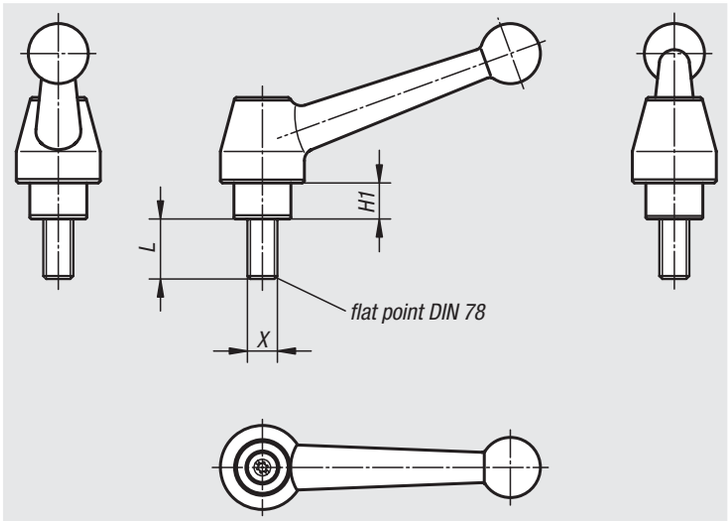
lift to disengage



Order No.	Version	Size	X	T	D	D1	D2	H	H1	H2	H3	A	No. of teeth
06440-1108	stainless steel electropolished	1	M8	17	19	28	20	41	12	54	49	83	24
06440-1110	stainless steel electropolished	1	M10	17	19	28	20	41	12	54	49	83	24
06440-1112	stainless steel electropolished	1	M12	17	19	28	20	41	12	54	49	83	24

Clamping levers

external thread



Material:
Handle 1.0401.
All other steel parts grade 5.8.

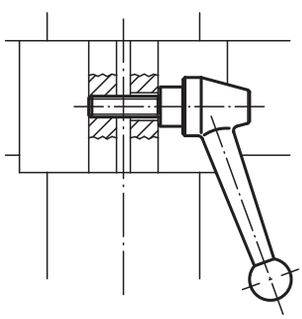
Version:
Handle painted silver-grey hammertone.
Steel parts black oxidised.

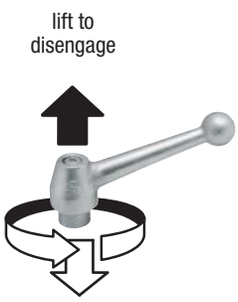
Sample order:
nlm 06441-110X30 (include length L)

Note:
For other dimensions see clamping levers with internal threads.

On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

example:

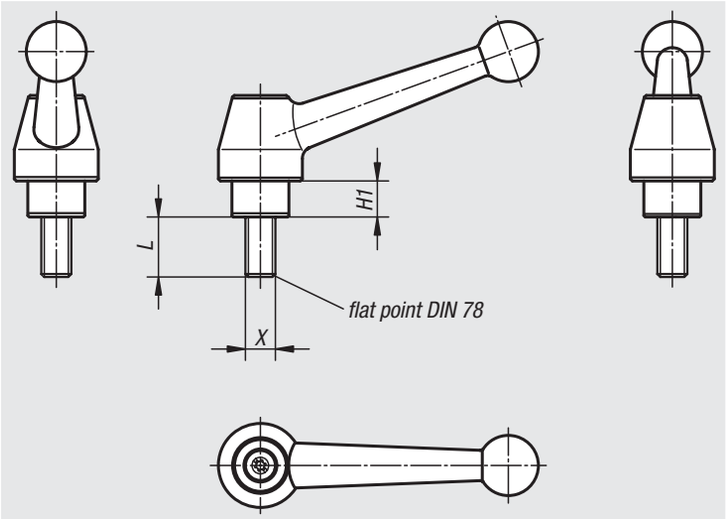




Order No.	Version	Size	X	H1	L
06441-110X	steel silver-grey	1	M10	12	20/25/30/35/40/45/50/55/60/70/80/90
06441-112X	steel silver-grey	1	M12	12	20/25/30/35/40/45/50/55/60/70/80/90
06441-212X	steel silver-grey	2	M12	12	25/30/35/40/45/50/55/60/70/80/90
06441-216X	steel silver-grey	2	M16	12	25/30/35/40/45/50/55/60/70/80/90
06441-316X	steel silver-grey	3	M16	12	30/40/50/60/70/80/90
06441-320X	steel silver-grey	3	M20	12	30/40/50/60/70/80/90

Clamping levers

external thread, stainless steel



Material:
Handle stainless steel 1.4308.
All other metal parts stainless steel 1.4305

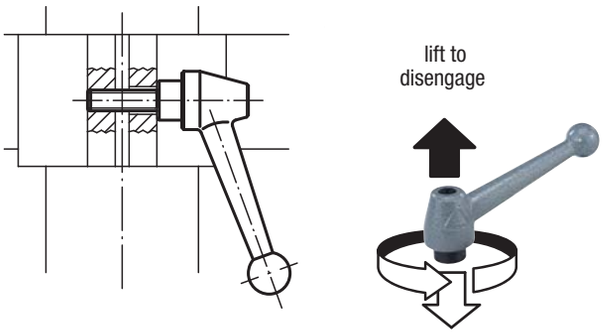
Version:
Handle stainless steel electrolytic polished.
Steel parts bright.

Sample order:
nlm 06441-1110X30 (include length L)

Note:
For other dimensions see clamping levers with internal threads.

On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

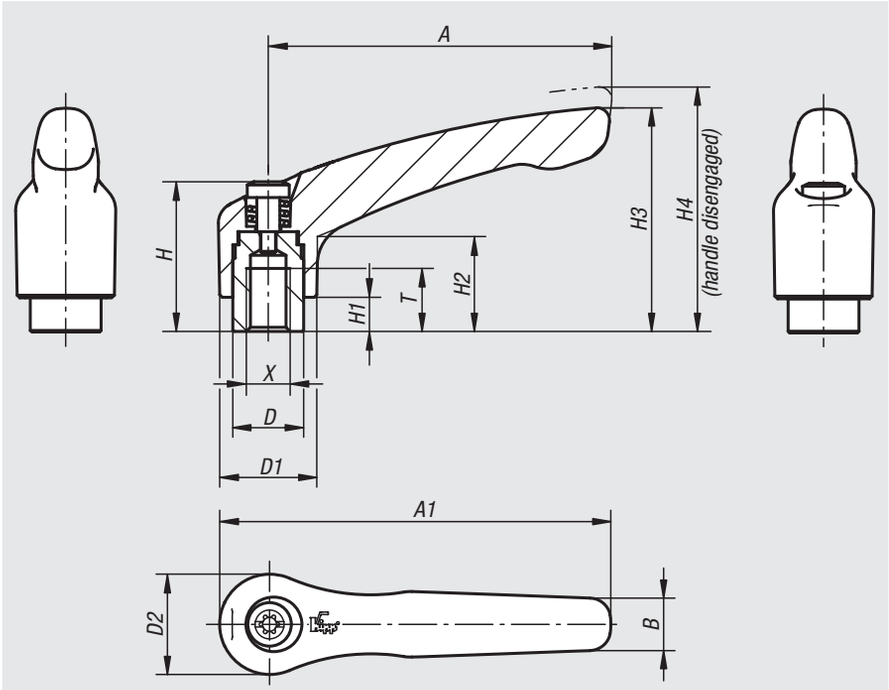
example:



Order No.	Version	Size	X	H1	L
06441-1110X	stainless steel electropolished	1	M10	12	25/30/40/50/60
06441-1112X	stainless steel electropolished	1	M12	12	25/30/40/50/60

Clamping levers

internal thread, steel



Material:
Handle 1.0401.
All other steel parts grade 5.8.

Version:
Handle plastic-coated, fine-textured structure.
Steel parts black oxidised.

Sample order:
nlm 06442-1051

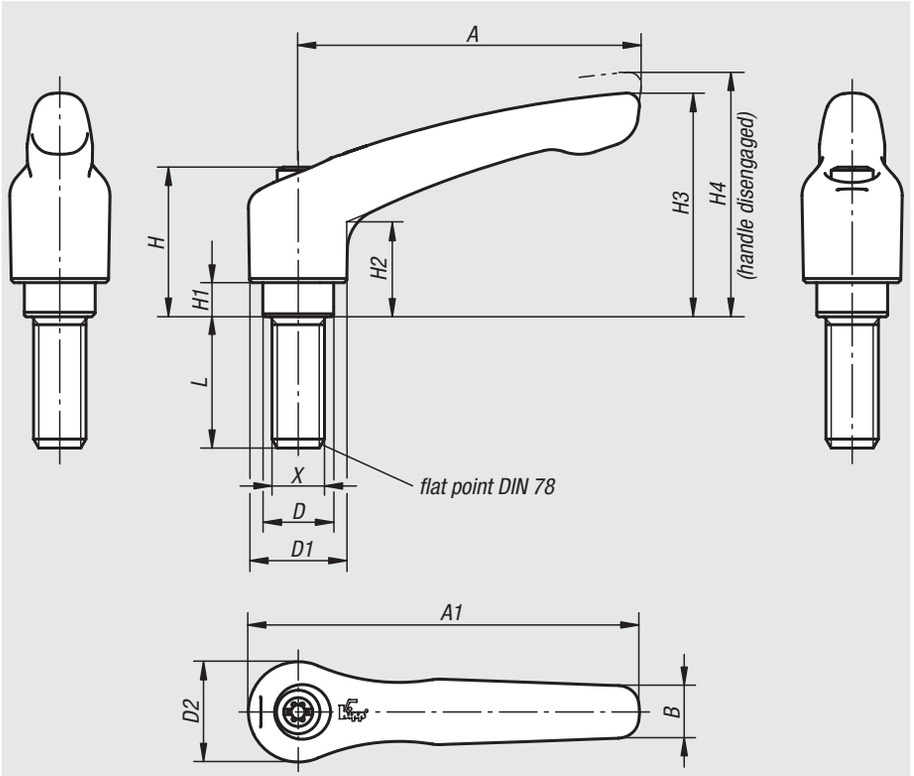
Note:
Standard colours are:
black or red RAL 3003.

lift to disengage

Order No. black	Order No. red	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06442-1041	**06442-10427**	1	M4	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06442-1051	**06442-10527**	1	M5	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06442-1061	**06442-10627**	1	M6	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06442-2061	**06442-20627**	2	M6	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20
06442-2081	**06442-20827**	2	M8	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20
06442-3081	**06442-30827**	3	M8	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06442-3101	**06442-31027**	3	M10	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06442-4101	**06442-41027**	4	M10	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06442-4121	**06442-41227**	4	M12	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06442-5121	**06442-51227**	5	M12	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26
06442-5161	**06442-51627**	5	M16	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26

Clamping levers

external thread, steel



Material:
Handle 1.0401.
All other steel parts grade 5.8.

Version:
Handle plastic-coated, fine-textured structure.
Steel parts black oxidised.

Sample order:
nlm 06443-1051X20

Note:
Standard colours are:
black or red RAL 3003.

lift to disengage

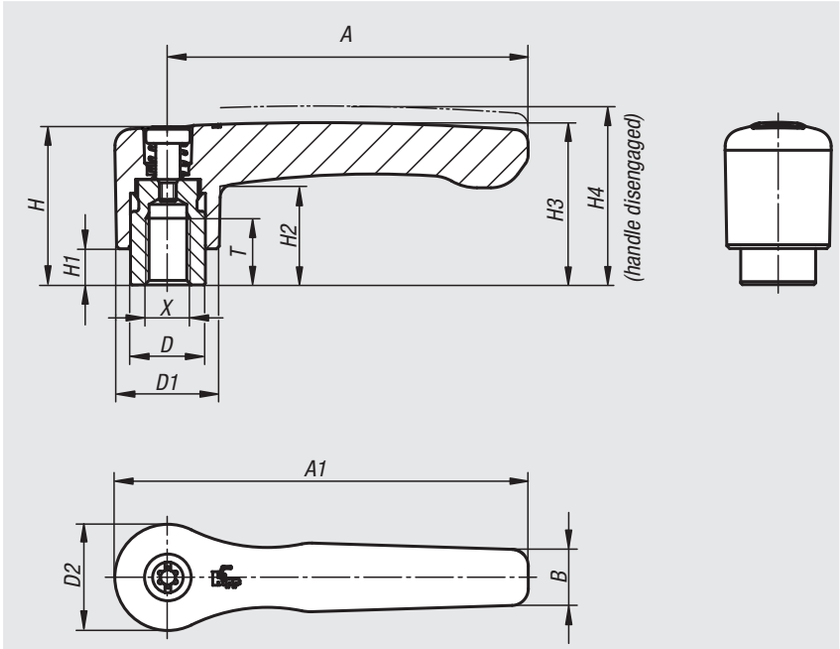
Specifications

Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
1	M5/M6	10	13	14	24,5	4	14,5	31	34	40	47	7	16
2	M6/M8/M10	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20
3	M8/M10	16	21	22	37	10	24	54,5	58,5	80	91	11	22
4	M10/M12	19	27	27,5	43	10	27	63	67,5	95	109	13	24
5	M12/M16	23	31	32	49	12	31,5	73	77,5	110	126	15	26

Order No. black	Order No. red	Size	X	L
06443-1051X	**06443-10527X**	1	M5	10/15/20/25/30/35/40/45/50
06443-1061X	**06443-10627X**	1	M6	10/15/20/25/30/35/40/45/50
06443-2061X	**06443-20627X**	2	M6	15/20/25/30/35/40/45/50/55/60
06443-2081X	**06443-20827X**	2	M8	15/20/25/30/35/40/45/50/55/60
06443-2101X	**06443-21027X**	2	M10	15/20/25/30/35/40/45/50/55/60
06443-3081X	**06443-30827X**	3	M8	15/20/25/30/35/40/45/50/55/60
06443-3101X	**06443-31027X**	3	M10	15/20/25/30/35/40/45/50/55/60
06443-4101X	**06443-41027X**	4	M10	20/25/30/35/40/45/50/55/60/70/80/90
06443-4121X	**06443-41227X**	4	M12	20/25/30/35/40/45/50/55/60/70/80/90
06443-5121X	**06443-51227X**	5	M12	25/30/35/40/45/50/55/60/70/80/90
06443-5161X	**06443-51627X**	5	M16	25/30/35/40/45/50/55/60/70/80/90

Clamping levers flat

internal thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated,
steel parts black oxidised.

Sample order:
nlm 06448-2061

Note:
Standard colours are:
black satin finish, orange RAL 2004.

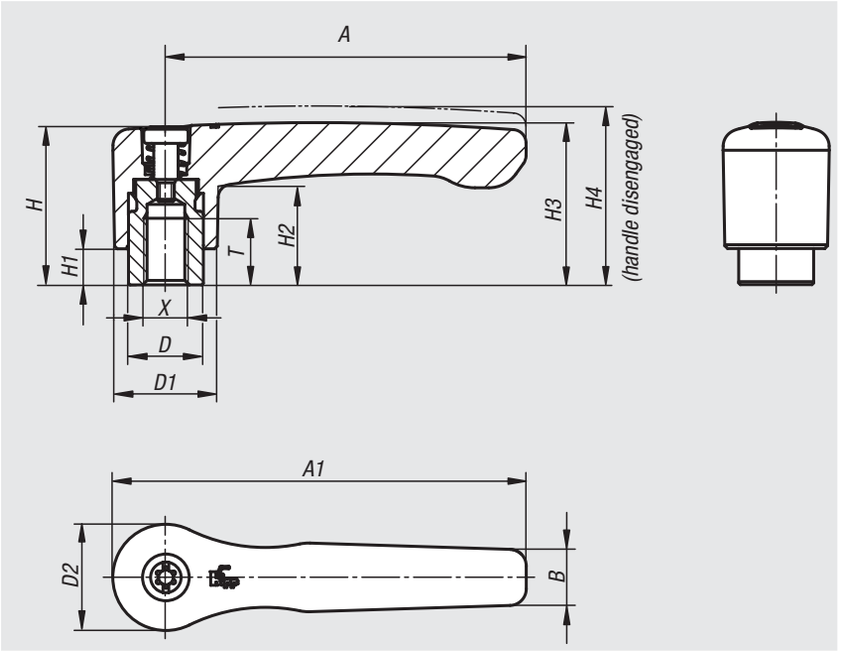
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at
extra charge

lift to
disengage

Order No. black satin finish	Order No. orange	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06448-2061	**06448-2062**	2	M6	12	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20
06448-2081	**06448-2082**	2	M8	12	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20
06448-3081	**06448-3082**	3	M8	14	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22
06448-3101	**06448-3102**	3	M10	14	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22

Clamping levers flat

internal thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts bright.

Sample order:
nlm 06449-2061

Note:
Standard colours are:
black satin finish, orange RAL 2004.

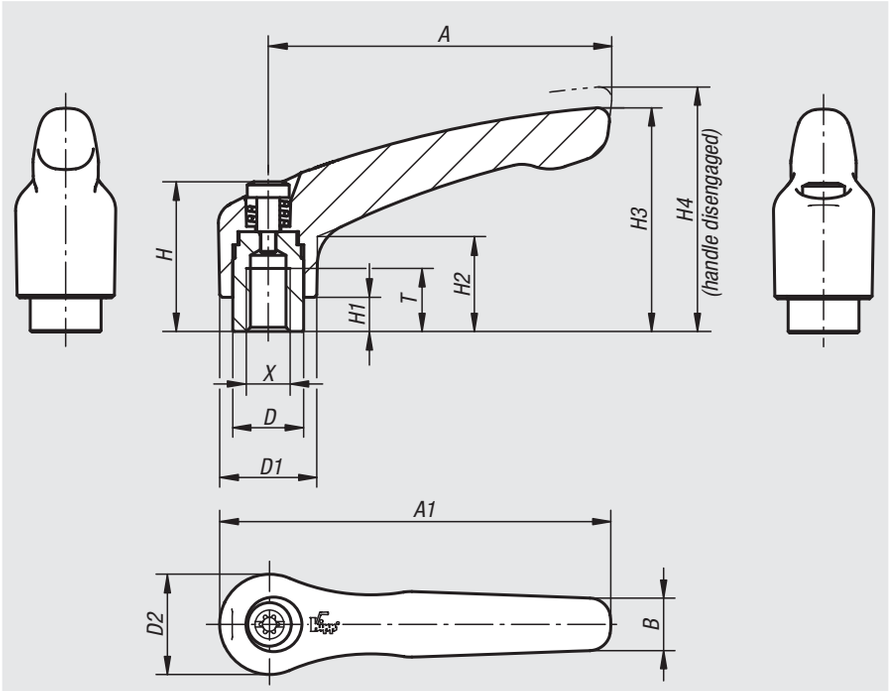
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge

lift to disengage

Order No. black satin finish	Order No. orange	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06449-2061	**06449-2062**	2	M6	12	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20
06449-2081	**06449-2082**	2	M8	12	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20
06449-3081	**06449-3082**	3	M8	14	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22
06449-3101	**06449-3102**	3	M10	14	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22

Clamping levers

internal thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated or high-gloss chromed.
Steel parts black oxidised.

Sample order:
nlm 06450-1041 (clamping lever, black satin finish)

Note:
Δ Add the desired lever colour here.
Standard colours are:
black satin finish, orange RAL 2004, ruby red RAL 3003, silver metallic, high-gloss chromed.

On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

black satin finish Δ = 1

orange Δ = 2

RAL 2004

ruby red Δ = 27

RAL 3003

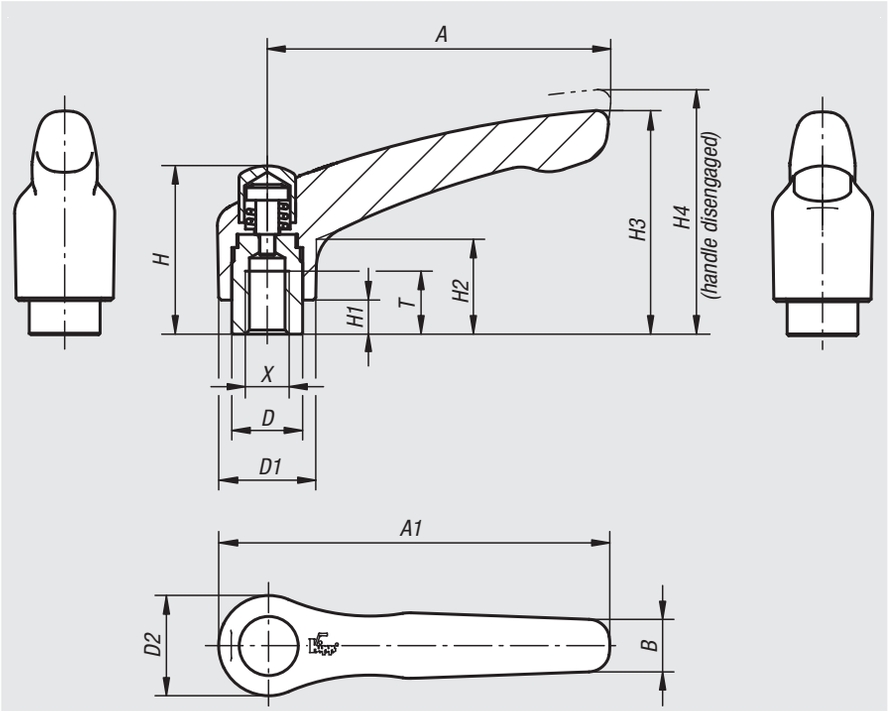
silver metallic Δ = 3

high-gloss chromed Δ = 6

Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06450-003Δ	0	M3	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06450-004Δ	0	M4	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06450-005Δ	0	M5	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06450-104Δ	1	M4	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06450-105Δ	1	M5	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06450-106Δ	1	M6	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06450-206Δ	2	M6	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06450-208Δ	2	M8	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06450-308Δ	3	M8	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06450-310Δ	3	M10	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06450-410Δ	4	M10	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06450-412Δ	4	M12	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06450-512Δ	5	M12	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26
06450-516Δ	5	M16	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26

Clamping levers with protective cap

internal thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.
Protective cap stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts black oxidised.
Protective cap stainless steel, bright.

Sample order:
nlm 06450-92061

Note:
Standard colours are:
black satin finish, orange RAL 2004.

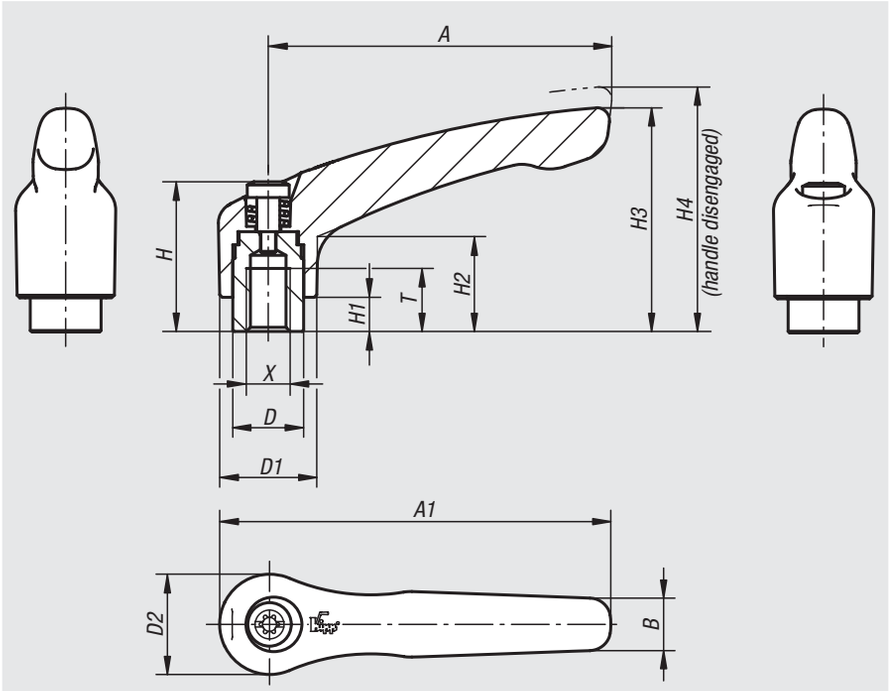
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

Order No. black satin finish	Order No. orange	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06450-92061	**06450-92062**	2	M6	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06450-92081	**06450-92082**	2	M8	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06450-93081	**06450-93082**	3	M8	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22
06450-93101	**06450-93102**	3	M10	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22

Clamping levers

internal thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated or high-gloss chromed.
Steel parts bright.

Sample order:
nlm 06451-1051 (clamping lever, black satin finish)

Note:
Δ Add the desired lever colour here.
Standard colours are:
black satin finish, orange RAL 2004, ruby red RAL 3003, silver metallic, high-gloss chromed.

On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

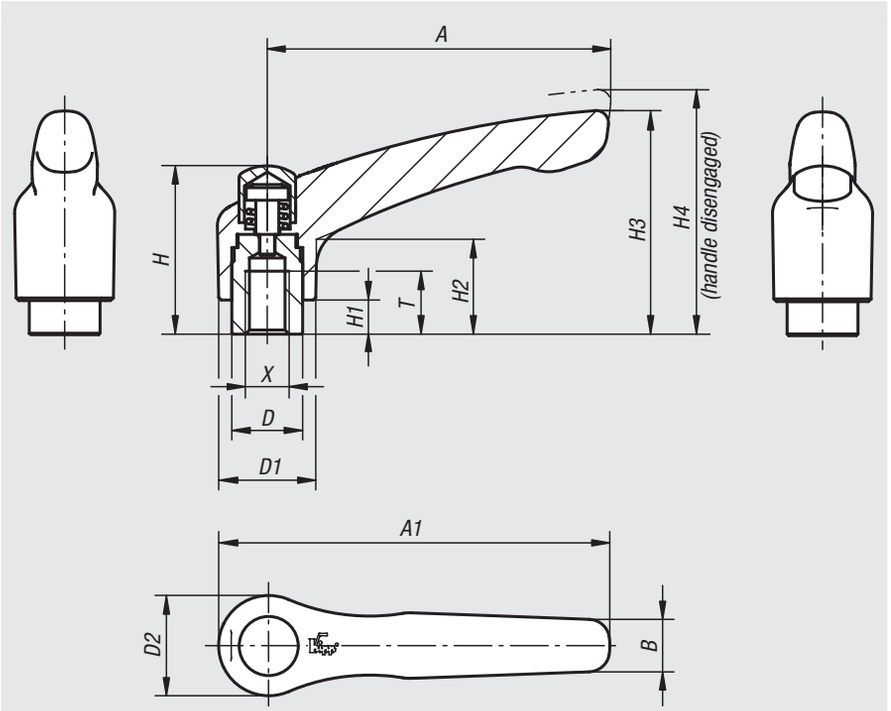
lift to disengage

black satin finish Δ = 1	orange Δ = 2	ruby red Δ = 27	silver metallic Δ = 3	high-gloss chromed Δ = 6
	RAL 2004	RAL 3003		

Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06451-003Δ	0	M3	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06451-004Δ	0	M4	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06451-005Δ	0	M5	9	10	13	14	24,5	4	14,5	30	33	30	37	7	16
06451-104Δ	1	M4	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06451-105Δ	1	M5	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06451-106Δ	1	M6	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06451-206Δ	2	M6	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06451-208Δ	2	M8	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06451-308Δ	3	M8	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06451-310Δ	3	M10	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06451-410Δ	4	M10	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06451-412Δ	4	M12	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06451-512Δ	5	M12	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26
06451-516Δ	5	M16	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26

Clamping levers with protective cap

internal thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.
Protective cap stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts bright.

Sample order:
nlm 06451-92081

Note:
Standard colours are:
black satin finish, orange RAL 2004.

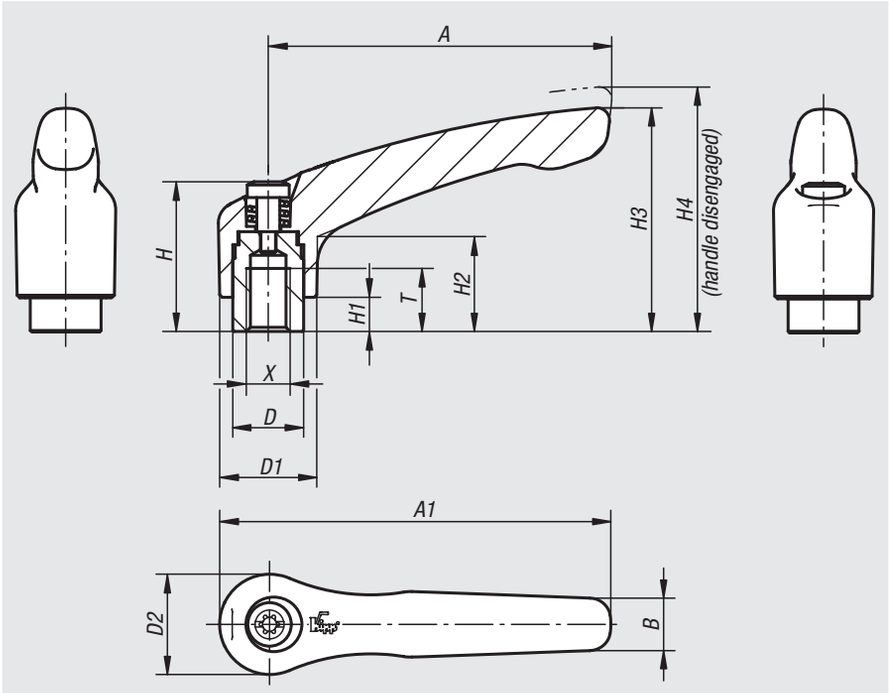
On request:
Other internal threads, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

Order No. black satin finish	Order No. orange	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06451-92061	**06451-92062**	2	M6	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06451-92081	**06451-92082**	2	M8	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
06451-93081	**06451-93082**	3	M8	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22
06451-93101	**06451-93102**	3	M10	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22

Clamping levers

with internal thread, stainless steel



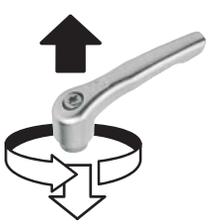
Material:
Handle investment cast 1.4308.
Other steel parts 1.4305.

Version:
Handle electrolytic polished.
Steel parts bright.

Sample order:
nlm 06454-105

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

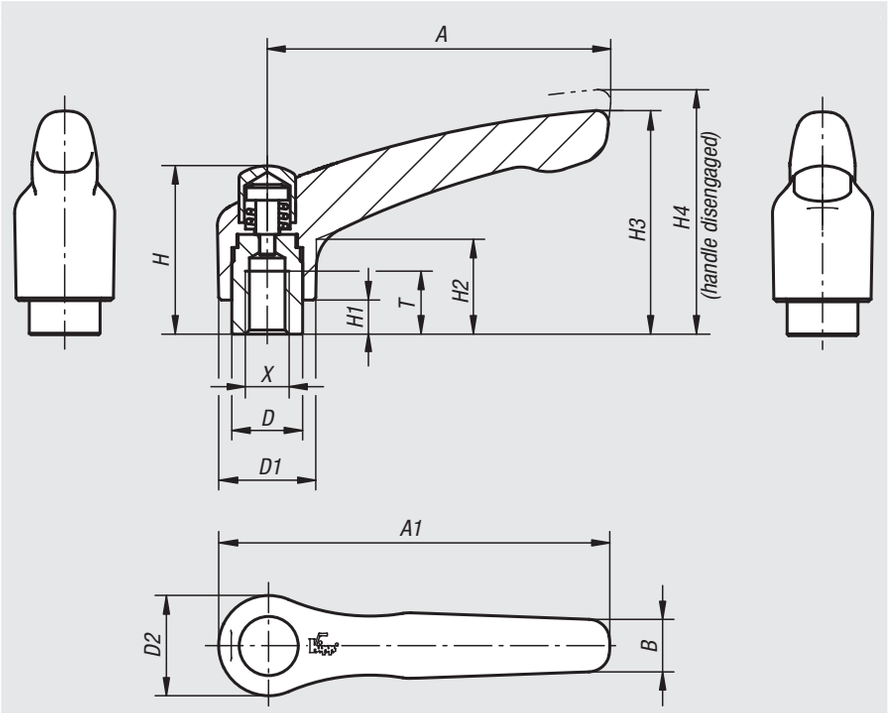
lift to disengage



Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06454-104	1	M4	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06454-105	1	M5	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06454-106	1	M6	9	10	13	14	24,5	4	14,5	31	34	40	47	7	16
06454-206	2	M6	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20
06454-208	2	M8	12	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20
06454-308	3	M8	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06454-310	3	M10	14	16	21	22	37	10	24	54,5	58,5	80	91	11	22
06454-410	4	M10	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06454-412	4	M12	17	19	27	27,5	43	10	27	63	67,5	95	109	13	24
06454-512	5	M12	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26
06454-516	5	M16	23	23	31	32	49	12	31,5	73	77,5	110	126	15	26

Clamping levers with protective cap

with internal thread, stainless steel



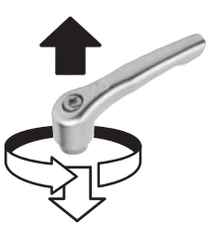
Material:
Handle investment cast 1.4308.
Other steel parts 1.4305.

Version:
Handle electrolytic polished.
Steel parts bright.

Sample order:
nlm 06454-9208

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

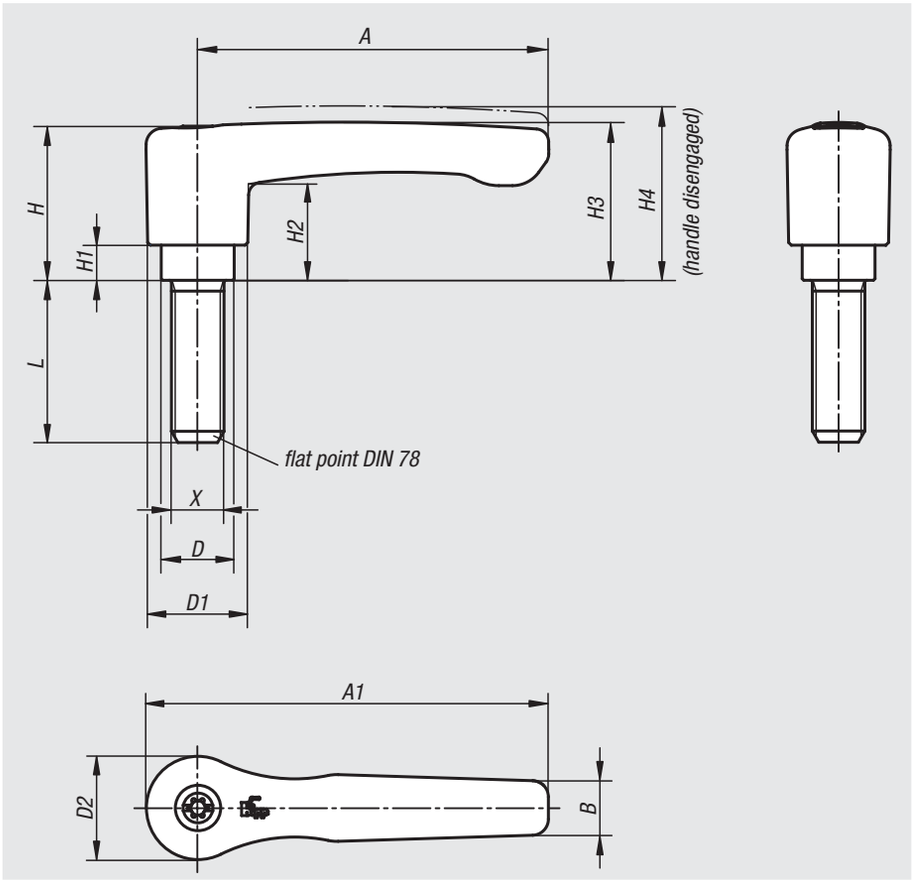
lift to disengage



Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06454-9206	2	M6	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	10	20
06454-9208	2	M8	12	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	10	20
06454-9308	3	M8	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22
06454-9310	3	M10	14	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22

Clamping levers flat

external thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated,
steel parts black oxidised.

Sample order:
nlm 06458-2061X15 (include length L)

Note:
Standard colours are:
black satin finish, orange RAL 2004.

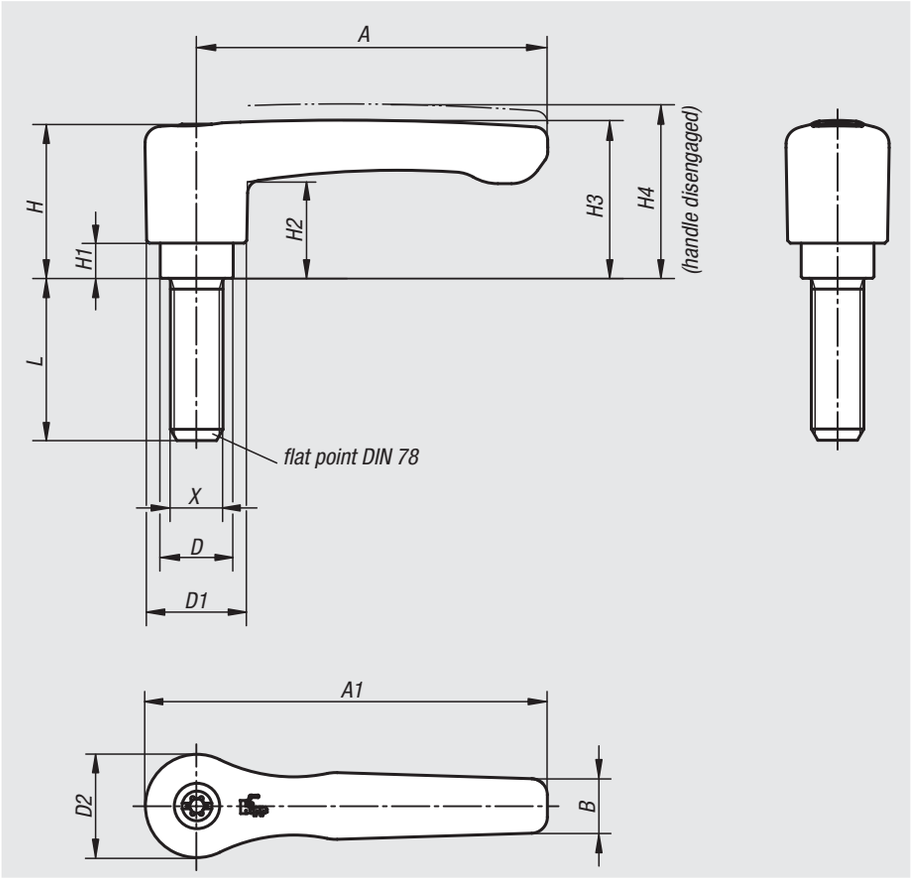
On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

Order No. black satin finish	Order No. orange	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06458-2061X	**06458-2062X**	2	M6	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	15/20/25/30/35/40/45/50/55/60
06458-2081X	**06458-2082X**	2	M8	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	15/20/25/30/35/40/45/50/55/60
06458-2101X	**06458-2102X**	2	M10	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	15/20/25/30/35/40/45/50/55/60
06458-3081X	**06458-3082X**	3	M8	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22	15/20/25/30/35/40/45/50/55/60
06458-3101X	**06458-3102X**	3	M10	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22	15/20/25/30/35/40/45/50/55/60

Clamping levers flat

external thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts bright.

Sample order:
nlm 06459-2061X15 (include length L)

Note:
Standard colours are:
black satin finish, orange RAL 2004.

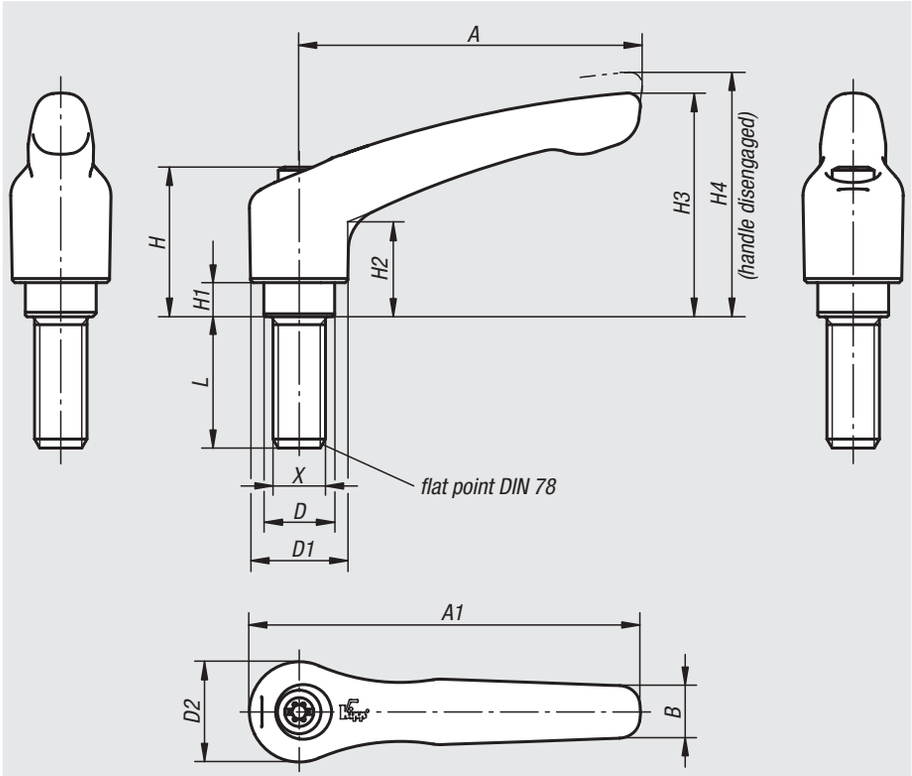
On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

Order No. black satin finish	Order No. orange	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06459-2061X	**06459-2062X**	2	M6	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	15/20/25/30/40/50/60
06459-2081X	**06459-2082X**	2	M8	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	15/20/25/30/40/50/60
06459-2101X	**06459-2102X**	2	M10	13,5	18,5	19,1	28,5	6,5	17,8	29,2	32,2	65	74,5	10,1	20	20/25/30/40/50/60
06459-3081X	**06459-3082X**	3	M8	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22	20/25/30/40/50/60
06459-3101X	**06459-3102X**	3	M10	16	21,2	22	37	10	23,8	38	42	80	91	11,7	22	20/25/30/40/50/60

Clamping levers

external thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.

Version:
Handle plastic-coated or high-gloss chromed.
Steel parts black oxidised.

Sample order:
nlm 06460-0041X10 (clamping lever, black satin finish; include length L)

Note:
Δ Add the desired lever colour here.
Standard colours are:
black satin finish, orange RAL 2004, ruby red RAL 3003, silver metallic, high-gloss chromed.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

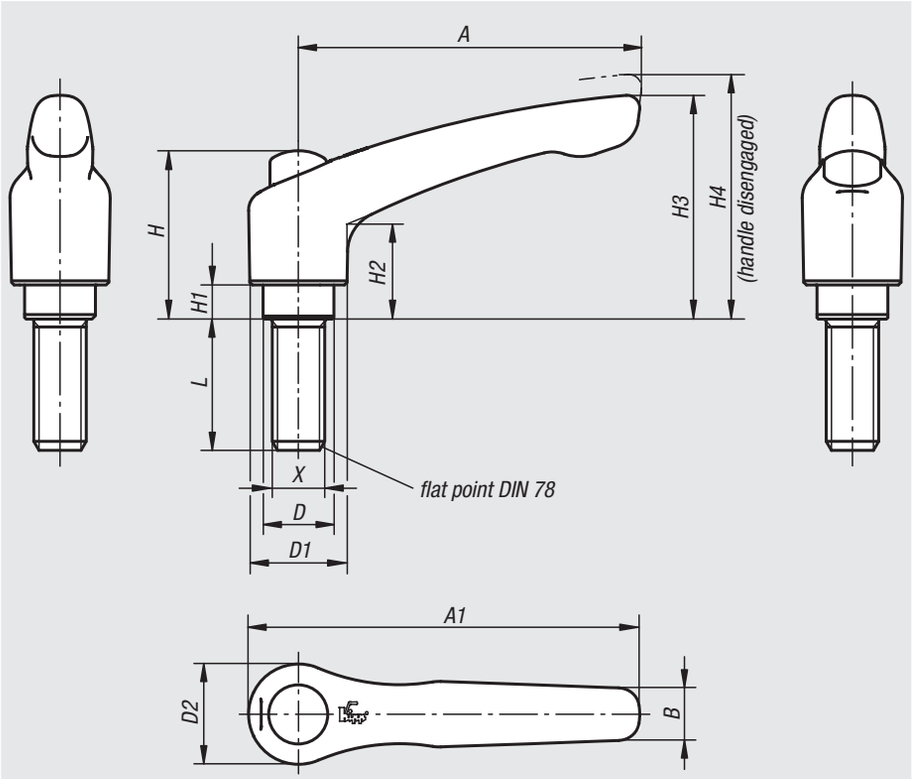
lift to disengage

black satin finish Δ = 1	orange Δ = 2	ruby red Δ = 27	silver metallic Δ = 3	high-gloss chromed Δ = 6
	RAL 2004	RAL 3003		

Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06460-004ΔX	0	M4	10	13	14	24,5	4	14,5	30	33	30	37	7	16	10/15/20/25/30/35/40/45/50
06460-005ΔX	0	M5	10	13	14	24,5	4	14,5	30	33	30	37	7	16	10/15/20/25/30/35/40/45/50
06460-105ΔX	1	M5	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25/30/35/40/45/50
06460-106ΔX	1	M6	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25/30/35/40/45/50
06460-206ΔX	2	M6	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	15/20/25/30/35/40/45/50/55/60
06460-208ΔX	2	M8	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	15/20/25/30/35/40/45/50/55/60
06460-210ΔX	2	M10	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	15/20/25/30/35/40/45/50/55/60
06460-308ΔX	3	M8	16	21	22	37	10	24	54,5	58,5	80	91	11	22	15/20/25/30/35/40/45/50/55/60
06460-310ΔX	3	M10	16	21	22	37	10	24	54,5	58,5	80	91	11	22	15/20/25/30/35/40/45/50/55/60
06460-410ΔX	4	M10	19	27	27,5	43	10	27	63	67,5	95	109	13	24	20/25/30/35/40/45/50/55/60/70/80/90
06460-412ΔX	4	M12	19	27	27,5	43	10	27	63	67,5	95	109	13	24	20/25/30/35/40/45/50/55/60/70/80/90
06460-512ΔX	5	M12	23	31	32	49	12	31,5	73	77,5	110	126	15	26	25/30/35/40/45/50/55/60/70/80/90
06460-516ΔX	5	M16	23	31	32	49	12	31,5	73	77,5	110	126	15	26	25/30/35/40/45/50/55/60/70/80/90

Clamping levers with protective cap

external thread



Material:
Handle die-cast zinc DIN 12844.
Steel parts grade 5.8.
Protective cap stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts black oxidised.
Protective cap stainless steel, bright.

Sample order:
nlm 06460-92081X30 (include length L)

Note:
Standard colours are:
black satin finish, orange RAL 2004.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

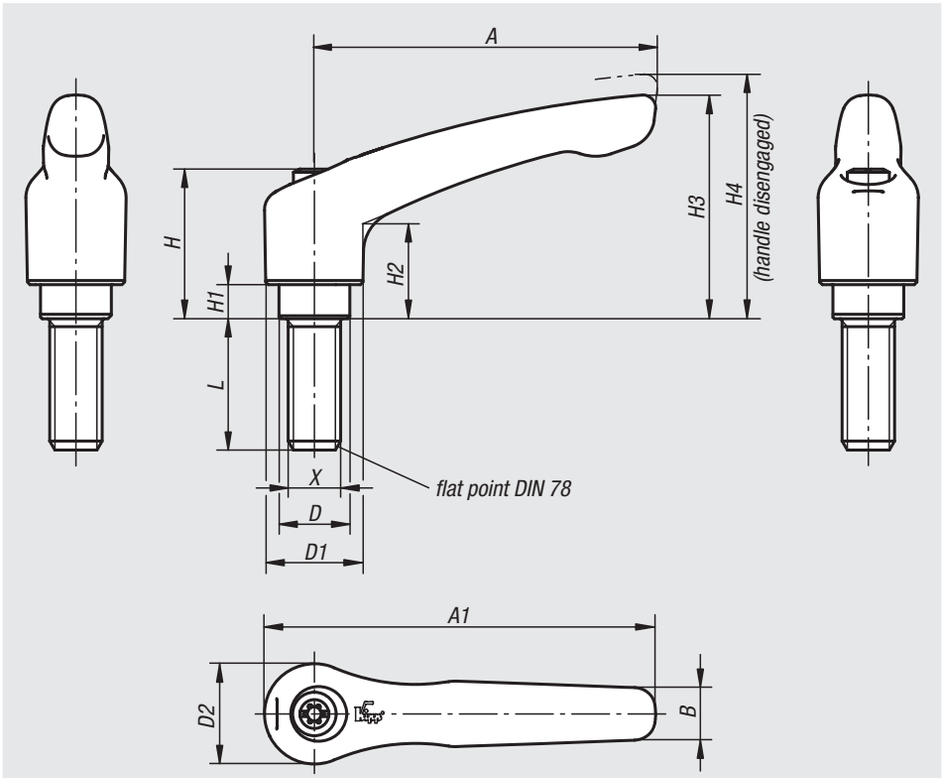
Specifications

Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
2	M6/M8/M10	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
3	M8/M10	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22

Order No. black satin finish	Order No. orange	Size	X	L
06460-92061X	**06460-92062X**	2	M6	15/20/25/30/35/40/45/50/55/60
06460-92081X	**06460-92082X**	2	M8	15/20/25/30/35/40/45/50/55/60
06460-92101X	**06460-92102X**	2	M10	15/20/25/30/35/40/45/50/55/60
06460-93081X	**06460-93082X**	3	M8	15/20/25/30/35/40/45/50/55/60
06460-93101X	**06460-93102X**	3	M10	15/20/25/30/35/40/45/50/55/60

Clamping levers

external thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.

Version:
Handle plastic-coated or high-gloss chromed.
Steel parts bright.

Sample order:
nlm 06461-1051X25 (clamping lever, black satin finish; include length L)

Note:
Δ Add the desired lever colour here.
Standard colours are:
black satin finish, orange RAL 2004, ruby red RAL 3003, silver metallic, high-gloss chromed.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

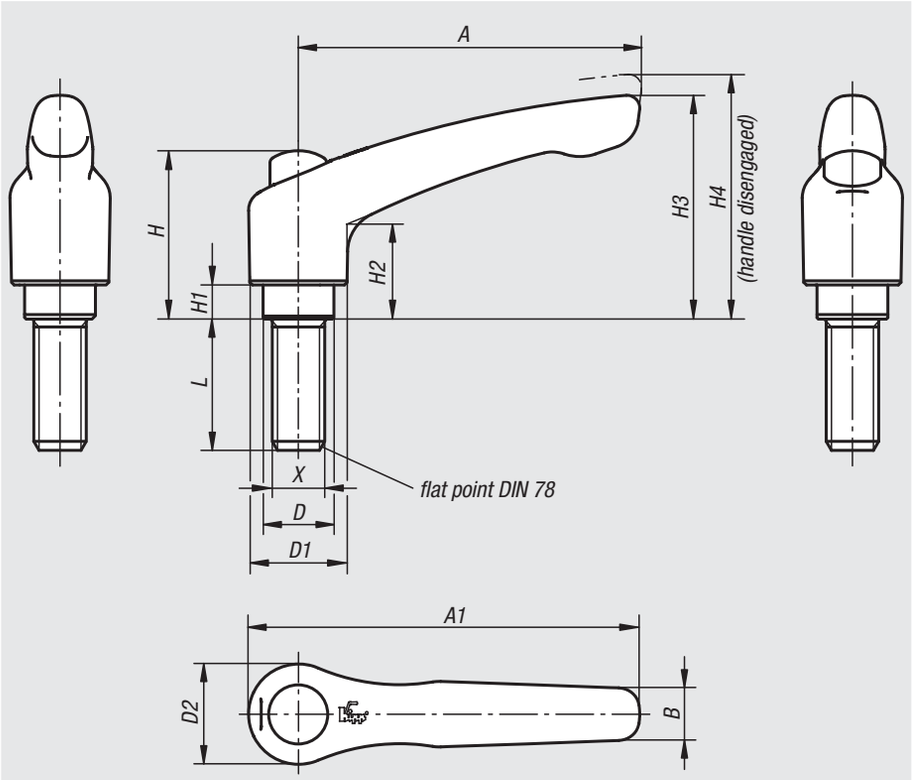
lift to disengage

black satin finish Δ = 1	orange Δ = 2	ruby red Δ = 27	silver metallic Δ = 3	high-gloss chromed Δ = 6
	RAL 2004	RAL 3003		

Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06461-004ΔX	0	M4	10	13	14	24,5	4	14,5	30	33	30	37	7	16	10/15/20/25
06461-005ΔX	0	M5	10	13	14	24,5	4	14,5	30	33	30	37	7	16	10/15/20/25
06461-105ΔX	1	M5	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25
06461-106ΔX	1	M6	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25/30/40/50
06461-206ΔX	2	M6	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	15/20/25/30/40/50/60
06461-208ΔX	2	M8	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	15/20/25/30/40/50/60
06461-210ΔX	2	M10	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	9,5	20	20/25/30/40/50/60
06461-308ΔX	3	M8	16	21	22	37	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60
06461-310ΔX	3	M10	16	21	22	37	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60
06461-412ΔX	4	M12	19	27	27,5	43	10	27	63	67,5	95	109	13	24	25/30/40/50/60
06461-516ΔX	5	M16	23	31	32	49	12	31,5	73	77,5	110	126	15	26	30/40/50/60

Clamping levers with protective cap

external thread, metal parts stainless steel



Material:
Handle die-cast zinc DIN 12844.
Steel parts stainless steel 1.4305.
Protective cap stainless steel 1.4305.

Version:
Handle plastic-coated.
Steel parts bright.

Sample order:
nlm 06461-92081X30 (include length L)

Note:
Standard colours are:
black satin finish, orange RAL 2004.

On request:
Other external threads, screw lengths, colours and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

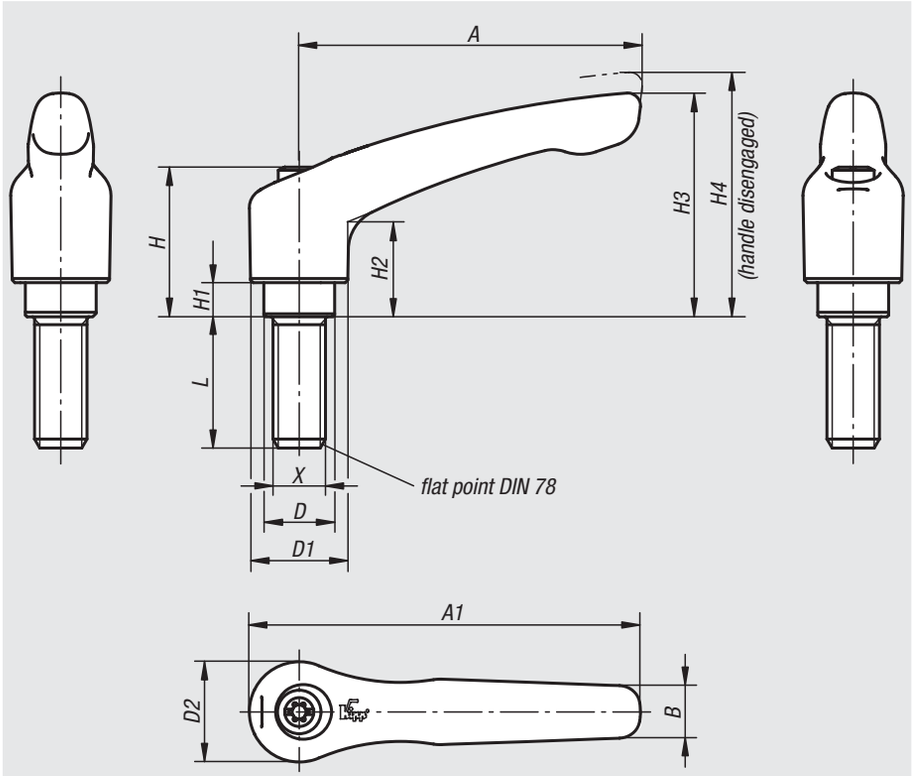
Specifications

Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
2	M6/M8/M10	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	9,5	20
3	M8/M10	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22

Order No. black satin finish	Order No. orange	Size	X	L
06461-92061X	**06461-92062X**	2	M6	15/20/25/30/40/50/60
06461-92081X	**06461-92082X**	2	M8	15/20/25/30/40/50/60
06461-92101X	**06461-92102X**	2	M10	20/25/30/40/50/60
06461-93081X	**06461-93082X**	3	M8	20/25/30/40/50/60
06461-93101X	**06461-93102X**	3	M10	20/25/30/40/50/60

Clamping levers

with external thread, stainless steel



Material:
Handle investment cast 1.4308.
Other steel parts 1.4305.

Version:
Handle electrolytic polished.
Steel parts bright.

Sample order:
nlm 06464-105X10 (include length L)

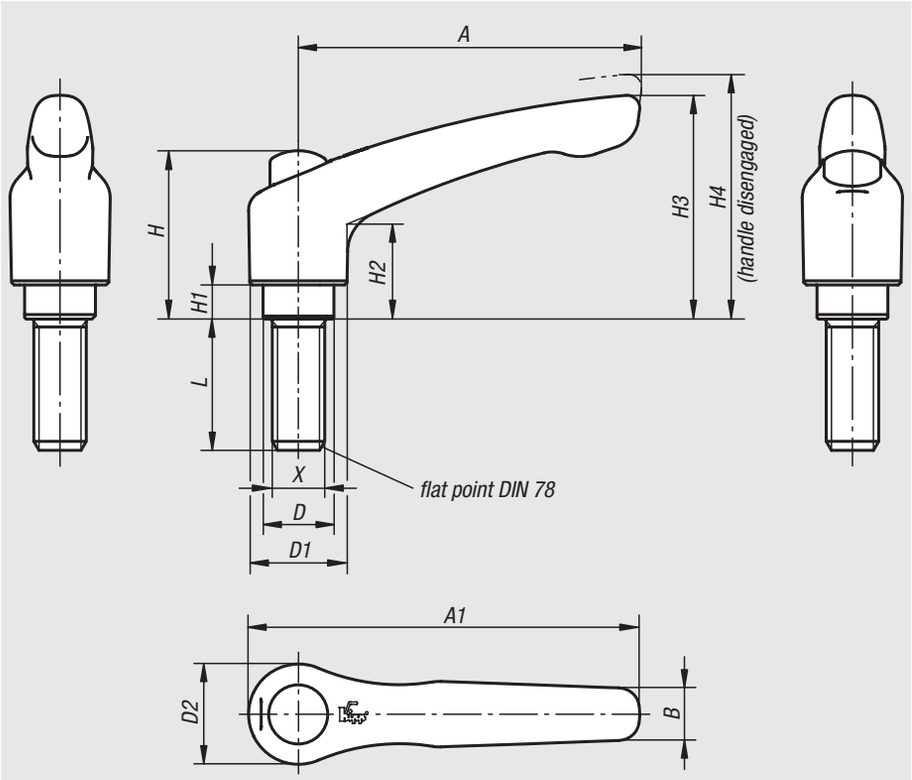
On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage

Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06464-105X	1	M5	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25
06464-106X	1	M6	10	13	14	24,5	4	14,5	31	34	40	47	7	16	10/15/20/25/30/40/50
06464-206X	2	M6	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20	15/20/25/30/40/50/60
06464-208X	2	M8	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20	15/20/25/30/40/50/60
06464-210X	2	M10	13,5	18,5	19	28,5	6,5	17,5	42,5	45,5	65	74,5	10	20	20/25/30/40/50/60
06464-308X	3	M8	16	21	22	37	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60
06464-310X	3	M10	16	21	22	37	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60
06464-412X	4	M12	19	27	27,5	43	10	27	63	67,5	95	109	13	24	25/30/40/50/60
06464-516X	5	M16	23	31	32	49	12	31,5	73	77,5	110	126	15	26	30/40/50/60

Clamping levers with protective cap

with external thread, stainless steel



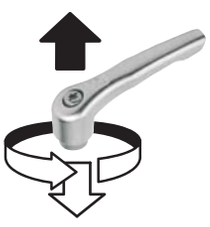
Material:
Handle investment cast 1.4308.
Other steel parts 1.4305.

Version:
Handle electrolytic polished.
Steel parts bright.

Sample order:
nlm 06464-9208X30 (include length L)

On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

lift to disengage



Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06464-9206X	2	M6	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	10	20	15/20/25/30/40/50/60
06464-9208X	2	M8	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	10	20	15/20/25/30/40/50/60
06464-9210X	2	M10	13,5	18,5	19	32	6,5	17,5	42,5	45,5	65	74,5	10	20	20/25/30/40/50/60
06464-9308X	3	M8	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60
06464-9310X	3	M10	16	21	22	41,5	10	24	54,5	58,5	80	91	11	22	20/25/30/40/50/60

Ratchet levers

Material:
Housing carbon steel, tension nut and tension pin case-hardened steel.

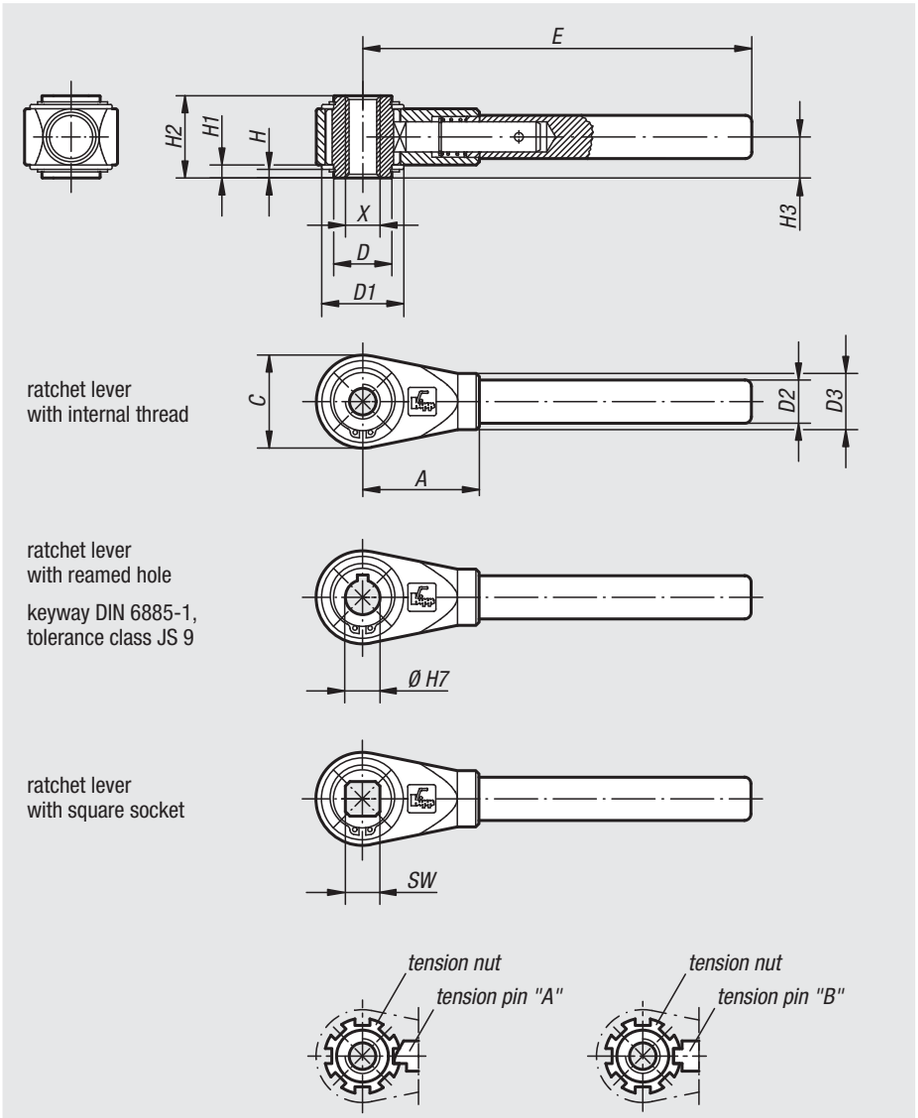
Version:
Black oxidised.
Matt-finished or high-polish chrome-plated versions available at extra charge.

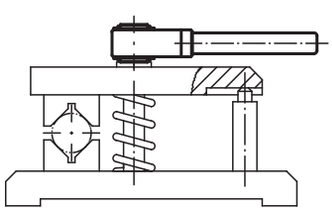
Sample order:
nlm 06470-316

Note:
Tension Pin A standard version (for ratchet action):
Use for clamping and releasing in limited space and when considerable travel is involved. In order to change the tightening direction, the handle must be reversed by 180°.

Tension Pin B special version:
Use for clamping and releasing in limited space and when short travel is involved. The handle is not reversed in order to change the tightening direction. It must be pulled out before it can be engaged in the next slot.

On request:
Other internal threads, reamed holes and square sockets.
Dimension „E“ available in other lengths at extra charge.
Special version: Tension pin B.





Ratchet levers

Ratchet levers with internal thread

Order No.	Size	X	D	D1	D2	D3	H	H1	H2	H3	C	A	E	No. of locking slots
06470-310	1	M10	22	33	17	22	3	4,5	31	15,5	36	48	150	7
06470-312	1	M12	22	33	17	22	3	4,5	31	15,5	36	48	150	7
06470-314	2	M14	27	38	20	26	4	6	38	19	43	54	180	8
06470-316	2	M16	27	38	20	26	4	6	38	19	43	54	180	8
06470-318	3	M18	35	45	24	30	4	6	42	21	51	70	230	8
06470-320	3	M20	35	45	24	30	4	6	42	21	51	70	230	8
06470-322	4	M22	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-324	4	M24	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-327	4	M27	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-330	5	M30	60	75	32	38	5	7,5	53	26,5	82	110	400	11
06470-336	5	M36	60	75	32	38	5	7,5	53	26,5	82	110	400	11
06470-342	5	M42	60	75	32	38	5	7,5	53	26,5	82	110	400	11

Ratchet levers with reamed hole

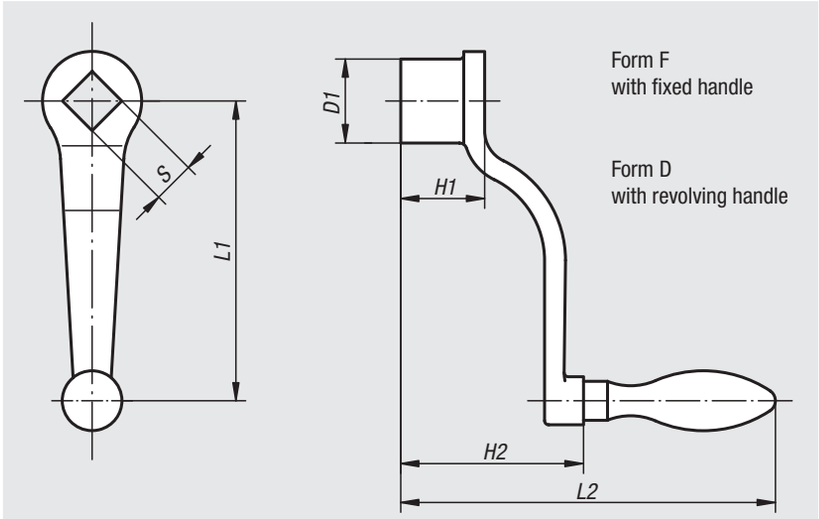
Order No.	Size	Loc. hole Ø H7 with keyway DIN 6885-1	D	D1	D2	D3	H	H1	H2	H3	C	A	E	No. of locking slots
06470-412	1	12	22	33	17	22	3	4,5	31	15,5	36	48	150	7
06470-414	2	14	27	38	20	26	4	6	38	19	43	54	180	8
06470-415	2	15	27	38	20	26	4	6	38	19	43	54	180	8
06470-416	2	16	27	38	20	26	4	6	38	19	43	54	180	8
06470-418	3	18	35	45	24	30	4	6	42	21	51	70	230	8
06470-420	3	20	35	45	24	30	4	6	42	21	51	70	230	8
06470-422	4	22	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-425	4	25	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-427	4	27	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-430	5	30	60	75	32	38	5	7,5	53	26,5	82	110	400	11
06470-436	5	36	60	75	32	38	5	7,5	53	26,5	82	110	400	11

Ratchet levers with square socket

Order No.	Size	Square socket SW	D	D1	D2	D3	H	H1	H2	H3	C	A	E	No. of locking slots
06470-510	1	10	22	33	17	22	3	4,5	31	15,5	36	48	150	7
06470-512	1	12	22	33	17	22	3	4,5	31	15,5	36	48	150	7
06470-513	2	13	27	38	20	26	4	6	38	19	43	54	180	8
06470-514	2	14	27	38	20	26	4	6	38	19	43	54	180	8
06470-517	3	17	35	45	24	30	4	6	42	21	51	70	230	8
06470-519	4	19	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-520	4	20	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-522	4	22	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-524	4	24	42	56	28	35	4	6	47	23,5	61	80	300	9
06470-530	5	30	60	75	32	38	5	7,5	53	26,5	82	110	400	11
06470-532	5	32	60	75	32	38	5	7,5	53	26,5	82	110	400	11

Crank handles offset

similar to DIN 468



Material:
Crank arm malleable or ductile iron.

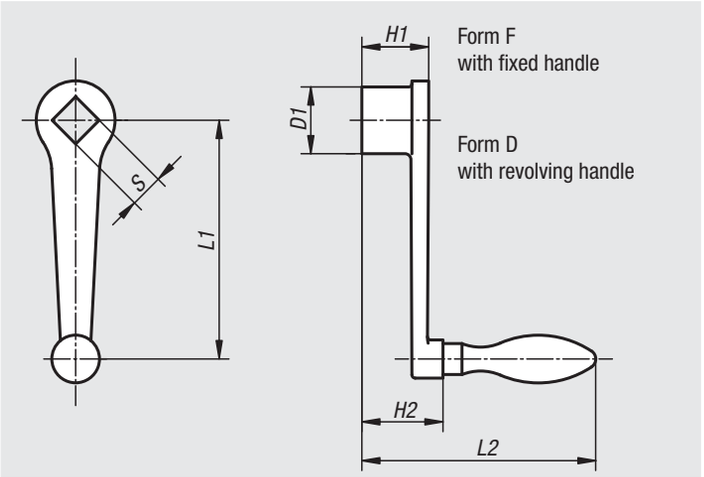
Version:
Blasted.

Sample order:
nlm 06480-212X14

Order No.	Form	L1	L2	S	D1	H1	H2	Grip Ø
06480-206X10	D	63	92	10 +0,2	20	20	40	16
06480-208X10	D	80	109	10 +0,2	24	24	44	20
06480-208X12	D	80	109	12 +0,2	24	24	44	20
06480-210X12	D	100	120	12 +0,2	28	28	55	20
06480-210X14	D	100	120	14 +0,3	28	28	55	20
06480-212X14	D	125	141	14 +0,3	34	34	58	25
06480-212X17	D	125	141	17 +0,3	34	34	58	25
06480-216X17	D	160	153	17 +0,3	37	38	70	25
06480-216X19	D	160	153	19 +0,3	37	38	70	25
06480-220X19	D	200	189	19 +0,3	40	44	84	32
06480-220X22	D	200	189	22 +0,3	40	44	84	32
06480-106X10	F	63	92	10 +0,2	20	20	40	16
06480-108X10	F	80	109	10 +0,2	24	24	44	20
06480-108X12	F	80	109	12 +0,2	24	24	44	20
06480-110X12	F	100	120	12 +0,2	28	28	55	20
06480-110X14	F	100	120	14 +0,3	28	28	55	20
06480-112X14	F	125	141	14 +0,3	34	34	58	25
06480-112X17	F	125	141	17 +0,3	34	34	58	25
06480-116X17	F	160	153	17 +0,3	37	38	70	25
06480-116X19	F	160	153	19 +0,3	37	38	70	25
06480-120X19	F	200	189	19 +0,3	40	44	84	32
06480-120X22	F	200	189	22 +0,3	40	44	84	32

Crank handles straight

similar to DIN 469



Material:
Crank arm malleable or ductile iron.

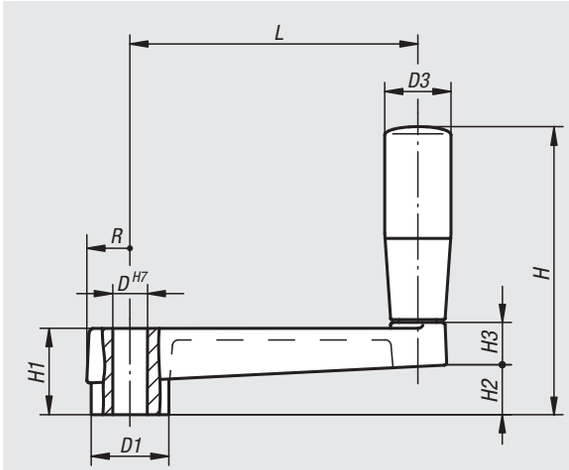
Version:
Blasted.

Sample order:
nlm 06490-120X22

Order No.	Form	L1	L2	S	D1	H1	H2	Grip Ø
06490-106X10	F	63	80	10 +0,2	20	20	28	16
06490-108X10	F	80	98	10 +0,2	24	24	33	20
06490-108X12	F	80	98	12 +0,2	24	24	33	20
06490-110X12	F	100	102	12 +0,2	28	28	37	20
06490-110X14	F	100	102	14 +0,3	28	28	37	20
06490-112X14	F	125	120	14 +0,3	34	34	40	25
06490-112X17	F	125	120	17 +0,3	34	34	40	25
06490-116X17	F	160	131	17 +0,3	37	38	48	25
06490-116X19	F	160	131	19 +0,3	37	38	48	25
06490-120X19	F	200	158	19 +0,3	40	44	53	32
06490-120X22	F	200	158	22 +0,3	40	44	53	32
06490-206X10	D	63	80	10 +0,2	20	20	28	16
06490-208X10	D	80	98	10 +0,2	24	24	33	20
06490-208X12	D	80	98	12 +0,2	24	24	33	20
06490-210X12	D	100	102	12 +0,2	28	28	37	20
06490-210X14	D	100	102	14 +0,3	28	28	37	20
06490-212X14	D	125	120	14 +0,3	34	34	40	25
06490-212X17	D	125	120	17 +0,3	34	34	40	25
06490-216X17	D	160	131	17 +0,3	37	38	48	25
06490-216X19	D	160	131	19 +0,3	37	38	48	25
06490-220X19	D	200	158	19 +0,3	40	44	53	32
06490-220X22	D	200	158	22 +0,3	40	44	53	32

Crank handles

aluminium



Material:
Aluminium.
Grip thermoplastic.

Version:
Arm plastic-coated, black.
Grip black.

Sample order:
nlm 06492-100

Order No.	D	D1	D3	H	H1	~H2	H3	L	R
06492-100	10	23	21	81	24	14	14	80	13
06492-120	12	27	23	100	28	17	15	100	15
06492-140	14	32	26	123	34	22	18	125	17,5

Crank handles

with fold-away grip

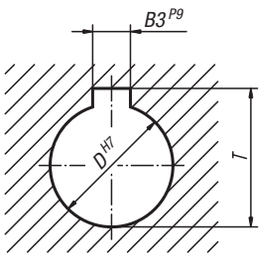
Material:
Black grey thermoplastic.

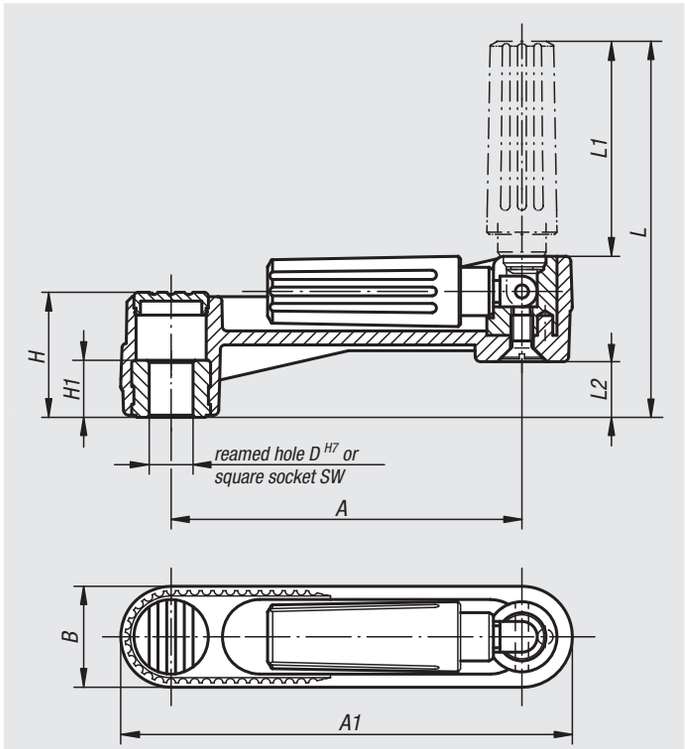
Version:
Steel parts black oxidised.

Sample order:
nlm 06500-1108

Note:
The hub cap is supplied loose.
The crank handle can be secured to a shaft using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.

keyway DIN 6885-1





Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2
06500-1108	without keyway	1	80	104	24	8	29	13	85,5	49	13
06500-1110	without keyway	1	80	104	24	10	29	13	85,5	49	13
06500-1210	without keyway	2	100	129	29	10	36	13	105	59,5	16
06500-1212	without keyway	2	100	129	29	12	36	13	105	59,5	16
06500-1312	without keyway	3	125	161	36	12	44	18,5	140	83,5	19,5
06500-1314	without keyway	3	125	161	36	14	44	18,5	140	83,5	19,5

Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2	B3	T
06500-110802	with keyway	1	80	104	24	8	29	13	85,5	49	13	2	9
06500-111003	with keyway	1	80	104	24	10	29	13	85,5	49	13	3	11,4
06500-121003	with keyway	2	100	129	29	10	36	13	105	59,5	16	3	11,4
06500-121204	with keyway	2	100	129	29	12	36	13	105	59,5	16	4	13,8
06500-131204	with keyway	3	125	161	36	12	44	18,5	140	83,5	19,5	4	13,8
06500-131405	with keyway	3	125	161	36	14	44	18,5	140	83,5	19,5	5	16,3

Order No.	Version	Size	A	A1	B	SW	H	H1	L	L1	L2
06500-2108	square socket	1	80	104	24	8	29	13	85,5	49	13
06500-2110	square socket	1	80	104	24	10	29	13	85,5	49	13
06500-2210	square socket	2	100	129	29	10	36	13	105	59,5	16
06500-2212	square socket	2	100	129	29	12	36	13	105	59,5	16
06500-2312	square socket	3	125	161	36	12	44	18,5	140	83,5	19,5
06500-2314	square socket	3	125	161	36	14	44	18,5	140	83,5	19,5

Crank handles

with revolving grip

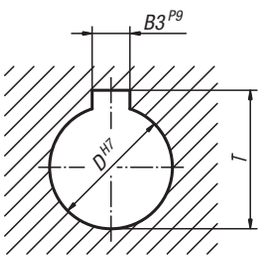
Material:
Black grey thermoplastic.

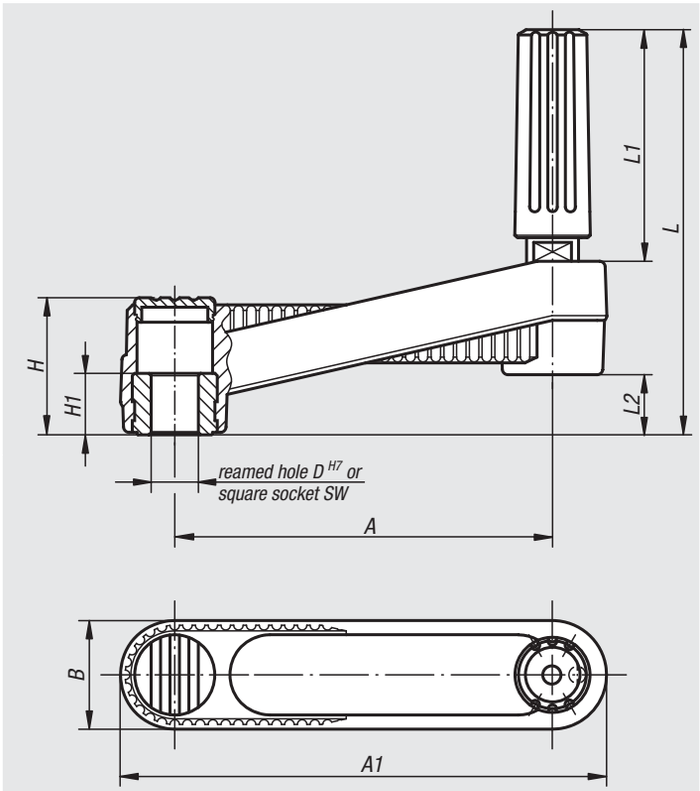
Version:
Steel parts black oxidised.

Sample order:
nlm 06500-3108

Note:
The hub cap and the revolving grip are supplied loose. To assemble the handle simply screw the grip into the existing hole. Novo·Grip crank handles can be secured to a shaft by using a transverse pin or by parallel key connection together with a DIN 6912 socket head screw and a DIN 7349 washer.

keyway DIN 6885-1





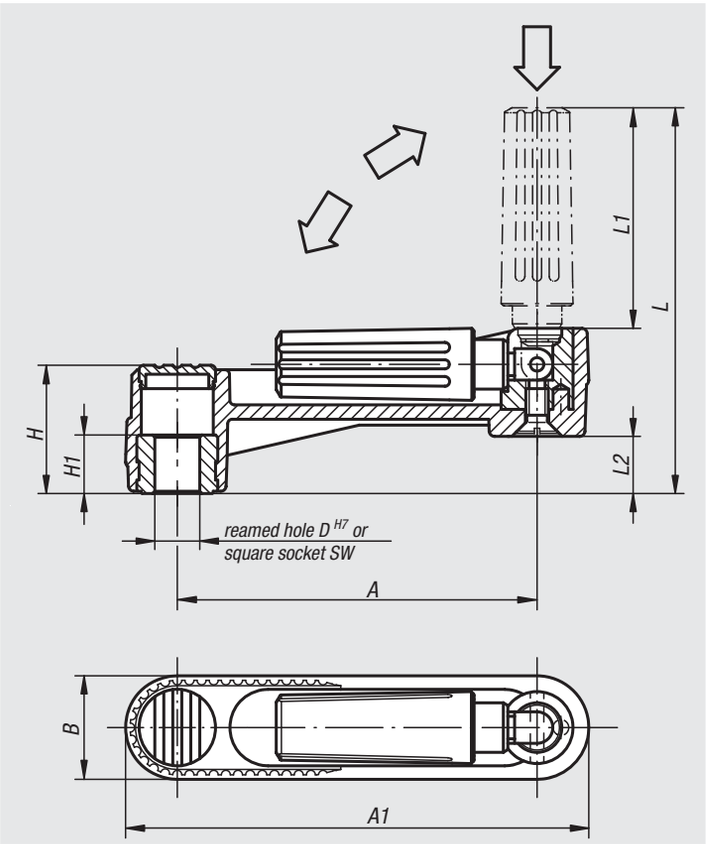
Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2
06500-3108	without keyway	1	80	104	24	8	29	13	85,5	49	13
06500-3110	without keyway	1	80	104	24	10	29	13	85,5	49	13
06500-3210	without keyway	2	100	129	29	10	36	13	105	59,5	16
06500-3212	without keyway	2	100	129	29	12	36	13	105	59,5	16
06500-3312	without keyway	3	125	161	36	12	44	18,5	140	83,5	19,5
06500-3314	without keyway	3	125	161	36	14	44	18,5	140	83,5	19,5

Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2	B3	T
06500-310802	with keyway	1	80	104	24	8	29	13	85,5	49	13	2	9
06500-311003	with keyway	1	80	104	24	10	29	13	85,5	49	13	3	11,4
06500-321003	with keyway	2	100	129	29	10	36	13	105	59,5	16	3	11,4
06500-321204	with keyway	2	100	129	29	12	36	13	105	59,5	16	4	13,8
06500-331204	with keyway	3	125	161	36	12	44	18,5	140	83,5	19,5	4	13,8
06500-331405	with keyway	3	125	161	36	14	44	18,5	140	83,5	19,5	5	16,3

Order No.	Version	Size	A	A1	B	SW	H	H1	L	L1	L2
06500-4108	square socket	1	80	104	24	8	29	13	85,5	49	13
06500-4110	square socket	1	80	104	24	10	29	13	85,5	49	13
06500-4210	square socket	2	100	129	29	10	36	13	105	59,5	16
06500-4212	square socket	2	100	129	29	12	36	13	105	59,5	16
06500-4312	square socket	3	125	161	36	12	44	18,5	140	83,5	19,5
06500-4314	square socket	3	125	161	36	14	44	18,5	140	83,5	19,5

Crank handles

with safety grip



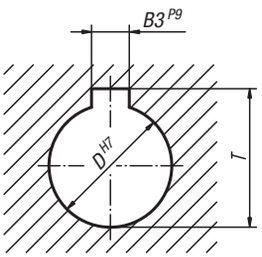
Material:
Arm and grip black grey thermoplastic.

Version:
Steel parts black oxidised.

Sample order:
nlm 06502-1108

Note:
The hub cover is supplied loose.
The crank handles can be secured to the shaft by cross-pinning or by parallel key together with a DIN 6912 socket head screw and DIN 7349 washer.
Two actions must be made to bring the safety grip into an operating position:
- Swing the grip out until it stops (90°).
- Push the grip in until it locks.
  The pushed-in position is the most comfortable for cranking. The grip swings back automatically after releasing.

keyway DIN 6885-1



Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2
06502-1108	without keyway	1	80	104	24	8	29	13	84	47,5	13
06502-1110	without keyway	1	80	104	24	10	29	13	84	47,5	13
06502-1210	without keyway	2	100	129	29	10	36	13	104	58,5	16
06502-1212	without keyway	2	100	129	29	12	36	13	104	58,5	16
06502-1312	without keyway	3	125	161	36	12	44	18,5	138,5	82	19,5
06502-1314	without keyway	3	125	161	36	14	44	18,5	138,5	82	19,5

Order No.	Version	Size	A	A1	B	D	H	H1	L	L1	L2	B3	T
06502-110802	with keyway	1	80	104	24	8	29	13	84	47,5	13	2	9
06502-111003	with keyway	1	80	104	24	10	29	13	84	47,5	13	3	11,4
06502-121003	with keyway	2	100	129	29	10	36	13	104	58,5	16	3	11,4
06502-121204	with keyway	2	100	129	29	12	36	13	104	58,5	16	4	13,8
06502-131204	with keyway	3	125	161	36	12	44	18,5	138,5	82	19,5	4	13,8
06502-131405	with keyway	3	125	161	36	14	44	18,5	138,5	82	19,5	5	16,3

Order No.	Version	Size	A	A1	B	SW	H	H1	L	L1	L2
06502-2108	square socket	1	80	104	24	8	29	13	84	47,5	13
06502-2110	square socket	1	80	104	24	10	29	13	84	47,5	13
06502-2210	square socket	2	100	129	29	10	36	13	104	58,5	16
06502-2212	square socket	2	100	129	29	12	36	13	104	58,5	16
06502-2312	square socket	3	125	161	36	12	44	18,5	138,5	82	19,5
06502-2314	square socket	3	125	161	36	14	44	18,5	138,5	82	19,5

06510

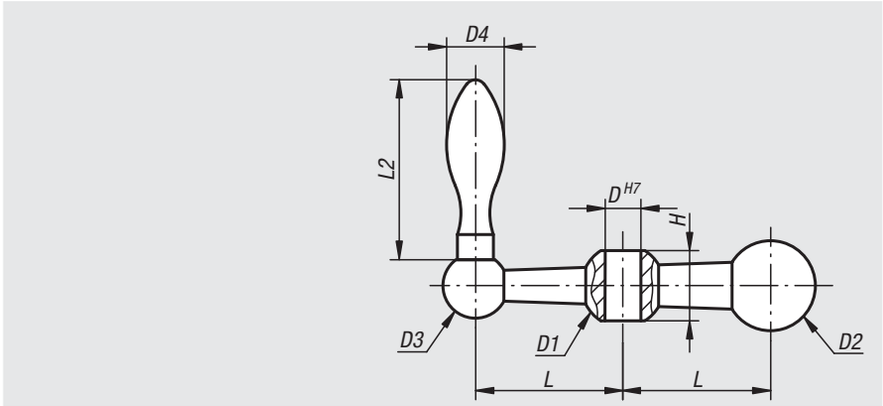
Crank handles balanced

Material:
Steel.

Version:
galvanized

Sample order:
nlm 06510-108

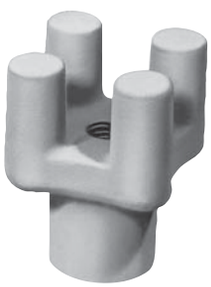
Note:
Fixed handle DIN 39.



Order No.	D	D1	D2	D3	D4	H	L	L2
06510-107	7	16	18	13	10	13	25	32
06510-108	8	20	22	16	14	17	34	46
06510-110	10	23	25	18	16	19,5	41	50
06510-112	12	26	28	20	18	21,5	50	56

06550

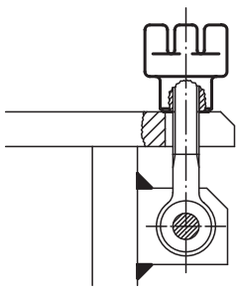
Bar knobs

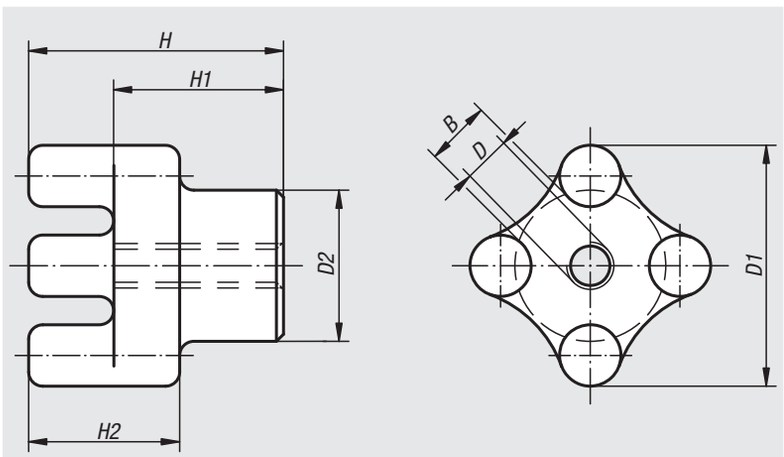


Material:
Malleable cast iron

Version:
Sand-blasted

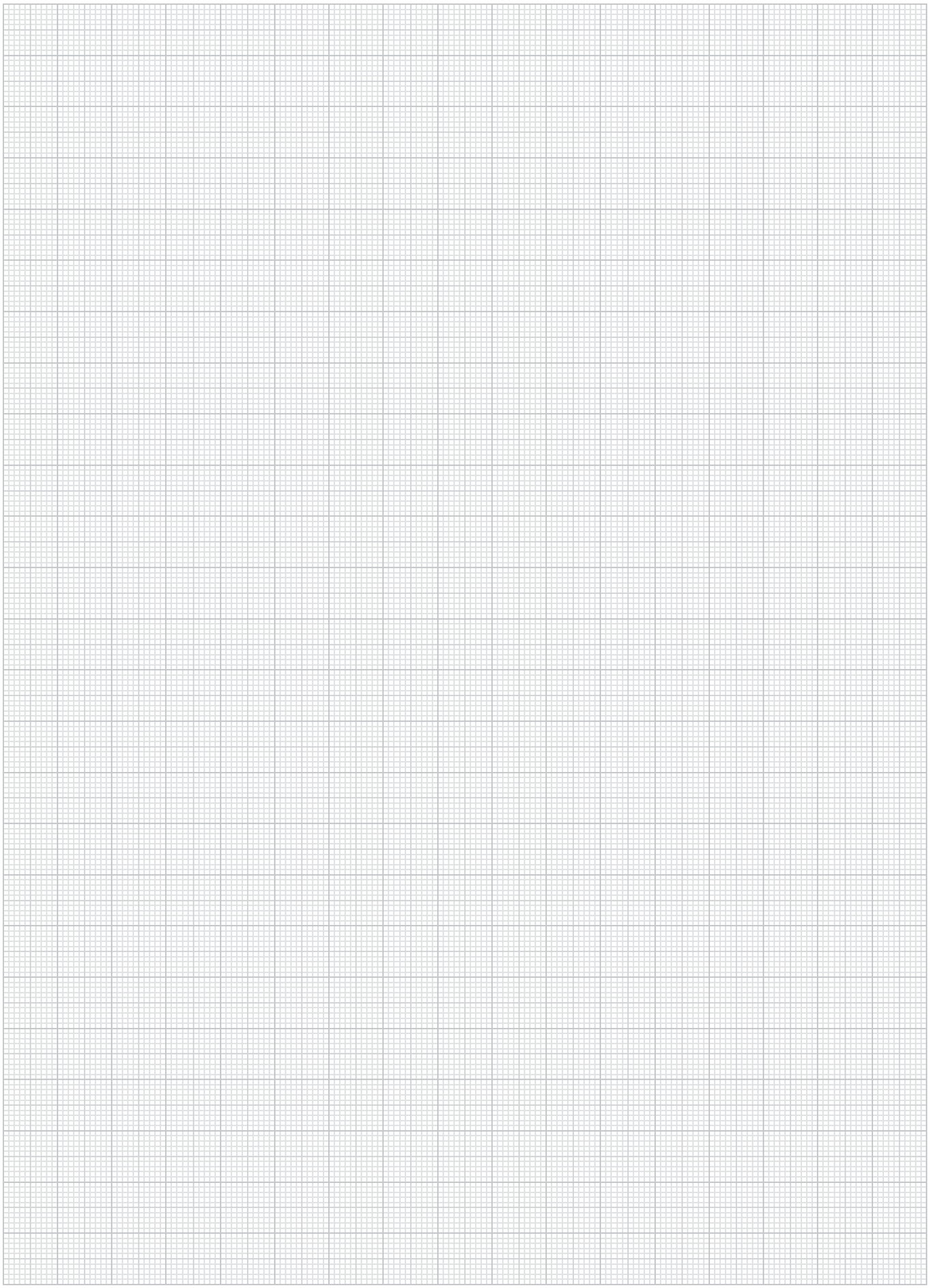
Sample order:
nlm 06550-12





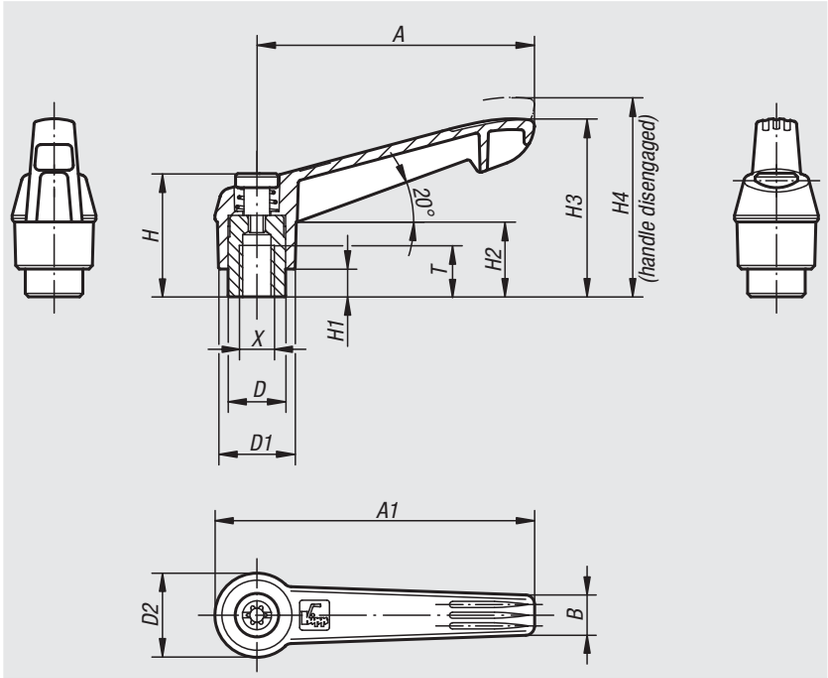
Order No.	D	D1	D2	H	H1	H2	B
06550-10	M10	51	32	54	36	32	12
06550-12	M12	51	32	54	36	32	12
06550-14	M14	51	32	54	36	32	12
06550-16	M16	51	32	54	36	32	12
06550-20	M20	64	38	60	40	35	18
06550-24	M24	90	57	70	40	45	30

Notes



Clamping levers with plastic handle

internal thread



Material:
Handle fibreglass reinforced plastic with die-cast zinc toothed ring.
Steel parts grade 5.8.

Version:
Steel parts black oxidised.

Sample order:
nlm 06600-10486 (lever colour signal green)

Note:
Δ Add the desired lever colour here.

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

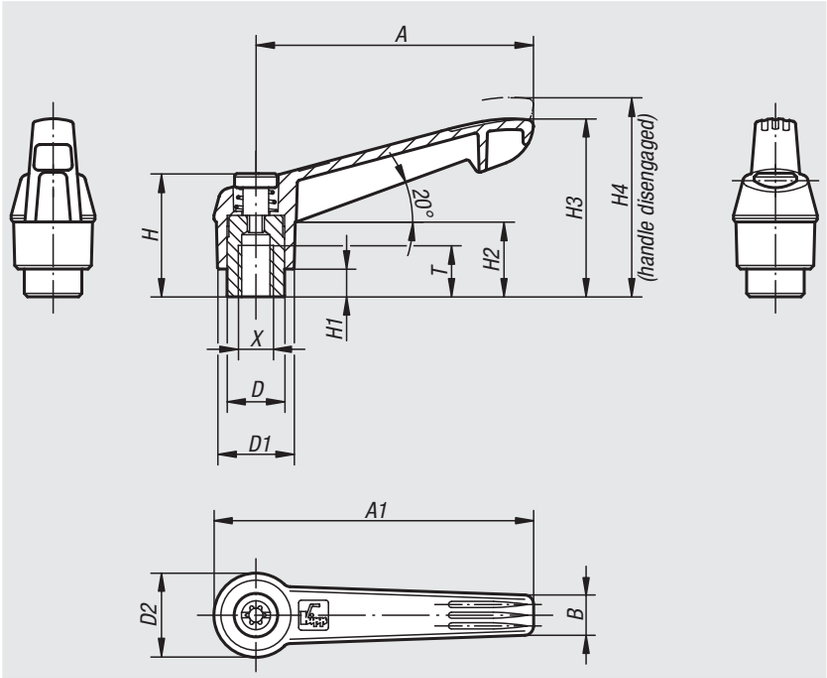
lift to disengage

black grey Δ = 1	orange Δ = 2	signal green Δ = 86	traffic red Δ = 84	bright yellow Δ = 16	traffic blue Δ = 87
RAL 7021	RAL 2004	RAL 6032	RAL 3020	RAL 1021	RAL 5017

Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06600-104Δ	1	M4	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06600-105Δ	1	M5	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06600-106Δ	1	M6	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06600-206Δ	2	M6	12	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20
06600-208Δ	2	M8	12	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20
06600-308Δ	3	M8	14	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22
06600-310Δ	3	M10	14	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22
06600-410Δ	4	M10	17	19	25,5	27,5	43	10	26	61	66	95	109	13	24
06600-412Δ	4	M12	17	19	25,5	27,5	43	10	26	61	66	95	109	13	24
06600-512Δ	5	M12	23	23	30	32,5	49	12	33	72	77	110	126	15,5	26
06600-516Δ	5	M16	23	23	30	32,5	49	12	33	72	77	110	126	15,5	26

Clamping levers with plastic handle

internal thread, metal parts stainless steel



Material:
Handle fibreglass reinforced plastic with die-cast zinc toothed ring.
Steel parts stainless steel 1.4305.

Version:
Stainless steel bright.

Sample order:
nlm 06601-10486 (lever colour signal green)

Note:
Δ Add the desired lever colour here.

On request:
Other internal threads and special versions.
Dimension „H1“ available in other lengths at extra charge.

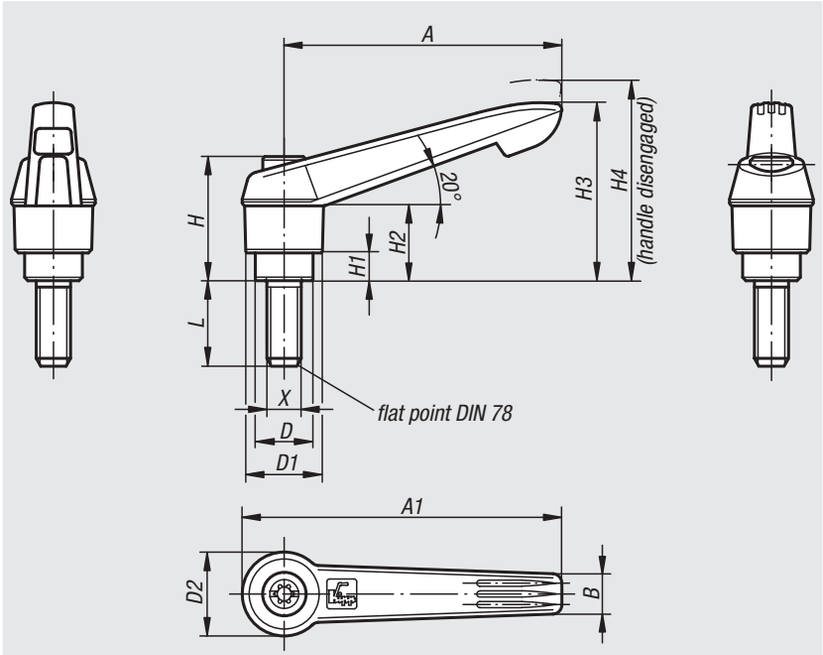
lift to disengage

black grey Δ = 1	orange Δ = 2	signal green Δ = 86	traffic red Δ = 84	bright yellow Δ = 16	traffic blue Δ = 87
RAL 7021	RAL 2004	RAL 6032	RAL 3020	RAL 1021	RAL 5017

Order No.	Size	X	T	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth
06601-104Δ	1	M4	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06601-105Δ	1	M5	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06601-106Δ	1	M6	9	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16
06601-206Δ	2	M6	12	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20
06601-208Δ	2	M8	12	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20
06601-308Δ	3	M8	14	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22
06601-310Δ	3	M10	14	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22
06601-410Δ	4	M10	17	19	25,5	27,5	43	10	26	61	66	95	109	13	24
06601-412Δ	4	M12	17	19	25,5	27,5	43	10	26	61	66	95	109	13	24
06601-512Δ	5	M12	23	23	30	32,5	49	12	33	72	77	110	126	15,5	26
06601-516Δ	5	M16	23	23	30	32,5	49	12	33	72	77	110	126	15,5	26

Clamping levers with plastic handle

external thread



Material:
Handle fibreglass reinforced plastic with die-cast zinc toothed ring.
Steel parts grade 5.8.

Version:
Steel parts black oxidised.

Sample order:
nlm 06610-1051X40 (lever black grey; include length L)

Note:
Δ Add the desired lever colour here.

On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

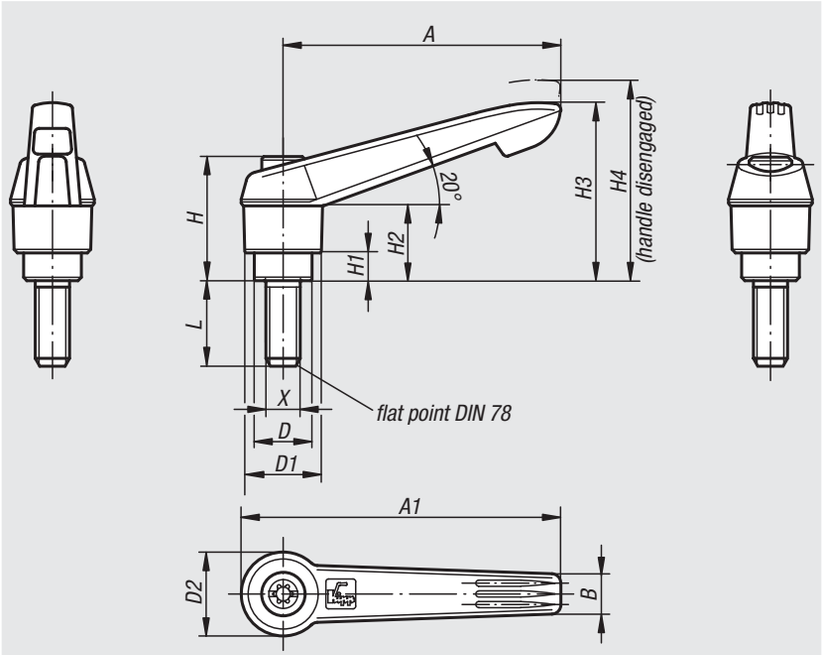
lift to disengage

black grey Δ = 1	orange Δ = 2	signal green Δ = 86	traffic red Δ = 84	bright yellow Δ = 16	traffic blue Δ = 87
RAL 7021	RAL 2004	RAL 6032	RAL 3020	RAL 1021	RAL 5017

Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06610-105ΔX	1	M5	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16	10/15/20/25/30/35/40/45/50
06610-106ΔX	1	M6	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16	10/15/20/25/30/35/40/45/50
06610-206ΔX	2	M6	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	15/20/25/30/35/40/45/50/55/60
06610-208ΔX	2	M8	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	15/20/25/30/35/40/45/50/55/60
06610-210ΔX	2	M10	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	15/20/25/30/35/40/45/50/55/60
06610-308ΔX	3	M8	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22	15/20/25/30/35/40/45/50/55/60
06610-310ΔX	3	M10	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22	15/20/25/30/35/40/45/50/55/60
06610-410ΔX	4	M10	19	25,5	27,5	43	10	26	61	66	95	109	13	24	20/25/30/35/40/45/50/55/60/70/80/90
06610-412ΔX	4	M12	19	25,5	27,5	43	10	26	61	66	95	109	13	24	20/25/30/35/40/45/50/55/60/70/80/90
06610-512ΔX	5	M12	23	30	32,5	49	12	33	72	77	110	126	15,5	26	25/30/35/40/45/50/55/60/70/80/90
06610-516ΔX	5	M16	23	30	32,5	49	12	33	72	77	110	126	15,5	26	25/30/35/40/45/50/55/60/70/80/90

Clamping levers with plastic handle

external thread, metal parts stainless steel



Material:
Handle fibreglass reinforced plastic with die-cast zinc toothed ring.
Steel parts stainless steel 1.4305.

Version:
Stainless steel bright.

Sample order:
nlm 06611-1051X20 (lever black grey; include length L)

Note:
Δ Add the desired lever colour here.

On request:
Other external threads, screw lengths and special versions.
Dimension „H1“ available in other lengths at extra charge.

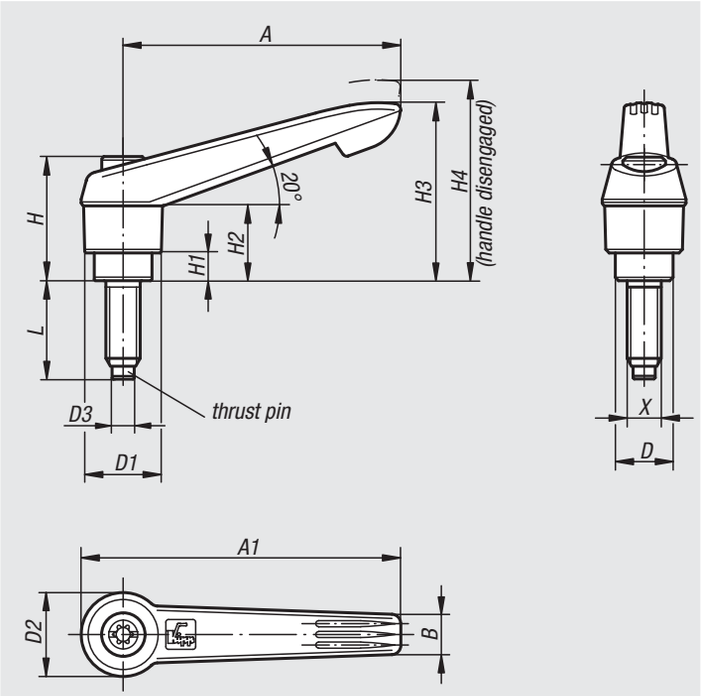
lift to disengage

black grey Δ = 1	orange Δ = 2	signal green Δ = 86	traffic red Δ = 84	bright yellow Δ = 16	traffic blue Δ = 87
RAL 7021	RAL 2004	RAL 6032	RAL 3020	RAL 1021	RAL 5017

Order No.	Size	X	D	D1	D2	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06611-105ΔX	1	M5	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16	10/15/20/25
06611-106ΔX	1	M6	10	13	14,5	24,5	4	15	30	33,5	40	47	7,5	16	10/15/20/25/30/40/50
06611-206ΔX	2	M6	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	15/20/25/30/40/50/60
06611-208ΔX	2	M8	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	15/20/25/30/40/50/60
06611-210ΔX	2	M10	13,5	18	19,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	20/25/30/40/50/60
06611-308ΔX	3	M8	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22	20/25/30/40/50/60
06611-310ΔX	3	M10	16	21,5	23	37	10	24	53,5	58	80	91,5	11	22	20/25/30/40/50/60
06611-412ΔX	4	M12	19	25,5	27,5	43	10	26	61	66	95	109	13	24	25/30/40/50/60
06611-516ΔX	5	M16	23	30	32,5	49	12	33	72	77	110	126	15,5	26	30/40/50/60

Clamping lever with thrust pin

and external thread



Material:
Handles fibreglass reinforced plastic with die-cast zinc toothed rings.
Steel parts grade 5.8.
Thrust pin, brass.

Version:
Steel parts black oxidised.

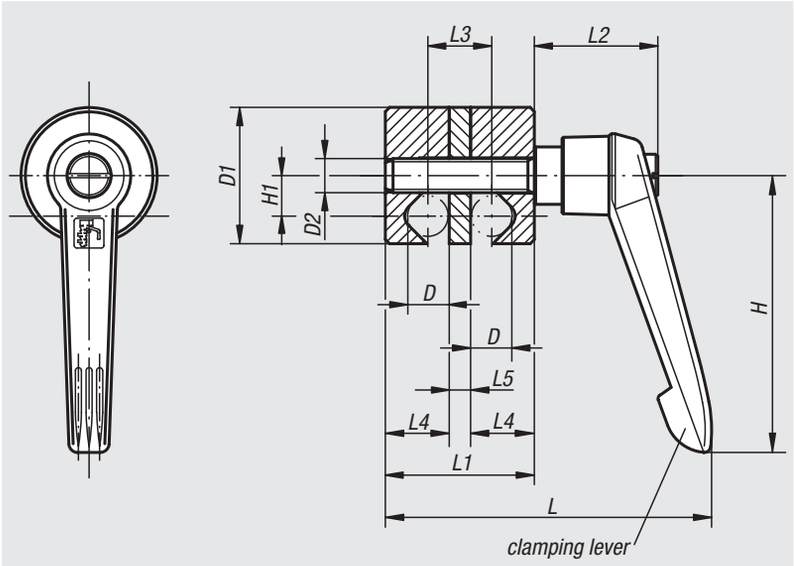
Sample order:
nlm 06612-12061X20

Note:
These components are used to prevent marring the workpiece surface.

On request:
Other external threads, screw lengths, clamp lever colours and thrust pin types as well as special versions.
Dimension „H1“ optionally available in other lengths at extra cost.

Order No.	Colour	Size	X	D	D1	D2	D3	H	H1	H2	H3	H4	A	A1	B	No. of teeth	L
06612-11051X20	black grey	1	M5	10	13	14,5	3	24,5	4	15	30	33,5	40	47	7,5	16	20
06612-11051X30	black grey	1	M5	10	13	14,5	3	24,5	4	15	30	33,5	40	47	7,5	16	30
06612-11051X40	black grey	1	M5	10	13	14,5	3	24,5	4	15	30	33,5	40	47	7,5	16	40
06612-11051X50	black grey	1	M5	10	13	14,5	3	24,5	4	15	30	33,5	40	47	7,5	16	50
06612-11061X20	black grey	1	M6	10	13	14,5	4	24,5	4	15	30	33,5	40	47	7,5	16	20
06612-11061X30	black grey	1	M6	10	13	14,5	4	24,5	4	15	30	33,5	40	47	7,5	16	30
06612-11061X40	black grey	1	M6	10	13	14,5	4	24,5	4	15	30	33,5	40	47	7,5	16	40
06612-11061X50	black grey	1	M6	10	13	14,5	4	24,5	4	15	30	33,5	40	47	7,5	16	50
06612-12061X20	black grey	2	M6	13,5	18	19,5	4	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	20
06612-12061X30	black grey	2	M6	13,5	18	19,5	4	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	30
06612-12061X40	black grey	2	M6	13,5	18	19,5	4	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	40
06612-12061X50	black grey	2	M6	13,5	18	19,5	4	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	50
06612-12061X60	black grey	2	M6	13,5	18	19,5	4	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	60
06612-12081X20	black grey	2	M8	13,5	18	19,5	5,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	20
06612-12081X30	black grey	2	M8	13,5	18	19,5	5,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	30
06612-12081X40	black grey	2	M8	13,5	18	19,5	5,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	40
06612-12081X50	black grey	2	M8	13,5	18	19,5	5,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	50
06612-12081X60	black grey	2	M8	13,5	18	19,5	5,5	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	60
06612-12101X20	black grey	2	M10	13,5	18	19,5	7	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	20
06612-12101X30	black grey	2	M10	13,5	18	19,5	7	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	30
06612-12101X40	black grey	2	M10	13,5	18	19,5	7	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	40
06612-12101X50	black grey	2	M10	13,5	18	19,5	7	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	50
06612-12101X60	black grey	2	M10	13,5	18	19,5	7	28,5	6,5	17,5	41,5	45,5	65	75	9,5	20	60

Clamping joints

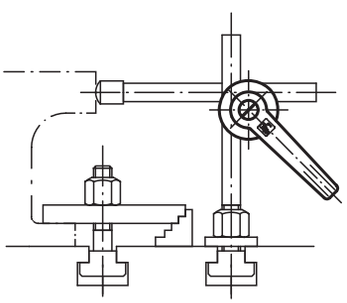


Material:
Clamping lever:
Handle fibreglass reinforced thermoplastic, black grey.
Steel parts:
grade 5.8.
Remaining components:
high-strength aluminium.

Version:
Steel parts black oxidised.
Aluminium nickel silver anodized.

Sample order:
nlm 06620-03

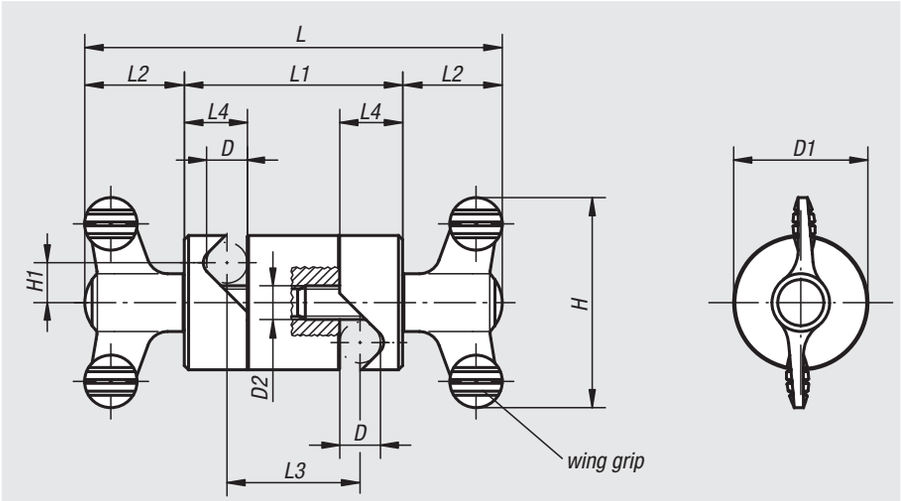
Note:
Clamping joints are used to clamp round cross sections (bars, tubes, etc.) and are infinitely adjustable.
The simple design together with the adjustable clamping lever permits rapid clamping.



Order No.	Size	D	D1	D2	L	L1	L2	L3	L4	L5	H	H1
06620-01	1	8	28	M8	72	31	29	13	13	5	65	8,5
06620-02	2	10	32	M8	76	35	29	15	15	5	65	9,5
06620-03	3	12	36	M8	81	40	29	18	17	6	65	10,5
06620-04	4	16	45	M10	103	50	37,5	22	22	6	80	13,5
06620-05	5	20	74	M10	131	70	42,5	30	30	10	95	22

Clamping joints

individually adjustable

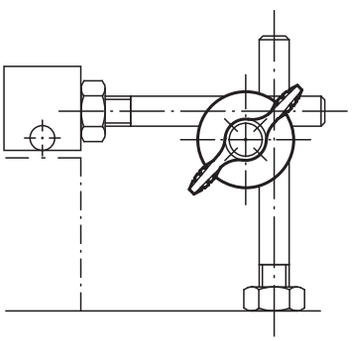


Material:
Wing grip:
grip black grey thermoplastic.
Screw steel 5.8.
Remaining components:
high-strength aluminium.

Version:
Steel parts blue chromed.
Aluminium nickel silver anodized.

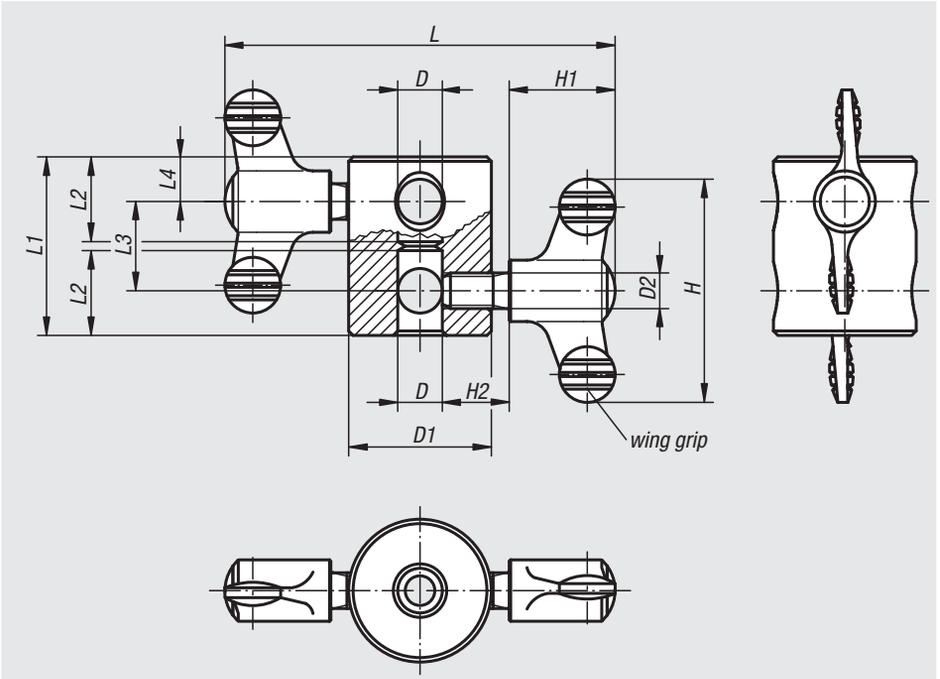
Sample order:
nlm 06621-02

Note:
Clamping joints are used to clamp round cross sections (bars, tubes, etc.) and are individually and infinitely adjustable.
The simple design together with the wing grip permits rapid clamping.



Order No.	Size	D	D1	D2	L	L1	L2	L3	L4	H	H1
06621-01	1	8	28	M8	90	42	24	24	13	50	8,5
06621-02	2	10	32	M8	100	52	24	32	15	50	9,5
06621-03	3	12	36	M8	104	56	24	34	17	50	10,5
06621-04	4	16	45	M10	143,2	72	35,6	44	22	75	13,5
06621-05	5	20	74	M10	173,2	102	35,6	62	30	75	22

Multiple connectors



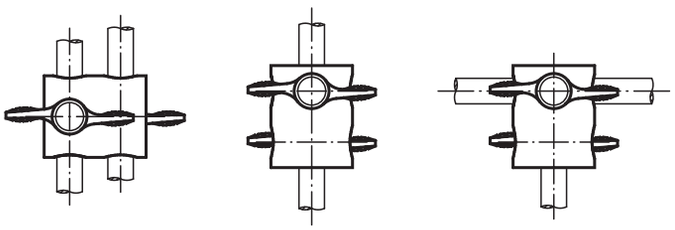
Material:
Wing grip:
grip black grey thermoplastic.
Screw steel 5.8.
Body:
high-strength aluminium.

Version:
Steel parts blue chromed.
Aluminium nickel silver anodized.

Sample order:
nlm 06622-04

Note:
Multiple connectors are used to extend round cross sections (bars, tubes, etc.) in a coaxial or parallel arrangement.
By a parallel arrangement, a strengthening or stiffening of the construction can be achieved.
The bore system in the body also allows for the production of right-angled connections.

Arrangement:



parallel coaxial right-angled

Order No.	Size	D	D1	D2	L	L1	L2	L3	L4	H	H1	H2
06622-01	1	8	28	M8	86	36	17	20	8	50	24	15
06622-02	2	10	32	M8	88	40	19	20	10	50	24	15
06622-03	3	12	36	M8	90	44	21	20	12	50	24	15
06622-04	4	16	45	M10	127,2	56	27	24	16	75	35,6	20

T-grips

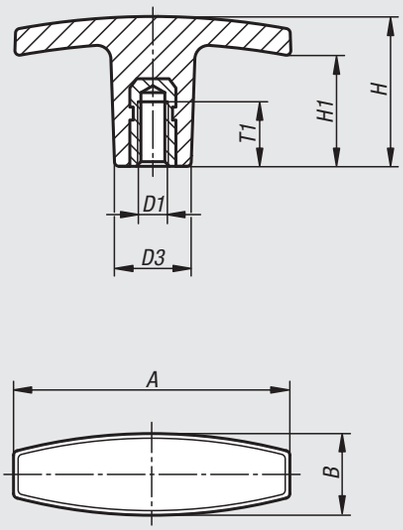
Material:
Fibreglass reinforced thermoplastic.
Tapped bush brass.
Screw steel.

Version:
Grip, black.
Screw galvanized.

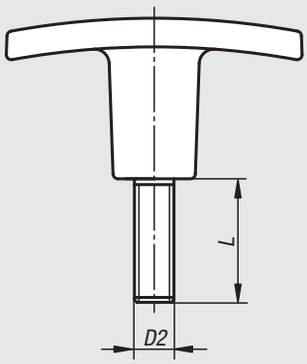
Sample order:
nlm 06649-25005X15 (include length L)

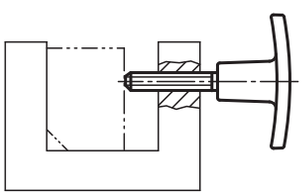
On request:
Grip colour red, yellow, green, blue, white or grey (min. quanitity 500).

T-grip
with internal thread



T-grip
with external thread

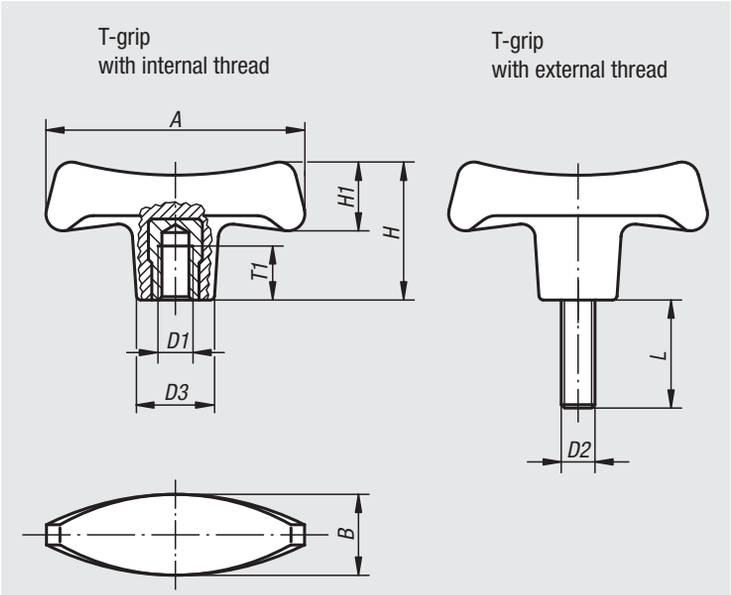




Order No.	Version	A	B	D1	D3	H	H1	T1
06649-14005	Internal thread	40	13	M5	13	30,5	20	10
06649-15005	Internal thread	50	15	M5	14	24	16	10
06649-16006	Internal thread	60	17	M6	16	31,5	23	12
06649-17108	Internal thread	71	19,5	M8	20	36	19	20
06649-17110	Internal thread	71	19,5	M10	20	36	19	20
06649-18010	Internal thread	80	26	M10	26	39,5	26	25
06649-18012	Internal thread	80	26	M12	26	39,5	26	25

Order No.	Version	A	B	D2	D3	H	H1	L
06649-24005X	External thread	40	13	M5	13	30,5	20	15
06649-25005X	External thread	50	15	M5	14	24	16	15/20
06649-26006X	External thread	60	17	M6	16	31,5	23	20/25
06649-27108X	External thread	71	19,5	M8	20	36	19	20/30
06649-27110X	External thread	71	19,5	M10	20	36	19	20/30
06649-28010X	External thread	80	26	M10	26	39,5	26	30
06649-28012X	External thread	80	26	M12	26	39,5	26	40

T-grips



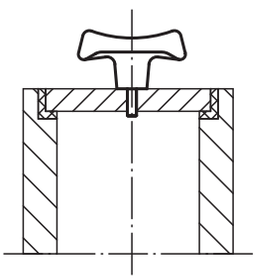
Material:
Duroplast PF 31, black.
Bush and stud galvanized steel.

Version:
High-gloss polished.

Sample order:
nlm 06650-27006X18 (include length L)

Note:
The versions 06650-17008 and 06650-18008 have a bush in copper-plated steel.

On request:
Other screw sizes, screw lengths and colours.

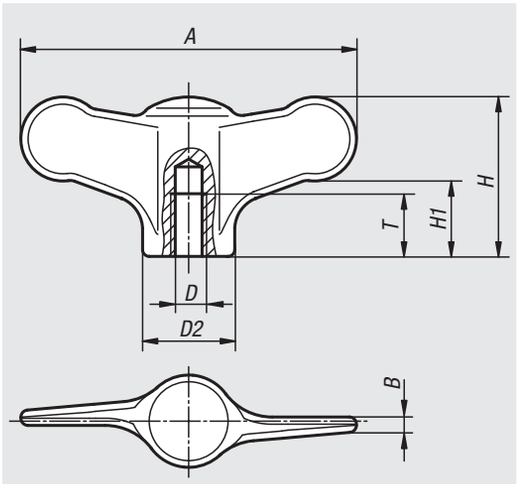


Order No.	Version	A	B	D1	D3	H	H1	T1
06650-17006	Internal thread	70	22	M6	19,6	38,8	20,2	12
06650-17008	Internal thread	70	22	M8	19,6	38,8	20,2	14
06650-17010	Internal thread	70	22	M10	19,6	38,8	20,2	14
06650-18008	Internal thread	80	25	M8	22,3	44	23	14
06650-18010	Internal thread	80	25	M10	22,3	44	23	22
06650-19010	Internal thread	90	28	M10	25	49,6	26	22
06650-19012	Internal thread	90	28	M12	25	49,6	26	21

Order No.	Version	A	B	D2	D3	H	H1	L
06650-27006X	External thread	70	22	M6	19,6	38,8	20,2	18
06650-27008X	External thread	70	22	M8	19,6	38,8	20,2	24
06650-28010X	External thread	80	25	M10	22,3	44	23	20/30
06650-29010X	External thread	90	28	M10	25	49,6	26	30
06650-29012X	External thread	90	28	M12	25	49,6	26	24

Wing grips

internal thread, stainless steel



Material:
Stainless steel 1.4308.

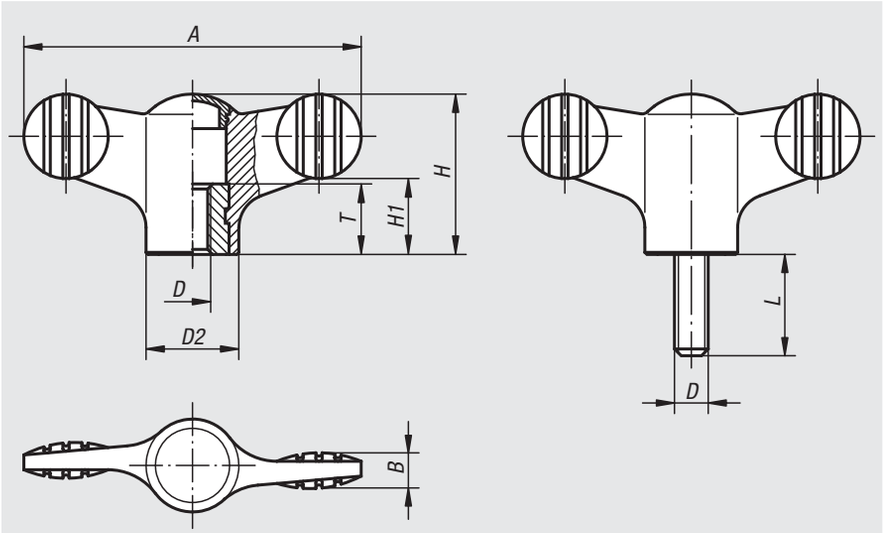
Version:
Blasted or ground and polished.

Sample order:
nlm 06651-105

On request:
With external threads.

Order No.	Version	D	D2	A	B	H	H1	T
06651-904	ground and polished	M4	10,5	38	1,7	18	8,5	9
06651-905	ground and polished	M5	10,5	38	1,7	18	8,5	9
06651-906	ground and polished	M6	10,5	38	1,7	18	8,5	9
06651-105	ground and polished	M5	14	50	2,3	24	11,5	12
06651-106	ground and polished	M6	14	50	2,3	24	11,5	12
06651-208	ground and polished	M8	21	75	3,4	35	16,5	15
06651-210	ground and polished	M10	21	75	3,4	35	16,5	15
06651-9041	blasted	M4	10,5	38	1,7	18	8,5	9
06651-9051	blasted	M5	10,5	38	1,7	18	8,5	9
06651-9061	blasted	M6	10,5	38	1,7	18	8,5	9
06651-1051	blasted	M5	14	50	2,3	24	11,5	12
06651-1061	blasted	M6	14	50	2,3	24	11,5	12
06651-2081	blasted	M8	21	75	3,4	35	16,5	15
06651-2101	blasted	M10	21	75	3,4	35	16,5	15

Wing grips



Material:
Grip black grey thermoplastic.
Bush and screw steel 5.8 or stainless steel 1.4305.

Version:
Bush or screw blue chromed or bright stainless steel.

Sample order:
nlm 06652-1057X20 (cap colour bright yellow; include length L)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

Wing grips with internal thread

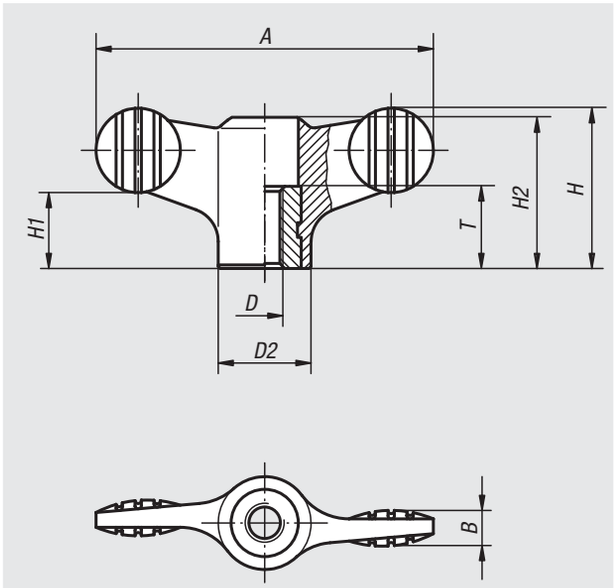
Order No. bush steel	Order No. bush stainless steel	D	D2	A	B	H	H1	T
06652-904Δ	**06652-0904Δ**	M4	12	38	4,5	18	8,5	10
06652-905Δ	**06652-0905Δ**	M5	12	38	4,5	18	8,5	10
06652-906Δ	**06652-0906Δ**	M6	12	38	4,5	18	8,5	10
06652-105Δ	**06652-0105Δ**	M5	14	50	5	24	11,5	10
06652-106Δ	**06652-0106Δ**	M6	14	50	5	24	11,5	10
06652-208Δ	**06652-0208Δ**	M8	21	75	7	35,6	16,5	14
06652-210Δ	**06652-0210Δ**	M10	21	75	7	35,6	16,5	14

Wing grips with external thread

Order No. screw steel	Order No. screw stainless steel	D	A	B	D2	H	H1	L
06652-904ΔX	**06652-0904ΔX**	M4	38	4,5	12	18	8,5	10/15
06652-905ΔX	**06652-0905ΔX**	M5	38	4,5	12	18	8,5	15/20/30
06652-906ΔX	**06652-0906ΔX**	M6	38	4,5	12	18	8,5	20/30/40
06652-105ΔX	**06652-0105ΔX**	M5	50	5	14	24	11,5	15/20
06652-106ΔX	**06652-0106ΔX**	M6	50	5	14	24	11,5	20/30/40
06652-108ΔX	**06652-0108ΔX**	M8	50	5	14	24	11,5	20/30/40
06652-208ΔX	**06652-0208ΔX**	M8	75	7	21	35,6	16,5	20/30/40
06652-210ΔX	**06652-0210ΔX**	M10	75	7	21	35,6	16,5	20/30/40/50

Wing grips

with tapped through bush



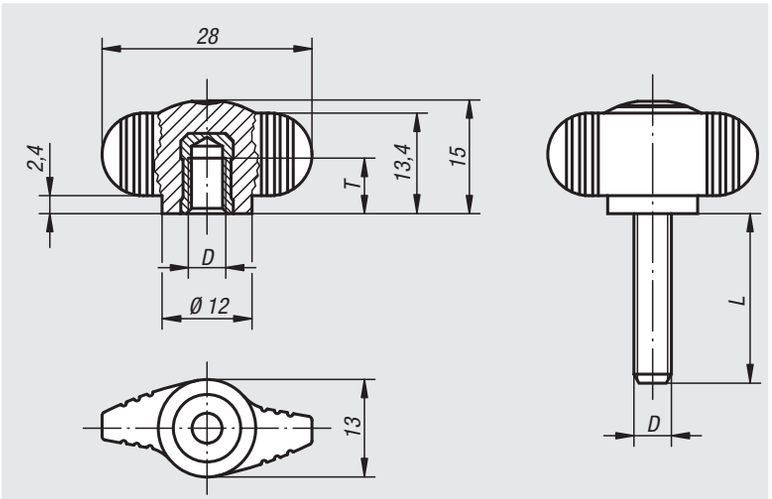
Material:
Grip black grey thermoplastic.
Bush steel 5.8
or stainless steel 1.4305.

Version:
Blue-chromed steel or bright stainless steel.

Sample order:
nlm 06652-1904

Order No.	Version	D	D2	A	B	H	H1	H2	T
06652-1904	bush steel	M4	12	38	4,5	18	8,5	16,1	10
06652-1905	bush steel	M5	12	38	4,5	18	8,5	16,1	10
06652-1906	bush steel	M6	12	38	4,5	18	8,5	16,1	10
06652-1105	bush steel	M5	14	50	5	24	11,5	22	10
06652-1106	bush steel	M6	14	50	5	24	11,5	22	10
06652-1208	bush steel	M8	21	75	7	35,6	17	33,3	14
06652-1210	bush steel	M10	21	75	7	35,6	17	33,3	14
06652-10904	bush stainless steel	M4	12	38	4,5	18	8,5	16,1	10
06652-10905	bush stainless steel	M5	12	38	4,5	18	8,5	16,1	10
06652-10906	bush stainless steel	M6	12	38	4,5	18	8,5	16,1	10
06652-10105	bush stainless steel	M5	14	50	5	24	11,5	22	10
06652-10106	bush stainless steel	M6	14	50	5	24	11,5	22	10
06652-10208	bush stainless steel	M8	21	75	7	35,6	17	33,3	14
06652-10210	bush stainless steel	M10	21	75	7	35,6	17	33,3	14

Wing grips “Miniwing”



Material:
Grip black grey thermoplastic.
Bush brass or stainless steel 1.4305.
Screw steel 5.8 or stainless steel 1.4305.

Version:
Steel blue chromed.
Stainless steel bright.

Sample order:
nlm 06652-005X10 (include length L)

Wing grips “Miniwing” with internal thread

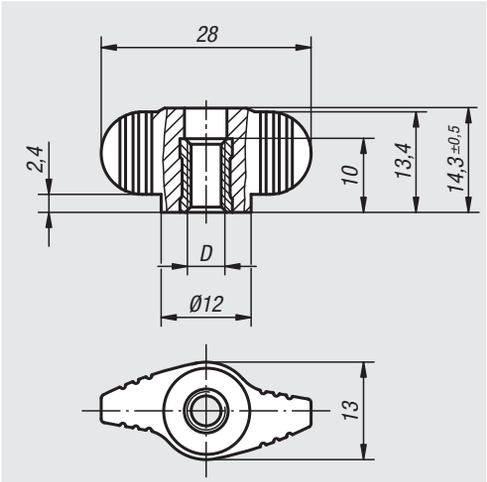
Order No.	Version	D	T
06652-004	bush brass	M4	6
06652-005	bush brass	M5	7,5
06652-006	bush brass	M6	9
06652-0004	bush stainless steel	M4	6
06652-0005	bush stainless steel	M5	7,5
06652-0006	bush stainless steel	M6	9

Wing grips “Miniwing” with external thread

Order No.	Version	D	L
06652-004X	screw steel	M4	8
06652-005X	screw steel	M5	10/15/20
06652-006X	screw steel	M6	10/15/20/25/30
06652-008X	screw steel	M8	20/25/30/40
06652-0004X	screw stainless steel	M4	8
06652-0005X	screw stainless steel	M5	10/15/20
06652-0006X	screw stainless steel	M6	10/15/20/25/30
06652-0008X	screw stainless steel	M8	20/25/30/40

Wing grips „Miniwing“

with tapped through bush



Material:
Grip black grey thermoplastic.
Bush steel 5.8
or stainless steel 1.4305.

Version:
Steel blue chromed.
Stainless steel bright.

Sample order:
nlm 06652-1004

Order No.	Version	D
06652-1004	bush steel	M4
06652-1005	bush steel	M5
06652-1006	bush steel	M6
06652-10004	bush stainless steel	M4
06652-10005	bush stainless steel	M5
06652-10006	bush stainless steel	M6

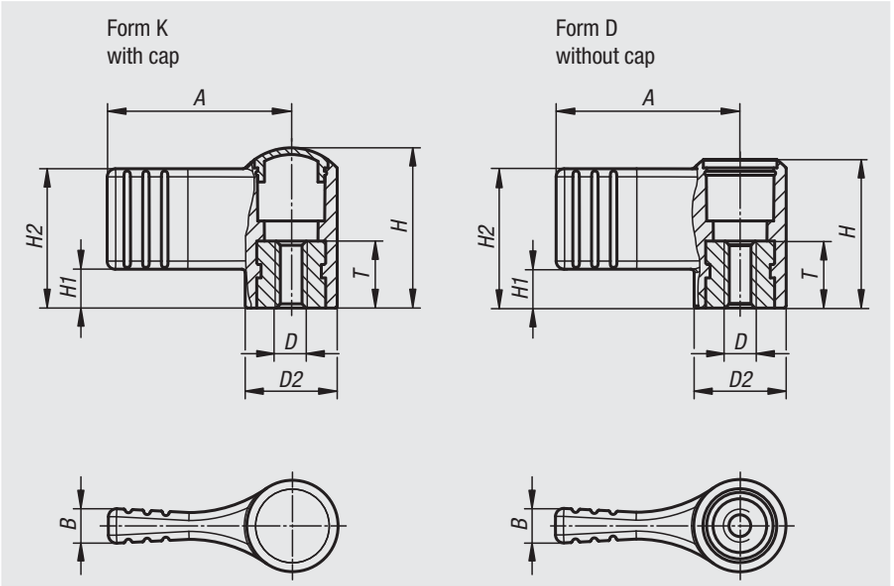
Wing grips one-sided

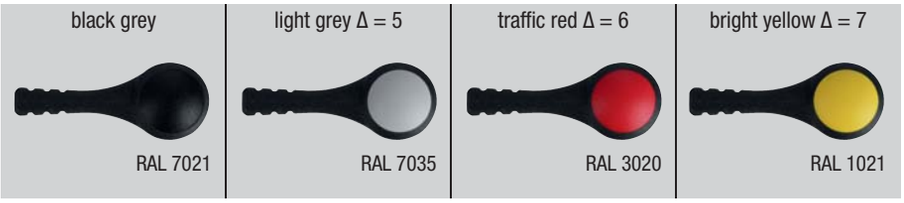
Material:
Thermoplastic black grey.
Bush steel 5.8 or stainless steel 1.4305.

Version:
Blue-chromed steel or bright stainless steel.

Sample order:
nlm 06660-09046 (Bush M4 stainless steel, cap traffic red.)

Note:
Δ Add the desired cap colour here. No colour code is required for black grey caps.





Wing grips, one-sided with cap

Order No. bush steel	Order No. bush stainless steel	Form	Size	D	D2	A	B	H	H1	H2	T
06660-904Δ	**06660-0904Δ**	K	9	M4	12	22	4,4	18	4,5	15,5	10
06660-905Δ	**06660-0905Δ**	K	9	M5	12	22	4,4	18	4,5	15,5	10
06660-906Δ	**06660-0906Δ**	K	9	M6	12	22	4,4	18	4,5	15,5	10
06660-105Δ	**06660-0105Δ**	K	1	M5	14	27,5	5,1	24	5,8	20,8	10
06660-106Δ	**06660-0106Δ**	K	1	M6	14	27,5	5,1	24	5,8	20,8	10
06660-208Δ	**06660-0208Δ**	K	2	M8	21	37,5	6,3	36	8,5	30,5	14
06660-210Δ	**06660-0210Δ**	K	2	M10	21	37,5	6,3	36	8,5	30,5	14

Wing grips, one-sided without cap

Order No. bush steel	Order No. bush stainless steel	Form	Size	D	D2	A	B	H	H1	H2	T
06660-1904	**06660-10904**	D	9	M4	12	22	4,4	16,1	4,5	15,5	10
06660-1905	**06660-10905**	D	9	M5	12	22	4,4	16,1	4,5	15,5	10
06660-1906	**06660-10906**	D	9	M6	12	22	4,4	16,1	4,5	15,5	10
06660-1105	**06660-10105**	D	1	M5	14	27,5	5,1	22,1	5,8	20,8	10
06660-1106	**06660-10106**	D	1	M6	14	27,5	5,1	22,1	5,8	20,8	10
06660-1208	**06660-10208**	D	2	M8	21	37,5	6,3	33,3	8,5	30,5	14
06660-1210	**06660-10210**	D	2	M10	21	37,5	6,3	33,3	8,5	30,5	14

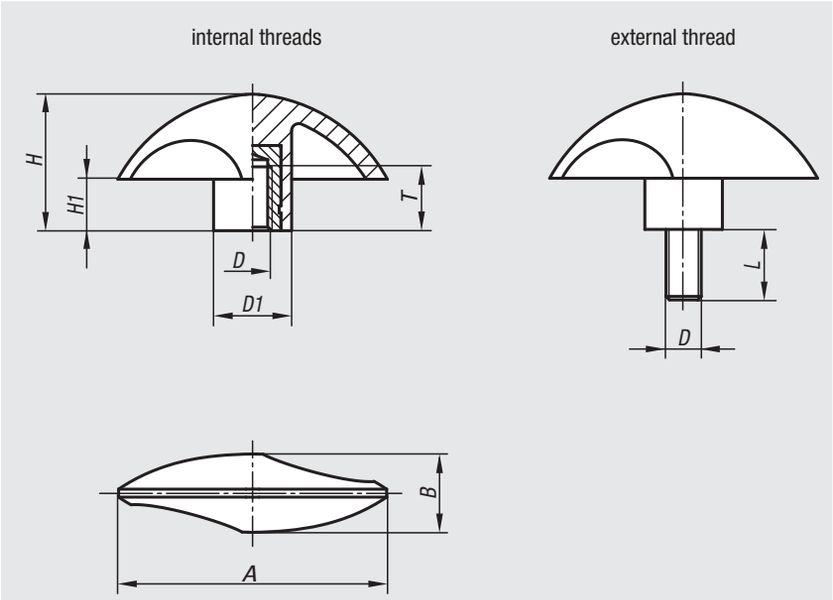
Wing grips

Material:
Grip polyamide, glass bead reinforced.
Bush brass or steel.
Screw steel.

Version:
Steel galvanized.

Sample order:
nlm 06665-15006

Note:
Temperature resistance from -50°C to 130°C.
Resistant to common chemicals and oils.



Wing grips with internal thread

Order No.	Version	D	D1	A	B	H	H1	T
06665-15006	bush brass	M6	15	51	15	25,5	9,5	9
06665-16008	bush galvanized steel	M8	18	61,5	18	31	11,5	14
06665-17510	bush galvanized steel	M10	22	76	22	38,5	14,5	14

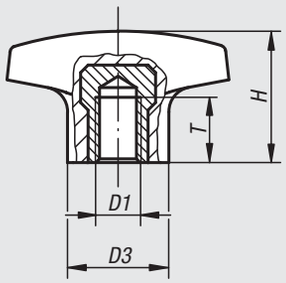
Wing grips with external thread

Order No.	Version	D	D1	A	B	H	H1	L
06665-25006X15	screw galvanized steel	M6	15	51	15	25,5	9,5	15
06665-26008X20	screw galvanized steel	M8	18	61,5	18	31	11,5	20
06665-27510X20	screw galvanized steel	M10	22	76	22	38,5	14,5	20

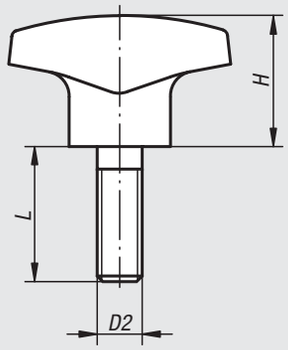
Clamping grips tristar

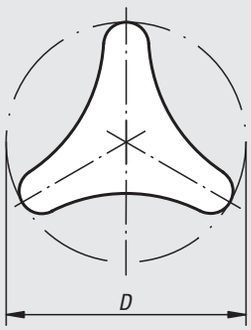
with high collar

Tristar grip
with internal thread



Tristar grip
with external thread



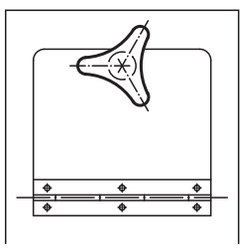


Material:
Black Duroplast PF 31.
Bush and screw galvanized steel or bright stainless steel.

Version:
High-gloss polished.

Sample order:
nlm 06702-14008X20

On request:
Other screw sizes, screw lengths and colours.



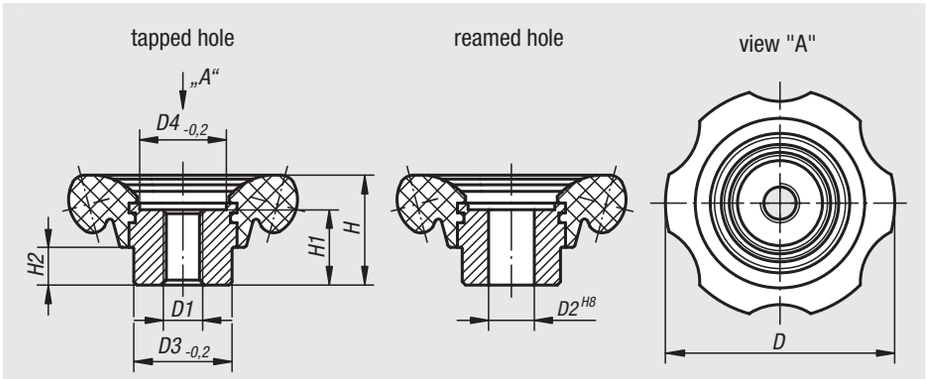
Clamping grips tristar with high collar, internal thread

Order No.	Version	D	D1	D3	H	T
06702-14006	bush steel	40	M6	14	22	12
06702-15008	bush steel	50	M8	18	28	14
06702-16210	bush steel	62	M10	22	35	14
06702-24006	bush stainless steel	40	M6	12	22	9
06702-25008	bush stainless steel	50	M8	15	28	13
06702-26210	bush stainless steel	62	M10	18	35	13

Clamping grips tristar with high collar, external thread

Order No.	Version	D	D2	D3	H	L
06702-14006X15	screw steel	40	M6	14	22	15
06702-14008X20	screw steel	40	M8	14	22	20
06702-15008X20	screw steel	50	M8	18	28	20
06702-15010X25	screw steel	50	M10	22	28	25
06702-16210X25	screw steel	62	M10	22	35	25
06702-24006X20	screw stainless steel	40	M6	12	22	20
06702-24008X20	screw stainless steel	40	M8	12	22	20
06702-25008X20	screw stainless steel	50	M8	15	28	20
06702-25010X30	screw stainless steel	50	M10	15	28	30
06702-26210X30	screw stainless steel	62	M10	18	35	30

Handwheels



Material:
Handwheel Duroplast PF 31.
Bush steel, black oxidised.

Version:
High-gloss polished, black.

Sample order:
nlm 06830-70112

Order No.	Version	D	D1	D2	D3	D4	H	H1	H2
06830-70110	tapped hole	70	M10	-	30	26,5	33,5	23	11,5
06830-70112	tapped hole	70	M12	-	30	26,5	33,5	23	11,5
06830-83112	tapped hole	83	M12	-	35	31,5	40	28	14
06830-83116	tapped hole	83	M16	-	35	31,5	40	28	14
06830-70212	reamed hole	70	-	12	30	26,5	33,5	23	11,5
06830-70214	reamed hole	70	-	14	30	26,5	33,5	23	11,5
06830-83214	reamed hole	83	-	14	35	31,5	40	28	14
06830-83216	reamed hole	83	-	16	35	31,5	40	28	14

Five lobe grips

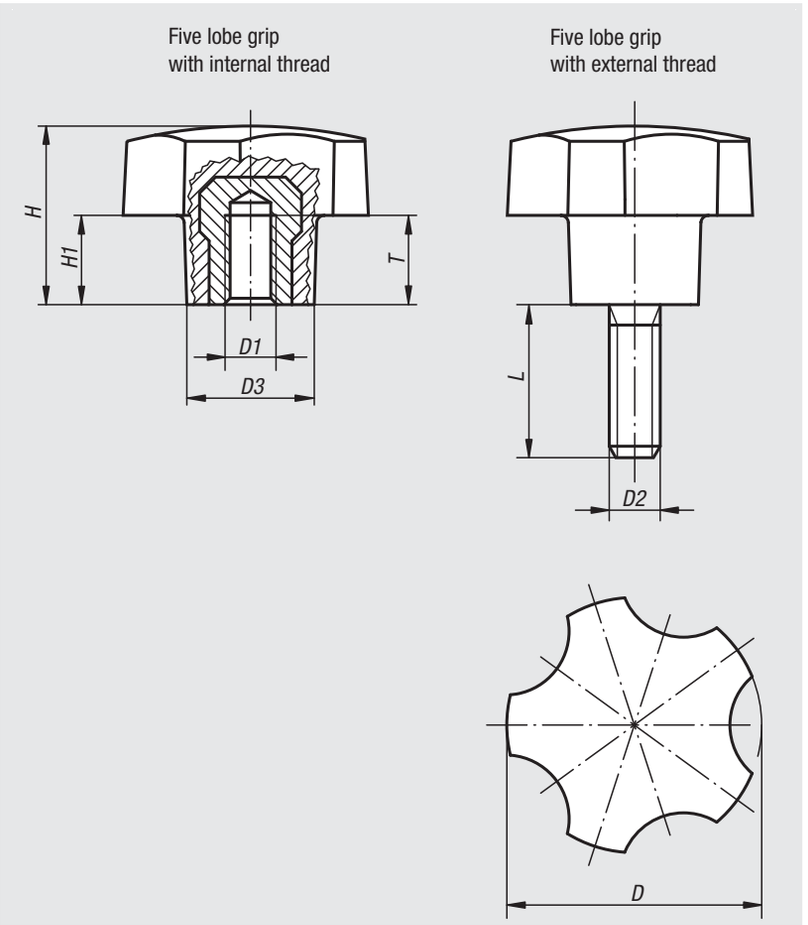
Material:
Duroplast PF 31, black.
Bush and stud galvanized steel.

Version:
High-gloss polished.

Sample order:
nlm 06850-3206X12 (include length L)

Note:
The versions 06850-3205 and 06850-3206 have a brass bush.

On request:
Other screw sizes, screw lengths and colours.



Five lobe grips with internal thread

Order No.	D	D1	D3	H	H1	T
06850-3205	32	M5	16	22,4	11,2	10
06850-3206	32	M6	16	22,4	11,2	9
06850-4006	40	M6	20	28	14	12
06850-4008	40	M8	20	28	14	14
06850-4010	40	M10	20	28	14	14
06850-5008	50	M8	25	35	17,5	14
06850-5010	50	M10	25	35	17,5	14

Five lobe grips with external thread

Order No.	D	D2	D3	H	H1	L
06850-3206X	32	M6	16	22,4	11,2	12/18
06850-3208X	32	M8	16	22,4	11,2	16/24
06850-4006X	40	M6	20	28	14	18
06850-4008X	40	M8	20	28	14	16/20/24
06850-4010X	40	M10	20	28	14	30
06850-5008X	50	M8	25	35	17,5	16/24
06850-5010X	50	M10	25	35	17,5	20/30

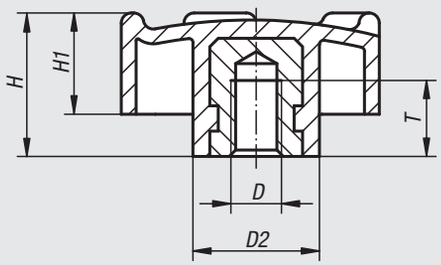
Ribbed grips

Material:
Grip black grey thermoplastic.
Bush steel.
Threaded pin steel 5.8.

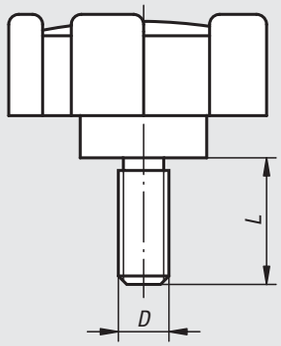
Version:
Bush galvanized.
Threaded pin blue chromed.

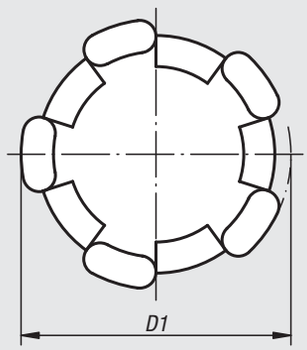
Sample order:
nlm 06853-3206

ribbed grip
with internal thread



ribbed grip
with external thread





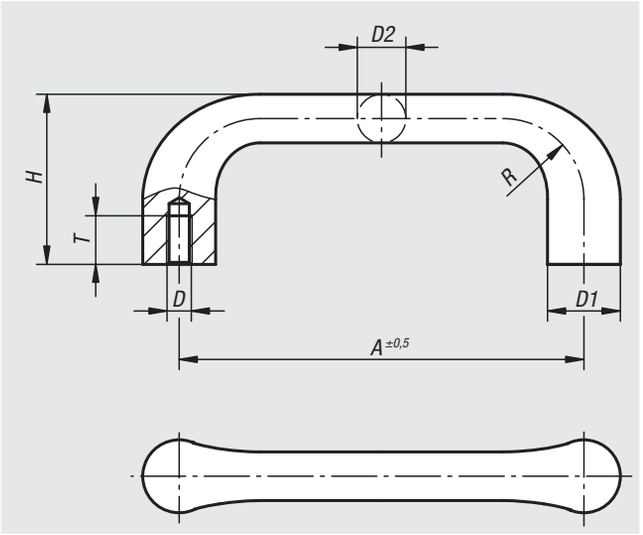
Ribbed grips with internal thread

Order No.	Size	D	D1	D2	H	H1	T
06853-3206	1	M6	32	15	17	12	9
06853-4008	2	M8	40	18	20,5	14,5	11
06853-5010	3	M10	50	20	25	18	14

Ribbed grips with external thread

Order No.	Size	D	D1	D2	H	H1	L
06853-320615	1	M6	32	15	17	12	15
06853-400816	2	M8	40	18	20,5	14,5	16
06853-501020	3	M10	50	20	25	18	20

Pull handles



Material:
GJS 400

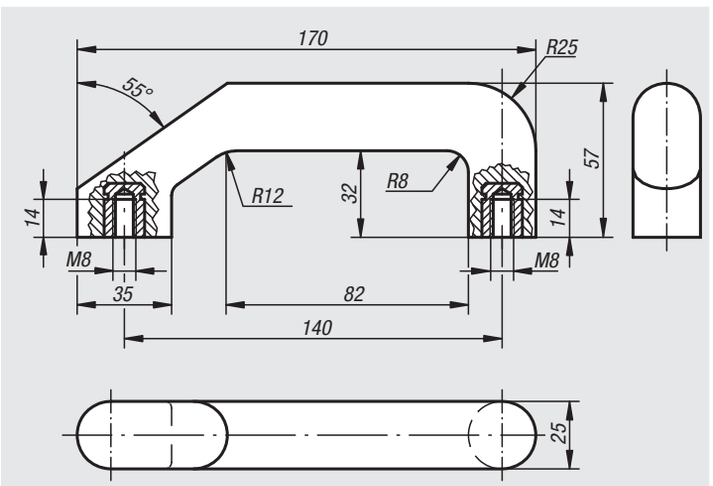
Version:
Vibratory ground.
Black plastic-coated.
Contact surfaces machined.

Sample order:
nlm 06895-12510

Assembly:
From the rear.

Order No. tumbled	Order No. tumbled plastic-coated, black	A	D	D1	D2	H	R	T	Load capacity N
06895-10006	**06895-100061**	100	M6	18	12	42	20	12	1000
06895-11208	**06895-112081**	112	M8	20	14	47	22	15	1000
06895-12510	**06895-125101**	125	M10	22	16	53	24	18	1000
06895-14012	**06895-140121**	140	M12	25	18	59	26	20	1000

Pull handles



Material:
Duroplast PF 31, black.
Bushing brass or galvanized steel.

Version:
High-gloss polished.

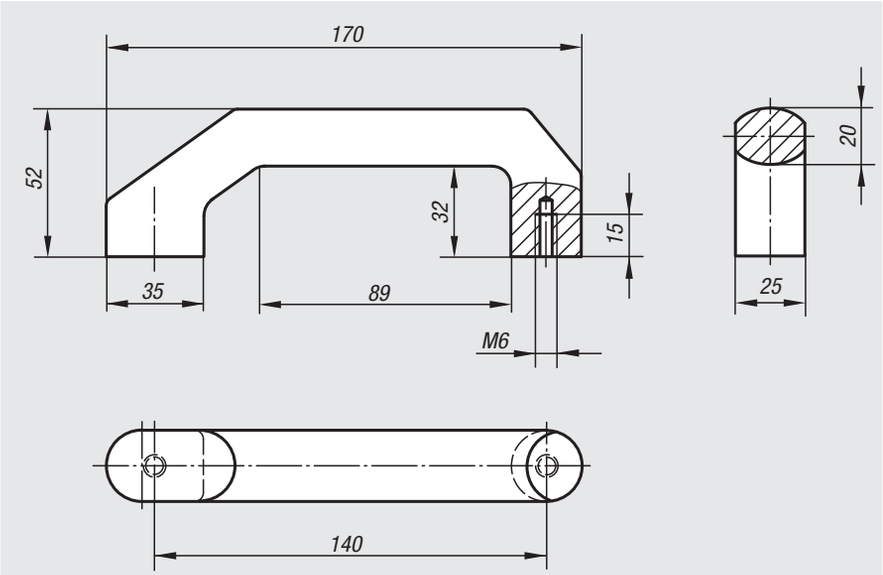
Sample order:
nlm 06900-101

Assembly:
From the rear.

Order No.	Bush material	Load capacity N
06900-101	brass	300
06900-201	galvanized steel	300

06900

Pull handles



Material:
Die-cast aluminium EN AW-5754.

Version:
Surface tumbled and black powder-coated or left bright.

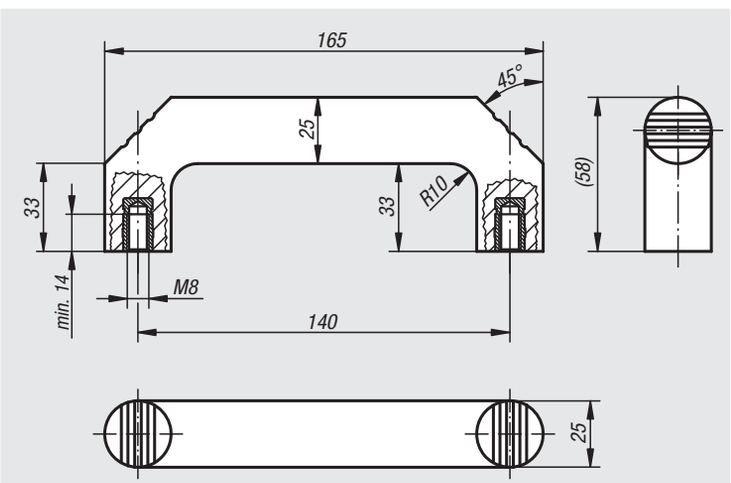
Sample order:
nlm 06900-140066

Assembly:
From the rear.

Order No.	Version	Load capacity N
06900-140066	black powder-coated	1000
06900-140067	bright	1000

06901

Pull handles



Material:
Duroplast PF 31, black.
Bushing brass or galvanized steel.

Version:
High-gloss polished.

Sample order:
nlm 06901-114008

Assembly:
From the rear.

Order No.	Bush material	Load capacity N
06901-114008	brass	500
06901-214008	galvanized steel	500

Pull handles

Material:
Thermoplastic.
Bushing brass.

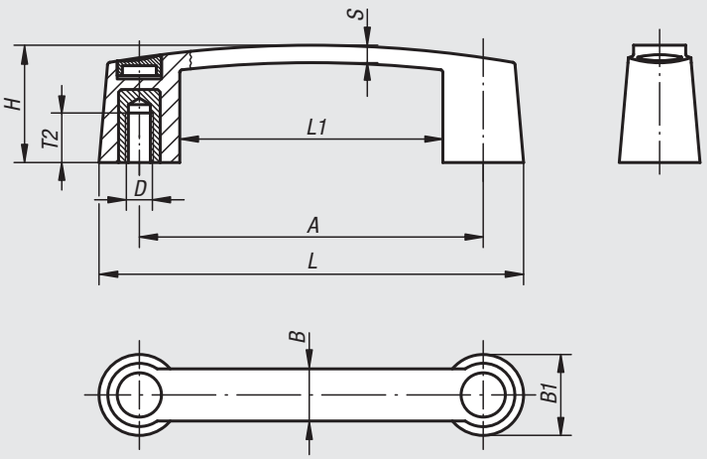
Version:
Handle and cap black.

Sample order:
nlm 06902-109406

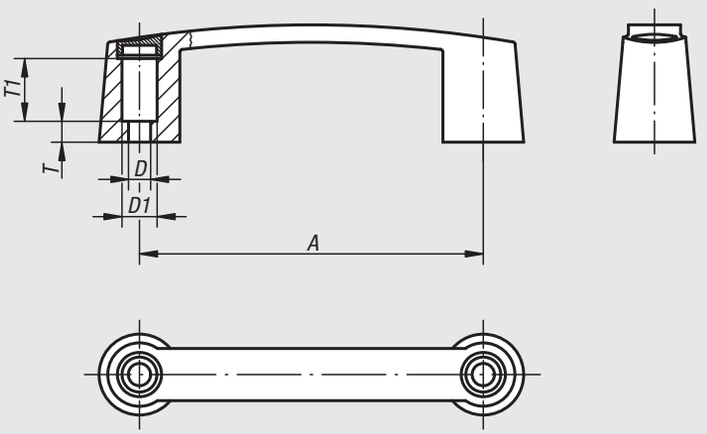
Assembly:
Form A from the rear.
Form B from the front.

On request:
Other handle or cap colours.

Form A

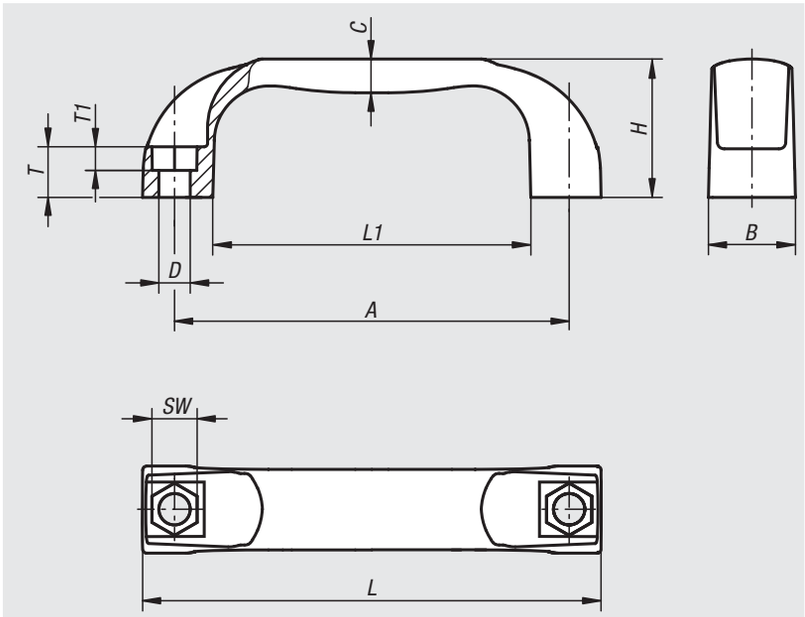


Form B



Order No.	Form	A	B	B1	D	D1	H	L	L1	S	T	T1	T2
06902-109406	A	93,5	17	26	M6	-	35	119,5	67,5	5,8	-	-	15,5
06902-111706	A	117	19	29	M6	-	40	145	89	6,4	-	-	15,5
06902-111708	A	117	19	29	M8	-	40	145	89	6,4	-	-	16
06902-113206	A	132	20	31	M6	-	45	163	101	6,7	-	-	15,5
06902-113208	A	132	20	31	M8	-	45	163	101	6,7	-	-	16
06902-117910	A	179	22	35	M10	-	50	213	145	7,1	-	-	22
06902-209406	B	93,5	17	26	6,8	12	35	119,5	67,5	5,8	4,5	19	-
06902-211708	B	117	19	29	8,5	13,5	40	145	89	6,4	8	23	-
06902-213208	B	132	20	31	8,5	13,5	45	163	101	6,7	8	22	-
06902-217908	B	179	22	35	8,5	13,5	50	213	145	7,1	12	22	-

Pull handles



Material:
Thermoplast PA (polyamide), glass-bead reinforced or PP (polypropylene), fibreglass reinforced.

Version:
black grey

Sample order:
nlm 06903-113208

Note:
The fastening hole is designed to accept the head of a socket or hexagon head bolt or a hexagon nut.

Assembly:
From the front or rear.

On request:
Other handle colours.

Order No.	Version	A	B	C	D	H	L	L1	SW	T	T1	Load capacity N
06903-109406	thermoplastic PA	94 ±0,5	21	8	6,6	36	109	76	10	13	6	1000
06903-111708	thermoplastic PA	117 ±0,5	26	10	9	41	136	94	13	15	8	1500
06903-113208	thermoplastic PA	132 ±0,5	27	11	9	44	154	112	13	16	8	1500
06903-117908	thermoplastic PA	179 ±1,0	28	11	9	50	197	156	13	17	8	1500
06903-209406	thermoplastic PP	94 ±0,5	21	8	6,6	36	109	76	10	13	6	500
06903-211708	thermoplastic PP	117 ±0,5	26	10	9	41	136	94	13	15	8	800
06903-213208	thermoplastic PP	132 ±0,5	27	11	9	44	154	112	13	16	8	800
06903-217908	thermoplastic PP	179 ±1,0	28	11	9	50	197	156	13	17	8	800

Pull handles

Material:
Glass bead reinforced thermoplastic

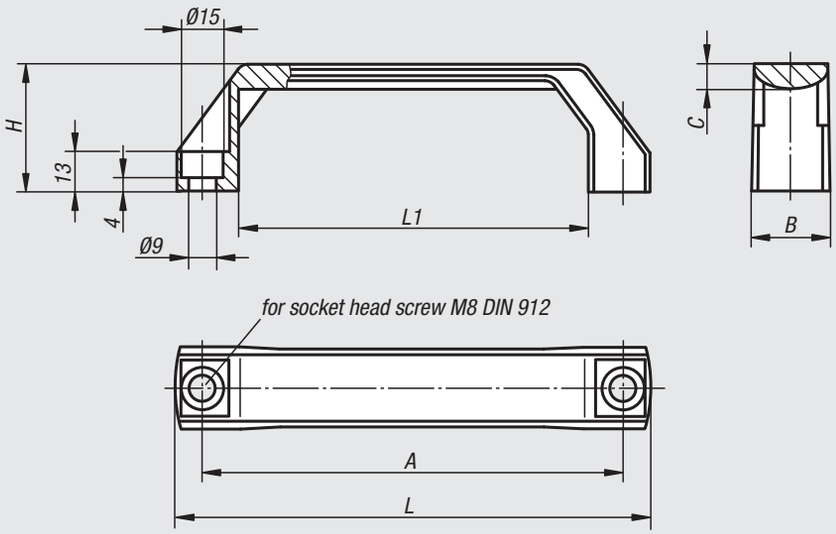
Version:
Matt black or orange

Sample order:
nlm 06904-1120081

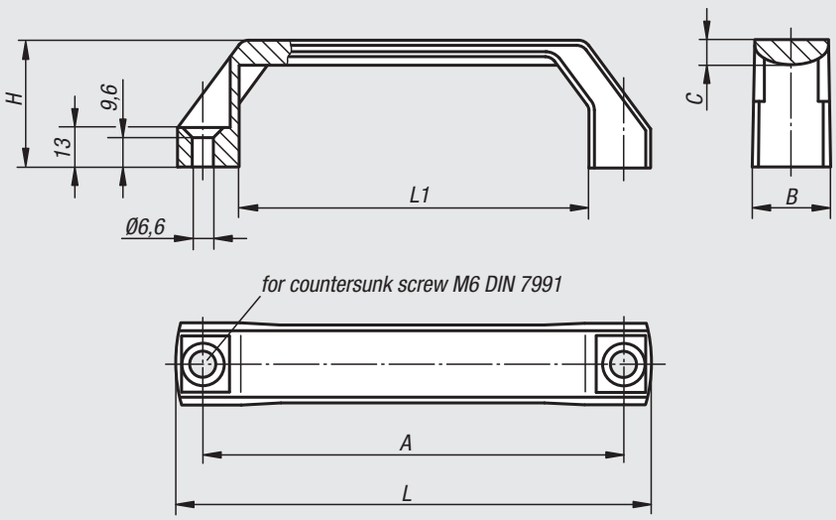
Note:
Dimension „A“ applies after mounting. Before mounting it can be up to 2 mm smaller due to the release of the bending stress.

Assembly:
From the front.

Form A



Form B



Order No. matt black	Order No. orange	Form	A	B	C	H	L	L1	Load capacity N
06904-1120081	**06904-1120082**	A	120	26	8	42	138	96	1000
06904-1140081	**06904-1140082**	A	140	26	8	42	158	116	1000
06904-1160081	**06904-1160082**	A	160	28	9	45	178	136	1000
06904-2120061	**06904-2120062**	B	120	26	8	42	138	96	1000
06904-2140061	**06904-2140062**	B	140	26	8	42	158	116	1000
06904-2160061	**06904-2160062**	B	160	28	9	45	178	136	1000

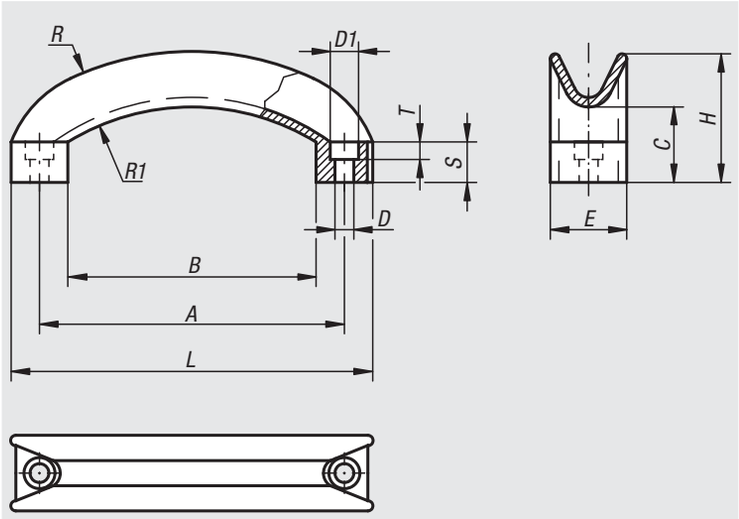
06909

Pull handles arch

Material:
Black grey thermoplastic.

Sample order:
nlm 06909-11406

Assembly:
From the front.



Order No.	D	D1	A	B	C	E	H	L	R	R1	S	T
06909-11406	6,5	10,5	114	92	29	28	48	134	117	79	15	6,5

06910

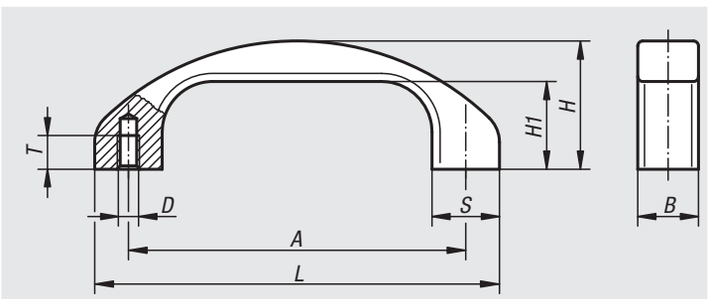
Pull handles

Material:
Profile aluminium EN AW-6060

Version:
High quality anodized version, glass-bead blasted, semi-gloss finish.

Sample order:
nlm 06910-120061

Assembly:
From the rear.



Order No.	Version	A	B	D	H	H1	L	S	T	Load capacity N
06910-120061	black anodized	120	22	M6	46	31	144	24	12	1000
06910-140081	black anodized	140	25	M8	53	36	168	28	15	1000
06910-120063	natural colour anodized	120	22	M6	46	31	144	24	12	1000
06910-140083	natural colour anodized	140	25	M8	53	36	168	28	15	1000

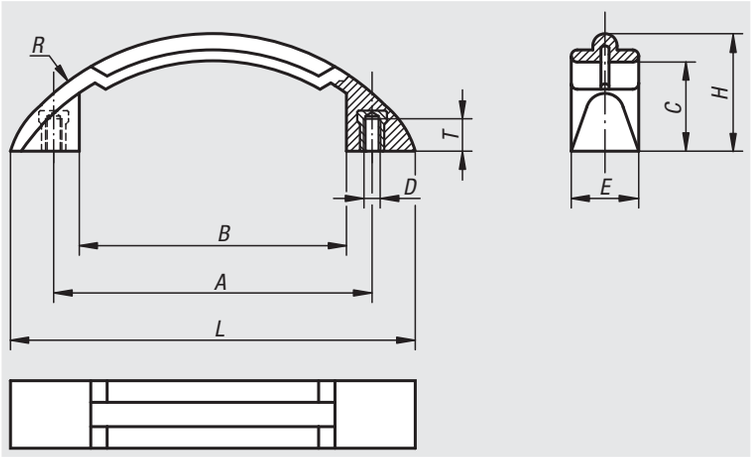
06911

Pull handles arch

Material:
Black grey thermoplastic.
Bushing brass.

Sample order:
nlm 06911-11906

Assembly:
From the rear.



Order No.	D	A	B	C	E	H	L	R	T
06911-11906	M6	119	98	33	25	43,5	150	94	10

06912

Pull handles

oblique

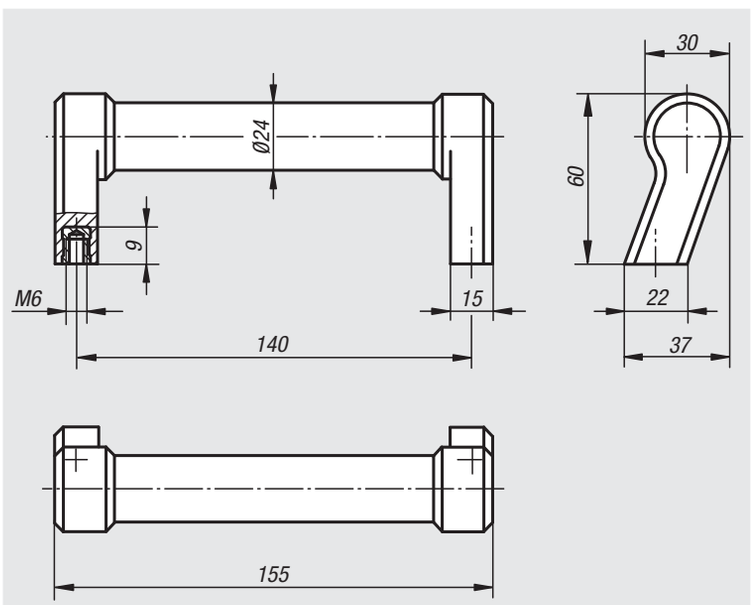
Material:
Grip glass-bead reinforced thermoplastic.
Bushing brass.

Version:
Matt black or light grey

Sample order:
nlm 06912-140061

Note:
Oblique, robust polyamide handle. Tube and legs form one unit. The oblique contact faces allow mounting under cramped conditions e.g. in corners.

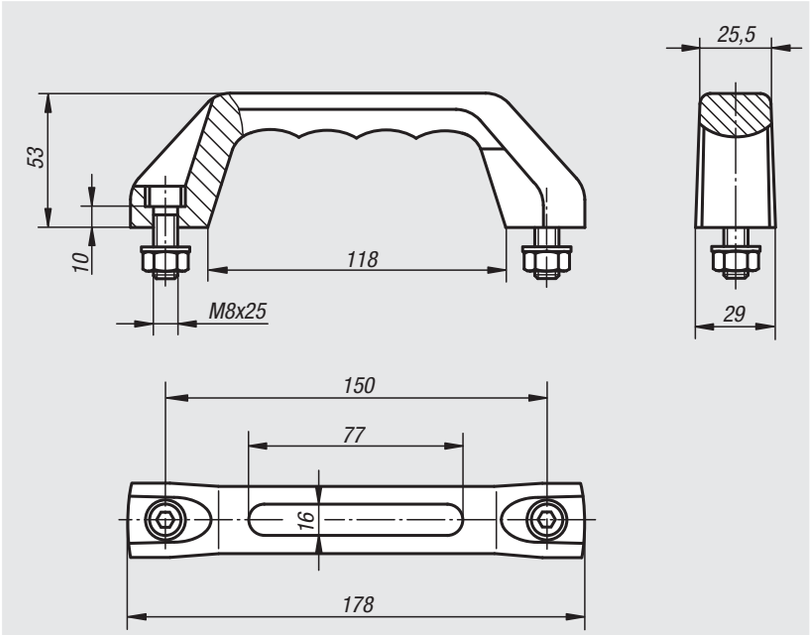
Assembly:
From the rear.



Order No.	Colour	Load capacity N
06912-140061	matt black	1000
06912-140062	light grey	1000

Pull handles

with soft inner face



Material:
Hard components glass-bead reinforced thermoplastic.
Soft components SEBS

Version:
Hard component matt black, soft component basalt grey.

Sample order:
nlm 06913-515008

Note:
Heavy-duty polyamide handle. Excellent carrying and gripping comfort thanks to its soft inner surface.
Black galvanized cylindrical screws, nuts and washers are supplied.
For wet areas, the fastening material is supplied in stainless steel (1.4301).

Assembly:
From the front.

On request:
With individual caption, embossed or raised on the soft material. Hard and soft components are available in all RAL colours.

Order No.	Version	Load capacity N
06913-515008	-	500
06913-615008	for wet areas	500

06914

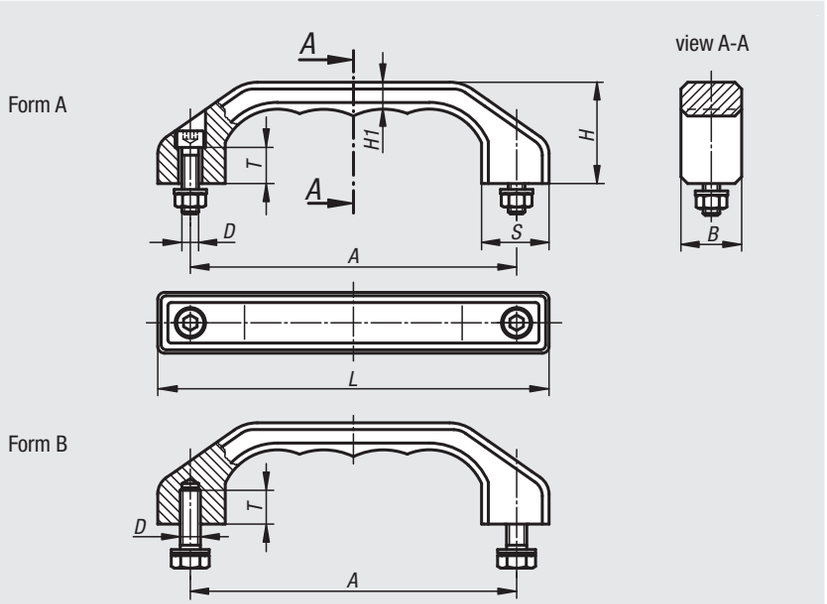
Pull handles stainless steel

Material:
Investment cast stainless steel 1.4308.
Fasteners made of 1.4301.

Version:
Abrasive cleaned and matt gloss electropolished.

Sample order:
nlm 06914-140081

Assembly:
Form A from the front.
Form B from the rear.



Order No.	Form	A	B	D	H	H1	L	S	T	Load capacity N
06914-140081	A	140	25	M8x30	45	12	170	28	15	1000
06914-180101	A	180	32	M10x40	58	15	218	36	18	1000
06914-140082	B	140	25	M8x18	45	12	170	28	15	1000
06914-180102	B	180	32	M10x20	58	15	218	36	18	1000

06915

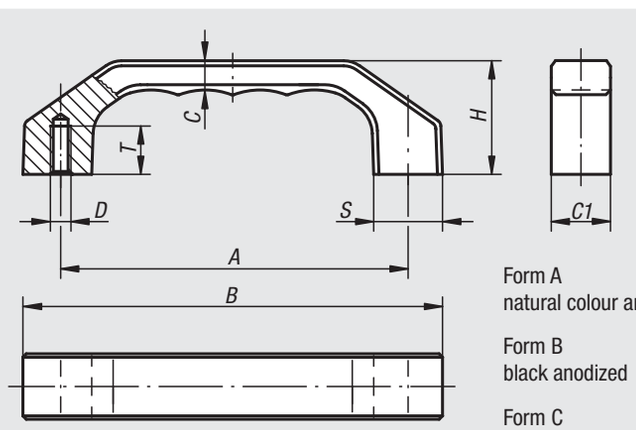
Pull handles

Material:
EN AW-6060

Version:
Matt-finished and anodized or powder-coated

Sample order:
nlm 06915-140082

Assembly:
From the rear.



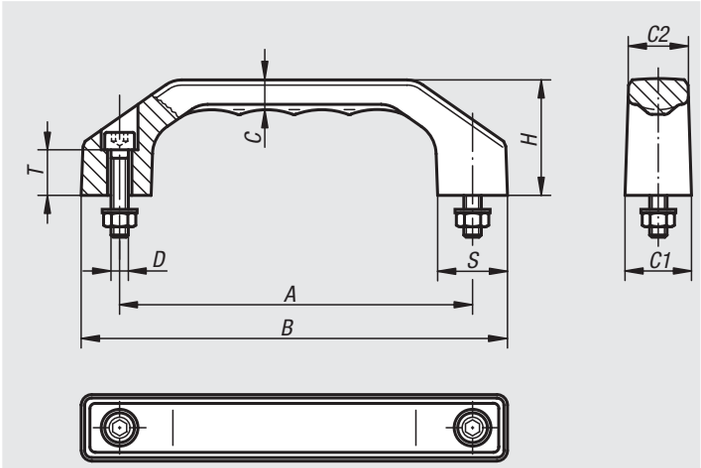
Form A
natural colour anodized

Form B
black anodized

Form C
titanium colour powder coated

Order No. Form A	Order No. Form B	Order No. Form C	A	B	C	C1	D	H	S	T	Load capacity N
06915-120061	**06915-120062**	**06915-120063**	120	146	10,5	22	M6	39	24	15	1000
06915-140081	**06915-140082**	**06915-140083**	140	170	12	25	M8	45	28	16	1000
06915-160081	**06915-160082**	**06915-160083**	160	194	13,5	28	M8	52	32	16	1000

Pull handles



Material:
Glass-bead reinforced thermoplastic.

Version:
Matt black with fine texture.

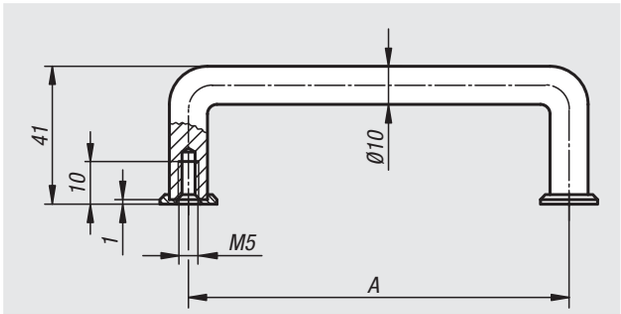
Sample order:
nlm 06916-140082

Note:
These handles are extremely flex-resistant and are very user friendly. Fastening screws, nuts and washers are supplied. Stainless steel fasteners are supplied for wet areas.

Assembly:
From the front.

Order No. -	Order No. for wet areas	A	B	C	C1	C2	D	H	S	T	Load capacity N
06916-100051	**06916-100052**	100	122	8,5	19	17	M5x22	35	20	13	1000
06916-120061	**06916-120062**	120	146	10,5	23	20,5	M6x25	39	24	15	1000
06916-140081	**06916-140082**	140	170	12	27	24	M8x30	45	28	16	1000
06916-160081	**06916-160082**	160	194	13,5	31	27,5	M8x35	52	32	20	1000
06916-180081	**06916-180082**	180	218	15,5	35	31	M10x40	58	36	20	1000

Pull handles round



Material:
Round aluminium

Version:
Surface matt-finished and natural colour or black anodized

Sample order:
nlm 06917-055051

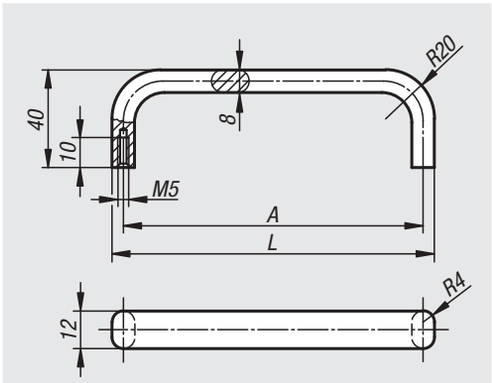
Note:
End washers not included.

Assembly:
From the rear.

Order No.	Version	A	Load capacity N	Order No. end washer
06917-055051	black anodized	55	500	06917-1
06917-088051	black anodized	88	500	06917-1
06917-100051	black anodized	100	500	06917-1
06917-120051	black anodized	120	500	06917-1
06917-180051	black anodized	180	500	06917-1
06917-200051	black anodized	200	500	06917-1
06917-235051	black anodized	235	500	06917-1
06917-250051	black anodized	250	500	06917-1
06917-055053	natural colour anodized	55	500	06917-3
06917-088053	natural colour anodized	88	500	06917-3
06917-100053	natural colour anodized	100	500	06917-3
06917-120053	natural colour anodized	120	500	06917-3
06917-180053	natural colour anodized	180	500	06917-3
06917-200053	natural colour anodized	200	500	06917-3
06917-235053	natural colour anodized	235	500	06917-3
06917-250053	natural colour anodized	250	500	06917-3

06918

Pull handles oval



Material:
Oval aluminium

Version:
Surface matt-finished and natural colour anodized or black anodized

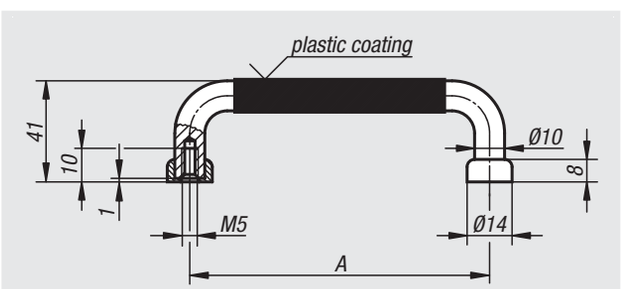
Sample order:
nlm 06918-055051

Assembly:
From the rear.

Order No. black anodized	Order No. natural colour anodized	A	L	Load capacity N
06918-055051	**06918-055053**	55	63	500
06918-088051	**06918-088053**	88	96	500
06918-100051	**06918-100053**	100	108	500
06918-120051	**06918-120053**	120	128	500
06918-180051	**06918-180053**	180	188	500
06918-200051	**06918-200053**	200	208	500
06918-235051	**06918-235053**	235	243	500
06918-250051	**06918-250053**	250	258	500

06919

Pull handles round



Material:
Round steel

Version:
Surface very finely ground and matt-polish chrome-plated.
Grip plastic coated.

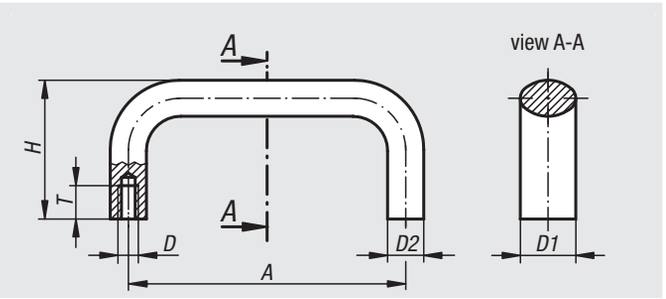
Sample order:
nlm 06919-05505

Note:
High quality handles for front panels and similar applications.

Assembly:
From the rear.

Order No.	A	Load capacity N
06919-05505	55	1000
06919-08805	88	1000
06919-10005	100	1000
06919-10205	102	1000
06919-11505	115	1000
06919-12005	120	1000
06919-13605	136	1000
06919-18005	180	1000
06919-20005	200	1000
06919-23505	235	1000
06919-25005	250	1000

Pull handles oval



Material:
Oval aluminium EN AW-6060

Version:
Black powder-coated or natural colour anodized.

Sample order:
nlm 06920-10001

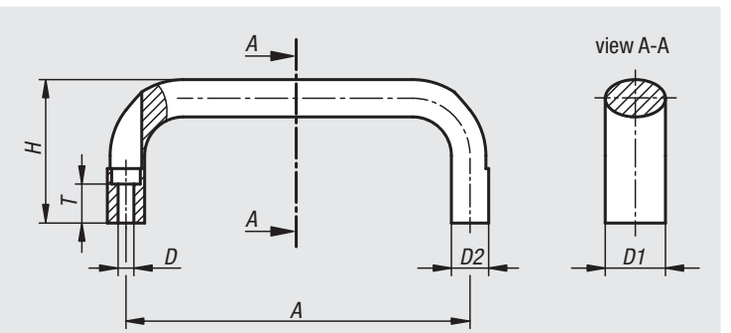
Note:
These handles are extremely robust and can be used where heavy duty equipment is called for.

Assembly:
From the rear.

Order No. black powder-coated	Order No. natural colour anodized	A	D	D1	D2	H	T	Load capacity N
06920-10001	**06920-10003**	100	M6	21/20	13	50	12	1000
06920-11201	**06920-11203**	112	M6	21/20	13	50	12	1000
06920-12001	**06920-12003**	120	M6	21/20	13	50	12	1000
06920-12801	**06920-12803**	128	M6	21/20	13	50	12	1000
06920-1600106	**06920-1600306**	160	M6	21/20	13	50	12	1000
06920-1120108	**06920-1120308**	112	M8	25/26	17	55	14	1000
06920-1200108	**06920-1200308**	120	M8	25/26	17	55	14	1000
06920-1280108	**06920-1280308**	128	M8	25/26	17	55	14	1000
06920-16001	**06920-16003**	160	M8	25/26	17	55	14	1000
06920-18001	**06920-18003**	180	M8	25/26	17	55	14	1000
06920-19201	**06920-19203**	192	M8	25/26	17	55	14	1000
06920-35001	**06920-35003**	350	M8	25/26	17	55	14	1000

06920

Pull handles oval



Material:
Oval aluminium EN AW-6060

Version:
Black powder-coated or ruby red RAL 3003.

Sample order:
nlm 06920-11000105

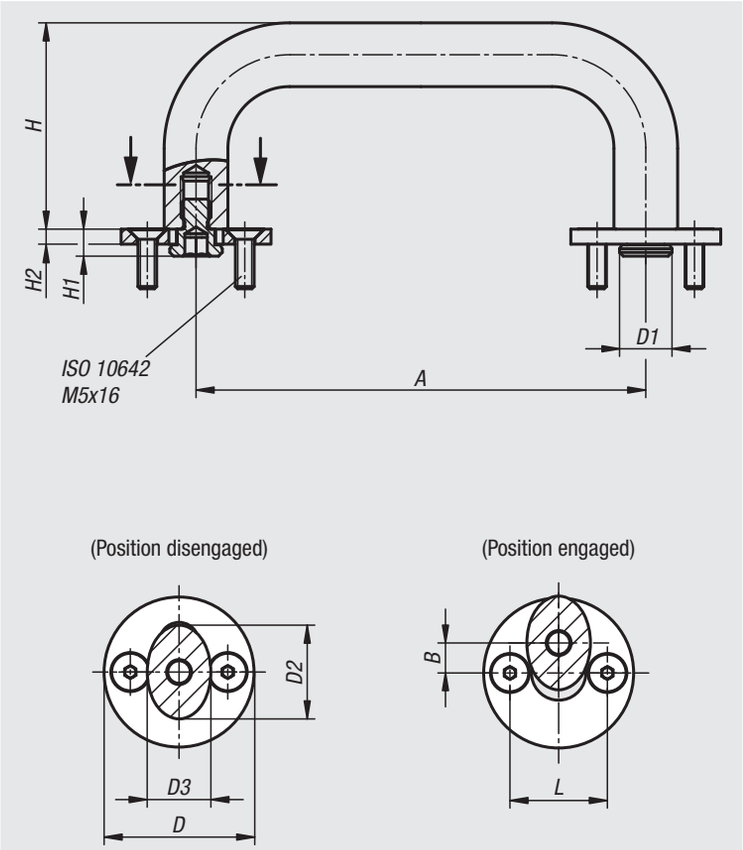
Assembly:
From the front.

Accessories:
Suitable screws for mounting the handles:
- Socket head screw ISO 4762-M5/ M6.

Order No. black powder-coated	Order No. ruby red powder-coated	A	D	D1	D2	H	T	Load capacity N
06920-11000105	**06920-11002705**	100	5,5	21	13	50	13,6	1.000
06920-11120105	**06920-11122705**	112	5,5	21	13	50	13,6	1.000
06920-11200105	**06920-11202705**	120	5,5	21	13	50	13,6	1.000
06920-11280105	**06920-11282705**	128	5,5	21	13	50	13,6	1.000
06920-11600105	**06920-11602705**	160	5,5	21	13	50	13,6	1.000
06920-11120106	**06920-11122706**	112	6,6	25	17	55	11	1.000
06920-11200106	**06920-11202706**	120	6,6	25	17	55	11	1.000
06920-11280106	**06920-11282706**	128	6,6	25	17	55	11	1.000
06920-11600106	**06920-11602706**	160	6,6	25	17	55	11	1.000
06920-11800106	**06920-11802706**	180	6,6	25	17	55	11	1.000

Pull handles oval

detachable



Material:
Pull handle oval aluminium EN AW-6060.
Locating pin free-cutting steel 1.0718.
Blanking disc free-cutting steel 1.0718.

Version:
Pull handle black powder-coated.
Locating pin black oxidised.
Blanking disc black oxidised.

Sample order:
nlm 06920-10012001

Note:
The pull handles are mounted on an object by a push-fit system.
Dismantling is carried out when no load is applied.

Order No.	A	D	D1	D2	D3	H	H1	H2	B	B1	L
06920-10012001	100	35	12	21	13	50	7,2	4	7	13	24
06920-11212001	112	35	12	21	13	50	7,2	4	7	13	24
06920-12012001	120	35	12	21	13	50	7,2	4	7	13	24
06920-12812001	128	35	12	21	13	50	7,2	4	7	13	24
06920-16012001	160	35	12	21	13	50	7,2	4	7	13	24
06920-11214001	112	40	14	25	17	55	7,2	4	8	15	26
06920-12014001	120	40	14	25	17	55	7,2	4	8	15	26
06920-12814001	128	40	14	25	17	55	7,2	4	8	15	26
06920-16014001	160	40	14	25	17	55	7,2	4	8	15	26
06920-18014001	180	40	14	25	17	55	7,2	4	8	15	26
06920-19214001	192	40	14	25	17	55	7,2	4	8	15	26
06920-35014001	350	40	14	25	17	55	7,2	4	8	15	26

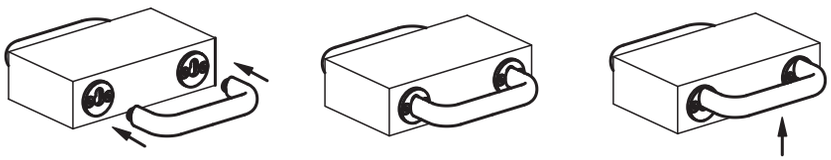
Pull handles oval

detachable

Application:
Insert the pull handle into the opening until the grip makes contact with the blanking disc.
Lock by holding the handle parallel and pulling up.
The grip can only be subject to vertical loads.
To release, follow the previous instructions in reverse.

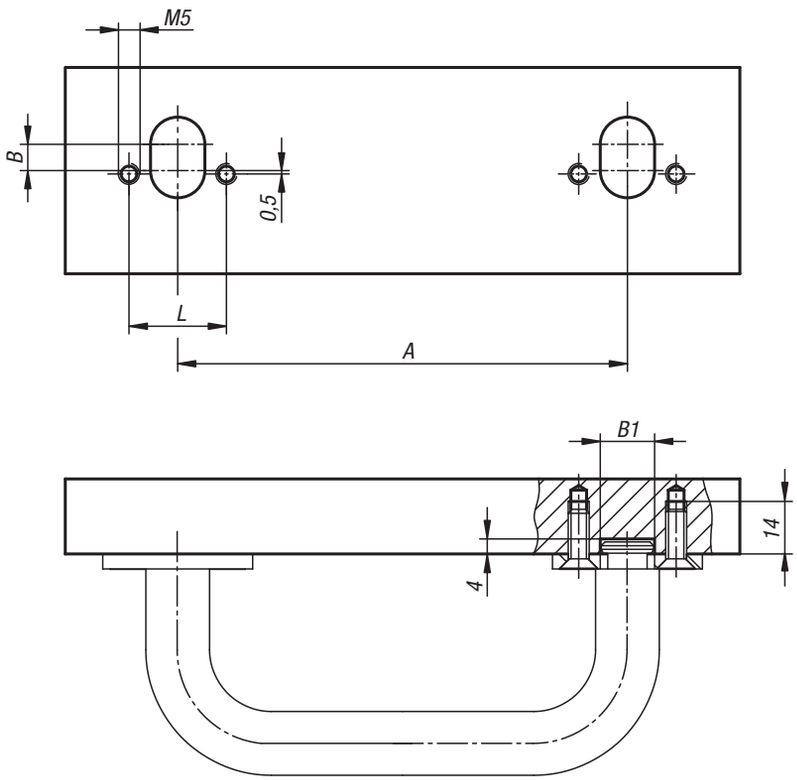
Assembly:
An object must be prepared before the blanking disc can be mounted.
See assembly instructions drawing.

how to use:



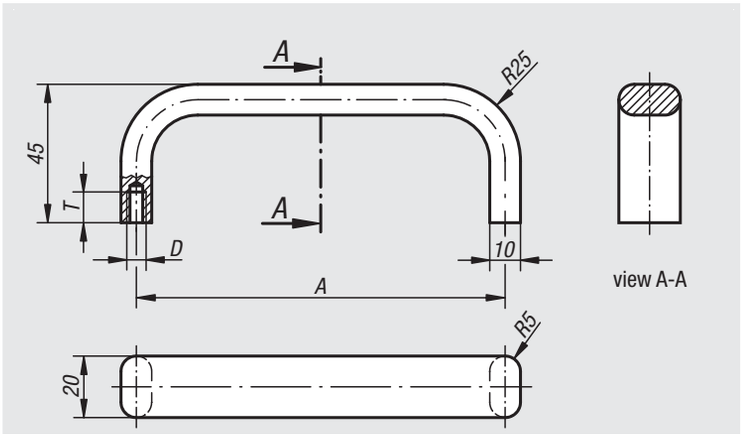
Insert Engage Lift

mounting instructions:



06921

Pull handles



Material:
Profile aluminium EN AW-6060

Version:
Matt-finished, black or natural colour anodized

Sample order:
nlm 06921-18001

Note:
These elegant flat profile aluminium handles are especially suitable for machines, fixtures, equipment etc.

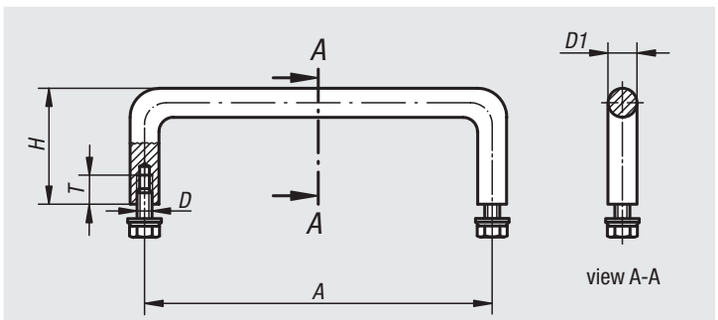
Assembly:
From the rear.

Order No. black anodized	Order No. natural colour anodized	A	D	T	Load capacity N
06921-12001	**06921-12003**	120	M5	10	500
06921-18001	**06921-18003**	180	M5	10	500
06921-20001	**06921-20003**	200	M5	10	500
06921-35001	**06921-35003**	350	M6	12	500

06922

Pull handles

stainless steel



Material:
Handle stainless steel 1.4305.
Fasteners 1.4301

Version:
Electropolished.

Sample order:
nlm 06922-120

Note:
Stainless steel pull handles are used mainly on equipment in the medical and food industry as well as in laboratories and neuclear technology.

Assembly:
From the rear.

Order No.	A	D	D1	H	T	Load capacity N
06922-100	100	M5x10	8	35	10	1000
06922-120	120	M5x10	10	40	10	1000
06922-250	250	M5x10	10	40	10	1000
06922-350	350	M5x10	10	40	10	1000

06923

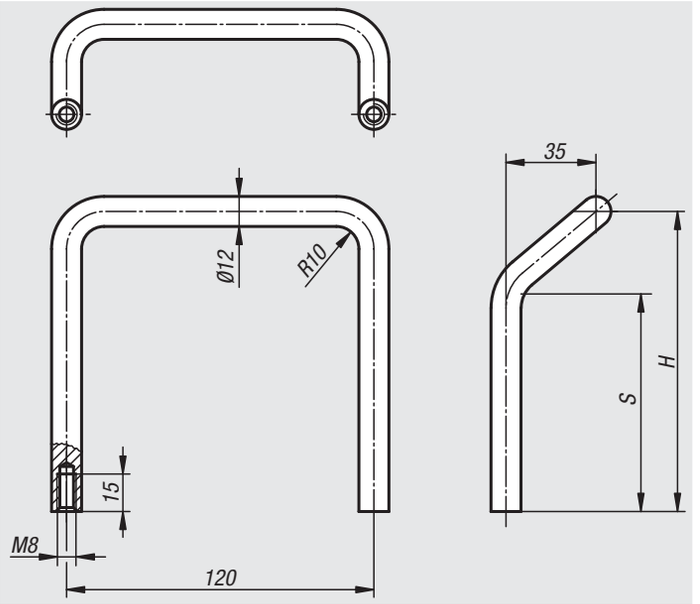
Pull handles angled

Material:
Round steel

Version:
Finely ground and high-gloss chrome-plated.

Sample order:
nlm 06923-06008

Assembly:
From the rear.



Order No.	H	S	Load capacity N
06923-06008	60	27	1000
06923-12008	120	87	1000

06924

Pull handles

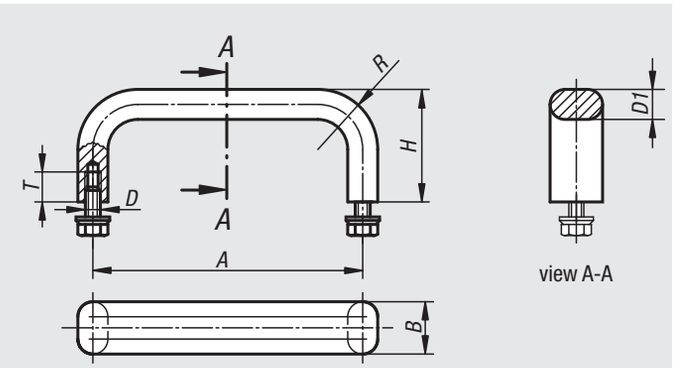
stainless steel

Material:
Handle stainless steel 1.4305,
Fastening material 1.4301

Version:
Semi-gloss tumbled.

Sample order:
nlm 06924-10005

Assembly:
From the rear.



Order No.	A	B	D	D1	H	R	T	Load capacity N
06924-10005	100	12	M5x10	8	40	22	10	1000
06924-12005	120	12	M5x10	8	40	22	10	1000
06924-15005	150	12	M5x10	8	40	22	10	1000
06924-18005	180	12	M5x10	8	40	22	10	1000
06924-25005	250	12	M5x10	8	40	22	10	1000
06924-10006	100	19,5	M6x12	10	45	24	12	1000
06924-12006	120	19,5	M6x12	10	45	24	12	1000
06924-15006	150	19,5	M6x12	10	45	24	12	1000
06924-18006	180	19,5	M6x12	10	45	24	12	1000
06924-25006	250	19,5	M6x12	10	45	24	12	1000

06925

Pull handles tubular

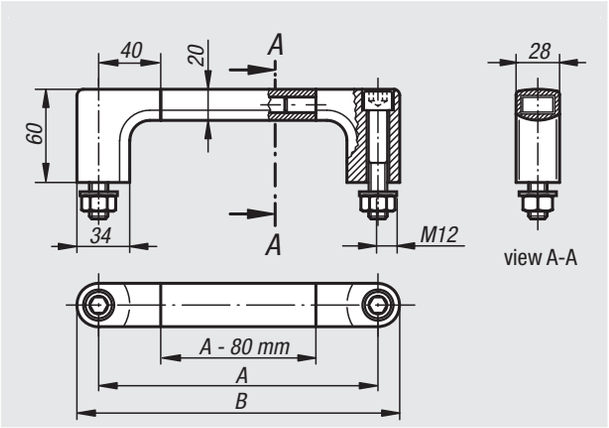
Material:
Aluminium.

Version:
Leg black powder-coated.
Grip natural colour anodized.

Sample order:
nlm 06925-300

Note:
Black galvanized M12x70 hexagon socket bolts, suitable washers and nuts for fastening are supplied.

Assembly:
From the front.



Order No.	A	B	Load capacity N
06925-180	180	208	1000
06925-200	200	228	1000
06925-250	250	278	1000
06925-300	300	328	1000
06925-350	350	378	1000
06925-400	400	428	1000
06925-500	500	528	1000
06925-600	600	628	1000

06926

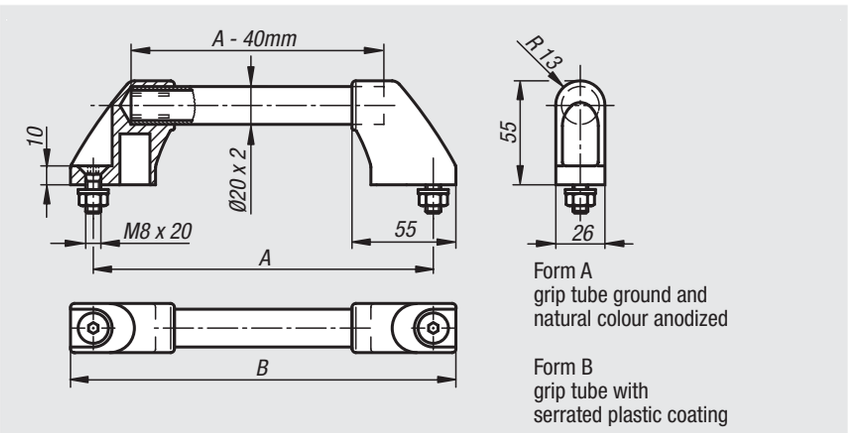
Pull handles tubular

Material:
Legs black glass-bead reinforced thermoplastic.
Grip tube aluminium.

Sample order:
nlm 06926-200

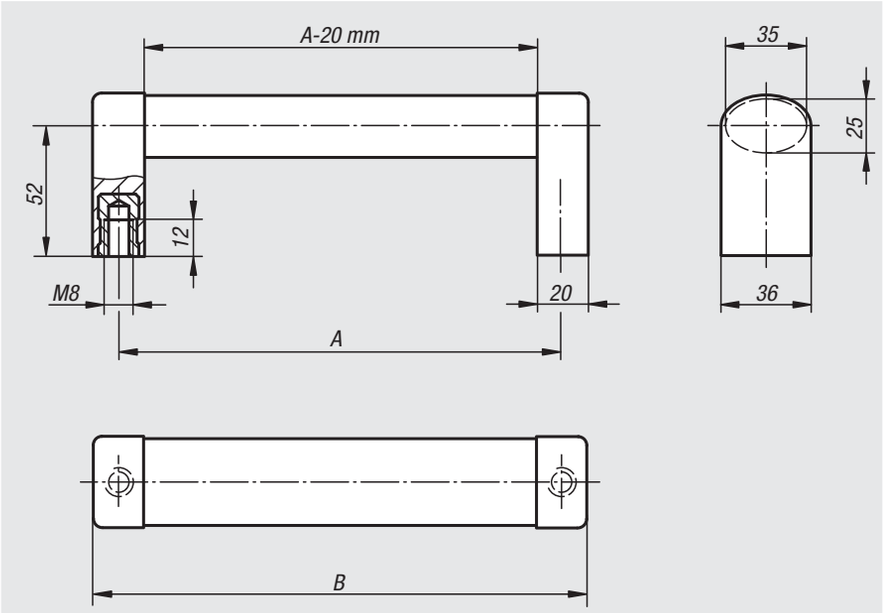
Note:
The legs have 4 webs in the hole for the grip tube. When pushing the tube in, these are trimmed off and produce a precise seating.
Black galvanized fastening screws, suitable washers and nuts are supplied.

Assembly:
From the front.



Order No. Form A	Order No. Form B	A	B	Load capacity N
06926-180	**06926-1803**	180	204	500
06926-200	**06926-2003**	200	224	500
06926-250	**06926-2503**	250	274	500
06926-300	**06926-3003**	300	324	500
06926-350	**06926-3503**	350	374	500
06926-400	**06926-4003**	400	424	500
06926-500	**06926-5003**	500	524	500
06926-600	**06926-6003**	600	624	500

Pull handles tubular



Material:
Grip aluminium EN AW-6060.
Legs polyamide glass-bead reinforced.
Bushing brass.
Clamping sleeves stainless steel.

Version:
Grip natural colour or black anodized.
Legs aluminium colour or black.

Sample order:
nlm 06927-1200081

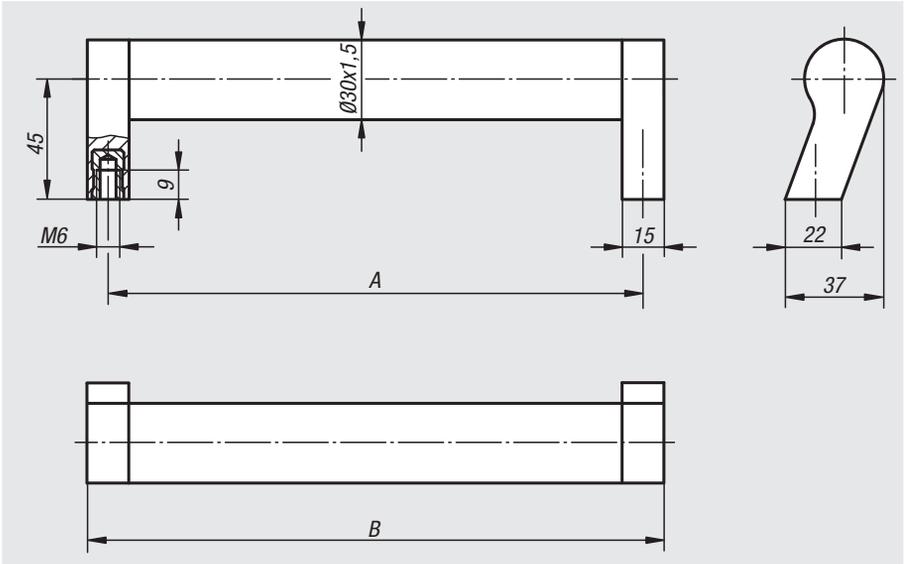
Note:
Oval-profile handles for joining together. Version with plastic legs and aluminium oval grip.

Assembly:
From the rear.

Order No. grip, natural colour anodized, leg aluminium colour	Order No. grip, natural colour anodized, leg black	Order No. grip, black anodized, leg black	A	B	Load capacity N
06927-1200081	**06927-1200082**	**06927-1200083**	200	220	1000
06927-1250081	**06927-1250082**	**06927-1250083**	250	270	1000
06927-1300081	**06927-1300082**	**06927-1300083**	300	320	1000
06927-1400081	**06927-1400082**	**06927-1400083**	400	420	1000
06927-1500081	**06927-1500082**	**06927-1500083**	500	520	1000

Pull handles tubular

oblique



Material:
Grip tube aluminium EN AW-6060;
Legs polyamide, glass-bead reinforced;
Bushing brass

Version:
Tube matt-polished anodized.
Legs black

Sample order:
nlm 06928-2150061

Note:
Oblique tubular pull handles in modern industrial design. Webs on the leg spigot provide a precision fit for the tube.

Assembly:
From the rear.

Order No.	A	B	Load capacity N
06928-2150061	150	165	800
06928-2200061	200	215	800
06928-2250061	250	265	800
06928-2300061	300	315	800
06928-2350061	350	365	800
06928-2400061	400	415	800

Pull handles

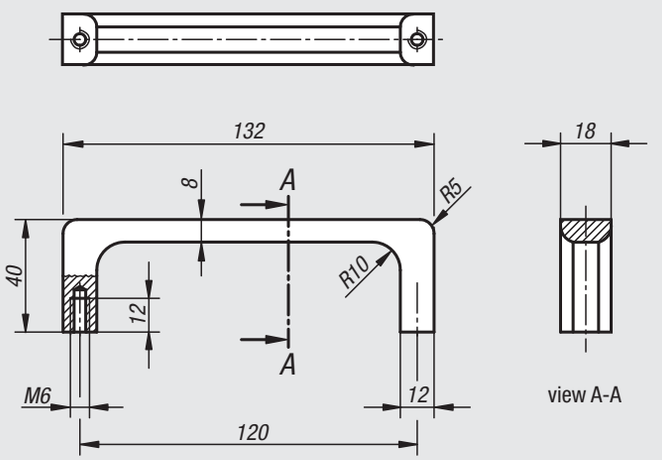
Material:
Profile aluminium EN AW-6060

Version:
Matt-finished, black anodized or natural colour anodized

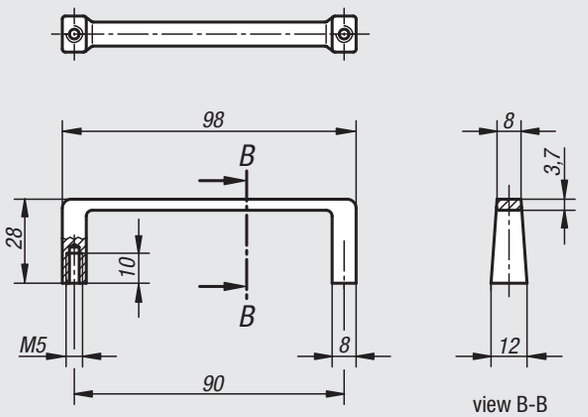
Sample order:
nlm 06929-12001

Assembly:
From the rear.

Form A



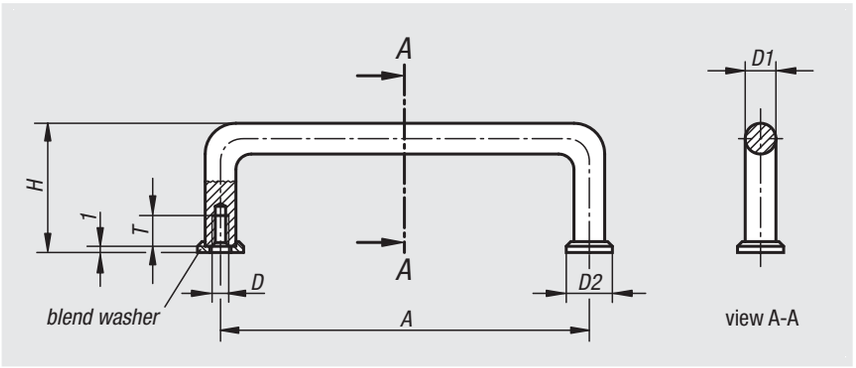
Form B



Order No.	Form	Version	Load capacity N
06929-12001	A	black anodized	500
06929-09001	B	black anodized	300
06929-12003	A	natural colour anodized	500
06929-09003	B	natural colour anodized	300

Pull handles

high-gloss chromed



Material:
Steel.

Version:
Finely ground and high-gloss chromed

Sample order:
nlm 06930-10204

Note:
These pull handles are used primarily on optical devices, laboratory installations, audio, video and hi-fi equipment, etc. The end washers are supplied loose.

Assembly:
From the rear.

On request:
Other surface finishes.

Order No.	A	D	D1	D2	H	T	Load capacity N
06930-03203	32	M3	5	8	21	6	1000
06930-04203	42	M3	5	8	25	6	1000
06930-05503	55	M3	5	8	25	6	1000
06930-07603	76	M3	5	8	25	6	1000
06930-08803	88	M3	5	8	25	6	1000
06930-03204	32	M4	8	12,5	33	8	1000
06930-05504	55	M4	8	12,5	33	8	1000
06930-06404	64	M4	8	12,5	33	8	1000
06930-08804	88	M4	8	12,5	33	8	1000
06930-09604	96	M4	8	12,5	33	8	1000
06930-09804	98	M4	8	12,5	33	8	1000
06930-10204	102	M4	8	12,5	33	8	1000
06930-12004	120	M4	8	12,5	33	8	1000
06930-12804	128	M4	8	12,5	33	8	1000
06930-13604	136	M4	8	12,5	33	8	1000
06930-05505	55	M5	10	15	41	10	1000
06930-08805	88	M5	10	15	41	10	1000
06930-10005	100	M5	10	15	41	10	1000
06930-10205	102	M5	10	15	41	10	1000
06930-11505	115	M5	10	15	41	10	1000
06930-12005	120	M5	10	15	41	10	1000
06930-13605	136	M5	10	15	41	10	1000
06930-18005	180	M5	10	15	41	10	1000
06930-20005	200	M5	10	15	41	10	1000
06930-23505	235	M5	10	15	41	10	1000
06930-25005	250	M5	10	15	41	10	1000

Pull handles

stainless steel

Material:
Handle stainless steel 1.4305
Fasteners made of 1.4301

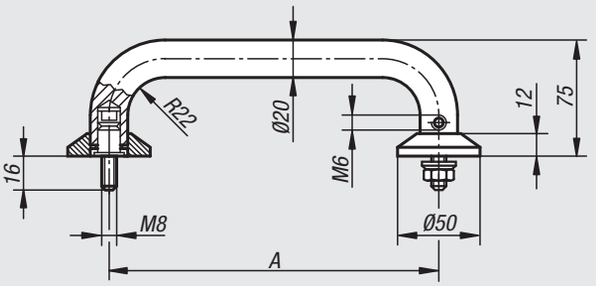
Version:
Ground and satin brushed finish.

Sample order:
nlm 06931-2001

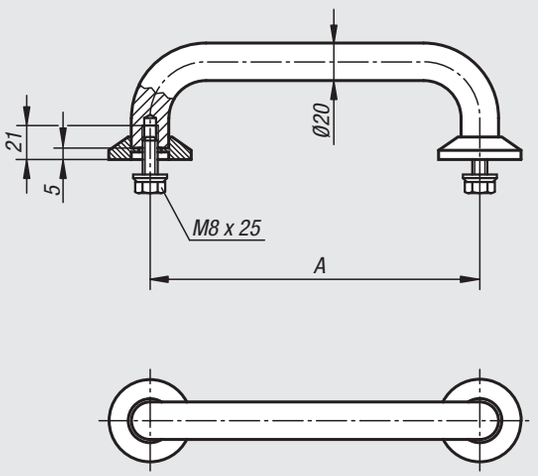
Note:
These stainless steel pull handles are ideal for all technical applications where highest load and high chemical or corrosive resistance is required.

Assembly:
From the rear.

Form A
front mounted



Form B
rear mounted



Order No.	Form	A	Load capacity N
06931-2001	A	200	1000
06931-2501	A	250	1000
06931-2002	B	200	1000
06931-2502	B	250	1000

Pull handles

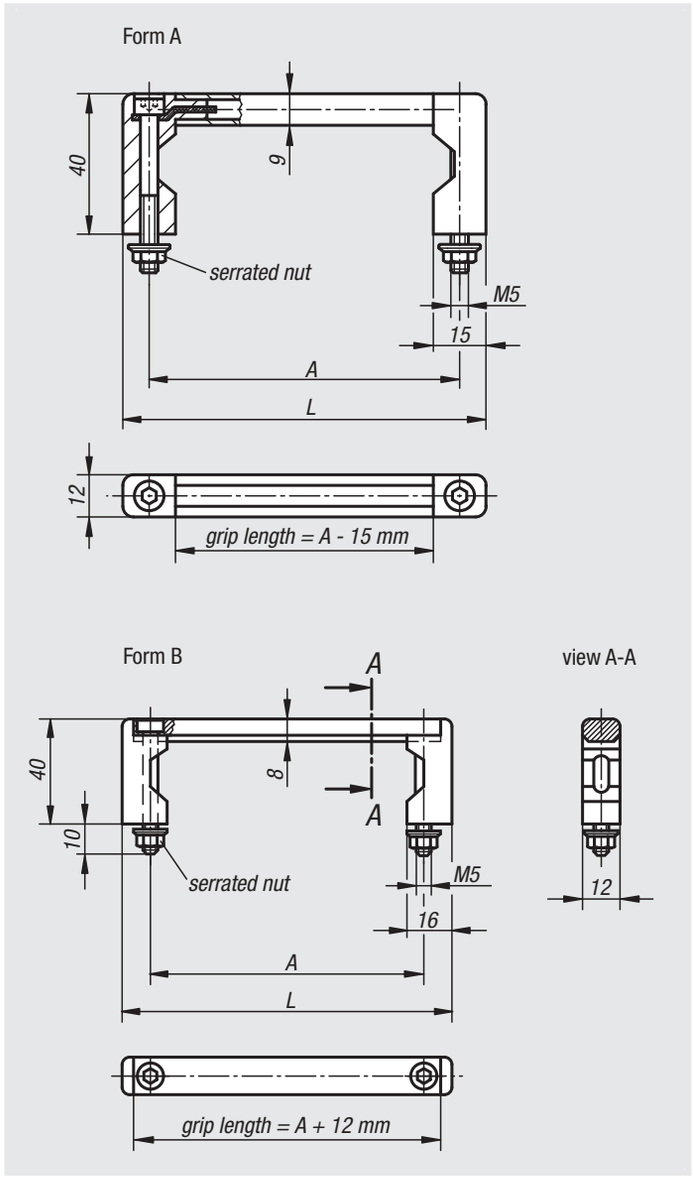
19"

Material:
Grip aluminium.
Legs glass-bead-reinforced polyamide.

Version:
Legs fine structure semi-matt, black.
Grip matt-finished and natural colour or black anodized.

Sample order:
nlm 06932-10001

Assembly:
From the front.



Order No. black anodized	Order No. natural colour anodized	Form	A	L	Load capacity N
06932-05501	**06932-05503**	A	55	70	1000
06932-08801	**06932-08803**	A	88	103	1000
06932-10001	**06932-10003**	A	100	115	1000
06932-12001	**06932-12003**	A	120	135	1000
06932-18001	**06932-18003**	A	180	195	1000
06932-23501	**06932-23503**	A	235	250	1000
06932-055101	**06932-055103**	B	55	75	1000
06932-088101	**06932-088103**	B	88	108	1000
06932-100101	**06932-100103**	B	100	120	1000
06932-120101	**06932-120103**	B	120	140	1000
06932-180101	**06932-180103**	B	180	200	1000
06932-235101	**06932-235103**	B	235	255	1000

06933

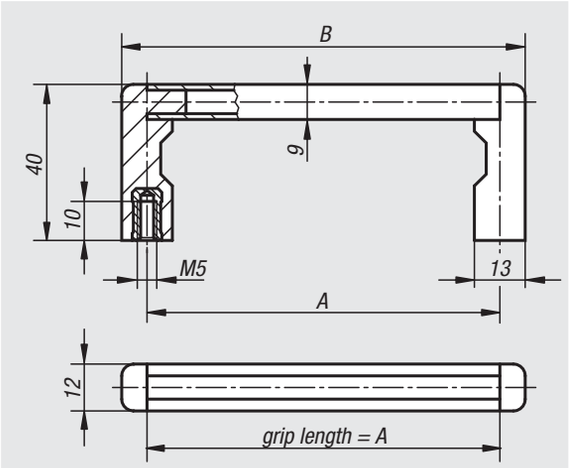
Pull handles

Material:
Grip aluminium.
Legs high-strength plastic

Sample order:
nlm 06933-05501

Note:
Shorten the aluminium grip to reduce the handle length.

Assembly:
From the rear.



Order No. grip black anodized	Order No. grip clear anodized	A	B	Load capacity N
06933-05501	**06933-05503**	55	69	1000
06933-08801	**06933-08803**	88	102	1000
06933-10001	**06933-10003**	100	114	1000
06933-12001	**06933-12003**	120	134	1000
06933-18001	**06933-18003**	180	194	1000
06933-23501	**06933-23503**	235	249	1000

06934

Pull handles fold-down

Material:
Steel or stainless steel 1.4305

Version:
Fine ground and high-gloss chromed.
Form B grip with smooth plastic sleeve.
Form C semi-gloss score-free tumbled.

Sample order:
nlm 06934-1201

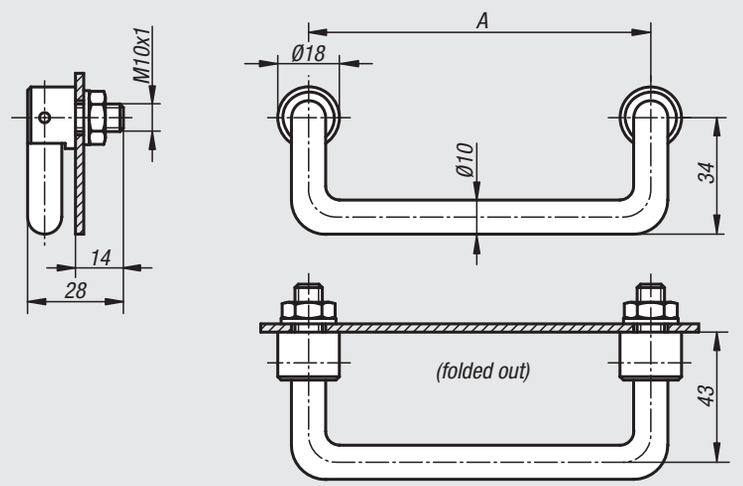
Note:
Galvanized washers and nuts are supplied. Form C fastening material in stainless steel. Spring lock in both end positions.

Assembly:
From the rear.

Form A
fine ground and high-gloss chromed

Form B
same as Form A, grip with smooth plastic sleeve

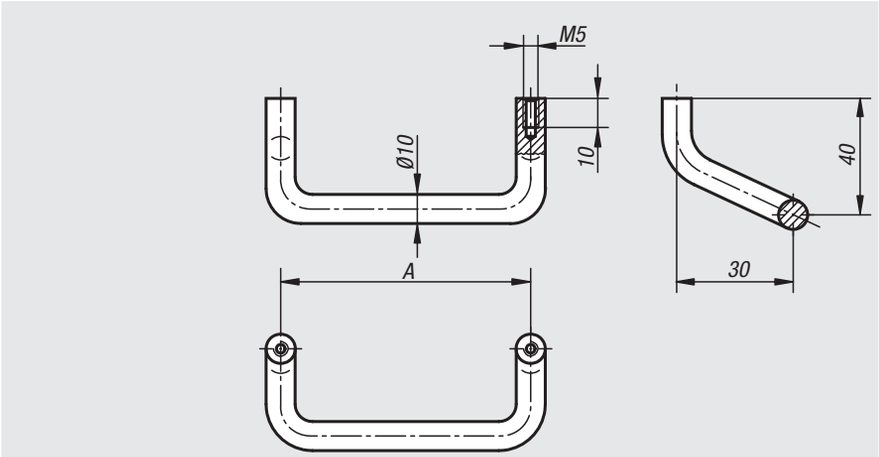
Form C
stainless steel, tumbled



Order No. Form A	Order No. Form B	Order No. Form C	A	Load capacity N
06934-1001	**06934-1002**	**06934-1003**	100	500
06934-1201	**06934-1202**	**06934-1203**	120	500
06934-1801	**06934-1802**	**06934-1803**	180	500

06935

Pull handles angled



Material:
Aluminium.

Version:
Matt-finished, black anodized or natural colour anodized.

Sample order:
nlm 06935-12001

Assembly:
From the rear.

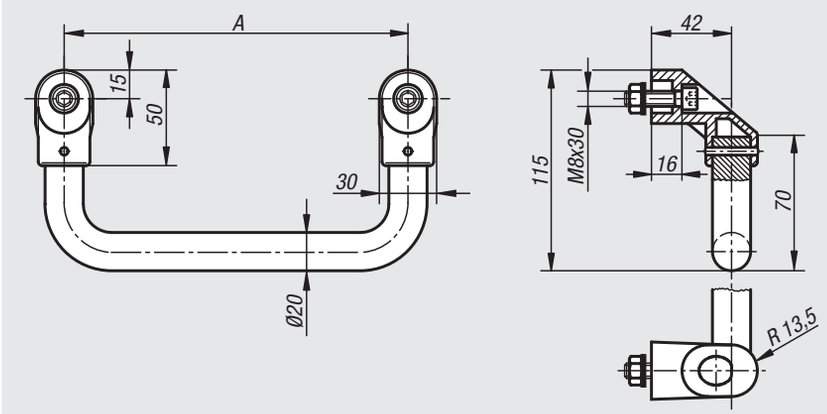
Order No. black anodized	Order No. natural colour anodized	A	Load capacity N
06935-08601	**06935-08603**	86	500
06935-12001	**06935-12003**	120	500
06935-18001	**06935-18003**	180	500

06936

Pull handles tubular angled

Form A
tube
natural colour anodized

Form B
tube
black anodized



Material:
Glass-bead reinforced thermoplastic leg.
Aluminium connecting tube.

Version:
Black thermoplastic.
Anodized aluminium.

Sample order:
nlm 06936-3002

Note:
The legs are pinned to the aluminium tube. Black galvanized socket head screws, nuts and washers are supplied.

Assembly:
From the front.

Order No. Form A	Order No. Form B	A	Load capacity N
06936-2001	**06936-2002**	200	800
06936-2501	**06936-2502**	250	800
06936-3001	**06936-3002**	300	800
06936-3501	**06936-3502**	350	800
06936-4001	**06936-4002**	400	800

06937

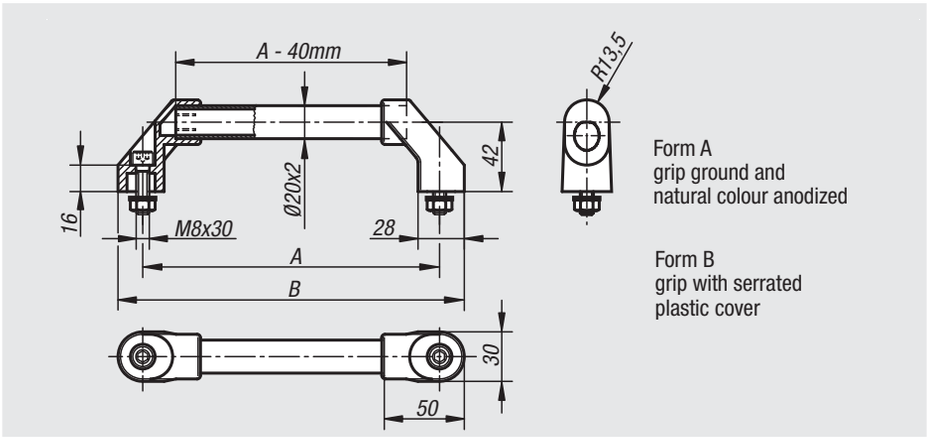
Pull handles tubular

Material:
Legs black glass-bead reinforced thermoplastic.
Grip aluminium EN AW-6060.

Sample order:
nlm 06937-3001

Note:
The legs have 4 webs in the hole for the grip tube. When pushing the tube in these are trimmed off and produce a precise seating. Black galvanized fastening screws, suitable washers and nuts are supplied.

Assembly:
From the front.



Form A
grip ground and
natural colour anodized

Form B
grip with serrated
plastic cover

Order No. Form A	Order No. Form B	A	B	Load capacity N
06937-1801	**06937-1802**	180	210	1000
06937-2001	**06937-2002**	200	230	1000
06937-2501	**06937-2502**	250	280	1000
06937-3001	**06937-3002**	300	330	1000
06937-3501	**06937-3502**	350	380	1000
06937-4001	**06937-4002**	400	430	1000
06937-5001	**06937-5002**	500	530	1000
06937-6001	**06937-6002**	600	630	1000

06938

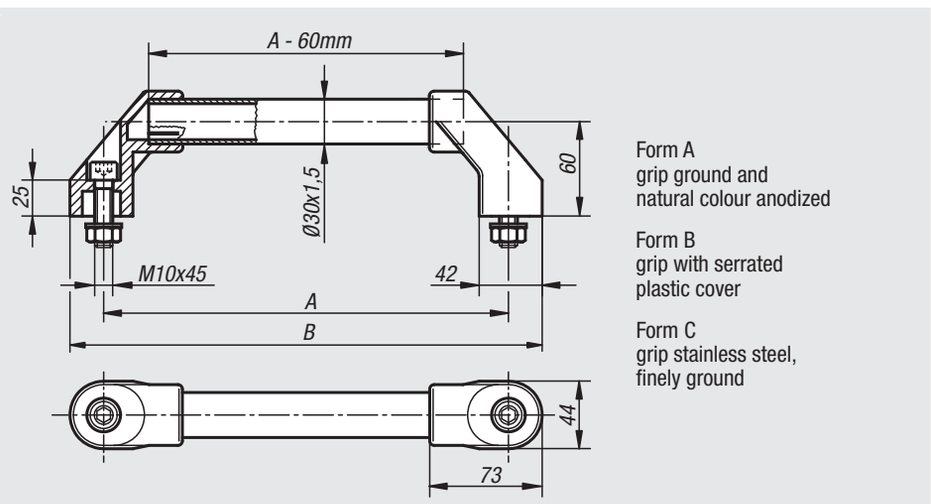
Pull handles tubular

Material:
Legs black glass-bead reinforced thermoplastic.
Grip aluminium EN AW-6060 or stainless steel 1.4301.

Sample order:
nlm 06938-3501

Note:
The legs have 4 webs in the hole for the grip tube. When pushing the tube in these are trimmed off and produce a precise seating. Black galvanized fastening screws, suitable washers and nuts are supplied.

Assembly:
From the front.



Form A
grip ground and
natural colour anodized

Form B
grip with serrated
plastic cover

Form C
grip stainless steel,
finely ground

Order No. Form A	Order No. Form B	Order No. Form C	A	B	Load capacity N
06938-2501	**06938-2502**	**06938-2503**	250	294	1000
06938-3001	**06938-3002**	**06938-3003**	300	344	1000
06938-3501	**06938-3502**	**06938-3503**	350	394	1000
06938-4001	**06938-4002**	**06938-4003**	400	444	1000
06938-5001	**06938-5002**	**06938-5003**	500	544	1000
06938-6001	**06938-6002**	**06938-6003**	600	644	1000

Pull handles tubular

Material:
Grip aluminium EN AW-6060.
Legs glass-bead reinforced polyamide.

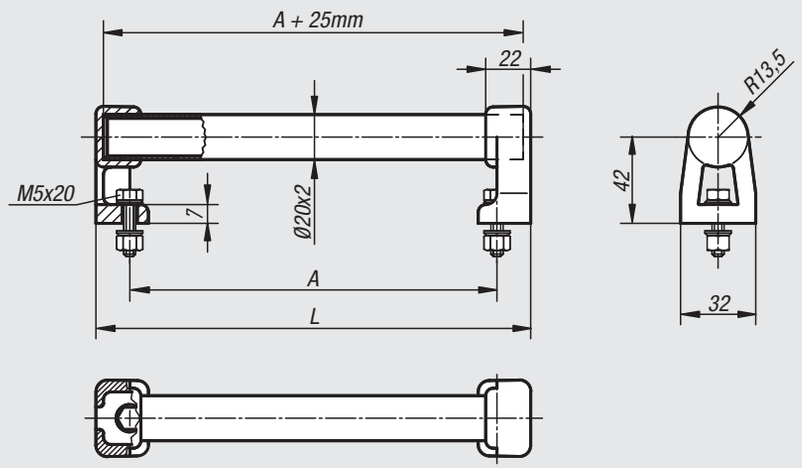
Version:
Grip natural colour anodized or with serrated plastic cover

Sample order:
nlm 06939-150203

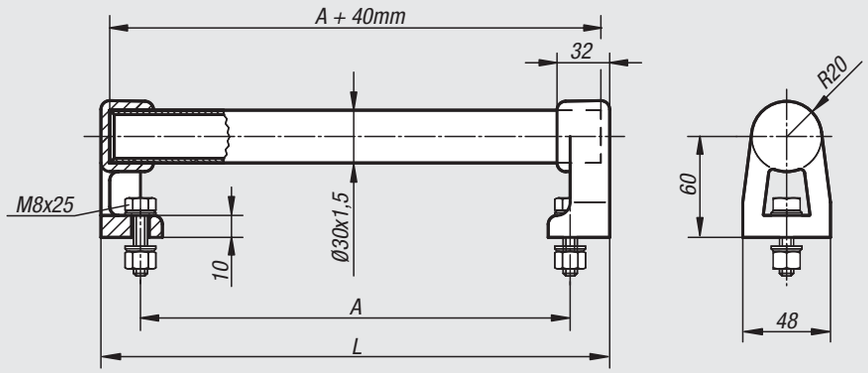
Note:
The legs have 2 or 4 PVC profile pins in the hole for the grip tube. When pushing the tube in these are trimmed off and produce a precise seating.
Black galvanized fastening screws, suitable washers and nuts are supplied.

Assembly:
From the front.

Form A

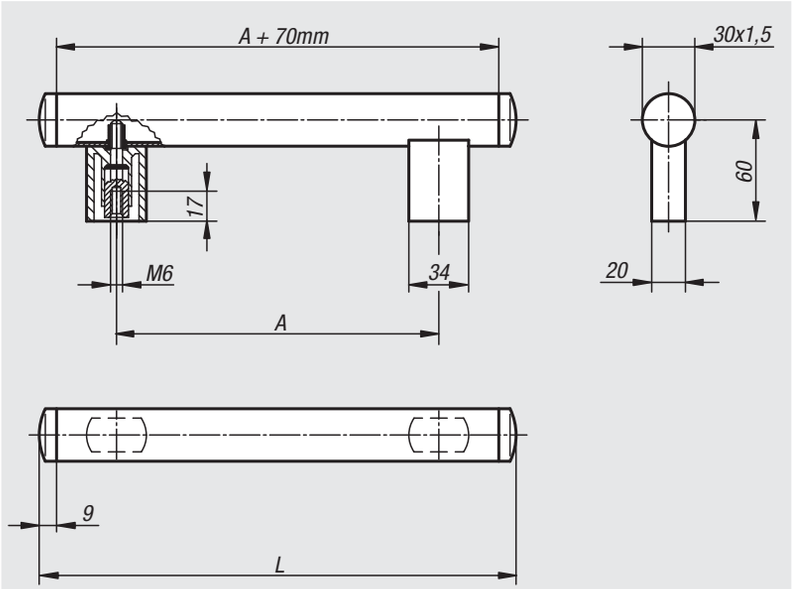


Form B



Order No. natural colour anodized	Order No. serrated plastic cover	Form	A	L	Load capacity N
06939-150203	**06939-150202**	A	150	184	1000
06939-200203	**06939-200202**	A	200	234	1000
06939-300203	**06939-300202**	A	300	334	1000
06939-400203	**06939-400202**	A	400	434	1000
06939-500203	**06939-500202**	A	500	534	1000
06939-150303	**06939-150302**	B	150	200	1000
06939-300303	**06939-300302**	B	300	350	1000
06939-400303	**06939-400302**	B	400	450	1000
06939-200303	**06939-200302**	B	200	250	1000
06939-500303	**06939-500302**	B	500	550	1000

Pull handles tubular



Material:
Legs and tube cap glass-bead reinforced polyamide.
Grip aluminium EN AW-6060.

Version:
Grip finely ground and black anodized or natural colour anodized.
Legs and tube cap semi-matt with fine texture, black.

Sample order:
nlm 06940-200061

Note:
The legs and tube are fastened together with pull-out resistant rivet nuts.

Assembly:
From the rear.

Order No.	Version	A	L	Load capacity N
06940-200061	black anodized	200	288	800
06940-250061	black anodized	250	338	800
06940-300061	black anodized	300	388	800
06940-400061	black anodized	400	488	800
06940-500061	black anodized	500	588	800
06940-200063	natural colour anodized	200	288	800
06940-250063	natural colour anodized	250	338	800
06940-300063	natural colour anodized	300	388	800
06940-400063	natural colour anodized	400	488	800
06940-500063	natural colour anodized	500	588	800

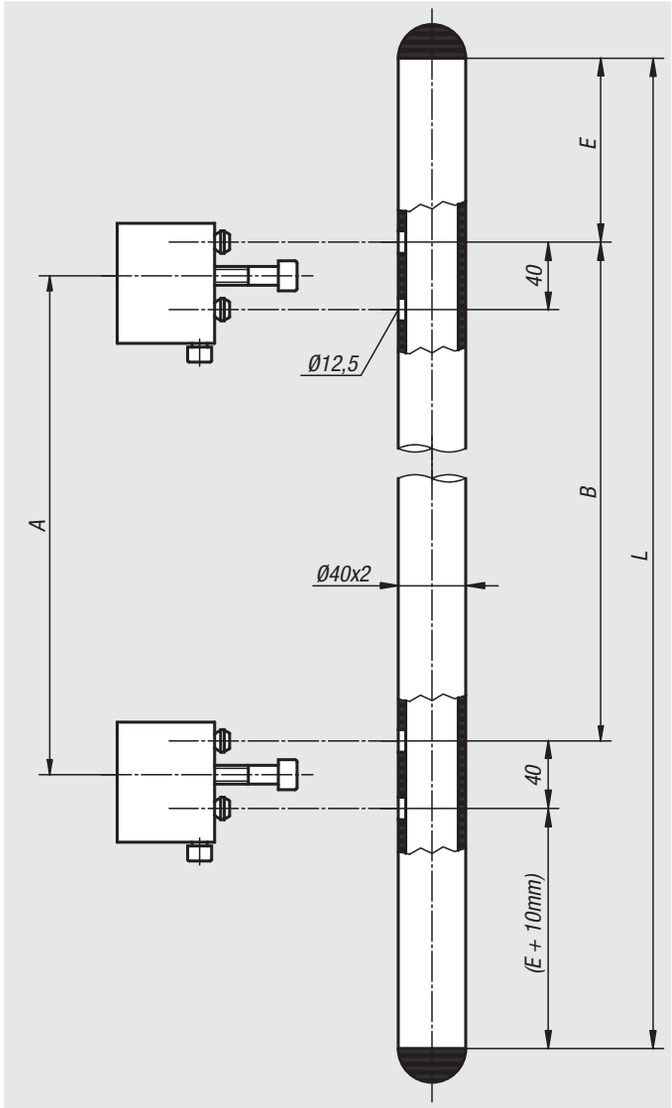
Pull handles tubular

Material:
Grip stainless steel 1.4301.
Legs die-cast aluminium.
End caps glass-bead reinforced plastic.
Screws and locking pins steel.

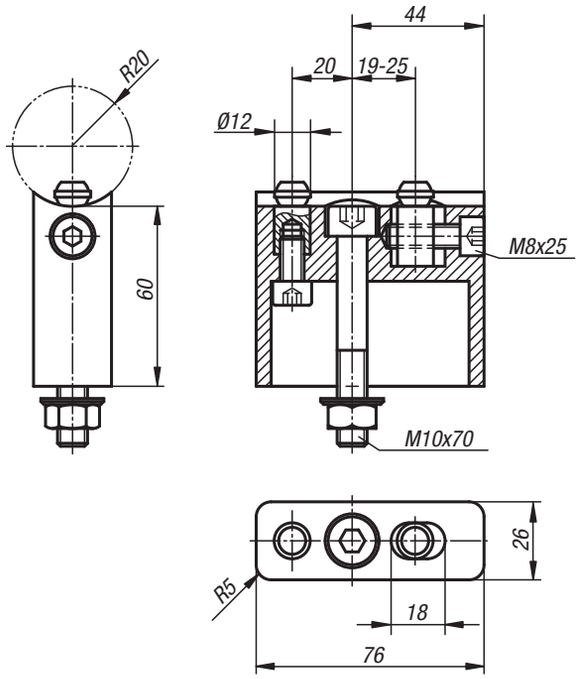
Version:
Grip finely ground.
Legs black powder-coated.
End cap black.
Screws and pins galvanized and chromed.

Sample order:
nlm 06941-0600101

Note:
Heavy duty tubular pull handles for machine and plant construction. Easy mounting from the front. Adjustable leg spacing by the same grip length.



Leg locking diagram:



Order No.	A	B	E	L	Load capacity N
06941-0600101	380	380	85	600	1000
06941-0700101	480	480	85	700	1000
06941-0800101	500	500	125	800	1000
06941-0900101	600	600	125	900	1000
06941-1000101	700	700	125	1000	1000

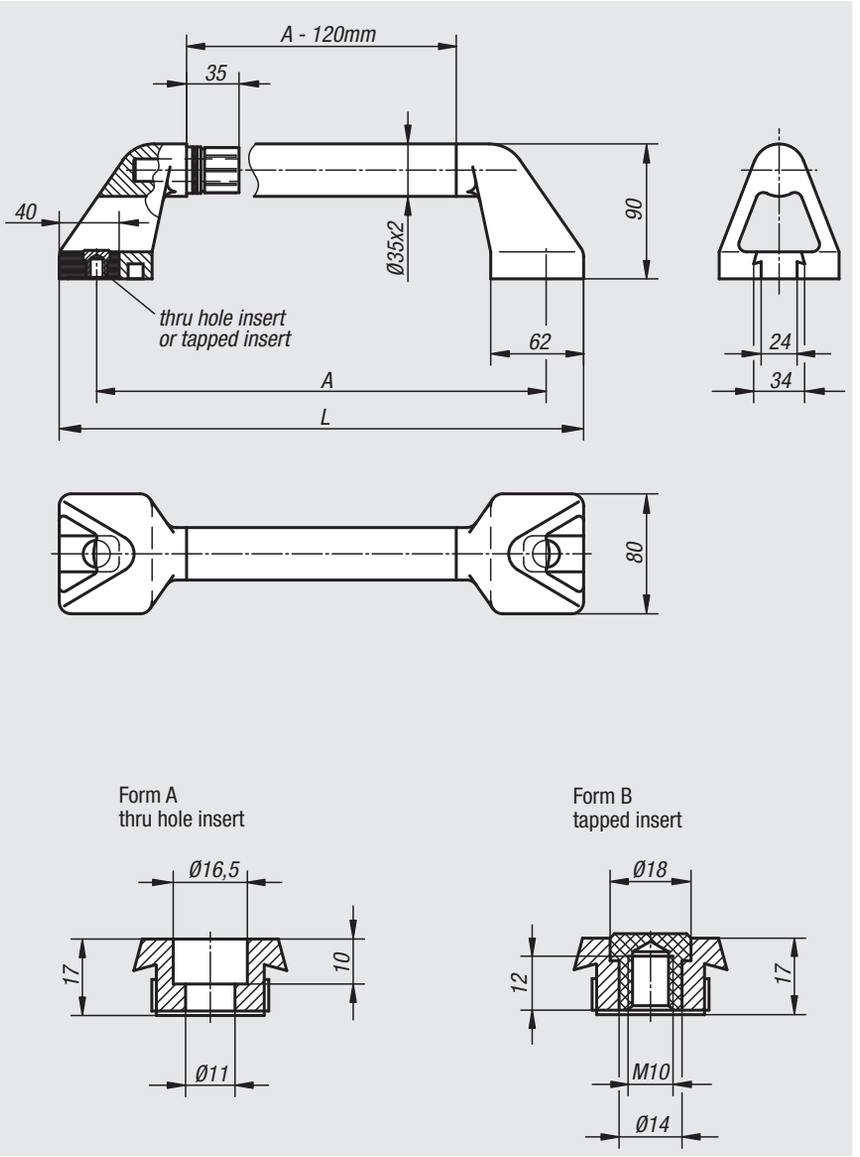
Pull handles tubular

Material:
Legs glass-bead reinforced thermoplastic.
Grip stainless steel 1.4301.
Inserts stainless steel 1.4305.

Version:
Legs fine structured, black.
Grip fine ground.
Inserts fine turned.

Sample order:
nlm 06942-300101

Note:
Locking webs allow a precision fit of the tube on the plastic leg boss.
Splash-proof with O-ring seals.
Different fastening inserts allow mounting from the front, rear or with each other.
Handles with through hole inserts (Form A) are supplied with stainless steel fasteners.
Handles with tapped inserts (Form B) are supplied without fasteners.



Order No.	Form	A	L	Load capacity N
06942-300101	A	300	350	1000
06942-350101	A	350	400	1000
06942-400101	A	400	450	1000
06942-500101	A	500	550	1000
06942-600101	A	600	650	1000
06942-300102	B	300	350	1000
06942-350102	B	350	400	1000
06942-400102	B	400	450	1000
06942-500102	B	500	550	1000
06942-600102	B	600	650	1000

Pull handles tubular stainless steel

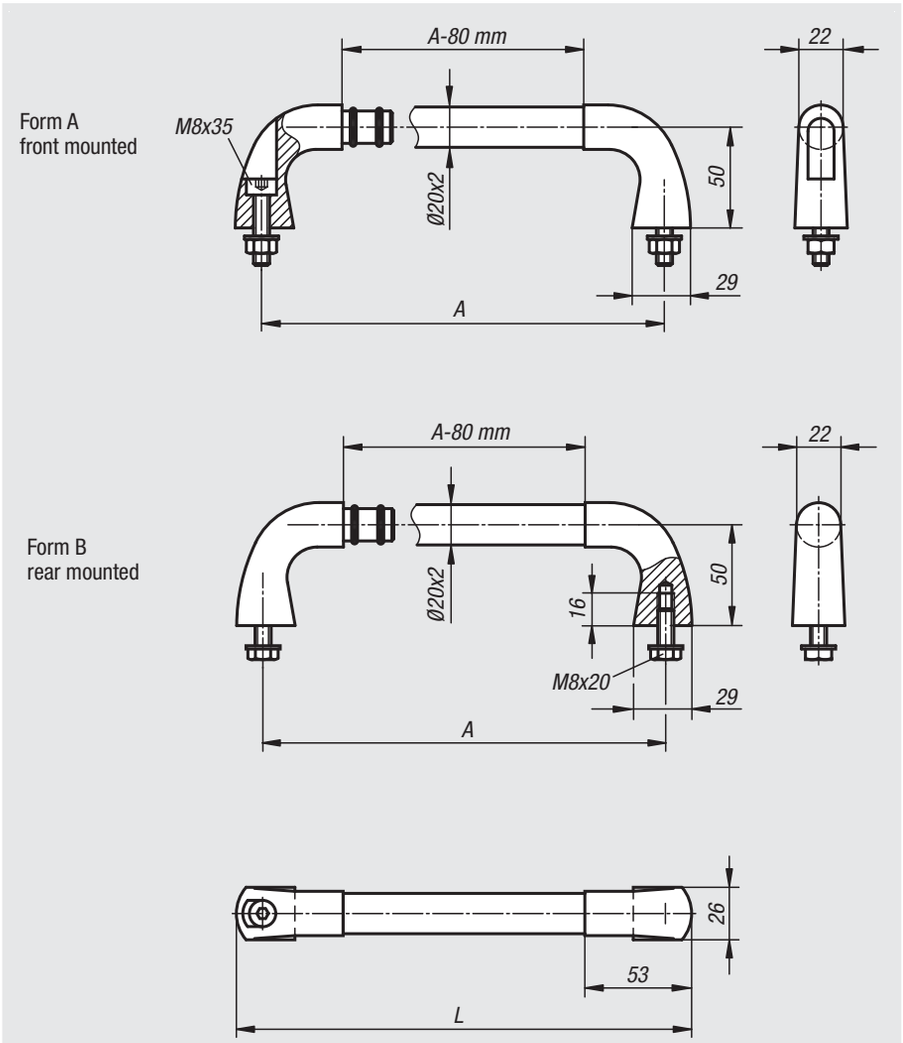
Material:
Grip and fasteners stainless steel 1.4301,
Legs investment cast 1.4581

Version:
Grip finely ground or with ribbed black plastic sleeve.
Legs abrasive cleaned and matt-gloss electropolished.

Sample order:
nlm 06943-200081

Note:
Socket head screws with nuts and washers are supplied for handles Form A.
Hexagon head screws and suitable washers are supplied for handles Form B.

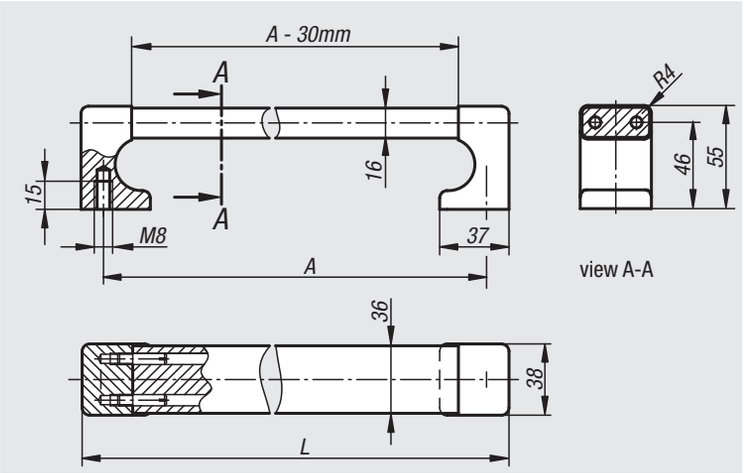
Assembly:
Form A from the front.
Form B from the rear.



Order No.	Form	Version	A	L	Load capacity N
06943-200081	A	tube ground	200	226	1000
06943-300081	A	tube ground	300	326	1000
06943-400081	A	tube ground	400	426	1000
06943-200082	A	tube with plastic cover	200	226	1000
06943-300082	A	tube with plastic cover	300	326	1000
06943-400082	A	tube with plastic cover	400	426	1000
06943-200083	B	tube ground	200	226	1000
06943-300083	B	tube ground	300	326	1000
06943-400083	B	tube ground	400	426	1000
06943-200084	B	tube with plastic cover	200	226	1000
06943-300084	B	tube with plastic cover	300	326	1000
06943-400084	B	tube with plastic cover	400	426	1000

06944

Pull handles



Material:
Legs and grip aluminium EN AW-6060.
Connecting pins stainless steel.

Version:
Legs and grip finely ground, black anodized or natural colour anodized.

Sample order:
nlm 06944-250081

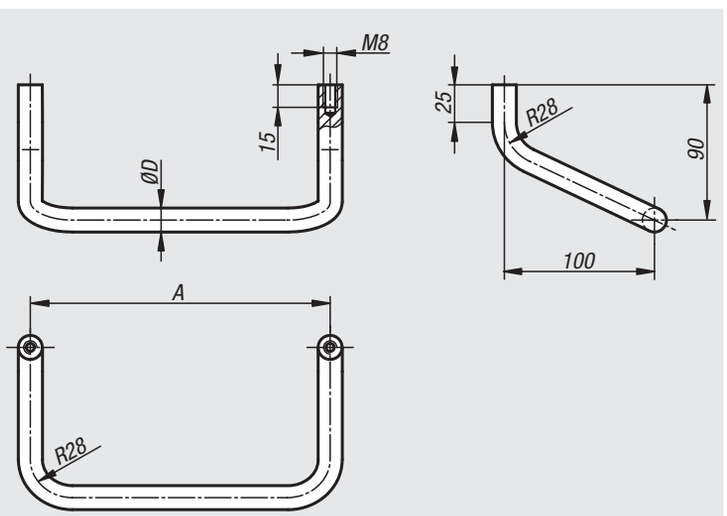
Note:
The solid construction permits this handle series to also be used as edge protectors.

Assembly:
From the rear.

Order No. black anodized	Order No. natural colour anodized	A	L	Load capacity N
06944-250081	**06944-250083**	250	274	1000
06944-300081	**06944-300083**	300	324	1000
06944-400081	**06944-400083**	400	424	1000
06944-500081	**06944-500083**	500	524	1000
06944-600081	**06944-600083**	600	624	1000

06945

Pull handles angled



Material:
Round aluminium EN AW-6060

Version:
Ground, glass blasted and matt-gloss black anodized.

Sample order:
nlm 06945-20016

Note:
End washers not included.

Assembly:
From the rear.

On request:
Any handle length.

Order No.	A	D	Load capacity N	Order No. end washer
06945-20016	200	16	1000	06945-16
06945-25016	250	16	1000	06945-16
06945-30016	300	16	1000	06945-16
06945-40016	400	16	1000	06945-16
06945-50018	500	18	1000	06945-18

Pull handles

Material:
Round steel

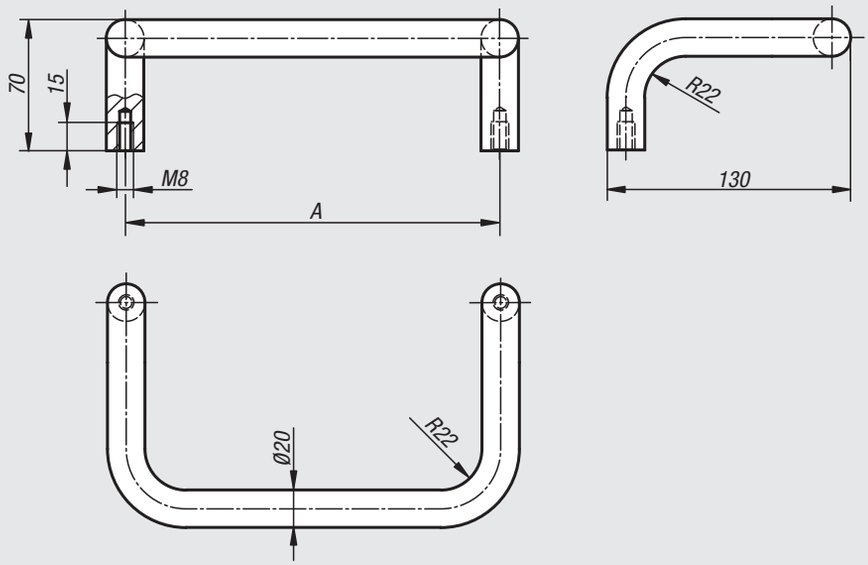
Version:
Ground, brushed and matt-chromed or black powder-coated with fine texture

Sample order:
nlm 06946-200081

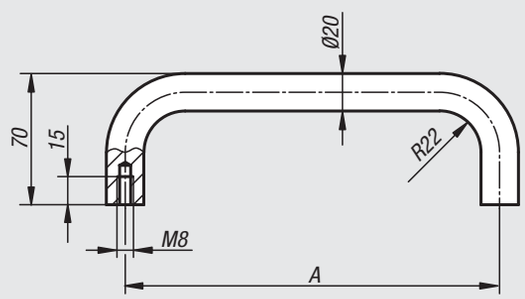
Note:
Available as straight or right-angled handle.

Assembly:
From the rear.

Form A

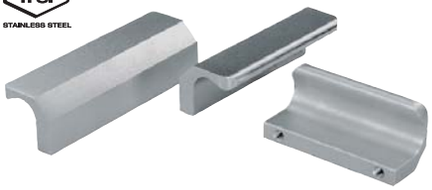


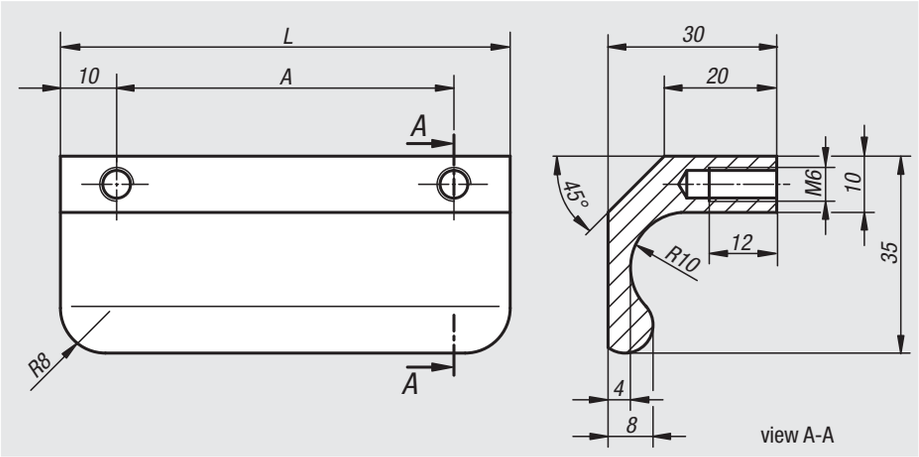
Form B



Order No.	Form	Version	A	Load capacity N
06946-200081	A	matt-chromed	200	1000
06946-350081	A	matt-chromed	350	1000
06946-200082	A	black powder-coated	200	1000
06946-350082	A	black powder-coated	350	1000
06946-200083	B	matt-chromed	200	1000
06946-250083	B	matt-chromed	250	1000
06946-300083	B	matt-chromed	300	1000
06946-350083	B	matt-chromed	350	1000
06946-200084	B	black powder-coated	200	1000
06946-250084	B	black powder-coated	250	1000
06946-300084	B	black powder-coated	300	1000
06946-350084	B	black powder-coated	350	1000

Ledge handles stainless steel





Material:
Profile stainless steel 1.4404

Version:
Abrasive cleaned and matt-gloss electropolished.

Sample order:
nlm 06951-06006

Assembly:
From the rear.

On request:
Any other lengths.

Order No.	A	L	Load capacity N
06951-06006	60	80	1000
06951-08006	80	100	1000
06951-10006	100	120	1000
06951-13006	130	150	1000

Ledge handles

Material:
Profile aluminium EN AW-6060

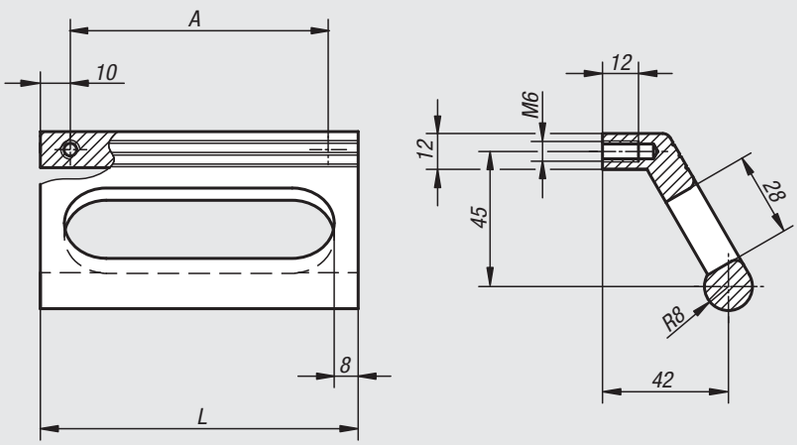
Version:
Matt-gloss anodized.

Sample order:
nlm 06952-086061

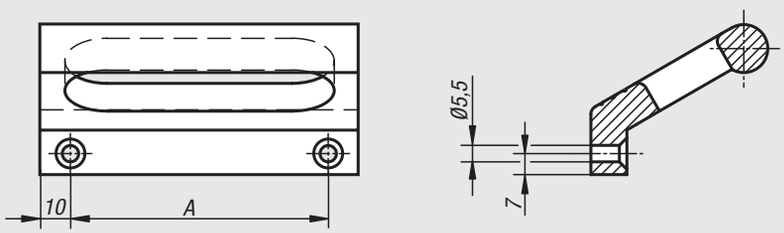
Note:
These ledge handles are available with M6 internal thread or with through hole for M5 countersunk screws for front mounting.

Assembly:
Form A from the rear.
Form B from the front.

Form A

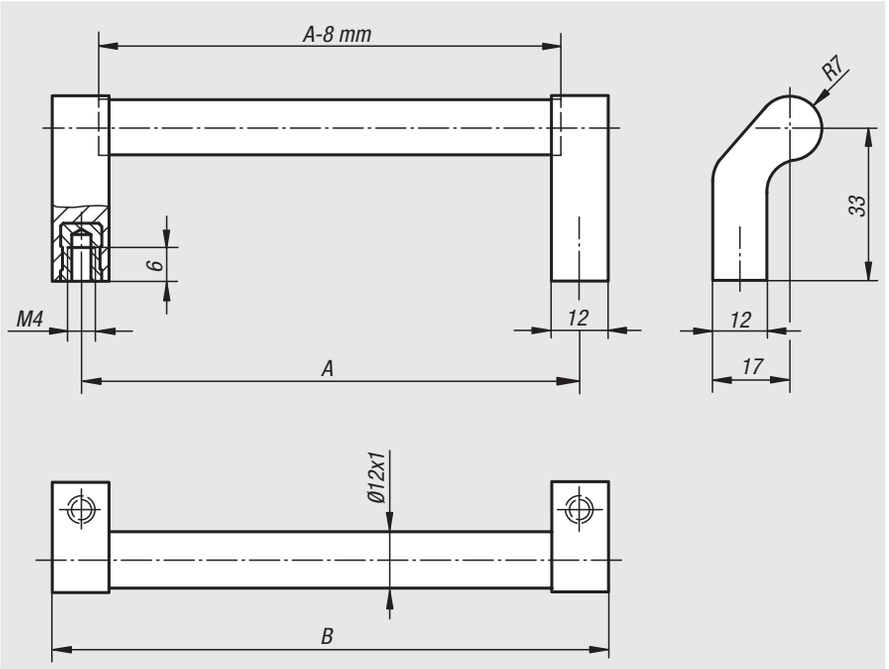


Form B



Order No.	Form	Version	A	L	Load capacity N
06952-086061	A	black anodized	86	106	500
06952-100061	A	black anodized	100	120	500
06952-120061	A	black anodized	120	140	500
06952-086063	A	natural colour anodized	86	106	500
06952-100063	A	natural colour anodized	100	120	500
06952-120063	A	natural colour anodized	120	140	500
06952-086051	B	black anodized	86	106	500
06952-100051	B	black anodized	100	120	500
06952-120051	B	black anodized	120	140	500
06952-086053	B	natural colour anodized	86	106	500
06952-100053	B	natural colour anodized	100	120	500
06952-120053	B	natural colour anodized	120	140	500

Tubular handles angled



Material:
Grip aluminium EN AW-6060 or stainless steel 1.4301.
Legs polyamide glass-bead reinforced.
Bushing brass.

Version:
Grip natural colour, black anodized or finely ground stainless steel.
Legs matt black.

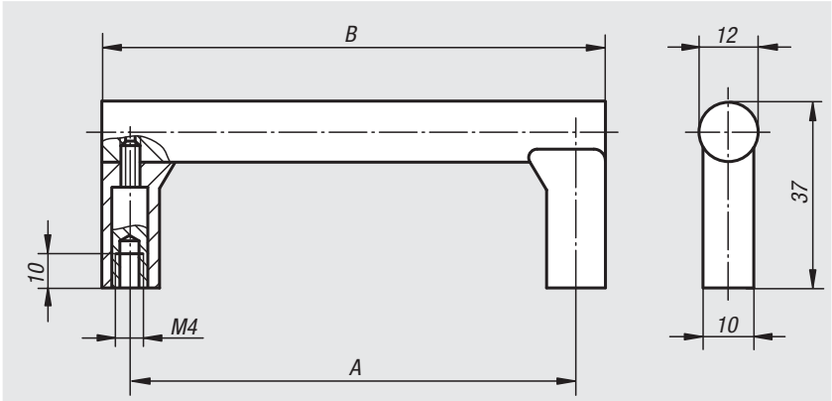
Sample order:
nlm 06956-088041

Note:
Clamping webs give a precision fit of tube to legs.

Assembly:
From the rear.

Order No.	Version	A	B	Load capacity N
06956-088041	natural colour anodized	88	100	200
06956-096041	natural colour anodized	96	108	200
06956-120041	natural colour anodized	120	132	200
06956-128041	natural colour anodized	128	140	200
06956-160041	natural colour anodized	160	172	200
06956-180041	natural colour anodized	180	192	200
06956-088042	black anodized	88	100	200
06956-096042	black anodized	96	108	200
06956-120042	black anodized	120	132	200
06956-128042	black anodized	128	140	200
06956-160042	black anodized	160	172	200
06956-180042	black anodized	180	192	200
06956-088043	stainless steel	88	100	200
06956-096043	stainless steel	96	108	200
06956-120043	stainless steel	120	132	200
06956-128043	stainless steel	128	140	200
06956-160043	stainless steel	160	172	200
06956-180043	stainless steel	180	192	200

Tubular handles



Material:
Grip aluminium EN AW-6060.
Legs polyamide glass-bead reinforced.
Bushing brass.

Version:
Grip fine ground and natural colour or black anodized.
Legs aluminium colour or black.

Sample order:
nlm 06958-1055041

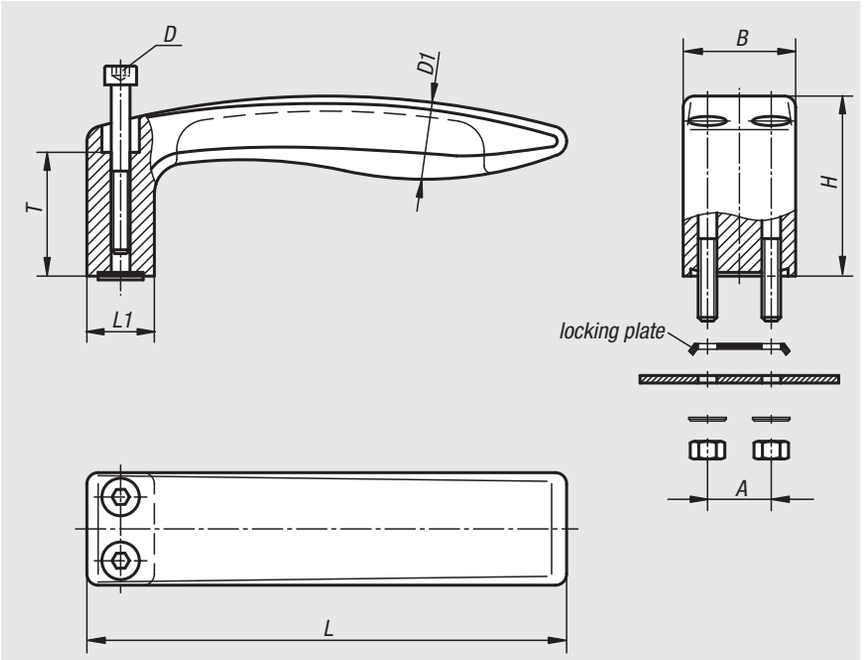
Note:
Grip and legs are screwed securely together.

Assembly:
From the rear.

Order No. Grip natural colour	Order No. Grip black	Version	A	B	Load capacity N
06958-1055041	**06958-1055043**	Legs aluminium colour	55	67	300
06958-1088041	**06958-1088043**	Legs aluminium colour	88	100	300
06958-1100041	**06958-1100043**	Legs aluminium colour	100	112	300
06958-1120041	**06958-1120043**	Legs aluminium colour	120	132	300
06958-1180041	**06958-1180043**	Legs aluminium colour	180	192	300
06958-1055042	**06958-1055044**	Legs black	55	67	300
06958-1088042	**06958-1088044**	Legs black	88	100	300
06958-1100042	**06958-1100044**	Legs black	100	112	300
06958-1120042	**06958-1120044**	Legs black	120	132	300
06958-1180042	**06958-1180044**	Legs black	180	192	300

Pull handles

open-ended screw on



Material:
Glass-bead reinforced thermoplastic.
Fastening material 1.4301.

Version:
Matt black with fine texture.

Sample order:
nlm 06959-12805

Note:
These open-ended handles can be mounted right or left. They are form stable and have a high load rating. Fastening bolts, nuts and washers are supplied as is a locking plate to prevent twisting.

Assembly:
From the front.

Order No.	A	B	D	D1	H	L	L1	T	Load capacity N
06959-12805	17	30	M5x45	20	48	128	18	33	800
06959-15606	20	36	M6x55	24	58	156	22	40	1000

Recessed handles

19"

Material:
Grip aluminium profile.
End caps polyamide.
Form A: rubber profile for mounting.
Form B: 2 steel countersunk screws for mounting.

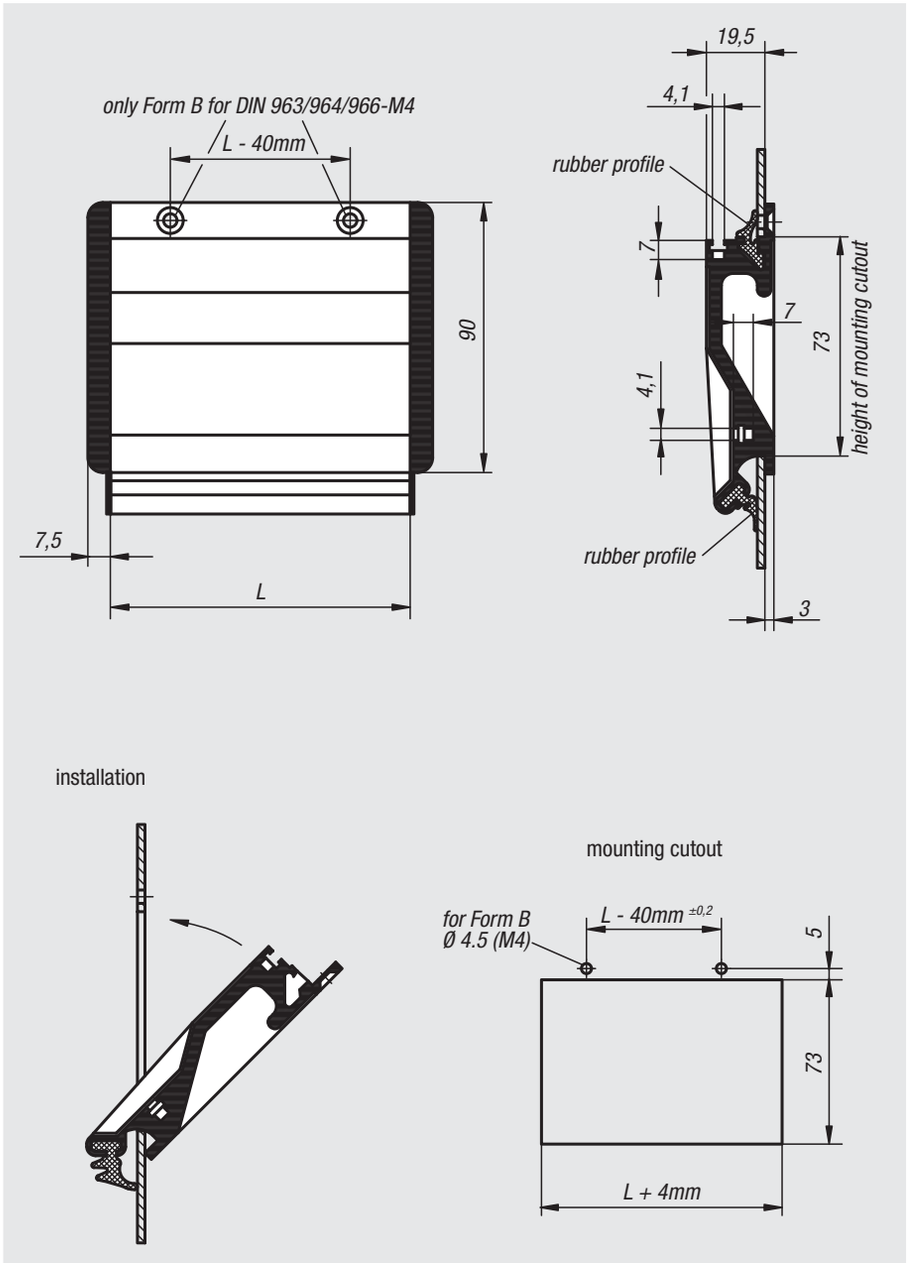
Version:
Handle glass-bead blasted, satin finish and black anodized or natural colour anodized.
Rubber profile black.
Fastening screws galvanized.

Sample order:
nlm 06960-10011

Note:
The Form A handles can be mounted without screws by material thicknesses of 1 - 2.5 mm. Two rubber profiles ensure an absolutely firm hold.
The Form B handles can be mounted from the front with 2 countersunk screws.

Two cross-slots offset by 90° for M4 screws allow an earthing cable to be connected and can serve as mounting aids for additional parts.

Assembly:
After fitting the lower rubber profile, press the two side caps onto the handle. Next press the handle over the lower edge of the mounting cutout at a 45° angle and then push it up against the housing panel.
Now, depending on which type is being used, push the 2nd rubber profile into the upper groove or fix in place with 2 countersunk screws.



Order No. black anodized	Order No. natural colour anodized	Form	L	Mounting cutout	Load capacity N
06960-10011	**06960-10013**	A	100	104 x 73	500
06960-11811	**06960-11813**	A	118	122 x 73	500
06960-16711	**06960-16713**	A	167	171 x 73	500
06960-10021	**06960-10023**	B	100	104 x 73	500
06960-11821	**06960-11823**	B	118	122 x 73	500
06960-16721	**06960-16723**	B	167	171 x 73	500

Recessed handles fold-down

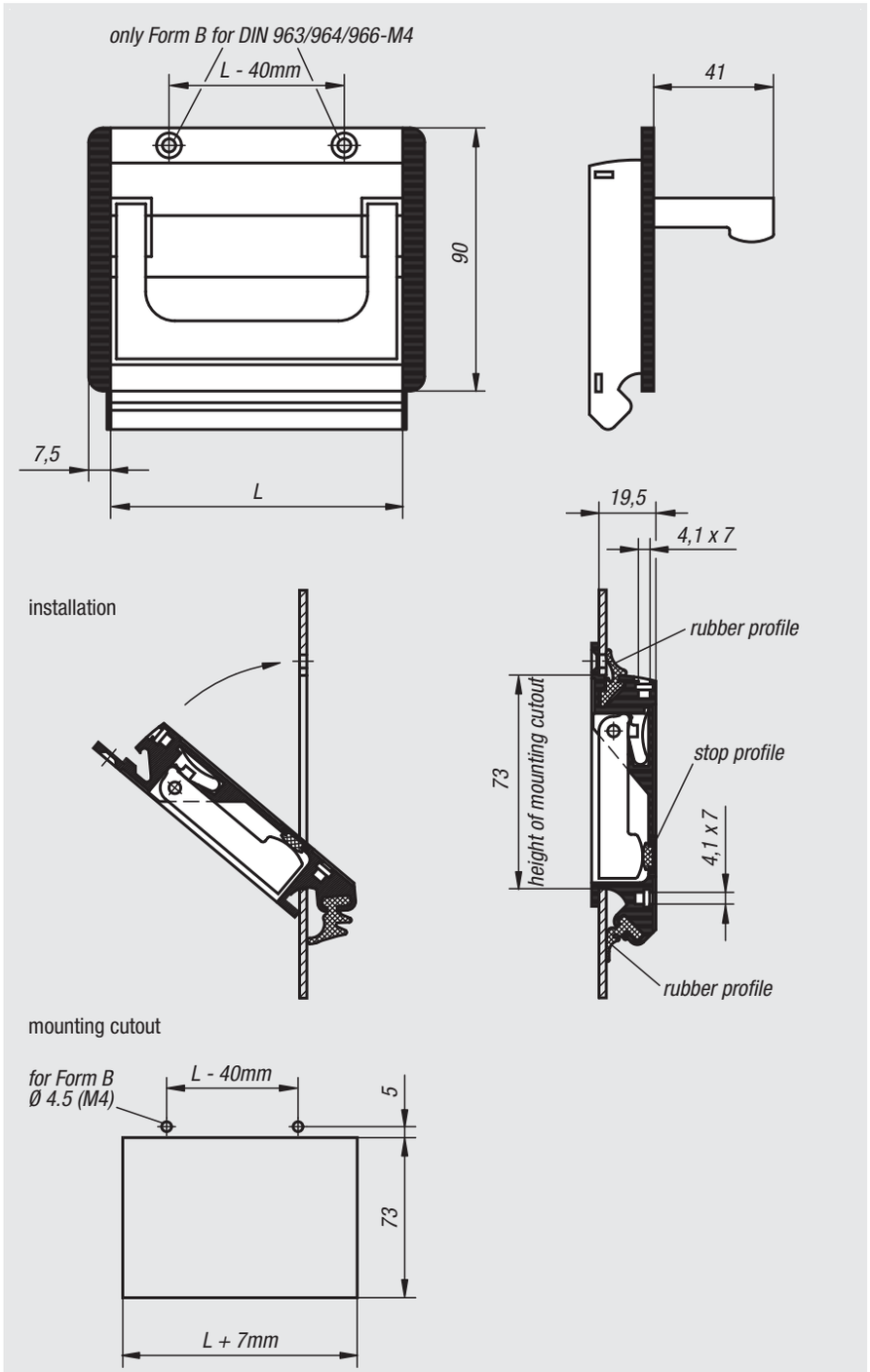
Material:
Tray and grip aluminium profile.
End caps polyamide.
Form A: Rubber profile for mounting.
Form B: 2 steel countersunk screws for mounting.

Version:
Tray and grip glass-bead blasted, satin finish and black anodized or natural colour anodized.
Rubber profile black.
Fastening screws galvanized

Sample order:
nlm 06961-10011

Note:
Form A handles can be mounted without screws for material thicknesses of 1 - 2.5 mm using 2 rubber profiles.
Form B handles can be mounted from the front with 2 countersunk screws.
Two cross-slots for M4 screws allow earthing connection and can serve as a mounting aid for additional parts.

Assembly:
After fitting the lower rubber profile, press the two side caps onto the handle. Next press the handle over the lower edge of the mounting cutout at a 45° angle and then push it up against the housing panel.
Now push the 2nd rubber profile into the upper groove or fix in place with 2 countersunk screws.



Order No. tray and folding handle black anodized	Order No. tray and folding handle natural colour anodized	Form	L	Mounting cutout	Load capacity N
06961-10011	**06961-10013**	A	100	107 x 73	500
06961-11811	**06961-11813**	A	118	125 x 73	500
06961-16711	**06961-16713**	A	167	174 x 73	500
06961-10021	**06961-10023**	B	100	107 x 73	500
06961-11821	**06961-11823**	B	118	125 x 73	500
06961-16721	**06961-16723**	B	167	174 x 73	500

Recessed handles fold-down

Material:
Die-cast aluminium.

Version:
Tray and handle black or light grey powder-coated, semi-matt.

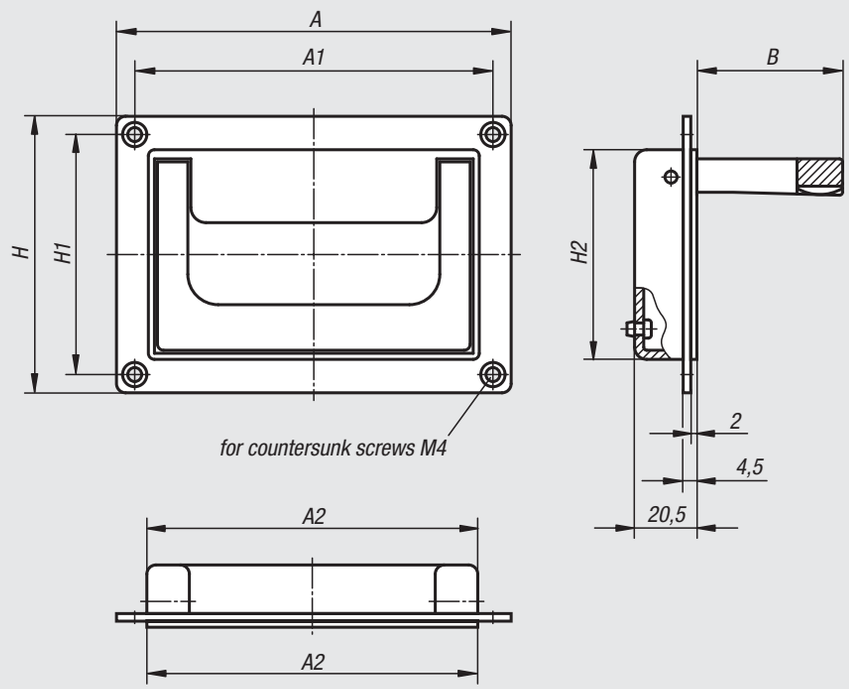
Sample order:
nlm 06962-05018411

Note:
With their modern design recessed fold-down handles can be used wherever solid and attractive handles are required.
Handles Form A snap into both resting and working positions.
Handles Form B swivel back into the resting position automatically after use.

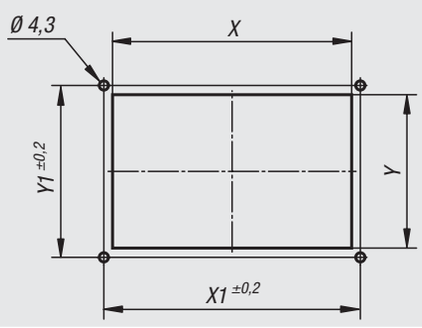
Assembly:
The handles can be installed from the front or rear of the housing panel with the same housing cutout.

Form A
handle snaps both into working and resting positions

Form B
handle swivels back automatically into resting position



mounting cutout



Order No.	Form	Version	A	A1	A2	B	H	H1	H2	X	X1	Y	Y1	Load capacity N
06962-07911811	A	black powder-coated	130	118	109	48	91	79	69	110	118	70,5	79	500
06962-05018411	A	black powder-coated	200	184	170	51	80	50	72	171	184	73	50	500
06962-07911812	A	light grey powder-coated	130	118	109	48	91	79	69	110	118	70,5	79	500
06962-05018412	A	light grey powder-coated	200	184	170	51	80	50	72	171	184	73	50	500
06962-07911821	B	black powder-coated	130	118	109	48	91	79	69	110	118	70,5	79	500
06962-05018421	B	black powder-coated	200	184	170	51	80	50	72	171	184	73	50	500
06962-07911822	B	light grey powder-coated	130	118	109	48	91	79	69	110	118	70,5	79	500
06962-05018422	B	light grey powder-coated	200	184	170	51	80	50	72	171	184	73	50	500

Recessed handles

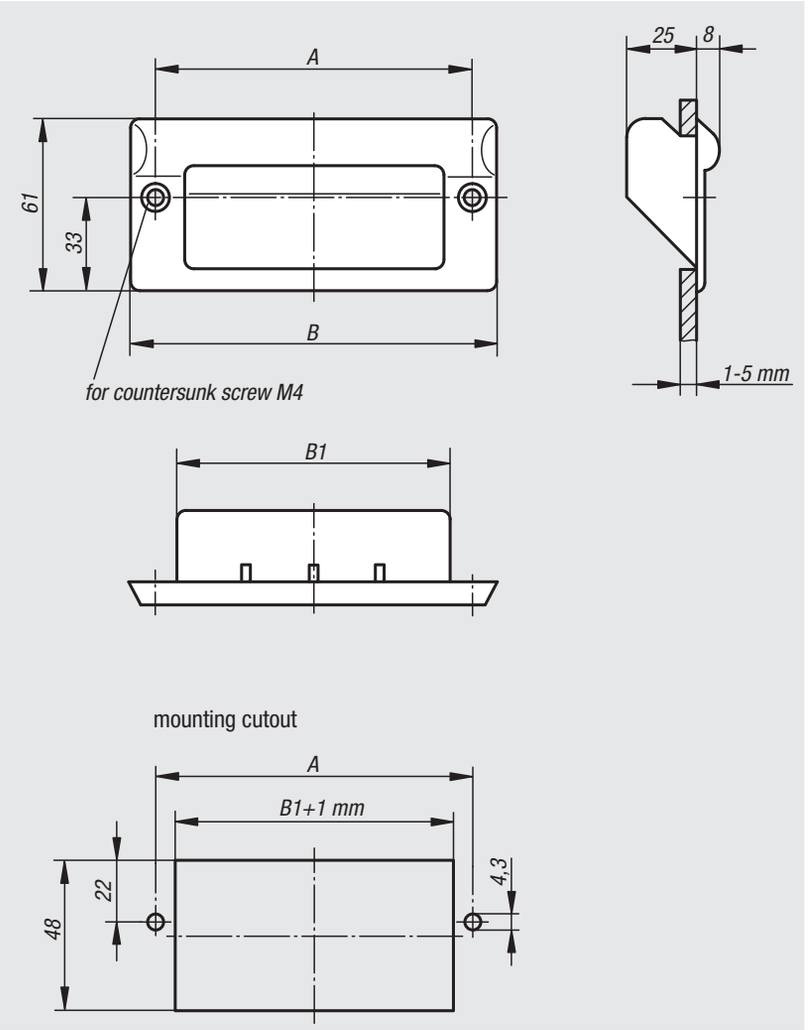
Material:
Glass-bead reinforced thermoplastic.

Version:
Semi-matt, black or light grey.

Sample order:
nlm 06965-1082041

Note:
These ergonomically shaped handles are ideally suited for wall thicknesses of 1-5 mm.

Assembly:
The handle is inserted in the cutout of the housing panel and then fixed from front with 2 countersunk screws (not included).



Order No.	Colour	A	B	B1	Load capacity N
06965-1082041	black	82	100	67	1000
06965-1112041	black	112	130	97	1000
06965-1082042	light grey	82	100	67	1000
06965-1112042	light grey	112	130	97	1000

Recessed handles fold-down

stainless steel

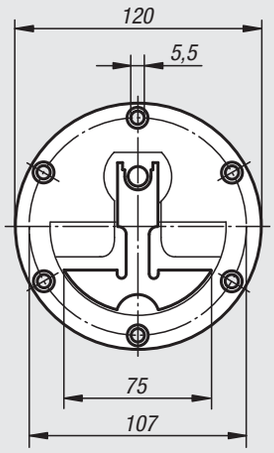
Material:
Stainless steel 1.4301.

Version:
High-gloss electropolished.

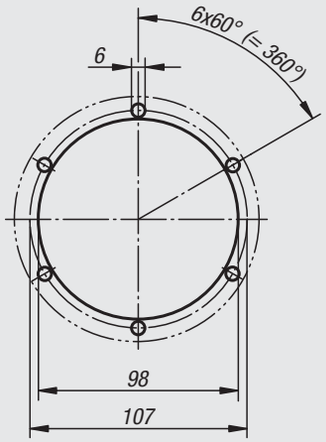
Sample order:
nlm 06970-1120000

Note:
Stainless steel retractable grips with marginal installation depth. For base and mounting plates or drawers. With return spring. The grip automatically swivels back into its resting position after use.

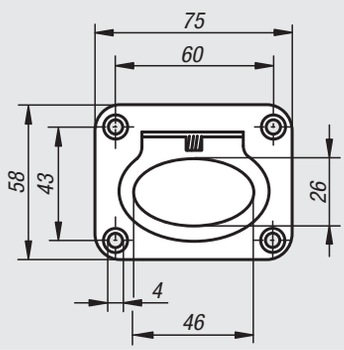
Form A



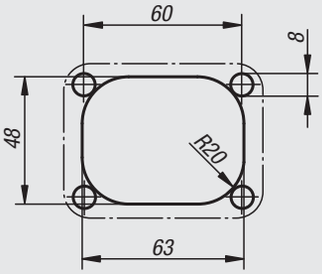
mounting cutout



Form B



mounting cutout



Order No.	Form	Load capacity N
06970-1120000	A	200
06970-2075058	B	200

Pull handles angled

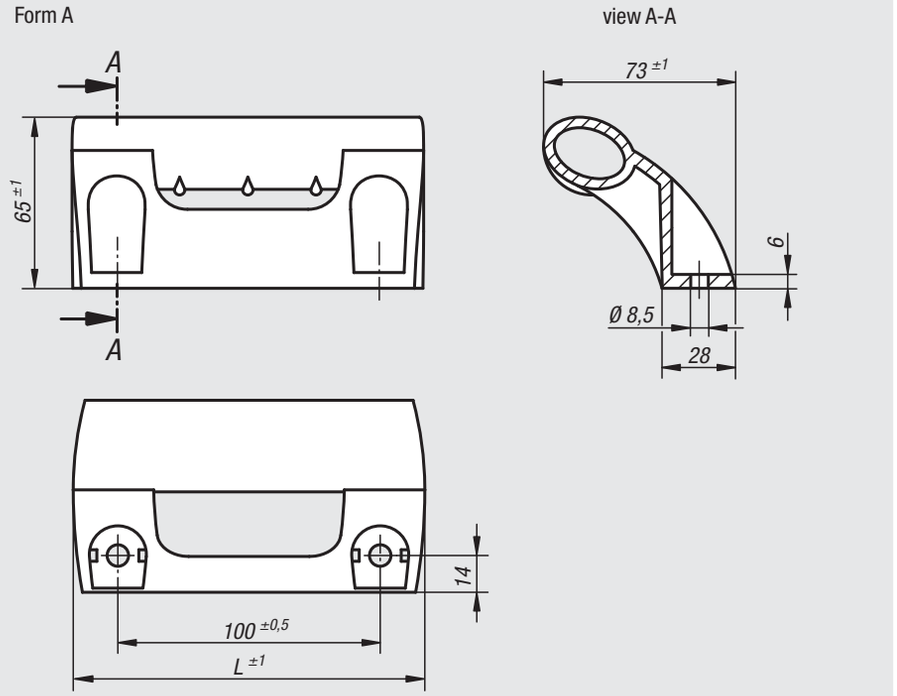
Material:
Glass-bead reinforced thermoplastic PA

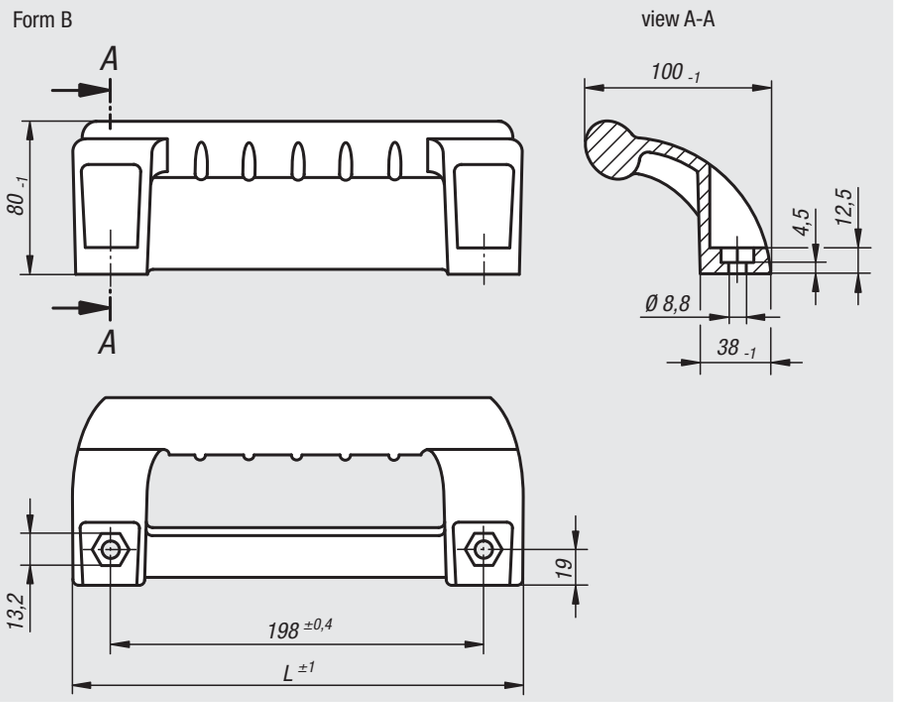
Version:
Black

Sample order:
nlm 06975-100081
06975-1 (2 per pack)

Note:
Ergonomic design pull handles with finger shield. For mounting on doors, hatches and aluminium profiles. Ideal for double-leaf doors. Fastening with hexagon or socket head M8 bolts.

Cover caps are not supplied.



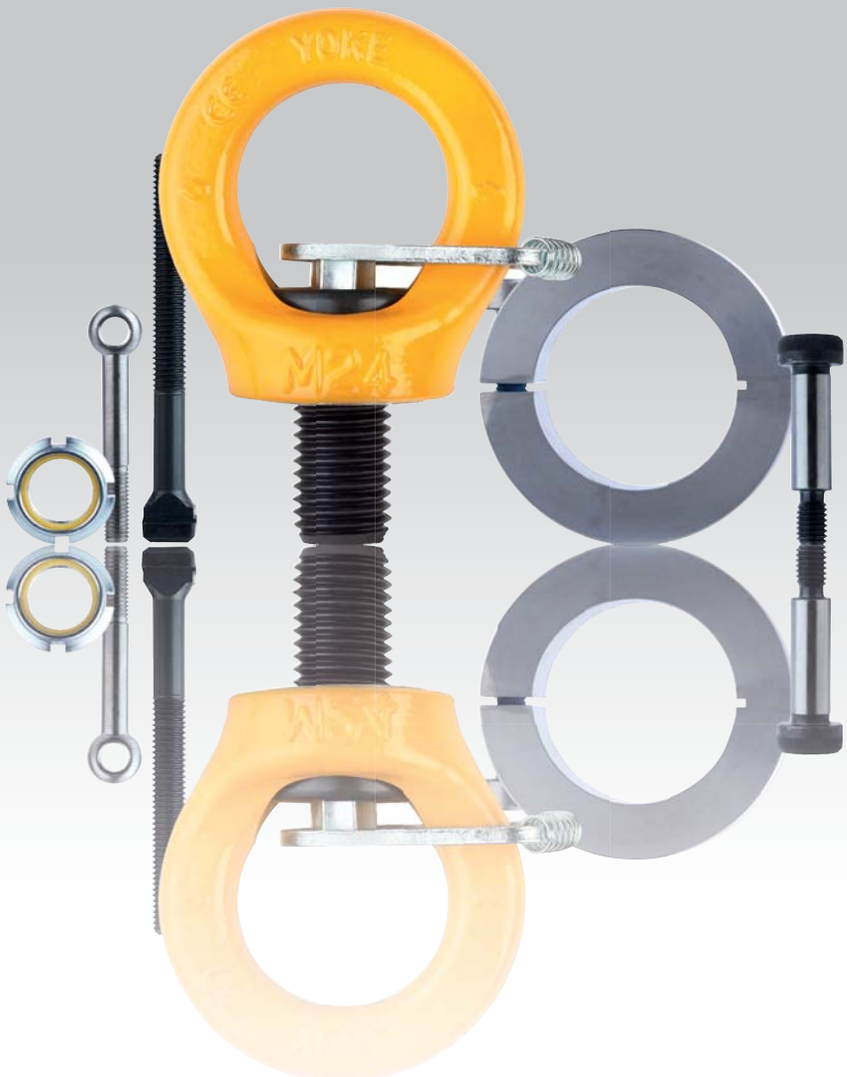


Order No.	Form	L	Load capacity N	Order No. cover caps
06975-100081	A	134	1000	06975-1
06975-198081	B	236	1000	06975-3

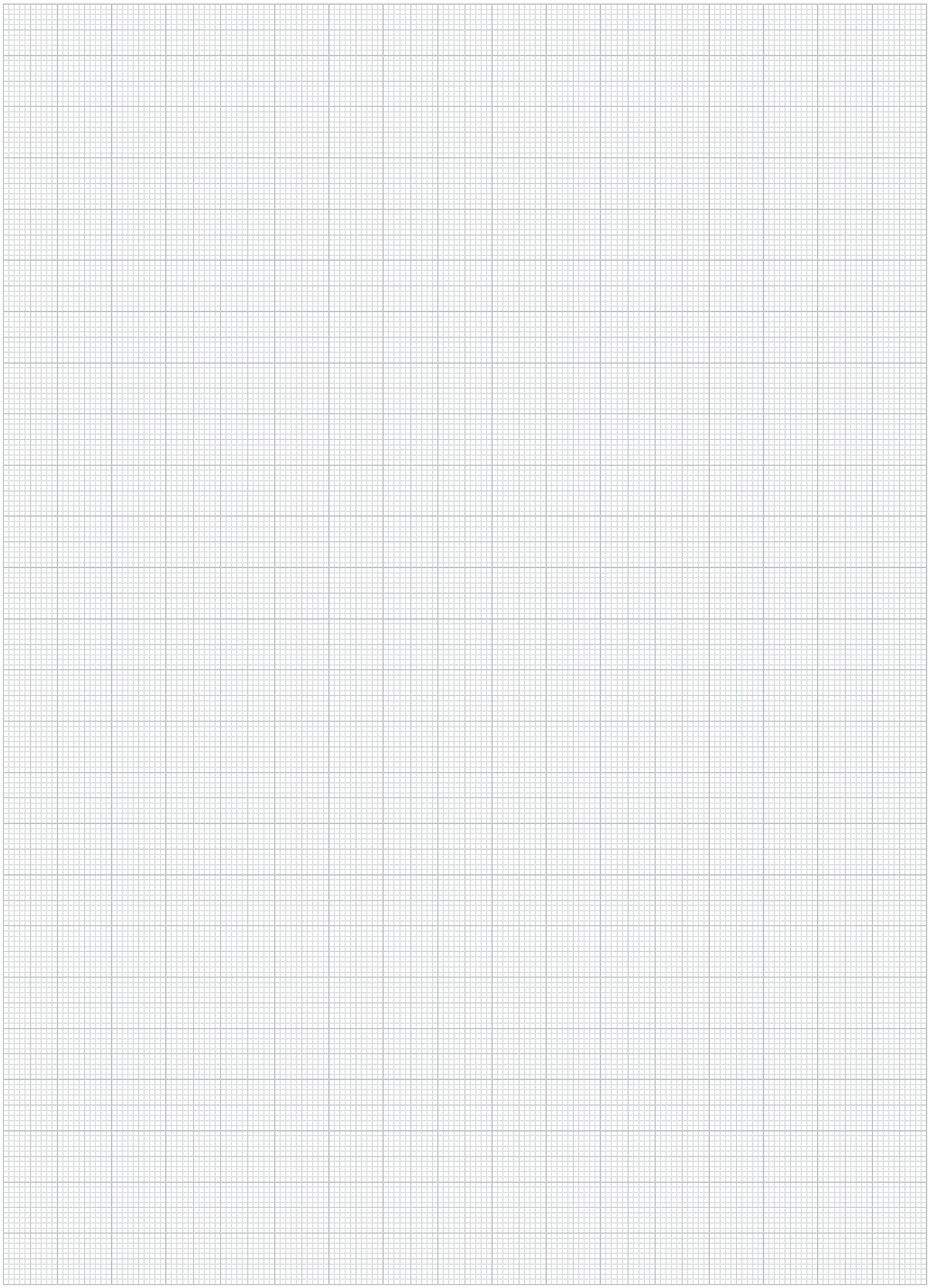
Notes

07000

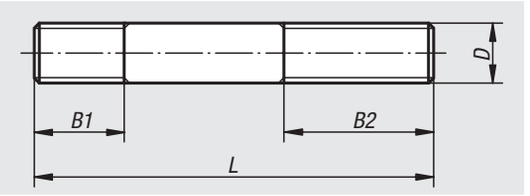
Fasteners
Ball-end thrust screws and grippers
Thrust screws and thrust pads
Torque bolts and threaded inserts
Lifting bolts
Swivel bales
Ring bolts



Notes



Studs



Material:
Carbon steel 1.1181.

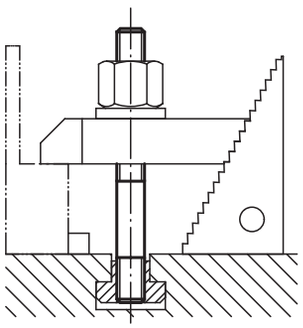
Version:
Tempered to 8.8 and black oxidised.

Sample order:
nlm 07020-308

Note:
Permissible load: see Technical Information.

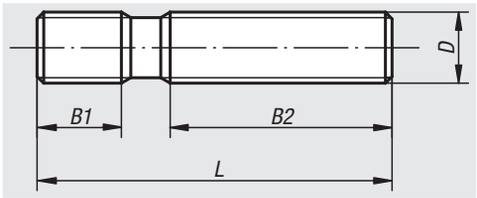
On request:
Stainless steel.

Order No.	D	L	B1	B2
07020-105	M5	20	7	10
07020-205	M5	30	7	10
07020-106	M6	25	10	12
07020-206	M6	35	10	12
07020-306	M6	45	10	12
07020-406	M6	60	10	12
07020-108	M8	40	12	25
07020-208	M8	50	12	25
07020-308	M8	70	12	25
07020-408	M8	80	12	25
07020-110	M10	50	15	30
07020-210	M10	67	15	30
07020-310	M10	80	15	30
07020-410	M10	100	15	30
07020-112	M12	56	18	30
07020-212	M12	67	18	30
07020-312	M12	80	18	30
07020-412	M12	100	18	30
07020-512	M12	125	18	30
07020-114	M14	60	20	30
07020-214	M14	80	20	30
07020-314	M14	100	20	30
07020-414	M14	125	20	30
07020-514	M14	150	20	30
07020-116	M16	75	25	30
07020-216	M16	100	25	30
07020-316	M16	125	25	30
07020-416	M16	150	25	30
07020-120	M20	100	30	40
07020-220	M20	125	30	40
07020-320	M20	150	30	40
07020-420	M20	180	30	40



Studs

DIN 6379



Material:
Carbon steel.

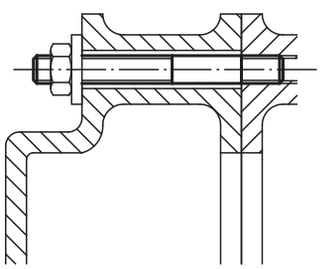
Version:
Thread rolled.
M6-M12 tempered to 10.9, black.
M14-M36 tempered to 8.8, black.

Sample order:
nlm 07030-12125

Note:

Permissible load: see Technical Information.

Order No.	D	L	B1	B2
07030-0632	M6	32	9	16
07030-0640	M6	40	9	20
07030-0650	M6	50	9	30
07030-0663	M6	63	9	40
07030-0680	M6	80	9	50
07030-06100	M6	100	9	63
07030-0840	M8	40	11	20
07030-0863	M8	63	11	40
07030-0880	M8	80	11	50
07030-08100	M8	100	11	63
07030-08125	M8	125	11	75
07030-08160	M8	160	11	100
07030-1050	M10	50	13	25
07030-1080	M10	80	13	50
07030-10100	M10	100	13	75
07030-10125	M10	125	13	75
07030-10160	M10	160	13	100
07030-10200	M10	200	13	125
07030-1250	M12	50	15	25
07030-1263	M12	63	15	32
07030-1280	M12	80	15	50
07030-12100	M12	100	15	63
07030-12125	M12	125	15	75
07030-12160	M12	160	15	100
07030-12200	M12	200	15	125
07030-1463	M14	63	17	32
07030-1480	M14	80	17	50
07030-14100	M14	100	17	63
07030-14125	M14	125	17	75
07030-14160	M14	160	17	100
07030-14200	M14	200	17	125
07030-14250	M14	250	17	160
07030-1663	M16	63	19	32
07030-1680	M16	80	19	50
07030-16100	M16	100	19	63
07030-16125	M16	125	19	75
07030-16160	M16	160	19	100
07030-16200	M16	200	19	125
07030-16250	M16	250	19	160
07030-16315	M16	315	19	180
07030-16350	M16	350	19	200
07030-16500	M16	500	20	315



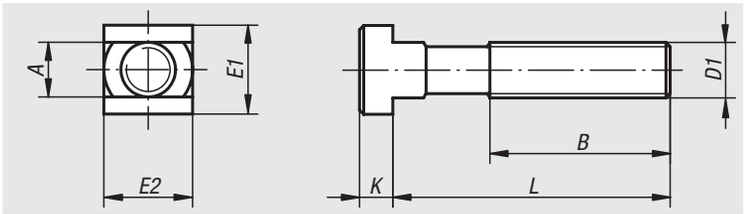
Studs

DIN 6379

Order No.	D	L	B1	B2
07030-1880	M18	80	23	50
07030-18125	M18	125	23	75
07030-18160	M18	160	23	100
07030-18200	M18	200	23	125
07030-18250	M18	250	23	150
07030-18315	M18	315	23	180
07030-2080	M20	80	27	32
07030-20125	M20	125	27	70
07030-20160	M20	160	27	100
07030-20200	M20	200	27	125
07030-20250	M20	250	27	160
07030-20315	M20	315	27	200
07030-20400	M20	400	27	250
07030-20500	M20	500	27	315
07030-22100	M22	100	31	45
07030-22160	M22	160	31	100
07030-22200	M22	200	31	125
07030-22250	M22	250	31	160
07030-22315	M22	315	31	180
07030-22400	M22	400	31	250
07030-24100	M24	100	35	45
07030-24125	M24	125	35	63
07030-24160	M24	160	35	100
07030-24200	M24	200	35	125
07030-24250	M24	250	35	160
07030-24315	M24	315	35	200
07030-24400	M24	400	35	250
07030-24500	M24	500	35	315
07030-24630	M24	630	35	315
07030-27125	M27	125	39	56
07030-27200	M27	200	39	125
07030-27315	M27	315	39	200
07030-27400	M27	400	39	250
07030-27500	M27	500	39	315
07030-30125	M30	125	43	56
07030-30200	M30	200	43	125
07030-30315	M30	315	43	200
07030-30500	M30	500	43	315
07030-30700	M30	700	43	400
07030-301000	M30	1000	44	400
07030-36160	M36	160	51	80
07030-36200	M36	200	51	125
07030-36250	M36	250	51	160
07030-36315	M36	315	51	200
07030-36400	M36	400	51	250
07030-36500	M36	500	51	315
07030-36700	M36	700	51	400

T-slot bolts

DIN 787



Material:
Carbon steel.

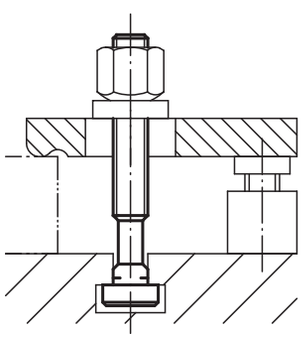
Version:
Forged and milled, rolled thread.
M6-M12 tempered to 10.9, black.
M14-M36 tempered to 8.8, black.

Sample order:
nlm 07040-1263

Note:

Permissible load: see Technical Information.

Order No.	Nominal slot size	D1	L	A	B	E1/E2	K
07040-0625	6	M6	25	5,7	15	10	4
07040-0640	6	M6	40	5,7	28	10	4
07040-0663	6	M6	63	5,7	40	10	4
07040-0832	8	M8	32	7,7	22	13	6
07040-0850	8	M8	50	7,7	35	13	6
07040-0880	8	M8	80	7,7	50	13	6
07040-1040	10	M10	40	9,7	30	15	6
07040-1063	10	M10	63	9,7	45	15	6
07040-10100	10	M10	100	9,7	60	15	6
07040-1250	12	M12	50	11,7	35	18	7
07040-1263	12	M12	63	11,7	40	18	7
07040-1280	12	M12	80	11,7	55	18	7
07040-12100	12	M12	100	11,7	65	18	7
07040-12125	12	M12	125	11,7	75	18	7
07040-12160	12	M12	160	11,7	100	18	7
07040-12200	12	M12	200	11,7	120	18	7
07040-1450	14	M12	50	13,7	35	22	8
07040-1463	14	M12	63	13,7	45	22	8
07040-1480	14	M12	80	13,7	55	22	8
07040-14100	14	M12	100	13,7	65	22	8
07040-14125	14	M12	125	13,7	75	22	8
07040-14160	14	M12	160	13,7	100	22	8
07040-14200	14	M12	200	13,7	120	22	8
07040-16631	16	M14	63	15,7	45	25	9
07040-16801	16	M14	80	15,7	55	25	9
07040-161001	16	M14	100	15,7	65	25	9
07040-161251	16	M14	125	15,7	75	25	9
07040-161601	16	M14	160	15,7	100	25	9
07040-162501	16	M14	250	15,7	150	25	9
07040-1663	16	M16	63	15,7	45	25	9
07040-1680	16	M16	80	15,7	55	25	9
07040-16100	16	M16	100	15,7	65	25	9
07040-16125	16	M16	125	15,7	85	25	9
07040-16160	16	M16	160	15,7	100	25	9
07040-16200	16	M16	200	15,7	125	25	9
07040-16250	16	M16	250	15,7	150	25	9
07040-1863	18	M16	63	17,7	45	28	10
07040-1880	18	M16	80	17,7	55	28	10
07040-18100	18	M16	100	17,7	65	28	10
07040-18125	18	M16	125	17,7	85	28	10
07040-18160	18	M16	160	17,7	100	28	10



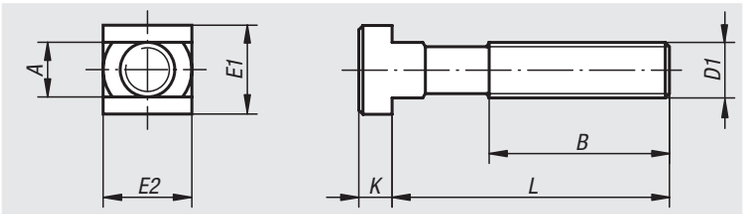
T-slot bolts

DIN 787

Order No.	Nominal slot size	D1	L	A	B	E1/E2	K
07040-18200	18	M16	200	17,7	125	28	10
07040-18250	18	M16	250	17,7	150	28	10
07040-2080	20	M20	80	19,7	55	32	12
07040-20100	20	M20	100	19,7	65	32	12
07040-20125	20	M20	125	19,7	85	32	12
07040-20160	20	M20	160	19,7	110	32	12
07040-20200	20	M20	200	19,7	125	32	12
07040-20250	20	M20	250	19,7	150	32	12
07040-20315	20	M20	315	19,7	190	32	12
07040-2280	22	M20	80	21,7	55	35	14
07040-22100	22	M20	100	21,7	65	35	14
07040-22125	22	M20	125	21,7	85	35	14
07040-22160	22	M20	160	21,7	110	35	14
07040-22200	22	M20	200	21,7	125	35	14
07040-22250	22	M20	250	21,7	150	35	14
07040-22315	22	M20	315	21,7	190	35	14
07040-24100	24	M24	100	23,7	70	40	16
07040-24125	24	M24	125	23,7	85	40	16
07040-24160	24	M24	160	23,7	110	40	16
07040-24200	24	M24	200	23,7	125	40	16
07040-24250	24	M24	250	23,7	150	40	16
07040-24315	24	M24	315	23,7	190	40	16
07040-24400	24	M24	400	23,7	240	40	16
07040-28100	28	M24	100	27,7	70	44	18
07040-28125	28	M24	125	27,7	85	44	18
07040-28160	28	M24	160	27,7	110	44	18
07040-28200	28	M24	200	27,7	125	44	18
07040-28250	28	M24	250	27,7	150	44	18
07040-28315	28	M24	315	27,7	190	44	18
07040-28400	28	M24	400	27,7	240	44	18
07040-36125	36	M30	125	35,6	80	54	22
07040-36160	36	M30	160	35,6	110	54	22
07040-36200	36	M30	200	35,6	135	54	22
07040-36250	36	M30	250	35,6	150	54	22
07040-36315	36	M30	315	35,6	200	54	22
07040-36500	36	M30	500	35,6	300	54	22
07040-42160	42	M36	160	41,6	100	65	26
07040-42250	42	M36	250	41,6	175	65	26
07040-42400	42	M36	400	41,6	250	65	26

T-slot bolts

DIN 787, 12.9



Material:
Carbon steel.

Version:
Forged and milled, rolled thread, tempered to 12.9, black.

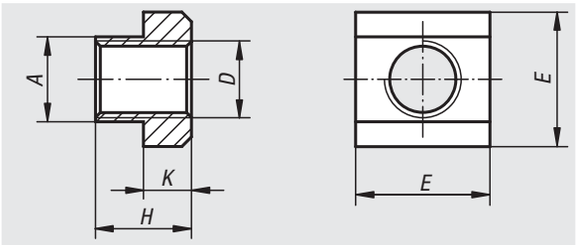
Sample order:
nlm 07040-112125

Note:
Permissible load: see Technical Information.

Order No.	Nominal slot size	D1	L	A	B	E1/E2	K
07040-11250	12	M12	50	11,7	35	18	7
07040-11280	12	M12	80	11,7	55	18	7
07040-112100	12	M12	100	11,7	65	18	7
07040-112125	12	M12	125	11,7	75	18	7
07040-112160	12	M12	160	11,7	100	18	7
07040-112200	12	M12	200	11,7	120	18	7
07040-11450	14	M12	50	13,7	35	22	8
07040-11480	14	M12	80	13,7	55	22	8
07040-114100	14	M12	100	13,7	65	22	8
07040-114125	14	M12	125	13,7	75	22	8
07040-114160	14	M12	160	13,7	100	22	8
07040-114200	14	M12	200	13,7	120	22	8
07040-11663	16	M16	63	15,7	45	25	9
07040-116100	16	M16	100	15,7	65	25	9
07040-116125	16	M16	125	15,7	85	25	9
07040-116160	16	M16	160	15,7	100	25	9
07040-116250	16	M16	250	15,7	150	25	9
07040-11863	18	M16	63	17,7	45	28	10
07040-118100	18	M16	100	17,7	65	28	10
07040-118125	18	M16	125	17,7	85	28	10
07040-118160	18	M16	160	17,7	100	28	10
07040-118250	18	M16	250	17,7	150	28	10
07040-12080	20	M20	80	19,7	55	32	12
07040-120125	20	M20	125	19,7	85	32	12
07040-120200	20	M20	200	19,7	125	32	12
07040-120315	20	M20	315	19,7	190	32	12
07040-12280	22	M20	80	21,7	55	35	14
07040-122125	22	M20	125	21,7	85	35	14
07040-122200	22	M20	200	21,7	125	35	14
07040-122315	22	M20	315	21,7	190	35	14
07040-124100	24	M24	100	23,7	70	40	16
07040-124160	24	M24	160	23,7	110	40	16
07040-124250	24	M24	250	23,7	150	40	16
07040-124400	24	M24	400	23,7	240	40	16
07040-128100	28	M24	100	27,7	70	44	18
07040-128160	28	M24	160	27,7	110	44	18
07040-128250	28	M24	250	27,7	150	44	18
07040-128400	28	M24	400	27,7	240	44	18

Nuts for T-slots

DIN 508 enhanced



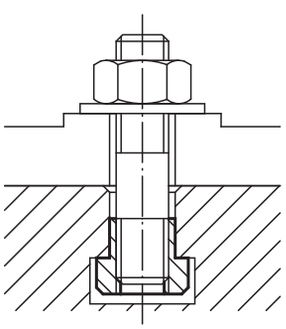
Material:
Carbon steel grade 10, EN AW-7075 or stainless steel 1.4305.

Version:
Steel black.
Aluminium and stainless steel bright.

Sample order:
nlm 07060-20

Note:
Nuts for T-slots in aluminium have threaded steel inserts.

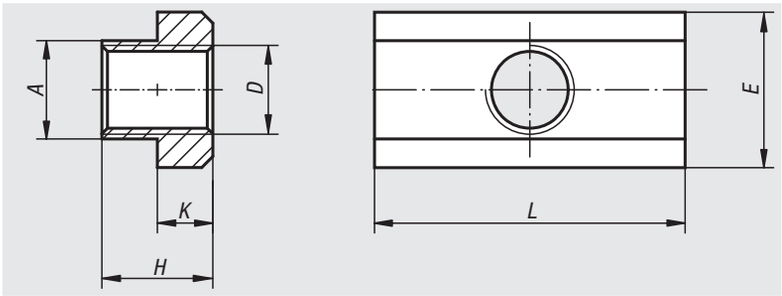
Order No. steel	Order No. aluminium	Order No. stainless steel	Nominal slot size	D	A	E	H	K
07060-05	**07060-204**	-	6	M5/M4	5,6	10	8	4
07060-06	**07060-206**	**07060-806**	8	M6	7,6	13	10	6
07060-061	**07060-2061**	-	10	M6	9,6	15	12	6
07060-08	-	**07060-808**	10	M8	9,6	15	12	6
07060-081	**07060-208**	-	12	M8	11,5	18	14	7
07060-10	-	**07060-810**	12	M10	11,5	18	14	7
07060-082	-	-	14	M8	13,5	22	16	8
07060-101	**07060-210**	-	14	M10	13,5	22	16	8
07060-12	-	**07060-812**	14	M12	13,5	22	16	8
07060-121	-	-	16	M12	15,6	25	18	9
07060-14	-	**07060-814**	16	M14	15,6	25	18	9
07060-122	-	-	18	M12	17,5	28	20	10
07060-141	-	-	18	M14	17,5	28	20	10
07060-16	-	**07060-816**	18	M16	17,5	28	20	10
07060-123	-	-	20	M12	19,6	32	24	12
07060-161	-	-	20	M16	19,6	32	24	12
07060-18	-	-	20	M18	19,6	32	24	12
07060-124	**07060-216**	-	22	M12/M16	21,6	35	28	14
07060-181	-	-	22	M18	21,6	35	28	14
07060-20	-	-	22	M20	21,6	35	28	14
07060-163	-	-	24	M16	23,6	40	32	16
07060-201	-	-	24	M20	23,6	40	32	16
07060-22	-	-	24	M22	23,6	40	32	16
07060-164	-	-	28	M16	27,6	44	36	18
07060-202	-	-	28	M20	27,6	44	36	18
07060-24	-	-	28	M24	27,6	44	36	18
07060-27	-	-	32	M27	31,5	50	40	20
07060-241	-	-	36	M24	35,5	54	44	22
07060-30	-	-	36	M30	35,5	54	44	22
07060-36	-	-	42	M36	41,5	65	52	26



07061

Nuts for T-slots

long



Material:
Carbon steel.

Version:
Tempered to 10.

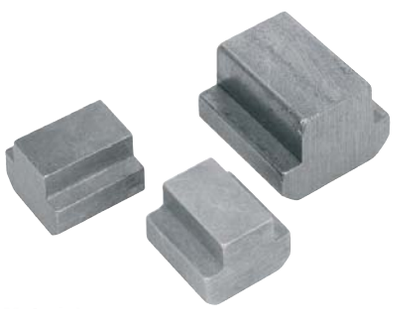
Sample order:
nlm 07061-12

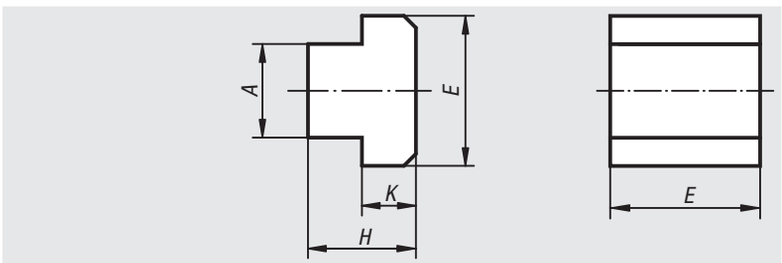
Order No.	Nominal slot size	D	A	E	L	H	K
07061-08	10	M8	9,7	15	30	12	6
07061-10	12	M10	11,7	18	36	14	7
07061-12	14	M12	13,7	22	44	16	8
07061-14	16	M14	15,7	25	50	18	9
07061-16	18	M16	17,7	28	56	20	10
07061-18	20	M18	19,7	32	64	24	12
07061-20	22	M20	21,7	35	70	28	14
07061-24	28	M24	27,7	44	88	36	18
07061-30	36	M30	35,6	54	108	44	22

07070

Nuts for T-slots

blanks





Material:
Carbon steel or stainless steel 1.4305.

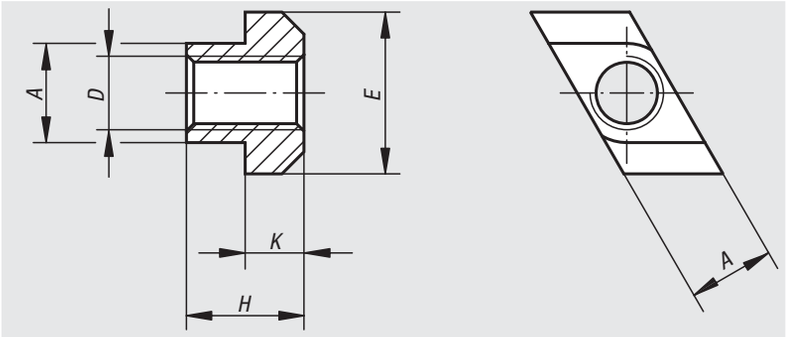
Sample order:
nlm 07070-16

Note:
These blank nuts are used to make nuts for T-slots with all sorts of thread sizes cost-effectively.

Order No. steel	Order No. stainless steel	Nominal slot size	A	E	H	K
07070-06	-	6	5,6	10	8	4
07070-08	**07070-808**	8	7,6	13	10	6
07070-10	**07070-810**	10	9,6	15	12	6
07070-12	**07070-812**	12	11,5	18	14	7
07070-14	**07070-814**	14	13,5	22	16	8
07070-16	-	16	15,6	25	18	9
07070-18	-	18	17,5	28	20	10
07070-20	-	20	19,6	32	24	12
07070-22	-	22	21,6	35	28	14
07070-24	-	24	23,6	40	32	16
07070-28	-	28	27,6	44	36	18
07070-36	-	36	35,5	54	44	22
07070-42	-	42	41,6	65	52	26

Nuts for T-slots

rhombic form



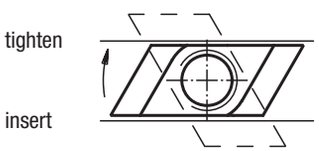
Material:
Carbon steel.

Version:
Tempered to 8 and black oxidised.

Sample order:
nlm 07080-114

Note:
The benefit of rhombic nuts for T-slots is that they can be fitted in the slot from the top. They are particularly useful for long T-slots, or when the configuration on the machine table does not permit clamping screws or nuts for T-slots to be inserted from the side.

Application:
Position from the top then twist in the slot until it stops.



Order No.	Nominal slot size	D	A	E	H	K
07080-105	6	M5	5,6	10	8	4
07080-106	8	M6	7,6	13	10	6
07080-108	10	M8	9,7	15	12	6
07080-110	12	M10	11,7	18	14	7
07080-210	14	M10	13,5	22	16	8
07080-310	18	M10	17,5	28	20	10
07080-112	14	M12	13,7	22	16	8
07080-114	16	M14	15,7	25	18	9
07080-116	18	M16	17,7	28	20	10
07080-216	20	M16	19,7	32	24	12
07080-316	22	M16	21,5	35	28	14
07080-416	28	M16	27,5	44	36	18
07080-118	20	M18	19,7	32	24	12
07080-120	22	M20	21,7	35	28	14
07080-124	28	M24	27,7	44	36	18
07080-130	36	M30	35,6	54	44	22
07080-136	42	M36	41,5	65	52	26

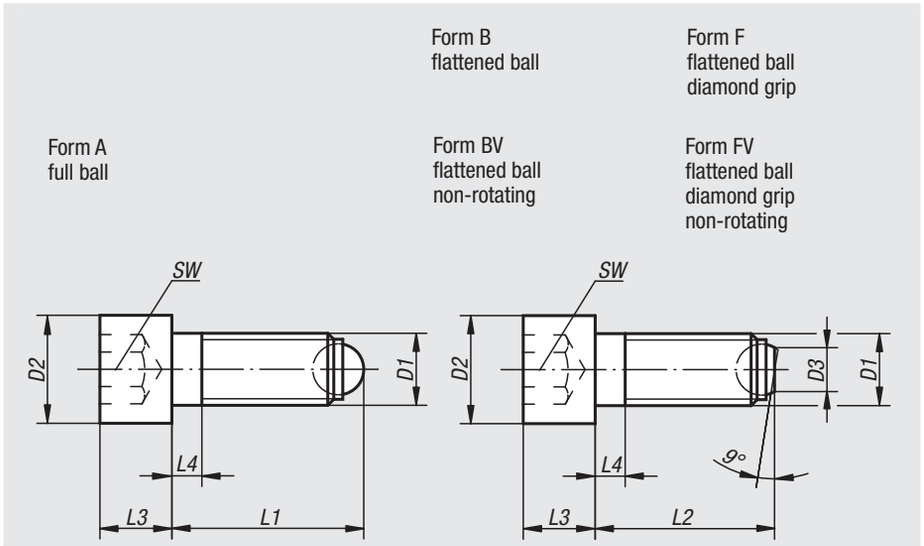
Ball-end thrust screws with head

Material:
Screw carbon steel.
Ball ball-bearing steel.

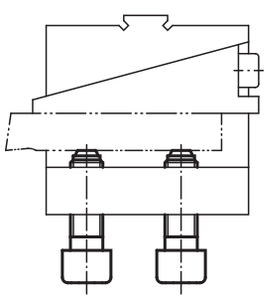
Version:
Screw, grade 10.9, black.
Ball hardened, bright.

Sample order:
nlm 07100-10820

Note:
Form A with full ball is used when a clean, polished contact surface is required. Surfaces which are not flat and parallel can be firmly clamped or supported with Form B with flattened ball, the movable ball can adapt itself up to 9°.



Order No. Form A	D1	D2	L1	L3	L4	Ball-Ø	SW
07100-10410	M4	7	10,2	4	2,1	2,5	3
07100-10416	M4	7	16,2	4	2,1	2,5	3
07100-10420	M4	7	20,2	4	2,1	2,5	3
07100-10512	M5	8,5	12,4	5	2,4	3	4
07100-10516	M5	8,5	16,4	5	2,4	3	4
07100-10520	M5	8,5	20,4	5	2,4	3	4
07100-10620	M6	10	20,8	6	3	4	5
07100-10630	M6	10	30,8	6	3	4	5
07100-10640	M6	10	40,8	6	16	4	5
07100-10820	M8	13	21,2	8	3,5	5,5	6
07100-10835	M8	13	36,2	8	3,5	5,5	6
07100-10850	M8	13	51,2	8	22	5,5	6
07100-11025	M10	16	26,7	10	4,5	7	8
07100-11040	M10	16	41,7	10	4,5	7	8
07100-11060	M10	16	61,7	10	28	7	8
07100-11230	M12	18	32	12	5	8,5	10
07100-11250	M12	18	52	12	5	8,5	10
07100-11280	M12	18	82	12	44	8,5	10
07100-11640	M16	24	43,3	16	6	12	14
07100-11660	M16	24	63,3	16	6	12	14
07100-11680	M16	24	83,3	16	36	12	14
07100-12050	M20	30	54,2	20	7,5	15	17
07100-12080	M20	30	84,2	20	28	15	17
07100-120100	M20	30	104,2	20	48	15	17
07100-12460	M24	36	64,7	24	9	18	19
07100-12490	M24	36	94,7	24	30	18	19
07100-124120	M24	36	124,7	24	60	18	19



Ball-end thrust screws with head

Order No. Form B	Order No. Form F	D1	D2	D3	L2	L3	L4	Ball-Ø	SW	Load rating max. kN (static load only)
07100-20410	-	M4	7	1,4	10	4	2,1	2,5	3	3,5
07100-20416	-	M4	7	1,4	16	4	2,1	2,5	3	3,5
07100-20420	-	M4	7	1,4	20	4	2,1	2,5	3	3,5
07100-20512	-	M5	8,5	2	12	5	2,4	3	4	4,5
07100-20516	-	M5	8,5	2	16	5	2,4	3	4	4,5
07100-20520	-	M5	8,5	2	20	5	2,4	3	4	4,5
07100-20620	-	M6	10	3,2	20	6	3	4	5	9
07100-20630	-	M6	10	3,2	30	6	3	4	5	9
07100-20640	-	M6	10	3,2	40	6	16	4	5	9
07100-20820	-	M8	13	4,5	20	8	3,5	5,5	6	15
07100-20835	-	M8	13	4,5	35	8	3,5	5,5	6	15
07100-20850	-	M8	13	4,5	50	8	22	5,5	6	15
07100-21025	**07100-31025**	M10	16	6	25	10	4,5	7	8	20
07100-21040	**07100-31040**	M10	16	6	40	10	4,5	7	8	20
07100-21060	**07100-31060**	M10	16	6	60	10	28	7	8	20
07100-21230	**07100-31230**	M12	18	7,2	30	12	5	8,5	10	30
07100-21250	**07100-31250**	M12	18	7,2	50	12	5	8,5	10	30
07100-21280	**07100-31280**	M12	18	7,2	80	12	44	8,5	10	30
07100-21640	**07100-31640**	M16	24	10,7	40	16	6	12	14	60
07100-21660	**07100-31660**	M16	24	10,7	60	16	6	12	14	60
07100-21680	**07100-31680**	M16	24	10,7	80	16	36	12	14	60
07100-22050	-	M20	30	13,5	50	20	7,5	15	17	90
07100-22080	-	M20	30	13,5	80	20	28	15	17	90
07100-220100	-	M20	30	13,5	100	20	48	15	17	90
07100-22460	-	M24	36	15,8	60	24	9	18	19	120
07100-22490	-	M24	36	15,8	90	24	30	18	19	120
07100-224120	-	M24	36	15,8	120	24	60	18	19	120

Order No. Form BV	Order No. Form FV	D1	D2	D3	L2	L3	L4	Ball-Ø	SW	Load rating max. kN (static load only)
07100-40820	-	M8	13	4,5	20	8	3,5	5,5	6	9
07100-40835	-	M8	13	4,5	35	8	3,5	5,5	6	9
07100-40850	-	M8	13	4,5	50	8	22	5,5	6	9
07100-41025	**07100-51025**	M10	16	6	25	10	4,5	7	8	12
07100-41040	**07100-51040**	M10	16	6	40	10	4,5	7	8	12
07100-41060	**07100-51060**	M10	16	6	60	10	28	7	8	12
07100-41230	**07100-51230**	M12	18	7,2	30	12	5	8,5	10	18
07100-41250	**07100-51250**	M12	18	7,2	50	12	5	8,5	10	18
07100-41280	**07100-51280**	M12	18	7,2	80	12	44	8,5	10	18
07100-41640	**07100-51640**	M16	24	10,7	40	16	6	12	14	36
07100-41660	**07100-51660**	M16	24	10,7	60	16	6	12	14	36
07100-41680	**07100-51680**	M16	24	10,7	80	16	36	12	14	36

Ball-end thrust screws with head

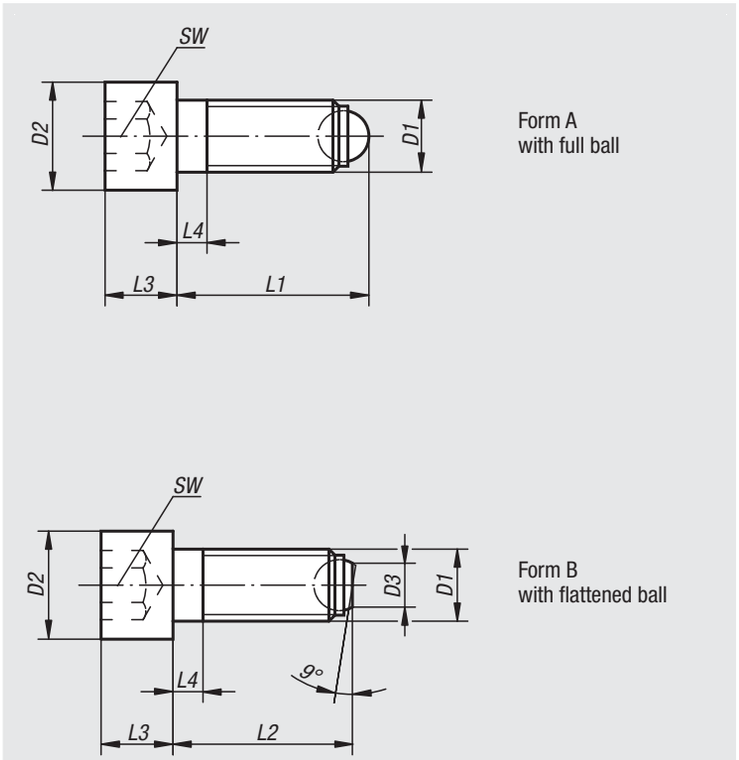
stainless steel

Material:
Stainless steel

Version:
Bright.

Sample order:
nlm 07101-11230

Note:
Form A with full ball is used when a clean, polished contact surface is required. Surfaces which are not flat and parallel can be firmly clamped or supported with Form B with flattened ball, the movable ball can adapt itself up to 9°.



Order No. Form A	D1	D2	L1	L3	L4	Ball-Ø	SW
07101-10410	M4	7	10,2	4	2,1	2,5	3
07101-10416	M4	7	16,2	4	2,1	2,5	3
07101-10420	M4	7	20,2	4	2,1	2,5	3
07101-10512	M5	8,5	12,4	5	2,4	3	4
07101-10516	M5	8,5	16,4	5	2,4	3	4
07101-10520	M5	8,5	20,4	5	2,4	3	4
07101-10620	M6	10	20,8	6	3	4	5
07101-10630	M6	10	30,8	6	3	4	5
07101-10640	M6	10	40,8	6	16	4	5
07101-10820	M8	13	21,2	8	3,5	5,5	6
07101-10835	M8	13	36,2	8	3,5	5,5	6
07101-10850	M8	13	51,2	8	22	5,5	6
07101-11025	M10	16	26,7	10	4,5	7	8
07101-11040	M10	16	41,7	10	4,5	7	8
07101-11060	M10	16	61,7	10	28	7	8
07101-11230	M12	18	32	12	5	8,5	10
07101-11250	M12	18	52	12	5	8,5	10
07101-11280	M12	18	82	12	44	8,5	10
07101-11640	M16	24	43,3	16	6	12	14
07101-11660	M16	24	63,3	16	6	12	14
07101-11680	M16	24	83,3	16	36	12	14

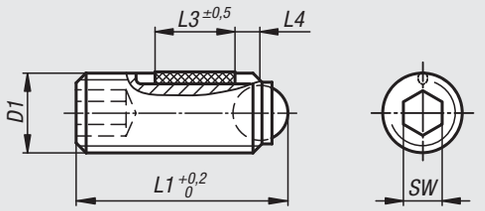
Order No. Form B	D1	D2	D3	L2	L3	L4	Ball-Ø	SW
07101-20410	M4	7	1,4	10	4	2,1	2,5	3
07101-20416	M4	7	1,4	16	4	2,1	2,5	3
07101-20420	M4	7	1,4	20	4	2,1	2,5	3
07101-20512	M5	8,5	2	12	5	2,4	3	4
07101-20516	M5	8,5	2	16	5	2,4	3	4
07101-20520	M5	8,5	2	20	5	2,4	3	4
07101-20620	M6	10	3,2	20	6	3	4	5
07101-20630	M6	10	3,2	30	6	3	4	5
07101-20640	M6	10	3,2	40	6	16	4	5
07101-20820	M8	13	4,5	20	8	3,5	5,5	6
07101-20835	M8	13	4,5	35	8	3,5	5,5	6
07101-20850	M8	13	4,5	50	8	22	5,5	6
07101-21025	M10	16	6	25	10	4,5	7	8
07101-21040	M10	16	6	40	10	4,5	7	8
07101-21060	M10	16	6	60	10	28	7	8
07101-21230	M12	18	7,2	30	12	5	8,5	10
07101-21250	M12	18	7,2	50	12	5	8,5	10
07101-21280	M12	18	7,2	80	12	44	8,5	10
07101-21640	M16	24	10,7	40	16	6	12	14
07101-21660	M16	24	10,7	60	16	6	12	14
07101-21680	M16	24	10,7	80	16	36	12	14

Ball-end thrust screws without head

with full ball, LONG-LOK secured

Form A
ball steel

Form D
ball POM



L4 = approx. two thread turns

Material:
Screw carbon steel, grade 10.9.
Ball, ball-bearing steel or POM.
LONG-LOK thread lock nylon.

Version:
Screw black.
Ball hardened, bright.

Sample order:
nlm 07105-1046

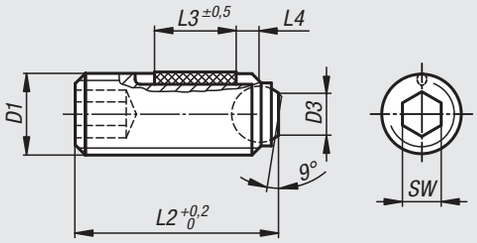
Note:
Ball-end thrust screws with full ball are used when a clean, polished contact surface is required.

Order No. Form A	Order No. Form D	D1	L1	L3	Ball-Ø	SW	Load rating max. kN (static load only)
07105-1046	**07105-3046**	M4	6	2,5	2,5	2	3,5/0,3
07105-10410	**07105-30410**	M4	10	3,5	2,5	2	3,5/0,3
07105-10416	**07105-30416**	M4	16	5	2,5	2	3,5/0.3
07105-1058	**07105-3058**	M5	8	3,5	3	2,5	4,5/0,5
07105-10512	**07105-30512**	M5	12	5	3	2,5	4,5/0,5
07105-10520	**07105-30520**	M5	20	6	3	2,5	4,5/0,5
07105-10610	**07105-30610**	M6	10,8	3,5	4	3	9/0,9
07105-10616	**07105-30616**	M6	16,8	7	4	3	9/0,9
07105-10620	**07105-30620**	M6	20,8	7	4	3	9/0,9
07105-10625	**07105-30625**	M6	25,8	7	4	3	9/0,9
07105-10650	-	M6	50,8	7	4	3	9
07105-10660	-	M6	60,8	7	4	3	9
07105-10810	**07105-30810**	M8	11,2	3,5	5,5	4	10/1,5
07105-10812	**07105-30812**	M8	13,2	5	5,5	4	10/1,5
07105-10820	**07105-30820**	M8	21,2	8	5,5	4	15/1,5
07105-10825	**07105-30825**	M8	26,2	8	5,5	4	15/1,5
07105-10830	**07105-30830**	M8	31,2	8	5,5	4	15/1,5
07105-10850	-	M8	51,2	8	5,5	4	15
07105-10860	-	M8	61,2	8	5,5	4	15
07105-10880	-	M8	81,2	8	5,5	4	15
07105-11012	**07105-31012**	M10	13,7	5	7	5	20/2
07105-11016	**07105-31016**	M10	17,7	9	7	5	20/2
07105-11020	**07105-31020**	M10	21,7	9	7	5	20/2
07105-11025	**07105-31025**	M10	26,7	9	7	5	20/2
07105-11035	**07105-31035**	M10	36,7	9	7	5	20/2
07105-11216	**07105-31216**	M12	18	8	8,5	6	30/3
07105-11220	**07105-31220**	M12	22	10	8,5	6	30/3
07105-11230	**07105-31230**	M12	32	10	8,5	6	30/3
07105-11240	**07105-31240**	M12	42	10	8,5	6	30/3
07105-11620	-	M16	23,3	10	12	8	60
07105-11625	-	M16	28,3	14	12	8	60
07105-11635	-	M16	38,3	14	12	8	60
07105-11650	-	M16	53,3	14	12	8	60

Ball-end thrust screws without head

with flattened ball LONG-LOK secured

Form B
with flattened ball



L4 = approx. two thread turns

Material:
Screw carbon steel, grade 10.9
Ball, ball-bearing steel.
LONG-LOK thread lock nylon.

Version:
Screw black.
Ball hardened, bright.

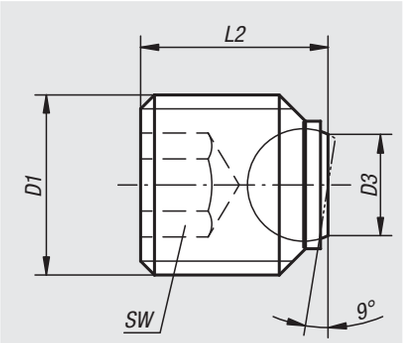
Sample order:
nlm 07105-20610

Note:
Surfaces which are not flat and parallel can be firmly clamped or supported with a flattened ball, the movable ball can adapt itself up to 9°.

Order No. Form B	D1	D3	L2	L3	Ball-Ø	SW	Load rating max. kN (static load only)
07105-20610	M6	3	10,1	3,5	4	3	9
07105-20616	M6	3	16,1	7	4	3	9
07105-20620	M6	3	20,1	7	4	3	9
07105-20625	M6	3	25,1	7	4	3	9
07105-20650	M6	3	50,1	7	4	3	9
07105-20660	M6	3	60,1	7	4	3	9
07105-20810	M8	4,1	10,3	3,5	5,5	4	10
07105-20812	M8	4,1	12,3	5	5,5	4	10
07105-20820	M8	4,1	20,3	8	5,5	4	15
07105-20825	M8	4,1	25,3	8	5,5	4	15
07105-20830	M8	4,1	30,3	8	5,5	4	15
07105-20850	M8	4,1	50,3	8	5,5	4	15
07105-20860	M8	4,1	60,3	8	5,5	4	15
07105-20880	M8	4,1	80,3	8	5,5	4	15
07105-21012	M10	5,6	12,3	5	7	5	20
07105-21016	M10	5,6	16,3	9	7	5	20
07105-21020	M10	5,6	20,3	9	7	5	20
07105-21025	M10	5,6	25,3	9	7	5	20
07105-21035	M10	5,6	35,3	9	7	5	20
07105-21216	M12	7	16,2	8	8,5	6	30
07105-21220	M12	7	20,2	10	8,5	6	30
07105-21230	M12	7	30,2	10	8,5	6	30
07105-21240	M12	7	40,2	10	8,5	6	30
07105-21620	M16	10,7	20	10	12	8	60
07105-21625	M16	10,7	25	14	12	8	60
07105-21635	M16	10,7	35	14	12	8	60
07105-21650	M16	10,7	50	14	12	8	60

Ball-end thrust screws without head

short version



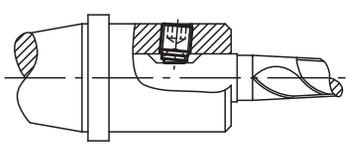
Material:
Screw carbon steel, ball ball-bearing steel.

Version:
Screw grade 12.9, black oxidised.
Ball hardened, bright.

Sample order:
nlm 07109-1416

Note:
Short ball-end thrust screws are particularly suited to DIN 1835 E straight milling cutter shanks together with e.g. Whistle Notch or Weldon tool holders.

application example:



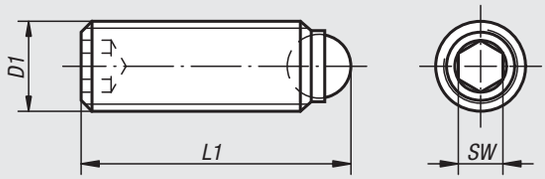
Order No.	D1	L2	D3	Ball-Ø	SW	Load rating max. kN (static load only)
07109-1416	M14	16	7,2	8,5	6	30
07109-1616	M16	16	7,2	8,5	8	30
07109-1820	M18x2	20	10,7	12	10	60
07109-2020	M20x2	20	10,7	12	10	60
07109-2025	M20x2	25	10,7	12	10	60
07109-2425	M24x2	25	13,5	15	12	90

Ball-end thrust screws without head

with full ball

Form A
steel ball

Form D
POM ball



Material:
Screw carbon steel, grade 10.9.
Ball, ball-bearing steel or POM.

Version:
Screw black.
Ball hardened, bright.

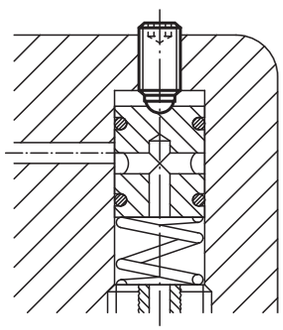
Sample order:
nlm 07110-10810

Note:
Ball-end thrust screws with full ball are used when a clean, polished contact surface is required.
Longer versions have been specially designed to be glued in, allowing mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.

Order No. Form A	Order No. Form D	D1	L1	Ball-Ø	SW	Load rating max. kN (static load only)
07110-1046	**07110-3046**	M4	6	2,5	2	3,5/0,3
07110-1048	**07110-3048**	M4	8	2,5	2	0,3/3,5
07110-10410	**07110-30410**	M4	10	2,5	2	3,5/0,3
07110-10412	**07110-30412**	M4	12	2,5	2	0,3/3,5
07110-10416	**07110-30416**	M4	16	2,5	2	3,5/0,3
07110-1058	**07110-3058**	M5	8	3	2,5	4,5/0,5
07110-10510	**07110-30510**	M5	10	3	2,5	4,5/0,5
07110-10512	**07110-30512**	M5	12	3	2,5	4,5/0,5
07110-10516	**07110-30516**	M5	16	3	2,5	4,5/0,5
07110-10520	**07110-30520**	M5	20	3	2,5	4,5/0,5
07110-10525	**07110-30525**	M5	25	3	2,5	4,5/0,5
07110-10610	**07110-30610**	M6	10,8	4	3	9/0,9
07110-10612	**07110-30612**	M6	12,8	4	3	9/0,9
07110-10616	**07110-30616**	M6	16,8	4	3	9/0,9
07110-10620	**07110-30620**	M6	20,8	4	3	9/0,9
07110-10625	**07110-30625**	M6	25,8	4	3	9/0,9
07110-10650	-	M6	50,8	4	3	9
07110-10660	-	M6	60,8	4	3	9
07110-10680	-	M6	80,8	4	3	9
07110-10810	**07110-30810**	M8	11,2	5,5	4	10/1,5
07110-10812	**07110-30812**	M8	13,2	5,5	4	10/1,5
07110-10816	**07110-30816**	M8	17,2	5,5	4	15/1,5
07110-10820	**07110-30820**	M8	21,2	5,5	4	15/1,5
07110-10825	**07110-30825**	M8	26,2	5,5	4	15/1,5
07110-10830	**07110-30830**	M8	31,2	5,5	4	15/1,5
07110-10850	-	M8	51,2	5,5	4	15
07110-10860	-	M8	61,2	5,5	4	15
07110-10880	-	M8	81,2	5,5	4	15

Ball-end thrust screws without head

with full ball



Order No. Form A	Order No. Form D	D1	L1	Ball-Ø	SW	Load rating max. kN (static load only)
07110-11012	**07110-31012**	M10	13,7	7	5	20/2
07110-11016	**07110-31016**	M10	17,7	7	5	20/2
07110-11020	**07110-31020**	M10	21,7	7	5	20/2
07110-11025	**07110-31025**	M10	26,7	7	5	20/2
07110-11035	**07110-31035**	M10	36,7	7	5	20/2
07110-11216	**07110-31216**	M12	18	8,5	6	30/3
07110-11220	**07110-31220**	M12	22	8,5	6	30/3
07110-11225	-	M12	27	8,5	6	30
07110-11230	**07110-31230**	M12	32	8,5	6	30/3
07110-11232	-	M12	34	8,5	6	30
07110-11240	**07110-31240**	M12	42	8,5	6	30/3
07110-11620	-	M16	23,3	12	8	60
07110-11625	-	M16	28,3	12	8	60
07110-11635	-	M16	38,3	12	8	60
07110-11650	-	M16	53,3	12	8	60
07110-12030	-	M20	34,2	15	10	90
07110-12040	-	M20	44,2	15	10	90
07110-12060	-	M20	64,2	15	10	90
07110-12435	-	M24	39,7	18	12	120
07110-12450	-	M24	54,7	18	12	120
07110-12480	-	M24	84,7	18	12	120

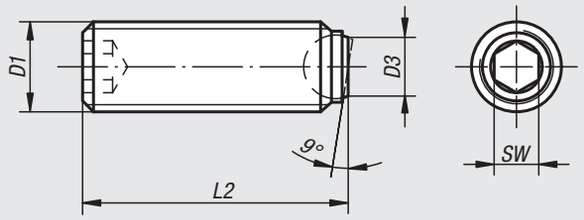
Ball-end thrust screws without head

with flattened ball

Form B
steel ball

Form C
POM ball

Form F
serrated steel ball



Material:
Screw carbon steel, grade 10.9.
Ball, ball-bearing steel or POM.

Version:
Screw black.
Ball hardened, bright.

Sample order:
nlm 07110-41012

Note:
Surfaces which are not flat and parallel can be firmly clamped or supported with Form B, C or F with flattened ball, the movable ball can adapt itself up to 9°.
Longer versions have been specially designed to glue in, allowing mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.

Order No.	Form	D1	D3	L2	Ball-Ø	SW	Load rating max. kN (static load only)
07110-41012	F	M10	6	12	7	5	20
07110-41016	F	M10	6	16	7	5	20
07110-41025	F	M10	6	25	7	5	20
07110-41035	F	M10	6	35	7	5	20
07110-41216	F	M12	7,2	16	8,5	6	30
07110-41220	F	M12	7,2	20	8,5	6	30
07110-41230	F	M12	7,2	30	8,5	6	30
07110-41240	F	M12	7,2	40	8,5	6	30
07110-41620	F	M16	10,7	20	12	8	60
07110-41625	F	M16	10,7	25	12	8	60
07110-41635	F	M16	10,7	35	12	8	60
07110-41650	F	M16	10,7	50	12	8	60

Order No.	Form	D1	D3	L2	Ball-Ø	SW	Load rating max. kN (static load only)
07110-7046	C	M4	1,8	5,9	2,5	2	0,3
07110-7048	C	M4	1,8	7,9	2,5	2	0,3
07110-70410	C	M4	1,8	9,9	2,5	2	0,3
07110-70412	C	M4	1,8	11,9	2,5	2	0,3
07110-70416	C	M4	1,8	15,9	2,5	2	0,3
07110-7058	C	M5	2,1	7,8	3	2,5	0,5
07110-70510	C	M5	2,1	9,8	3	2,5	0,5
07110-70512	C	M5	2,1	11,8	3	2,5	0,5
07110-70516	C	M5	2,1	15,8	3	2,5	0,5
07110-70520	C	M5	2,1	19,8	3	2,5	0,5
07110-70525	C	M5	2,1	24,8	3	2,5	0,5
07110-70610	C	M6	3	10,3	4	3	0,9
07110-70612	C	M6	3	12,3	4	3	0,9
07110-70616	C	M6	3	16,3	4	3	0,9
07110-70620	C	M6	3	20,3	4	3	0,9
07110-70625	C	M6	3	25,3	4	3	0,9
07110-70810	C	M8	4,2	10,4	5,5	4	1,5
07110-70812	C	M8	4,2	12,4	5,5	4	1,5
07110-70816	C	M8	4,2	16,4	5,5	4	1,5
07110-70820	C	M8	4,2	20,4	5,5	4	1,5
07110-70825	C	M8	4,2	25,4	5,5	4	1,5
07110-70830	C	M8	4,2	30,4	5,5	4	1,5

Ball-end thrust screws without head

with flattened ball

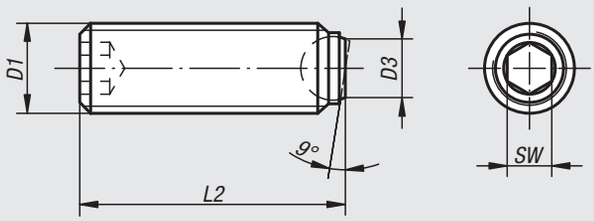
Order No.	Form	D1	D3	L2	Ball-Ø	SW	Load rating max. kN (static load only)
07110-2046	B	M4	1,4	5,8	2,5	2	3,5
07110-2048	B	M4	1,4	7,8	2,5	2	3,5
07110-20410	B	M4	1,4	9,8	2,5	2	3,5
07110-20412	B	M4	1,4	11,8	2,5	2	3,5
07110-20416	B	M4	1,4	15,8	2,5	2	3,5
07110-2058	B	M5	2	7,6	3	2,5	4,5
07110-20510	B	M5	2	9,6	3	2,5	4,5
07110-20512	B	M5	2	11,6	3	2,5	4,5
07110-20516	B	M5	2	15,6	3	2,5	4,5
07110-20520	B	M5	2	19,6	3	2,5	4,5
07110-20525	B	M5	2	24,6	3	2,5	4,5
07110-20610	B	M6	3	10,1	4	3	9
07110-20612	B	M6	3	12,1	4	3	9
07110-20616	B	M6	3	16,1	4	3	9
07110-20620	B	M6	3	20,1	4	3	9
07110-20625	B	M6	3	25,1	4	3	9
07110-20650	B	M6	3	50,1	4	3	9
07110-20660	B	M6	3	60,1	4	3	9
07110-20680	B	M6	3	80,1	4	3	9
07110-20810	B	M8	4,1	10,3	5,5	4	10
07110-20812	B	M8	4,1	12,3	5,5	4	10
07110-20816	B	M8	4,1	16,3	5,5	4	15
07110-20820	B	M8	4,1	20,3	5,5	4	15
07110-20825	B	M8	4,1	25,3	5,5	4	15
07110-20830	B	M8	4,1	30,3	5,5	4	15
07110-20850	B	M8	4,1	50,3	5,5	4	15
07110-20860	B	M8	4,1	60,3	5,5	4	15
07110-20880	B	M8	4,1	80,3	5,5	4	15
07110-21012	B	M10	5,6	12,3	7	5	20
07110-21016	B	M10	5,6	16,3	7	5	20
07110-21020	B	M10	5,6	20,3	7	5	20
07110-21025	B	M10	5,6	25,3	7	5	20
07110-21035	B	M10	5,6	35,3	7	5	20
07110-21216	B	M12	7	16,2	8,5	6	30
07110-21220	B	M12	7	20,2	8,5	6	30
07110-21230	B	M12	7	30,2	8,5	6	30
07110-21240	B	M12	7	40,2	8,5	6	30
07110-21620	B	M16	10,7	20	12	8	60
07110-21625	B	M16	10,7	25	12	8	60
07110-21635	B	M16	10,7	35	12	8	60
07110-21650	B	M16	10,7	50	12	8	60
07110-22030	B	M20	13,5	30	15	10	90
07110-22040	B	M20	13,5	40	15	10	90
07110-22060	B	M20	13,5	60	15	10	90
07110-22435	B	M24	15,8	35	18	12	120
07110-22450	B	M24	15,8	50	18	12	120
07110-22480	B	M24	15,8	80	18	12	120

Ball-end thrust screws without head

with flattened ball and rotation lock

Form BV
flattened ball
non-rotating

Form FV
flattened ball
diamond grip, non-rotating



Material:
Screw carbon steel, grade 10.9.
Ball, ball-bearing steel.

Version:
Screw black.
Ball hardened, bright.

Sample order:
nlm 07110-50820

Note:
Surfaces which are not flat and parallel can be firmly clamped or supported with with a flattened ball, the movable ball can adapt itself up to 9°.
Longer versions have been designed especially to be glued in. This allows mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.

Order No. Form BV	Order No. Form FV	D1	D3	L2	Ball-Ø	SW	Load rating max. kN (static load only)
07110-50820	-	M8	4,1	20,3	5,5	4	9
07110-50830	-	M8	4,1	30,3	5,5	4	9
07110-51025	**07110-61025**	M10	5,6	25,3	7	5	12
07110-51035	**07110-61035**	M10	5,6	35,3	7	5	12
07110-51230	**07110-61230**	M12	7	30,2	8,5	6	18
07110-51240	**07110-61240**	M12	7	40,2	8,5	6	18
07110-51635	**07110-61635**	M16	10,7	35	12	8	36
07110-51650	**07110-61650**	M16	10,7	50	12	8	36

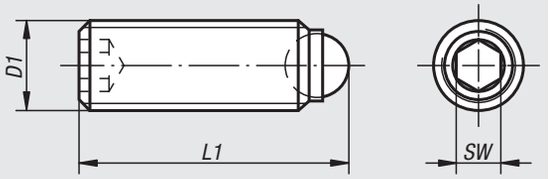
Ball-end thrust screws without head

stainless steel with full ball

Form A
ball stainless steel

Form D
ball POM

Form E
ball ceramic



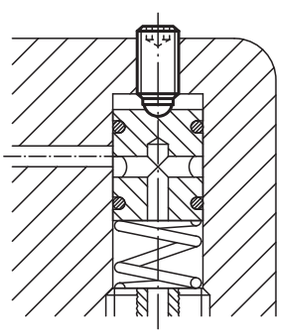
Material:
Stainless steel screw.
Stainless steel ball, POM or ceramics Si_3N_4.

Version:
Stainless steel bright.

Sample order:
nlm 07111-1046

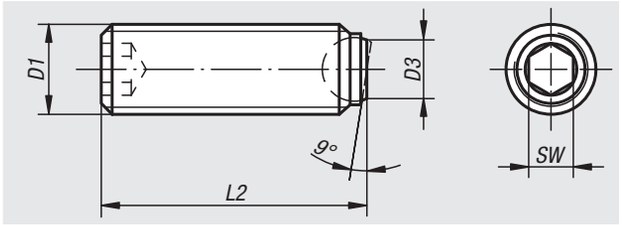
Note:
Ball-end thrust screws with full ball are used when a clean, polished contact surface is required. Longer versions have been designed especially to be glued in, allowing mechanical connecting elements with external threads to be made cost-effectively for small and medium-sized runs. Silicon nitride (Si_3N_4) is characterised by a combination of excellent properties, these include high resilience and strength, excellent wear resistance and good chemical resistance.

Order No. Form A	Order No. Form D	Order No. Form E	D1	L1	Ball-Ø	SW
07111-1046	**07111-3046**	-	M4	6	2,5	2
07111-1048	**07111-3048**	-	M4	8	2,5	2
07111-10410	**07111-30410**	-	M4	10	2,5	2
07111-10412	**07111-30412**	-	M4	12	2,5	2
07111-10416	**07111-30416**	-	M4	16	2,5	2
07111-1058	**07111-3058**	**07111-8058**	M5	8	3	2,5
07111-10510	**07111-30510**	-	M5	10	3	2,5
07111-10512	**07111-30512**	**07111-80512**	M5	12	3	2,5
07111-10516	**07111-30516**	-	M5	16	3	2,5
07111-10520	**07111-30520**	**07111-80520**	M5	20	3	2,5
07111-10525	**07111-30525**	-	M5	25	3	2,5
07111-10610	**07111-30610**	**07111-80610**	M6	10,8	4	3
07111-10612	**07111-30612**	-	M6	12,8	4	3
07111-10616	**07111-30616**	**07111-80616**	M6	16,8	4	3
07111-10620	**07111-30620**	**07111-80620**	M6	20,8	4	3
07111-10625	**07111-30625**	**07111-80625**	M6	25,8	4	3
07111-10650	-	-	M6	50,8	4	3
07111-10660	-	-	M6	60,8	4	3
07111-10680	-	-	M6	80,8	4	3
07111-10810	**07111-30810**	**07111-80810**	M8	11,2	5,5	4
07111-10812	**07111-30812**	**07111-80812**	M8	13,2	5,5	4
07111-10816	**07111-30816**	-	M8	17,2	5,5	4
07111-10820	**07111-30820**	**07111-80820**	M8	21,2	5,5	4
07111-10825	**07111-30825**	**07111-80825**	M8	26,2	5,5	4
07111-10830	**07111-30830**	**07111-80830**	M8	31,2	5,5	4
07111-10850	-	-	M8	51,2	5,5	4
07111-10860	-	-	M8	61,2	5,5	4
07111-10880	-	-	M8	81,2	5,5	4
07111-11012	-	**07111-81012**	M10	13,7	7	5
07111-11016	-	**07111-81016**	M10	17,7	7	5
07111-11020	-	**07111-81020**	M10	21,7	7	5
07111-11025	-	**07111-81025**	M10	26,7	7	5
07111-11035	-	**07111-81035**	M10	36,7	7	5
07111-11216	-	**07111-81216**	M12	18	8,5	6
07111-11220	-	**07111-81220**	M12	22	8,5	6
07111-11225	-	-	M12	27	8,5	6
07111-11230	-	**07111-81230**	M12	32	8,5	6
07111-11232	-	-	M12	34	8,5	6
07111-11240	-	**07111-81240**	M12	42	8,5	6
07111-11620	-	-	M16	23,3	12	8
07111-11625	-	-	M16	28,3	12	8
07111-11635	-	-	M16	38,3	12	8
07111-11650	-	-	M16	53,3	12	8



Ball-end thrust screws without head

stainless steel with flattened ball



Material:
Screw and ball stainless steel.

Version:
Stainless steel bright.

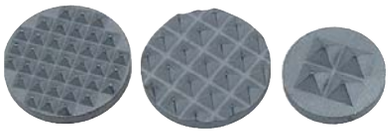
Sample order:
nlm 07111-2046

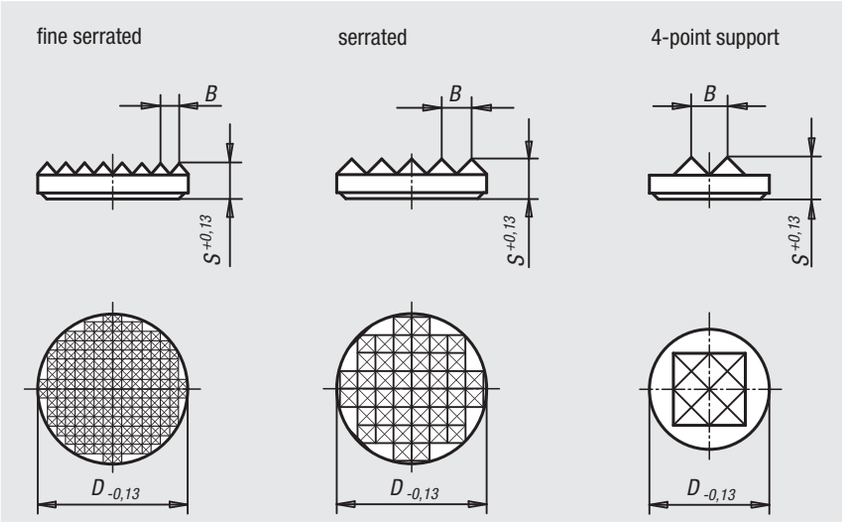
Note:
Surfaces which are not flat and parallel can be firmly clamped or supported with with a flattened ball, the movable ball can adapt itself up to 9°.
Longer versions have been designed especially to be glued in. This allows mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.

Order No.	D1	D3	L2	Ball-Ø	SW
07111-2046	M4	1,4	5,8	2,5	2
07111-2048	M4	1,4	7,8	2,5	2
07111-20410	M4	1,4	9,8	2,5	2
07111-20412	M4	1,4	11,8	2,5	2
07111-20416	M4	1,4	15,8	2,5	2
07111-2058	M5	2	7,6	3	2,5
07111-20510	M5	2	9,6	3	2,5
07111-20512	M5	2	11,6	3	2,5
07111-20516	M5	2	15,6	3	2,5
07111-20520	M5	2	19,6	3	2,5
07111-20525	M5	2	24,6	3	2,5
07111-20610	M6	3	10,1	4	3
07111-20612	M6	3	12,1	4	3
07111-20616	M6	3	16,1	4	3
07111-20620	M6	3	20,1	4	3
07111-20625	M6	3	25,1	4	3
07111-20650	M6	3	50,1	4	3
07111-20660	M6	3	60,1	4	3
07111-20680	M6	3	80,1	4	3
07111-20810	M8	4,1	10,3	5,5	4
07111-20812	M8	4,1	12,3	5,5	4
07111-20816	M8	4,1	16,3	5,5	4
07111-20820	M8	4,1	20,3	5,5	4
07111-20825	M8	4,1	25,3	5,5	4
07111-20830	M8	4,1	30,3	5,5	4
07111-20850	M8	4,1	50,3	5,5	4
07111-20860	M8	4,1	60,3	5,5	4
07111-20880	M8	4,1	80,3	5,5	4
07111-21012	M10	5,6	12,3	7	5
07111-21016	M10	5,6	16,3	7	5
07111-21020	M10	5,6	20,3	7	5
07111-21025	M10	5,6	25,3	7	5
07111-21035	M10	5,6	35,3	7	5
07111-21216	M12	7	16,2	8,5	6
07111-21220	M12	7	20,2	8,5	6
07111-21230	M12	7	30,2	8,5	6
07111-21240	M12	7	40,2	8,5	6
07111-21620	M16	10,7	20	12	8
07111-21625	M16	10,7	25	12	8
07111-21635	M16	10,7	35	12	8
07111-21650	M16	10,7	50	12	8

Gripper pads round

carbide





Material:
Carbide.

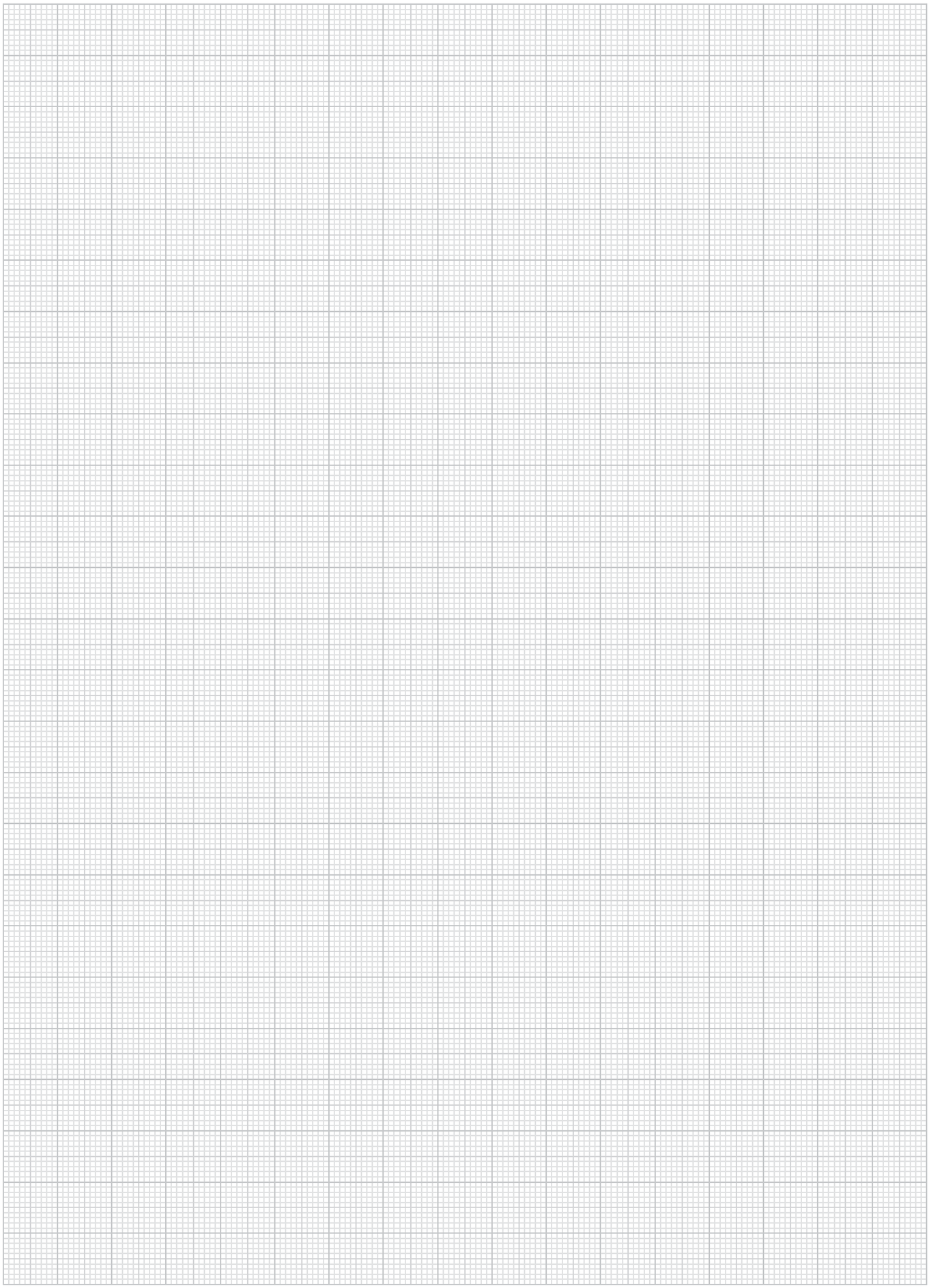
Version:
sintered.

Sample order:
nlm 07112-211

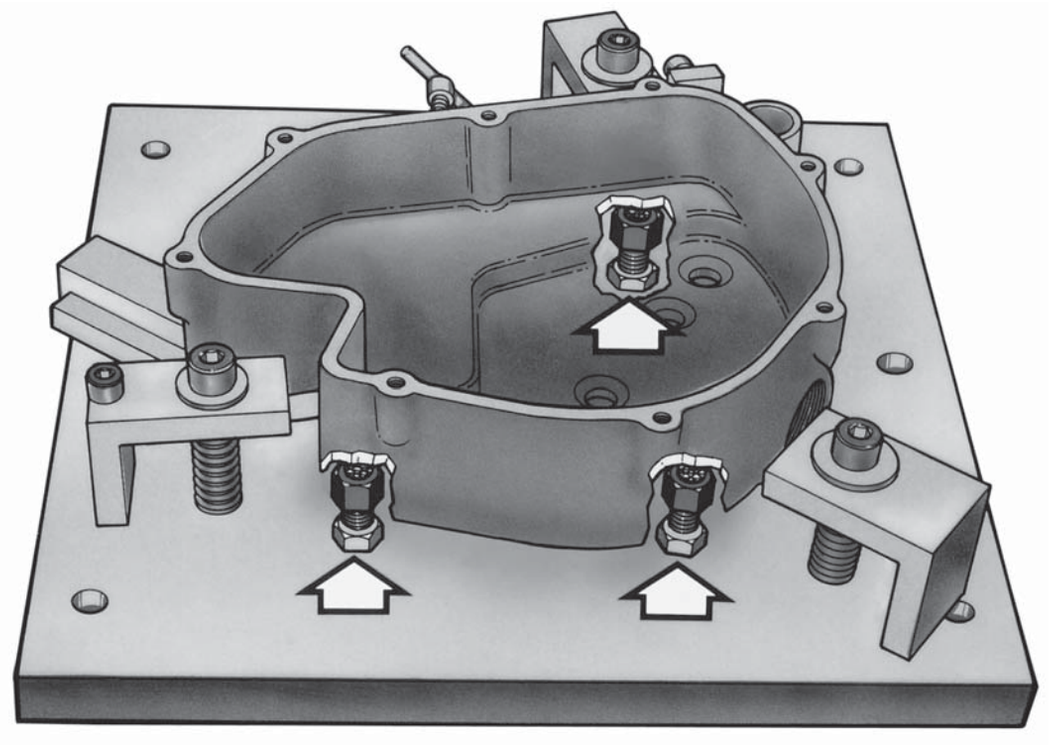
Note:
These carbide gripper pads are available as 4-point or serrated. They have many uses i.e. they can be glued onto cast iron base plates.

Order No.	Version	D	S	B
07112-110	serrated	6,35	3,2	2,3
07112-111	serrated	7,9	3,2	2,3
07112-112	serrated	9,5	3,2	3,0
07112-113	serrated	12,7	3,2	3,0
07112-114	serrated	19,05	3,2	3,0
07112-211	fine serrated	7,9	3,2	1,5
07112-212	fine serrated	9,5	3,2	2,3
07112-213	fine serrated	12,7	3,2	2,3
07112-214	fine serrated	19,05	3,2	2,3
07112-215	fine serrated	25,4	4	2,3
07112-411	4-point support	7,9	3,2	3,0
07112-412	4-point support	9,5	3,2	3,0
07112-413	4-point support	12,7	4	3,5

Notes



Application: norelem grippers



Round grippers and inserts

Material:
Form C, F, M tool steel
Form E, O, P stainless steel
Form K POM

Version:
Form C hardened and black oxidised.
Form E hardened, bright.
Form K white.
Form O with diamond impregnated surface comparable to 100 grade abrasive grit.
Form P with polyurethane surface, Shore hardness 60°.
Form F, hardened and black oxidised.
Form M with carbide serrations, black oxidised.

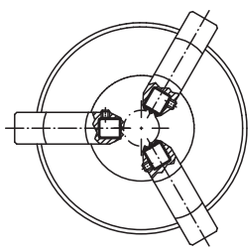
Sample order:
nlm 07113-2510

Note:
Grippers and inserts are ideal for use in clamping arms, gripping systems, clamping fixtures, clamping jaws and self-aligning pads. The use of grippers allows the transfer of very high torque values and above average grip, even with hard materials and surface irregularities.

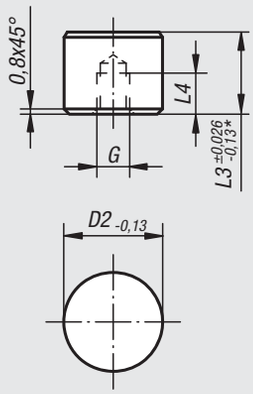
Form O: The abrasive diamond surface is bonded firmly to the base. It is ideally suited to supporting smooth or slippery applications with a minimum of clamping pressure. This allows the diamond particles to get a firm grip on a very small area with minimum damage to the surface.
The diamond surface offers excellent wear resistance.

Form P: The polyurethane surface is vulcanised firmly to the ball. It is abrasion-resistant and does not discolour. It offers optimum protection against damage to delicate surfaces. The pearl-like surface gives a firm grip and allows air to escape so as to prevent any suction effect between the contact surface and the self-aligning pads.

Grippers and inserts can be fitted in the following self-aligning pads:
Order No. 02003-117X022 up to 02003-936X036
Order No. 02007-110X015 up to 02007-924X100
Order No. 02007-120X030 up to 02007-924X080

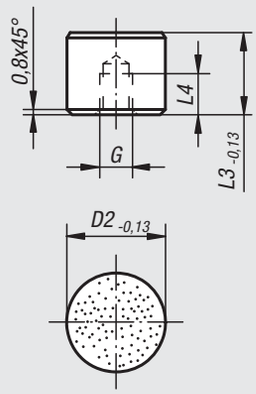


Form C, E, K

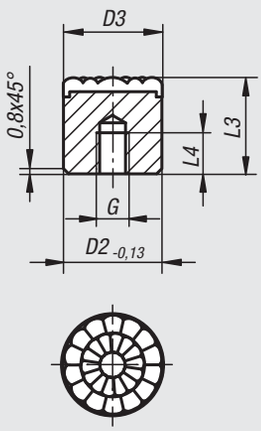


* Applies to Form K

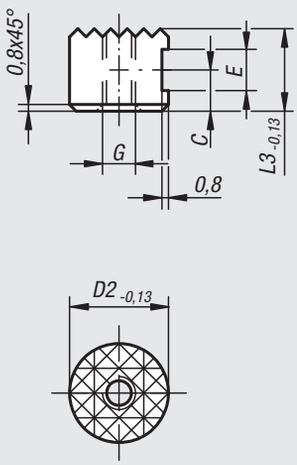
Form O
stainless steel insert
diamond impregnated



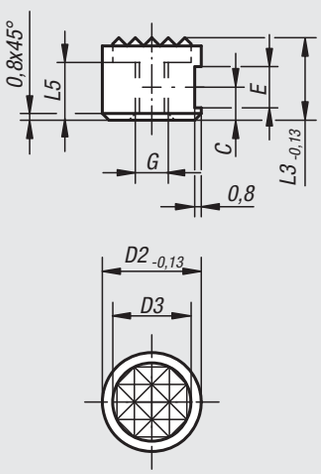
Form P
stainless steel insert,
PUR surface



Form F
diamond grip insert



Form M
carbide steel
diamond grip



Round grippers and inserts

Order No. Form C	Order No. Form E	Order No. Form K	Order No. Form O	D2	L3	L4	G
07113-10108	**07113-10102**	**07113-10109**	**07113-10105**	10	10	5	M5
07113-10128	**07113-10122**	**07113-10129**	**07113-10125**	10	12	6,4	M5
07113-12108	**07113-12102**	**07113-12109**	**07113-12105**	12	10	5	M5
07113-12128	**07113-12122**	**07113-12129**	**07113-12125**	12	12	6,4	M5
07113-16108	**07113-16102**	**07113-16109**	**07113-16105**	16	10	5	M6
07113-16128	**07113-16122**	**07113-16129**	**07113-16125**	16	12	6,4	M6
07113-20108	**07113-20102**	**07113-20109**	**07113-20105**	20	10	5	M6
07113-20128	**07113-20122**	**07113-20129**	**07113-20125**	20	12	6,4	M6
07113-25108	**07113-25102**	**07113-25109**	**07113-25105**	25	10	5	M6
07113-25128	**07113-25122**	**07113-25129**	**07113-25125**	25	12	6,4	M6

Order No.	Form	D2	D3	L3	L4	G
07113-08126	Form P	8	8	12	6	M4
07113-10126	Form P	10	10	12	6	M5
07113-12126	Form P	12	13	12	6	M5
07113-16126	Form P	16	16	12	6	M6
07113-20126	Form P	20	21	12	6	M6
07113-25126	Form P	25	27	12	6	M6

Order No. Form F	Order No. Form M	D2	D3	L3	L5	C	E	G
07113-1010	**07113-10107**	10	-/7,9	10	-/6	4,5	4,75	M5
07113-1210	**07113-12107**	12	-/9,5	10	-/6	4,5	4,75	M5
07113-1212	**07113-12127**	12	-/9,5	12	-/7	6	4,75	M5
07113-1610	**07113-16107**	16	-/12,7	10	-/6	4,5	4,75	M6
07113-2010	**07113-20107**	20	-/15,9	10	-/6	4,5	4,75	M6
07113-2510	**07113-25107**	25	-/19	10	-/6	4,5	4,75	M6

Grippers and inserts round

with counterbore

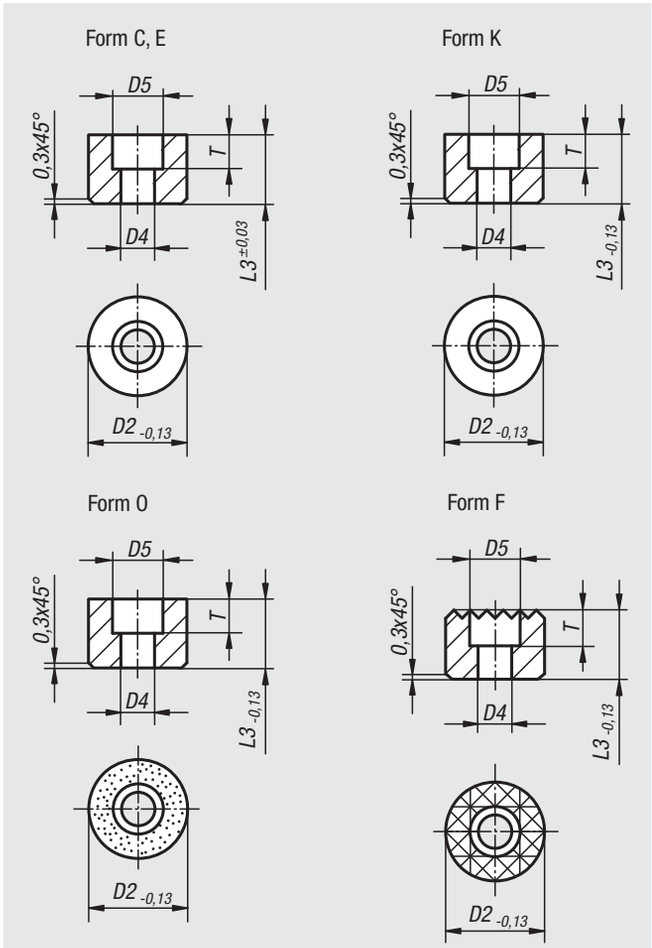
Material:
Form C, F tool steel
Form E, O stainless steel
Form K POM

Version:
Form C, F hardened and black oxidised.
Form E, hardened, bright.
Form K white.
Form O with diamond impregnated surface comparable to 100 grade abrasive grit.

Sample order:
nlm 07113-110108

Note:
Grippers and inserts are ideal for use in clamping arms, gripping systems, clamping fixtures, clamping jaws and self-aligning pads. The use of grippers allows the transfer of very high torque values and above average grip, even with hard materials and surface irregularities.

Form O: The abrasive diamond surface is bonded firmly to the base. It is ideally suited to supporting smooth or slippery applications with a minimum of clamping pressure. This allows the diamond particles to get a firm grip on a very small area with minimum damage to the surface.
The diamond surface offers excellent wear resistance.

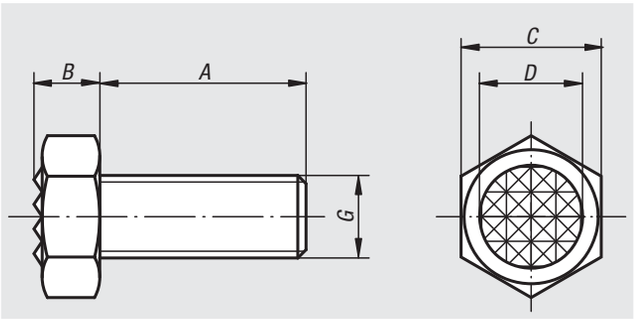


Order No. Form C	Order No. Form E	Order No. Form K	Order No. Form O	D2	D4	D5	L3	T
07113-110108	**07113-110102**	**07113-110109**	**07113-110105**	10	3,4	6	10	5
07113-110128	**07113-110122**	**07113-110129**	**07113-110125**	10	3,4	6	12	5
07113-112108	**07113-112102**	**07113-112109**	**07113-112105**	12	4,5	9	10	5,6
07113-112128	**07113-112122**	**07113-112129**	**07113-112125**	12	4,5	9	12	5,6
07113-116108	**07113-116102**	**07113-116109**	**07113-116105**	16	5,5	11	10	6,6
07113-116128	**07113-116122**	**07113-116129**	**07113-116125**	16	5,5	11	12	6,6
07113-120108	**07113-120102**	**07113-120109**	**07113-120105**	20	6,6	11	10	7,6
07113-120128	**07113-120122**	**07113-120129**	**07113-120125**	20	6,6	11	12	7,6
07113-125108	**07113-125102**	**07113-125109**	**07113-125105**	25	6,6	11	10	7,6
07113-125128	**07113-125122**	**07113-125129**	**07113-125125**	25	6,6	11	12	7,6

Round grippers

Order No.	Form	D2	D4	D5	L3	T
07113-11210	Form F	12	4,5	8	10	5,6
07113-11212	Form F	12	4,5	8	12	5,6
07113-11610	Form F	16	4,5	8	10	5,6
07113-11612	Form F	16	4,5	8	12	5,6
07113-12010	Form F	20	5,5	10	10	6,6
07113-12012	Form F	20	5,5	10	12	6,6
07113-12510	Form F	25	6,6	11	10	7,6
07113-12512	Form F	25	6,6	11	12	7,6

Hexagonal grippers



Material:
Hex head screw, grade 10.9.
Serrations carbide, hardness 72-74 HRC.

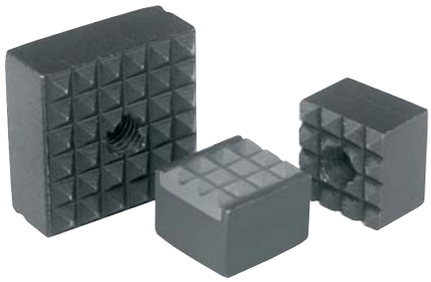
Version:
Black oxidised.

Sample order:
nlm 07114-1710

Note:
The serrated carbide tips are soldered in.

Order No.	A	B	C	D	G	Serration
07114-1006	25	5	10	7,9	M6	superfine
07114-1308	25	6,4	13	9,5	M8	fine
07114-1710	25	8,3	17	12,7	M10	fine
07114-17102	40	8,3	17	12,7	M10	fine
07114-1912	25	8,7	19	15,9	M12	fine
07114-19122	40	8,7	19	15,9	M12	fine
07114-2416	35	11	24	19	M16	fine
07114-24162	50	11	24	19	M16	fine
07114-3020	40	13,7	30	25,4	M20	superfine
07114-30202	60	13,7	30	25,4	M20	superfine

Grippers square



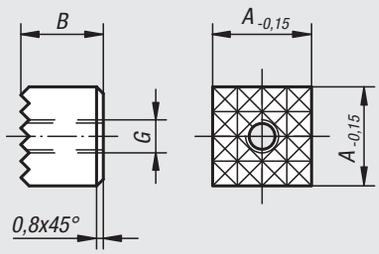
Material:
Tool steel hardened or carbide.

Version:
Black oxidised.

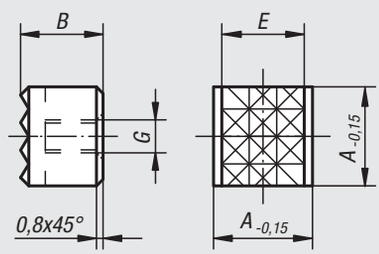
Sample order:
nlm 07115-2506

Note:
Grippers and inserts are ideal for use in clamping arms, gripping systems, clamping fixtures, clamping jaws and self-aligning pads.
Grippers transfer very high torque values,even with hard materials and surface irregularities. Grippers guarantee above average holding forces at high cutting forces.
The serrated carbide tips are soldered in.

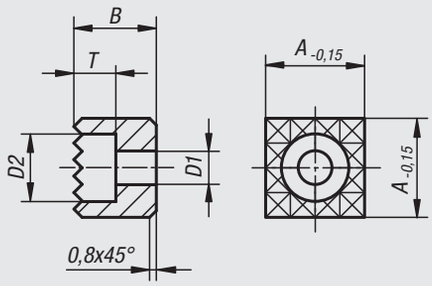
Form A
tool steel



Form B
tool steel
carbide diamond grip



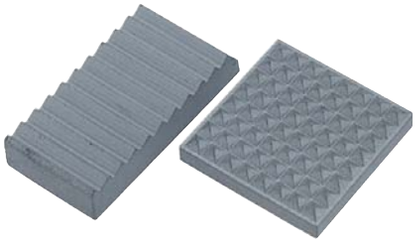
Form C
tool steel

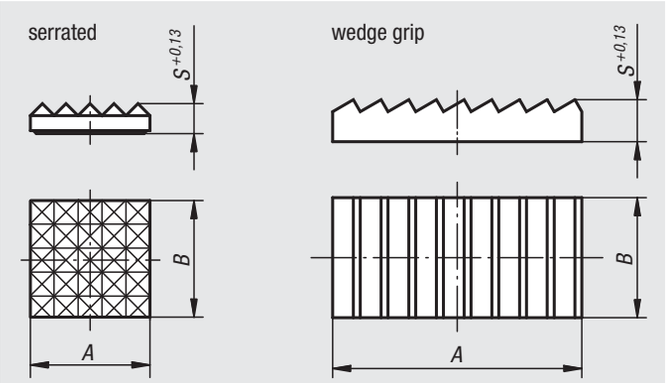


Order No.	Form	A	B	D1	D2	E	G	T	Serration
07115-1005	A	10	10	-	-	-	M5	-	superfine
07115-101205	A	10	12	-	-	-	M5	-	superfine
07115-1205	A	12	10	-	-	-	M5	-	fine
07115-121205	A	12	12	-	-	-	M5	-	fine
07115-1606	A	16	10	-	-	-	M6	-	fine
07115-161206	A	16	12	-	-	-	M6	-	fine
07115-2005	A	20	10	-	-	-	M5	-	fine
07115-201205	A	20	12	-	-	-	M5	-	fine
07115-2506	A	25	10	-	-	-	M6	-	fine
07115-251206	A	25	12	-	-	-	M6	-	fine
07115-12057	B	12	10	-	-	10,3	M5	-	fine
07115-1210048	C	12	10	4,5	8	-	-	5,6	fine
07115-1212048	C	12	12	4,5	8	-	-	5,6	fine
07115-1610048	C	16	10	4,5	8	-	-	5,6	fine
07115-1612048	C	16	12	4,5	8	-	-	5,6	fine
07115-2010058	C	20	10	5,5	10	-	-	6,6	fine
07115-2012058	C	20	12	5,5	10	-	-	6,6	fine
07115-2510068	C	25	10	6,6	11	-	-	7,6	fine
07115-2512068	C	25	12	6,6	11	-	-	7,6	fine

Gripper pads square

carbide





Material:
Carbide.

Version:
sintered.

Sample order:
nlm 07116-201

Note:
These carbide gripper pads are available as serrated or wedge grips. They have many uses i.e. they can be glued onto cast iron base plates.

Order No.	Version	A	B	S
07116-101	serrated	9,5 -0,13	9,5 -0,13	3,2
07116-102	serrated	12,7 -0,13	12,7 -0,13	3,2
07116-201	fine serrated	9,5 -0,13	9,5 -0,13	3,2
07116-202	fine serrated	12,7 -0,13	12,7 -0,13	3,2
07116-203	fine serrated	15,9 -0,13	15,9 -0,13	3,2
07116-206	fine serrated	19,05 -0,13	19,05 -0,13	4
07116-207	fine serrated	25,4 -0,13	25,4 -0,13	4
07116-308	wedge	25,7 +0,5	13,05 -0,13	4,8
07116-309	wedge	38,4 +0,5	19,5	6,35

Grippers adjustable

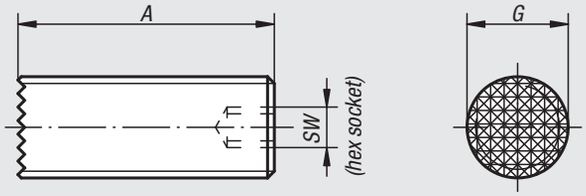
Material:
Hardened tool steel or carbide.

Version:
Black oxidised.

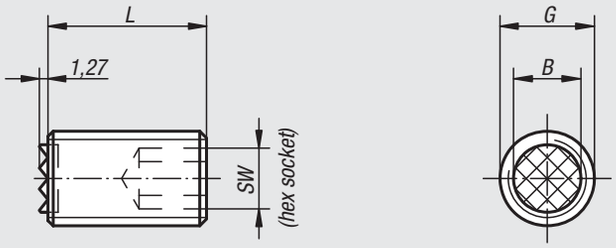
Sample order:
nlm 07117-5012

Note:
The full thread on the grippers allows exact adjustment to the clamping application.
The carbide tips are soldered in.

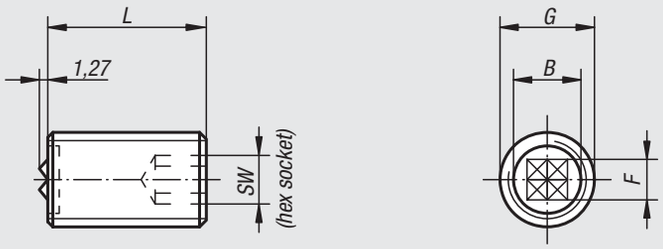
Form A
tool steel



Form B
carbide diamond grip

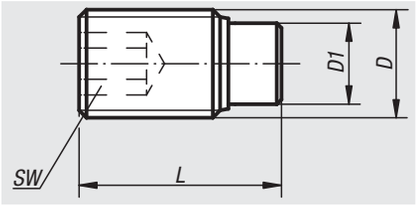


Form C
4-point carbide insert



Order No.	Form	A	L	B	G	F	SW
07117-4010	A	40	-	-	M10	-	3
07117-4012	A	40	-	-	M12	-	5
07117-4016	A	40	-	-	M16	-	6
07117-4020	A	40	-	-	M20	-	8
07117-2510	B	-	25	6,4	M10	-	5
07117-5010	B	-	50	6,4	M10	-	5
07117-2512	B	-	25	7,9	M12	-	6
07117-5012	B	-	50	7,9	M12	-	6
07117-2516	B	-	25	11,2	M16	-	8
07117-5016	B	-	50	11,2	M16	-	8
07117-2520	B	-	25	12,7	M20	-	10
07117-5020	B	-	50	12,7	M20	-	10
07117-25124	C	-	25	7,9	M12	6,5	6
07117-50124	C	-	50	7,9	M12	6,5	6
07117-25164	C	-	25	11,2	M16	8	8
07117-50164	C	-	50	11,2	M16	8	8
07117-25204	C	-	25	12,7	M20	8	10
07117-50204	C	-	50	12,7	M20	8	10

Thrust screws

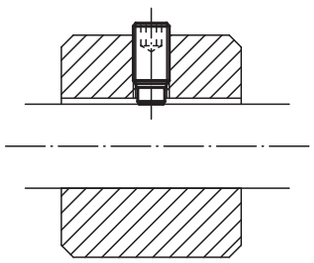


Material:
Screw grade 10.9.
Pin brass or POM.

Version:
Screw black oxidised.

Sample order:
nlm 07119-04X105 (include length L)

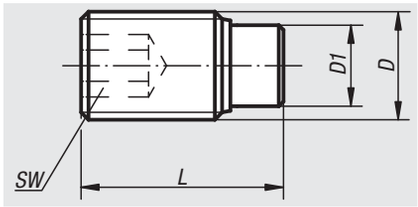
Note:
Thrust screws are ideal for clamping or exerting pressure on threaded spindles, axles, shafts and treated surfaces without marring.
Longer versions are specially designed to be glued in, allowing small to medium series of mechanical external thread fastening elements to be made cost-effectively.



Order No.	Version	D	D1	L	SW
07119-04X	pin brass	M4	2,5	6,5/10,5/16,5/30,5/40,5	2
07119-05X	pin brass	M5	3	8,5/12,5/20,5/30,5/40,5	2,5
07119-06X	pin brass	M6	4	11,5/17,5/26,5/41,5/51,5/61,5	3
07119-08X	pin brass	M8	5,5	12/22/32/52/62/82	4
07119-10X	pin brass	M10	7	14/18/27/37/52/62/82	5
07119-12X	pin brass	M12	8,5	18,5/22,5/32,5/42,5/52,5/62,5/82,5	6

Order No.	Version	D	D1	L	SW
07119-104X	pin POM	M4	2	7/9/11/13/17/31/41	2
07119-105X	pin POM	M5	3	9/11/13/17/21/31/41	2,5
07119-106X	pin POM	M6	3,5	11,3/13,3/17,3/21,3/26,3/41,3/51,3/61,3	3
07119-108X	pin POM	M8	5	13,6/17,6/21,6/26,6/33,6/51,6/61,6/81,6	4
07119-110X	pin POM	M10	6,5	17,9/21,9/26,9/33,9/41,9/51,9/61,9/81,9	5
07119-112X	pin POM	M12	8	22,1/27,1/34,1/42,1/52,1/62,1/82,1	6

Thrust screws stainless steel



Material:
Screw stainless steel.
Pin brass or POM.

Version:
Screw bright.

Sample order:
nlm 07119-041X105 (include length L)

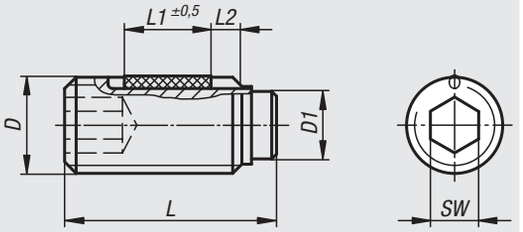
Note:
Thrust screws are ideal for clamping or exerting pressure on threaded spindles, axles, shafts and treated surfaces without marring.
Longer versions are specially designed to be glued in, allowing small to medium series of mechanical external thread fastening elements to be made cost-effectively.

Order No.	Version	D	D1	L	SW
07119-041X	pin brass	M4	2,5	6,5/10,5/16,5/30,5/40,5	2
07119-051X	pin brass	M5	3	8,5/12,5/20,5/30,5/40,5	2,5
07119-061X	pin brass	M6	4	11,5/13,5/17,5/21,5/26,5/41,5/51,5/61,5	3
07119-081X	pin brass	M8	5,5	12/22/32/52/62/82	4
07119-101X	pin brass	M10	7	14/18/27/37	5
07119-121X	pin brass	M12	8,5	22,5/32,5/42,5	6

Order No.	Version	D	D1	L	SW
07119-1041X	pin POM	M4	2	7/9/11/13/17/31/41	2
07119-1051X	pin POM	M5	3	9/11/13/17/21/31/41	2,5
07119-1061X	pin POM	M6	3,5	11,3/13,3/17,3/21,3/26,3/41,3/51,3/61,3	3
07119-1081X	pin POM	M8	5	13,6/17,6/21,6/26,6/33,6/51,6/61,6/81,6	4
07119-1101X	pin POM	M10	6,5	17,9/21,9/26,9/36,9	5
07119-1121X	pin POM	M12	8	22,1/32,1/42,1	6

Thrust screws

LONG-LOK secured



L2 = approx. two thread turns

Material:
Screw grade 10.9.
Pin brass or POM.
LONG-LOK thread lock nylon.

Version:
Screw black oxidised.

Sample order:
nlm 07119-204X65 (include length L)

Note:
Thrust screws are ideal for clamping or exerting pressure on threaded spindles, axles, shafts and treated surfaces without marring.
Longer versions are specially designed to be glued in, allowing small to medium series of mechanical external thread fastening elements to be made cost-effectively.

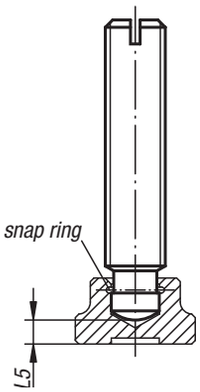
Order No.	Version	D	D1	L (L1)	SW
07119-204X	pin brass	M4	2,5	6,5 (2,5)/10,5 (3,5)/16,5 (5)/30,5 (5)/40,5 (5)	2
07119-205X	pin brass	M5	3	8,5 (3,5)/12,5 (5)/20,5 (6)/30,5 (6)/40,5 (6)	2,5
07119-206X	pin brass	M6	4	11,5 (3,5)/17,5 (7)/26,5 (7)/41,5 (7)/51,5 (7)/61,5 (7)	3
07119-208X	pin brass	M8	5,5	12 (3,5)/22 (8)/32 (8)/52 (8)/62 (8)/82 (8)	4
07119-210X	pin brass	M10	7	14 (5)/18 (9)/27 (9)/37 (9)/52 (9)/62 (9)/82 (9)	5
07119-212X	pin brass	M12	8,5	18,5 (8)/22,5 (10)/32,5 (10)/42,5 (10)/52,5 (10)/62,5 (10)/82,5 (10)	6

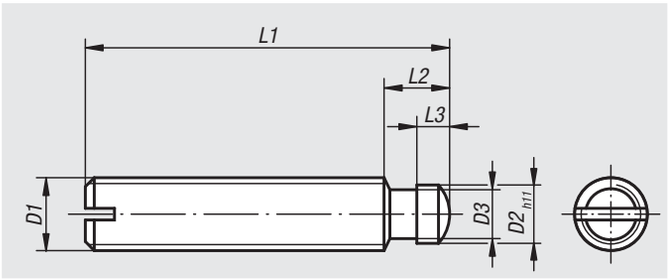
Order No.	Version	D	D1	L (L1)	SW
07119-304X	pin POM	M4	2	7 (2,5)/9 (3,5)/11 (3,5)/13 (5)/17 (5)/31 (5)/41 (5)	2
07119-305X	pin POM	M5	3	9 (3,5)/11 (3,5)/13 (5)/17 (6)/21 (6)/31 (6)/41 (6)	2,5
07119-306X	pin POM	M6	3,5	11,3 (3,5)/13,3 (5)/17,3 (7)/21,3 (7)/26,3 (7)/41,3 (7)/51,3 (7)/61,3 (7)	3
07119-308X	pin POM	M8	5	13,6 (5)/17,6 (8)/21,6 (8)/26,6 (8)/33,6 (8)/51,6 (8)/61,6 (8)/81,6 (8)	4
07119-310X	pin POM	M10	6,5	17,9 (9)/21,9 (9)/26,9 (9)/33,9 (9)/41,9 (9)/51,9 (9)/61,9 (9)/81,9 (9)	5
07119-312X	pin POM	M12	8	22,1 (10)/27,1 (10)/34,1 (10)/42,1 (10)/52,1 (10)/62,1 (10)/82,1 (10)	6

07120

Grub screws

with thrust point DIN 6332





Material:
Steel or stainless steel

Version:
Steel: thrust point case-hardened, black.
Stainless steel: bright.

Sample order:
nlm 07120-12X60 (include length L1)

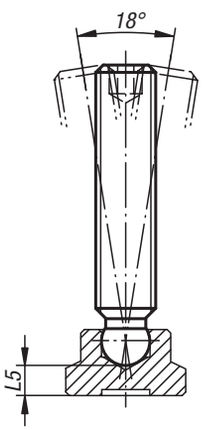
Note:
The thrust pin of the DIN 6332 grub screws is designed for direct clamping and for use together with thrust pads 07140.

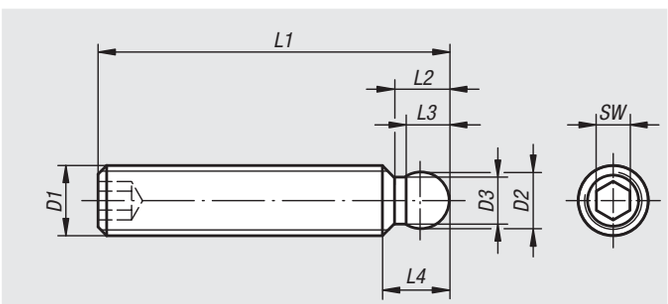
Order No. Steel	Order No. Stainless steel	D1	L1	D2	D3	L2	L3	L5
07120-06X	**07120-061X**	M6	30/35/40/50	4,5	4	6	2,5	2,2
07120-08X	**07120-081X**	M8	35/40/45/50/60	6	5,4	7,5	3	3
07120-10X	**07120-101X**	M10	50/55/60/65/80	8	7,2	9	4,5	3,6
07120-12X	**07120-121X**	M12	60/65/70/80/100	8	7,2	10	4,5	4,5
07120-14X	**07120-141X**	M14	60/80/100	10	9	12	5	5
07120-16X	**07120-161X**	M16	65/70/80/100/125	12	11	12	5	5,3
07120-20X	**07120-201X**	M20	80/90/100/125/150	15,5	14,4	14	5,5	5,6

07121

Grub screws

with ball thrust point





Material:
Steel grade 5.8.

Version:
Black oxidised.

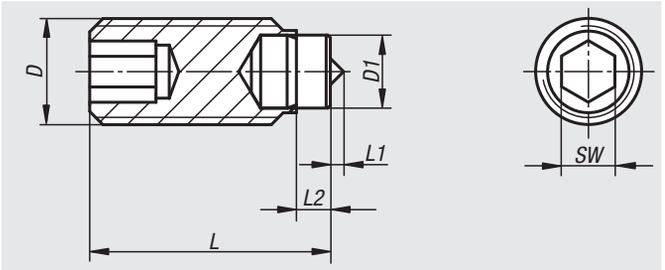
Sample order:
nlm 07121-06X50 (include length L1)

Note:
These grub screws are used together with the thrust pads 07142 for clamping.

Order No.	D1	L1	D2	D3	L2	L3	L4	L5	SW
07121-06X	M6	30/35/40/50	4,5	3,5	4,3	3,7	5,5	3,8	3
07121-08X	M8	35/40/45/50/60	6	4,8	5,8	4,8	7,4	4,4	4
07121-10X	M10	50/55/60/65/80	8	6,5	7,3	6,3	9	5	5
07121-12X	M12	60/65/70/80	8	6,6	7,1	6,3	9,8	6,9	6

Thrust screws

with point



Material:
Screw steel grade 10.9.
Pin tool steel.

Version:
Pin, hardened.
Screw and pin black oxidised.

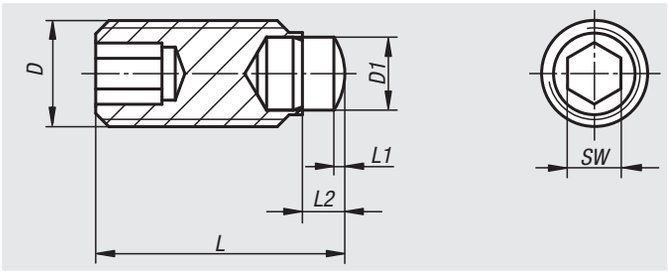
Sample order:
nlm 07122-05X09

Note:
These thrust screws with point are used when additional positive fixation is required.

Order No.	D	D1	L	L1	L2	SW	Load rating max. kN (static load only)
07122-05X09	M 5	3	8,5	0,5	1,3	2,5	4,5
07122-05X13	M 5	3	12,5	0,5	1,3	2,5	4,5
07122-05X17	M 5	3	16,5	0,5	1,3	2,5	4,5
07122-05X21	M 5	3	20,5	0,5	1,3	2,5	4,5
07122-06X14	M 6	4	13,5	0,8	1,9	3	9
07122-06X18	M 6	4	17,5	0,8	1,9	3	9
07122-06X22	M 6	4	21,5	0,8	1,9	3	9
07122-06X27	M 6	4	26,5	0,8	1,9	3	9
07122-08X14	M 8	5,5	14	1	2,4	4	15
07122-08X18	M 8	5,5	18	1	2,4	4	15
07122-08X22	M 8	5,5	22	1	2,4	4	15
07122-08X27	M 8	5,5	27	1	2,4	4	15
07122-08X34	M 8	5,5	34	1	2,4	4	15
07122-10X18	M10	7	18	1,5	2,6	5	20
07122-10X22	M10	7	22	1,5	2,6	5	20
07122-10X27	M10	7	27	1,5	2,6	5	20
07122-10X34	M10	7	34	1,5	2,6	5	20
07122-10X42	M10	7	42	1,5	2,6	5	20

Thrust screws

with radiused half-dog point



Material:
Screw steel grade 10.9.
Pin tool steel.

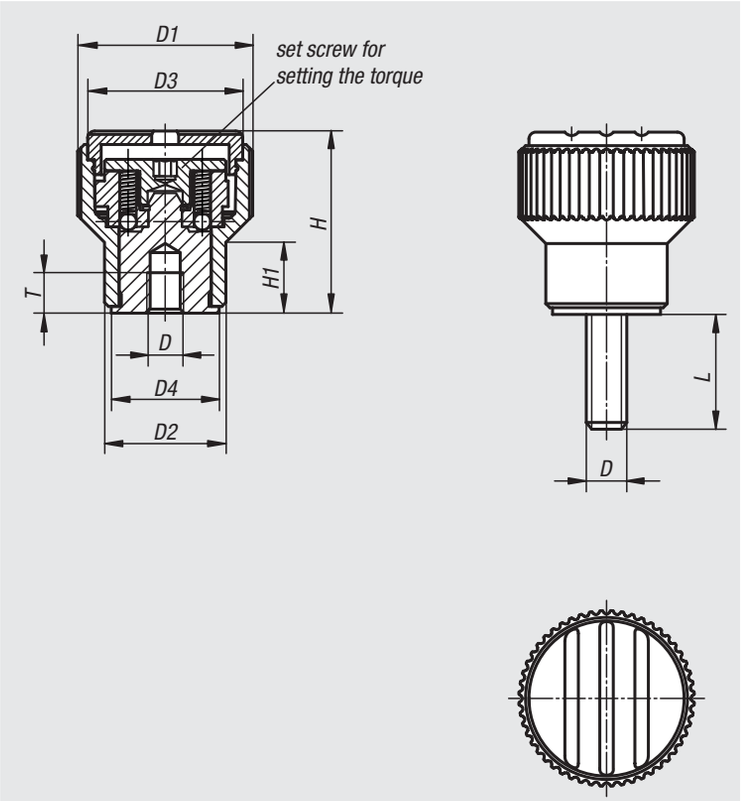
Version:
Pin, hardened.
Screw and pin black oxidised.

Sample order:
nlm 07123-05X09

Note:
These radiused half-dog point thrust screws are used when a punctiform thrust or support point are required.

Order No.	D	D1	L	L1	L2	SW	Load rating max. kN (static load only)
07123-05X09	M 5	3	9	0,5	1,8	2,5	4,5
07123-05X13	M 5	3	13	0,5	1,8	2,5	4,5
07123-05X17	M 5	3	17	0,5	1,8	2,5	4,5
07123-05X21	M 5	3	21	0,5	1,8	2,5	4,5
07123-06X14	M 6	4	14,3	0,8	2,7	3	9
07123-06X18	M 6	4	18,3	0,8	2,7	3	9
07123-06X22	M 6	4	22,3	0,8	2,7	3	9
07123-06X27	M 6	4	27,3	0,8	2,7	3	9
07123-08X15	M 8	5,5	14,8	0,8	3,2	4	15
07123-08X19	M 8	5,5	18,8	0,8	3,2	4	15
07123-08X23	M 8	5,5	22,8	0,8	3,2	4	15
07123-08X28	M 8	5,5	27,8	0,8	3,2	4	15
07123-08X35	M 8	5,5	34,8	0,8	3,2	4	15
07123-10X19	M10	7	18,9	1,1	3,5	5	20
07123-10X23	M10	7	22,9	1,1	3,5	5	20
07123-10X28	M10	7	27,9	1,1	3,5	5	20
07123-10X35	M10	7	34,9	1,1	3,5	5	20
07123-10X43	M10	7	42,9	1,1	3,5	5	20

Knurled torque knobs



Material:
Thermoplastic, black grey.
Bush and screw steel 5.8.

Version:
Bush black oxidised.
Screw blue chromed.

Sample order:
nlm 07125-2056X30 (cap colour traffic red; include length L)

Note:
The set screw sets the required torque. The knob de-clutches and turns freely when the desired torque is reached.

Δ Add the desired cap colour here. No colour code is required for black grey caps.

black grey	light grey Δ = 5	traffic red Δ = 6	bright yellow Δ = 7
RAL 7021	RAL 7035	RAL 3020	RAL 1021

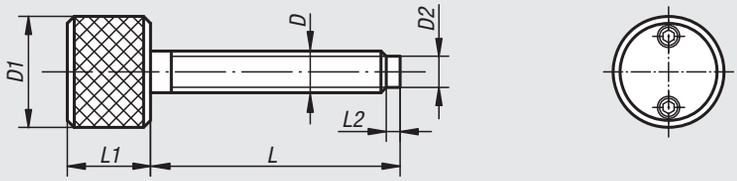
Order No.	Version	Size	D	D1	D2	D3	D4	H	H1	T	Adjustable torque approx. Nm min. - max.
07125-205Δ	bush steel	2	M5	26	18	23	16	27	10,5	5	0,1 - 0,3
07125-206Δ	bush steel	2	M6	26	18	23	16	27	10,5	6	0,1 - 0,3
07125-306Δ	bush steel	3	M6	34	22	31	20	37,5	14,5	10	0,1 - 0,3
07125-308Δ	bush steel	3	M8	34	22	31	20	37,5	14,5	14	0,1 - 0,3

Order No.	Version	Size	D	D1	D2	D3	D4	H	H1	Adjustable torque approx. Nm min. - max.	L
07125-205ΔX	screw steel	2	M5	26	18	23	16	27	10,5	0,1 - 0,3	30/50
07125-206ΔX	screw steel	2	M6	26	18	23	16	27	10,5	0,1 - 0,3	30/50
07125-306ΔX	screw steel	3	M6	34	22	31	20	37,5	14,5	0,1 - 0,3	40/60
07125-308ΔX	screw steel	3	M8	34	22	31	20	37,5	14,5	0,1 - 0,3	40/60

07130

Torque screws

with thrust point



F1 = Minimum final pressure
F2 = Maximum final pressure

Material:
Free-cutting steel

Version:
Black oxidised.

Sample order:
nlm 07130-08X60 (include length L)

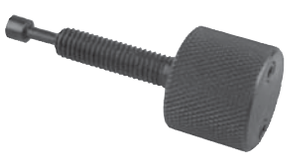
Note:
The torque required for the knurled screw is generated by two spring-mounted thrust balls.
As soon as the adjustable final pressure is reached, the grip runs free.
The final pressure is set using the set screws located in the head.

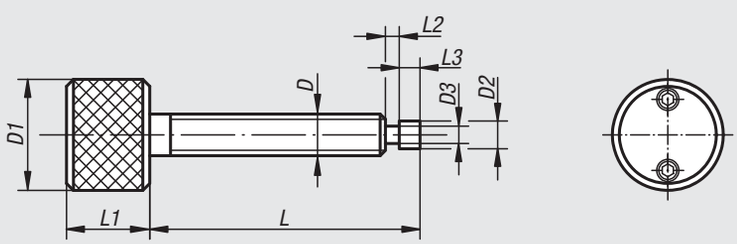
Order No.	D	D1	D2	L	L1	L2	F1 (N)	F2 (N)
07130-06X	M6	25	4,7	40/60	20	3	40	800
07130-08X	M8	25	6,5	40/60/80	20	3	40	650
07130-10X	M10	25	8,2	40/60/80	20	3	40	550
07130-12X	M12	25	10	40/60/80/100	20	3	40	450

07131

Torque screws

with slot coupling





F1 = Minimum final pressure
F2 = Maximum final pressure

Material:
Free-cutting steel

Version:
Black oxidised.

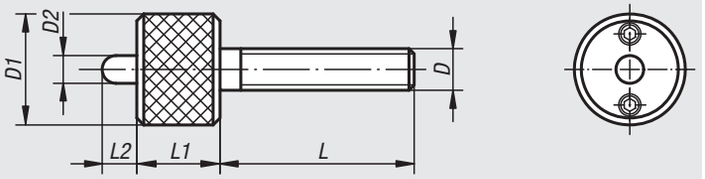
Sample order:
nlm 07131-06

Note:
The torque required for the knurled screw is generated by two spring-mounted thrust balls.
As soon as the adjustable final pressure is reached, the grip runs free.
The final pressure is set using the set screws located in the head.

Order No.	D	D1	D2	D3	L	L1	L2	L3	F1 (N)	F2 (N)
07131-06	M6	25	4,7	2,5	45	20	8	5	40	800
07131-10	M10	25	7,7	4,5	45	20	8	5	40	550

Torque screws

with support pin



F1 = Minimum final pressure
F2 = Maximum final pressure

Material:
Free-cutting steel

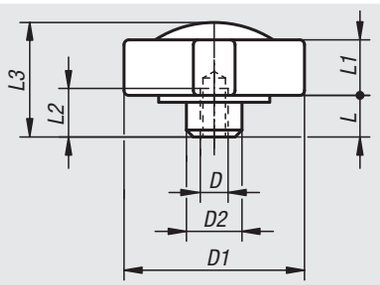
Version:
Black oxidised.

Sample order:
nlm 07132-06

Note:
The torque required for the knurled screw is generated by two spring-mounted thrust balls.
As soon as the adjustable final pressure is reached, the grip runs free.
The final pressure is set using the set screws located in the head.

Order No.	D	D1	D2	L	L1	L2	F1 (N)	F2 (N)
07132-06	M6	25	6	45	20	8	40	800
07132-10	M10	25	6	45	20	8	40	550
07132-12	M12	25	6	45	20	8	40	450

Torque grips



F1 = Minimum final pressure
F2 = Maximum final pressure

Material:
Nut: free cutting steel.
Handle: grey cast GJL 250.

Version:
Nut black oxidised.
Grip bright.

Sample order:
nlm 07133-08

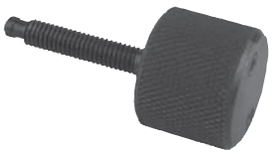
Note:
The torque required for the grip is generated by two spring-mounted thrust balls.
As soon as the adjustable final pressure is reached, the grip runs free.
The final pressure is set using the set screws located in the head.

Order No.	D	D1	D2	L	L1	L2	L3	F1 (N)	F2 (N)
07133-08	M8	60	20	12	22	13	40	40	900
07133-10	M10	60	20	12	22	13	40	40	700
07133-12	M12	60	20	12	22	13	40	40	500

07134

Torque screws

with ball thrust points

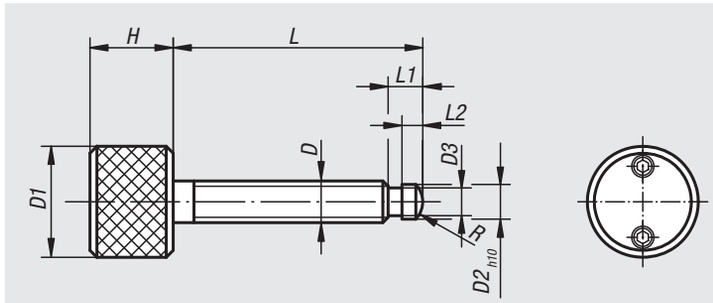


Material:
Free-cutting steel

Version:
Black oxidised.

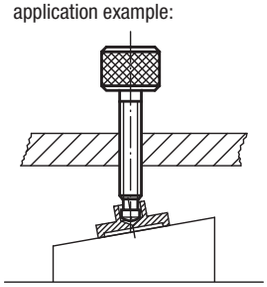
Sample order:
nlm 07134-08X60 (include length L)

Note:
The torque required for the knurled screw is generated by two spring-mounted thrust balls.
As soon as the adjustable final pressure is reached, the grip runs free.
The final pressure is set using the set screws located in the head.
These torque screws are particularly useful when used together with thrust pads (07138, 07140 or 07141) for clamping sloping surfaces.



F1 = Minimum final pressure
F2 = Maximum final pressure

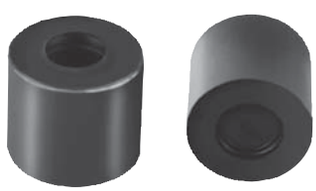
application example:

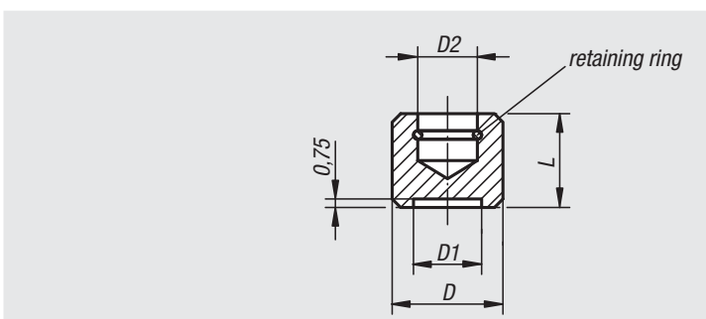


Order No.	D	D1	D2	D3	H	L	L1	L2	F1 (N)	F2 (N)	R
07134-06X	M6	25	4,5	4,1	20	40/60	6	2,5	40	800	3
07134-08X	M8	25	6	5,3	20	60/80	7,5	3	40	650	5
07134-10X	M10	25	8	7,2	20	60/80	9	4,5	40	550	6
07134-12X	M12	25	8	7,2	20	80/100	10	4,5	40	450	6

07138

Thrust pads





Material:
Thrust pad steel.
Retaining ring spring steel.

Version:
Surface hardened and black oxidised.

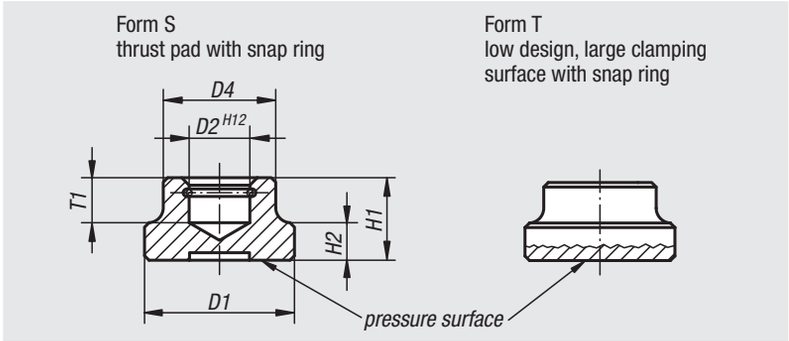
Sample order:
nlm 07138-10

Note:
These thrust pads press lightly onto torque screws with ball thrust pins (07134) or grub screws with thrust pins (07120).
The ball end allows the thrust pad to adapt to the clamping surface.

Order No.	D	D1	D2	L	Suitable for
07138-10	10	5	4,5	8	07120-06, 07134-06
07138-12	12	6	6	9	07120-08, 07134-08
07138-14	14	8	8	11	07120-10, 07120-12, 07134-10, 07134-12

Thrust pads

DIN 6311 enhanced

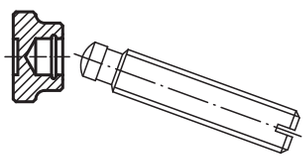


Material:
Steel: case-hardened. Snap ring spring steel.
Stainless steel: bright. Snap ring stainless steel.

Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 07140-12

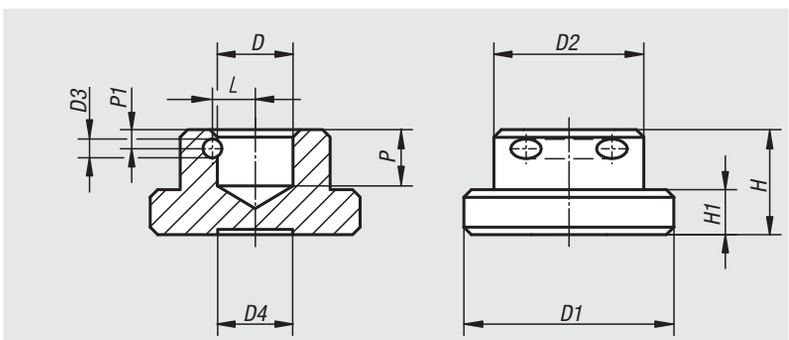
Note:
When fitting the thrust pad, ensure that it is inclined as far as possible in the direction of the snap ring opening. The snap ring is supplied assembled.



Order No. Steel	Order No. Stainless steel	Form	D1	D2	D4	H1	H2	T1	For grub screws with trust point DIN 6332
07140-06	**07140-061**	S	12	4,6	10	7	2,5	4	M6
07140-08	**07140-081**	S	16	6,1	12	9	4	5	M8
07140-10	**07140-101**	S	20	8,1	15	11	5	6	M10
07140-12	**07140-121**	S	25	8,1	18	13	7	7	M12
07140-16	**07140-161**	S	32	12,1	22	15	7	7,5	M16
07140-20	**07140-201**	S	40	15,6	28	16	9	8	M20
07140-108	-	T	25	6,1	12	8	4	4,5	M8
07140-110	-	T	32	8,1	18	10	6	6	M10 / M12
07140-116	-	T	40	12,1	22	12	7	7	M16

Thrust pads

with retaining pin



Material:
Free-cutting steel

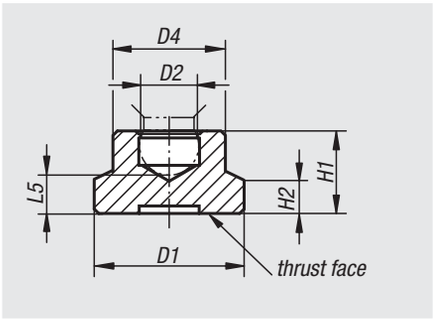
Version:
Case-hardened and black oxidised.

Sample order:
nlm 07141-10

Note:
The pin is used to hold the pad on screw 07120.

Order No.	D	D1	D2	D3	D4	H	H1	L	P	P1
07141-06	4,6	12	10	2	5	7	2,5	3	4	1,6
07141-08	6,1	16	12	2	7	9	4	3,5	5	2
07141-10	8,1	20	15	2	8	11	5	4,6	7	2,7
07141-12	8,1	25	18	2	10	13	6	4,6	7	2,7
07141-14	10,1	28	20	2,5	10	14	6	5,7	7,5	2,5
07141-16	12,1	32	22	2,5	14	15	7	6,7	7,5	2,5
07141-20	15,6	40	28	2,5	18	16	9	8,3	8	3

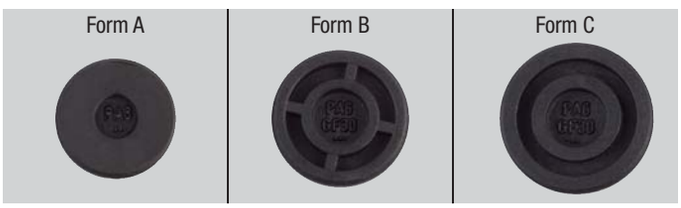
Thrust pads



Material:
Steel.
PA 6 plastic.

Version:
Black oxidised.
Black plastic.

Sample order:
nlm 07142-08



Order No.	Form	Material	D1	D2	D4	H1	H2	L5	Suitable for grub screws
07142-06	A	Steel	15	4,4	8,6	7,6	2,5	3,8	M6
07142-08	A	Steel	18	5,9	12	9	3,5	4,4	M8
07142-10	A	Steel	21	7,9	15	11	4	5	M10
07142-12	A	Steel	25	7,9	18	13	5	6,9	M12
07142-206	A	Plastic	15	4,4	8,6	7,6	2,5	3,8	M6
07142-208	B	Plastic	18	5,9	12	9	3,5	4,4	M8
07142-210	C	Plastic	21	7,9	15	11	4	5	M10
07142-212	C	Plastic	25	7,9	18	13	5	6,9	M12

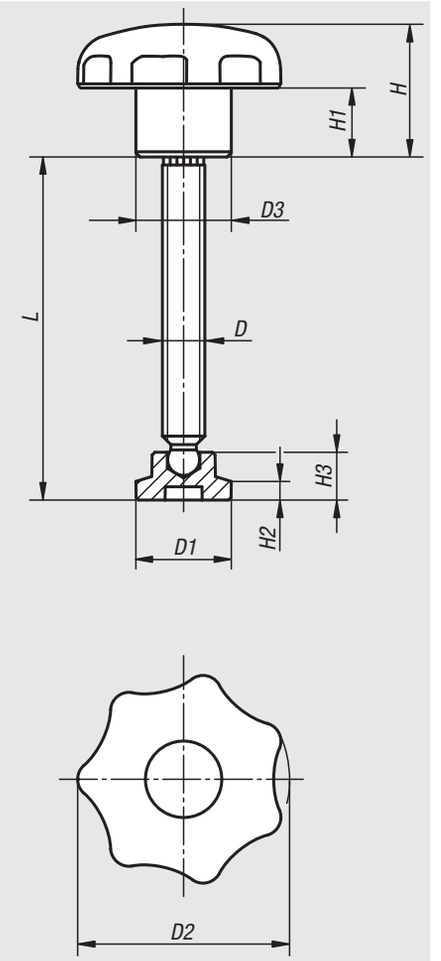
Thrust spindles

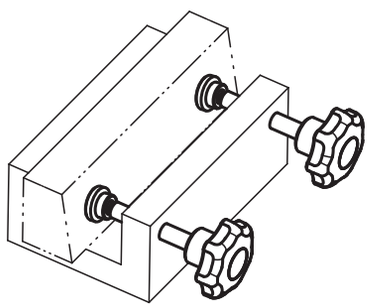
Material:
Star grip: thermoplastic.
Bush: steel.
Grub screw: steel, grade 5.8.
Thrust pad: plastic PA 6.

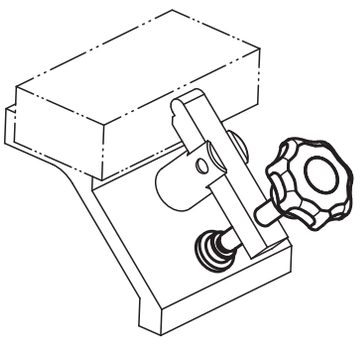
Version:
Star grip, thrust pad black.
Bush galvanized and blue chromed.
Grub screw black oxidised.

Sample order:
nlm 07143-06053

Note:
The thrust pad is supplied loose. It can be lightly pressed onto the end of the spindle.







Order No.	D	D1	D2	D3	L	H	H1	H2	H3
07143-06053	M6	15	32	14	53,8	20	10	2,5	7,6
07143-08064	M8	18	40	18	64,6	25	13	3,5	9
07143-10070	M10	21	50	22	70,1	32	17	4	11
07143-12086	M12	25	63	26	86	40	21	5	13

Swivel feet

Material:
Form A, G: Thrust plate carbon steel. Ball element free-cutting.
Form B: Stainless steel.
Form C: Thrust plate POM. Ball element free-cutting steel.
Form D: Thrust plate POM. Ball element stainless steel.

Anti-slip-plate thermoplastic elastomer.

Version:
Form A, G: Ball element case-hardened, black oxidised.
Form B: Bright.
Form C: Ball element case-hardened, black oxidised.
Form D: Ball element bright.

Sample order:
nlm 07144-112

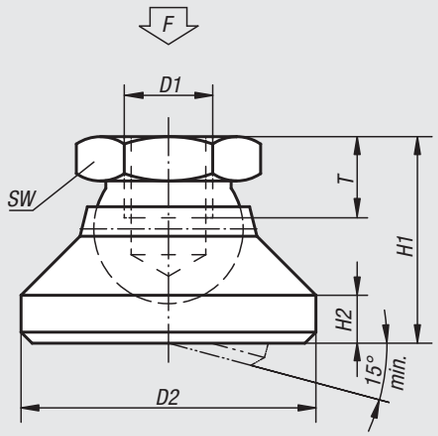
Note:
The anti-slip plate absorbs vibrations and prevents the swivel foot slipping.

Form A
thrust plate and
ball element steel

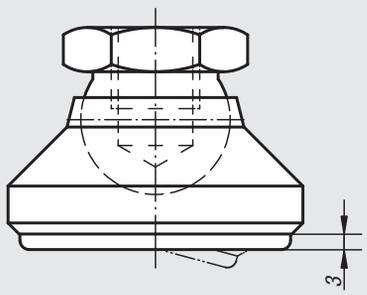
Form B
thrust plate and
ball element stainless steel

Form C
thrust plate POM,
ball element steel

Form D
thrust plate POM,
ball element stainless steel



Form G
thrust plate and
ball element steel
with anti-slip plate



Order No. Form A	Order No. Form B	D1	D2	H1	H2	T	SW	Load rating max. kN (static load only)
07144-106	**07144-306**	M6	20	15	2,5	8,5	10	10
07144-108	**07144-308**	M8	25	18	4	9	13	18
07144-110	**07144-310**	M10	32	22	5	10	17	20
07144-112	**07144-312**	M12	40	26	6	12	19	35
07144-116	**07144-316**	M16	50	32	7	14	24	45
07144-120	**07144-320**	M20	60	42	8	18	30	55

Order No. Form C	Order No. Form D	D1	D2	H1	H2	T	SW	Load rating max. kN (static load only)
07144-506	**07144-206**	M6	20	15	2,5	8,5	10	4
07144-508	**07144-208**	M8	25	18	4	9	13	7
07144-510	**07144-210**	M10	32	22	5	10	17	10
07144-512	**07144-212**	M12	40	26	6	12	19	18
07144-516	**07144-216**	M16	50	32	7	14	24	20
07144-520	**07144-220**	M20	60	42	8	18	30	22

Order No. Form G	D1	D2	H1	H2	T	SW	Load rating max. kN (static load only)
07144-410	M10	32	22	5	10	17	12
07144-412	M12	40	26	6	12	19	17
07144-416	M16	50	32	7	14	24	20
07144-420	M20	60	42	8	18	30	24

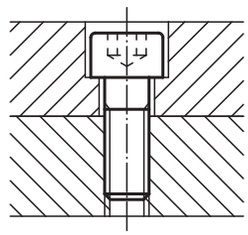
Socket head screws

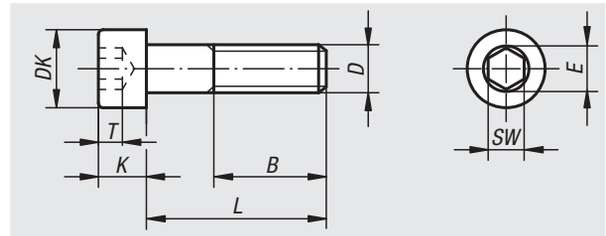
DIN 912 / DIN EN ISO 4762, steel or stainless steel

Material:
Steel or stainless steel (A 2)

Version:
Steel grade 8.8, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07160-08X40 (include length L)





Order No. steel	Order No. stainless steel	D	L	B	DK	K	E	SW	T
07160-04X	**07160-104X**	M4	10/12/16/18/20/25	20	7	4	3,44	3	2
07160-05X	**07160-105X**	M5	10/12/16/18/20/25/30/40	22	8,5	5	4,58	4	2,5
07160-06X	**07160-106X**	M6	10/12/16/18/20/25/30/35/40/45/50/55/60	24	10	6	5,72	5	3
07160-08X	**07160-108X**	M8	16/18/20/25/30/35/40/45/50/60/70/80	28	13	8	6,86	6	4
07160-10X	**07160-110X**	M10	16/18/20/25/30/35/40/45/50/60/70/80/90/100	32	16	10	9,15	8	5
07160-12X	**07160-112X**	M12	20/25/30/35/40/45/50/60/70/80/90/100/110/120	36	18	12	11,43	10	6
07160-14X	-	M14	50/80/120	40	21	14	13,9	12	7
07160-16X	-	M16	30/35/40/45/50/60/70/80/90/100/110/120	44	24	16	16	14	8
07160-20X	-	M20	40/45/50/60/70/80/90/100/110/120	52	30	20	19,44	17	10

07160

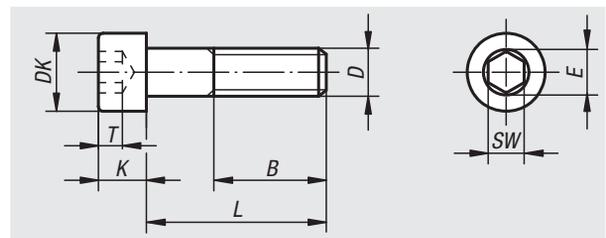
Socket head screws

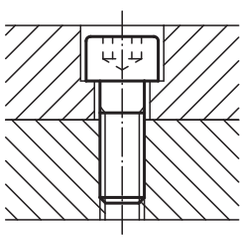
DIN 912/DIN EN ISO 4762

Material:
Steel.

Version:
Steel grade 12.9, black.

Sample order:
nlm 07160-206X40 (include length L)

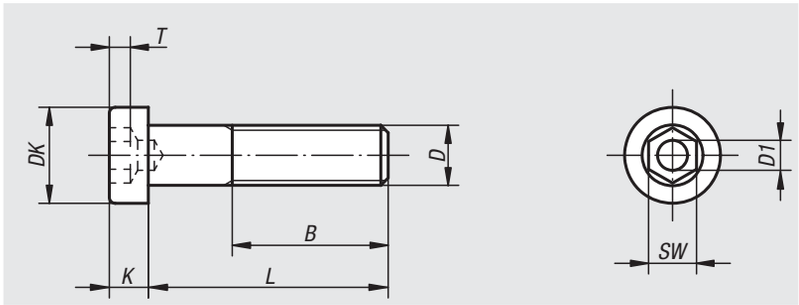




Order No.	D	L	B	DK	K	E	SW	T
07160-206X	M6	18/20/25/30/35/40/45/50/55/60/65/70/80/90/100	24	10	6	5,72	5	3
07160-210X	M10	30/35/40/45/50/55/60/65/70/75/80/90/100/110/120/130/140	32	16	10	9,15	8	5
07160-216X	M16	35/40/45/50/55/60/65/70/75/80/90/100/110/120/130/140/150/160/170/180/200	44	24	16	16	14	8

Socket head screws with low head

DIN 6912



Material:
Steel or stainless steel (A 2)

Version:
Steel grade 8.8, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07161-110X20 (include length L)

Order No.	Material	D	L	B	DK	K	D1	SW	T
07161-04X	steel	M4	10/12/16/20/25	14	7	2,8	2	3	1,48
07161-05X	steel	M5	10/12/16/20/25/30	16	8,5	3,5	2,5	4	1,88
07161-06X	steel	M6	10/12/16/20/25/30/35/40/45/50/60	18	10	4	3	5	2,38
07161-08X	steel	M8	10/12/16/20/25/30/35/40/45/50/60/70/80	22	13	5	4	6	2,88
07161-10X	steel	M10	20/25/30/35/40/45/50/60/70/80/90/100	26	16	6,5	5	8	3,35
07161-12X	steel	M12	20/25/30/35/40/45/50/60/70/80/90/100/110/120	30	18	7,5	6	10	3,85
07161-16X	steel	M16	30/35/40/45/50/60/70/80/90/100/110/120	38	24	10	8	14	5,35
07161-20X	steel	M20	40/45/50/60/70/80/90/100/110/120	46	30	12	10	17	6,32
07161-104X	stainless steel	M4	10/12/16/20/25	14	7	2,8	2	3	1,48
07161-105X	stainless steel	M5	10/12/16/20/25/30	16	8,5	3,5	2,5	4	1,88
07161-106X	stainless steel	M6	10/12/16/20/25/30/35/40/45/50/60	18	10	4	3	5	2,38
07161-108X	stainless steel	M8	10/12/16/20/25/30/35/40/45/50/60/70	22	13	5	4	6	2,88
07161-110X	stainless steel	M10	16/20/25/30/35/40/45/50/60/70	26	16	6,5	5	8	3,35
07161-112X	stainless steel	M12	20/25/30/35/40/45/50/60/70	30	18	7,5	6	10	3,85

Grub screws with flat point

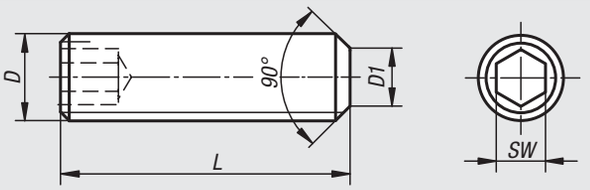
hexagon socket DIN 913

Material:
Steel or stainless steel (A 2).

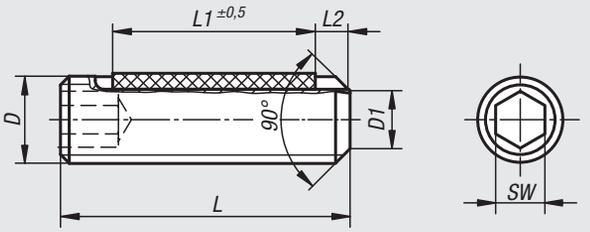
LONG-LOK thread lock in nylon.

Version:
Steel class 45 H, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07165-110X20 (include length L)



with LONG-LOK thread lock

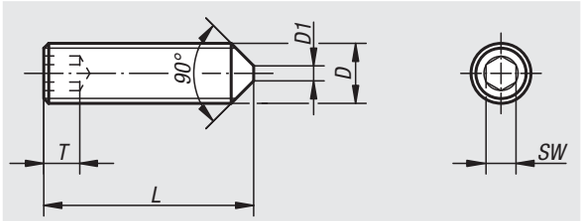


L2 = approx. 2x thread pitch

Order No.	Material	Version	D	L	L1	D1	SW
07165-03X	steel	-	M3	5/6/8/10/12/16/20	-	2	1,5
07165-04X	steel	-	M4	5/6/8/10/12/16/20/25	-	2,5	2
07165-05X	steel	-	M5	5/6/8/10/12/16/20/25/30	-	3,5	2,5
07165-06X	steel	-	M6	6/8/10/12/16/20/25/30/35/40/45/50/60	-	4	3
07165-08X	steel	-	M8	8/10/12/16/20/25/30/35/40/45/50/60/70/80	-	5,5	4
07165-10X	steel	-	M10	10/12/16/20/25/30/35/40/45/50/60/70/80/90/100	-	7	5
07165-103X	stainless steel	-	M3	5/6/8/10/12	-	2	1,5
07165-104X	stainless steel	-	M4	5/6/8/10/12/16/20	-	2,5	2
07165-105X	stainless steel	-	M5	5/6/8/10/12/16/20/25/30	-	3,5	2,5
07165-106X	stainless steel	-	M6	6/8/10/12/16/20/25/30/35/40	-	4	3
07165-108X	stainless steel	-	M8	8/10/12/16/20/25/30/35/40/45/50	-	5,5	4
07165-110X	stainless steel	-	M10	10/12/16/20/25/30/35/40/45/50	-	7	5
07165-203X	steel	LONG-LOK	M3	5/6/8/10/12	2/3/5/7/8	2	1,5
07165-204X	steel	LONG-LOK	M4	5/6/8/10/12/16	2/2,5/4/6/8/12	2,5	2
07165-205X	steel	LONG-LOK	M5	5/6/8/10/12/16	2/3/3,5/5/7/10	3,5	2,5
07165-206X	steel	LONG-LOK	M6	6/8/10/12/16/20	2,5/3/5/7/11/14	4	3
07165-208X	steel	LONG-LOK	M8	8/10/12/16/20	2,5/3,5/5/9/12	5,5	4
07165-210X	steel	LONG-LOK	M10	10/12/16/20	5/6/10/12	7	5
07165-303X	stainless steel	LONG-LOK	M3	5/6/8/10/12	2/3/5/7/8	2	1,5
07165-304X	stainless steel	LONG-LOK	M4	5/6/8/10/12/16	2/2,5/4/6/8/12	2,5	2
07165-305X	stainless steel	LONG-LOK	M5	5/6/8/10/12/16	2/3/3,5/5/7/10	3,5	2,5
07165-306X	stainless steel	LONG-LOK	M6	6/8/10/12/16/20	2,5/3/5/7/10/14	4	3
07165-308X	stainless steel	LONG-LOK	M8	8/10/12/16/20	3/3,5/5/9/12	5,5	4
07165-310X	stainless steel	LONG-LOK	M10	10/12/16/20	5/6/10/12	7	5

Grub screw with hexagon socket and pointed end

DIN 914 / DIN EN ISO 4027



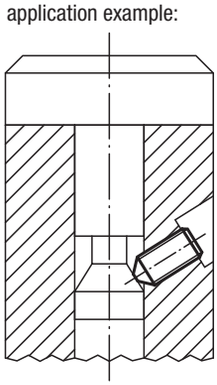
Material:
Steel or stainless steel (A 2)

Version:
Steel class 45 H, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07166-110X12 (include length L)

Note:
By M4x5, M5x5, M5x6, M6x6, M8x8, M10x10 the point angle is 120°.

application example:

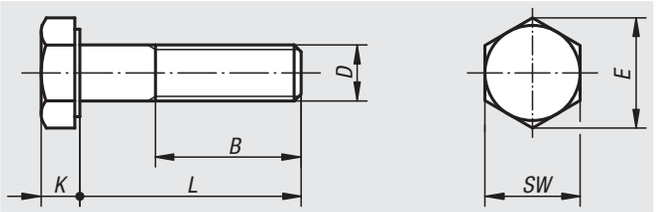


Order No. steel	Order No. stainless steel	D	L	D1	T	SW
07166-03X	**07166-103X**	M3	5/6/8/10/12/16/20	-	1,2	1,5
07166-04X	**07166-104X**	M4	5/6/8/10/12/16/20/25	-	1,5	2
07166-05X	**07166-105X**	M5	5/6/8/10/12/14/16/20/25/30	-	2	2,5
07166-06X	**07166-106X**	M6	6/8/10/12/16/20/25/30/35/40/45/50/60	1,5	2	3
07166-08X	**07166-108X**	M8	8/10/12/14/16/20/25/30/35/40/45/50/60	2	3	4
07166-10X	**07166-110X**	M10	10/12/16/20/25/30/35/40/45/50/60/70/80	2,5	4	5

07170

Hexagon head bolts

DIN 931/DIN EN ISO 4014/DIN EN 24014



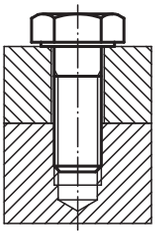
Material:
Steel or stainless steel (A 2)

Version:
Steel grade 8.8, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07170-110X50 (include length L)

On request:
Wrench sizes to DIN ISO 272.

application example:

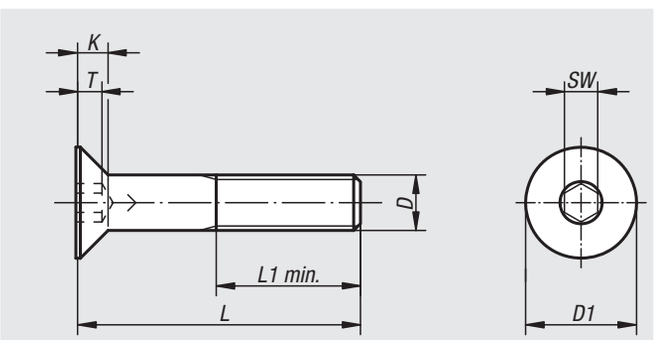


Order No. steel	Order No. stainless steel	D	L	B	SW	E	K
07170-04X	-	M4	25/30/35/40/45/50	14	7	7,66	2,8
07170-05X	**07170-105X**	M5	25/30/35/40/45/50/60	16	8	8,79	3,5
07170-06X	**07170-106X**	M6	30/35/40/45/50/60/70	18	10	11,05	4
07170-08X	**07170-108X**	M8	35/40/45/50/60/70/80	22	13	14,38	5,3
07170-10X	**07170-110X**	M10	40/45/50/60/70/80/90/100	26	17	18,9	6,4
07170-12X	**07170-112X**	M12	45/50/60/70/80/90/100/110/120	30	19	21,1	7,5
07170-16X	**07170-116X**	M16	60/70/80/90/100/110/120	38	24	26,75	10
07170-20X	-	M20	70/80/90/100/110/120	46	30	33,53	12,5

07175

Screws with countersunk head

hexagon socket DIN 7991



Material:
Steel or stainless steel (A 2)

Version:
Steel grade 8.8, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07175-106X20 (include length L)

Order No. steel	Order No. stainless steel	D	L	L1 min.	K	T	D1	SW
07175-04X	**07175-104X**	M4	10/12/16/20/25	14	2,3	1,8	8	2,5
07175-05X	**07175-105X**	M5	10/12/16/20/25/30	16	2,8	2,3	10	3
07175-06X	**07175-106X**	M6	10/12/16/20/25/30/35/40/45/50/60	18	3,3	2,5	12	4
07175-08X	**07175-108X**	M8	16/20/25/30/35/40/45/50/60	22	4,4	3,5	16	5
07175-10X	**07175-110X**	M10	16/20/25/30/35/40/45/50/60/70	26	5,5	4,4	20	6
07175-12X	**07175-112X**	M12	20/25/30/35/40/45/50/60/70/80	30	6,5	4,6	24	8
07175-16X	**07175-116X**	M16	30/35/40/45/50/60/70/80	38	7,5	5,3	30	10

Eye bolts

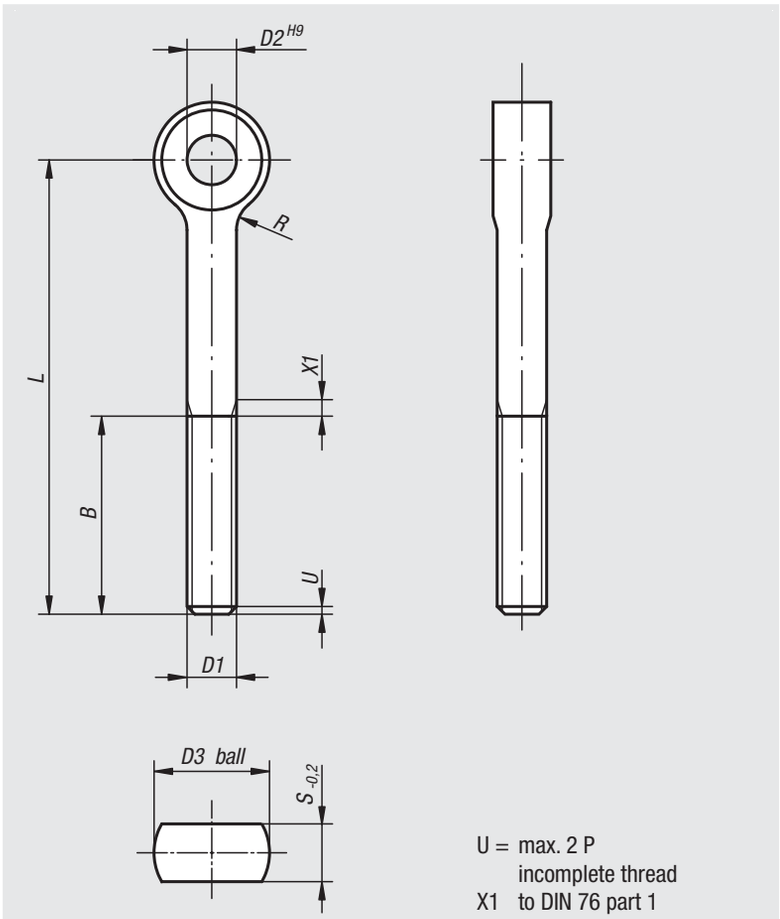
DIN 444, Form B

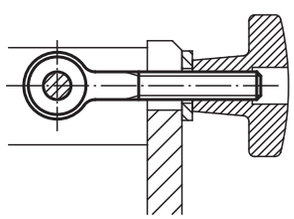
Material:
Steel, grade 8.8 or stainless steel.

Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 07180-12100

Note:
Suitable hinge pin, see 04250.

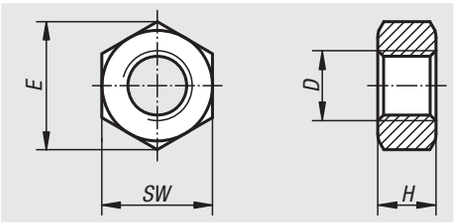




Order No. steel	Order No. stainless steel	D1	L	D2	D3	B	S	R
07180-0550	**07180-10550**	M5	50	5	12	16	6	2,5
07180-0575	**-**	M5	75	5	12	16	6	2,5
07180-0650	**07180-10650**	M6	50	6	14	18	7	4
07180-0675	**07180-10675**	M6	75	6	14	18	7	4
07180-0850	**07180-10850**	M8	50	8	18	22	9	4
07180-0875	**07180-10875**	M8	75	8	18	22	9	4
07180-1075	**07180-11075**	M10	75	10	20	26	12	4
07180-10100	**07180-110100**	M10	100	10	20	26	12	4
07180-1275	**07180-11275**	M12	75	12	25	30	14	6
07180-12100	**07180-112100**	M12	100	12	25	30	14	6
07180-12120	**07180-112120**	M12	120	12	25	30	14	6
07180-12130	**07180-112130**	M12	130	12	25	36	14	6
07180-1475	**07180-11475**	M14	75	14	28	36	16	6
07180-14130	**07180-114130**	M14	130	14	28	36	16	6
07180-16130	**07180-116130**	M16	130	16	32	44	17	6
07180-20140	**07180-120140**	M20	140	18	40	52	22	6

Hexagon nuts

DIN 934/DIN EN ISO 4032/DIN EN 24032



Material:
Steel or stainless steel (A 2)

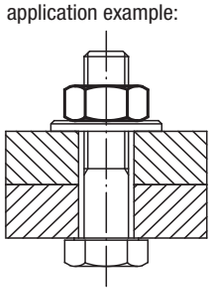
Version:
Steel grade 8, bright.
Stainless steel A 2-70, bright.

Sample order:
nlm 07210-10

Note:
The nut grade must always be the same or higher than the bolt grade, i.e. bolts with grade 8.8 are always paired with nuts grade 8 or higher, but never less.

On request:
Wrench sizes to DIN ISO 272.

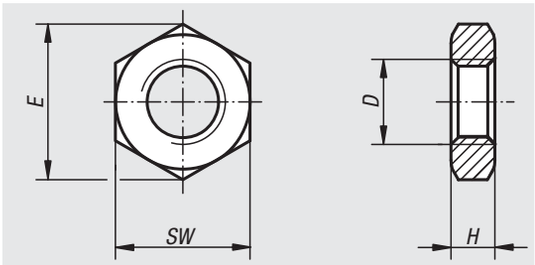
application example:



Order No. steel	Order No. stainless steel	D	E	H	SW
07210-03	**07210-103**	M3	6,01	2,4	5,5
07210-04	**07210-104**	M4	7,66	3,2	7
07210-05	**07210-105**	M5	8,79	4	8
07210-06	**07210-106**	M6	11,05	5	10
07210-08	**07210-108**	M8	14,38	6,5	13
07210-10	**07210-110**	M10	18,9	8	17
07210-12	**07210-112**	M12	21,1	10	19
07210-16	**07210-116**	M16	26,76	13	24
07210-20	**07210-120**	M20	32,95	16	30

Hexagon nuts thin

DIN 439



Material:
Steel or stainless steel (A 2).

Version:
Steel grade 04, galvanized or black oxidised.
Stainless steel A2, bright.

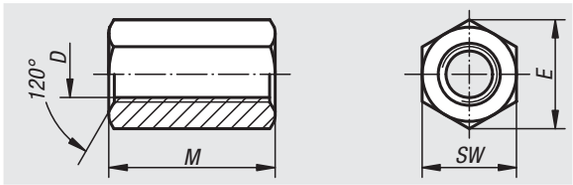
Sample order:
nlm 07212-10

Note:
These hexagon nuts are used in screw connections exposed to limited loads, e.g. as a locknut for clevis joints or rod ends.

Order No. galvanized steel	Order No. stainless steel	Order No. black oxidised steel	Version	D	E	H	SW
07212-05	**07212-105**	**07212-205**	right-hand thread	M5	8,79	2,7	8
07212-06	**07212-106**	**07212-206**	right-hand thread	M6	11,05	3,2	10
07212-006	**07212-1062**	**07212-2063**	right-hand thread	M6x0,75	11,05	3,2	10
07212-08	**07212-108**	**07212-208**	right-hand thread	M8	14,38	4	13
07212-008	**07212-1083**	**07212-2083**	right-hand thread	M8x1	14,38	4	13
07212-10	**07212-110**	**07212-210**	right-hand thread	M10	18,9	5	17
07212-103	**07212-1103**	**07212-2103**	right-hand thread	M10x1	18,9	5	17
07212-104	**07212-1104**	**-**	right-hand thread	M10x1,25	18,9	5	17
07212-12	**07212-112**	**07212-212**	right-hand thread	M12	21,1	6	19
07212-123	**07212-1123**	**-**	right-hand thread	M12x1,25	21,1	6	19
07212-124	**07212-1124**	**07212-2124**	right-hand thread	M12x1,5	21,1	6	19
07212-16	**07212-116**	**07212-216**	right-hand thread	M16	26,76	8	24
07212-163	**07212-1163**	**07212-2163**	right-hand thread	M16x1,5	26,76	8	24
07212-183	**-**	**-**	right-hand thread	M18x1,5	29,56	9	27
07212-203	**07212-1203**	**07212-2203**	right-hand thread	M20x1,5	32,95	10	30
07212-223	**07212-1223**	**-**	right-hand thread	M22x1,5	36,9	10	32
-	**07212-1243**	**07212-2243**	right-hand thread	M24x2	39,6	12	36
07212-061	**07212-1061**	**-**	left-hand thread	M6	11,05	3,2	10
07212-081	**07212-1081**	**-**	left-hand thread	M8	14,38	4	13
07212-101	**07212-1101**	**-**	left-hand thread	M10	18,9	5	17
07212-1031	**07212-11031**	**-**	left-hand thread	M10x1	18,9	5	17
07212-1041	**07212-11041**	**-**	left-hand thread	M10x1,25	18,9	5	17
07212-121	**07212-1121**	**-**	left-hand thread	M12	21,1	6	19
07212-1231	**07212-11231**	**-**	left-hand thread	M12x1,25	21,1	6	19
07212-1241	**07212-11241**	**-**	left-hand thread	M12x1,5	21,1	6	19
07212-161	**07212-1161**	**-**	left-hand thread	M16	26,76	8	24
07212-2031	**07212-12031**	**-**	left-hand thread	M20x1,5	32,95	10	30
07212-2231	**07212-12231**	**-**	left-hand thread	M22x1,5	36,9	10	32

Extension nuts

height 3xD



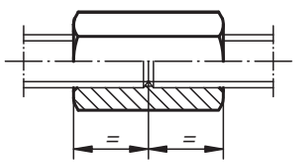
Material:
Carbon steel.

Version:
Tempered to grade 10, black.

Sample order:
nlm 07220-16

Note:
For functional and safety reasons screws should be screwed into a maximum of half the nut height from both sides.
Minimum thread depth 1x diameter.

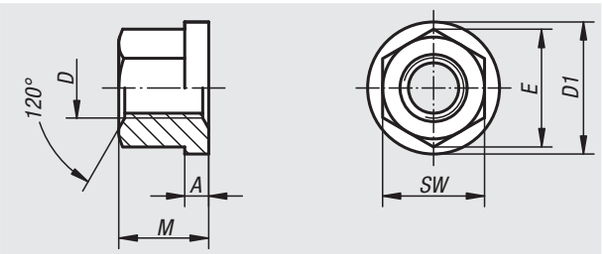
On request:
DIN ISO 272 spanner sizes.



Order No.	D	M = 3 x D	SW	E
07220-06	M6	18	10	11,5
07220-08	M8	24	13	15
07220-10	M10	30	17	19,6
07220-12	M12	36	19	21,9
07220-14	M14	42	22	25,4
07220-16	M16	48	24	27,7
07220-18	M18	54	27	31,2
07220-20	M20	60	30	34,6
07220-22	M22	66	32	36,9
07220-24	M24	72	36	41,6
07220-27	M27	81	41	47,3
07220-30	M30	90	46	53,1
07220-36	M36	108	55	63,5

Hexagon nuts with collar

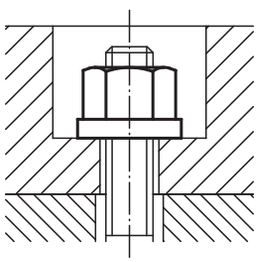
height 1.5xD, DIN 6331 enhanced



Material:
Carbon steel or stainless steel (A2).

Version:
Steel grade 10, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07240-16



Order No.	Material	D	M = 1,5 x D	A	D1	SW	E
07240-05	steel	M5	7,5	2	12	9	10,4
07240-06	steel	M6	9	3	14	10	11,5
07240-08	steel	M8	12	3,5	18	13	15
07240-10	steel	M10	15	4	22	16	18,5
07240-101	steel	M10	15	4	22	17	19,6
07240-12	steel	M12	18	4	25	18	20,8
07240-121	steel	M12	18	4	25	19	21,9
07240-14	steel	M14	21	4,5	28	22	25,4
07240-16	steel	M16	24	5	31	24	27,7
07240-18	steel	M18	27	5	34	27	31,2
07240-20	steel	M20	30	6	37	30	34,6
07240-22	steel	M22	33	6	40	34	36,9
07240-24	steel	M24	36	6	45	36	41,6
07240-30	steel	M30	45	8	58	46	53,1
07240-36	steel	M36	54	10	68	55	63,5
07240-806	stainless steel	M6	9	3	14	10	11,5
07240-808	stainless steel	M8	12	3,5	18	13	15
07240-810	stainless steel	M10	15	4	22	16	18,5
07240-811	stainless steel	M10	15	4	22	17	19,6
07240-812	stainless steel	M12	18	4	25	18	20,8
07240-8121	stainless steel	M12	18	4	25	19	21,9
07240-816	stainless steel	M16	24	5	31	24	27,7
07240-820	stainless steel	M20	30	6	37	30	34,6

Hexagon nut

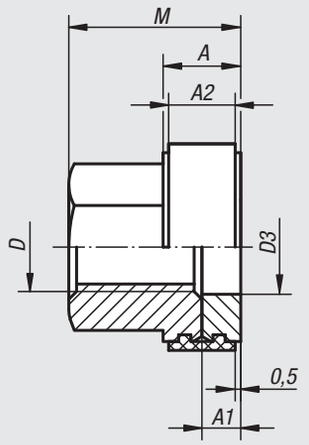
with no-loss washer

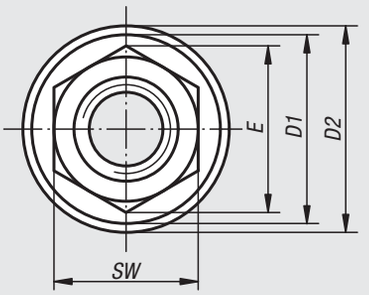
Material:
Hex nut and washer carbon steel.
Retaining ring PA 6 black.

Version:
Hexagonal nut and washer tempered, black oxidised.
Hexagonal nut grade 10.

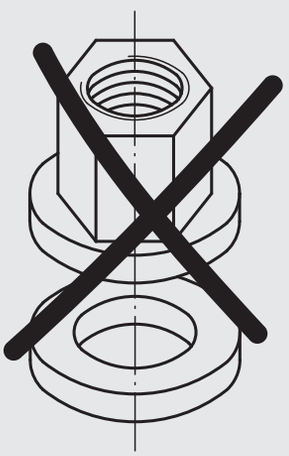
Sample order:
nlm 07242-12

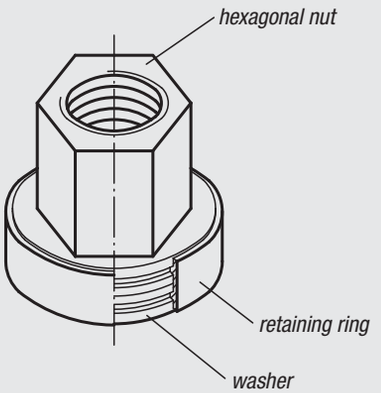
Advantages:
- A compact unit.
- The washer is permanently attached to the hexagonal nut by a retaining ring.
- Components such as expensive special claw clamps, clamping disks, flanges etc. are protected by the hex nut with washer. The reduced wear leads to cost advantages.
- Other cost advantages in procurement - a single ordering process where previously two were required.





We bring together what belongs together.
Hexagonal nut and washer in a single unit.



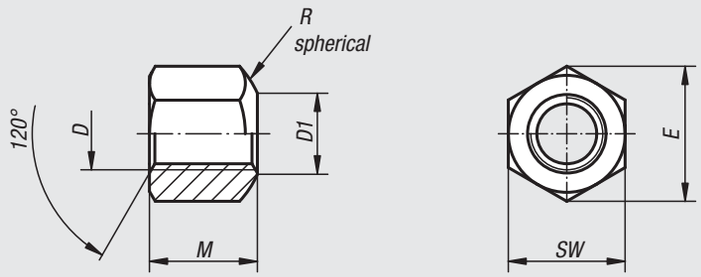


Order No.	D	M	A	A1	A2	D1	D2	D3	E	SW
07242-08	M8	15,5	7	3,5	6	17	18,6	8,5	15	13
07242-10	M10	19	8	4	7	21	22,7	10,5	18,5	16
07242-12	M12	22	8	4	7	24	25,7	12,5	20,8	18
07242-16	M16	29	10	5	9	30	32	16,5	27,7	24
07242-20	M20	36	12	6	11	36	38	20,5	34,6	30
07242-24	M24	42	12	6	11	44	46	24,5	41,6	36

Hexagon nuts Form B

height 1.5xD, DIN 6330 enhanced

Form B
with spherical end one side

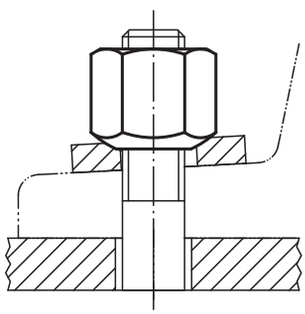


Material:
Carbon steel or stainless steel (A2).

Version:
Tempered to 10, black.
Stainless steel A 2-70, bright.

Sample order:
nlm 07260-12

Note:
These nuts can be used with spherical washers 07420 Form D and G.

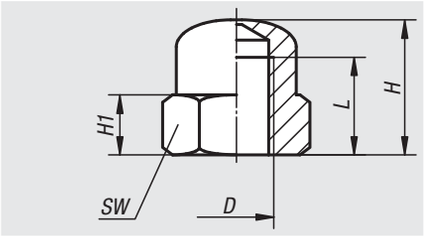


Order No.	Material	D	M = 1,5 x D	D1	SW	E	R
07260-05	steel	M5	7,5	6,5	9	10,4	7
07260-06	steel	M6	9	7	10	11,5	9
07260-08	steel	M8	12	9	13	15	11
07260-10	steel	M10	15	11,5	16	18,4	15
07260-101	steel	M10	15	11,5	17	19,6	15
07260-12	steel	M12	18	14	18	20,7	17
07260-121	steel	M12	18	14	19	21,9	17
07260-14	steel	M14	21	16	22	25,4	20
07260-16	steel	M16	24	18	24	27,7	22
07260-18	steel	M18	27	20	27	31,2	24,5
07260-20	steel	M20	30	22	30	34,6	27
07260-22	steel	M22	33	24	32	36,9	29
07260-24	steel	M24	36	26	36	41,6	32
07260-30	steel	M30	45	32	46	53,1	41
07260-36	steel	M36	54	38	55	63,5	50
07260-806	stainless steel	M6	9	7	10	11,5	9
07260-808	stainless steel	M8	12	9	13	15	11
07260-810	stainless steel	M10	15	11,5	16	18,4	15
07260-811	stainless steel	M10	15	11,5	17	19,6	15
07260-812	stainless steel	M12	18	14	18	20,7	17
07260-816	stainless steel	M16	24	18	24	27,7	22
07260-820	stainless steel	M20	30	22	30	34,6	27

07280

Hexagon domed cap nuts

similar to DIN 1587



Material:
Steel.

Version:
Steel grade 8, black oxidised.

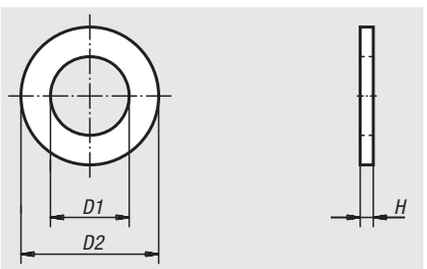
Sample order:
nlm 07280-10

Order No.	D	H	H1	L	SW
07280-05	M5	10	4	6,5	9
07280-06	M6	12	5	8	10
07280-08	M8	15	6,5	11	13
07280-10	M10	18	8	13	17
07280-12	M12	22	10	16	19
07280-14	M14	25	11	18	22
07280-16	M16	28	13	21	24
07280-20	M20	34	16	26	30

07300

Washers

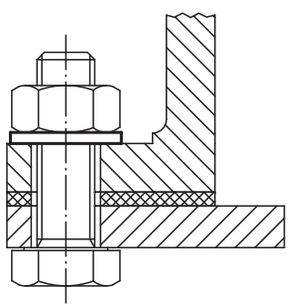
medium DIN 125 Form A



Material:
Steel 140 HV or stainless steel (A 2-70)

Version:
Bright.

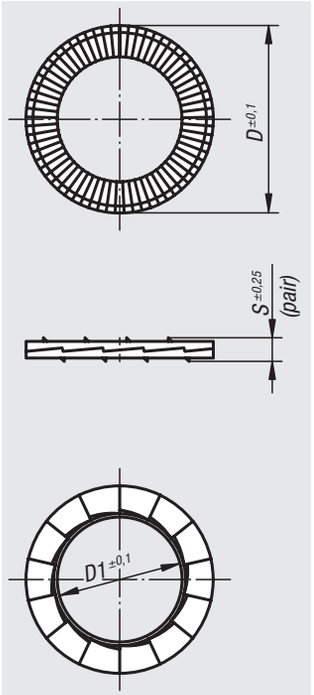
Sample order:
nlm 07300-10



Order No. steel	Order No. stainless steel	for screws	D1	D2	H
07300-03	**07300-103**	M3	3,2	7	0,5
07300-04	**07300-104**	M4	4,3	9	0,8
07300-05	**07300-105**	M5	5,3	10	1
07300-06	**07300-106**	M6	6,4	12	1,6
07300-08	**07300-108**	M8	8,4	16	1,6
07300-10	**07300-110**	M10	10,5	20	2
07300-12	**07300-112**	M12	13	24	2,5
07300-14	**07300-114**	M14	15	28	2,5
07300-16	**07300-116**	M16	17	30	3
07300-20	**07300-120**	M20	21	37	3
07300-24	**07300-124**	M24	25	44	4
07300-30	**07300-130**	M30	31	56	4
07300-36	**07300-136**	M36	37	66	5

Lock washer self-locking

DIN 25201



Material:
Steel or stainless steel

Version:
Galvanised steel, surface hardness 47 HRC ±5%.
Stainless steel, surface hardness HV 350 ±5%

Sample order:
nlm 07310-0817261

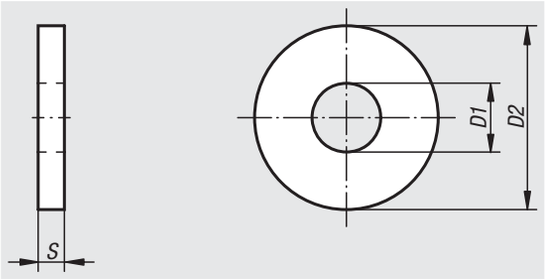
Note:
These lock washers ensure that bolts and screws subjected to transverse loads, chattering or vibrations do not work loose. A fastener is also secure by low tightening torques. If a screw or nut that is subjected to dynamic loads starts to work loose, the washer in contact turns with it. The teeth on this washer lock into the teeth on the counter washer preventing the screw or nut turning further. The more a fastener tries to work loose, the more it is blocked by the teeth on the washers.

Supplied glued together in pairs.

Order No.	Version	for screws	for screws "	D	D1	S
07310-030718	standard	M3	1/8"	7	3,4	1,8
07310-050918	standard	M5	3/16"	9	5,4	1,8
07310-061118	standard	M6	1/4"	10,8	6,5	1,8
07310-081426	standard	M8	5/16"	13,5	8,7	2,5
07310-101726	standard	M10	3/8"	16,6	10,7	2,5
07310-122026	standard	M12	1/2"	19,5	13	2,5
07310-162537	standard	M16	5/8"	25,4	17	3,4
07310-182937	standard	M18	11/16"	29	19,5	3,4
07310-203137	standard	M20	3/4"	30,7	21,4	3,4
07310-030722	standard stainless steel	M3	1/8"	7	3,4	2,2
07310-050922	standard stainless steel	M5	3/16"	9	5,4	2,2
07310-061122	standard stainless steel	M6	1/4"	10,8	6,5	2,2
07310-081422	standard stainless steel	M8	5/16"	13,5	8,7	2,2
07310-101722	standard stainless steel	M10	3/8"	16,6	10,7	2,2
07310-122022	standard stainless steel	M12	1/2"	19,5	13	2,2
07310-162532	standard stainless steel	M16	5/8"	25,4	17	3,2
07310-182932	standard stainless steel	M18	11/16"	29	19,5	3,2
07310-203132	standard stainless steel	M20	3/4"	30,7	21,4	3,2
07310-040918	large contact face	M4	5/32"	9	4,4	1,8
07310-061426	large contact face	M6	1/4"	13,5	6,5	2,5
07310-0817261	large contact face	M8	5/16"	16,6	8,7	2,5
07310-1021261	large contact face	M10	3/8"	21	10,7	2,5
07310-1225371	large contact face	M12	1/2"	25,4	13	3,4
07310-1631371	large contact face	M16	5/8"	30,7	17	3,4
07310-040922	large contact face stainless steel	M4	5/32"	9	4,4	2,2
07310-061422	large contact face stainless steel	M6	1/4"	13,5	6,5	2,2
07310-081722	large contact face stainless steel	M8	5/16"	16,6	8,7	2,2
07310-122532	large contact face stainless steel	M12	1/2"	25,4	13	3,2
07310-163132	large contact face stainless steel	M16	5/8"	30,7	17	3,2

Washers for clamps

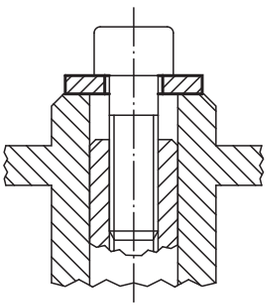
steel or aluminium DIN 6340



Material:
Steel or EN AW-7022

Version:
Stamped steel: pressed flat and tempered to 1200-1400 N/mm², black.
Turned steel: black oxidised.

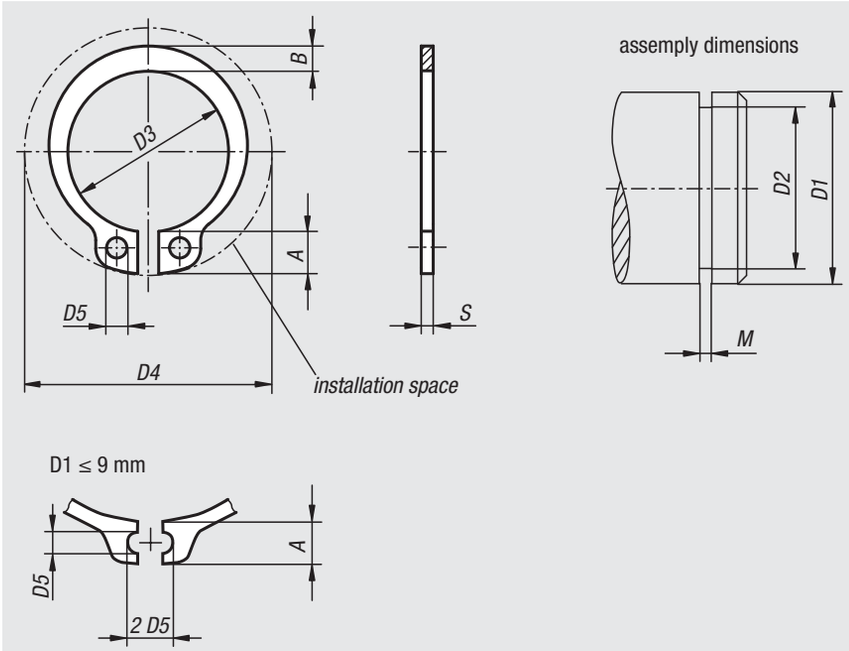
Sample order:
nlm 07320-16



Order No. stamped steel	Order No. aluminium	Order No. turned steel	D1	D2	S	for screw
07320-06	**07320-206**	**07320-306**	6,4	17	3	M6
07320-08	**07320-208**	**07320-308**	8,4	23	4	M8
07320-10	**07320-210**	**07320-310**	10,5	28	4	M10
07320-12	**07320-212**	**07320-312**	13	35	5	M12
07320-14	**07320-214**	**07320-314**	15	40	5	M14
07320-16	**07320-216**	**07320-316**	17	45	6	M16
07320-18	**07320-218**	**07320-318**	19	45	6	M18
07320-20	**07320-220**	**07320-320**	21	50	6	M20
07320-22	**07320-222**	-	23	50	8	M22
07320-24	**07320-224**	-	25	60	8	M24
07320-30	**07320-230**	-	31	68	10	M30
07320-36	**07320-236**	-	38	80	10	M36

Circlips for shafts

DIN 471

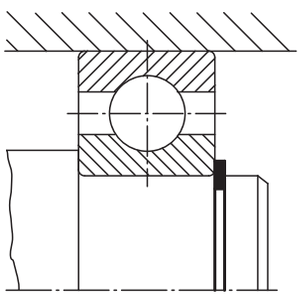


Material:
Spring steel

Version:
Phosphated

Sample order:
nlm 07330-050600

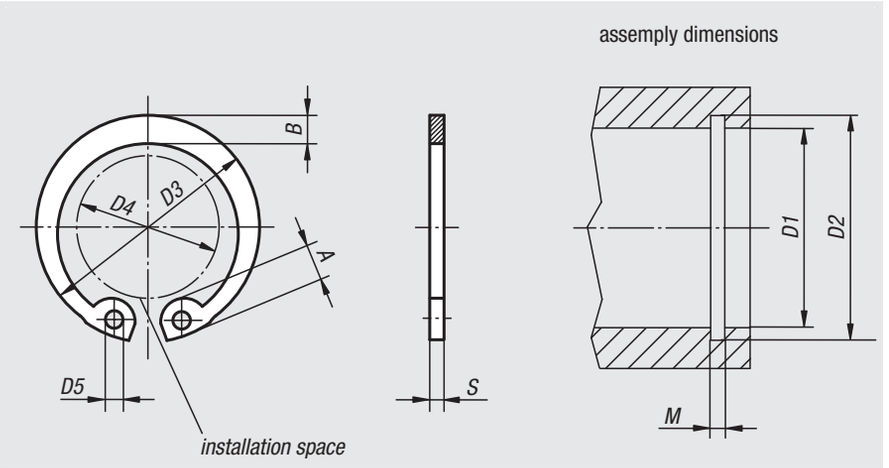
Note:
DIN 471 circlips are retaining rings mounted in a groove on a shaft OD. They withstand high axial forces between machine elements (e.g. bearings) and the groove in which the ring is mounted.



Order No.	A	B	D1	D2	D3	D4	D5	M	S
07330-050600	2,5	1,1	5	4,8	4,7	10,3	1	0,7	0,6
07330-060700	2,7	1,3	6	5,7	5,6	11,7	1,2	0,8	0,7
07330-080800	3,2	1,5	8	7,6	7,4	14,7	1,2	0,9	0,8
07330-101000	3,3	1,8	10	9,6	9,3	17	1,5	1,1	1
07330-121000	3,3	1,8	12	11,5	11	19	1,7	1,1	1
07330-141000	3,5	2,1	14	13,4	12,9	21,4	1,7	1,1	1
07330-151000	3,6	2,2	15	14,3	13,8	22,6	1,7	1,1	1
07330-161000	3,7	2,2	16	15,2	14,7	23,8	1,7	1,1	1
07330-171000	3,8	2,3	17	16,2	15,7	25	1,7	1,1	1
07330-181200	3,9	2,4	18	17	16,5	26,2	2	1,3	1,2
07330-201200	4	2,6	20	19	18,5	28,4	2	1,3	1,2
07330-221200	4,2	2,8	22	21	20,5	30,8	2	1,3	1,2
07330-251200	4,4	3	25	23,9	23,2	34,2	2	1,3	1,2
07330-261200	4,5	3,1	26	24,9	24,2	35,5	2	1,3	1,2
07330-301500	5	3,5	30	28,6	27,9	40,5	2	1,6	1,5
07330-321500	5,2	3,6	32	30,3	29,6	43	2,5	1,6	1,5
07330-351500	5,6	3,9	35	33	32,2	46,8	2,5	1,6	1,5
07330-401750	6	4,4	40	37,5	36,5	52,6	2,5	1,85	1,75
07330-471750	6,8	4,9	47	44,5	43,5	-	2,5	1,85	1,75
07330-502000	6,9	5,1	50	47	45,8	64,5	2,5	2,15	2

Circlips for holes

DIN 472

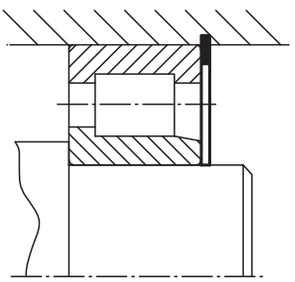


Material:
Spring steel

Version:
Phosphated

Sample order:
nlm 07331-080800

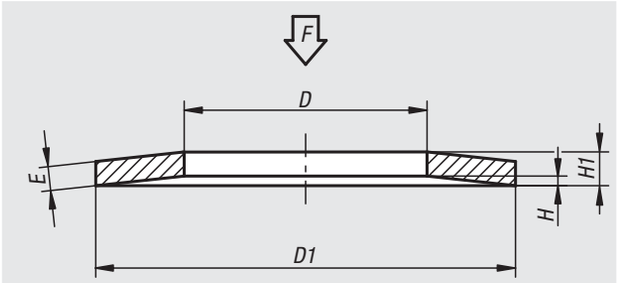
Note:
DIN 472 circlips are retaining rings which are mounted in a groove in a bore. They can withstand high axial forces between machine elements (e.g. bearings) and the groove in the ID in which the ring is mounted.



Order No.	A	B	D1	D2	D3	D4	D5	M	S
07331-080800	2,4	1,1	8	8,4	8,7	3	1	0,9	0,8
07331-101000	3,2	1,4	10	10,4	10,8	3,3	1,2	1,1	1
07331-121000	3,4	1,7	12	12,5	13	4,9	1,5	1,1	1
07331-141000	3,7	1,9	14	14,6	15,1	6,2	1,7	1,1	1
07331-151000	3,7	2	15	15,7	16,2	7,2	1,7	1,1	1
07331-161000	3,8	2	16	16,8	17,3	8	1,7	1,1	1
07331-171000	3,9	2,1	17	17,8	18,3	8,8	1,7	1,1	1
07331-181000	4,1	2,2	18	19	19,5	9,4	2	1,1	1
07331-201000	4,2	2,3	20	21	21,5	11,2	2	1,1	1
07331-221000	4,2	2,5	22	23	23,5	13,2	2	1,1	1
07331-251200	4,5	2,7	25	26,2	26,9	15,5	2	1,3	1,2
07331-261200	4,7	2,8	26	27,2	27,9	16,1	2	1,3	1,2
07331-301200	4,8	3	30	31,4	32,1	19,9	2	1,3	1,2
07331-321200	5,4	3,2	32	33,7	34,4	20,6	2,5	1,3	1,2
07331-351500	5,4	3,4	35	37	37,8	23,6	2,5	1,6	1,5
07331-401750	5,8	3,9	40	42,5	43,5	27,8	2,5	1,85	1,75
07331-471750	6,4	4,4	47	49,5	50,5	33,5	2,5	1,85	1,75
07331-502000	6,5	4,6	50	53	54,2	36,3	2,5	2,15	2

Spring washers

DIN 2093



Material:
Spring steel

Version:
Phosphated and oiled.

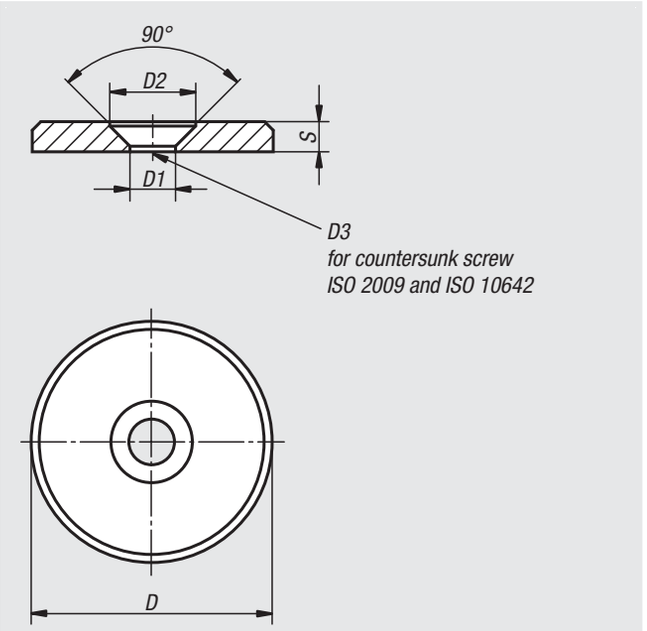
Sample order:
nlm 07360-080

Note:
If several spring washers are assembled to form a spring packet, the spring force of the single washer can be multiplied by the number washers giving high spring force with short spring travel. If several spring washers are assembled to form a spring column, the spring force of the entire column is the same as that of a single washer giving low spring force with long spring travel.

F = 0.25 x H

Order No.	D	D1	E	H	H1	F (N)
07360-030	3,2	8	0,4	0,2	0,6	69,2
07360-050	5,2	10	0,4	0,3	0,7	87,8
07360-051	5,2	15	0,7	0,55	1,25	340,2
07360-060	6,2	12,5	0,5	0,35	0,85	120,0
07360-061	6,2	12	0,5	0,35	0,85	133,5
07360-070	7,2	14	0,8	0,3	1,1	283,8
07360-080	8,2	16	0,9	0,35	1,25	362,5
07360-081	8,2	16	0,6	0,45	1,05	172,0
07360-090	9,2	18	1	0,4	1,4	450,6
07360-100	10,2	20	1,1	0,45	1,55	548,2
07360-101	10,2	20	0,9	0,55	1,45	411,7
07360-102	10,2	20	0,8	0,55	1,35	304,3
07360-120	12,2	25	1,5	0,55	2,05	1040,0
07360-121	12,2	23	1,25	0,6	1,85	863,4
07360-123	12,2	23	1	0,6	1,6	474,7
07360-140	14,2	28	1,5	0,65	2,15	1033,0
07360-141	14,2	28	1	0,8	1,8	490,0
07360-160	16,3	31,5	1,75	0,7	2,45	1391,0
07360-161	16,3	31,5	1,25	0,9	2,15	790,5
07360-180	18,3	35,5	2	0,8	2,8	1864,0
07360-182	18,3	35,5	1,25	1	2,25	730,9
07360-200	20,4	40	2,25	0,9	3,15	2336,0
07360-220	22,4	45	2,5	1	3,5	2773,0
07360-250	25,4	50	3	1,1	4,1	4255,0
07360-251	25,4	50	2,5	1,4	3,9	3473,0
07360-280	28,5	56	2	1,6	3,6	1910,0
07360-310	31	63	2,5	1,75	4,25	2942,0
07360-360	40,5	70	4	1,7	5,7	9025,0

Handwheel washers



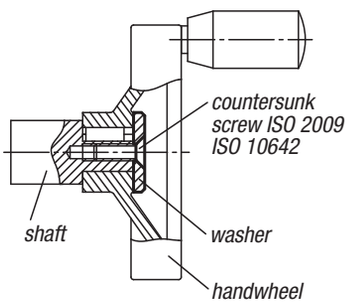
Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Steel black oxidised.
Stainless steel bright.

Sample order:
nlm 07375-00416

Note:
Together with a countersunk screw DIN EN ISO 2009 or DIN EN ISO 10642 the washers are used at the front surface of shaft extensions for axial fastening and securing of handwheels and handles using a keyway.

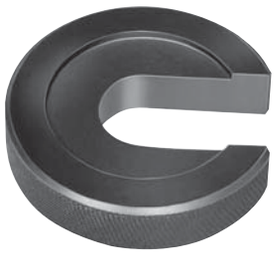
The washers can be used with the handwheels 06262, 06263, 06264, 06265, 06271, 06273, 06275, 06277, 06279, 06287, 06288 and crank handles 06500, 06502.

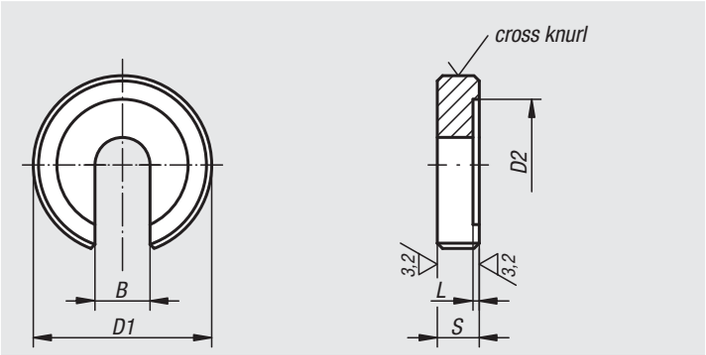


Order No.	Material	D	D1	D2	D3	S
07375-00416	steel	16	4,3	8,4	M4	3
07375-00420	steel	20	4,3	8,4	M4	3
07375-00522	steel	22	5,3	10	M5	3,5
07375-00525	steel	25	5,3	10	M5	3,5
07375-00528	steel	28	5,3	10	M5	3,5
07375-00632	steel	32	6,4	12	M6	4
07375-00636	steel	36	6,4	12	M6	4
07375-00640	steel	40	6,4	12	M6	5
07375-00645	steel	45	6,4	12	M6	6
07375-00652	steel	52	6,4	12	M6	6
07375-10416	stainless steel	16	4,3	8,4	M4	3
07375-10420	stainless steel	20	4,3	8,4	M4	3
07375-10522	stainless steel	22	5,3	10	M5	3,5
07375-10525	stainless steel	25	5,3	10	M5	3,5
07375-10528	stainless steel	28	5,3	10	M5	3,5
07375-10632	stainless steel	32	6,4	12	M6	4
07375-10636	stainless steel	36	6,4	12	M6	4
07375-10640	stainless steel	40	6,4	12	M6	5
07375-10645	stainless steel	45	6,4	12	M6	6
07375-10652	stainless steel	52	6,4	12	M6	6

C-washers

DIN 6372 enhanced

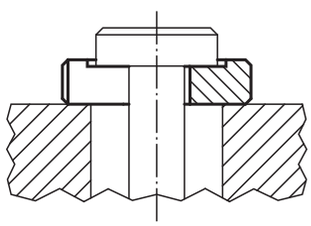




Material:
Carbon steel.

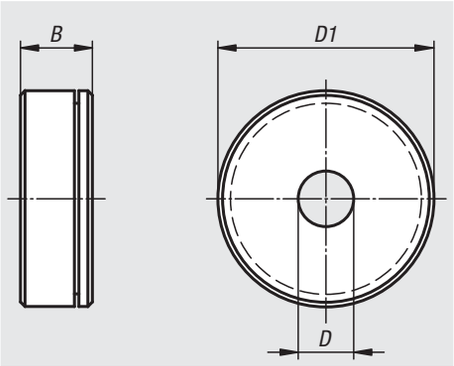
Version:
Tempered and black oxidised.

Sample order:
nlm 07380-12



Order No.	B	D1	D2	L	S
07380-05	5,25	17	12	0,75	5
07380-06	6,4	22	16	0,8	6
07380-08	8,4	28	21	1	7
07380-10	10,5	34	25	1,2	8
07380-12	13	40	30	1,8	9
07380-14	14,5	48	33	1,8	12
07380-16	17	56	37	1,8	12
07380-20	21	64	45	2	14
07380-24	25	75	52	2	16
07380-30	31	90	65	2	18
07380-36	37	100	75	2,5	20

Clamping force intensifiers



Material:
Bearing housing steel.

Version:
Black oxidised.

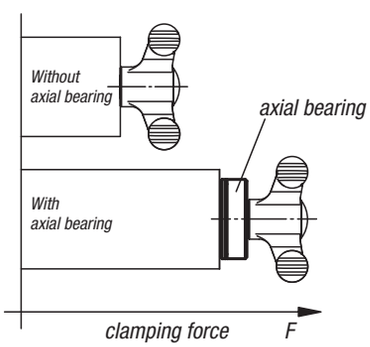
Sample order:
nlm 07415-06

Note:
As a rule, the clamping force intensifier is used together with tightening or clamping elements. The integrated axial needle roller thrust bearing unit can achieve ca. twice the clamping force by the same lever length.

Advantages:
The component surface is protected by the stationary lower ring. The higher preload force causes a lower tendency for material relaxation in the thread.

Clamping levers, wing and star grips, knurled knobs or hexagonal and socket head screws etc. can be used as tightening or clamping elements.

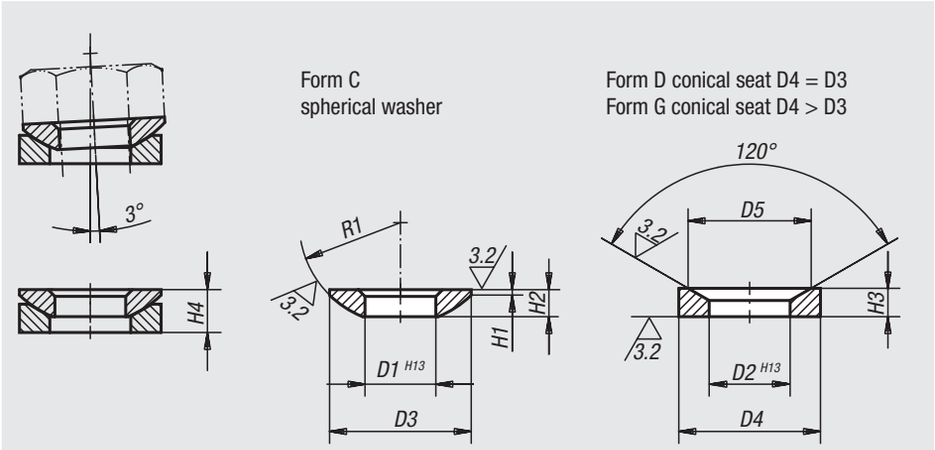
With constant torque



Order No.	B	D	D1
07415-06	8	6	24
07415-08	8	8	25
07415-10	8	10	30
07415-12	8	12	35

Spherical washers

DIN 6319, edition 10/01



Material:
Mild steel or stainless steel.
Form G carbon steel tempered to HV 390 ±40.

Version:
Case-hardened.
Stainless steel not hardened, bright.

Sample order:
nlm 07420-216

Note:
Conical seat Form G should be used over slots.

Order No. steel	Order No. stainless steel	Form	D1	D3	H1	H2	R1	for screw Ø	Load rating max. kN (static load only)
07420-105	-	C	5,25	10,5	0,4	2	7,5	5	-
07420-106	**07420-0106**	C	6,4	12	0,7	2,3	9	6	9/6
07420-108	**07420-0108**	C	8,4	17	0,6	3,2	12	8	17/12
07420-110	**07420-0110**	C	10,5	21	0,8	4	15	10	26/16
07420-112	**07420-0112**	C	13	24	1,1	4,6	17	12	38/24
07420-114	-	C	15	28	1,2	5	22	14	53
07420-116	**07420-0116**	C	17	30	1,3	5,3	22	16	73/45
07420-120	**07420-0120**	C	21	36	2	6,3	27	20	117/71
07420-124	**07420-0124**	C	25	44	2,4	8,2	32	24	168/105
07420-130	**07420-0130**	C	31	56	3,6	11,2	41	30	269/191
07420-136	**07420-0136**	C	37	68	4,6	14	50	36	394/-
07420-142	**07420-0142**	C	43	78	6,5	17	58	42	542/-
07420-148	**07420-0148**	C	50	92	8	21	67	48	714/-
07420-156	-	C	58	103	9,5	23	79	56	-
07420-164	-	C	66	120	12	27	93	64	-

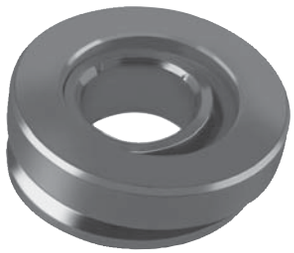
Spherical washers

DIN 6319, edition 10/01

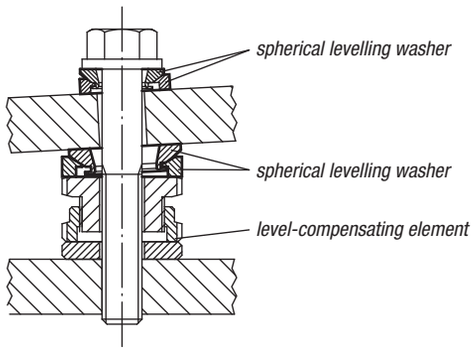
Order No. steel	Order No. stainless steel	Form	D2	D4	D5	H3	H4 with conical seat	for screw Ø	Load rating max. kN (static load only)
07420-205	-	D	6	10,5	9,25	2,1	3,1	5	-
07420-206	**07420-0206**	D	7,1	12	11	2,8	4	6	9/6
07420-208	**07420-0208**	D	9,6	17	14,5	3,5	5,6	8	17/12
07420-210	**07420-0210**	D	12	21	18,5	4,2	6,3	10	26/16
07420-212	**07420-0212**	D	14,2	24	20	5	8	12	38/24
07420-214	-	D	16,5	28	24,8	5,6	8,2	14	53
07420-216	**07420-0216**	D	19	30	26	6,2	9,3	16	73/45
07420-220	**07420-0220**	D	23,2	36	31	7,5	11,6	20	117/71
07420-224	**07420-0224**	D	28	44	37	9,5	15	24	168/105
07420-230	**07420-0230**	D	35	56	49	12	18,9	30	269/191
07420-236	**07420-0236**	D	42	68	60	15	23,3	36	394/-
07420-242	**07420-0242**	D	49	78	70	18	28,3	42	542/-
07420-248	**07420-0248**	D	56	92	82	22	35,2	48	714/-
07420-256	-	D	65	103	92	25	39,7	56	-
07420-264	-	D	75	120	110	30	46,5	64	-
07420-305	-	G	6	15	9,25	2,5	3,5	5	-
07420-306	**07420-0306**	G	7,1	17	11	4	5,2	6	9/6
07420-308	**07420-0308**	G	9,6	24	14,5	5	6,8	8	17/12
07420-310	**07420-0310**	G	12	30	18,5	5	7,1	10	26/16
07420-312	**07420-0312**	G	14,2	36	20	6	9	12	38/24
07420-314	-	G	16,5	40	24,8	6	8,6	14	53
07420-316	**07420-0316**	G	19	44	26	7	10,1	16	73/45
07420-320	**07420-0320**	G	23,2	50	31	8	12	20	117/71
07420-324	**07420-0324**	G	28	60	37	10	15,5	24	168/105
07420-330	**07420-0330**	G	35	68	49	12	18,7	30	269/191
07420-336	-	G	42	80	60	12	20,3	36	394/-

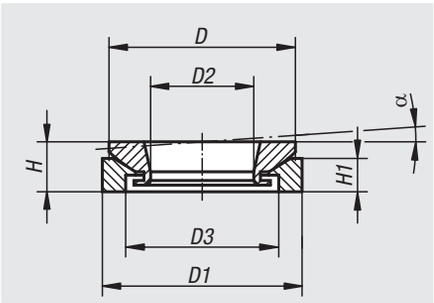
07460

Spherical levelling washers



application example:





Material:
Steel 1.7225.
Stainless steel 1.4305.

Version:
Steel blue-chromed.
Stainless steel bright.

Sample order:
nlm 07460-401

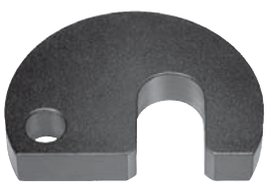
Note:
Spherical levelling washers are for exact positioning when mounting up to 4° sloping surfaces. A second spherical levelling washer is recommended as support to correct the bolt angle if the angle of D3 is > 1°. The two washers cannot be detached from each other.

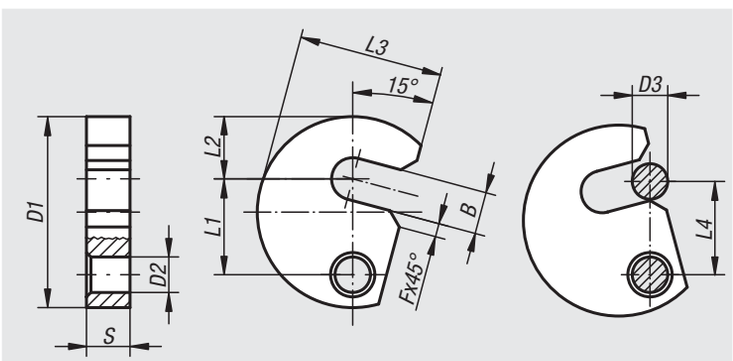
Order No. steel	Order No. stainless steel	H	H1	D	D1	D2	D3	α
07460-151	**07460-152**	8	5,5	23	25	8,5	15	4°
07460-201	**07460-202**	10	6,2	30	32	13	20	4°
07460-301	**07460-302**	12,5	9	40	45	20	30	4°
07460-401	**07460-402**	16	13	52	58	29	38	4°
07460-501	**07460-502**	20	14	65	70	36	48	4°

07520

C-washers captive

DIN 6371



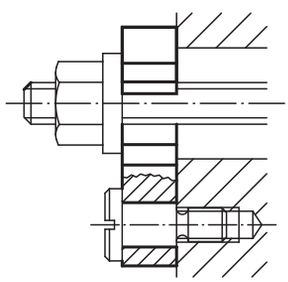


Material:
Carbon steel 1.0760.

Version:
Nitrided and black oxidised.

Sample order:
nlm 07520-12

Note:
07520-14 is not standard. Suitable shoulder screws see 07530.



Order No.	B	D1	D2	D3	F	L1	L2	L3	L4	S
07520-06	7,5	38	9	6	3	19,6	11	29	19	9,8
07520-08	9,5	43	9	8	3	21,6	14	32,5	21	9,8
07520-10	11,5	48	9	10	3	23,6	17	36,5	23	9,8
07520-12	13,5	61	11	12	3	29,6	22	45	29	11,8
07520-14	15,5	65	11	14	3	31,6	23	49	31	11,8
07520-16	17,5	68	11	16	3	33,6	25	50	33	11,8
07520-20	21,5	74	11	20	4	36,6	28	55	36	11,8

07523

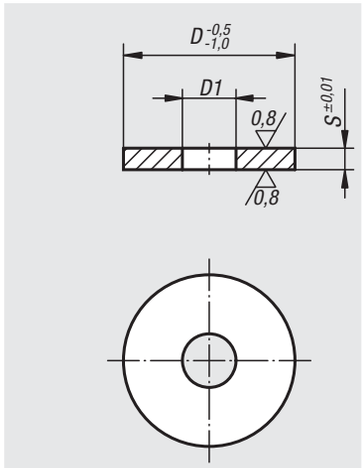
Spacing washers ground

Material:
Carbon steel.

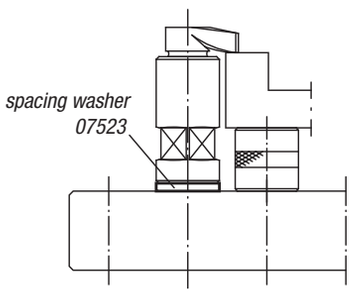
Version:
Tempered, black oxidised.
Contact faces ground.

Sample order:
nlm 07523-16005

Note:
The spacing washer is used to alter the clamping range of hook clamps and hook holders. When a spacing washer is inserted between the base and the hook holder or riser cylinder it prevents damage to the support face.



application example:

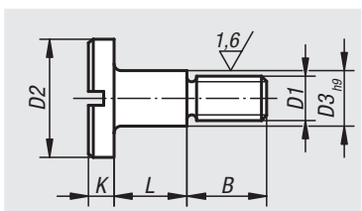


Order No.	D	D1	S
07523-12001	40	12,5	1
07523-12003	40	12,5	3
07523-12005	40	12,5	5
07523-16001	50	16,5	1
07523-16003	50	16,5	3
07523-16005	50	16,5	5
07523-16105	60	16,5	5

07530

Shoulder screws with slotted flat head

DIN 923

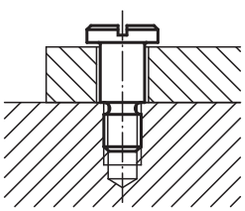


Material:
Steel.

Version:
Black oxidised, grade 5.8.

Sample order:
nlm 07530-08

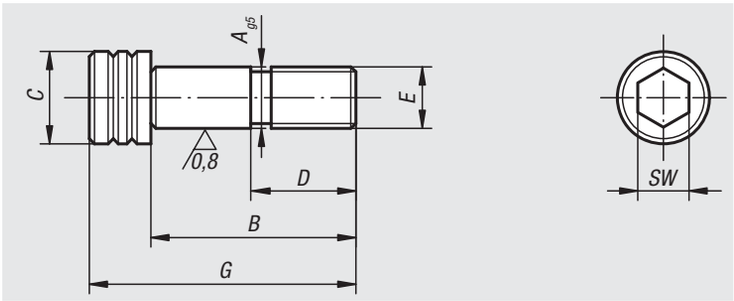
Note:
For use with captive C-washers 07520.



Order No.	D1	D2	D3	L	B	K
07530-06	M6	13	8	10 +0,15/+0,07	9	3,1
07530-08	M8	16	10	12 +0,2/+0,1	11	3,8
07530-10	M10	20	13	16 +0,2/+0,1	13,5	4,6

07533

Shoulder screws Form B



Material:
Carbon steel.

Version:
Tempered, black oxidised.
Precision diameters ground.

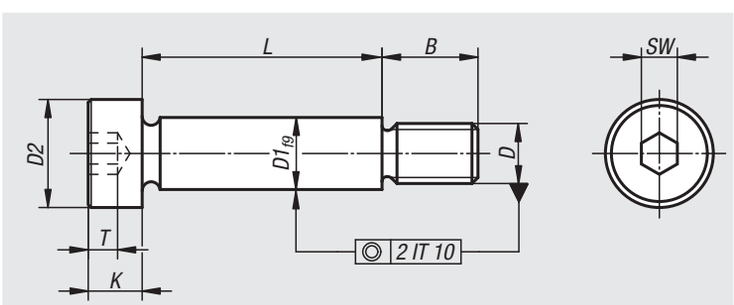
Sample order:
nlm 07533-12065

Order No.	A	B	C	D	E	G	SW
07533-12045	12	45	18	22	M12	57	10
07533-12055	12	55	18	22	M12	67	10
07533-12065	12	65	18	22	M12	77	10
07533-12075	12	75	18	22	M12	87	10
07533-16055	16	55	24	25	M16	71	14
07533-16065	16	65	24	25	M16	81	14
07533-16075	16	75	24	25	M16	91	14

07534

Shoulder screws

similar to DIN ISO 7379



Material:
Steel.

Version:
Grade 12.9, black oxidised.
Shaft OD ground.

Sample order:
nlm 07534-06X20 (include length L)

Note:
Hexagon socket head shoulder screws are precision construction elements for many applications. As they can simplify complicated constructions, they are frequently chosen as the most cost-effective solution. Shoulder screws provide the decisive rationalising effect required today.

Order No.	D1	D	D2	B	K	T	SW	L
07534-06X	6	M5	10	9,5 ±0,25	4,5	2,4	3	16/20/25/30/40/50/60
07534-08X	8	M6	13	11 ±0,25	5,5	3,3	4	16/20/25/30/40/50/60
07534-10X	10	M8	16	13 ±0,25	7	4,2	5	16/20/25/30/40/50/60/70/80
07534-12X	12	M10	18	16 ±0,40	9	4,9	6	16/20/25/30/40/50/60/70/80/90/100
07534-16X	16	M12	24	18 ±0,40	11	6,6	8	40/50/60/70/80/90/100/120
07534-20X	20	M16	30	22 ±0,40	14	8,8	10	50/60/70/80/90/100/120

Shoulder screws

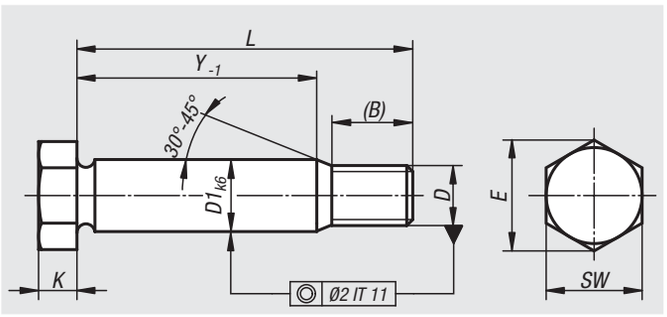
with hexagon head DIN 609

Material:
Steel.

Version:
Grade 8.8, black oxidised.
Shaft OD ground.

Sample order:
nlm 07535-09X40 (include length L)

Note:
Shoulder screws are used if the screw connection is subjected to transverse forces or if workpieces must be positioned relative to each other.

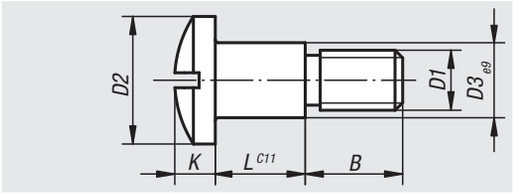


Order No.	D1	D	(B) reference dimension	E	K	SW	Y	L
07535-09X25	9	M8	14,5	14,38	5,3	13	8	25
07535-09X30	9	M8	14,5	14,38	5,3	13	13	30
07535-09X35	9	M8	14,5	14,38	5,3	13	18	35
07535-09X40	9	M8	14,5	14,38	5,3	13	23	40
07535-09X45	9	M8	14,5	14,38	5,3	13	28	45
07535-09X50	9	M8	14,5	14,38	5,3	13	33	50
07535-09X60	9	M8	16,5	14,38	5,3	13	41	60
07535-11X30	11	M10	17,5	17,77	6,4	17	10	30
07535-11X35	11	M10	17,5	17,77	6,4	17	15	35
07535-11X40	11	M10	17,5	17,77	6,4	17	20	40
07535-11X45	11	M10	17,5	17,77	6,4	17	25	45
07535-11X50	11	M10	17,5	17,77	6,4	17	30	50
07535-11X60	11	M10	19,5	17,77	6,4	17	38	60
07535-11X70	11	M10	19,5	17,77	6,4	17	48	70
07535-11X80	11	M10	19,5	17,77	6,4	17	58	80
07535-11X90	11	M10	19,5	17,77	6,4	17	68	90
07535-11X100	11	M10	19,5	17,77	6,4	17	78	100
07535-13X35	13	M12	20,5	19,85	7,5	19	11,5	35
07535-13X40	13	M12	20,5	19,85	7,5	19	16,5	40
07535-13X45	13	M12	20,5	19,85	7,5	19	21,5	45
07535-13X50	13	M12	20,5	19,85	7,5	19	26,5	50
07535-13X60	13	M12	22,5	19,85	7,5	19	34,5	60
07535-13X70	13	M12	22,5	19,85	7,5	19	44,5	70
07535-13X80	13	M12	22,5	19,85	7,5	19	54,5	80
07535-13X90	13	M12	22,5	19,85	7,5	19	64,5	90
07535-13X100	13	M12	22,5	19,85	7,5	19	74,5	100
07535-17X40	17	M16	25	26,17	10	24	11,5	40
07535-17X45	17	M16	25	26,17	10	24	16,5	45
07535-17X50	17	M16	25	26,17	10	24	21,5	50
07535-17X60	17	M16	27	26,17	10	24	29,5	60
07535-17X70	17	M16	27	26,17	10	24	39,5	70
07535-17X80	17	M16	27	26,17	10	24	49,5	80
07535-17X90	17	M16	27	26,17	10	24	59,5	90
07535-17X100	17	M16	27	26,17	10	24	69,5	100
07535-21X50	21	M20	28,5	32,95	12,5	30	17,5	50
07535-21X60	21	M20	30,5	32,95	12,5	30	25,5	60
07535-21X70	21	M20	30,5	32,95	12,5	30	35,5	70
07535-21X80	21	M20	30,5	32,95	12,5	30	45,5	80
07535-21X90	21	M20	30,5	32,95	12,5	30	55,5	90
07535-21X100	21	M20	30,5	32,95	12,5	30	65,5	100
07535-21X120	21	M20	30,5	32,95	12,5	30	85,5	120
07535-25X60	25	M24	36,5	39,35	15	36	19	60
07535-25X70	25	M24	36,5	39,35	15	36	29	70
07535-25X80	25	M24	36,5	39,35	15	36	39	80
07535-25X90	25	M24	36,5	39,35	15	36	49	90
07535-25X100	25	M24	36,5	39,35	15	36	59	100
07535-25X120	25	M24	36,5	39,35	15	36	79	120

07540

Shoulder screws

with slotted domed head



Material:
Carbon steel.

Version:
Black oxidised.

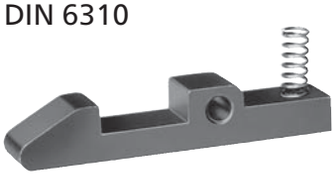
Sample order:
nlm 07540-10

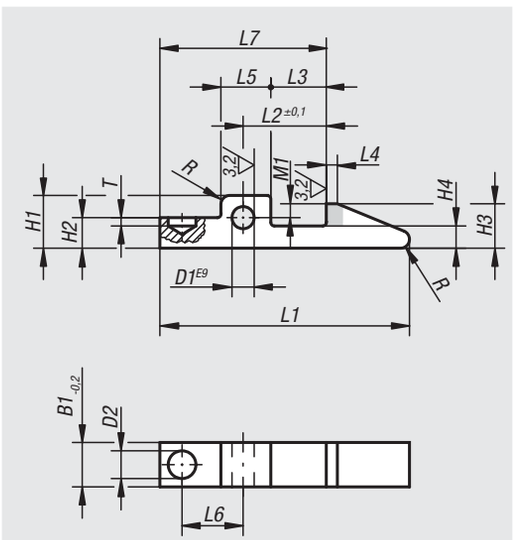
Order No.	D1	D2	D3	L	B	K
07540-06	M6	14	8	10,2	9,8	6
07540-08	M8	18	10	12,2	11,8	7
07540-10	M10	22	12	14,2	14,8	9
07540-12	M12	22	14	16,2	15,8	9

07560

Hinged fastener

DIN 6310





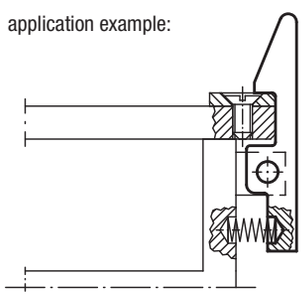
Material:
Carbon steel 1.2067

Version:
Black oxidised, snapper nose hardened (see grey region).

Sample order:
nlm 07560-02

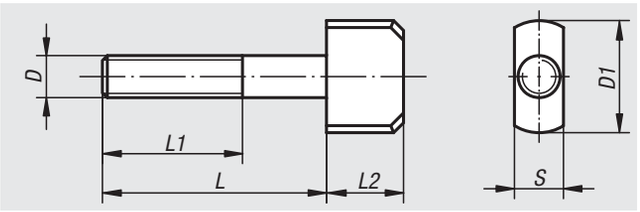
Note:
The spring is supplied. Spring dimensions:
Ø 4.8 x 14
Ø 5.8 x 17
Ø 7.3 x 21

application example:



Order No.	L1	B1	D1	D2	H1	H2	H3	H4	L2	L3	L4	L5	L6	L7	M1	T	R
07560-01	45	8	4	5	9,5	5,5	8	4	15	10	2	9	11	30	2,5	1,5	1,6
07560-02	60	10	5	6,3	12	7	10	5	20	14	3	11	15	40	3	3	2,5
07560-03	80	14	6	8	15	9	14	7	30	22	5	14	23	60	5	5	4

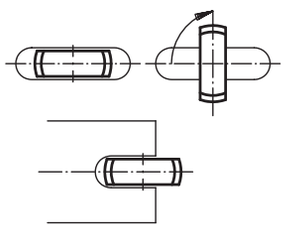
Quarter-turn screws



Material:
Carbon steel 1.1191

Version:
Tempered to 8.8 and black oxidised.

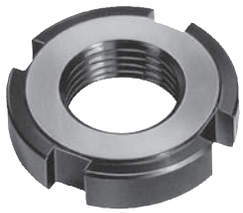
Sample order:
nlm 07570-10



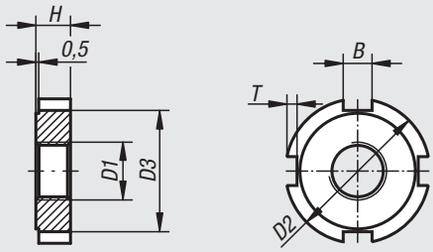
Order No.	D	D1	L	L1	L2	S
07570-06	M6	20	30	25	14	6,5
07570-08	M8	25	40	30	16	8,5
07570-10	M10	28	50	40	16	10,5
07570-12	M12	32	60	50	20	12,5

Slotted round nuts

DIN 1804



Form W = not hardened
Form H = hardened and ground



Material:
Steel.

Version:
Form W = black oxidised.
Form H = hardened and flat face ground.

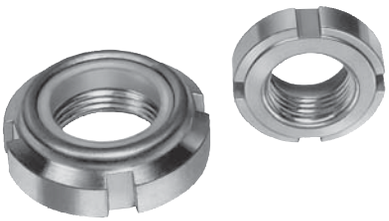
Sample order:
nlm 07590-120

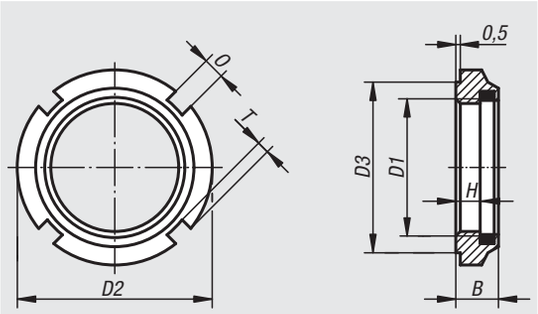
Note:
Form H is case hardened, apart from the thread.
Both flat faces are ground.

Order No. Form W	Order No. Form H	D1	D2	D3	H	B	T
07590-110	**07590-210**	M10 x 1	25	20	6	5	2
07590-112	**07590-212**	M12 x 1,5	28	23	6	5	2
07590-114	**07590-214**	M14 x 1,5	30	25	7	5	2
07590-116	**07590-216**	M16 x 1,5	32	27	7	5	2
07590-118	**07590-218**	M18 x 1,5	34	28	8	6	2,5
07590-120	**07590-220**	M20 x 1,5	36	30	8	6	2,5
07590-122	**07590-222**	M22 x 1,5	40	34	9	6	2,5
07590-124	**07590-224**	M24 x 1,5	42	36	9	6	2,5
07590-126	**07590-226**	M26 x 1,5	45	38	10	7	3
07590-128	**07590-228**	M28 x 1,5	50	43	10	7	3
07590-130	**07590-230**	M30 x 1,5	50	43	10	7	3
07590-132	**07590-232**	M32 x 1,5	52	45	11	7	3
07590-135	**07590-235**	M35 x 1,5	55	48	11	7	3
07590-138	**07590-238**	M38 x 1,5	58	50	11	8	3,5
07590-140	**07590-240**	M40 x 1,5	62	54	12	8	3,5
07590-142	**07590-242**	M42 x 1,5	62	54	12	8	3,5

Slotted nuts

with elastic lock





Material:
Free-cutting steel.
Elastic ring polyamide (max. 100 °C).

Version:
galvanized

Sample order:
nlm 07595-24

Note:
Elastic lock slotted nuts have enormous cost advantages. They do not need lock washers with folding tabs and so the expensive milling of a slot is not required.
The polyamide ring is resistant to petrol and oil.
Elastic lock slotted nuts can be used several times. They withstand the strongest vibrations and oscillations irrespective of the tightening torque and are therefore useful as adjustment nuts.

Order No.	D1	D2	D3	H	B	T	O
07595-10	M10x1	18	15	4,4	7,6	1,5	3
07595-12	M12x1,5	21	18	5,7	9,2	1,5	3
07595-14	M14x1,5	24	21	6	10,7	1,5	4
07595-16	M16x1,5	28	24	6	10,7	2	4
07595-18	M18x1,5	28	24	7,3	10,7	2	4
07595-20	M20x1,5	32	27	6	9,6	2,5	4
07595-22	M22x1,5	38	33	7	12,7	2,5	5
07595-24	M24x1,5	38	33	6,2	10,7	2,5	5
07595-28	M28x1,5	44	38	6,9	11,2	3	5
07595-30	M30x1,5	44	38	6,5	11	3	5
07595-32	M32x1,5	50	44	6,6	11,2	3	5
07595-35	M35x1,5	50	44	7	11	3	5
07595-38	M38x1,5	53	47	6,6	12,2	3	5
07595-40	M40x1,5	56	50	7	12	3	6
07595-42	M42x1,5	62	55	10,6	15,2	3,5	6

Technical information for adjustment nuts

Assembly:

1. Carefully clean the adjustment nut and connection points and lightly oil with a film of standard machine oil without anti-friction additives.
2. Screw the adjustment nut onto the spindle thread but not quite up to the contact face (Fig. 1).
3. Tighten the screws uniformly and crosswise while turning the adjustment nut back and forth until it turns with almost no backlash on the thread (Fig. 2).
4. Now tighten the adjustment nut with a higher than specified torque (ca. +30%) against the contact face, then loosen again and finally tighten with specified torque (Fig. 3). This prevents the need to re-adjust later.
5. Now secure the adjustment nut by uniformly tightening the screws. Highest demands of spindle concentricity can be positively influenced by testing and individually tightening the screws. Possible stresses caused by small lateral run-out errors can be corrected.

Disassembly:

Slightly loosen all the screws crosswise. Now fully loosen all the screws. This prevents the last screw being subjected to the full stress of the membrane and being blocked.

If an adjustment nut has been secured on a spindle thread, after dismantling it can only be used again on the same spindle. The adaption procedure between spindle and adjustment nut can lead to problems when attempting to fit the nut to another.

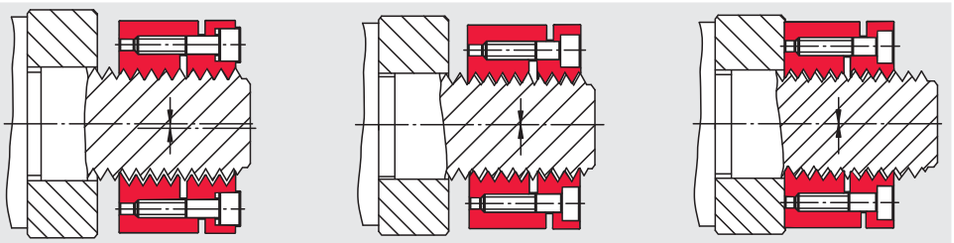


Fig. 1 Fig. 2 Fig. 3

Setting an axial pre-tension load:

The axial pre-tension of a screw connection is often function critical and therefore must be set accurately. Measuring this value directly during assembly is mostly not possible making an indirect setting necessary. The tightening load for the adjustment screw pre-tension torque must be calculated.

This can be determined by the following formula:

$$M_v = \frac{(F_v + V) \cdot (U + \mu A \cdot rA)}{1000} \text{ [Nm]}$$

M_v = Pre-tension torque of the adjustment nut (Nm)
F_v = Required axial pre-tension force of the screw connection (N)
V = Adjustment nut specific supplement (N), compensates the face load alleviation by the securing process
U = Constant (mm), includes the calculation factor for the respective thread (see table)
μA = Coefficient of friction for the locating face of the adjustment nut. Approximate value μA = 0.1 (steel/steel)
rA = Operative frictional radius for the locating face of the adjustment nut (mm)

The securing procedure subjects the spindle thread to stress and produces an intensive flank pressure (= high axial rigidity). This effect simultaniously relieves the contace face of the adjusment nut, which can be easily counterbalanced by correspondingly higher pre-tension torque during assembly. This higher pre-tension torque is calculated by supplement V to the required pre-tension force F_v.

Order No.	Calculation factor U (mm)	Adjustment nut specific supplement V (N)
07598-024101015	0,703	2457
07598-026121515	0,881	2438
07598-032141516	0,997	2995
07598-034161518	1,112	3962
07598-036181518	1,228	3931
07598-040201518	1,344	3900
07598-040221518	1,459	3869
07598-042241518	1,575	3838
07598-045261520	1,690	3806
07598-046281520	1,805	3775
07598-048301520	1,921	3744
07598-050321522	2,037	3713
07598-053351522	2,210	3666

Adjustment nuts

Material:
Steel.
Clamping screws carbon steel.

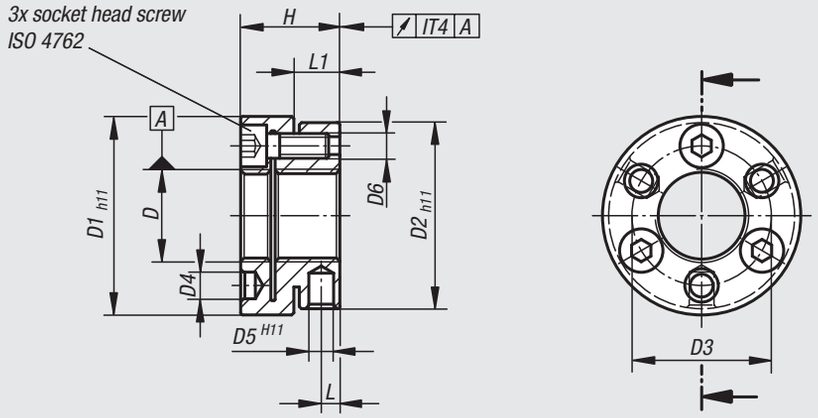
Version:
Black oxidised.
Clamping screws ISO 4762, grade 12.9.

Sample order:
nlm 07598-024101015

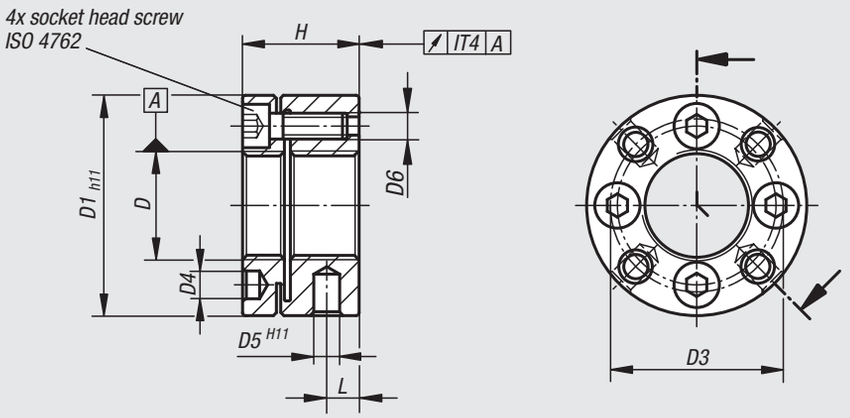
Note:
Two screw parts that are elastically connected are tightened against each other with screws.
The adjustment nut is constructed rotationally symmetric. There are no unbalancing keyways or slots.

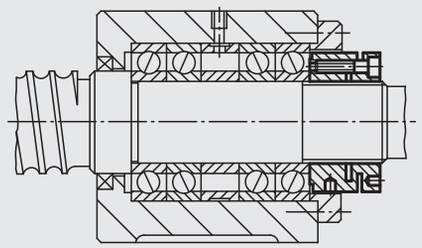
Attention:
The adjustment nut can be axially deformed and must be handled with care. The clamping screws may only be tightened when the adjustment nut is completely screwed onto the spindle thread, otherwise the adjustment nut could become defective through unacceptable plastic deformation.

M10 x 1 - M14 x 1,5



as of M16 x 1,5





Example:
Due to the assembly with an adjustment nut the bearing of the ball bearing spindle gains high axial rigidity. During highly dynamic operation the high security factor of the adjustment nut is also very advantageous.

Order No.	D	D1	D2	D3	D4	D5	D6	H	L	L1	Tightening torque of screws (Nm)	Max. static axial pressure stress N	Max. dynamic axial pressure stress N	Inertia (gcm^2)
07598-024101015	M10x1	24	22	17	3,2	2,5	M3	15	3	6,5	2	15000	12000	27
07598-026121515	M12x1,5	26	25	19	3,2	3	M3	15	3	6,5	2	18000	13000	40
07598-032141516	M14x1,5	32	30	22,5	4,3	4	M4	16	3	7	2,9	22000	17000	96
07598-034161518	M16x1,5	34	-	24,5	4,3	4	M4	18	5	-	2,9	22000	17000	147
07598-036181518	M18x1,5	36	-	26,5	4,3	4	M4	18	5	-	2,9	25000	19000	183
07598-040201518	M20x1,5	40	-	30,5	4,3	4	M4	18	5	-	2,9	28000	18000	283
07598-040221518	M22x1,5	40	-	30,5	4,3	4	M4	18	5	-	2,9	32000	23000	270
07598-042241518	M24x1,5	42	-	32,5	4,3	4	M4	18	5	-	2,9	35000	25000	323
07598-045261520	M26x1,5	45	-	36,5	4,3	5	M4	20	6,5	-	2,9	49000	34000	479
07598-046281520	M28x1,5	46	-	38,5	4,3	5	M4	20	6,5	-	2,9	53000	36000	504
07598-048301520	M30x1,5	48	-	40,5	4,3	5	M4	20	6,5	-	2,9	57000	38000	588
07598-050321522	M32x1,5	50	-	42,5	4,3	5	M4	22	7	-	2,9	64000	44000	743
07598-053351522	M35x1,5	53	-	45,5	4,3	5	M4	22	7	-	2,9	66000	47000	914

07620

Clevis

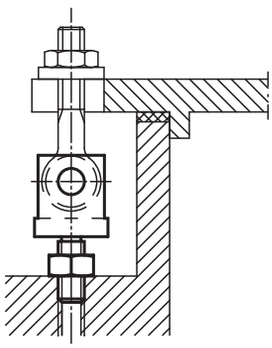
with external thread

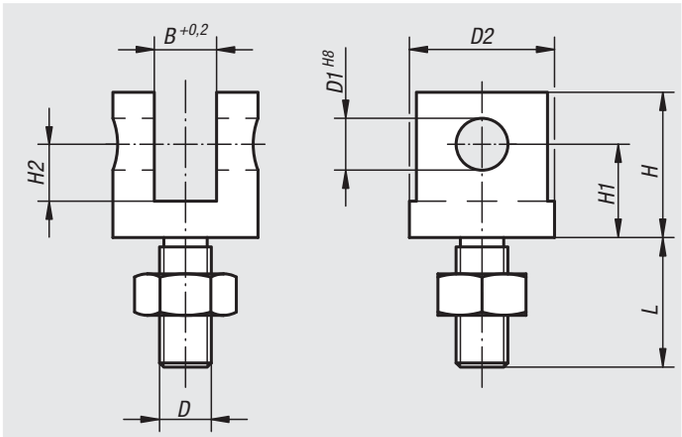
Material:
Carbon steel 1.1191

Version:
Tempered and black oxidised.

Sample order:
nlm 07620-05

Note:
Suitable clevis pin see 04250.





Order No.	D	D1	D2	B	H	H1	H2	L
07620-05	M5	5	12	6	16	10	7	14,5
07620-06	M6	6	16	7	19	12	8	15
07620-08	M8	8	20	9	23	15	10	20
07620-10	M10	10	28	12	28	18	11	25
07620-12	M12	12	30	14	34	21	13,5	30
07620-14	M14	14	36	16	37	23	15	35
07620-16	M16	16	40	17	42	26	17	40
07620-20	M20	18	50	22	52	32	21	50

07630

Grub screws

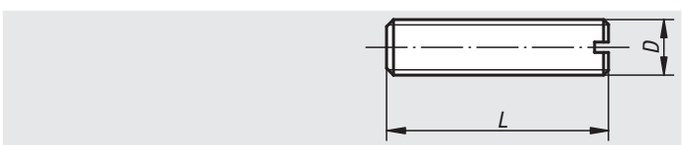
DIN 551

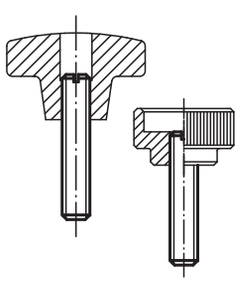
Material:
Steel.

Version:
Bright, grade 5.8.

Sample order:
nlm 07630-10X40 (include length L)

Note:
A solid joint between grub screw and counter-piece can often be made more cost-effectively by gluing it.
The LOCTITE products are especially suitable for this. See 97990.

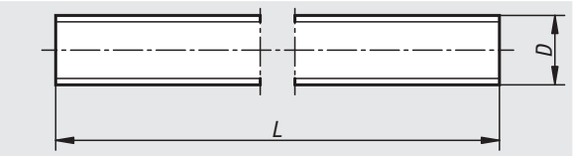




Order No.	D	L
07630-06X	M6	20/25/30/35/40/45/50/60/70
07630-08X	M8	25/30/35/40/45/50/60/70/80
07630-10X	M10	25/30/35/40/45/50/60/70/80
07630-12X	M12	30/35/40/45/50/60/70/80/100
07630-16X	M16	30/35/40/45/50/60/70/80/100
07630-20X	M20	40/50/60/70/80/90/100

Threaded rods

steel and stainless steel DIN 976-1



Material:
Carbon steel or stainless steel.

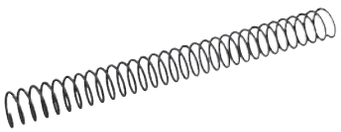
Version:
Tempered to 8.8.

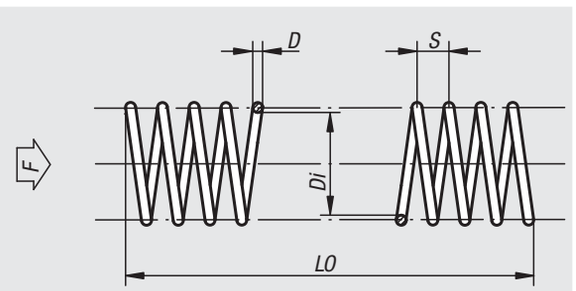
Sample order:
nlm 07640-16

Note:
Threaded rods are only available in 1000 mm lengths.

Order No. steel	Order No. stainless steel	D	L
07640-05	**07640-052**	M5	1000
07640-06	**07640-062**	M6	1000
07640-08	**07640-082**	M8	1000
07640-10	**07640-102**	M10	1000
07640-12	**07640-122**	M12	1000
07640-14	**-**	M14	1000
07640-16	**07640-162**	M16	1000
07640-18	**07640-182**	M18	1000
07640-20	**07640-202**	M20	1000
07640-22	**07640-222**	M22	1000
07640-24	**07640-242**	M24	1000

Springs

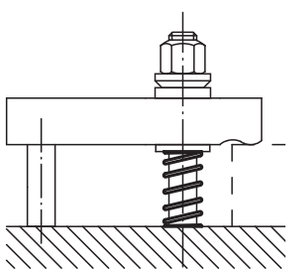




Material:
Spring steel 1.5026

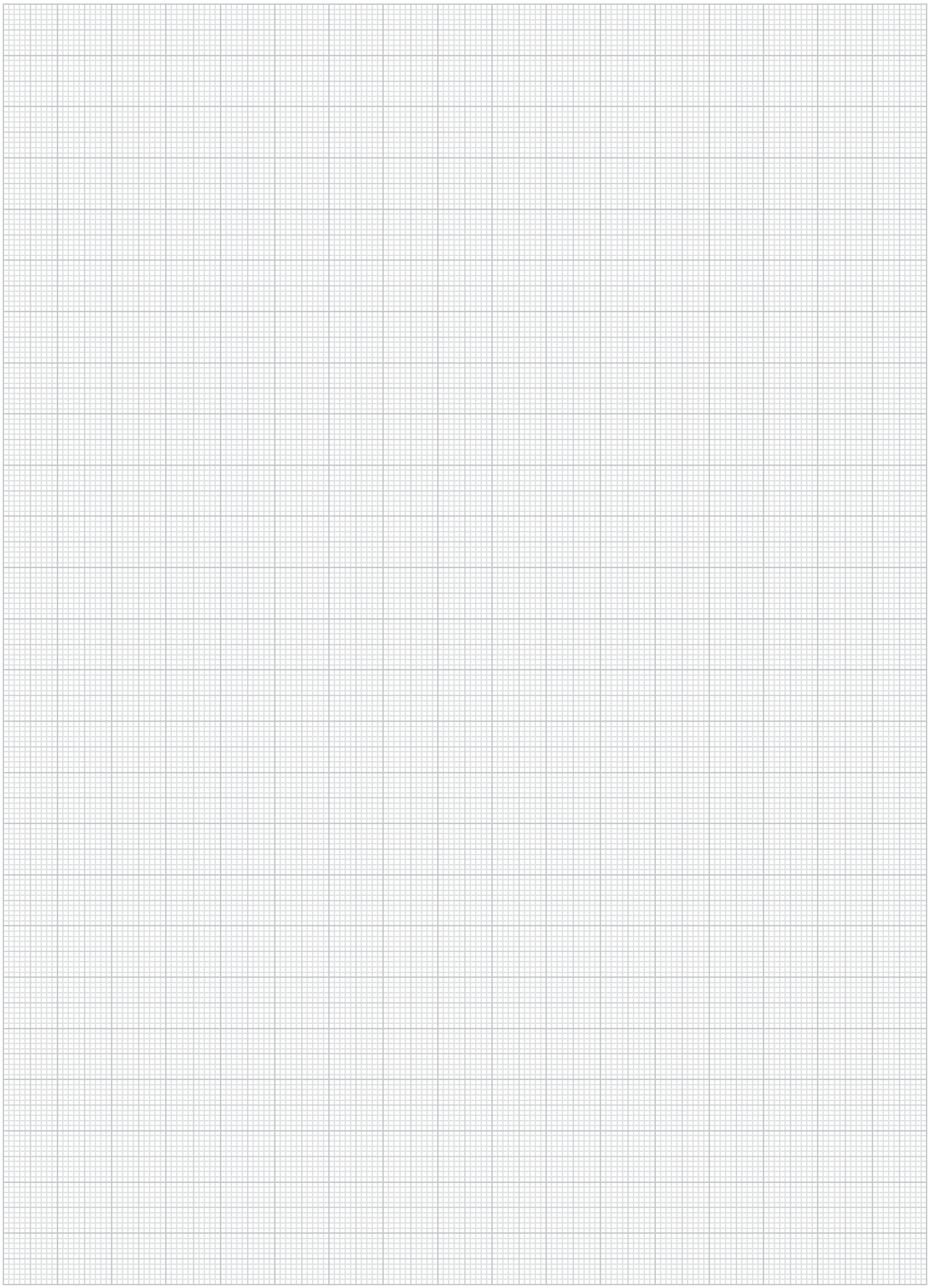
Sample order:
nlm 07650-12

Note:
Springs are only available in 400 mm long versions.



Order No.	D	Di	LO	S	Spring force F approx. N	Compression factor under f
07650-06	1	6,5	400	3	32	1,3
07650-08	1	8,5	400	4	25	2,1
07650-10	1,2	10,5	400	4	35	2,7
07650-12	1,4	12,5	400	5	47	3,3
07650-14	1,5	14,5	400	6	50	4,0
07650-16	1,6	16,5	400	7	53	4,8
07650-18	1,8	18,5	400	7	68	5,4
07650-20	1,8	20,5	400	8	62	6,5
07650-24	2	25	400	9	70	8,6

Notes



HeliCoil®plus threaded inserts

Material:
Rust and acid-resistant chromiun-nickel alloy 1.4301

Version:
Bright.

Sample order:
nlm 07645-01 (assortment box)

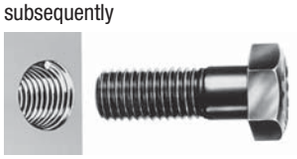
Note:
HeliCoil®plus threaded inserts are an indispensable aid to any metalworking business and restoration shop.
Threaded holes that are torn out, rusted solid or have been drilled too big, can have their original intearnal thread diameter restored in minutes.
Technically perfect and lasting for an unlimited time, they are also corrosion and heat-resistant.
It is even possible to recycle expensive products thrown away.
As a result of the high surface quality an optimum limit of elasticity and high pre-tensioning of high tensile bolts is guaranteed.
HeliCoil®plus threaded inserts are also ideally suited for movable threads in all light-alloy and cast parts. Instructions for installation and thread are enclosed in the assortment box. Additional dimensions, of installation tools as well, available on request.

Assortment Box
Assortment box consisting of M5 to M12 threaded inserts, each in three different thread lengths, spiral drills (only for M5 - M10 inserts), special hand-operated tapping drills, spindle inserts and pin breakers.

Repair Kits
Consisting of threaded inserts of one size, each in three different thread lengths, spiral drills, special hand-operated tapping drills, spindle inserts and pin breakers.

previously

subsequently



assortment box

repair kits

spare threaded inserts, loose

Order No.	Version	Thread sizes in set	No. off inserts	Insert length assembled mm
07645-01	assortment box	M5	10	5 / 7,5 / 10
		M6	10	6 / 9 / 12
		M8	10	8 / 12 / 16
		M10	10	10 / 15 / 20
		M12	10	12 / 18 / 24

Order No.	Version	Threaded Inserts	No. off inserts	Insert length assembled mm
07645-0523	repair kits	M5	20 of each	5 / 7,5 / 10
07645-0623	repair kits	M6	20 of each	6 / 9 / 12
07645-0823	repair kits	M8	10 of each	8 / 12 / 16
07645-1023	repair kits	M10	10 of each	10 / 15 / 20
07645-1223	repair kits	M12	10 of each	12 / 18 / 24

Order No.	Version	Threaded Inserts	Insert length assembled mm
07645-0521	spare threaded inserts, loose	M5	5
07645-0531	spare threaded inserts, loose	M5	7,5
07645-0541	spare threaded inserts, loose	M5	10
07645-0621	spare threaded inserts, loose	M6	6
07645-0631	spare threaded inserts, loose	M6	9
07645-0641	spare threaded inserts, loose	M6	12
07645-0821	spare threaded inserts, loose	M8	8
07645-0831	spare threaded inserts, loose	M8	12
07645-0841	spare threaded inserts, loose	M8	16
07645-1021	spare threaded inserts, loose	M10	10
07645-1031	spare threaded inserts, loose	M10	15
07645-1041	spare threaded inserts, loose	M10	20
07645-1221	spare threaded inserts, loose	M12	12
07645-1231	spare threaded inserts, loose	M12	18
07645-1241	spare threaded inserts, loose	M12	24

Self-tapping thread inserts installation information

Installing by hand

1. Drilling

Drill out the old hole with a core drill. If necessary, countersink the hole. By hard and tough materials the thread must be pre-tapped (max. intermediate tap).

2. Screw threaded insert onto the intallation tool

Screw the thread insert onto the installation tool with the slot or hole downwards and lock in place with the locknut using a spanner.

3. Screw in the thread insert

Screw in thread insert into the hole. The thread insert cuts its own thread. The intsallation tool has a ¼“ hexagon spigot and can be driven by a cordless driver, ratchet and socket etc.

4. Screw out the installation tool

Loosen the lock nuts with a spanner and screw the installation tool out. With the thread insert the thread is now more wear resistant, more durable and vibration resistant than the original thread.

Installation on a machine

1. Drilling

Drill out the old hole with a core drill. If necessary countersink the borehole. By hard and tough materials the thread must be pre-tapped (max. intermediate tap).

2. Machine settings and positioning

Position the workpiece under the machine. Set the machine to the screw in depth. Turn the outer sleeve so that the stop pin makes contact and carries the sleeve when screwing in begins. Screw the threaded insert 2 to 4 turns onto the threaded pin.

3. Screw in the thread insert

Allow the machine to run until the threaded insert is screwed into the workpiece. Introduce the tool gently to the workpiecedown to prevent damaging or breaking the thread insert or the installation tool.

4. Screw the tool out

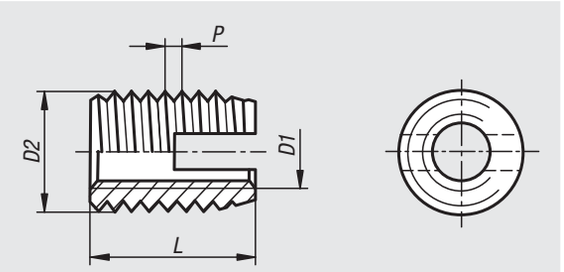
Set the machine into reverse. The outer sleeve is carried by the stop pin and counters the thread insert.

Recommended drilling diameter

		Threaded inserts with cutting slot case-hardened steel, galvanized, yellow-chromated				**Threaded inserts with cutting holes** case-hardened steel, galvanized, yellow-chromated			
Materials	Light metal alloys tensile strength [N/mm²]	< 250 N/mm²	< 300 N/mm²	< 350 N/mm²	> 350 N/mm²	< 300 N/mm²	< 350 N/mm²	> 350 N/mm²	
	Brass, non-ferrous metals, bronze				> 350 N/mm²			> 350 N/mm²	
	Cast iron Brinell hardness [HB]	< 150 HB	< 200 HB	> 200 HB		< 150 HB	< 200 HB	> 200 HB	
Internal thread D	**M3 x 0,5**	-	4,6 mm	4,7 mm	4,8 mm	4,6 mm	4,7 mm		4,8 mm
	M4 x 0,7	5,9 mm	6,0 mm	6,1 mm	6,2 mm	6,0 mm	6,1 mm		6,2 mm
	M5 x 0,8	7,2 mm	7,3 mm	7,5 mm	7,6 mm	7,4 mm	7,5 mm	7,6 mm	7,7 mm
	M6 x 1,0	8,8 mm	9,0 mm	9,2 mm	9,4 mm	9,3 mm	9,4 mm	9,5 mm	9,6 mm
	M8 x 1,25	10,8 mm	11,0 mm	11,2 mm	11,4 mm	11,1 mm	11,2 mm	11,3 mm	11,5 mm
	M10 x 1,5	12,8 mm	13,0 mm	13,2 mm	13,4 mm	-	-	-	-
	M12 x 1,75	14,8 mm	15,0 mm	15,2 mm	15,4 mm	-	-	-	-
	M16 x 2,0	18,8 mm	19,0 mm	19,2 mm	19,4 mm	-	-	-	-
	Flank coverage	ca. 60%	ca. 50%	ca. 40%	ca. 30%	ca. 80%	ca. 70%	ca. 60%	ca. 50%
		Lubrication may be required				Lubrication may be required			

Threaded inserts self-tapping

with cutting slot



Material:
Steel or stainless steel 1.4305

Version:
Steel, case-hardened, galvanized, yellow passivated (chrome VI-free).
Stainless steel bright.

Sample order:
nlm 07652-03

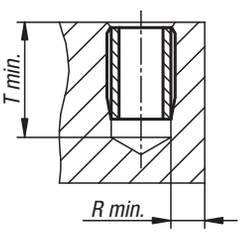
Note:
Self-tapping threaded inserts for making high-strength, wear-free, vibration resistant screw connections in materials with low shear strength such as aluminium and aluminium alloys, brass, bronze, cast iron, duro and thermoplastics.

The threaded inserts are tapered at the bottom and have a cutting slot. By screwing in they cut their own threads inside a receiver hole. This guarantees a completely secure and firm anchoring in the host material.

Internal thread D1 acc. to ISO 6H.

The threaded inserts with cutting slot spring slightly inwards in the slot region in some materials. This results in a screw locking effect. If this is not desired, we recommend the threaded inserts with a cutting bore.

Mounting dimensions



Order No.	Material	D1	D2	P	L	T min.	R min. light metal	R min. cast iron	R min. plastics	Order No. Hand ass. tool	Order No. M/C ass. tool
07652-03	Steel	M3	5	0,5	6	8	1	1,5	1,25	07652-803	07652-903
07652-04	Steel	M4	6,5	0,75	8	10	1,3	1,95	1,6	07652-804	07652-904
07652-05	Steel	M5	8	1	10	13	1,6	2,4	2	07652-805	07652-905
07652-06	Steel	M6	10	1,5	14	17	2	3	2,5	07652-806	07652-906
07652-08	Steel	M8	12	1,5	15	18	2,4	3,6	3	07652-808	07652-908
07652-10	Steel	M10	14	1,5	18	22	2,8	4,2	3,5	07652-810	07652-910
07652-12	Steel	M12	16	1,5	22	26	3,2	4,8	4	07652-812	07652-912
07652-16	Steel	M16	20	1,5	22	27	4	6	5	-	07652-916
07652-103	Stainless steel	M3	5	0,5	6	8	1	1,5	1,25	07652-803	07652-903
07652-104	Stainless steel	M4	6,5	0,75	8	10	1,3	1,95	1,6	07652-804	07652-904
07652-105	Stainless steel	M5	8	1	10	13	1,6	2,4	2	07652-805	07652-905
07652-106	Stainless steel	M6	10	1,5	14	17	2	3	2,5	07652-806	07652-906
07652-108	Stainless steel	M8	12	1,5	15	18	2,4	3,6	3	07652-808	07652-908
07652-110	Stainless steel	M10	14	1,5	18	22	2,8	4,2	3,5	07652-810	07652-910
07652-112	Stainless steel	M12	16	1,5	22	26	3,2	4,8	4	07652-812	07652-912
07652-116	Stainless steel	M16	20	1,5	22	27	4	6	5	-	07652-916

Assembly tools

for self-tapping threaded inserts

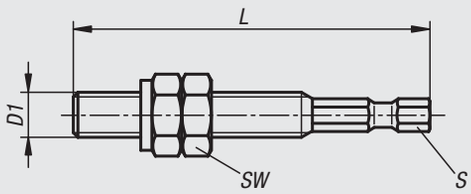
Material:
Steel.

Version:
Hand assembly tool, galvanized.
Machine assembly tool, black oxidised.

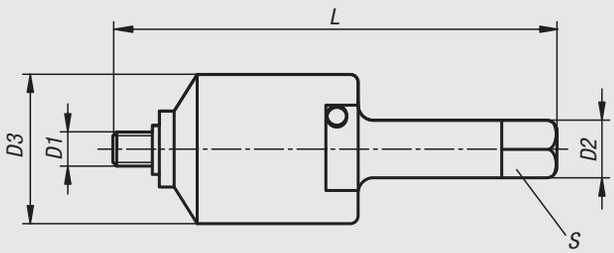
Sample order:
nlm 07652-803

Note:
The assembly tool with a tap wrench is used for insertion by hand. Machine assembly is carried out with the machine assembly tool preferably on a thread-cutting machine.

Hand assembly tool



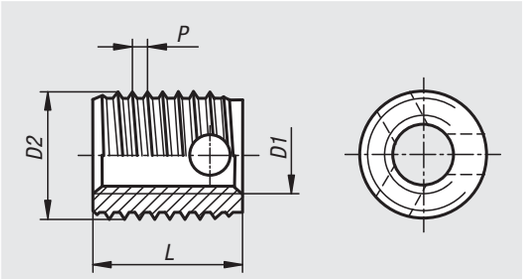
Machine assembly tool



Order No.	Version	D1	D2	D3	L	S	SW	Insertion torque ref. values Nm	RPM ref. values for light metal
07652-803	Hand assembly tool	M3	-	-	46	1/4“	5,5	2,5	-
07652-804	Hand assembly tool	M4	-	-	48	1/4“	7	5,5	-
07652-805	Hand assembly tool	M5	-	-	57	1/4“	8	10	-
07652-806	Hand assembly tool	M6	-	-	62	1/4“	10	15	-
07652-808	Hand assembly tool	M8	-	-	72	1/4“	13	28	-
07652-810	Hand assembly tool	M10	-	-	82	1/4“	17	40	-
07652-812	Hand assembly tool	M12	-	-	92	1/4“	19	60	-
07652-903	Machine assembly tool	M3	8	20	90	6,2	-	2,5	650 - 900
07652-904	Machine assembly tool	M4	8	20	90	6,2	-	5,5	400 - 600
07652-905	Machine assembly tool	M5	12	26	119	10	-	10	400 - 600
07652-906	Machine assembly tool	M6	12	26	119	10	-	15	280 - 400
07652-908	Machine assembly tool	M8	12	26	119	10	-	28	280 - 400
07652-910	Machine assembly tool	M10	16	34	148	12	-	40	200 - 300
07652-912	Machine assembly tool	M12	16	34	148	12	-	60	200 - 300
07652-916	Machine assembly tool	M16	22	48	176	18	-	160	150 - 200

Threaded inserts self-tapping

with cutting bores



Material:
Steel or stainless steel 1.4305

Version:
Steel, case-hardened, galvanized, yellow passivated (chrome VI-free).
Stainless steel bright.

Sample order:
nlm 07653-03

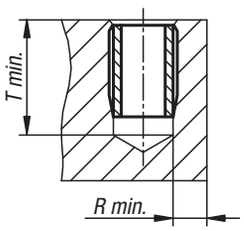
Note:
Self-tapping threaded inserts for making high-strength, wear-free, vibration resistant screw connections in materials with low shear strength such as aluminium and aluminium alloys, brass, bronze, cast iron, duro and thermoplastics.

The threaded inserts are tapered at the bottom and have three cutting bores. They cut their own threads inside a receiver hole. This guarantees a completely secure and firm anchoring in the host material.

Internal thread D1 acc. to ISO 6H.

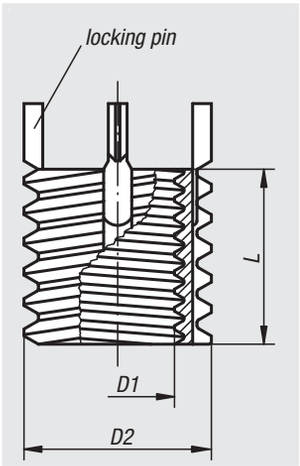
The threaded inserts with cutting bores are designed especially for materials difficult to machine. Due to the thicker wall, it can withstand greater force during cutting, which is also distributed over three cutting bores.

Mounting dimensions



Order No.	Material	D1	D2	P	L	T min.	R min. light metal	R min. cast iron	R min. plastics	Order No. Hand ass. tool	Order No. M/C ass. tool
07653-03	Steel	M3	5	0,6	4	6	1	1,5	1,25	07652-803	07652-903
07653-04	Steel	M4	6,5	0,8	6	8	1,3	1,95	1,6	07652-804	07652-904
07653-05	Steel	M5	8	1	7	9	1,6	2,4	2	07652-805	07652-905
07653-06	Steel	M6	10	1,25	8	10	2	3	2,5	07652-806	07652-906
07653-08	Steel	M8	12	1,5	9	11	2,4	3,6	3	07652-808	07652-908
07653-10	Steel	M10	14	1,5	10	13	2,8	4,2	3,5	07652-810	07652-910
07653-12	Steel	M12	16	1,75	12	15	3,2	4,8	4	07652-812	07652-912
07653-103	Stainless steel	M3	5	0,6	4	6	1	1,5	1,25	07652-803	07652-903
07653-104	Stainless steel	M4	6,5	0,8	6	8	1,3	1,95	1,6	07652-804	07652-904
07653-105	Stainless steel	M5	8	1	7	9	1,6	2,4	2	07652-805	07652-905
07653-106	Stainless steel	M6	10	1,25	8	10	2	3	2,5	07652-806	07652-906
07653-108	Stainless steel	M8	12	1,5	9	11	2,4	3,6	3	07652-808	07652-908
07653-110	Stainless steel	M10	14	1,5	10	13	2,8	4,2	3,5	07652-810	07652-910
07653-112	Stainless steel	M12	16	1,75	12	15	3,2	4,8	4	07652-812	07652-912

Threaded inserts



Material:
Steel or stainless steel

Version:
Passivated.

Sample order:
nlm 07660-12 threaded insert
nlm 07660-812 assembly tool

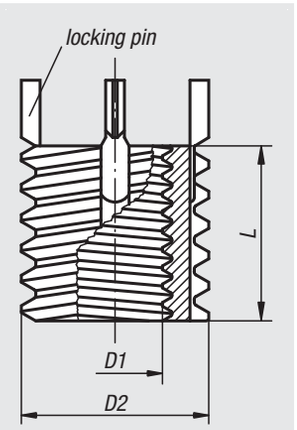
Note:
Threaded inserts allow threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Threaded inserts are suitable for use in various materials, including light metals and casting. Inserts with internal threads larger than M6 are supplied with four locking pins instead of two. Permissible deviations:
The medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads. Other dimensions ±0.25 mm.

Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are required besides the assembly tool.

Order No. steel	Order No. stainless steel	D1 Internal thread	D2 External thread	L Length	Core drill Ø	Counter-sink Ø +0.25	Tap size	Min. thread depth	Removal drill Ø	Removal drilling depth	Order No. assembly tools
07660-05	**07660-105**	M5	M8	8	6,9	8,3	M8	9,5	5,5	4	07660-805
07660-06	**07660-106**	M6	M10x1,25	10	8,8	10,3	M10x1,25	11,5	7,5	4,8	07660-806
07660-08	**07660-108**	M8	M12x1,25	12	10,8	12,3	M12x1,25	13,5	9,5	4,8	07660-808
07660-08X1	**07660-108X1**	M8x1	M12x1,25	12	10,8	12,3	M12x1,25	13,5	9,5	4,8	07660-808
07660-10	**07660-110**	M10	M14x1,5	14	12,8	14,3	M14x1,5	15,5	11,5	4,8	07660-810
07660-10X125	**07660-110X125**	M10x1,25	M14x1,5	14	12,8	14,3	M14x1,5	15,5	11,5	4,8	07660-810
07660-12	**07660-112**	M12	M16x1,5	16	14,8	16,3	M16x1,5	17,5	13,5	4,8	07660-812
07660-12X125	**07660-112X125**	M12x1,25	M16x1,5	16	14,8	16,3	M16x1,5	17,5	13,5	4,8	07660-812

Threaded inserts reinforced



Material:
Steel or stainless steel

Version:
Passivated.

Sample order:
nlm 07661-12 reinforced threaded insert
nlm 07661-812 assembly tool

Note:
Reinforced threaded inserts allow threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Reinforced threaded inserts are suitable for use in various materials, including light metals and casting.
Inserts with internal threads larger than M6 are supplied with four locking pins instead of two.
Permissible deviations:
The medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads. Other dimensions ±0.25 mm.

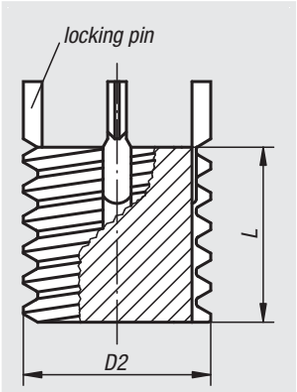
With reinforced threaded inserts we also offer a version with a stronger cross-section for use in applications with greater stress.

Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are required besides the assembly tool.

Order No. steel	Order No. stainless steel	D1 Internal thread	D2 External thread	L Length	Core drill Ø	Counter-sink Ø +0.25	Tap size	Min. thread depth	Removal drill Ø	Removal drilling depth	Order No. assembly tools
07661-04	**07661-104**	M4	M8	8	6,9	8,3	M8	9,5	5,5	4	07661-804
07661-05	**07661-105**	M5	M10x1,25	10	8,8	10,3	M10x1,25	12,5	7,5	4,8	07661-805
07661-06	**07661-106**	M6	M12x1,25	12	10,8	12,3	M12x1,25	14,5	9,5	4,8	07661-806
07661-08	**07661-108**	M8	M14x1,5	14	12,8	14,3	M14x1,5	16,5	11,5	4,8	07661-808
07661-08X1	**07661-108X1**	M8x1	M14x1,5	14	12,8	14,3	M14x1,5	16,5	11,5	4,8	07661-808
07661-10	**07661-110**	M10	M16x1,5	16	14,8	16,3	M16x1,5	18,5	13,5	4,8	07661-810
07661-10X125	**07661-110X125**	M10x1,25	M16x1,5	16	14,8	16,3	M16x1,5	18,5	13,5	4,8	07661-810
07661-12	**07661-112**	M12	M18x1,5	18	16,8	18,3	M18x1,5	20,5	15,5	4,8	07661-812
07661-12X125	**07661-112X125**	M12x1,25	M18x1,5	18	16,8	18,3	M18x1,5	20,5	15,5	4,8	07661-812
07661-14	**07661-114**	M14	M20x1,5	20	18,8	20,3	M20x1,5	22,5	17,5	4,8	07661-814
07661-14X15	**07661-114X15**	M14x1,5	M20x1,5	20	18,8	20,3	M20x1,5	22,5	17,5	4,8	07661-814
07661-16	**07661-116**	M16	M22x1,5	22	20,7	22,3	M22x1,5	24,5	17,8	6,4	07661-816
07661-16X15	**07661-116X15**	M16x1,5	M22x1,5	22	20,7	22,3	M22x1,5	24,5	17,8	6,4	07661-816
07661-18X15	**07661-118X15**	M18x1,5	M24x1,5	24	22,5	24,3	M24x1,5	26,5	19,8	6,4	07661-818
07661-20	**07661-120**	M20	M30x2	30	28	30,3	M30x2	34,5	25,8	6,4	07661-820
07661-20X15	**07661-120X15**	M20x1,5	M30x2	30	28	30,3	M30x2	34,5	25,8	6,4	07661-820
07661-22X15	**07661-122X15**	M22x1,5	M32x2	32	30	32,3	M32x2	36,5	27,8	6,4	07661-822
07661-24	**07661-124**	M24	M33x2	33	31	33,3	M33x2	37,5	28,8	6,4	07661-824
07661-24X2	**07661-124X2**	M24x2	M33x2	33	31	33,3	M33x2	37,5	28,8	6,4	07661-824

Threaded inserts solid body



Material:
Steel.

Version:
Passivated.

Sample order:
nlm 07662-10X125 solid body threaded insert
nlm 07662-810 assembly tool

Note:
Solid body threaded inserts allow threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Solid body threaded inserts are suitable for use in various materials, including light metals and castings.
Permissible deviations:
The medium tolerance class applies to the threads listed, i.e. 6g for bolt threads.
Other dimensions ±0.25 mm.

Solid body threaded inserts are used where threaded holes that have been drilled too large or drill hole spacings that have not been observed in workpieces need to be redone.

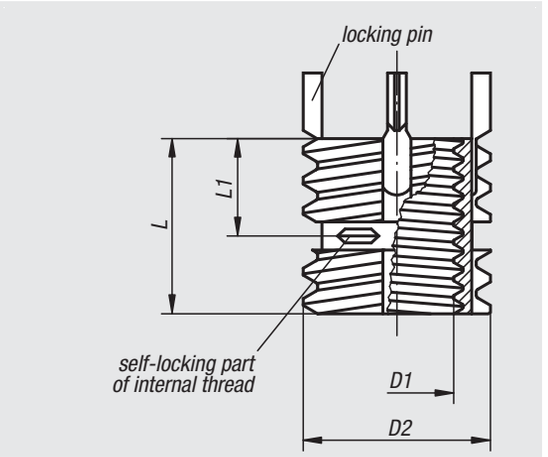
Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are rquired besides the assembly tool.

Order No.	D2 External thread	L Length	Core drill Ø	Counter-sink Ø +0.25	Tap size	Min. thread depth	Removal drill Ø	Removal drilling depth	Order No. assembly tools
07662-08	M8	8	6,9	8,3	M8	9,5	5,5	4	07662-808
07662-10X125	M10x1,25	10	8,8	10,3	M10x1,25	12,5	7,5	4,8	07662-810
07662-12X125	M12x1,25	12	10,8	12,3	M12x1,25	14,5	9,5	4,8	07662-812
07662-14X15	M14x1,5	14	12,8	14,3	M14x1,5	16,5	11,5	4,8	07662-814
07662-16X15	M16x1,5	16	14,8	16,3	M16x1,5	18,5	13,5	4,8	07662-816
07662-18X15	M18x1,5	18	16,8	18,3	M18x1,5	20,5	15,5	4,8	07662-818
07662-20X15	M20x1,5	20	18,8	20,3	M20x1,5	22,5	17,5	4,8	07662-820
07662-22X15	M22x1,5	22	20,7	22,3	M22x1,5	24,5	17,8	6,4	07662-822
07662-24X15	M24x1,5	24	22,5	24,3	M24x1,5	26,5	19,8	6,4	07662-824
07662-30X2	M30x2	30	28	30,3	M30x2	34,5	25,8	6,4	07662-830

Threaded inserts

with internal thread, self-locking



Material:
Stainless steel

Version:
Passivated.

Sample order:
nlm 07663-112 threaded insert
nlm 07660-812 assembly tool

Note:
Threaded inserts allow threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Threaded inserts are suitable for use in various materials, including light metals and casting.
Inserts with internal threads larger than M6 are supplied with four locking pins instead of two.
Permissible deviations:
the medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads.
Other dimensions ±0.25 mm.

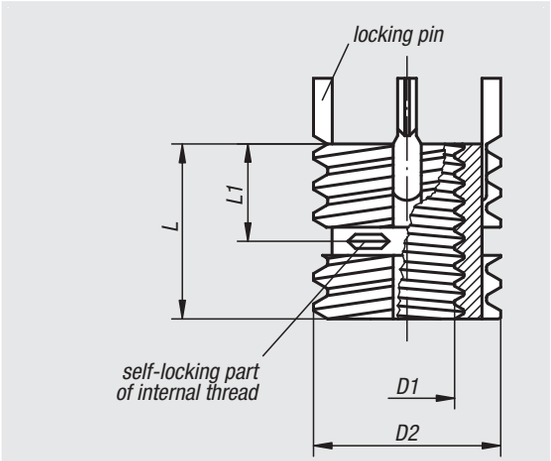
Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are required besides the assembly tool.

Order No.	D1 Internal thread	D2 External thread	L1 Length	L Length	Core drill Ø	Counter-sink Ø +0.25	Tap size	Min. thread depth	Removal drill Ø	Removal drilling depth	Order No. assembly tools
07663-105	M5	M8	4	8	6,9	8,3	M8	9,5	5,5	4	07660-805
07663-106	M6	M10x1,25	5	10	8,8	10,3	M10x1,25	11,5	7,5	4,8	07660-806
07663-108	M8	M12x1,25	6	12	10,8	12,3	M12x1,25	13,5	9,5	4,8	07660-808
07663-110	M10	M14x1,5	7	14	12,8	14,3	M14x1,5	15,5	11,5	4,8	07660-810
07663-112	M12	M16x1,5	8	16	14,8	16,3	M16x1,5	17,5	13,5	4,8	07660-812

Threaded inserts reinforced

internal thread, self-locking



Material:
Stainless steel

Version:
Passivated.

Sample order:
nlm 07664-110 reinforced threaded insert
nlm 07661-810 assembly tool

Note:
Reinforced threaded inserts allow threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Reinforced threaded inserts are suitable for use in various materials, including light metals and casting.
Inserts with internal threads larger than M6 are supplied with four locking pins instead of two.
Permissible deviations:
The medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads. Other dimensions ±0.25 mm.

Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are required besides the assembly tool.

Order No.	D1 Internal thread	D2 External thread	L1 Length	L Length	Core drill Ø	Counter-sink Ø +0.25	Tap size	Min. thread depth	Removal drill Ø	Removal drilling depth	Order No. assembly tools
07664-104	M4	M8	4	8	6,9	8,3	M8	9,5	5,5	4	07661-804
07664-105	M5	M10x1,25	5	10	8,8	10,3	M10x1,25	12,5	7,5	4,8	07661-805
07664-106	M6	M12x1,25	6	12	10,8	12,3	M12x1,25	14,5	9,5	4,8	07661-806
07664-108	M8	M14x1,5	7	14	12,8	14,3	M14x1,5	16,5	11,5	4,8	07661-808
07664-110	M10	M16x1,5	8	16	14,8	16,3	M16x1,5	18,5	13,5	4,8	07661-810
07664-112	M12	M18x1,5	9	18	16,8	18,3	M18x1,5	20,5	15,5	4,8	07661-812
07664-114	M14	M20x1,5	10	20	18,8	20,3	M20x1,5	22,5	17,5	4,8	07661-814
07664-116	M16	M22x1,5	11	22	20,7	22,3	M22x1,5	24,5	17,8	6,4	07661-816
07664-116X15	M16x1,5	M22x1,5	11	22	20,7	22,3	M22x1,5	24,5	17,8	6,4	07661-816
07664-118X15	M18x1,5	M24x1,5	12	24	22,5	24,3	M24x1,5	26,5	19,8	6,4	07661-818
07664-120	M20	M30x2	15	30	28	30,3	M30x2	34,5	25,8	6,4	07661-820

Repair kit

Material:
Steel.

Version:
Passivated.

Sample order:
nlm 07666-01

Note:
The repair kit allows threaded holes which have been damaged, torn out or jammed to be used again or to be repaired. This makes it possible to recover scrap and rejects of expensive products.
Threaded inserts are suitable for use in various materials, including light metals and casting.
Inserts with internal threads larger than M6 are supplied with four locking pins instead of two.
Permissible deviations:
the medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads. Other dimensions ±0.25 mm.

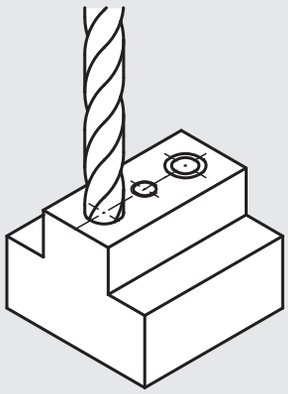
Technical information see operating instructions for threaded inserts.

Advantages:
- Quick and easy installation.
- The insert is fixed with pins in order to prevent torsion due to twisting or vibrations.
- No other special tools are required besides the assembly tool.

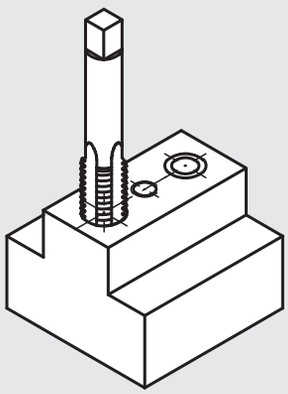
Order No.	Threaded inserts supplied internal thread	Threaded inserts supplied external thread	Length of inserts	Number of inserts	Number of assembly tool	Order No. Threaded insert
07666-01	M5	M8	8	8	1	07660-05
	M6	M10x1,25	10	8	1	07660-06
	M8	M12x1,25	12	6	1	07660-08
	M8x1	M12x1,25	12	6	-	07660-08X1
	M10	M14x1,5	14	4	1	07660-10
	M10x1,25	M14x1,5	14	4	-	07660-10X125
	M12	M16x1,5	16	3	1	07660-12
	M12x1,25	M16x1,5	16	3	-	07660-12X125

Operating instructions for threaded inserts

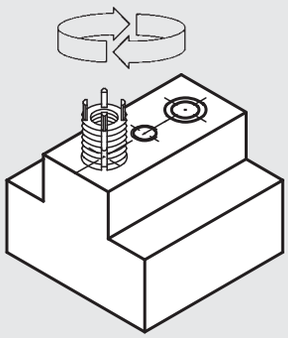
Fitting instructions



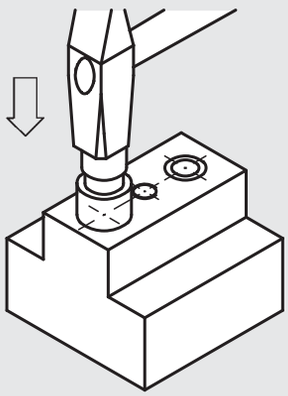
1.*
Rebore the old thread and countersink it (82° – 100°).



2.*
Tap thread with a standard screw tap.



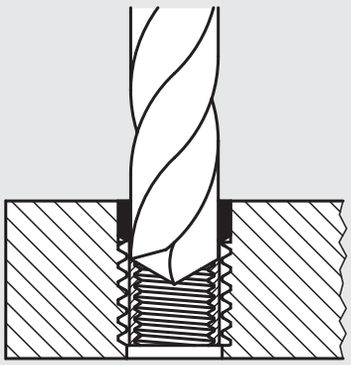
3.
Screw in the insert to just below the surface (0.3 – 0.7 mm).



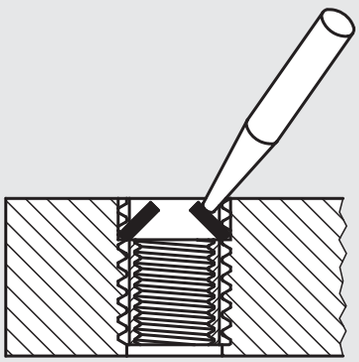
4.
Drive in the locking pins by striking the assembly tool lightly with a hammer.

* For steps 1 and 2 see table under installation of threaded inserts.

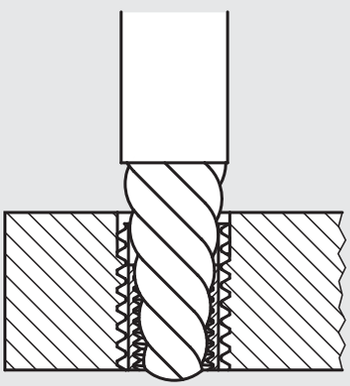
Removal instructions



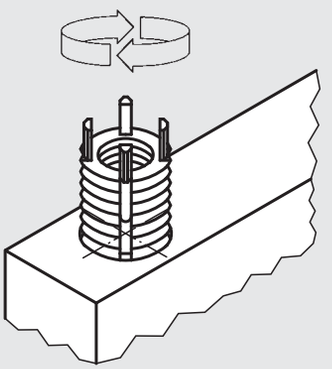
1.*
Rebore the material between the locking pins and the internal thread to the specified depth.



2.
Bend the locking pins inwards and break them off.



3.
Remove the old insert with a screw extractor.

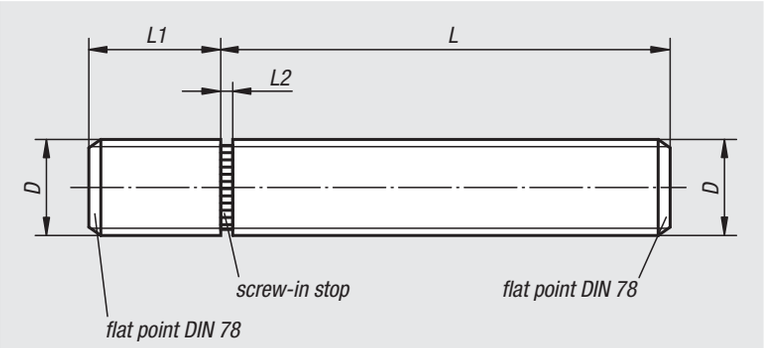


4.
Install a new threaded insert in the original threaded hole.

* For step 1 see table under removal of threaded inserts.

Studs

with screw-in stop for gluing in



Material:
Steel or stainless steel 1.4305.

Version:
Steel blue-chromed.
Stainless steel bright.

Sample order:
nlm 07670-1040201

Note:
Studs with screw-in stop have been designed especially for gluing-in. They allow mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.
The LOCTITE products 638 and 648 (see 97990) have proven themselves in practice as successful bonding agents.

Order No. steel	Order No. stainless steel	D	L	L1	L2
07670-1040201	**07670-1040202**	M4	20	6	1
07670-1040301	**07670-1040302**	M4	30	6	1
07670-1040401	**07670-1040402**	M4	40	6	1
07670-1040501	**07670-1040502**	M4	50	6	1
07670-1050201	**07670-1050202**	M5	20	8	1
07670-1050301	**07670-1050302**	M5	30	8	1
07670-1050401	**07670-1050402**	M5	40	8	1
07670-1050501	**07670-1050502**	M5	50	8	1
07670-1050601	**07670-1050602**	M5	60	8	1
07670-1060201	**07670-1060202**	M6	20	9	1,5
07670-1060301	**07670-1060302**	M6	30	9	1,5
07670-1060401	**07670-1060402**	M6	40	9	1,5
07670-1060501	**07670-1060502**	M6	50	9	1,5
07670-1060601	**07670-1060602**	M6	60	9	1,5
07670-1080201	**07670-1080202**	M8	20	12	1,5
07670-1080301	**07670-1080302**	M8	30	12	1,5
07670-1080401	**07670-1080402**	M8	40	12	1,5
07670-1080501	**07670-1080502**	M8	50	12	1,5
07670-1080601	**07670-1080602**	M8	60	12	1,5
07670-1080801	**07670-1080802**	M8	80	12	1,5
07670-1100201	**07670-1100202**	M10	20	14	2
07670-1100301	**07670-1100302**	M10	30	14	2
07670-1100401	**07670-1100402**	M10	40	14	2
07670-1100501	**07670-1100502**	M10	50	14	2
07670-1100601	**07670-1100602**	M10	60	14	2
07670-1100801	**07670-1100802**	M10	80	14	2
07670-1120301	**07670-1120302**	M12	30	17	2
07670-1120401	**07670-1120402**	M12	40	17	2
07670-1120501	**07670-1120502**	M12	50	17	2
07670-1120601	**07670-1120602**	M12	60	17	2
07670-1120801	**07670-1120802**	M12	80	17	2
07670-1160301	**07670-1160302**	M16	30	22	2
07670-1160401	**07670-1160402**	M16	40	22	2
07670-1160501	**07670-1160502**	M16	50	22	2
07670-1160601	**07670-1160602**	M16	60	22	2
07670-1160801	**07670-1160802**	M16	80	22	2

Technical information for studs with screw-in stop

Studs with screw-in stop are designed especially as glue-in studs. They allow mechanical connecting elements with external thread to be made cost-effectively for small and medium-sized series.

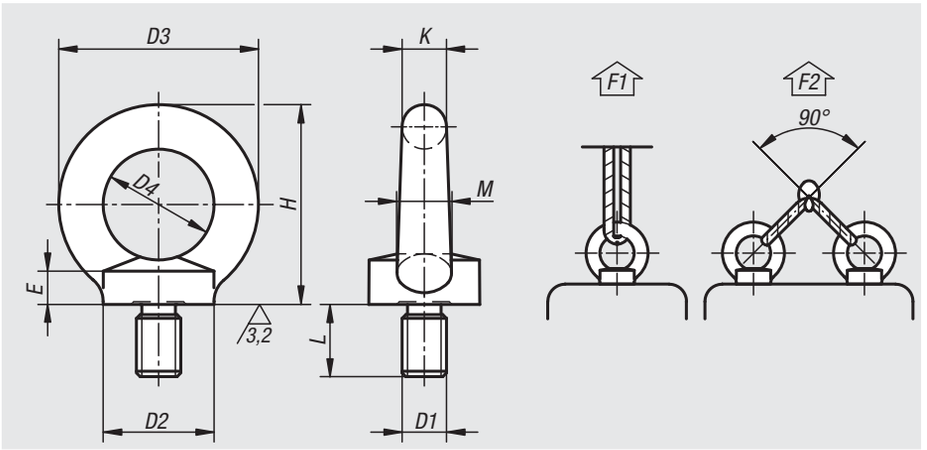
Advantages:

– Defined screw-in length due to the screw-in stop.
– Screwing in against the screw-in stop achieves an optimal bonding gap and hence a permanently safe bond that has been proven a thousandfold.
– Easy and low-cost connection.
– The operating part product line can be quickly and easily supplemented by other external thread variations.

The LOCTITE products 638 and 648 have proven themselves in practice as a successful bonding agent.

Ring bolts

DIN 580 / stainless steel similar to DIN 580



Material:
Hardened steel 1.0401 or stainless steel 1.4301.

Version:
Steel: drop forged.
stainless steel: cast.

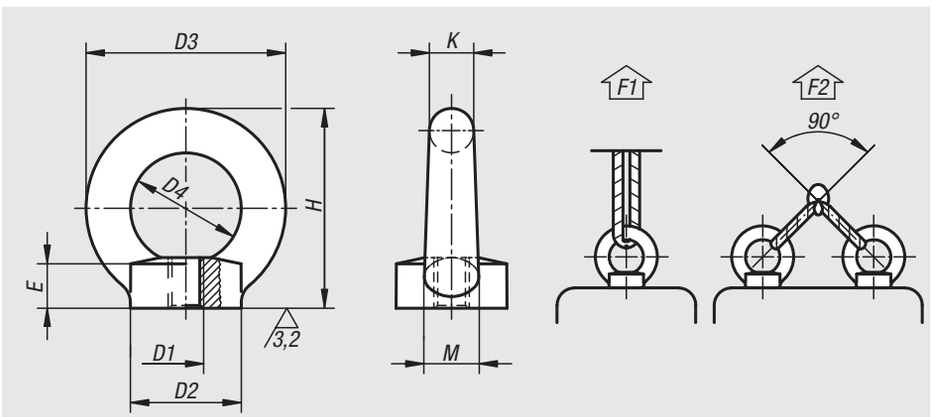
Sample order:
nlm 07680-20

Note:
Ring bolts, steel acc. to DIN 580:
For high demand lifting and functions in safety relevant areas (machine construction, lifting units, lifting tackle).
Ring bolts, stainless steel similar to DIN 580:
For light lifting, and functions without special requirement, e.g. fence construction, chain barriers and light machining.

Order No. steel	Order No. stainless steel	D1	L	D2	D3	D4	E	H	K	M	F1 max. kN	F2 max. kN
07680-08	**07680-108**	M8	13	20	36	20	6	36	8	10	1,4	0,95
07680-10	**07680-110**	M10	17	25	45	25	8	45	10	12	2,3	1,7
07680-12	**07680-112**	M12	20,5	30	54	30	10	53	12	14	3,4	2,4
07680-16	**07680-116**	M16	27	35	63	35	12	62	14	16	7	5
07680-20	-	M20	30	40	72	40	14	71	16	19	12	8,3
07680-24	-	M24	36	50	90	50	18	90	20	24	18	12,7

Ring nuts DIN 582

stainless steel similar to DIN 582



Material:
Steel 1.0401 or stainless steel 1.4301

Version:
Steel: drop forged.
stainless steel: cast.

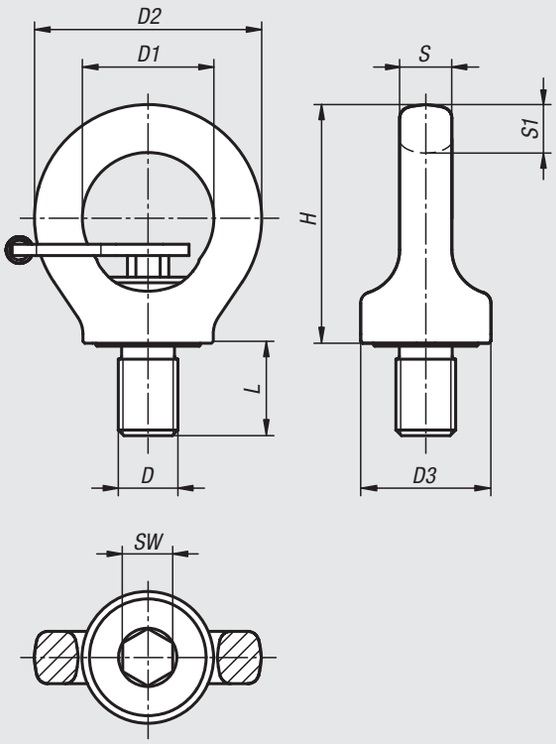
Sample order:
nlm 07690-10

Note:
Ring nuts, steel acc. to DIN 582:
For high demand lifting and functions in safety relevant areas (machine construction, lifting units, lifting tackle).
Ring nuts, stainless steel similar to DIN 582:
For light lifting, and functions without special requirement, e.g. fence construction, chain barriers and light machining.

Order No. steel	Order No. stainless steel	D1	D2	D3	D4	E	H	K	M	F1 max. kN	F2 max. kN
07690-08	**07690-108**	M8	20	36	20	8,5	36	8	10	1,4	0,95
07690-10	**07690-110**	M10	25	45	25	10	45	10	12	2,3	1,7
07690-12	**07690-112**	M12	30	54	30	11	53	12	14	3,4	2,4
07690-16	**07690-116**	M16	35	63	35	13	62	14	16	7	5
07690-20	**07690-120**	M20	40	72	40	16	71	16	19	12	8,3
07690-24	-	M24	50	90	50	20	90	20	24	18	12,7

Ring bolts rotatable

high-strength grade 10



Material:
Ring in steel 1.6541;
screw in steel

Version:
Ring forged and high tensile tempered.
100% electromagnetic crack tested per EN 1677-1,
4x safety factor.
Plastic-coated.
Thread grade 10.9.

Sample order:
nlm 07695-08151

Note:
In contrast to DIN 580 ring bolts this ring bolt is rotatable, therefore the load direction is adjustable and unintended tightening or loosening is negated.

– 4x safety factor
– lateral loading up to 90° is possible
– ring can rotate 360° with tightened screw

The listed load values apply for a minimum screw length of 1x nominal thread diameter in steel with a minimum tensile strength of 363 N/mm², at an application temperature of -20 °C to +100 °C.

Maximum lifting weight "G" in kg for different sling types

Sling configuration	G	G	G	G	G		G	
No. off slings	1	2	1	2	2	2	3 - 4	3 - 4
Sling angle ∢	0°	0°	90°	90°	0°-45°	45°-60°	0°-45°	45°-60°
M8	1000	2000	300	600	420	300	630	450
M10	1000	2000	400	800	560	400	840	600
M12	2000	4000	750	1500	1000	750	1600	1120
M16	4000	8000	1500	3000	2000	1500	3150	2250
M20	6000	12000	2300	4600	3220	2300	4830	3450
M24	8000	16000	3200	6400	4480	3200	6700	4800
M30	12000	24000	4500	9000	6300	4500	9400	6700

Order No.	Version	D	D1	D2	D3	H	L	S	S1	SW	Permissible load kg
07695-08151	with hexagon wrench	M8	25	44	25	47	12	9	9,5	6	300
07695-10151	with hexagon wrench	M10	25	44	26	47	15	9	9,5	6	400
07695-12181	with hexagon wrench	M12	30	52	34	55	18	11	11	8	750
07695-16241	with hexagon wrench	M16	35	61	35	64	24	14	13	10	1.500
07695-20301	with hexagon wrench	M20	40	70	44	74	30	16	15	12	2.300
07695-24361	with hexagon wrench	M24	48	84	52	91	36	19	18	14	3.200
07695-30451	with hexagon wrench	M30	60	105	61	112	45	25	22,5	17	4.500
07695-08150	without hexagon wrench	M8	25	44	25	47	12	8	11	6	300
07695-10150	without hexagon wrench	M10	25	44	25	47	15	8	11	6	400
07695-12180	without hexagon wrench	M12	30	52	33	55	18	10	13	8	750
07695-16240	without hexagon wrench	M16	35	61	35	64	24	14	13	10	1.500
07695-20300	without hexagon wrench	M20	40	70	44	74	30	16	17	12	2.300
07695-24360	without hexagon wrench	M24	48	84	52	91	36	19	21	14	3.200
07695-30450	without hexagon wrench	M30	60	108	62	112	45	27	26	17	4.500

Ring bolts

swivel and 360° rotatable, grade 8

Material:
Steel.

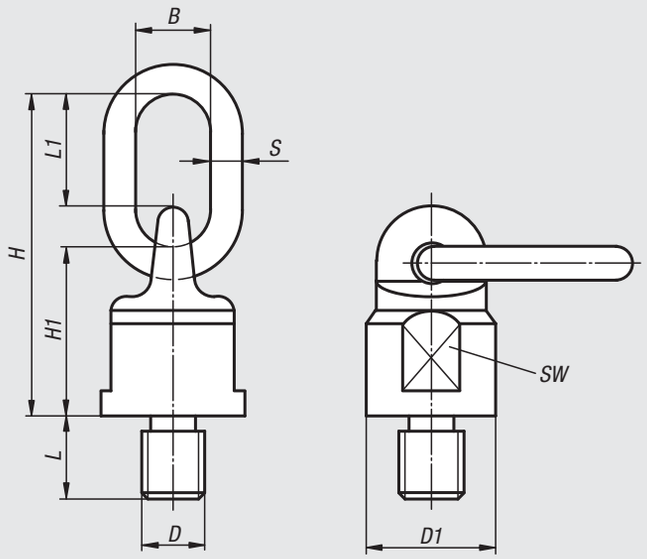
Version:
Quality class 8, ball bearing;
red plastic-coated

Sample order:
nlm 07710-1018

Note:
Compact and light design, full loading on all sides. 4x safety factor against breakage in all loading axis. Rotatable 360°. Link swivel range max. 180°. The ball bearing allows the ring to rotate even under load.

Lifting or securing loads, swivel rings have many uses.

For the loading capacity to be valid it must be ensured that the ring is in line with the load. The swivel face must lie flat on the support beam and the screw must always be screwed in fully.

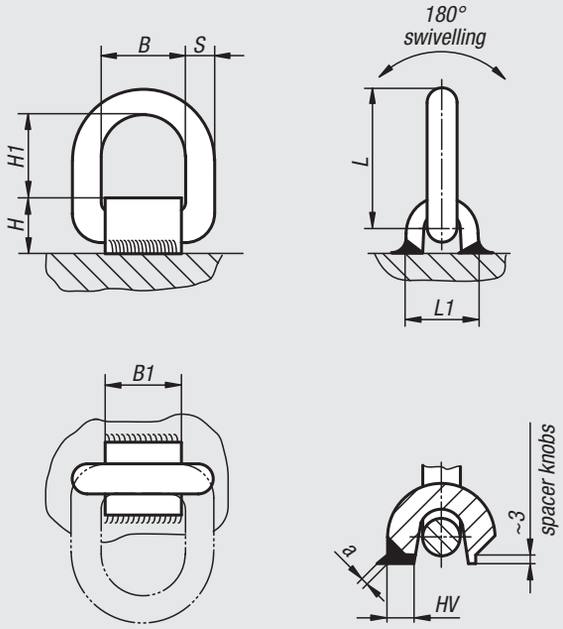


Maximum lifting weight "G" in kg for different sling types

Sling confguration	G	G	G	G	G	G	G	G
No. off slings	1	2	1	2	2	2	3 - 4	3 - 4
sling angle ∢	0°	0°	90°	90°	0°-45°	45°-60°	0°-45°	45°-60°
M10	600	1200	300	600	420	300	630	450
M12	1000	2000	500	1000	750	500	1100	750
M16	2000	4000	1120	2000	1500	1120	2360	1600
M20	4000	8000	2000	4000	2800	2000	4000	3000
M24	6300	12500	3150	6300	4250	3150	6300	4750
M30	10600	21200	5300	10600	7100	5800	11200	8000
M36	12500	25000	8000	16000	11200	8000	16800	12000

Order No.	B	D	D1	H	H1	L	L1	S	SW	Permissible load kg
07710-1018	30	M10	38	105	50	18	46	13	30	300
07710-1218	30	M12	38	105	50	18	46	13	30	500
07710-1620	30	M16	38	105	50	20	46	13	30	1120
07710-2030	34	M20	50	131	61	30	57	16	40	2000
07710-2430	40	M24	58	153	68	30	70	19	48	3150
07710-3035	40	M30	75	165	80	35	65	20	65	5300
07710-3654	50	M36	85	205	95	54	90	22	75	8000

Weld-on D-ring



Material:
Eye, steel type 1.6541;
welding block, steel type S355JR

Version:
D-ring forged, high tensile tempered, red plastic coated.
Welding block forged, high tensile tempered, bright.

Sample order:
nlm 07720-1000

Note:
Weld-on D-rings allow for quick installation.

They offer a compact design and can be loaded from all sides, with 4x safety factor against breakage.

The welding block is forged from easy to weld S355JR (St 52-3). The small knobs serve as spacers for the air gap required for fillet welding (ca. 3 mm).
The load data given in the table is clearly marked on the welding block, they apply to worst scenario cases for the lifting type shown.

Welding must be carried out by a proficient welder certified to EN 287-1.

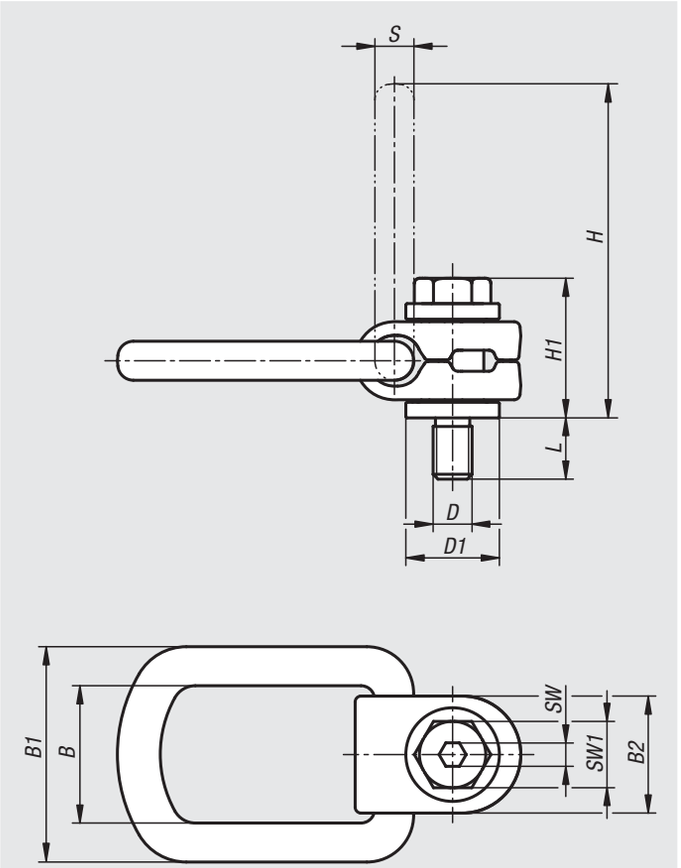
Maximum transport weight "G" in kg for different stop types

Kind of attachment	G	G	G	G	G		G	
Number of pieces	1	2	1	2	2	2	3 - 4	3 - 4
Inclination angle ∢	0°	0°	90°	90°	0°-45°	45°-60°	0°-45°	45°-60°
07720-1***	1600	3200	1120	2240	1500	1120	2360	1600
07720-2***	3000	6000	2000	4000	2800	2000	4000	3000
07720-3***	4750	9500	3150	6300	4250	3150	6300	4750
07720-5***	8000	16000	5300	10600	7100	5300	11200	8000

Order No. without spring band	Order No. with spring band	B	B1	H	H1	L	L1	S	Weld seam	Permissible load kg
07720-1000	**07720-1001**	40	38	32	40	73	38	13	HV 5 + a3	1120
07720-2000	**07720-2001**	41	38	32	45	81	40	13	HV 5 + a3	2000
07720-3000	**07720-3001**	45	43	38	45	87	42	17	HV 8 + a3	3150
07720-5000	**07720-5001**	55	50	48	57	108	60	22	HV 12 + a4	5300

Hoist rings 360° rotation

grade 10



Material:
Ring and attachment shackle steel.
Bolt and bushing steel.

Version:
Ring and shackle forged, hardened and tempered. 100% electromagnetic crack detection, plastic-coating yellow.
Bolt grade 10.9. 100% electromagnetic crack detection.
Bush galvanized.

Sample order:
nlm 07725-08016

Note:
These hoist rings have full swivel and pivot action and can take the full load from any direction. An integrated spring holds the ring in any position. The working load limit is specified on the hoist ring. This applies to the most unfavourable load rating (see table). The test load is 2.5 times the maximum permissible load. With captive but removable hexagon screw. The hoist rings corresponding to the Machinery Directive and are BG certified.

Temperature range:
from -40 °C to 100 °C = 100% permissible load
up to 200°C = 85% permissible load
up to 250°C = 80% permissible load
up to 350°C = 75% permissible load

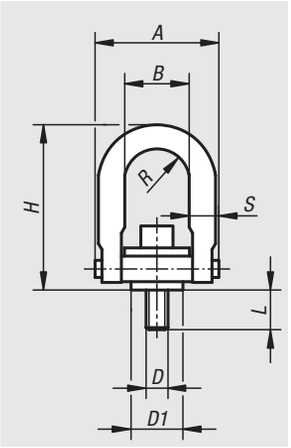
The specified load values are valid for a minimum thread depth of 1.5x nominal thread diameter in steel with a minimum tensile strength of 363 N/mm².

Maximum lifting weight "G" in kg for different sling types

Sling confguration	G	G	G	G	G	G	G	G
No. off slings	1	2	1	2	2	2	2	3 - 4	3 - 4	3 - 4
sling angle ∢	0°	90°	0°	90°	0°-45°	45°-60°	asymmetric	0°-45°	45°-60°	asymmetric
M8	300	600	300	600	420	300	300	630	450	300
M10	630	1260	630	1260	880	630	630	1320	950	630
M12	1000	2000	1000	2000	1400	1000	1000	2100	1500	1000
M16	1500	3000	1500	3000	2100	1500	1500	3150	2250	1500
M20	2500	5000	2500	5000	3500	2500	2500	5250	3750	2500
M24	4000	8000	4000	8000	5600	4000	4000	8400	6000	4000
M30	5000	10000	5000	10000	7000	5000	5000	10500	750	5000
M36	8000	16000	8000	16000	11200	8000	8000	16800	12000	8000

Order No.	D	D1	B	B1	B2	H	H1	L	S	SW	SW1	max. permissible load kg	Tightening torque Nm
07725-08016	M8	24	35	55	30	85	35	11	10	6	13	300	30
07725-10021	M10	24	35	55	30	85	36	16	10	6	17	630	60
07725-12024	M12	31	37	57	33	98	44	18	13,5	8	19	1.000	100
07725-16029	M16	31	37	57	33	98	46	24	13,5	10	24	1.500	150
07725-20036	M20	45	54	82	50	140	57	34	16,5	12	30	2.500	250
07725-24041	M24	45	54	82	50	140	59	36	16,5	14	36	4.000	400
07725-30053	M30	59	65	99	60	170	81	48	22,5	17	46	5.000	500
07725-36060	M36	59	65	99	60	172	76	55	22,5	22	55	7.000	700

Hoist ring



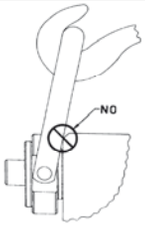
Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 07730-10

Note:
Every hoist ring undergoes an additional visual inspection after load testing (5x safety factor).
A safety data sheet for installation is included with every hoist ring.
Do not use spacer washers between the bush flange and support beam.
Tighten the screws to the stated torque and check and re-tighten regularly.
After installation check if the ring swivels and turns freely in all directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the hoist ring be exceeded.

Important! Never use excessively large slings or other systems, as they could open the eye or lead to the opening of the U bow.



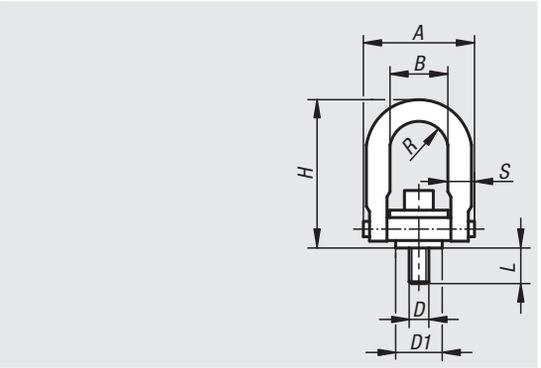
Check that the eye turns/swivels freely in all directions.

Avoid excessively sharp angles. To sling a load weighing 1000 kg atached in two locations with a 30° angle, each suspension must be capable of taking a load of 1000 kg.

Order No.	Version	D	D1	A	B	H	L	R	S	max. permissible load kg	Tightening torque Nm
07730-08	standard	M8	19	46,7	22	67,8	12,5	10,9	9,7	400	9,81
07730-10	standard	M10	19	46,7	22	67,8	17,5	10,9	9,7	450	16,7
07730-12	standard	M12	38,1	89,4	46	123	19	22,4	19	1050	37,3
07730-16	standard	M16	38,1	89,4	46	123	29	22,4	19	1900	80,4
07730-201	standard	M20	38,1	89,4	46	123	34	22,4	19	2150	133
07730-20	standard	M20	58,7	130,6	70	163	32	35,6	25,4	3000	133
07730-24	standard	M24	58,7	130,6	70	163	37	35,6	25,4	4200	304
07730-30	standard	M30	81	165,1	90	221,7	46	44,5	31,7	7000	588
07730-36	standard	M36	106,4	217,2	115	316,7	68	57,2	44,4	11000	981
07730-42	standard	M42	106,4	217,2	115	316,7	68	57,2	44,4	12500	981
07730-48	standard	M48	106,4	217,2	115	316,7	88	57,2	44,4	13500	981
07730-112	long	M12	38,1	89,4	46	170,7	19	22,4	19	1050	37,3
07730-116	long	M16	38,1	89,4	46	170,7	29	22,4	19	1900	80,4
07730-1201	long	M20	38,1	89,4	46	170,7	34	22,4	19	2150	133
07730-120	long	M20	58,7	130,6	70	206	32	35,6	25,4	3000	133
07730-124	long	M24	58,7	130,6	70	206	37	35,6	25,4	4200	304

07735

Hoist ring with Envirolox® coating



Material:
Carbon steel.

Version:
Hoist ring with Envirolox® protective coating.
Washer chrome plated.

Sample order:
nlm 07735-10

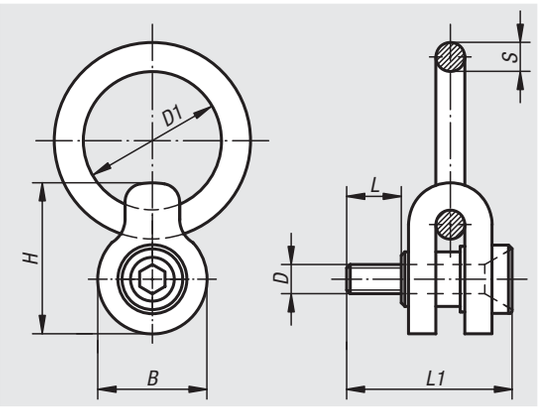
Note:
Every hoist ring undergoes an additional visual inspection after load testing (5x safety factor).
The new Envirolox® protective coating is environmentally friendly and is proven to be effective in extreme conditions. Possible application areas: in corrosive atmospheres such as maritime freight, chemical industry etc.

Safety:
Safety instructions see 07730.

Order No.	A	B	D	D1	H	L	R	S	max. permissible load kg	Tightening torque Nm
07735-08	46,7	22	M8	19	67,8	12,5	10,9	9,7	400	9,81
07735-10	46,7	22	M10	19	67,8	17,5	10,9	9,7	450	16,7
07735-12	89,4	46	M12	38,1	121,4	19	22,4	19	1050	37,3
07735-16	89,4	46	M16	38,1	121,4	29	22,4	19	1900	80,4
07735-20	89,4	46	M20	38,1	121,4	34	22,4	19	2150	133
07735-120	130,6	70	M20	58,7	165,6	32	35,6	25,4	3000	133
07735-24	130,6	70	M24	58,7	165,6	37	35,6	25,4	4200	304
07735-30	165,1	90	M30	81	221,7	46	44,5	31,7	7000	588

07750

Lifting ring



Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 07750-10

Note:
Every lifting ring undergoes an additional visual inspection after load testing (5x safety factor).
A safety data sheet for installation is included with every lifting ring.
Do not use spacer washers between the bush flange and support surface.
Tighten the screws to the stated torque and check and re-tighten regularly. After installation check if the ring swivels and turns freely in all directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the lifting ring be exceeded.

Order No.	D	D1	B	H	L	L1	S	max. permissible load kg	Tightening torque Nm
07750-08	M8	50,5	38	51	16	61	9,5	325	4,21
07750-10	M10	50,5	38	51	20	63	9,5	500	5,88
07750-12	M12	76	60	81	24	85	16	725	19,61
07750-16	M16	76	60	81	31	94	16	1400	34,32
07750-20	M20	101,5	95	125,5	40	133	25,5	2290	68,65
07750-24	M24	101,5	95	125,5	47	147	25,5	3050	122,6

Swivel bale

with axial ring

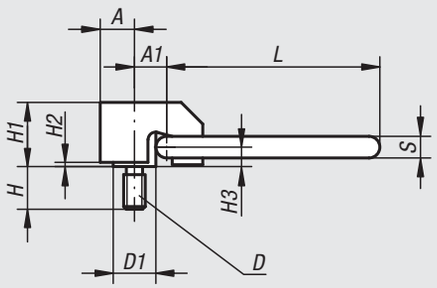
Material:
Carbon steel.

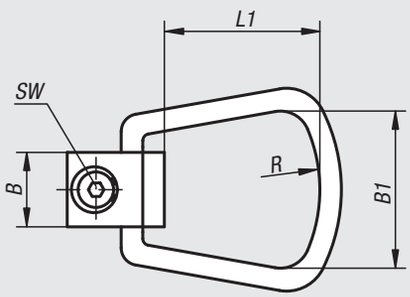
Version:
Black oxidised.

Sample order:
nlm 07752-12

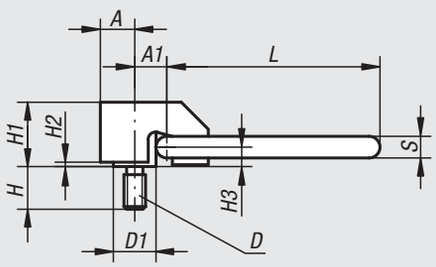
Note:
Every swivel bale undergoes an additional visual inspection after load testing (5x safety factor).
A safety data sheet for installation is included with every swivel bale.
Do not use spacer washers between the bush flange and support beam.
Tighten the screws to the stated torque and check and re-tighten regularly. After installation check if the bale swivels and turns freely in all directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the swivel bale be exceeded.

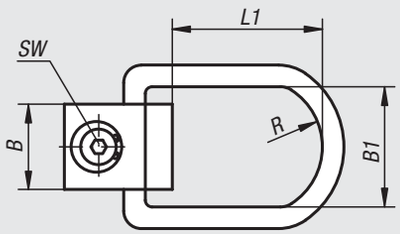
07752-08
07752-10





07752-12 to
07752-20





Order No.	A	A1	B	B1	D	D1	H	H1	H2	H3	L	L1	R	S	SW	Tightening torque Nm	max. permissible load kg
07752-08	12,7	12,7	25,4	44,5	M8	15,8	15,8	23,8	1,6	7,2	75,4	52,4	25,4	7,9	6	4,2	325
07752-10	12,7	12,7	25,4	44,5	M10	15,8	19,8	23,8	1,6	7,2	75,4	52,4	25,4	7,9	6	6	500
07752-12	19,8	23,8	41,3	50,8	M12	25,4	23,8	40,1	2	11,1	120,7	82,6	38,1	12,7	10	20	725
07752-16	19,8	23,8	41,3	50,8	M16	25,4	31,8	40,1	2	11,1	120,7	82,6	38,1	12,7	10	40	1400
07752-20	19,8	23,8	41,3	50,8	M20	25,4	39,7	40,1	2	11,1	120,7	82,6	38,1	12,7	10	70	2290

Hoist ring

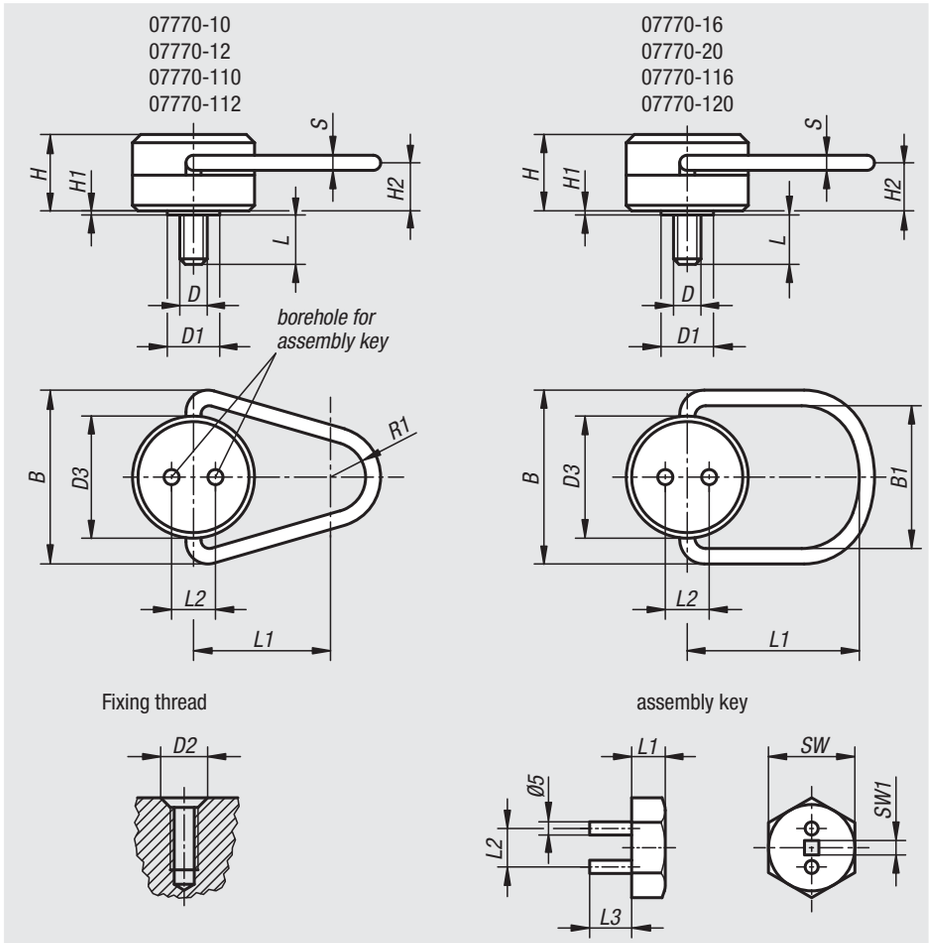
Material:
Carbon steel or stainless steel.

Version:
Steel black oxidised.
Stainless steel bright.

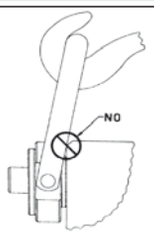
Sample order:
nlm 07770-10 Swivel eye bolt.
nlm 07770-101 Assembly key.

Note swivel eye bolt:
Do not use spacer washers between the bush flange and support surface.
The permissible countersink diameter (D2) for the thread should be retained.
Tighten the screws to the stated torque and check and re-tighten regularly. After installation check if the ring turns and swivels freely in all directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the hoist ring be exceeded.

Note assembly key:
- Insert the assembly key in the holes in the hoist ring.
- Tighten the hoist ring to the recommended torque using a torque wrench.
- The permissible diameter of the countersink must be adhered to.



Important! Never use excessively large slings or other systems, as they could open the eye or lead to the opening of the U bow.



Check that the eye turns/swivels freely in all directions.

Avoid excessively sharp angles. To sling a load weighing 1000 kg atached in two locations with a 30° angle, each suspension must be capable of taking a load of 1000 kg.

Hoist ring

Order No.	Material	B	B1	D	D1	D2	D3	H	H1	H2	L	L1	L2	R1	S	max. permissible load kg	Recommended tightening torque Nm	suitable for lifting ring: Order No.
07770-10	steel	66,7	-	M10	19,1	13	44,5	27,8	1,2	17,9	14,6	50,8	16,3	12,7	7,9	500	10	07770-101
07770-12	steel	66,7	-	M12	19,1	16	44,5	27,8	1,2	17,9	19,1	50,8	16,3	12,7	7,9	700	25	07770-101
07770-16	steel	96,8	70	M16	22,2	19	63,5	38,5	0,8	22,6	23,8	88,9	23,1	-	12,7	1500	50	07770-201
07770-20	steel	96,8	70	M20	25,4	22	63,5	38,5	0,8	22,6	30,2	88,9	23,1	-	12,7	2000	80	07770-201
07770-110	stainless steel	66,7	-	M10	19,1	13	44,5	27,8	1,2	17,9	14,6	50,8	16,3	12,7	7,9	250	10	07770-101
07770-112	stainless steel	66,7	-	M12	19,1	16	44,5	27,8	1,2	17,9	19,1	50,8	16,3	12,7	7,9	350	25	07770-101
07770-116	stainless steel	96,8	70	M16	22,2	19	63,5	38,5	0,8	22,6	23,8	88,9	23,1	-	12,7	750	50	07770-201
07770-120	stainless steel	96,8	70	M20	25,4	22	63,5	38,5	0,8	22,6	30,2	88,9	23,1	-	12,7	1000	80	07770-201

Assembly key

Order No.	L1	L2	L3	SW	SW1
07770-101	14	16,3	17,5	24	1/4″
07770-201	16,5	23,1	28,6	32	3/8″

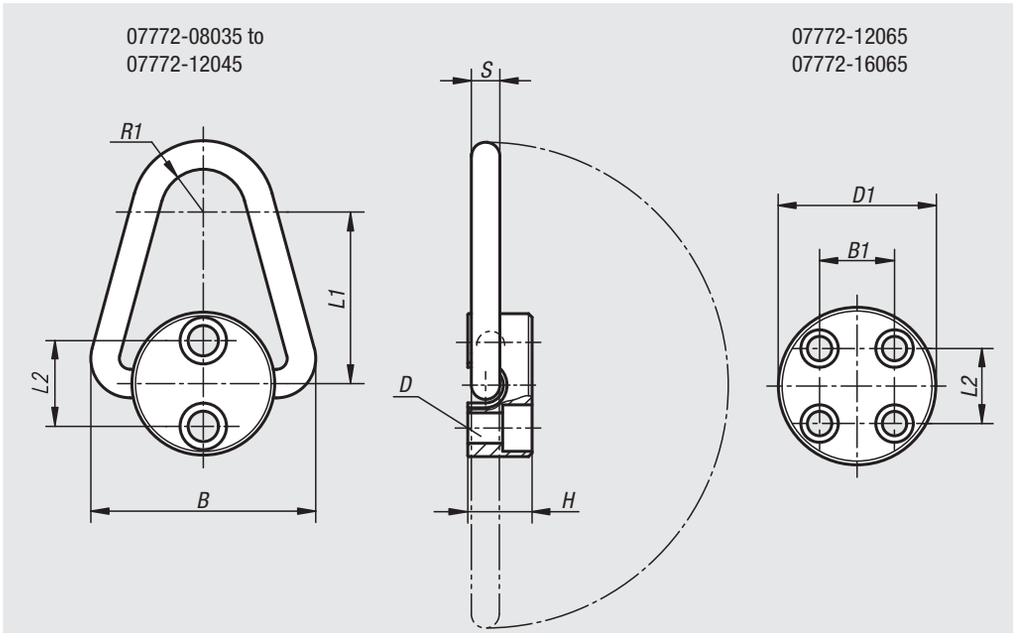
Flip Flop hoist ring

Material:
Body carbon steel. Bracket steel.

Version:
Black oxidised. Bracket hardened.

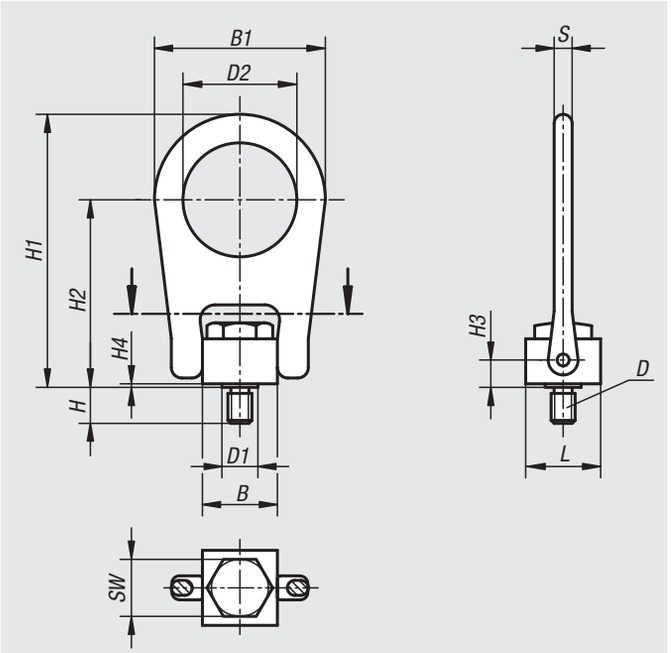
Sample order:
nlm 07772-08035

Note:
Every hoist ring undergoes an additional visual inspection after load testing (6x safety factor).
A safety data sheet for installation is included with every hoist ring.
Do not use spacer washers between the bush flange and support beam.
Tighten the screws to the stated torque and check and re-tighten regularly. After installation check if the ring swivels freely in both directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the hoist ring be exceeded.



Order No.	D for screw DIN 912	D1	B	B1	H	L1	L2	R1	S	Tightening torque Nm	max. permissible load kg
07772-08035	M8 x 35 (2x)	45	65	-	19	51	25,4	13	8	10	900
07772-10040	M10 x 40 (2x)	57	81	-	22	64	28,6	16	10	15	1100
07772-12045	M12 x 45 (2x)	64	100	-	29	76	38,1	19	13	35	2250
07772-12065	M12 x 65 (4x)	80	130	31,8	35	102	41,3	22	19	45	5400
07772-16065	M16 x 65 (4x)	92	160	31,8	48	127	52,4	25,4	25,4	100	9000

Swivel eye bolts



Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 07774-10

Note:
Every swivel eye bolt undergoes an additional visual inspection after load testing (5x safety factor).
A safety data sheet for installation is included with every swivel eye bolt.
Do not use spacer washers between the bush flange and support surface.
Tighten the screws to the stated torque and check and re-tighten regularly. After installation check if the ring swivels freely in both directions.
Lift with care! Avoid impacts!
In no event must the permissible load stamped on the hoist ring be exceeded.

Order No.	B	B1	D	D1	D2	H	H1	H2	H3	H4	L	S	SW	max. permissible load kg	Tightening torque Nm
07774-08	25,4	57,2	M8	12,7	38,1	12	91,3	62,7	8,7	1,2	25,4	6,3	19	400	10
07774-10	25,4	57,2	M10	12,7	38,1	15	91,3	62,7	8,7	1,2	25,4	6,3	19	450	17
07774-12	50,8	112,7	M12	25,4	76,2	18	161,9	101,6	14,3	1,6	38,1	19	32	1050	37
07774-16	50,8	112,7	M16	25,4	76,2	24	161,9	101,6	14,3	1,6	38,1	19	32	1900	80
07774-20	50,8	112,7	M20	25,4	76,2	30	161,9	101,6	14,3	1,6	38,1	19	32	2150	134

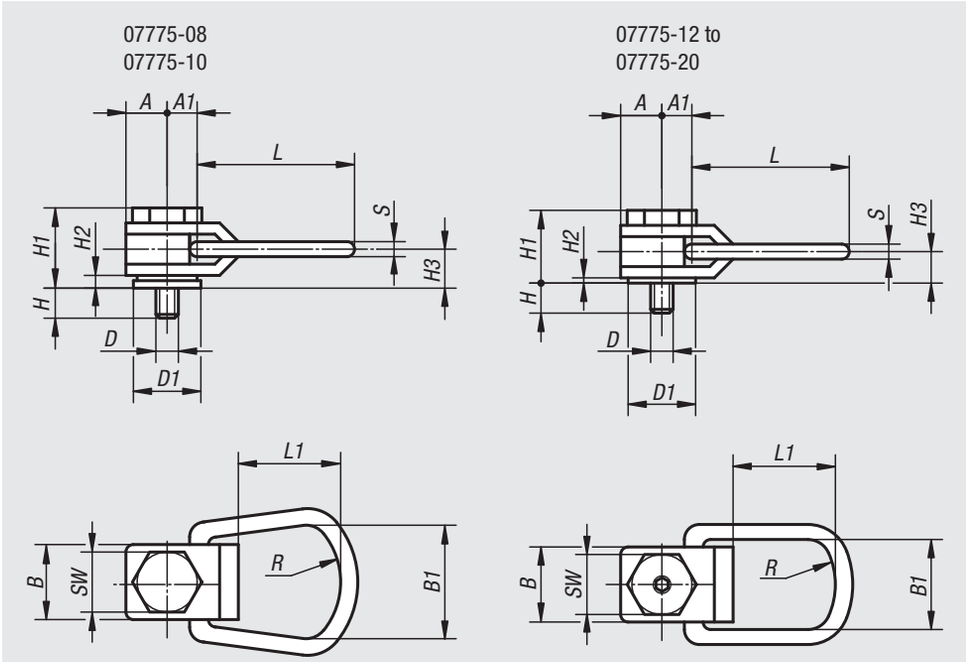
Swivel bale

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 07775-10

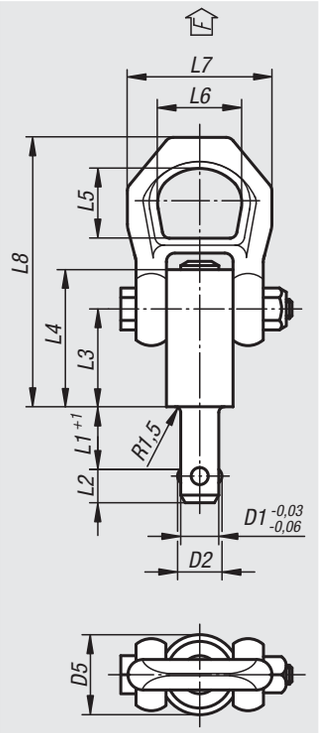
Note:
Every swivel bale is load tested to 5x safety factor. The flat and light design make this swivel bale easier to use than similar swivel bales. The swivel bale is installed using a spanner or hexagon key depending on type.



Order No.	A	A1	B	B1	D	D1	H	H1	H2	H3	L	L1	R	S	SW	hexagon socket	max. permissible load kg
07775-08	13	13	25	44	M8	21	16	33	3	14	76	52	25	8	19	-	325
07775-10	13	13	25	44	M10	21	20	33	3	14	76	52	25	8	19	-	500
07775-12	22	19	44	51	M12	35	24	48	4	21	110	75	38	13	32	6	725
07775-16	22	19	44	51	M16	35	32	48	4	21	110	75	38	13	32	8	1400
07775-20	29	25	57	67	M20	48	40	59	6	26	145	102	51	16	44	10	2290

Lifting pins

self-locking



Material:
Steel.
Push button in aluminium.

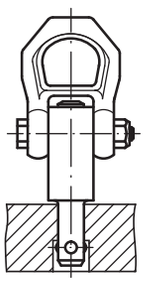
Version:
Steel, manganese phosphate treated.

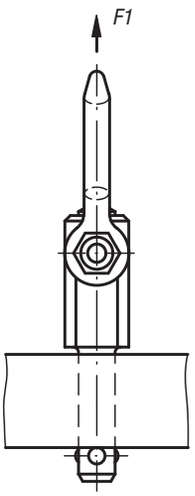
Sample order:
nlm 07780-2110X50

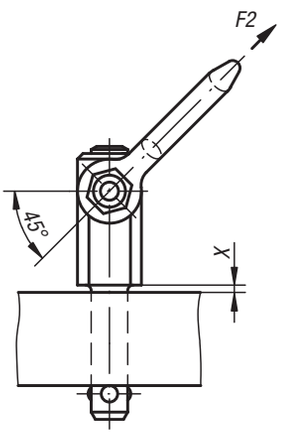
Note:
Self-locking lifting pins are quick and easy lifting devices with swing shackles.
The ball are unlocked by pressing the push button. After releasing the push button the ball is securely locked.
- Corrosion protected
- Temperature range: +250 °C

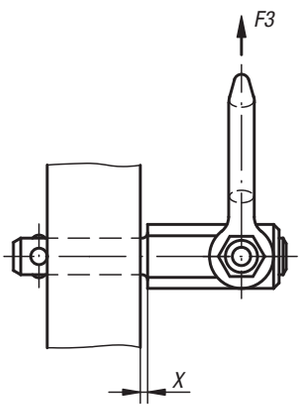
TÜV tested.

Values X min, F1, F2 and F3 with 5x safety factor.





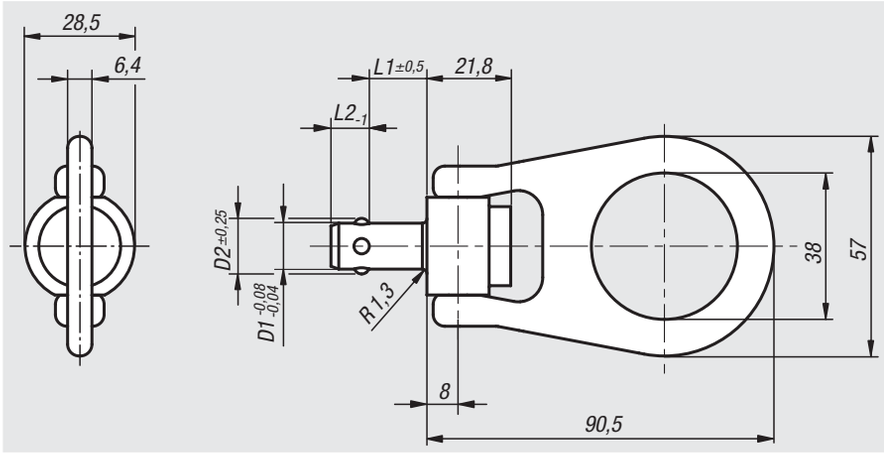




Order No.	D1	D2	D5	L1	L2	L3	L4	L5	L6	L7	L8	X min.	X max.	Receiving hole H11	F1 kN	F2 kN	F3 kN
07780-2110X15	10	11,7	21,5	15	10,2	25,7	36	27	30	49	87,5	1,5	10	10	2,7	2,4	2,1
07780-2110X25	10	11,7	21,5	25	10,2	25,7	36	27	30	49	87,5	1,5	15	10	2,7	2,4	2,1
07780-2110X35	10	11,7	21,5	35	10,2	25,7	36	27	30	49	87,5	1,5	25	10	2,7	2,4	2,1
07780-2110X50	10	11,7	21,5	50	10,2	25,7	36	27	30	49	87,5	1,5	35	10	2,7	2,4	2,1
07780-2112X15	12	14,2	21,5	15	11	25,7	36	27	30	49	87,5	1,5	10	12	3,5	3,2	2,8
07780-2112X25	12	14,2	21,5	25	11	25,7	36	27	30	49	87,5	1,5	20	12	3,5	3,2	2,8
07780-2112X35	12	14,2	21,5	35	11	25,7	36	27	30	49	87,5	1,5	25	12	3,5	3,2	2,8
07780-2112X50	12	14,2	21,5	50	11	25,7	36	27	30	49	87,5	1,5	45	12	3,5	3,2	2,8
07780-2516X25	16	18,6	25	25	15,1	31	44,5	27	30	49	92,8	1,5	20	16	4,8	4,5	4,1
07780-2516X50	16	18,6	25	50	15,1	31	44,5	27	30	49	92,8	1,5	40	16	4,8	4,5	4,1
07780-2516X75	16	18,6	25	75	15,1	31	44,5	27	30	49	92,8	1,5	55	16	4,8	4,5	4,1
07780-2520X50	20	24,5	30	50	19,7	36,5	52	32,6	36	56	114	1,5	25	20	10	8,5	6,5
07780-2520X75	20	24,5	30	75	19,7	36,5	52	32,6	36	56	114	1,5	30	20	10	8,5	6,5

Lifting pins, stainless steel,

self-locking



Material:
Pin and shackle stainless steel 1.4542;
Push button stainless steel 1.4305;
Ball stainless steel 1.4125;
Spring stainless steel 1.4310

Version:
Pin and balls hardened and passivated

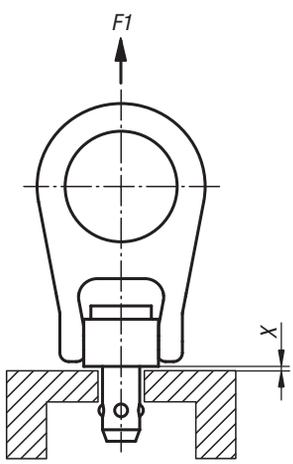
Sample order:
nlm 07782-2810X15
(include length L1)

Note:
Quick and easy lifting device with swing shackle and safety bar against unintended release. The balls are unlocked by pressing the push button. When the push button is released the balls are securely locked.

Corrosion and weather resistant.
High tensile, hardened pin for extreme loads with the high wear resistance. Temperature range max. 250 °C.

CE certified.

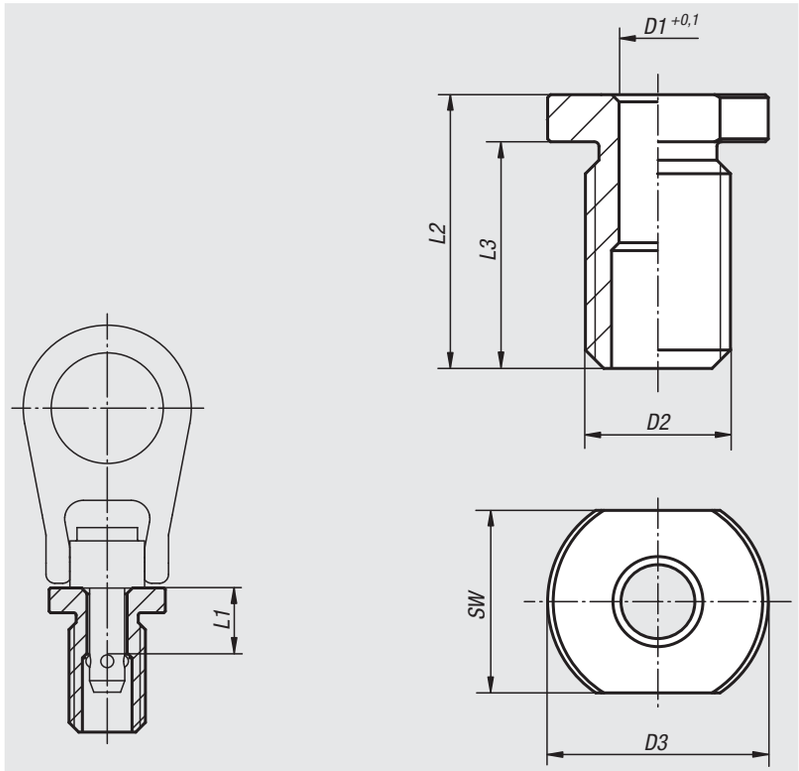
Values X max, and F1 with 5x safety factor.



Order No.	D1	D2	L1	L2	X max.	F1 kN	Receiving hole
07782-2810X	10	12	15/20/25/30/35/40/50/75	9	1,5	4,4	10 +0,1
07782-2812X	12	14,27	15/20/25/30/35/40/50/75/100	10	1,5	5,5	12 +0,1
07782-2816X	16	19	15/20/25/30/35/40/50/75/100	14	1,5	6,2	16 +0,1

Receiver bush, stainless steel,

for lifting pins

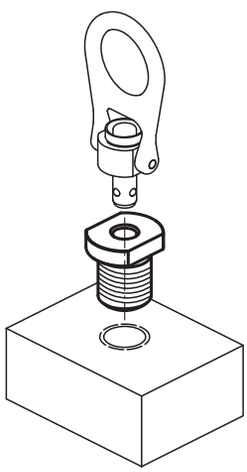


Material:
Stainless steel 1.4542

Version:
Hardened and passivated.

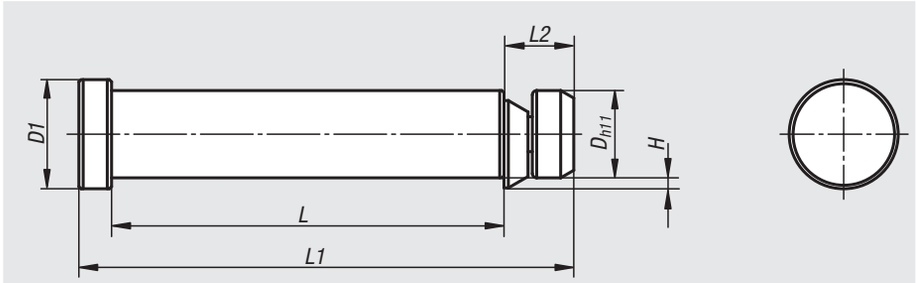
Sample order:
nlm 07784-1015

Note:
The receiver bush is for quick and safe insertion of ball operated lifting pins. They offer an easy and reliable installation in a variety of lifting materials. Also for use with thin walled materials and blind holes.
They are corrosion resistant with low wearing.



Order No.	D1	D2	D3	L1	L2	L3	SW	Tightening torque Nm	Suitable for
07784-1015	10	M20x2,5	34,8	15	29	22	26	36	07780-2110X15 / 07782-2810X15
07784-1215	12	M22x2,5	34,8	15	37	28	30	50	07780-2112X15 / 07782-2812X15
07784-1615	16	M27x3	41,2	15	41	31	32	69	07782-2816X15

Lifting bolt with ring lock



Material:
Bolts, ring nut and safety ring:
Ø 12, 16 and 20 = 16MnCrS5 1.7139
Ø 25 and 32 = 42CrMoS4 1.7227
strip spring: CK75 1.1248

Version:
Black oxidised.

Sample order:
nlm 07790-12055

Note:
The lifting bolts are used for safely hoisting loads with the aid of end flanges similar to VDI 3366. The hole for receiving dimension D must have a tolerance of +1mm.

The retaining ring is compelled into position by a spring band - the lifting bolt can only be released by conscious movement of the retaining ring.

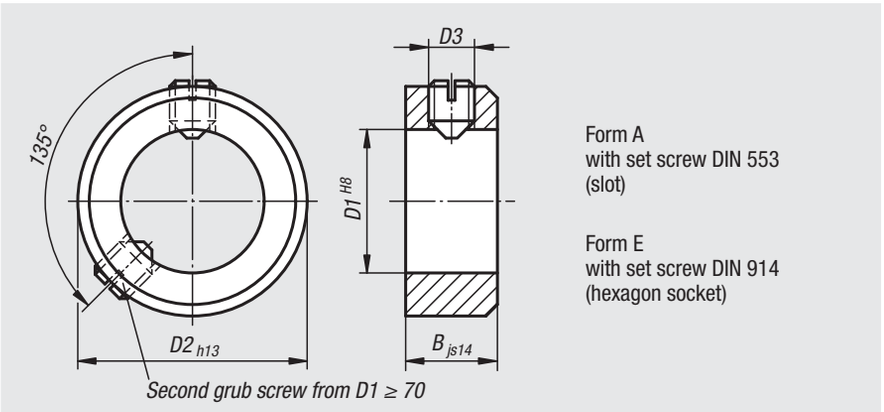
With CE marking.

Detailed operating instructions are included.

Order No.	D	D1	L	L1	L2	H	max. load in kg	Approx. weight kg
07790-12055	12	15	55	69	10	1,4	300	0,061
07790-16072	16	20	72	89	13	1,8	600	0,140
07790-20090	20	25	90	113	16	2,3	900	0,278
07790-25115	25	32	115	143	20	3,2	2.000	0,548
07790-32145	32	40	145	180	25	3,7	6.400	1,111

Shaft collars set screw

DIN 705, steel



Form A
with set screw DIN 553
(slot)

Form E
with set screw DIN 914
(hexagon socket)

Material:
Steel.

Version:
Bright.

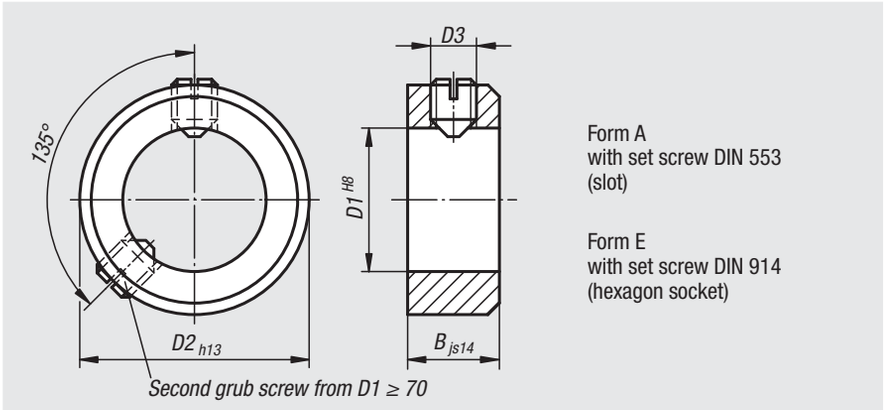
Sample order:
nlm 07800-100301

Order No. Form A	Order No. Form E	D1	B	D2	D3 set screw
07800-100301	**07800-300301**	3	5	7	M2x3
07800-100401	**07800-300401**	4	5	8	M2,5x3
07800-100501	**07800-300501**	5	6	10	M3x4
07800-100601	**07800-300601**	6	8	12	M4x5
07800-100701	**07800-300701**	7	8	12	M4x5
07800-100801	**07800-300801**	8	8	16	M4x6
07800-100901	**07800-300901**	9	10	18	M5x8
07800-101001	**07800-301001**	10	10	20	M5x8
07800-101101	**07800-301101**	11	10	20	M5x8
07800-101201	**07800-301201**	12	12	22	M6x8
07800-101401	**07800-301401**	14	12	25	M6x8
07800-101501	**07800-301501**	15	12	25	M6x8
07800-101601	**07800-301601**	16	12	28	M6x8
07800-101801	**07800-301801**	18	14	32	M6x8
07800-102001	**07800-302001**	20	14	32	M6x8
07800-102401	**07800-302401**	24	16	40	M8x12
07800-102501	**07800-302501**	25	16	40	M8x10
07800-102601	**07800-302601**	26	16	40	M8x10
07800-102801	**07800-302801**	28	16	45	M8x12
07800-103001	**07800-303001**	30	16	45	M8x10
07800-103201	**07800-303201**	32	16	50	M8x12
07800-103501	**07800-303501**	35	16	56	M8x12

Order No. Form A	Order No. Form E	D1	B	D2	D3 set screw
07800-103601	**07800-303601**	36	16	56	M8x12
07800-103801	**07800-303801**	38	16	56	M8x12
07800-104001	**07800-304001**	40	18	63	M10x16
07800-104201	**07800-304201**	42	18	63	M10x16
07800-104501	**07800-304501**	45	18	70	M10x16
07800-104801	**07800-304801**	48	18	70	M10x16
07800-105001	**07800-305001**	50	18	80	M10x16
07800-105201	**07800-305201**	52	18	80	M10x16
07800-105501	**07800-305501**	55	18	80	M10x16
07800-105601	**07800-305601**	56	18	80	M10x16
07800-105801	**07800-305801**	58	20	90	M10x16
07800-106001	**07800-306001**	60	20	90	M10x16
07800-106301	**07800-306301**	63	20	90	M10x16
07800-106501	**07800-306501**	65	20	100	M10x20
07800-106801	**07800-306801**	68	20	100	M10x20
07800-107001	**07800-307001**	70	20	100	M10x20
07800-107201	**07800-307201**	72	22	110	M12x20
07800-107501	**07800-307501**	75	22	110	M12x20
07800-108001	**07800-308001**	80	22	110	M12x20
07800-108501	**07800-308501**	85	22	125	M12x25
07800-109001	**07800-309001**	90	22	125	M12x20
07800-110001	**07800-310001**	100	25	140	M12x25

Shaft collars set screw

DIN 705, stainless steel



Form A
with set screw DIN 553
(slot)

Form E
with set screw DIN 914
(hexagon socket)

Material:
Stainless steel 1.4305.

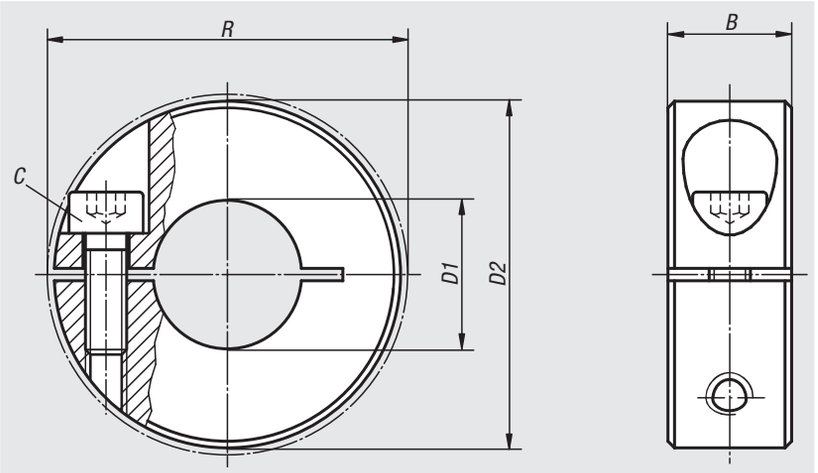
Version:
Bright.

Sample order:
nlm 07800-100302

Order No. Form A	Order No. Form E	D1	B	D2	D3 set screw
07800-100302	**07800-300302**	3	5	7	M2x3
07800-100402	**07800-300402**	4	5	8	M2,5x3
07800-100502	**07800-300502**	5	6	10	M3x4
07800-100602	**07800-300602**	6	8	12	M4x5
07800-100702	**07800-300702**	7	8	12	M4x5
07800-100802	**07800-300802**	8	8	16	M4x6
07800-100902	**07800-300902**	9	10	18	M5x8
07800-101002	**07800-301002**	10	10	20	M5x8
07800-101102	**07800-301102**	11	10	20	M5x8
07800-101202	**07800-301202**	12	12	22	M6x8
07800-101402	**07800-301402**	14	12	25	M6x8
07800-101502	**07800-301502**	15	12	25	M6x8
07800-101602	**07800-301602**	16	12	28	M6x8
07800-101802	**07800-301802**	18	14	32	M6x8
07800-102002	**07800-302002**	20	14	32	M6x8
07800-102402	**07800-302402**	24	16	40	M8x12
07800-102502	**07800-302502**	25	16	40	M8x10
07800-102602	**07800-302602**	26	16	40	M8x10
07800-102802	**07800-302802**	28	16	45	M8x12
07800-103002	**07800-303002**	30	16	45	M8x10
07800-103202	**07800-303202**	32	16	50	M8x12
07800-103502	**07800-303502**	35	16	56	M8x12

Order No. Form A	Order No. Form E	D1	B	D2	D3 set screw
07800-103602	**07800-303602**	36	16	56	M8x12
07800-103802	**07800-303802**	38	16	56	M8x12
07800-104002	**07800-304002**	40	18	63	M10x16
07800-104202	**07800-304202**	42	18	63	M10x16
07800-104502	**07800-304502**	45	18	70	M10x16
07800-104802	**07800-304802**	48	18	70	M10x16
07800-105002	**07800-305002**	50	18	80	M10x16
07800-105202	**07800-305202**	52	18	80	M10x16
07800-105502	**07800-305502**	55	18	80	M10x16
07800-105602	**07800-305602**	56	18	80	M10x16
07800-105802	**07800-305802**	58	20	90	M10x16
07800-106002	**07800-306002**	60	20	90	M10x16
07800-106302	**07800-306302**	63	20	90	M10x16
07800-106502	**07800-306502**	65	20	100	M10x20
07800-106802	**07800-306802**	68	20	100	M10x20
07800-107002	**07800-307002**	70	20	100	M10x20
07800-107202	**07800-307202**	72	22	110	M12x20
07800-107502	**07800-307502**	75	22	110	M12x20
07800-108002	**07800-308002**	80	22	110	M12x20
07800-108502	**07800-308502**	85	22	125	M12x25
07800-109002	**07800-309002**	90	22	125	M12x20
07800-110002	**07800-310002**	100	25	140	M12x25

Shaft collars one-piece



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 07810-01001

Note:
One-piece shaft collars surround the shaft with a uniformly distributed clamping force. This leads to a dimensionally precise fit and very high retaining forces without damaging the shaft.

The shaft tolerance should lie within h11.

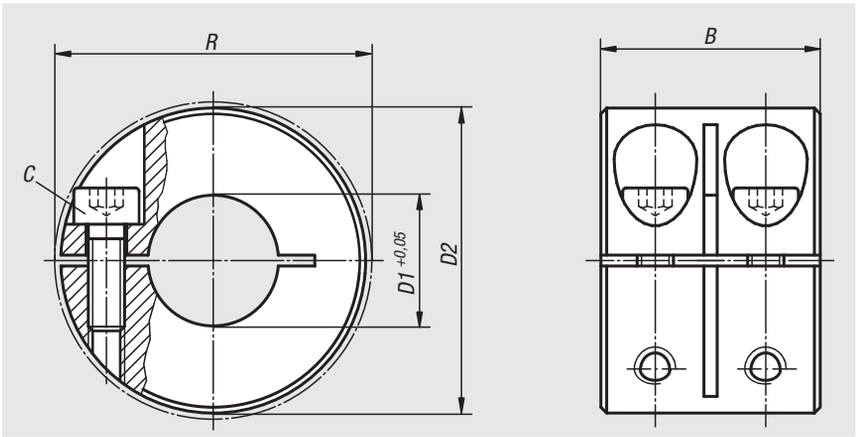
Temperature range:
-40 °C up to +175 °C.

On request:
Other dimensions.

Order No. steel	Order No. stainless steel	B	C (DIN 912)	D1	D2	R
07810-00401	**07810-00402**	9	M3x8	4	16	20,7
07810-00501	**07810-00502**	9	M3x8	5	16	20,7
07810-00601	**07810-00602**	9	M3x8	6	16	20,7
07810-00801	**07810-00802**	9	M3x8	8	18	22,4
07810-01001	**07810-01002**	9	M3x10	10	24	26
07810-01201	**07810-01202**	11	M4x12	12	28	31,8
07810-01501	**07810-01502**	13	M5x16	15	34	39,4
07810-01601	**07810-01602**	13	M5x16	16	34	39,4
07810-01801	**07810-01802**	13	M5x16	18	36	41,1
07810-02001	**07810-02002**	15	M6x18	20	40	46,4
07810-02201	**07810-02202**	15	M6x18	22	42	48,1
07810-02501	**07810-02502**	15	M6x18	25	45	50,8
07810-02801	**07810-02802**	15	M6x18	28	48	53,5
07810-03001	**07810-03002**	15	M6x18	30	54	58,6
07810-04001	**07810-04002**	15	M6x18	40	60	64,8
07810-05001	**07810-05002**	19	M8x25	50	78	83,9

Shaft collars one-piece

wide



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 07811-01201

Note:
One-piece shaft collars surround the shaft with a uniformly distributed clamping force. This leads to a dimensionally precise fit and very high retaining forces without damaging the shaft.

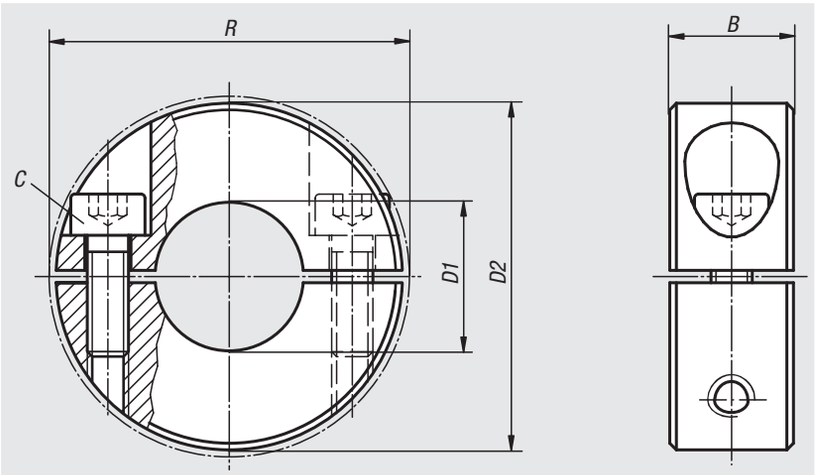
The shaft tolerance should lie within h11.

Temperature range:
-40 °C to +175 °C.

On request:
Other dimensions.

Order No.	Material	B	C	D1	D2	R
07811-00801	Steel	20	M3X8	8	18	22,4
07811-01001	Steel	20	M3X10	10	24	26
07811-01201	Steel	24	M4x12	12	28	31,8
07811-01601	Steel	29	M5X16	16	34	39,4
07811-02001	Steel	33	M6X18	20	40	46,4
07811-02501	Steel	33	M6X18	25	45	50,8
07811-03001	Steel	33	M6X18	30	54	58,6
07811-04001	Steel	33	M6X18	40	60	65
07811-05001	Steel	41	M8X25	50	78	87
07811-00802	Stainless steel	20	M3X8	8	18	22,4
07811-01002	Stainless steel	20	M3X10	10	24	26
07811-01202	Stainless steel	24	M4x12	12	28	31,8
07811-01602	Stainless steel	29	M5X16	16	34	39,4
07811-02002	Stainless steel	33	M6X18	20	40	46,6
07811-02502	Stainless steel	33	M6X18	25	45	50,8
07811-03002	Stainless steel	33	M6X18	30	54	58,6
07811-04002	Stainless steel	33	M6X18	40	60	65
07811-05002	Stainless steel	41	M8X25	50	78	87

Shaft collars two-piece



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 07812-01001

Note:
Two-piece shaft collars surround the shaft with a uniformly distributed clamping force. This leads to a dimensionally precise fit and very high retaining forces without damaging the shaft.

The shaft tolerance should lie within h11.

Two-piece shaft collars can be quickly and easily mounted or removed without dismantling other components.

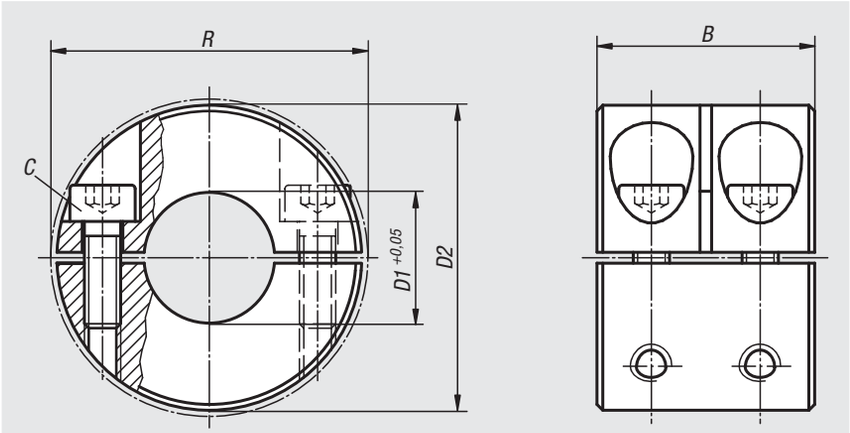
Temperature range:
-40 °C up to +175 °C.

On request:
Other dimensions.

Order No. steel	Order No. stainless steel	B	C (DIN 912)	D1	D2	R
07812-00401	**07812-00402**	9	M3x8	4	16	20,7
07812-00501	**07812-00502**	9	M3x8	5	16	20,7
07812-00601	**07812-00602**	9	M3x8	6	16	20,7
07812-00801	**07812-00802**	9	M3x8	8	18	22,4
07812-01001	**07812-01002**	9	M3x10	10	24	26
07812-01201	**07812-01202**	11	M4x12	12	28	31,8
07812-01501	**07812-01502**	13	M5x16	15	34	39,4
07812-01601	**07812-01602**	13	M5x16	16	34	39,4
07812-01801	**07812-01802**	13	M5x16	18	36	41,1
07812-02001	**07812-02002**	15	M6x18	20	40	46,4
07812-02201	**07812-02202**	15	M6x18	22	42	48,1
07812-02501	**07812-02502**	15	M6x18	25	45	50,8
07812-02801	**07812-02802**	15	M6x18	28	48	53,5
07812-03001	**07812-03002**	15	M6x18	30	54	58,4
07812-04001	**07812-04002**	15	M6x18	40	60	64,8
07812-05001	**07812-05002**	19	M8x25	50	78	83,9

Shaft collars two-piece

wide



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 07813-00801

Note:
One-piece shaft collars surround the shaft with a uniformly distributed clamping force. This leads to a dimensionally precise fit and very high retaining forces without damaging the shaft.

The shaft tolerance should lie within h11.

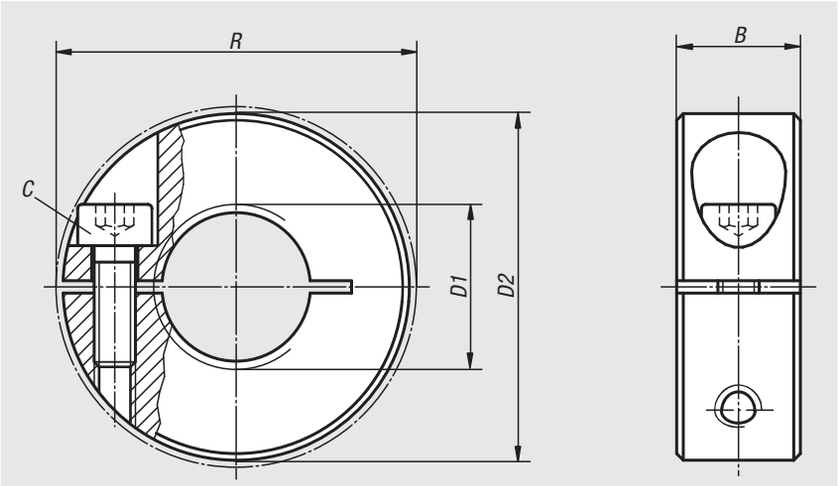
Temperature range:
-40 °C to +175 °C.

On request:
Other dimensions.

Order No.	Material	B	C	D1	D2	R
07813-00801	Steel	20	M3x8	8	18	22,4
07813-01001	Steel	20	M3x10	10	24	26,0
07813-01201	Steel	24	M4x12	12	28	31,8
07813-01601	Steel	29	M5x16	16	34	39,4
07813-02001	Steel	33	M6x18	20	40	46,4
07813-02501	Steel	33	M6x18	25	45	50,8
07813-03001	Steel	33	M6x18	30	54	58,6
07813-04001	Steel	33	M6x18	40	60	65
07813-05001	Steel	41	M8x25	50	78	87
07813-00802	Stainless steel	20	M3x8	8	18	22,4
07813-01002	Stainless steel	20	M3x10	10	24	26
07813-01202	Stainless steel	24	M4x12	12	28	31,7
07813-01602	Stainless steel	29	M5x16	16	34	39,4
07813-02002	Stainless steel	33	M6x18	20	40	46,4
07813-02502	Stainless steel	33	M6x18	25	45	50,8
07813-03002	Stainless steel	33	M6x18	30	54	58,6
07813-04002	Stainless steel	33	M6x18	40	60	65
07813-05002	Stainless steel	41	M8x25	50	78	87

Shaft collars

with thread



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 07814-0601

Note:
Shaft collars with thread surround the counterpiece with an equal distribution of the clamping forces.

Temperature range:
-40 °C to +175 °C.

Order No. Steel	Order No. Stainless steel	B	C	D1	D2	R
07814-0401	**07814-0402**	9	M3x8	M4	16	20,7
07814-0501	**07814-0502**	9	M3x8	M5	16	20,7
07814-0601	**07814-0602**	9	M3x8	M6	16	20,7
07814-0801	**07814-0802**	9	M3x8	M8	18	22,4
07814-1001	**07814-1002**	9	M3x10	M10	24	26
07814-1201	**07814-1202**	11	M4x12	M12	28	31,8
07814-1601	**07814-1602**	13	M5x16	M16	34	39,4
07814-2001	**07814-2002**	15	M6x18	M20	40	46,4

Notes

08000

Drilling jigs
Drill bushes
Jig elements

08000

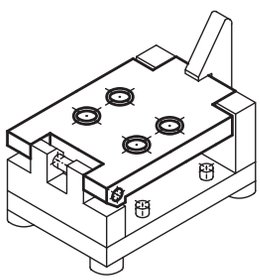
Drilling plates

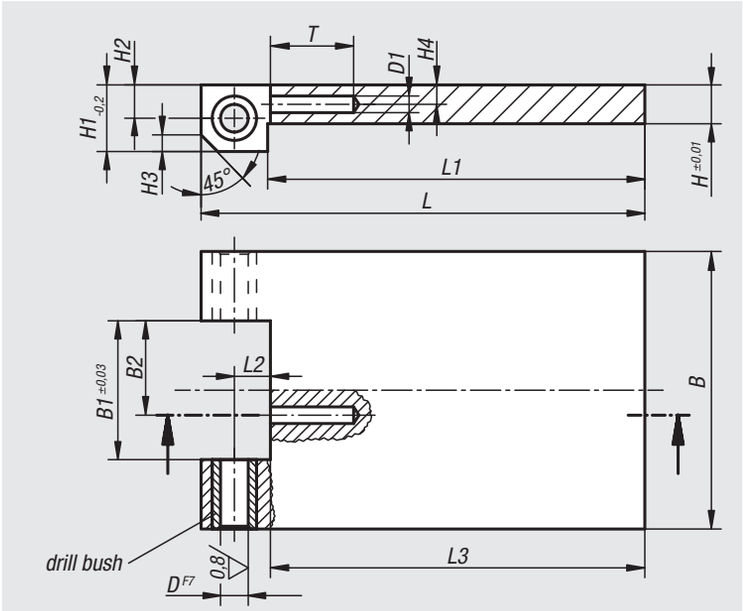
Material:
1.0036

Version:
Bright.

Sample order:
nlm 08000-02

Note:
Spring, cylindrical pin and shims are supplied.





Order No.	L	L1	L2	L3	B	B1	B2	H	H1	H2	H3	H4	D	D1	T
08000-01	80	68	6,5	67,5	50	25	17	7	12	6	4	2,5	5	3	15
08000-02	100	84	8,5	83,5	65	32	22	9	15	8	5,5	3	6	3	15
08000-03	150	130	10,5	129,5	100	50	33	16	20	10	7,5	5	8	3	15

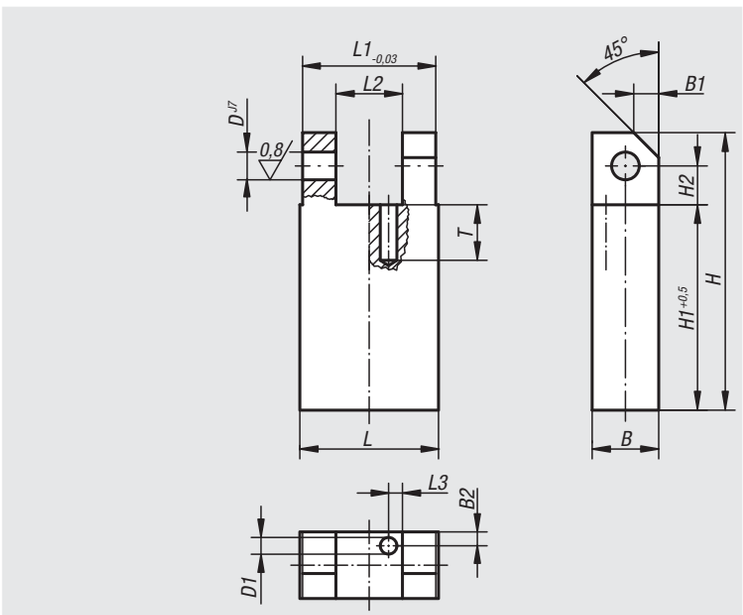
08050

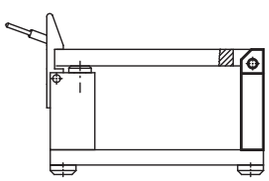
Hinge blocks, long

Material:
1.0036

Version:
Black oxidised.

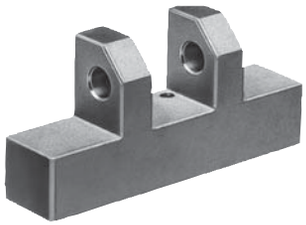
Sample order:
nlm 08050-01





Order No.	L	L1	L2	L3	B	B1	B2	H	H1	H2	D	D1	T
08050-01	25	24	12	2,5	12	4,5	2,5	50	37	7	5	3	10
08050-02	32	31	16	2,5	16	6	2,5	63	46	9	6	3	10
08050-03	50	49	20	2,5	20	8	2,5	100	79	11	8	3	10

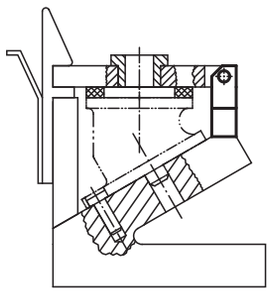
Hinge blocks, short

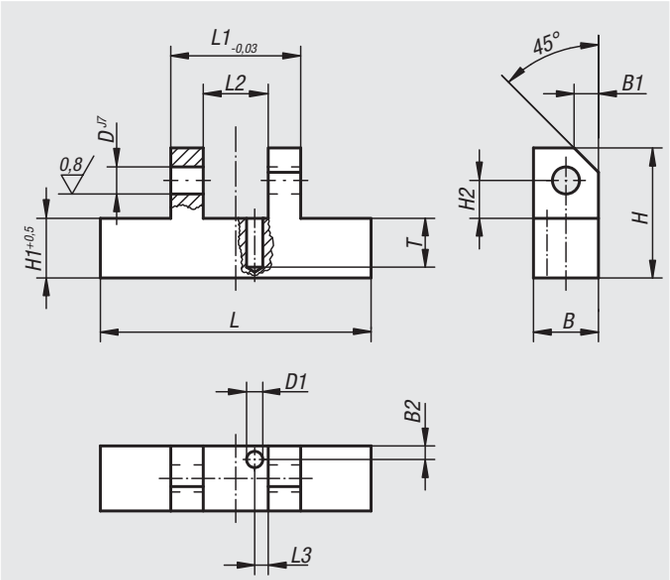


Material:
1.0036

Version:
Phosphated

Sample order:
nlm 08100-02





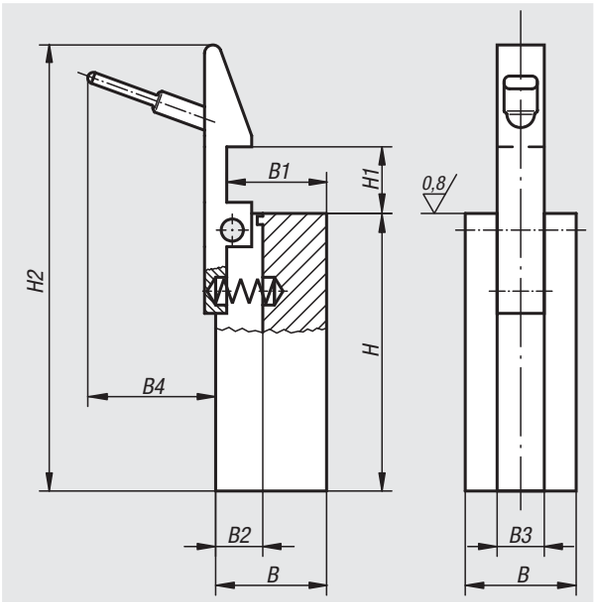
Order No.	L	L1	L2	L3	B	B1	B2	H	H1	H2	D	D1	T
08100-01	50	24	12	2,5	12	4,5	2,5	24	11	7	5	3	9
08100-02	65	31	16	2,5	15	6	2,5	30	13	9	6	3	10
08100-03	100	49	20	2,5	20	8	2,5	48	27	11	8	3	10

Latch

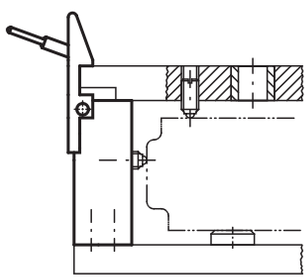
Version:
Body phosphated, snapper black oxidised. Base body 1.0036, hinged fastener 1.0503

Sample order:
nlm 08150-01

Note:
Missing dimensions for hinged fastener see 07560.

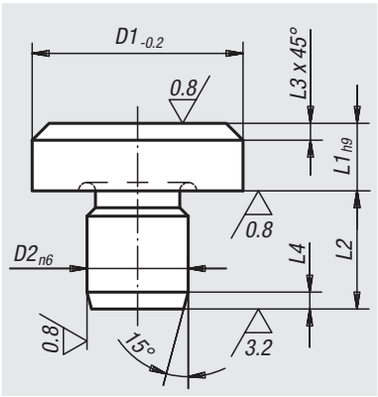


application example:



Order No.	B	B1	B2	B3	B4	H	H1	H2
08150-01	20	18	9	8,5	23	50	12	77
08150-02	30	28	11	10,5	24	63	16	99
08150-03	40	36	14	14,5	24	100	25	145

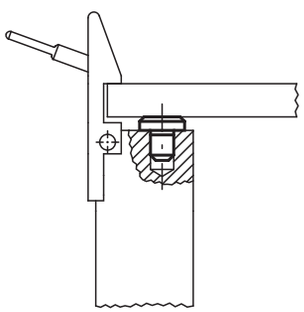
Rest pads



Material:
Tool steel.

Version:
Hardened and ground.
No centre bore on top face.

Sample order:
nlm 02010-041



Order No.	D1	L1	D2	L2	L3	L4
02010-041	6	2,5	4	6,5	0,7	1,2
02010-042	6	4,5	4	8,5	0,7	1,2
02010-061	10	4,5	6	8,5	0,9	1,5

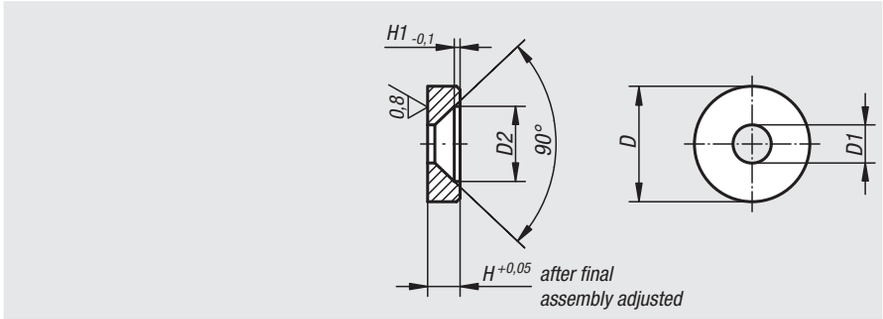
08180

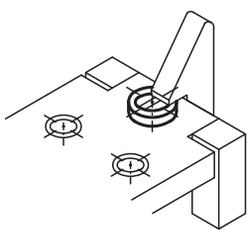
Thrust washers

Material:
Free-cutting steel

Version:
Carbonitrided and tempered, black oxidised.
Bottom face ground.

Sample order:
nlm 08180-01



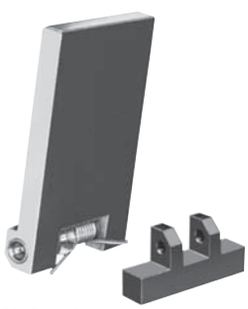


Order No.	D	D1	D2	H	H1
08180-01	12	4,3	8,3	2,5	0,4
08180-02	16	5,3	10,4	4,5	0,8

08270

Drilling plates

with short hinge block



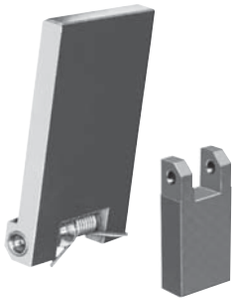
Material:
See 08000 - 08180

Sample order:
nlm 08270-01

Order No.	drilling plate	short hinge block	equalising washers and hinge pins
08270-01	08000-01	08100-01	1 set
08270-02	08000-02	08100-02	1 set
08270-03	08000-03	08100-03	1 set

Drilling plates

with long hinge block



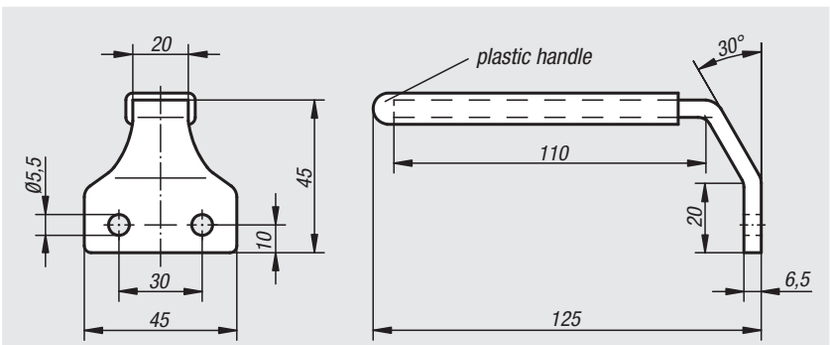
Material:
See 08000 - 08180

Sample order:
nlm 08280-02

Order No.	drilling plate	long hinge block	equalising washers and hinge pins
08280-01	08000-01	08050-01	1 set
08280-02	08000-02	08050-02	1 set
08280-03	08000-03	08050-03	1 set

Handle

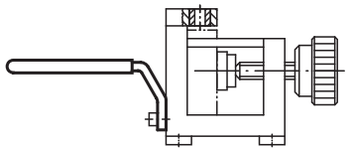
for drilling jigs



Material:
Light metal

Version:
Painted black

Sample order:
nlm 08300-01



Order No.	Dimensions
08300-01	see drawing

Technical information for DIN 6348 drilling jigs

Using norelem drilling jigs, down times and machine costs can be saved by significantly reducing the clamping times. The stress is removed from the design department and toolmaking through the universal ability to use the drilling jigs, even for small-scale production runs.

The drill and support plates are prepared dependent on the bore spacing of the part to be machined. While the corresponding drill bushes are placed in the drill plate, fixing pins are attached to the support plate to enable quick and easy positioning of the part for machining. Since the drill and supporting plates can be changed quickly, the drilling jig is immediately available for another part to be machined.

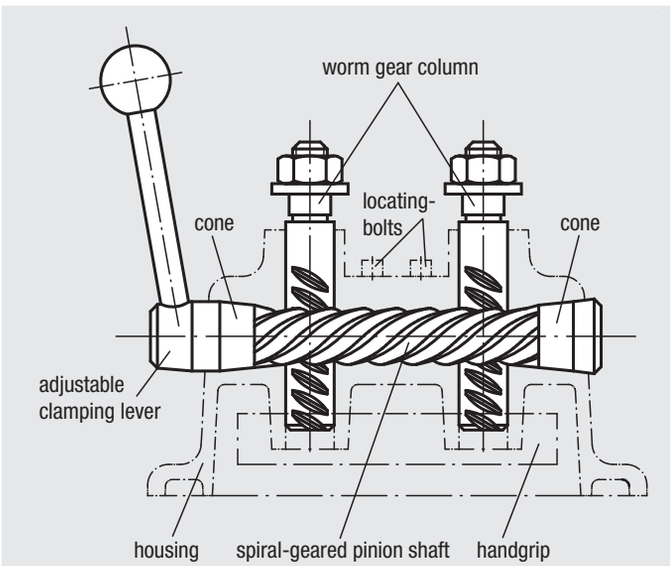
Version:

The drilling jigs are supplied in 9 sizes. They differ in terms of the position of the working area relative to the columns. In the case of sizes 0 to 3 the working area is in front of the columns, in sizes 3 to 5 the working area is between the columns.

Operating method:

The spiral-geared pinion shaft has cones at both ends. The axial force of the helical gear drive pulls the cone of the pinion shaft into a taper bore which is worked into the casing. The pair of cones at the ends of the pinion shaft work in opposition to the powerful and consistent clamping top and bottom; as a result, the drill plate cannot fall onto hands when the part to be machined is changed. The clamp holds perfectly and safely, even in case of vibration. The clamping element can be taken apart and put together by anyone with no professional knowledge. The clamping lever can be changed from left to right-hand use by loosening the hexagonal bolt on the face of the right-hand cone. The pinion shaft can now be used so that the adjustable clamping lever is on the right-hand side.

The clamp is activated by pressing the lever down and released by lifting the lever up. The best working position can be engaged using the adjustable clamping lever, so the operator can work in a standing or seated position.

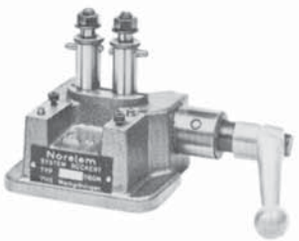


Force tables

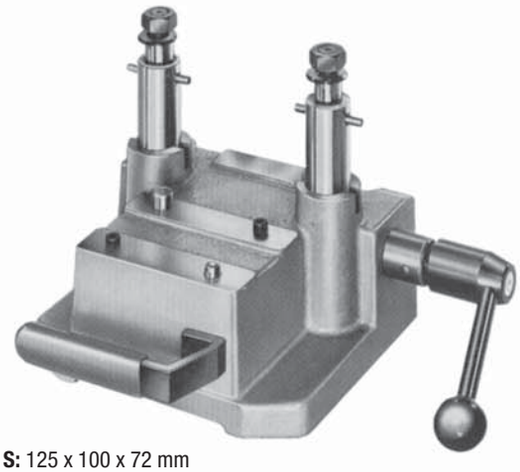
Hand force N	Size							
	0	1	2	2S	3S	3	4	5
	Clamping force N							
100	600	1200	1250	1250	1300	2800	2900	3800
200	1100	2100	2150	2150	2200	5500	5600	7500

Drilling jigs

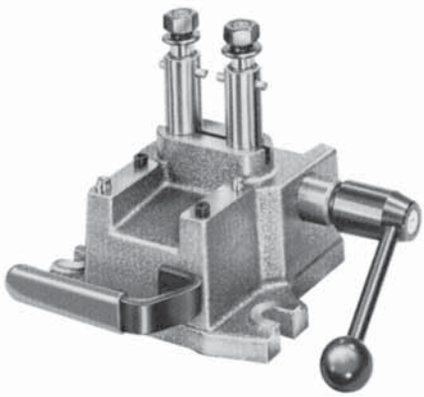
DIN 6348



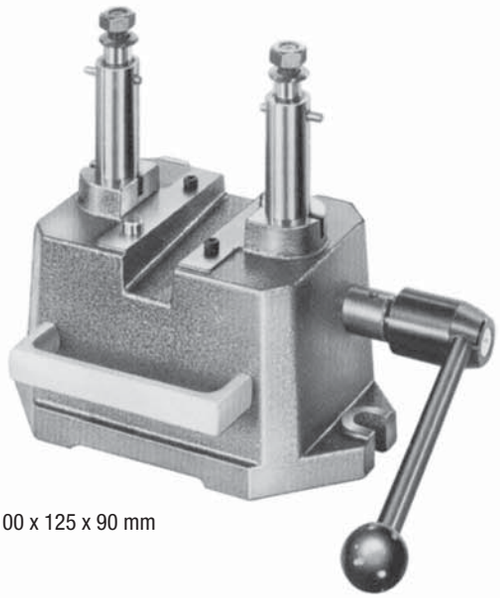
Size 0: 60 x 32 x 34 mm



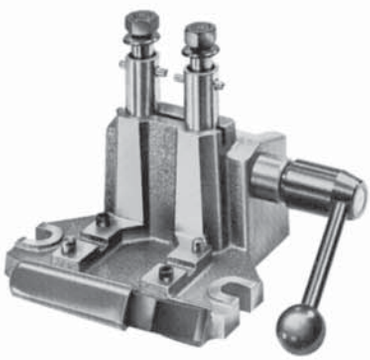
Size 3 S: 125 x 100 x 72 mm



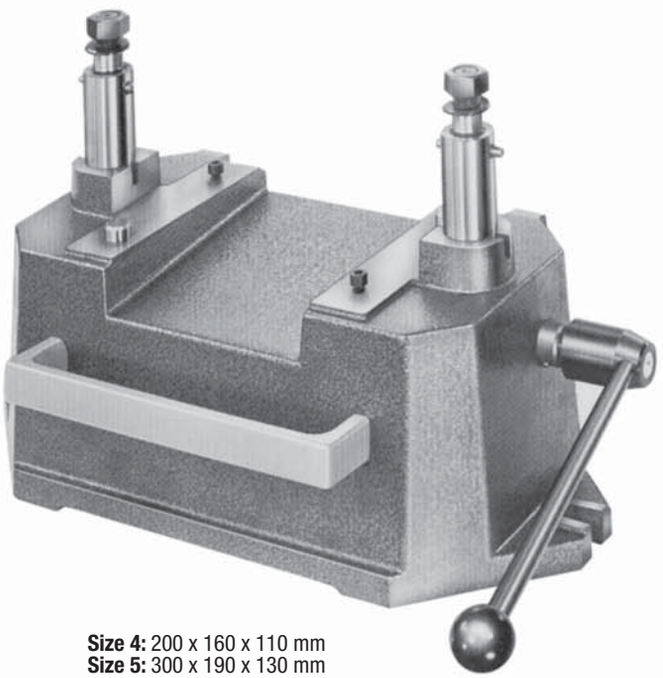
Size 1: 80 x 50 x 60 mm
Size 2: 100 x 60 x 70 mm



Size 3: 100 x 125 x 90 mm



Size 2 S:
a size with expanded working area: 100 x 60 x 125 mm



Size 4: 200 x 160 x 110 mm
Size 5: 300 x 190 x 130 mm

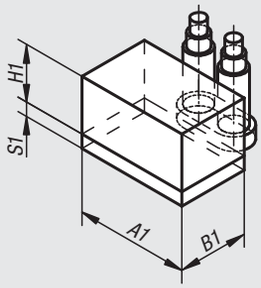
Drilling jigs size 0 to 3 S

DIN 6348 enhanced

Sample order:
nlm 08550-02

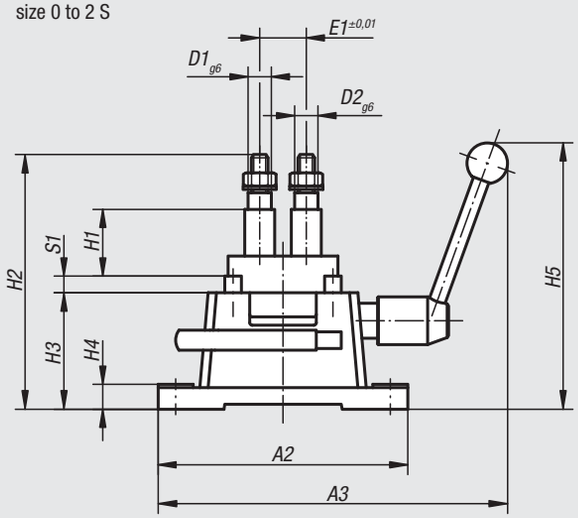
Note:
Accessories, see 08570 - 08610 and 08640 - 08710.
Force table, see Technical Information for drilling jigs DIN 6348.

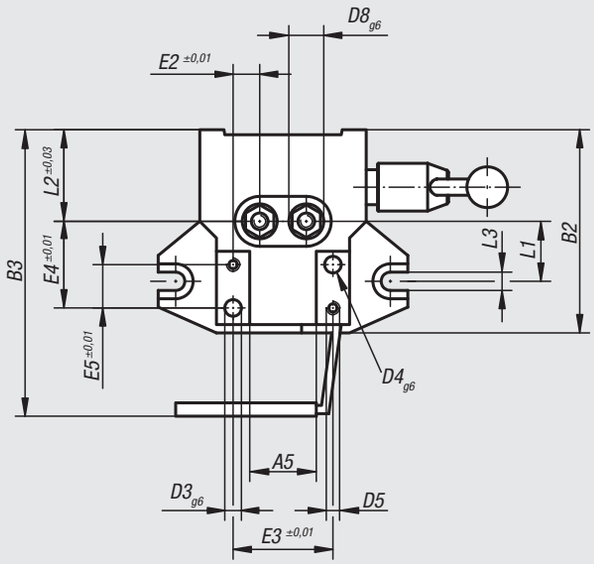
working area



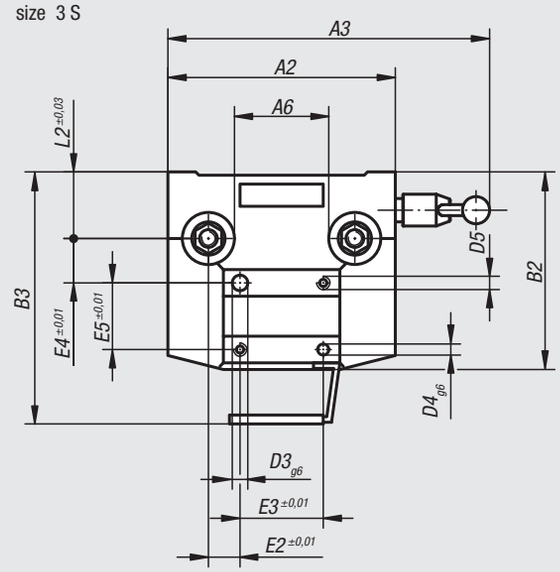
The working area can be expanded:
By A1 and B1 with larger drilling plates or support plates.
By H1 with extension columns 08600 and 08610.

size 0 to 2 S





size 3 S



Drilling jigs size 0 to 3 S

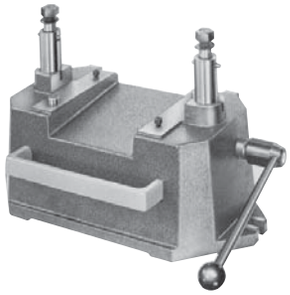
DIN 6348 enhanced

Order No.	Size	Size DIN 6348	A1	A2	A3~	A5	A6	B1	B2~	B3~	D1	D2	D3	D4	D5	D8
08550-00	0	60x32	63	100	190	35	-	32	86	-	10	9	4	5	M4	15
08550-01	1	80x50	80	150	250	40	-	50	122	172	14	14	10	8	M6	18
08550-02	2	100x60	100	180	270	56	-	60	153	203	16	16	10	8	M6	25
08550-12	2 S	100x60x115	100	180	275	50	-	60	153	203	16	16	10	8	M6	25
08550-13	3 S	125x100	125	205	375	-	95	90	178	228	20	18	14	10	M6	30

Order No.	E1	E2	E3	E4	E5	H1 min.	H1 max.	H2 min.	H2 max.	H3	H4	~H5	L1	L2	L3	S1	Stroke at 210°
08550-00	24	13	50	40	18	2	28	72	98	47	7	125	31	35	-	6	42
08550-01	28	16	60	46	20	8	50	121	163	70	15	200	36	55	11	10	42
08550-02	50	15	80	70	40	8	60	126	180	80	18	210	50	60	16	10	42
08550-12	50	15	80	70	40	63	115	138	190	25	18	210	50	60	16	10	42
08550-13	132	28,5	75	40	60	10	62	138	190	85	20	375	-	60	-	10	42

Drilling jigs size 3 to 5

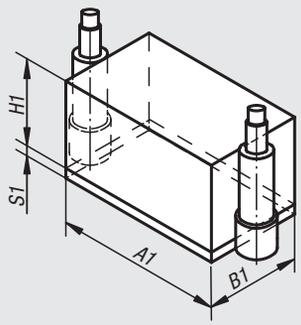
DIN 6348



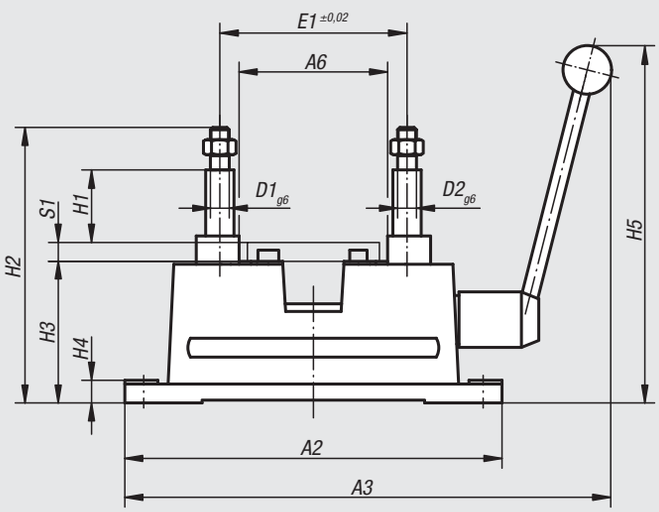
Sample order:
nlm 08550-05

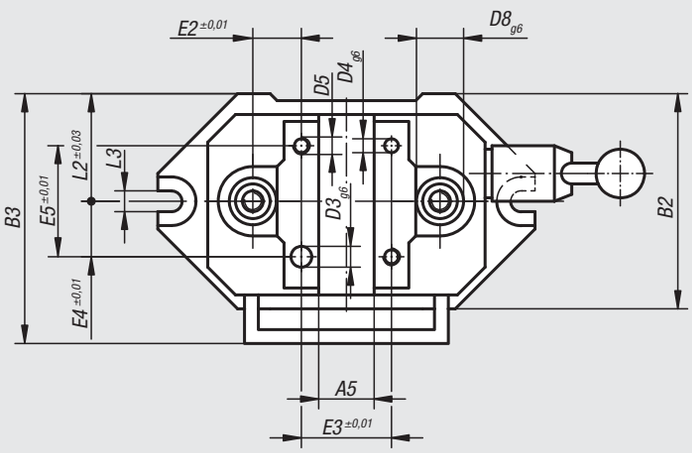
Note:
Accessories see 08570 – 08610.
Force table, see Technical Information for drilling jigs DIN 6348.

working area



The working area can be expanded:
By A1 and B1 with larger drilling plates or support plates.
By H1 with extension columns 08600 and 08610.





Drilling jigs size 3 to 5

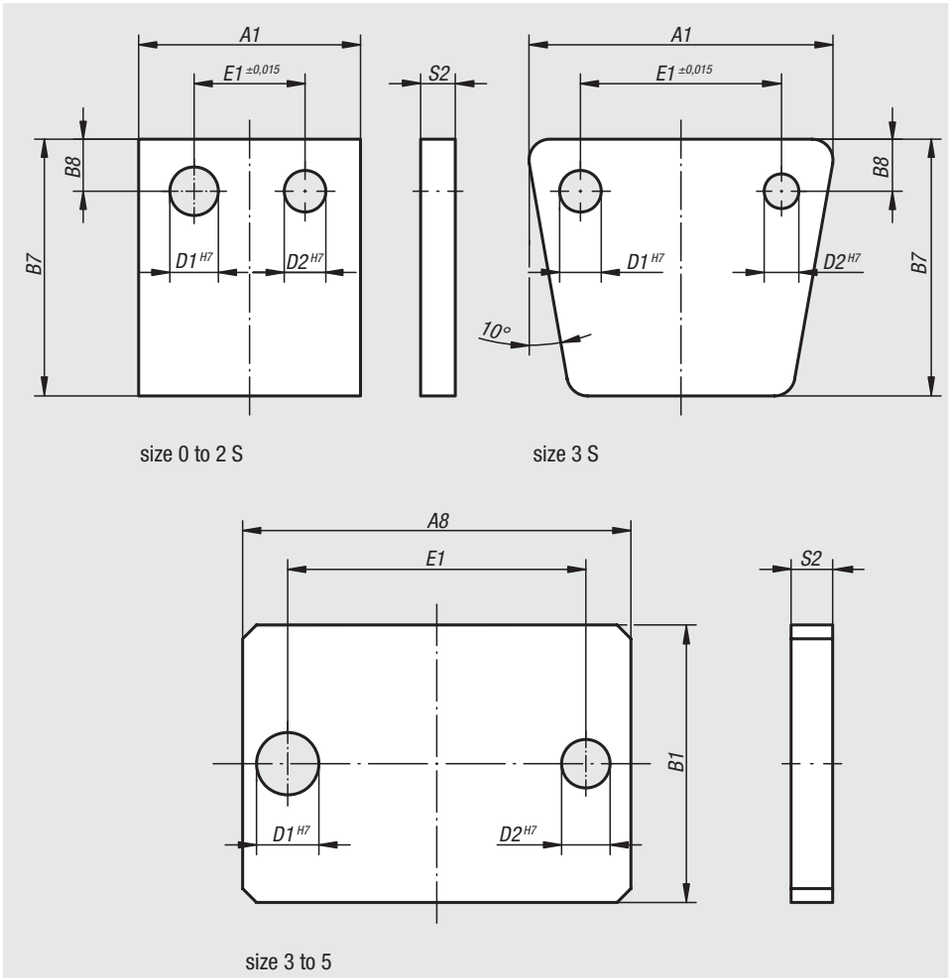
DIN 6348

Order No.	Size	Size DIN 6348	A1	A2	A3~	A5	A6	B1	B2~	B3~	D1	D2	D3	D4	D5	D8
08550-03	3	100x125	85	270	340	39	95	125	155	195	20	18	14	10	M6	30
08550-04	4	200x160	188	400	480	120	195	160	195	235	20	18	14	10	M8	30
08550-05	5	300x190	278	530	660	180	285	190	238	278	24	22	20	18	M8	40

Order No.	E1	E2	E3	E4	E5	H1 min.	H1 max.	H2 min.	H2 max.	H3	H4	~H5	L2	L3	S1	Stroke at 210°
08550-03	132	36	60	37,5	75	10	80	194	264	130	24	400	80	16	10	42
08550-04	236	43	150	50	100	5	95	205	295	152	24	420	100	16	15	42
08550-05	335	57,5	220	62,5	125	15	115	255	355	180	24	550	120	16	15	42

Drilling plates

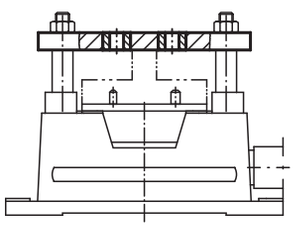
DIN 6348 enhanced



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 08570-03

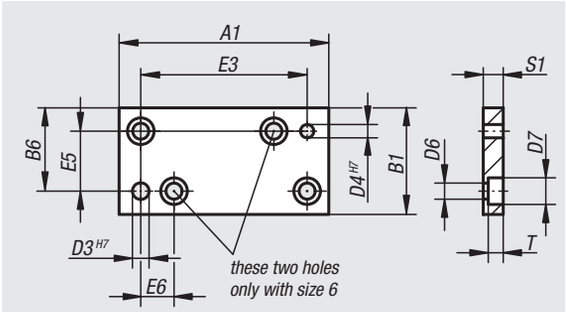


Order No.	Version	Suitable for jig size	Jig dimensions	A1	B7	B8	E1	D1	D2	S2
08570-00	Size 0 to 3 S	0	60 x 32	50	56	9	24	10	9	8
08570-01	Size 0 to 3 S	1	80 x 50	80	80	14	28	14	14	12
08570-02	Size 0 to 3 S	2	100 x 60	100	96	16	50	16	16	14
		2 S	100 x 60 x 115							
08570-13	Size 0 to 3 S	3 S	125 x 100	168	130	17	132	20	18	16

Order No.	Version	Suitable for jig size	Jig dimensions	A8	B1	E1	D1	D2	S2
08570-03	Size 3 to 5	3	100 x 125	170	125	132 ±0,015	20	18	16
08570-04	Size 3 to 5	4	200 x 160	275	160	236 ±0,015	20	18	16
08570-05	Size 3 to 5	5	300 x 190	380	190	335 ±0,015	24	22	20

Base plates

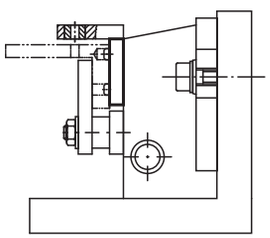
DIN 6348



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 08580-05

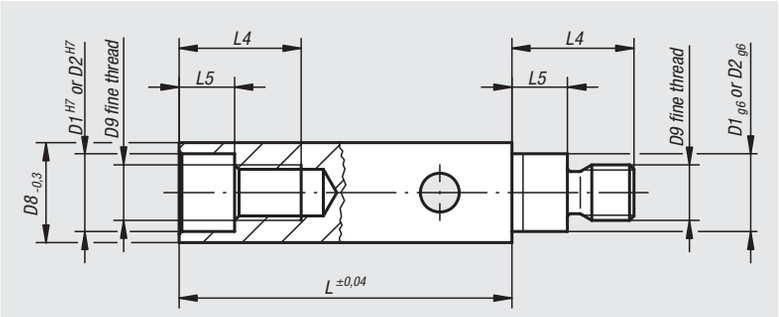


Order No.	Suitable for jig size	Jig dimensions	A1	B1	B6	D3	D4	D6	D7	E3	E5	E6	S1	T
08580-00	0	60 x 32	63	32	25	4	5	4,5	8	50 ±0,01	18 ±0,01	-	6	4,6
08580-01	1	80 x 50	80	50	30	10	8	6,6	11	60 ±0,01	20 ±0,01	-	10	6,8
08580-02	2	100 x 60	100	60	50	10	8	6,6	11	80 ±0,01	40 ±0,01	-	10	6,8
	2 S	100 x 60 x 115												
08580-03	3	100 x 125	85	125	100	14	10	6,6	11	60 ±0,015	75 ±0,015	-	10	6,8
	3 S	125 x 100												
08580-04	4	200 x 160	188	160	130	14	10	9	15	150 ±0,015	100 ±0,015	-	15	9
08580-05	5	300 x 190	278	190	157,5	20	18	9	15	220 ±0,015	125 ±0,015	-	15	9
08580-06	6	400 x 250	400	250	225	20	18	13,5	20	320 ±0,015	200 ±0,015	40	18	13

08600

Extension columns

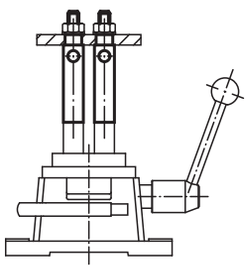
short



Material:
Hardened steel 1.7139

Version:
Hardened, black oxidised.

Sample order:
nlm 08600-01 (in pairs)

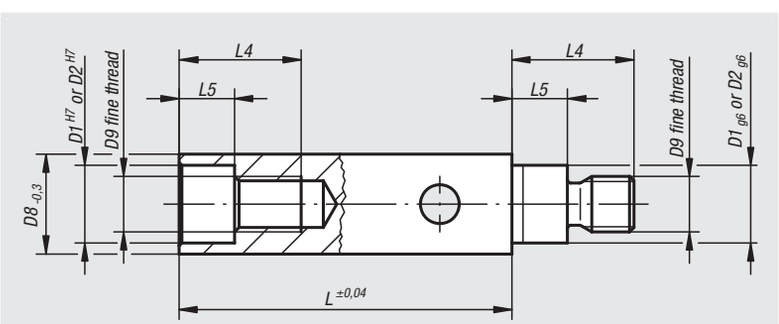


Order No.	Suitable for jig size	D1	D2	D8	D9	L	L4	L5
08600-01	1	14	14	22	M10x1	60	22	10
08600-02	2; 2 S	16	16	25	M14x1,5	60	28	12
08600-03	3; 3 S; 4	20	18	30	M14x1,5	60	32	14,5
08600-05	5	24	22	40	M20x1,5	60	43	18
08600-06	6	26	24	40	M20x1,5	70	46	22

08610

Extension columns

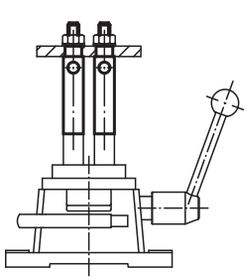
long



Material:
Hardened steel 1.7139

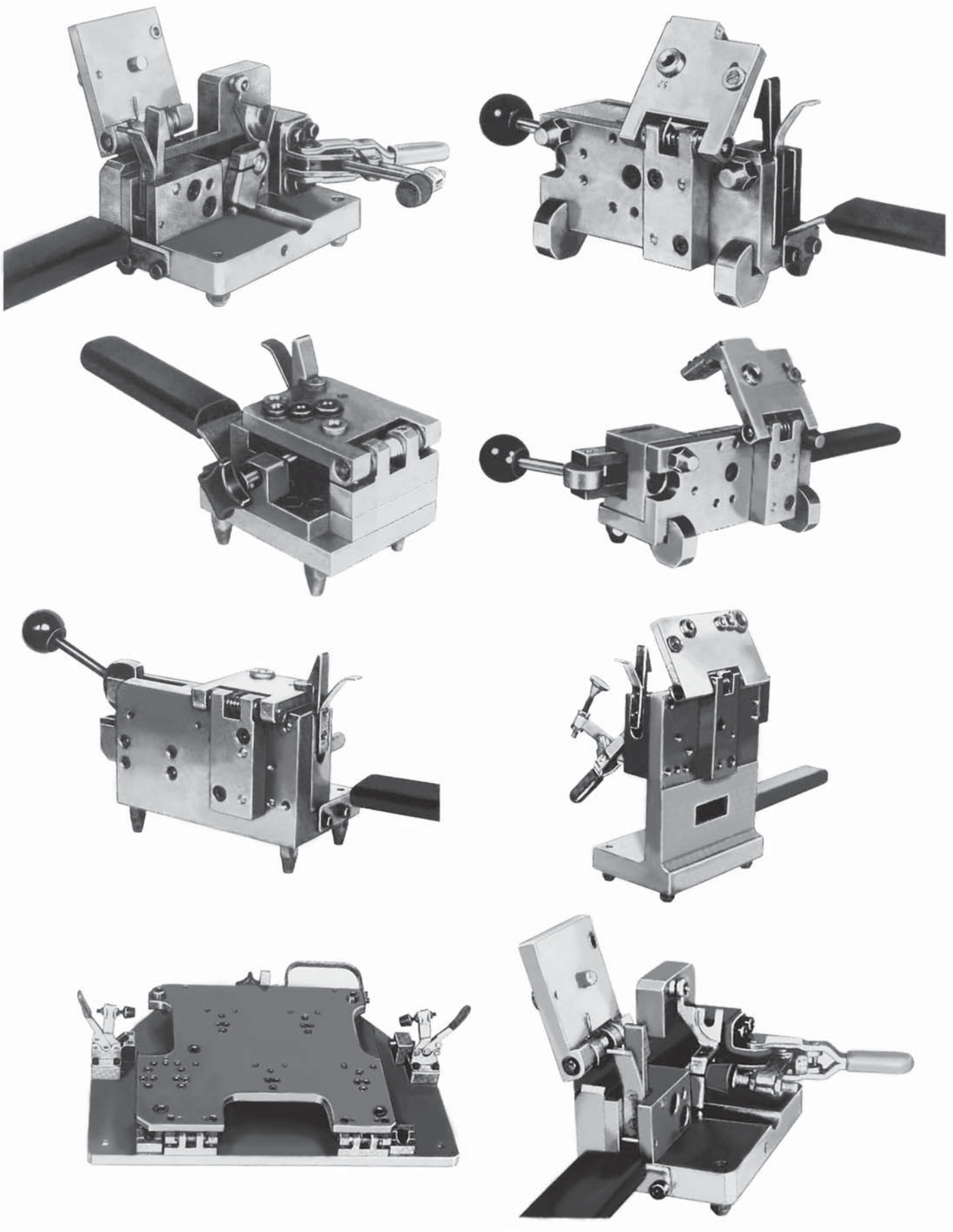
Version:
Hardened, black oxidised.

Sample order:
nlm 08610-03 (in pairs)



Order No.	Suitable for jig size	D1	D2	D8	D9	L	L4	L5
08610-02	2; 2 S	16	16	25	M14x1,5	120	28	12
08610-03	3; 3 S; 4	20	18	30	M14x1,5	120	32	14,5
08610-05	5	24	22	40	M20x1,5	120	43	18
08610-06	6	26	24	40	M20x1,5	120	46	22

Examples of diverse drilling jigs using almost exclusively norelem parts:



Drilling jigs for cylindrical parts

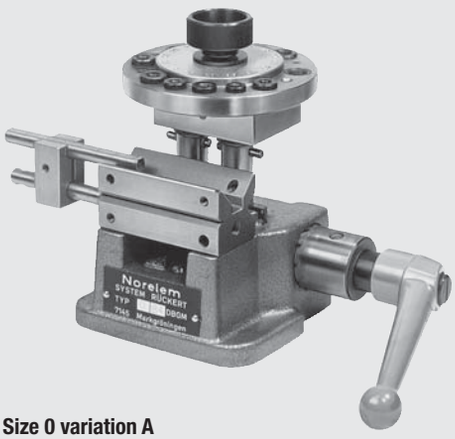
Version:
A consisting of:
– 08550 drilling jig DIN 6348
– 08710 V-block with stop
– 08641 locating plate
– 08640 Index drilling disc with 16 common drill bush diameters, see table. Intermediate sizes can be partially achieved using DIN 173 push-in drill bushes.

B consisting of:
– 08550 drilling jig DIN 6348
– 08710 V-block with stop
– 08641 locating plate (this may be omitted with size 2, but then the max. clamping width is reduced by 30 mm)
– 08650 drill bush holder plate with 4 bush holders size 5-8, Ø 8, Ø 10, Ø 12 and Ø 15. Intermediate sizes can be partially achieved using DIN 173 push-in drill bushes. See table for choice of drill bush holders sizes 1 to 4. All drill bush holders can be used for holder plates size 0 and 2.

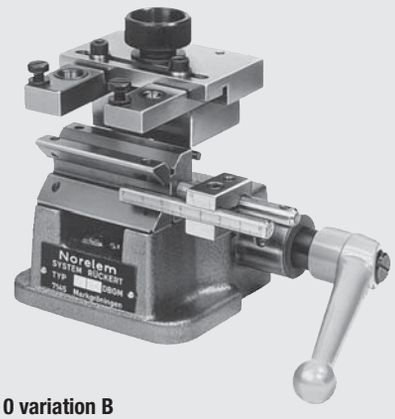
Sample order:
nlm 08630-12

Note:
Drilling jigs for cylindrical parts are particularly rational for producing transverse holes in round bars. The drilling jigs DIN 6348 size 0 and 2 are used as the basic elements.
A V-block with adjustable stop with mm divisions and nonius is used in place of the standard support plate. The index drilling discs or drilling bush holders are mounted on the columns. Set-up is very easy and can be done without special technical knowledge.
All parts can be individually supplied at a later date. They are produced true to gauge enabling Forms A and B to be interchangeable. A clamped part can be drilled, reamed, counterbored and tapped using push-in bushes.

Size 0
for workpieces Ø 2 to 28 mm

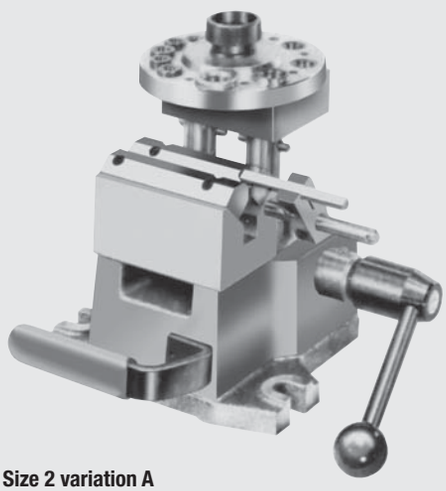


Size 0 variation A
with V-block and index drilling disc



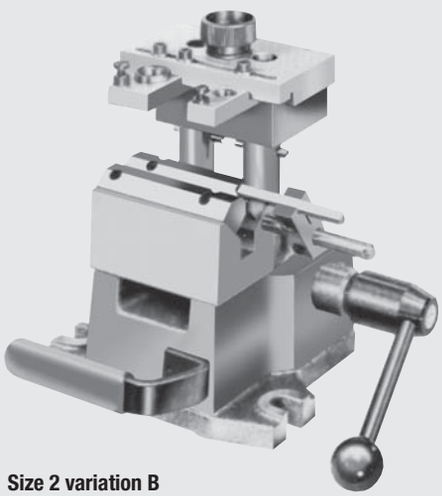
Size 0 variation B
with V-block and bush holders, adjustment range of holders: 64 mm

Size 2
for workpieces Ø 6 to 60 mm



Size 2 variation A
with V-block and index drilling disc

Insert a Ø10 mm shaft to align the upper prism rail then tighten the hexagon socket screws

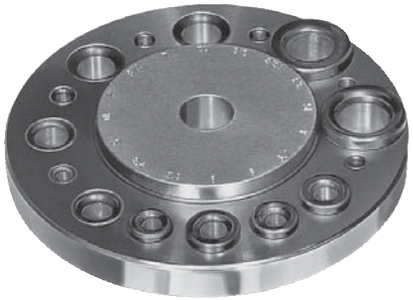


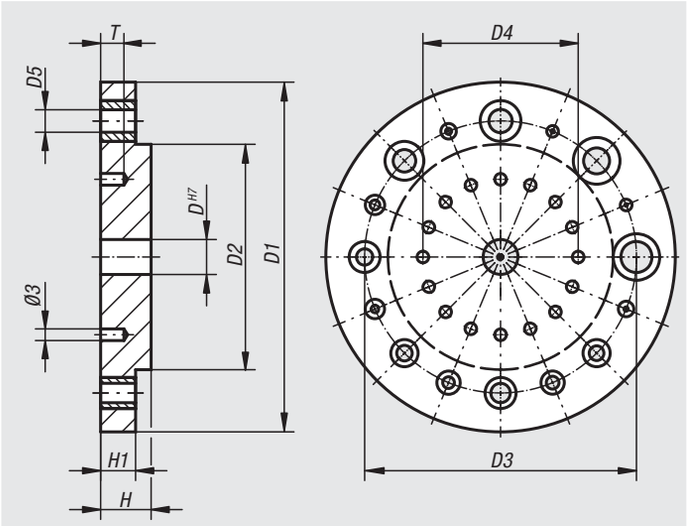
Size 2 variation B
with V-block and bush holders, adjustment range of holders: 100 mm

Order No.	Size	Version
08630-10	0	A
08630-12	2	A
08630-20	0	B
08630-22	2	B

Index drilling discs

for drilling jig for cylindrical parts





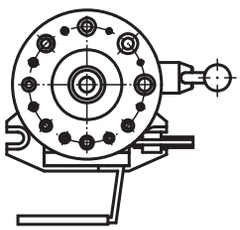
Material:
Steel 1.0036

Version:
Bright.

Sample order:
nlm 08640-00

Note:
We can equip the index drilling discs to your requirements or supply them with 4 mm pre-drilled and tapped holes.

* Basic bush for push-in drill bushes.



Order No.	Suitable for cylinder jig size	D	D1	D2	D3	D4	H	H1	T	D5 pressed-in bush
08640-00	0	9	88	58	70	40	13	9	6	0,7 / 0,9 / 1,1 / 1,6 / 2 / 2,5 / 3 / 3,3 / 3,8 / 4 / 4,2 / 5 / 5,8 / 6 / 6,7 / 8*
08640-02	2	16	123	67	94	60	18	12	6	3 / 3,3 / 3,8 / 4 / 4,2 / 5 / 5,8 / 6* / 6,7 / 8* / 8,4 / 10* / 11,8 / 12* / 13,8 / 15*

Drill bush holder plates

for drilling jig for cylindrical parts

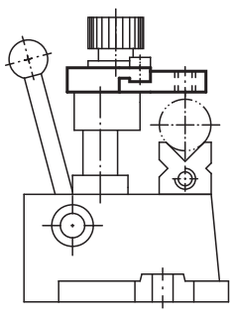
Material:
Steel 1.0036

Version:
Bright.

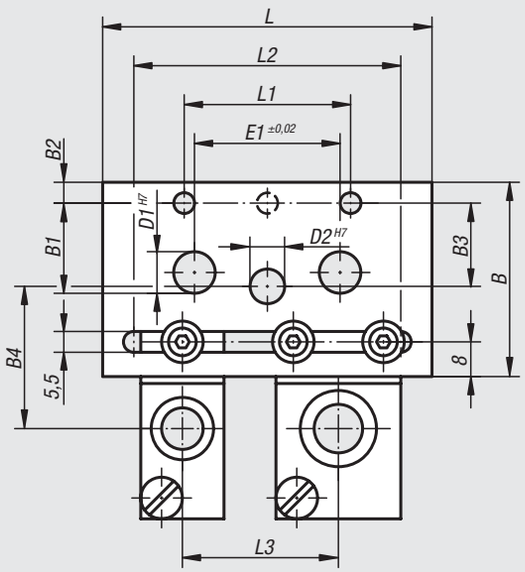
Sample order:
nlm 08650-02: Drill bush holder plates
nlm 08650-12X3.9 (include dimension D): Drill bush holder

Note:
The drill bush holders suitable for the drill bush holder plates must also be ordered.

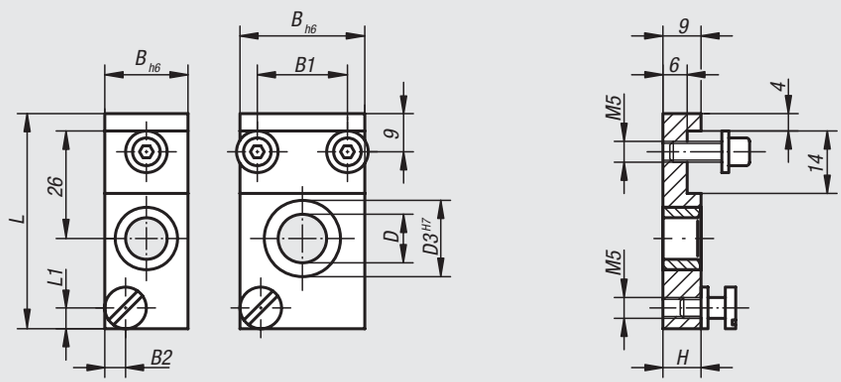
* Basic bush for push-in drill bushes.



Drill bush holder plate



Drill bush holder



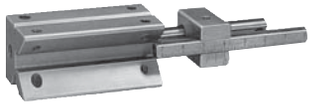
smallest hole spacing L3 = "B" of 1st drill bush holder + "B" of 2nd drill bush holder / 2

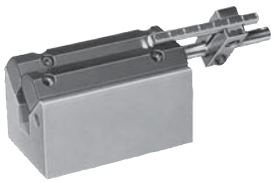
Order No.	Version	Suitable for cylinder jig size	D1	D2	E1	L	L1	L2	B	B1	B2	B3	B4	B5 with bush holder size 1 and 2	B5 with bush holder size 3 to 8	B6	H
08650-00	drill bush holder plate	0	-	9	-	80	40	64	47	-	5	20	35	66	82	5	14
08650-02	drill bush holder plate	2	16	16	50	120	80	100	68	26	4	30	47	87	113	17	19

Order No.	Version	Size	D applicable drill bush	D applicable bush from	D applicable bush to	D3	L	L1	B	B1	B2	H
08650-10	drill bush holder	1	-	0,4	3,3	3	36	-	8	-	-	10
08650-12	drill bush holder	2	-	3,4	6	4	36	-	12	-	-	10
08650-13	drill bush holder	3	-	6,1	10	4	52	-	20	-	-	10
08650-14	drill bush holder	4	-	10,1	15	4	52	-	30	20	-	10
08650-15	drill bush holder	5	8*	-	-	-	52	5	20	-	5	10
08650-16	drill bush holder	6	10*	-	-	-	52	5	20	-	5	12
08650-17	drill bush holder	7	12*	-	-	-	52	5	30	20	5	12
08650-18	drill bush holder	8	15*	-	-	-	52	5	30	20	5	12

V-blocks

with stop

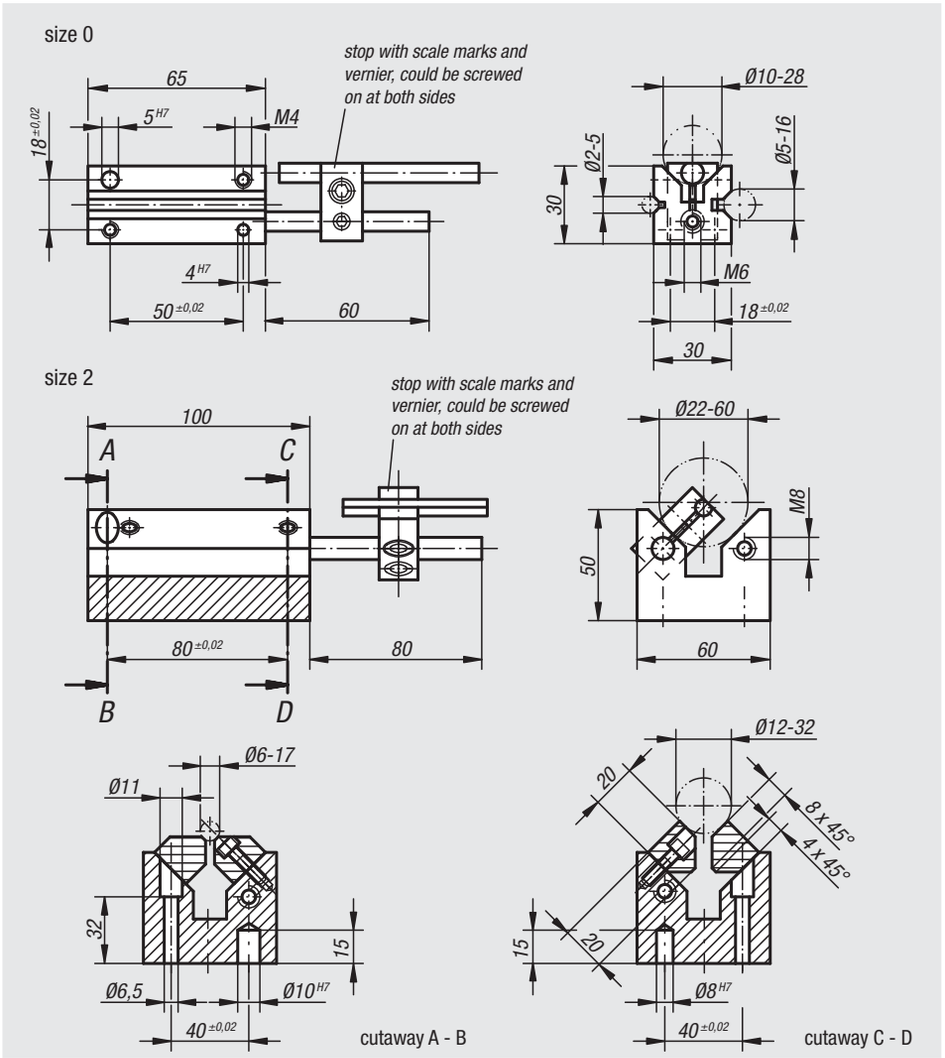


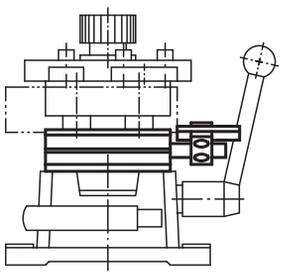


Material:
V-blocks 1.0531.
Jaw in steel

Version:
Bright.
Jaws black oxidised and ground.

Sample order:
nlm 08710-02



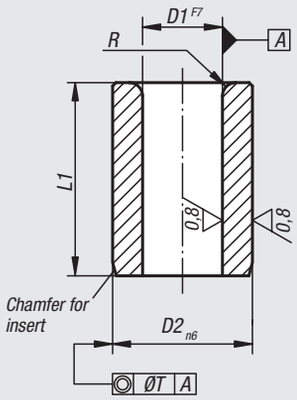


Order No.	Suitable for cylinder jig size
08710-00	0
08710-02	2

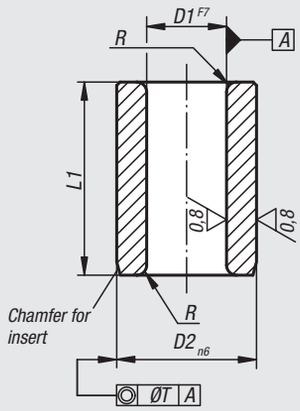
Cylindrical drill bushes

DIN 179

Form A
hole, rounded at one end



Form B
hole, rounded at both ends

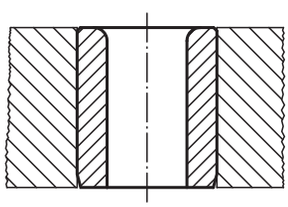


Material:
Special steel

Version:
Hardened and ground.
Hardness 740 ±80 HV 10

Sample order:
nlm 08900-A0120X06
(bush Form A D1 = 1.2 mm and L = 6 mm)

Note:
From diameter D1 over 15 mm size increases are 0.5 mm.

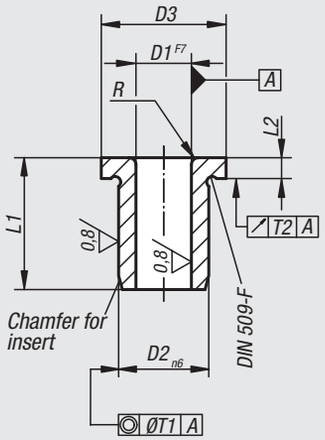


D1	D2	L1	Version	R	T
from 0.4 up to 0.8	3	6	short	1	0,01
from 0.9 up to 1.0	3	6/9	short/medium	1	0,01
from 1.1 up to 1.8	4	6/9	short/medium	1	0,01
from 1.9 up to 2.6	5	6/9	short/medium	1	0,01
from 2.7 up to 3.3	6	8/12/16	short/medium/long	1	0,01
from 3.4 up to 4.0	7	8/12/16	short/medium/long	1	0,01
from 4.1 up to 5.0	8	8/12/16	short/medium/long	1	0,01
from 5.1 up to 6.0	10	10/16/20	short/medium/long	1,5	0,02
from 6.1 up to 8.0	12	10/16/20	short/medium/long	1,5	0,02
from 8.1 up to 10.0	15	12/20/25	short/medium/long	2	0,02
from 10.1 up to 12.0	18	12/20/25	short/medium/long	2	0,02
from 12.1 up to 15.0	22	16/28/36	short/medium/long	2	0,02
from 15.5 up to 18.0	26	16/28/36	short/medium/long	2	0,02
from 18.5 up to 22.0	30	20/36/45	short/medium/long	3	0,02
from 22.5 up to 26.0	35	20/36/45	short/medium/long	3	0,02
from 26.5 up to 30.0	42	25/45/56	short/medium/long	3	0,02
from 30.5 up to 35.0	48	25/45/56	short/medium/long	3	0,04
from 35.5 up to 42.0	55	30/56/67	short/medium/long	3,5	0,04
from 42.5 up to 48.0	62	30/56/67	short/medium/long	3,5	0,04

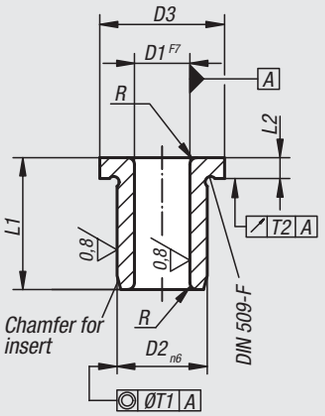
Drill bushes with collar

DIN 172

Form A
hole, rounded at one end



Form B
hole, rounded at both ends

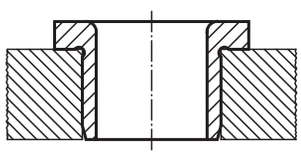


Material:
Special steel.

Version:
Hardened and ground.
Hardness 740 ±80 HV 10

Sample order:
nlm 08910-A0120X09
(bush Form A D1 = 1.2 mm and L1 = 9 mm)

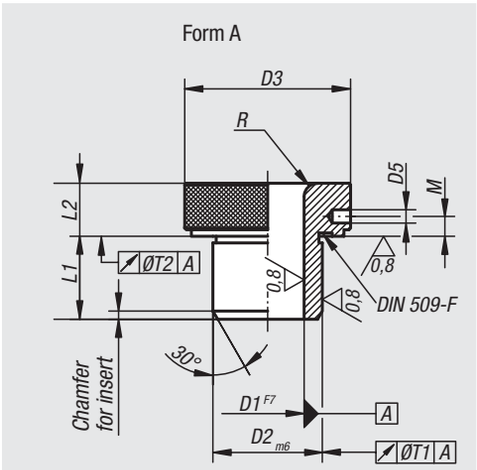
Note:
From diameter D1 over 15 mm size increases are 0.5 mm.



D1	D2	D3	L1	Version	L2	R	T1	T2
from 0.4 up to 0.8	3	6	6	medium	2	1	0,01	0,03
from 0.9 up to 1.0	3	6	6/9	short/medium	2	1	0,01	0,03
from 1.1 up to 1.8	4	7	6/9	short/medium	2	1	0,01	0,03
from 1.9 up to 2.6	5	8	6/9	short/medium	2	1	0,01	0,03
from 2.7 up to 3.3	6	9	8/12/16	short/medium/long	2,5	1	0,01	0,03
from 3.4 up to 4.0	7	10	8/12/16	short/medium/long	2,5	1	0,01	0,03
from 4.1 up to 5.0	8	11	8/12/16	short/medium/long	2,5	1	0,01	0,03
from 5.1 up to 6.0	10	13	10/16/20	short/medium/long	3	1,5	0,02	0,03
from 6.1 up to 8.0	12	15	10/16/20	short/medium/long	3	1,5	0,02	0,03
from 8.1 up to 10.0	15	18	12/20/25	short/medium/long	3	2	0,02	0,03
from 10.1 up to 12.0	18	22	12/20/25	short/medium/long	4	2	0,02	0,03
from 12.1 up to 15.0	22	26	16/28/36	short/medium/long	4	2	0,02	0,03
from 15.5 up to 18.0	26	30	16/28/36	short/medium/long	4	2	0,02	0,03
from 18.5 up to 22.0	30	34	20/36/45	short/medium/long	5	3	0,02	0,03
from 22.5 up to 26.0	35	39	20/36/45	short/medium/long	5	3	0,02	0,05
from 26.5 up to 30.0	42	46	25/45/56	short/medium/long	5	3	0,02	0,05
from 30.5 up to 35.0	48	52	25/45/56	short/medium/long	5	3	0,04	0,05
from 35.5 up to 42.0	55	59	30/56/67	short/medium/long	5	3,5	0,04	0,05
from 42.5 up to 48.0	62	66	30/56/67	short/medium/long	6	3,5	0,04	0,05

Drill bushes push-in

DIN 173

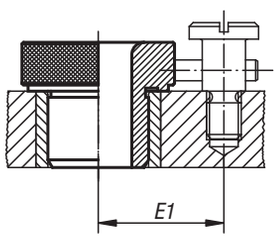


Material:
Special steel

Version:
Hardened to 780 ±40 HV 10 and ground.
Without lead-in groove.

Sample order:
nlm 08920-A1000X15 (bush Form A D1 = 10 mm and D2 = 15 mm, coiled spring pin mounted)

Note:
All bushes have the bore size marked on the upper face, e.g. 10. A DIN 173-1 flat-head screw can be used as a rest for the stop pin.
Diameters D1 over 15 mm increase in size by 0.5 mm.



D1	D2	D3	D5	M	L1	L2	E1 centre spacing to flathead screws	R	T1	T2
from 2.5 up to 4.0	8	16	2,5	4	10	10	15	3	0,02	0,005
from 4.1 up to 6.0	10	19	2,5	4	12	10	16,5	3	0,02	0,005
from 6.1 up to 8.0	12	22	3	4	12	12	19,5	4	0,02	0,005
from 8.1 up to 10.0	15	26	3	4	16	12	21,5	5	0,02	0,005
from 10.1 up to 12.0	18	30	3	4	16	12	23,5	5	0,02	0,005
from 12.1 up to 15.0	22	35	5	5	20	16	28	5	0,02	0,005
from 15.5 up to 18.0	26	40	5	5	20	16	30,5	5	0,02	0,005
from 18.5 up to 22.0	30	47	5	5	20	16	34	6	0,02	0,005
from 22.5 up to 26.0	35	55	6	6	25	20	38	6	0,04	0,008
from 26.5 up to 30.0	42	62	6	6	25	20	41,5	6	0,04	0,008
from 30.5 up to 35.0	48	69	6	6	30	20	45	8	0,04	0,008
from 35.5 up to 42.0	55	77	6	6	30	20	49	8	0,04	0,008
from 42.5 up to 48.0	62	85	8	7,5	35	20	53	8	0,04	0,008

Drill bushes push-in

DIN 173-1

Material:
Special steel

Version:
Hardened to 780 ±40 HV 10 and ground.

Sample order:
nlm 08920-K0400X16 (bush Form K D1 = 4 mm and L1 = 16 mm)

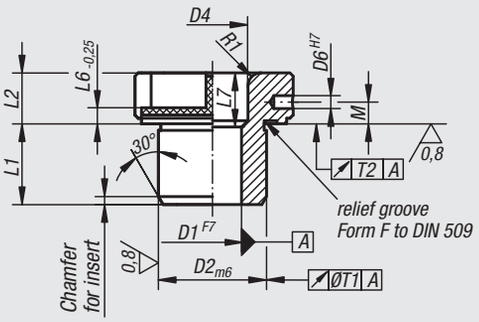
Note:
All bushes have the bore size marked on the upper face, e.g. 15 F7.
Form K are quick-change bushes. Dowels or coiled spring pins together with DIN 173-1 flathead screws can be used in place of the stop pin.

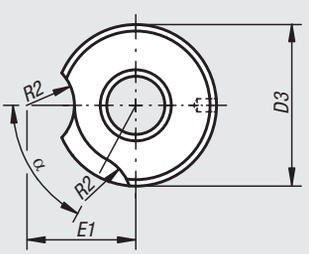
The bayonet mount is secured with DIN 173-1 clamping bushes together with DIN 912 socket head screws.

E2 = Hole spacing when using dowels or coiled spring pins.

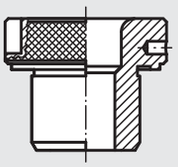
Diameter D1 over 15 mm increase in size by 0.5 mm.

Form K
quick-change bush for
right-hand cutting tools

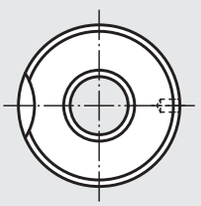




Form L
exchangeable bush

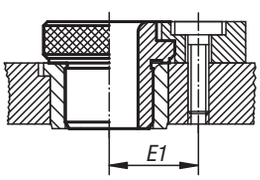


dimensions same
as Form K

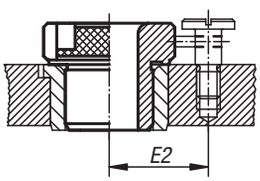


D1	Version	D2	D3	D4	D6	L1	L2	L6	L7	M	T1	T2	R1	R2	E1	E2	α
from 2.3 up to 4.0	short	8	15	-	2,5	10	8	3	-	4,25	0,02	0,005	1,5	7	11,5	15	65°
from 2.3 up to 4.0	medium	8	15	4,5	2,5	16	8	3	6	4,25	0,02	0,005	1,5	7	11,5	15	65°
from 4.1 up to 6.0	short	10	18	-	2,5	12	8	3	-	4,25	0,02	0,005	2	7	13	17	65°
from 4.1 up to 6.0	medium	10	18	6,5	2,5	20	8	3	8	4,25	0,02	0,005	2	7	13	17	65°
from 4.1 up to 6.0	long	10	18	6,5	2,5	25	8	3	13	4,25	0,02	0,005	2	7	13	17	65°
from 6.1 up to 8.0	short	12	22	-	3	12	10	4	-	6	0,02	0,005	2	8,5	16,5	20	60°
from 6.1 up to 8.0	medium	12	22	8,5	3	20	10	4	8	6	0,02	0,005	2	8,5	16,5	20	60°
from 6.1 up to 8.0	long	12	22	8,5	3	25	10	4	13	6	0,02	0,005	2	8,5	16,5	20	60°
from 8.1 up to 10.0	short	15	26	-	3	16	10	4	-	6	0,02	0,005	2	8,5	18	22	50°
from 8.1 up to 10.0	medium	15	26	10,5	3	28	10	4	12	6	0,02	0,005	2	8,5	18	22	50°
from 8.1 up to 10.0	long	15	26	10,5	3	36	10	4	20	6	0,02	0,005	2	8,5	18	22	50°
from 10.1 up to 12.0	short	18	30	-	3	16	10	4	-	6	0,02	0,005	2	8,5	20	24	50°
from 10.1 up to 12.0	medium	18	30	12,5	3	28	10	4	12	6	0,02	0,005	2	8,5	20	24	50°
from 10.1 up to 12.0	long	18	30	12,5	3	36	10	4	20	6	0,02	0,005	2	8,5	20	24	50°
from 12.1 up to 15.0	short	22	34	-	5	20	12	5,5	-	7	0,02	0,005	3	10,5	23,5	28	35°
from 12.1 up to 15.0	medium	22	34	15,5	5	36	12	5,5	16	7	0,02	0,005	3	10,5	23,5	28	35°
from 12.1 up to 15.0	long	22	34	15,5	5	45	12	5,5	25	7	0,02	0,005	3	10,5	23,5	28	35°
from 15.5 up to 18.0	short	26	39	-	5	20	12	5,5	-	7	0,02	0,005	3	10,5	26	31	35°
from 15.5 up to 18.0	medium	26	39	19	5	36	12	5,5	16	7	0,02	0,005	3	10,5	26	31	35°
from 15.5 up to 18.0	long	26	39	19	5	45	12	5,5	25	7	0,02	0,005	3	10,5	26	31	35°
from 18.5 up to 22.0	short	30	46	-	5	25	12	5,5	-	7	0,02	0,005	3	10,5	29,5	35	30°
from 18.5 up to 22.0	medium	30	46	23	5	45	12	5,5	20	7	0,02	0,005	3	10,5	29,5	35	30°
from 18.5 up to 22.0	long	30	46	23	5	56	12	5,5	31	7	0,02	0,005	3	10,5	29,5	35	30°
from 22.5 up to 26.0	short	35	52	-	6	25	12	5,5	-	7	0,04	0,008	3	10,5	32,5	37	30°
from 22.5 up to 26.0	medium	35	52	27	6	45	12	5,5	20	7	0,04	0,008	3	10,5	32,5	37	30°
from 22.5 up to 26.0	long	35	52	27	6	56	12	5,5	31	7	0,04	0,008	3	10,5	32,5	37	30°
from 26.5 up to 30.0	short	42	59	-	6	30	12	5,5	-	7	0,04	0,008	3	10,5	36	41	30°
from 26.5 up to 30.0	medium	42	59	31	6	56	12	5,5	26	7	0,04	0,008	3	10,5	36	41	30°
from 26.5 up to 30.0	long	42	59	31	6	67	12	5,5	37	7	0,04	0,008	3	10,5	36	41	30°

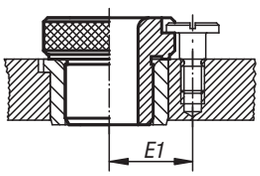
example:



Quick-change drill bush Form K
with bush with collar DIN 172
or bush DIN 179



Quick-change drill bush Form K
with bush with collar DIN 172
or bush DIN 179

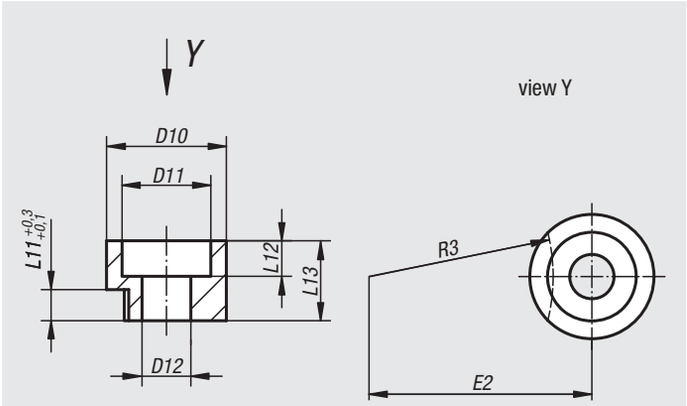


Exchangeable drill bush Form L
with bush with collar DIN 172
or bush DIN 179

08926

Clamping bushes

DIN 173-1



Material:
Clamping bush 1.0711.
Socket head screw steel.

Version:
Bright.

Sample order:
nlm 08926-061X10 (clamping bush D12= 6.1 mm and L13 = 10 mm)

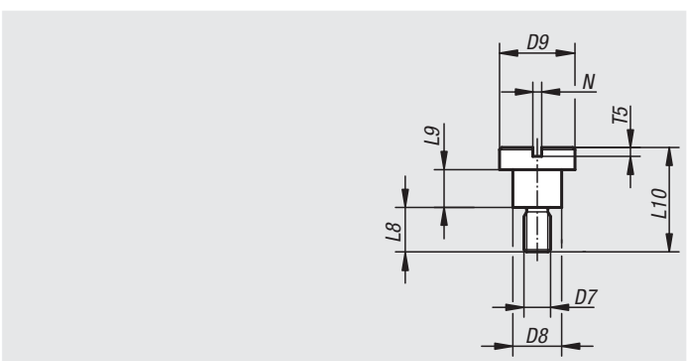
Note:
A DIN 912 socket head screw is supplied.

Order No.	D12	for drill bushes (D1)	D10	D11	L11	L12	L13	E2	R3	Socket head screw DIN 912
08926-051X08	5,1	to 6,0	13	10	3	4	8	13,2	9,5	M5x16
08926-061X10	6,1	over 6,0 to 12,0	16	12	4	5	10	19,7	15	M6x20
08926-081X12	8,1	over 12,0 to 30,0	20	15	5,5	5	12	36,2	30	M8x25

08927

Shoulder screws flathead

for DIN 173 drill bushes



Material:
Steel.

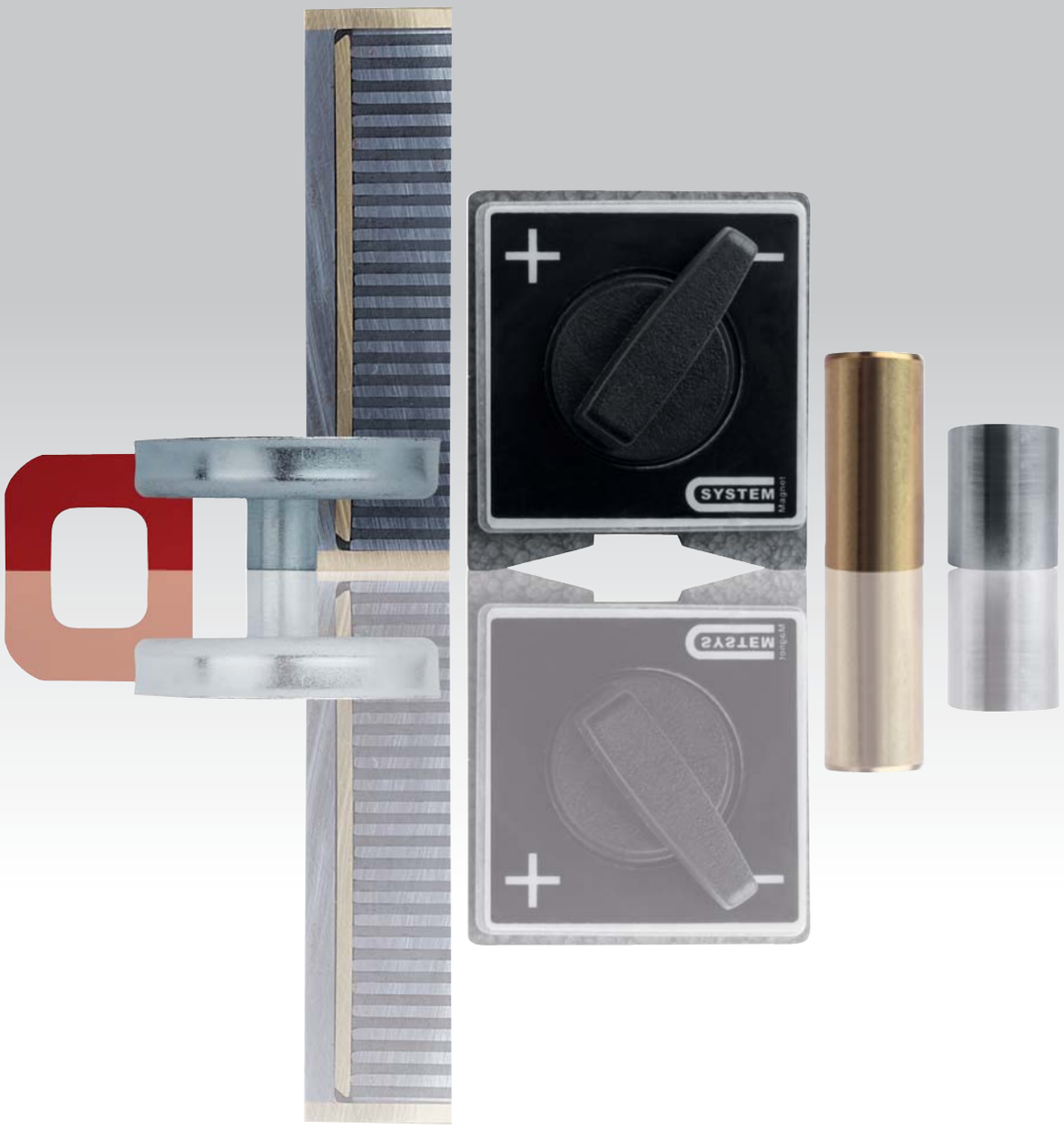
Version:
Bright, grade 10.9

Sample order:
nlm 08927-06X04 (DIN 173-1 screw D7 = M6 and L9 = 4 mm)

Order No.	Version	D7	for drill bushes (D1)	L8	L9	L10	D8	D9	N	T5
08927-05X03	short	M5	to 6,0	9	3	15	7,5	13	1,6	2
08927-06X04	short	M6	over 6,0 to 12,0	10	4	18	9,5	16	2	2,5
08927-08X55	short	M8	over 12,0 to 30,0	11,5	5,5	22	12	20	2,5	3
08927-05X06	long	M5	to 6,0	9	6	18	7,5	13	1,6	2
08927-06X08	long	M6	over 6,0 to 12,0	10	8	22	9,5	16	2	2,5
08927-08X105	long	M8	over 12,0 to 30,0	11,5	10,5	27	12	20	2,5	3

09000

Magnets



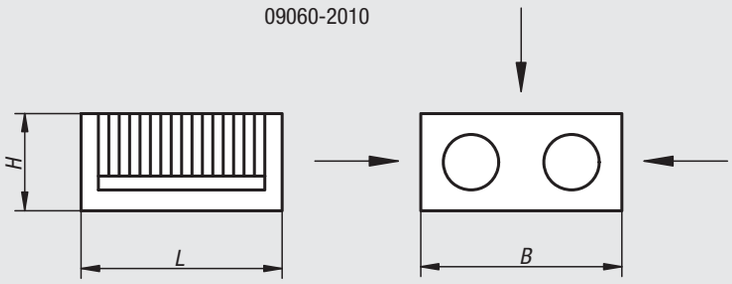
Magnets permanent for workholding

with fine pole division

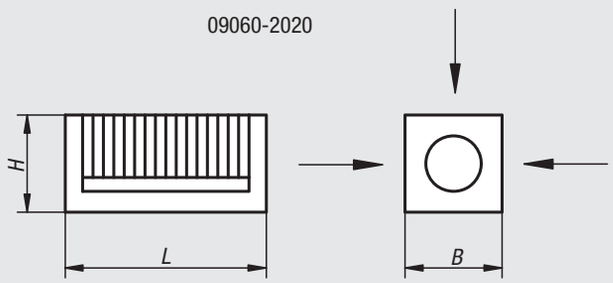
Sample order:
nlm 09060-2020

Note:
The workholding magnets 09060-2010 to 09060-2030 consist of a permanent magnetic system with fine pole divisions (4 mm) which are effective on two or three faces.
To clamp extremely thin steel parts we recommend the magnet 09060-2040 with the finest pole division of 1.3 mm. The magnetic lifespan of the workholding magnets under conditions prevailant in industrial machining is unlimited.
Approximately half the height of the workholding magnets can be ground down or polished away with no significant impairment of the magnetic strength.

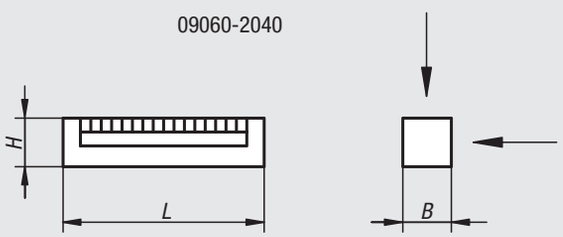
09060-2010

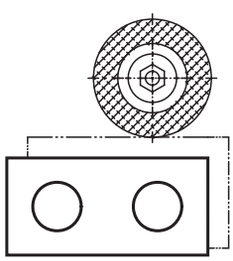


09060-2020



09060-2030
09060-2040





Order No.	L	B	H	Max. angular deviation	Magnetic surfaces mm
09060-2010	100	100	50	10´	1x 100x100 2x 100x50
09060-2020	100	50	50	10´	3x 100x50
09060-2030	100	25	25	10´	2x 100x25
09060-2040	100	25	25	10´	2x 100x25

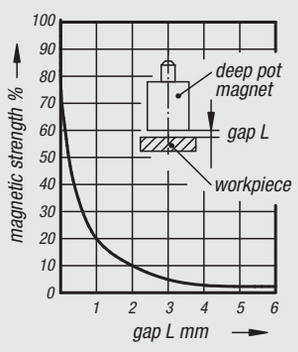
Technical data for magnets (pot magnets)

Structure:
Pot magnets are magnets that, due to their structure have only one attracting surface. No other surface is magnetic. This construction makes it possible to limit the three-dimensional affect of the magnetic field so that no unintentional magnetization of the entire workpiece in contact with the pot magnet, or of the machine elements surrounding the magnet occurs.

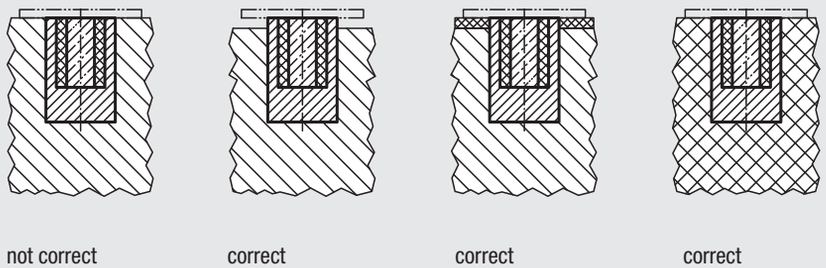
Designs:
The deep pot magnets series:
09060-01 to 09060-10
09061-01 to 09061-09
09063-01 to 09063-10
have a core made of the permanent magnetic material AlNiCo, which is inserted for magnetic shielding into a soft iron pot with an intervening sleeve made of a non-magnetic material.
The shallow pot magnets series:
09064-01 to 09064-10 and
09065-01 to 09065-26
have a core made of the permanent magnetic ceramic material SrFE (hard ferrite) . This is also inserted into soft iron pot to create the desired magnetic shielding.
The pot magnets series:
09066-01 to 09066-18 and
09067-01 to 09067-15
have a SmCo core, an alloy of rare metallic elements together with cobalt. SmCo increases the magnetic force by three to five times that of AlNiCo or hard ferrit magnets by the same magnet size.

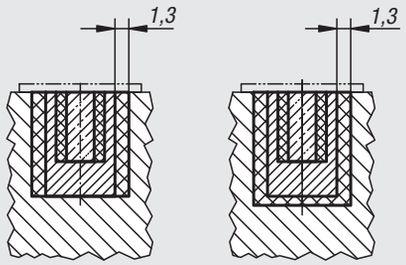
Magnetic strengths:
The values indicated in the table are minimum values that are achieved for a vertical pull-down with full-surface contact of the pot magnets on soft iron or low-carbon steel workpieces of sufficient thickness. By unclean pole faces or uneven workpieces, air gaps are formed which sharply decrease the attractive force. It is therefore advisable to always ensure a clean pole face and to clean it from time to time if necessary.

Diagram:
Reduction of the magnetic strength of a deep pot magnet with increasing air gap (non-magnetic intermediate layers have the same effect as air gaps).

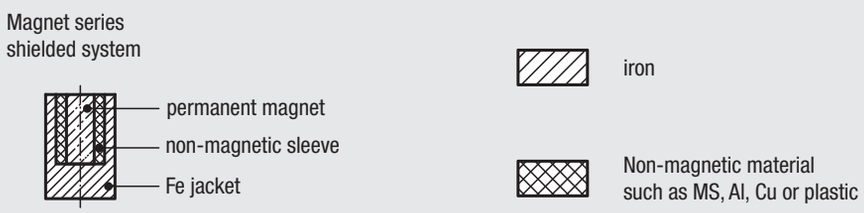


Mounting instructions for shielded pot magnets without pins





SmCo pot magnets (deep or shallow) must not be mounted directly in iron, but must be screwed, glued, pressed or cast into a sleeve of non-magnetic material (see illustration below).



Installation or fastening possibilities of pot magnets

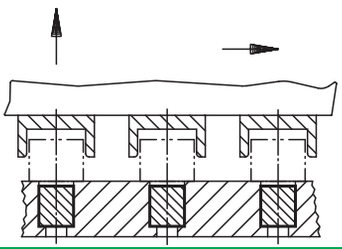
Order No.	Description	System	Temperature* max. °C	Fastening possibility
from **09060-01** to **09060-10**	deep pot	shielded	450	Press in/shrink-fit/ glue in
from **09061-01** to **09061-09**	deep pot	shielded	450	Solder in (soft solder)/ gluing in
from **09063-01** to **09063-10**	deep pot	shielded	450	Rivet pin/ screw in
from **09064-01** to **09064-10**	shallow pot	shielded	100	Press in/glue in
from **09065-01** to **09065-26**	shallow pot	shielded	100	Screw in
from **09066-01** to **09066-18**	shallow pot	shielded	200	Press in/glue in
from **09067-01** to **09067-15**	deep pot	shielded	200	Press in/glue in screw in

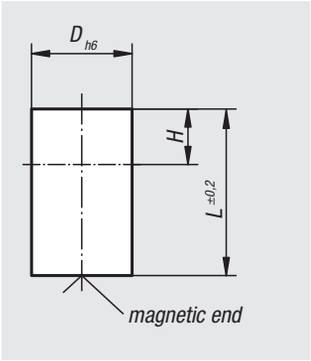
*Long-term heating or alternating thermal stresses may lead to mechanical changes in the magnet system. In many cases they have no influence on the function. The same applies for chemical stresses (chemical baths, aggressive gases, etc).

09060

Round magnets (deep pot magnets)

in AlNiCo with fitting tolerance





Material:
Housing, steel.
Magnetic core AlNiCo.

Version:
Bright.

Sample order:
nlm 09060-01

Note:
Shielded system. Diameter „D“ ground to a h6 tolerance. Fastening possibilities by pressing, shrink-fit or gluing. Deep pot magnets can be shortened by the dimension „H“ with no loss of attracting force.

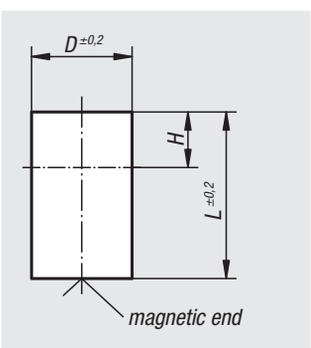
Temperature range:
max. 450°C.

Order No.	D	L	H	Magnetic force N
09060-01	6	10	2	1,5
09060-02	8	12	3	3,5
09060-03	10	16	6	7
09060-04	13	18	7	10
09060-05	16	20	5	18
09060-06	20	25	6	42
09060-07	25	30	5	96
09060-08	32	35	3	180
09060-09	40	45	5	240
09060-10	50	50	2	420

09061

Round magnets (deep pot magnets)

in AlNiCo without fitting tolerance



Material:
Housing, steel.
Magnetic core AlNiCo.

Version:
galvanized

Sample order:
nlm 09061-01

Note:
Shielded system. Diameter „D“ without fitting tolerance. Fastening possibilities are pressing, shrink-fit or gluing. Deep pot magnets can be shortened by the dimension „H“ with no loss of attracting force.

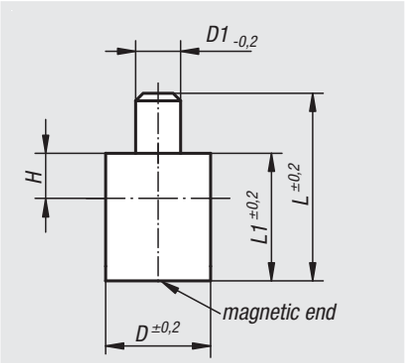
Temperature range:
max. 450°C.

Order No.	D	L	H	Magnetic force N
09061-01	6	20	12	1,5
09061-02	8	20	11	3,5
09061-03	10	20	10	7
09061-04	13	20	9	10
09061-05	16	20	5	18
09061-06	20	25	6	42
09061-07	25	35	10	96
09061-08	32	40	8	180
09061-09	40	50	10	240

09063

Round magnets with pin (deep pot magnets)

in AlNiCo



Material:
Housing, steel.
Magnetic core AlNiCo.

Version:
galvanized

Sample order:
nlm 09063-01

Note:
Deep pot magnets with smooth pin, shielded system. The magnets can be shortened by the dimension „H“ (to lengthen the pin) with no loss of attracting force.

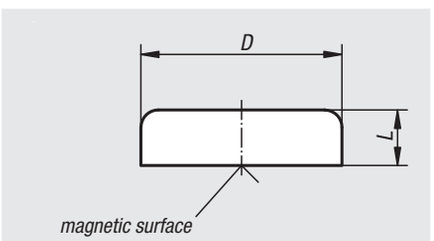
Temperature range:
max. 450°C.

Order No.	D	D1	L	L1	H	Magnetic force N
09063-01	6	3	28	20	2	1,7
09063-02	8	3	28	20	3	4
09063-03	10	4	28	20	6	8,5
09063-04	13	4	28	20	7	12
09063-05	16	5	28	20	5	20
09063-06	20	6	33	25	6	50
09063-07	25	8	45	35	5	115
09063-08	32	10	50	40	3	200
09063-09	40	15	70	50	5	240
09063-10	50	18	85	60	2	420

09064

Magnets (shallow pot magnets)

in hard ferrite



Material:
Housing, steel.
Magnetic core hard ferrite.

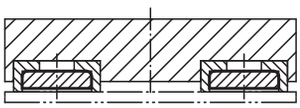
Version:
Housing, galvanized.

Sample order:
nlm 09064-01

Note:
Shallow pot magnets without threaded bush. These magnets are pressed or glued into the receiving holes.

Hairline cracks in the magnetic material are unavoidable for technical reasons in the D=80 version. They do not impair the attracting function of the magnets in any way.

Temperature range:
max. 200°C.



Order No.	D	L	Magnetic force N
09064-01	10 ±0,15	4,5	4
09064-02	13 ±0,15	4,5	10
09064-03	16 ±0,15	4,5	18
09064-04	20 ±0,15	6	30
09064-05	25 ±0,15	7	40
09064-06	32 ±0,20	7	80
09064-07	40 ±0,20	8	125
09064-08	50 ±0,20	10	220
09064-09	63 ±0,20	14	350
09064-10	80 ±0,25	18	600

09065

Magnets with thread (shallow pot magnets)

in hard ferrite

Material:
Housing, steel.
Magnetic core hard ferrite.

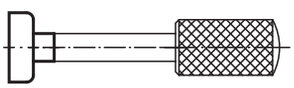
Version:
Housing, galvanized.

Sample order:
nlm 09065-01

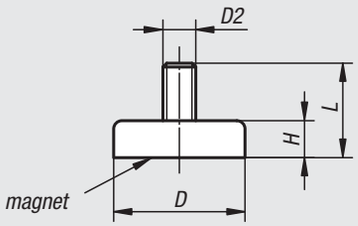
Note:
Shallow pot magnets, shielded system.

Hairline cracks in the magnetic material are unavoidable for technical reasons in D=80, D=100 and D=125 versions. They do not impair the attracting function of the magnets in any way.

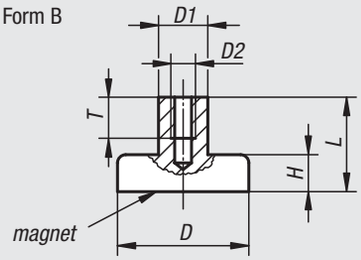
Temperature range:
max. 200°C.



Form A



Form B



Order No. Form A	Order No. Form B	D	D1	D2	L	H	T	Magnetic force N
09065-21	**09065-01**	10 ±0,15	-/6	M3	11,5	4,5	-/5	4
09065-22	**09065-02**	13 ±0,15	-/6	M3	11,5	4,5	-/5	10
09065-23	**09065-03**	16 ±0,15	-/6	M3	11,5	4,5	-/5	18
09065-24	**09065-04**	20 ±0,15	-/6	M3	13	6	-/5	30
09065-25	**09065-05**	25 ±0,15	-/8	M4	15	7	-/6	40
09065-26	**09065-06**	32 ±0,20	-/8	M4	15	7	-/6	80
-	**09065-07**	40 ±0,20	10	M5	18	8	8	125
-	**09065-08**	50 ±0,20	12	M6	22	10	10	220
-	**09065-09**	63 ±0,20	15	M8	30	14	14	350
-	**09065-10**	80 ±0,25	20	M10	34	18	14	600
-	**09065-11**	99 ±0,25	22	M12	42	22	17	900
-	**09065-12**	125 ±0,25	25	M14	50	26	20	1.300

09066

Magnets (shallow pot magnets)

in SmCo

Material:
Housing, steel.
Magnetic core, SmCo.

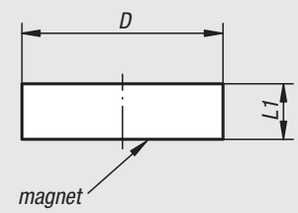
Version:
Housing, galvanized.

Sample order:
nlm 09066-01

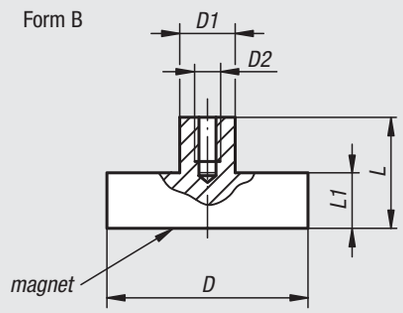
Note:
Shallow pot magntes, shielded system. Magntes with an SmCo core have three to five times the attracting force of AlNiCo or hard ferrite magntes.

Temperature range:
max. 200°C.

Form A



Form B



Order No. Form A	Order No. Form B	D	D1	D2	L	L1	Magnetic force N
09066-01	**09066-11**	6 ±0,15	-/6	-/M3	-/11,5	4,5	5
09066-02	**09066-12**	8 ±0,15	-/6	-/M3	-/11,5	4,5	11
09066-03	**09066-13**	10 ±0,15	-/6	-/M3	-/11,5	4,5	20
09066-04	**09066-14**	13 ±0,15	-/6	-/M3	-/11,5	4,5	40
09066-05	**09066-15**	16 ±0,15	-/6	-/M4	-/11,5	4,5	60
09066-06	**09066-16**	20 ±0,15	-/8	-/M4	-/13	6	90
09066-07	**09066-17**	25 ±0,15	-/8	-/M4	-/14	7	150
09066-08	**09066-18**	32 ±0,20	-/10	-/M5	-/15,5	7	220

Round magnets (deep pot magnets)

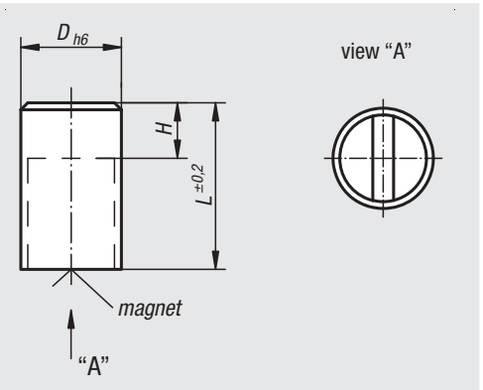
in SmCo

Material:
Housing brass.
Magnetic core SmCo

Sample order:
nlm 09067-01

Note:
Smooth design, shielded system. Diameter „D“ ground with h6 tolerance. Under no circumstances may SmCo magnets be pressed directly into iron, as otherwise loss of attractive force due to magnetic short circuits occurs. SmCo magnets are especially suitable for direct use in spot-welding machines, as no demagnetisation occurs.
Deep pot magnets can be shortened by the dimension „H“ with no loss of attractive force.

Temperature range:
max. 200°C.



Order No.	D	L	H	Magnetic force N	Distance to iron wall/mm
09067-01	6	20	10	8	1,5
09067-03	8	20	10	22	1,5
09067-05	10	20	8	40	2
09067-07	13	20	6	60	2,5
09067-09	16	20	2	125	3
09067-11	20	25	5	250	4
09067-13	25	35	7	400	5
09067-15	32	40	4,5	600	6

Round magnets with internal thread (deep pot magnets)

in NdFeB

Material:
Housing, steel.
Magnetic core NdFeB.

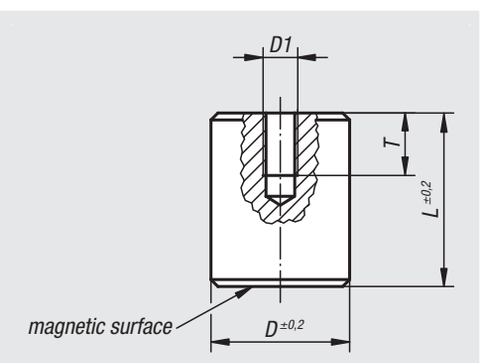
Version:
Housing, galvanized.

Sample order:
nlm 09068-01

Note:
Shielded system. Deep pot magnets are used for mounting in steel and iron. This requirement is principally stipulated in plant and machine construction.
Can also be used in blind holes.

Size D=50 has 4 magnets Ø18 mm.

Temperature range:
max. 80°C.



Order No.	D	D1	L	T	Can be shortened by (mm)	Magnetic force N
09068-01	8	M3	12	5	3	12
09068-02	10	M4	16	7	7	24
09068-03	13	M4	18	7	3	60
09068-04	16	M4	20	7	6	90
09068-05	20	M5	25	9	9	135
09068-06	25	M6	30	9	10	190
09068-07	35	M8	40	13	10	300
09068-08	50	M12	50	13	13	550

Magnets (shallow pot magnets)

in NdFeB

Material:
Housing, steel.
Magnetic core NdFeB.

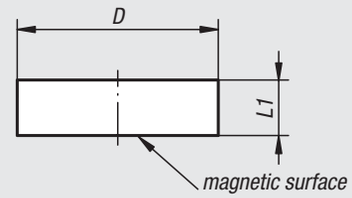
Version:
Housing, galvanized.

Sample order:
nlm 09069-01

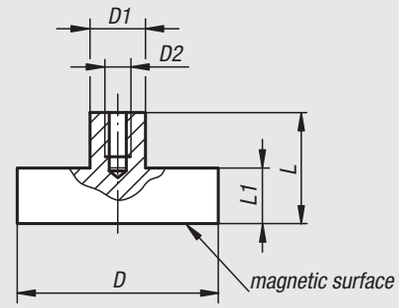
Note:
Shielded system. With the permanent magnetic material NdFeB the attracive force increases by ca. 10-20% compared with SmCo.

Temperature range:
max. 80°C.

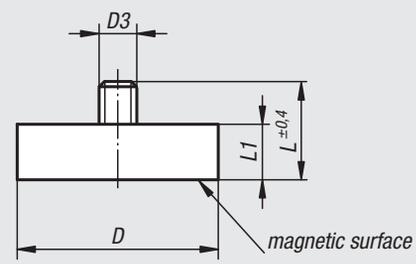
Form A



Form B



Form C

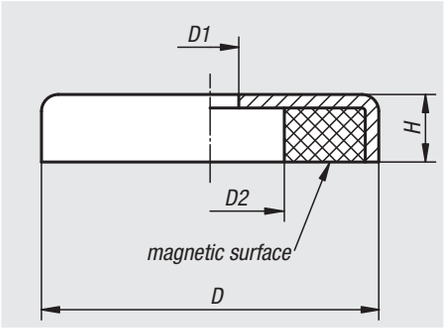


Order No.	Form	D	D1	D2	D3	L	L1	Magnetic force N
09069-01	A	6 ±0,15	-	-	-	-	4,5	5
09069-02	A	8 ±0,15	-	-	-	-	4,5	13
09069-03	A	10 ±0,15	-	-	-	-	4,5	25
09069-04	A	13 ±0,15	-	-	-	-	4,5	60
09069-05	A	16 ±0,15	-	-	-	-	4,5	95
09069-06	A	20 ±0,15	-	-	-	-	6	140
09069-07	A	25 ±0,15	-	-	-	-	7	200
09069-08	A	32 ±0,20	-	-	-	-	7	350
09069-11	B	6 ±0,15	6	M3	-	11,5	4,5	5
09069-12	B	8 ±0,15	6	M3	-	11,5	4,5	13
09069-13	B	10 ±0,15	6	M3	-	11,5	4,5	25
09069-14	B	13 ±0,15	6	M3	-	11,5	4,5	60
09069-15	B	16 ±0,15	6	M4	-	11,5	4,5	95
09069-16	B	20 ±0,15	8	M4	-	13	6	140
09069-17	B	25 ±0,15	8	M4	-	14	7	200
09069-18	B	32 ±0,20	10	M5	-	15,5	7	350
09069-23	C	10 ±0,15	-	-	M3	11,5	4,5	25
09069-24	C	13 ±0,15	-	-	M5	12,5	4,5	60
09069-25	C	16 ±0,15	-	-	M6	12,5	4,5	95
09069-26	C	20 ±0,15	-	-	M6	16	6	140
09069-27	C	25 ±0,15	-	-	M6	17	7	200
09069-28	C	32 ±0,20	-	-	M6	17	7	350

09070

Magnets with counterbore (shallow pot magnets)

hard ferrite



Material:
Housing, steel.
Magnetic core hard ferrite.

Version:
Housing, galvanized.

Sample order:
nlm 09070-50

Note:
Shielded system

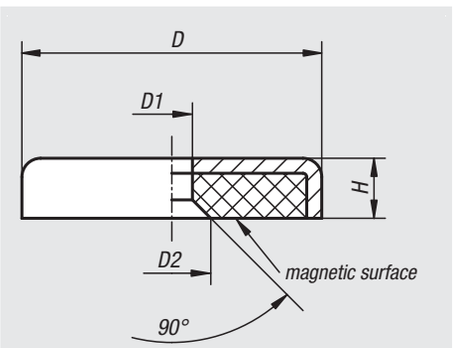
Temperature range:
max. 200°C.

Order No.	D	D1	D2	H	Magnetic force N
09070-50	50 ±0,20	8,5	22	10	180
09070-63	63 ±0,20	6,5	24	14	290
09070-80	80 ±0,25	6,5	11,5	18	540

09071

Magnets with countersunk hole (shallow pot magnets)

hard ferrite



Material:
Housing, steel.
Magnetic core hard ferrite.

Version:
Housing, galvanized.

Sample order:
nlm 09071-01

Note:
Shielded system

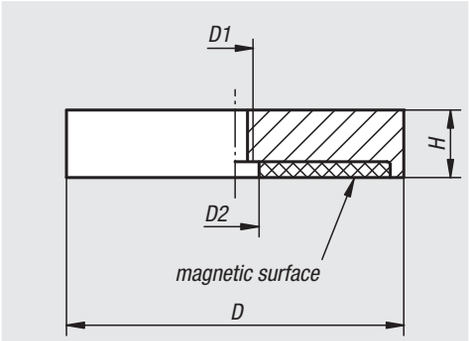
Temperature range:
max. 200°C.

Order No.	D	D1	D2	H	Magnetic force N
09071-01	16 ±0,15	3,3	7	4,5	14
09071-02	20 ±0,15	4,2	9	6	27
09071-03	25 ±0,15	5,5	11	7	36
09071-04	32 ±0,20	5,5	11	7	72
09071-05	40 ±0,20	5,5	11	8	90

09072

Magnets with internal thread (shallow pot magnets)

in NdFeB



Material:
Housing, steel.
Magnetic core NdFeB.

Version:
Housing, galvanized.

Sample order:
nlm 09072-01

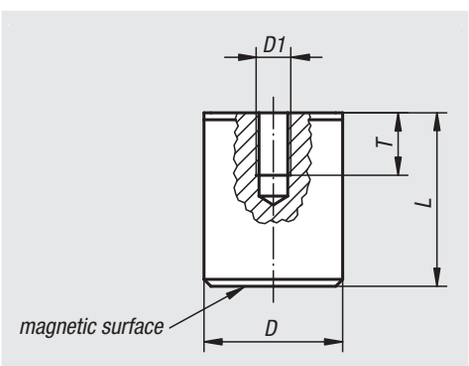
Note:
Shielded system

Temperature range:
max. 80°C.

Order No.	D	D1	D2	H	Magnetic force N
09072-01	32	M5	5,5	7	330
09072-02	40	M5	10,5	8	550
09072-03	63	M10	11,7	14	1.100
09072-04	75	M10	13	15	1.750

09094

Round magnets (pot magnets)



Material:
Housing, steel.
Magnetic core AlNiCo.

Version:
Housing painted red.

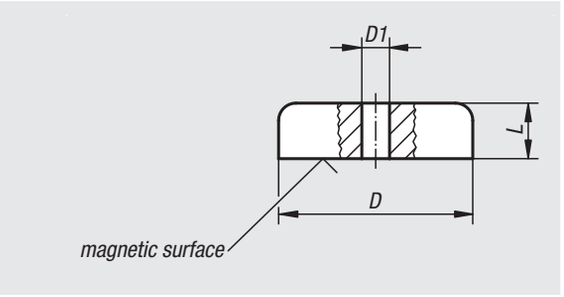
Sample order:
nlm 09094-01

Note:
Hard magnet in aluminium housing and steel jacket. Shielded system. Pot magnets are used for retaining, lifting and mounting in fixtures.

Temperature range:
max. 450°C.

Order No.	D	D1	L	T	Magnetic force N
09094-01	17	M6	16	4	18
09094-02	21	M6	19	5	28
09094-03	27	M6	25	6	65
09094-04	35	M6	30	9	115
09094-05	65	M12	43	13	400

Magnets (shallow pot magnets)



Material:
Housing, steel.
Magnetic core AlNiCo.

Version:
Housing painted red.

Sample order:
nlm 09096-01

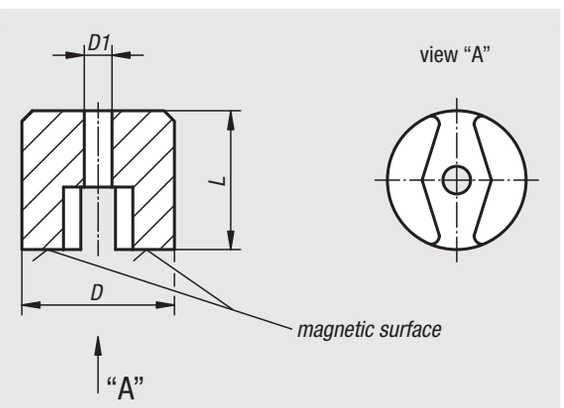
Note:
Shielded system. Shallow pot magnets are used in fixtures with minimal space.

Temperature range:
max. 450°C.

On request:
Other colours.

Order No.	D	D1	L	Magnetic force N
09096-01	19	3,5	8	30
09096-02	29	5	9	55
09096-03	38	5	10,5	95

Magnets (button magnets)



Material:
Magnetic core AlNiCo.

Version:
painted red.

Sample order:
nlm 09098-01

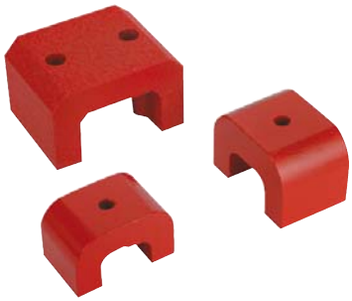
Note:
Split attractive surface with through hole. Non-shielded system. Button magnets are used in laboratories, inspection rooms and for holding metal objects.

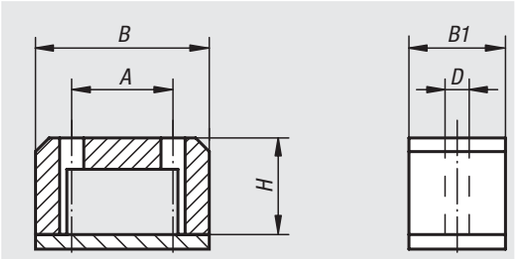
Temperature range:
max. 450°C.

Order No.	D	D1	L	Magnetic force N
09098-01	13	4,2	10	7
09098-02	19	5,4	13	19
09098-03	25	5,4	16	29
09098-04	32	7	25	66

09100

Magnets (U-magnet)





Material:
Magnetic core AlNiCo.

Version:
painted red.

Sample order:
nlm 09100-01

Note:
Horseshoe magnets with high attractive force. Non-shielded system. The magnets are supplied with a galvanised protective plating and are used for holding, sorting and lifting.
Sizes 1, 2 and 3 have only one attachment hole in the centre.

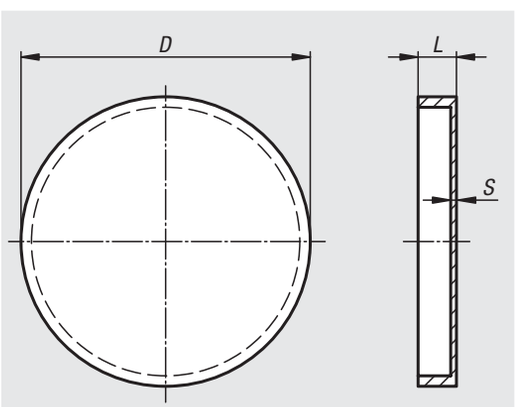
Temperature range:
max. 450°C.

Order No.	Size	A	B	B1	D	H	Magnetic force N
09100-01	1	-	30	20	5	20	45
09100-02	2	-	40	25	5	25	90
09100-03	3	-	45	29	5	30	120
09100-04	4	32	57	45	8	35	230
09100-05	5	38	70	57	8	41	320

09110

Protective rubber caps

for shallow pot magnets



Material:
Synthetic rubber.

Version:
Black

Sample order:
nlm 09110-50

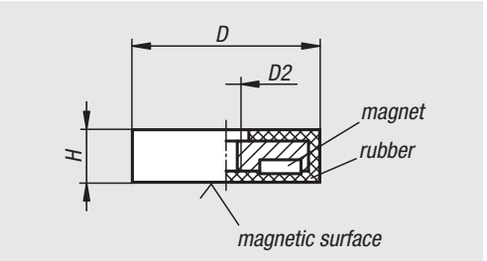
Note:
For protecting sensitive surfaces. The rubber protective caps are slipped over the magnetic surfaces. The shear force with which the magnet can be displaced is doubled and achieves almost the original attractive force of the magnet.

Temperature range:
max. 60°C.

Order No.	D	L	S
09110-50	52	6	0,5
09110-63	65	8	0,5
09110-80	83	11	0,5

Magnets shallow pot with internal thread

NdFeB, with rubber protective jacket



Material:
Housing, steel.
Magnetic core NdFeB (neodym).
Protective rubber jacket, synthetic rubber.

Version:
Housing, galvanized.
Black protective rubber jacket.

Sample order:
nlm 09112-01

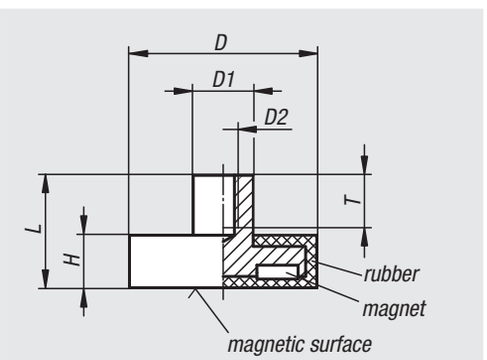
Note:
Shallow pot magnet with internal thread. Shielded system. With rubber protective jacket for protecting sensitive surfaces. The coefficient of friction is increased by the rubber jacket so that high lateral friction is achieved.

Temperature range:
max. 60°C.

Order No.	D	D2	H	Magnetic force N
09112-01	22	M4	6	35
09112-02	31	M5	6	75
09112-03	43	M4	6	85
09112-04	66	M6	8,5	180
09112-05	88	M6	8	420

Magnets shallow pot with tapped pin

NdFeB, with rubber protective jacket



Material:
Housing, steel.
Magnetic core NdFeB (neodym).
Protective rubber jacket, synthetic rubber.

Version:
Housing, galvanized.
Black protective rubber jacket.

Sample order:
nlm 09114-01

Note:
Shallow pot magnets with tapped pin, shielded system. With rubber protective jacket for protecting sensitive surfaces. The coefficient of friction is increased by the rubber jacket so that high lateral friction is achieved.

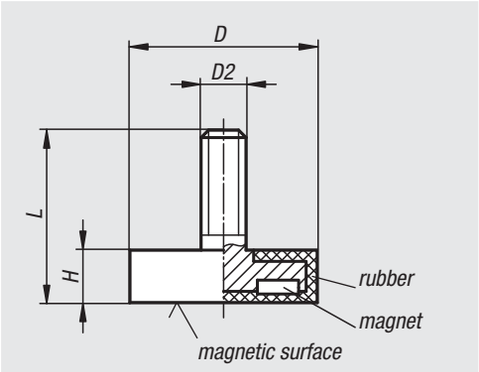
Temperature range:
max. 60°C.

Order No.	D	D1	D2	H	L	T	Magnetic force N
09114-01	12	8	M4	7	14,8	6	10
09114-02	22	8	M4	6	11,5	6	50
09114-03	31	8	M4	6	11,5	5	75
09114-04	43	8	M4	6	10,5	5	85
09114-05	66	10	M5	8,2	15	8	180
09114-06	88	12	M8	8,2	17	11	420

09116

Magnets shallow pot with threaded pin

NdFeB, with rubber protective jacket



Material:
Housing, steel.
Magnetic core NdFeB (neodym).
Protective rubber jacket, synthetic rubber.

Version:
Housing, galvanized.
Black protective rubber jacket.

Sample order:
nlm 09116-01

Note:
Shallow pot magnets with threaded pin, shielded system. With rubber protective jacket for protecting sensitive surfaces. The coefficient of friction is increased by the rubber jacket, so that high lateral friction is achieved.

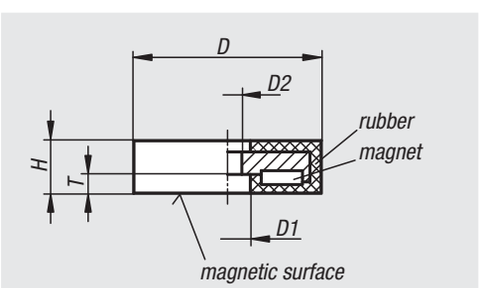
Temperature range:
max. 60°C

Order No.	D	D2	H	L	Magnetic force N
09116-01	22	M4	6	12,5	50
09116-02	43	M6	6	21	85
09116-03	66	M8	8,2	23	180
09116-04	88	M8	8,2	23,5	420

09118

Magnets shallow pot with through hole

NdFeB, with rubber protective jacket



Material:
Housing, steel.
Magnetic core NdFeB (neodym).
Protective rubber jacket, synthetic rubber.

Version:
Housing, galvanized.
Black protective rubber jacket.

Sample order:
nlm 09118-01

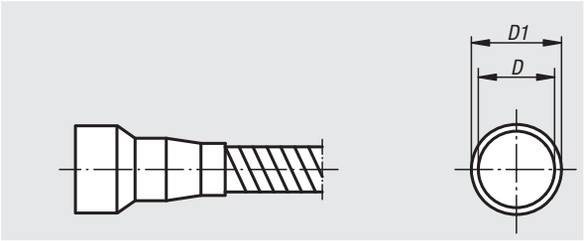
Note:
Shallow pot magnets, shielded system. With rubber protective jacket for protecting sensitive surfaces. The coefficient of friction is increased by the rubber jacket so that high lateral friction is achieved.

Temperature range:
max. 60°C.

Order No.	D	D1	D2	H	T	Magnetic force N
09118-01	22	8	4	6	3,5	35
09118-02	31	9	6	6	3,5	75
09118-03	43	12,8	7	6	4,2	85
09118-04	57	25,3	8	7,6	3,3	175
09118-05	66	22	5,5	8,5	3,2	210

09150

Magnets pickup



Version:
Strong permanent magnet with flexible brass tube and black plastic grip. Surface chromed.

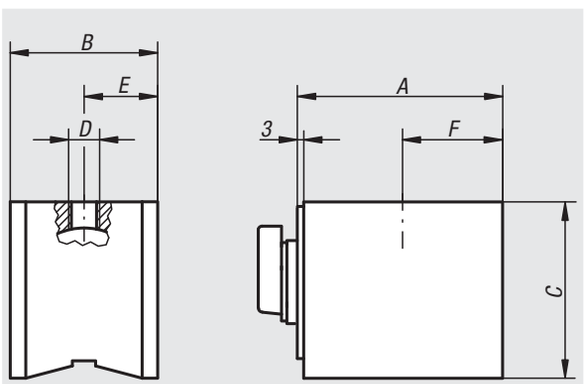
Sample order:
nlm 09150-04

Note:
Pickup magnetics are primarily used for removing or searching for steel parts in inaccessible places.

Order No.	Size	D	D1	total length mm	Magnetic force N
09150-01	1	6	8	450	5
09150-02	2	10	12	450	10
09150-03	3	13	15	520	18
09150-04	4	17	19	520	30

09210

Magnetic base permanent



Version:
Permanent magnetic base with high magnetic force.
On / off switch.
Surface black.

Sample order:
nlm 09210-03

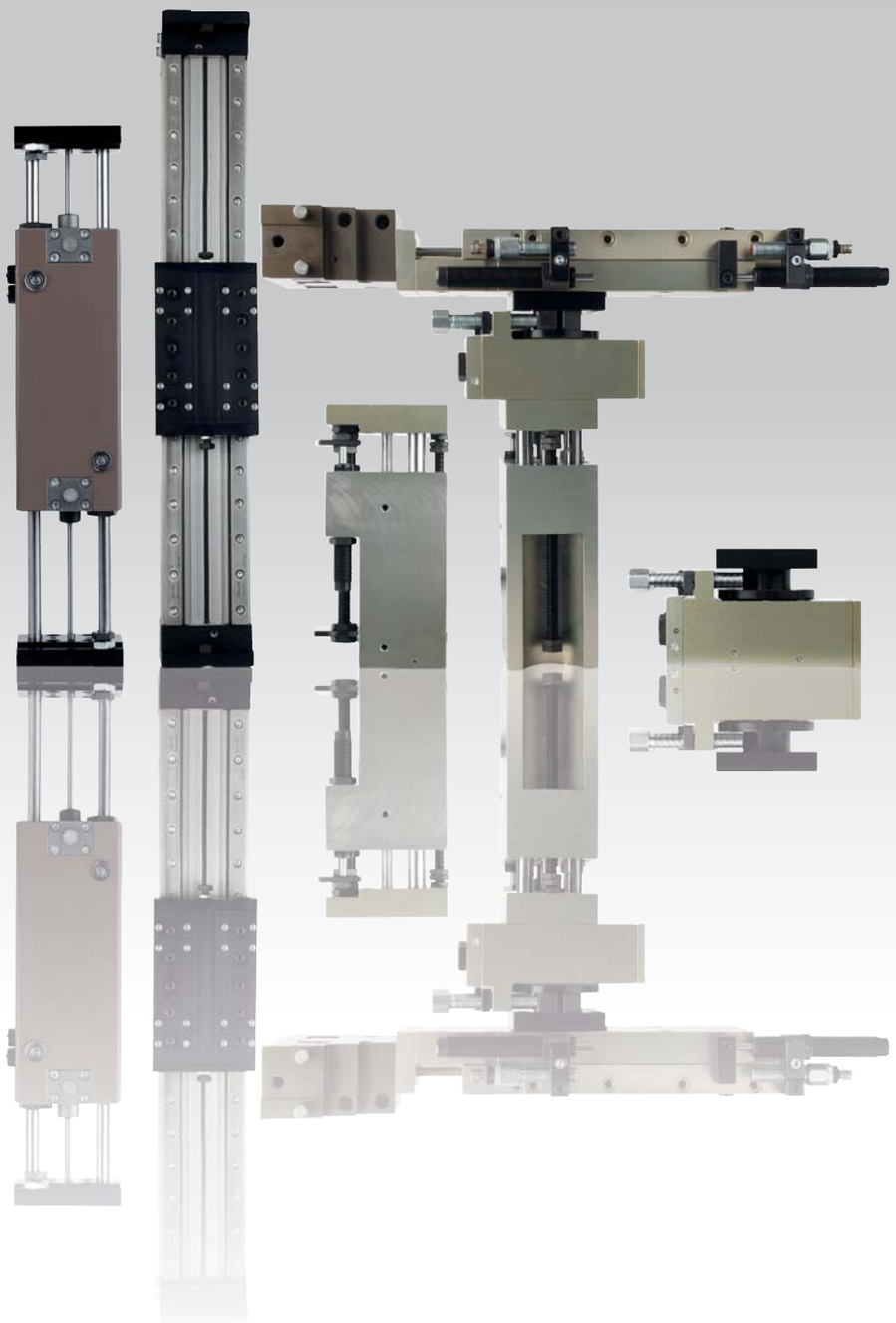
Note:
Permanent magnetic bases are used in fixtures as retaining magnets, as gauge stands etc.

Order No.	A	B	C	D	E	F	Magnetic force N
09210-01	61	50	55	M8x8	25	29	600
09210-02	76	50	55	M8x8	25	36,5	900
09210-03	76	50	55	M10x8	25	36,5	900

Notes

20000

Linear modules
Lifting units
Rotary modules
Grip modules
Inductive proximity switches
Plug connectors



Notes

Technical information for pneumatic linear modules with round guides

Housing:
Hard coated aluminium alloy with high corrosion resistance and surface hardness.

Flange plates:
Aluminium alloy. Weight reduction, no oxidation.

Mounting surfaces:
Three mounting faces with mounting and locating holes on the housing and flange plates for flexible application.

Fastening thread:
All fastening threads in the housing are reinforced with threaded inserts.

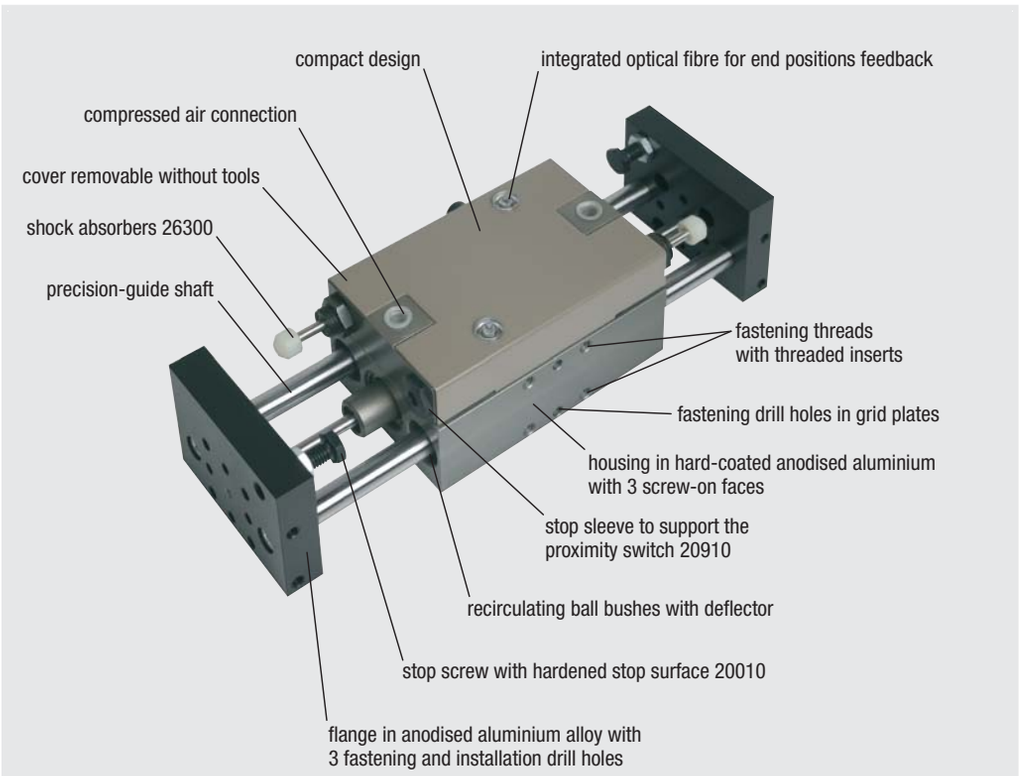
Guidance:
Ball guide bushing and precision steel shafts. Extremely precise and quiet run at high speeds. Low friction values due to rolling friction, low moving force, low wear. No stick-slip phenomena.

Piston bores:
Fine honed piston bores ensure a long lifespan of the piston seals.

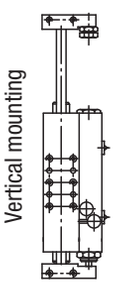
Piston seals:
The double grooved rings undertake ancillary sealing and guidance functions and guarantee optimal sealing at full pressure.

Advantages:
- Locating holes for highest fitting accuracy of the modules with each. All modules can be combined without intermediate plates (see combination table.
- Compact design, double action cylinder, integrated shock absorber and proximity switch.
- Assembly and maintenance friendly. Cover removable without tools.
- Any mounting position.
- Integrated fibre optics make the LED indicators easily visible from most perspectives.
- Optionally available with integrated stroke deviation safeguard to secure production.

The drive is a double-acting cylinder integrated in the carriage. Four sizes with two or three guide shafts and travel of 40 to 300 mm are available. The large dimensioned guide shafts with ball-bearing guides allow load bearing capacities up to max. 1080 N and repeat accuracies of ±0.01 mm are realisable.



Combination possibilities without intermediate plate



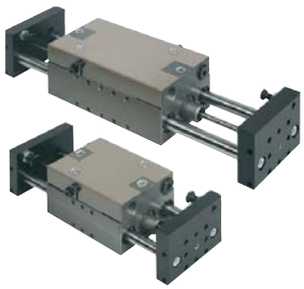
	Horizontal mounting			
	Size 1	Size 2	Size 3	Size 5
Size 1	X	X	X	
Size 2		X	X	X
Größe 3			X	X
Size 5				X

Unlisted combinations are possible with intermediate plates.

In principle, linear module combinations in all stroke variants and sizes are possible. However, in horizontal applications it is better to use modules of the same size or larger.

Pneumatic linear modules

with two round guides

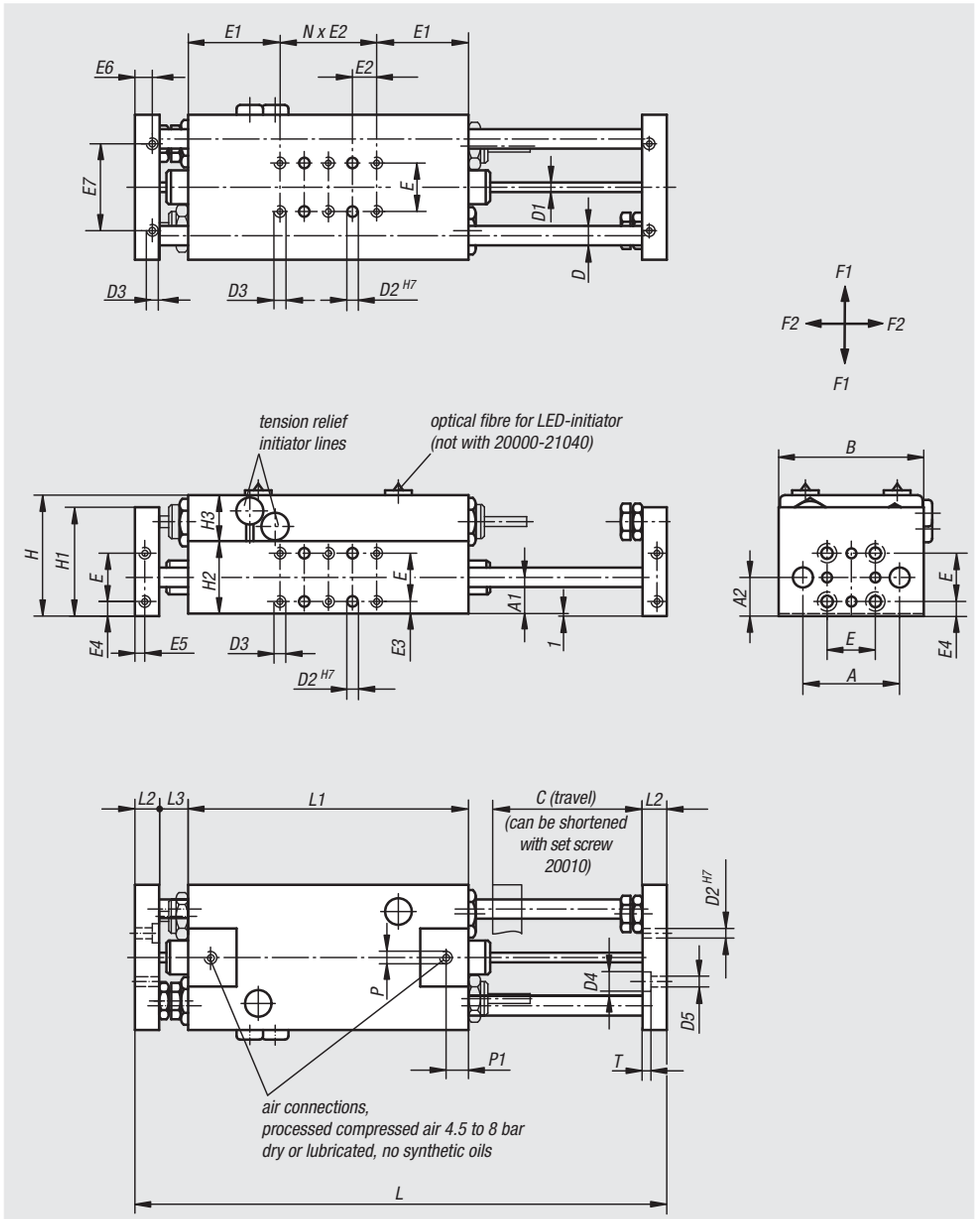


Material:
Body and flange plate EN AW-5754.
Guide shafts steel

Version:
Body, hard-coated
Flange plates, anodized.
Guide shaft, hardened.

Sample order:
nlm 20000-21040

Note:
Maintenance-free pneumatic linear modules with two precision steel shafts and ball guide bushing with wipers. Double acting cylinder drive. All fastening threads have threaded inserts. The as accessory available shock absorbers and proximity switches can be integrated (no protruding edges). Positive fit construction for hundred per cent reproducibility. Combinations in all sizes and stroke variants are feasible without adapter plates.
Repeat accuracies of ±0.01 mm are possible.
Specified loads apply by centred carriages.



Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20000-21040	1	26300-1415010	20910-010X5000	-
20000-21060	1	26300-1415010	20910-020	20950-030X2000
20000-21080	1	26300-1415010	20910-020	20950-030X2000
20000-21100	1	26300-1415010	20910-020	20950-030X2000
20000-22060	2	26300-1415010	20910-020	20950-030X2000
20000-22090	2	26300-1415010	20910-030	20950-030X2000
20000-22120	2	26300-1415010	20910-030	20950-030X2000
20000-22150	2	26300-1415010	20910-030	20950-030X2000
20000-23080	3	26300-2015016	20910-030	20950-030X2000
20000-23120	3	26300-2015016	20910-030	20950-030X2000
20000-23160	3	26300-2015016	20910-030	20950-030X2000
20000-23200	3	26300-2015016	20910-030	20950-030X2000
20000-25120	5	26300-2515030	20910-030	20950-030X2000
20000-25180	5	26300-2515030	20910-030	20950-030X2000
20000-25240	5	26300-2515030	20910-030	20950-030X2000
20000-25300	5	26300-2515030	20910-030	20950-030X2000

Pneumatic linear modules

with two round guides

Temperature range:
+5 °C up to +80 °C

On request:
Available with locking cartridge as stroke deviation safeguard.

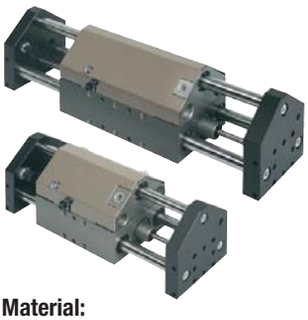
Accessories:
See table for shock absorber, proximitiy switch and plug connector.

Order No.	Size	A	A1	A2	B	C (travel)	D	D1	D2	D3	D4	D5	E	E1	E2	E3	E4	E5	E6	E7
20000-21040	1	40	15	16	60	40	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-21060	1	40	15	16	60	60	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-21080	1	40	15	16	60	80	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-21100	1	40	15	16	60	100	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-22060	2	55	20	21	82	60	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-22090	2	55	20	21	82	90	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-22120	2	55	20	21	82	120	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-22150	2	55	20	21	82	150	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-23080	3	70	25	26	100	80	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-23120	3	70	25	26	100	120	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-23160	3	70	25	26	100	160	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-23200	3	70	25	26	100	200	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-25120	5	104	38	39	150	120	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-25180	5	104	38	39	150	180	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-25240	5	104	38	39	150	240	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-25300	5	104	38	39	150	300	25	12	10	M10	18	11	60	72	30	8	9	8	17	96

Order No.	Size	H	H1	H2	H3	L	L1	L2	L3	N (number)	P	P1	T	F1 max. kN	F2 max. kN	Piston force at 6 bar (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)
20000-21040	1	50	45	30	19	180	96	12	10	2	M5	9,3	3	0,140	0,380	100	16	11,3
20000-21060	1	50	45	30	19	220	116	12	10	4	M5	9,3	3	0,090	0,260	100	16	17
20000-21080	1	50	45	30	19	260	136	12	10	6	M5	9,3	3	0,050	0,180	100	16	22,6
20000-21100	1	50	45	30	19	300	156	12	10	8	M5	9,3	3	0,025	0,125	100	16	28,3
20000-22060	2	64	60	40	23	254	120	16	21	2	G 1/8	9,9	5,7	0,300	0,610	250	25	56
20000-22090	2	64	60	40	23	314	150	16	21	4	G 1/8	9,9	5,7	0,160	0,350	250	25	84
20000-22120	2	64	60	40	23	374	180	16	21	6	G 1/8	9,9	5,7	0,080	0,240	250	25	112
20000-22150	2	64	60	40	23	434	210	16	21	8	G 1/8	9,9	5,7	0,045	0,160	250	25	140
20000-23080	3	77	70	50	26	300	140	20	20	2	G 1/8	9,5	5	0,460	0,840	407	32	118
20000-23120	3	77	70	50	26	380	180	20	20	4	G 1/8	9,5	5	0,240	0,520	407	32	178
20000-23160	3	77	70	50	26	460	220	20	20	6	G 1/8	9,5	5	0,120	0,320	407	32	236
20000-23200	3	77	70	50	26	540	260	20	20	8	G 1/8	9,5	5	0,070	0,200	407	32	295
20000-25120	5	112	100	76	35	420	204	25	23	2	G 1/4	14	7	0,750	1,080	660	40	354,6
20000-25180	5	112	100	76	35	540	264	25	23	4	G 1/4	14	7	0,420	0,700	660	40	531,8
20000-25240	5	112	100	76	35	660	324	25	23	6	G 1/4	14	7	0,250	0,480	660	40	709,1
20000-25300	5	112	100	76	35	780	384	25	23	8	G 1/4	14	7	0,160	0,360	660	40	886,4

Linear modules pneumatic

with three round guides

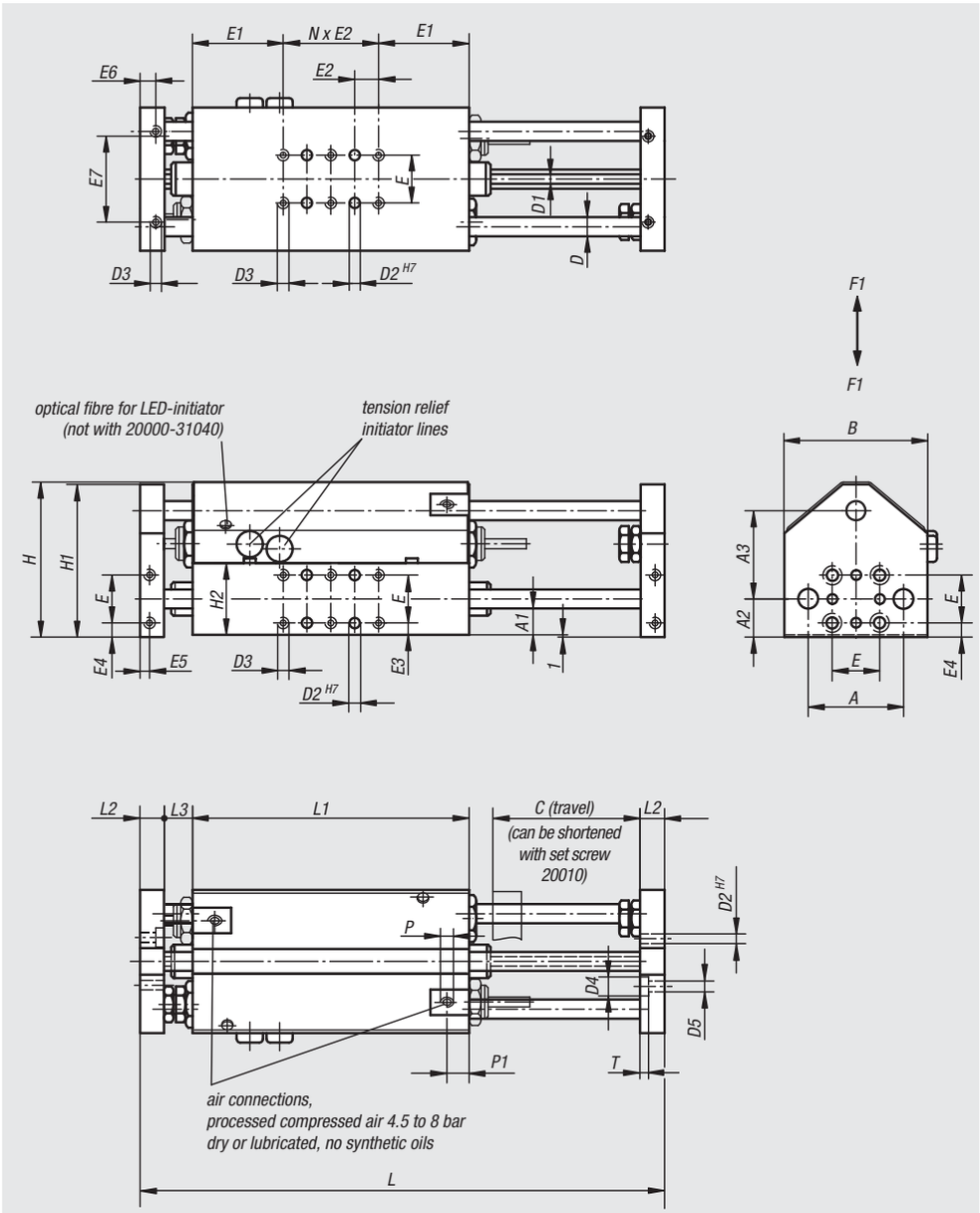


Material:
Body and flange plate EN AW-5754.
Guide shafts steel

Version:
Body, hard-coated
Flange plates, anodized.
Guide shaft, hardened.

Sample order:
nlm 20000-31040

Note:
Maintenance-free pneumatic linear modules with three precision steel shafts and ball guide bushing with wipers. Double acting cylinder drive. All fastening threads have threaded inserts. The as accessory available shock absorbers and proximity switches can be integrated (no protruding edges). Positive fit construction for hundred per cent reproducibility. Combinations in all sizes and stroke variants are feasible without adapter plates.
Repeat accuracies of ±0.01 mm are possible.
Specified loads apply by centred carriages.



Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20000-31040	1	26300-1415010	20910-010X5000	-
20000-31060	1	26300-1415010	20910-020	20950-030X2000
20000-31080	1	26300-1415010	20910-020	20950-030X2000
20000-31100	1	26300-1415010	20910-020	20950-030X2000
20000-32060	2	26300-1415010	20910-020	20950-030X2000
20000-32090	2	26300-1415010	20910-030	20950-030X2000
20000-32120	2	26300-1415010	20910-030	20950-030X2000
20000-32150	2	26300-1415010	20910-030	20950-030X2000
20000-33100	3	26300-2015016	20910-030	20950-030X2000
20000-33120	3	26300-2015016	20910-030	20950-030X2000
20000-33160	3	26300-2015016	20910-030	20950-030X2000
20000-33200	3	26300-2015016	20910-030	20950-030X2000
20000-35120	5	26300-2515030	20910-030	20950-030X2000
20000-35180	5	26300-2515030	20910-030	20950-030X2000
20000-35240	5	26300-2515030	20910-030	20950-030X2000
20000-35300	5	26300-2515030	20910-030	20950-030X2000

Linear modules pneumatic

with three round guides

Temperature range:
+5 °C up to +80 °C

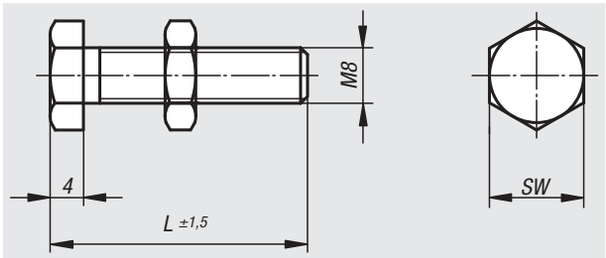
On request:
Available with locking cartridge as stroke deviation safeguard.

Accessories:
See table for shock absorber, proximitiy switch and plug connector.

Order No.	Size	A	A1	A2	A3	B	C (travel)	D	D1	D2	D3	D4	D5	E	E1	E2	E3	E4	E5	E6	E7
20000-31040	1	40	15	16	37	60	40	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-31060	1	40	15	16	37	60	60	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-31080	1	40	15	16	37	60	80	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-31100	1	40	15	16	37	60	100	8	4	4	M4	8	4,5	20	38	10	5	6	4	9	36
20000-32060	2	55	20	21	50	82	60	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-32090	2	55	20	21	50	82	90	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-32120	2	55	20	21	50	82	120	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-32150	2	55	20	21	50	82	150	12	6	5	M5	10	5,5	30	45	15	5	6	5	11	50
20000-33100	3	70	25	26	62	100	80	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-33120	3	70	25	26	62	100	120	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-33160	3	70	25	26	62	100	160	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-33200	3	70	25	26	62	100	200	16	8	6	M6	11	6,6	40	50	20	5	6	6	14	70
20000-35120	5	104	38	39	93	150	120	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-35180	5	104	38	39	93	150	180	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-35240	5	104	38	39	93	150	240	25	12	10	M10	18	11	60	72	30	8	9	8	17	96
20000-35300	5	104	38	39	93	150	300	25	12	10	M10	18	11	60	72	30	8	9	8	17	96

Order No.	Size	H	H1	H2	L	L1	L2	L3	N (number)	P	P1	T	F1 max. kN	Piston force at 6 bar (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)
20000-31040	1	65	64	30	180	96	12	10	2	M5	9,3	3	0,380	100	16	11,3
20000-31060	1	65	64	30	220	116	12	10	4	M5	9,3	3	0,260	100	16	17
20000-31080	1	65	64	30	260	136	12	10	6	M5	9,3	3	0,180	100	16	22,6
20000-31100	1	65	64	30	300	156	12	10	8	M5	9,3	3	0,125	100	16	28,3
20000-32060	2	86	85	40	254	120	16	21	2	G 1/8	9,9	5,7	0,610	250	25	56
20000-32090	2	86	85	40	314	150	16	21	4	G 1/8	9,9	5,7	0,350	250	25	84
20000-32120	2	86	85	40	374	180	16	21	6	G 1/8	9,9	5,7	0,240	250	25	112
20000-32150	2	86	85	40	434	210	16	21	8	G 1/8	9,9	5,7	0,160	250	25	140
20000-33100	3	107	106	50	300	140	20	20	2	G 1/8	9,5	5	0,840	407	32	118
20000-33120	3	107	106	50	380	180	20	20	4	G 1/8	9,5	5	0,520	407	32	178
20000-33160	3	107	106	50	460	220	20	20	6	G 1/8	9,5	5	0,320	407	32	236
20000-33200	3	107	106	50	540	260	20	20	8	G 1/8	9,5	5	0,200	407	32	295
20000-35120	5	159	158	76	420	204	25	23	2	G 1/4	14	7	1,080	660	40	354,6
20000-35180	5	159	158	76	540	264	25	23	4	G 1/4	14	7	0,700	660	40	531,8
20000-35240	5	159	158	76	660	324	25	23	6	G 1/4	14	7	0,480	660	40	709,1
20000-35300	5	159	158	76	780	384	25	23	8	G 1/4	14	7	0,360	660	40	886,4

Stop screws



Material:
Steel.

Version:
Stop screw black oxidised.
Stop face hardened.
Nut galvanized.

Sample order:
nlm 20010-08017

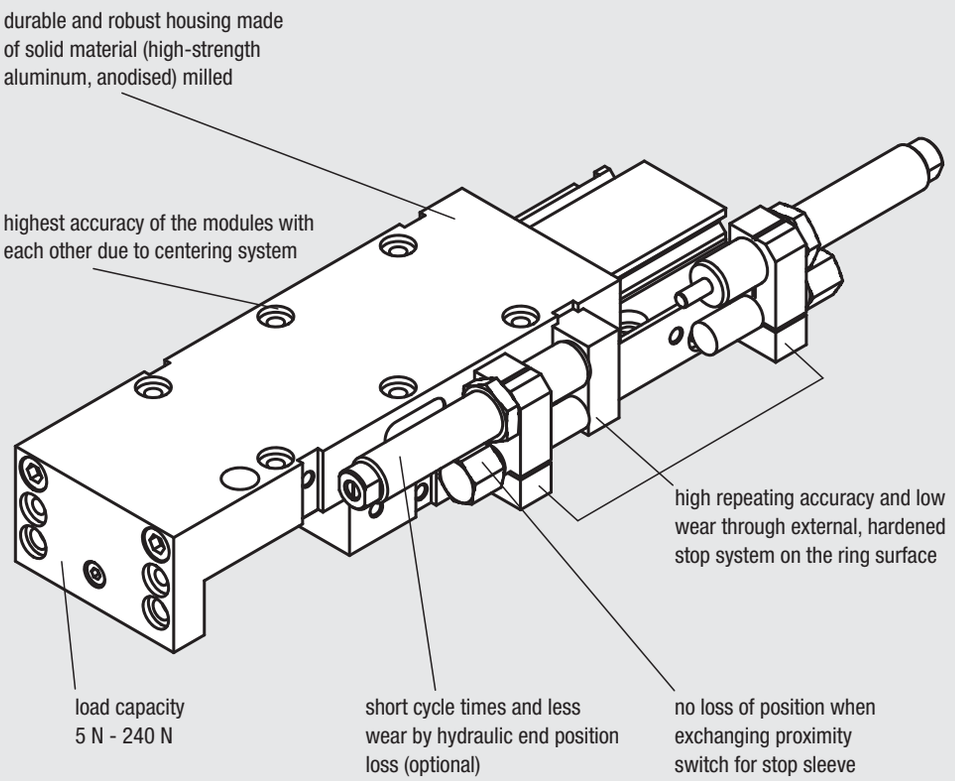
Note:
Stop screws are for reducing the nominal stroke of pneumatic linear modules with two or three round guides.

Order No.	L	SW
20010-08017	17	13
20010-08022	22	13
20010-08027	27	13
20010-08032	32	13
20010-08035	35	13
20010-08045	45	13
20010-08055	55	13
20010-08065	65	13
20010-08073	73	13
20010-08088	88	13

Technical information for pneumatic linear modules with rail guide

The linear modules can be mounted in any position. The standardised fastening holes allow diverse combinations with our other units. The precise centring system allows all modules to be combined with one another quickly and easily. No adapter plate required for same size combinations.

– piston force at 6 bar: 11 N – 76 N.
– cylinder diameter: 6 mm – 16 mm.
– stroke lengths: 20 mm – 200 mm.
– repeat accuracy: ±0.01 mm.
– diverse fastening possibilities.
– recirculating linear ball bearings for heavy loads and positioning accuracy and quiet operation.
– cross roller guide for high torque loads and precision.



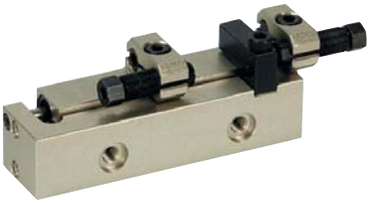
Travel times			
norelem	**Stroke lengths (mm)**	**Load (kg)**	**time / cycle**
20030	20 / 35 / 50	0,250	0,2 s / 0,3 s / 0,4 s
20032	35 / 65	0,500	0,3 s / 0,45 s
20034	30 / 60 / 90	1,000	0,3 s / 0,4 s / 0,5 s
20036	50 / 100 / 150 / 200	5,000	0,5 s / 0,65 s / 0,8 s / 0,95 s

The specified guide values for cycle times were ascertained under operation specific conditions and represent effective values.

Selection overview				
Guidance	Recirculating balls		Cross roller	
Design	for smallest installations	for small installations	-	-
Stroke lengths (mm)	20 / 35 / 50	35 / 65	20 / 30 / 45 / 60 / 75 / 90	30 / 50 / 75 / 100 / 125 / 150 /200
Piston force at 6 bar (N)	11	18	33	76
Cylinder Ø (mm)	6	8	12	16
Load bearing max. (N)	5	12	33	100 - 240
norelem	**20030**	**20032**	**20034**	**20036**

Linear modules pneumatic

with rail guide



Material:
Housing high-strength aluminium.
Stop system steel.

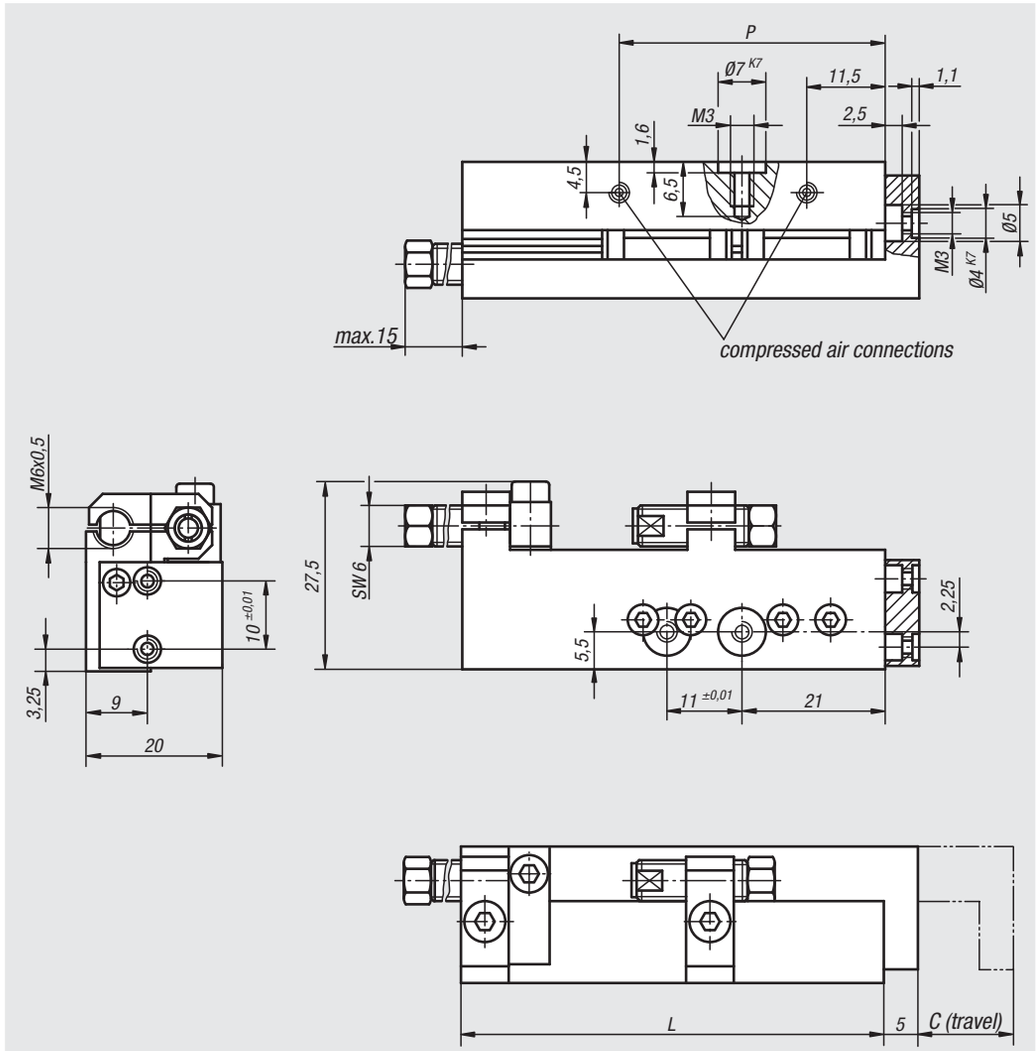
Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20030-2020

Note:
Maintenance-free pneumatic linear modules for the smallest installation spaces with recirculating ball bearing guide and load capacity of max. 5 N.
Control by 4/2 or 5/2 directional valve.
Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection M3.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.
The position of the stop system is variable.

Repeat accuracy ±0.01 mm.

Accessories:
See table for shock absorbers and proximity switches.



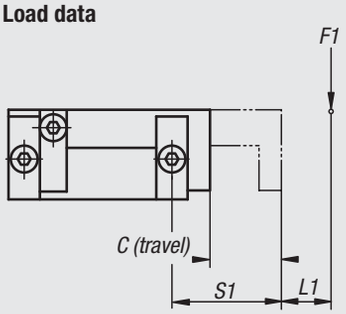
Order No.	Size	C (travel)	L	P	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)
20030-2020	2	20	62	39	11	7	6	8,8
20030-2035	2	35	77	63	11	7	6	15,4
20030-2050	2	50	92	69	11	7	6	22

Order No.	Size	Suitable shock absorber	Suitable proximity switch
20030-2020	2	26310-0605005	20900-010X2000
20030-2035	2	26310-0605005	20900-010X2000
20030-2050	2	26310-0605005	20900-010X2000

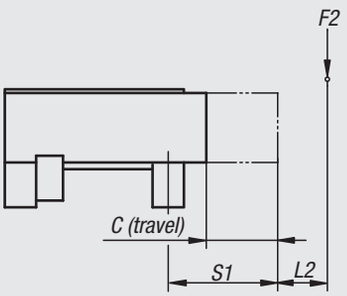
Linear modules pneumatic

with rail guide

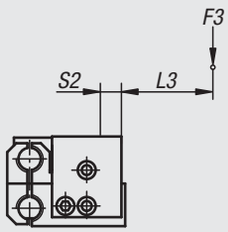
Load data



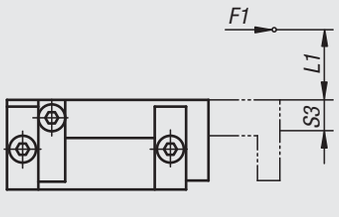
M1 = (S1 + L1) x F1



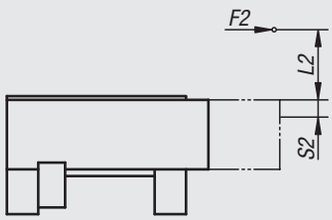
M2 = (S1 + L2) x F2



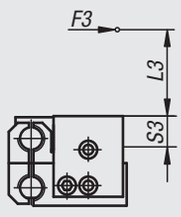
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

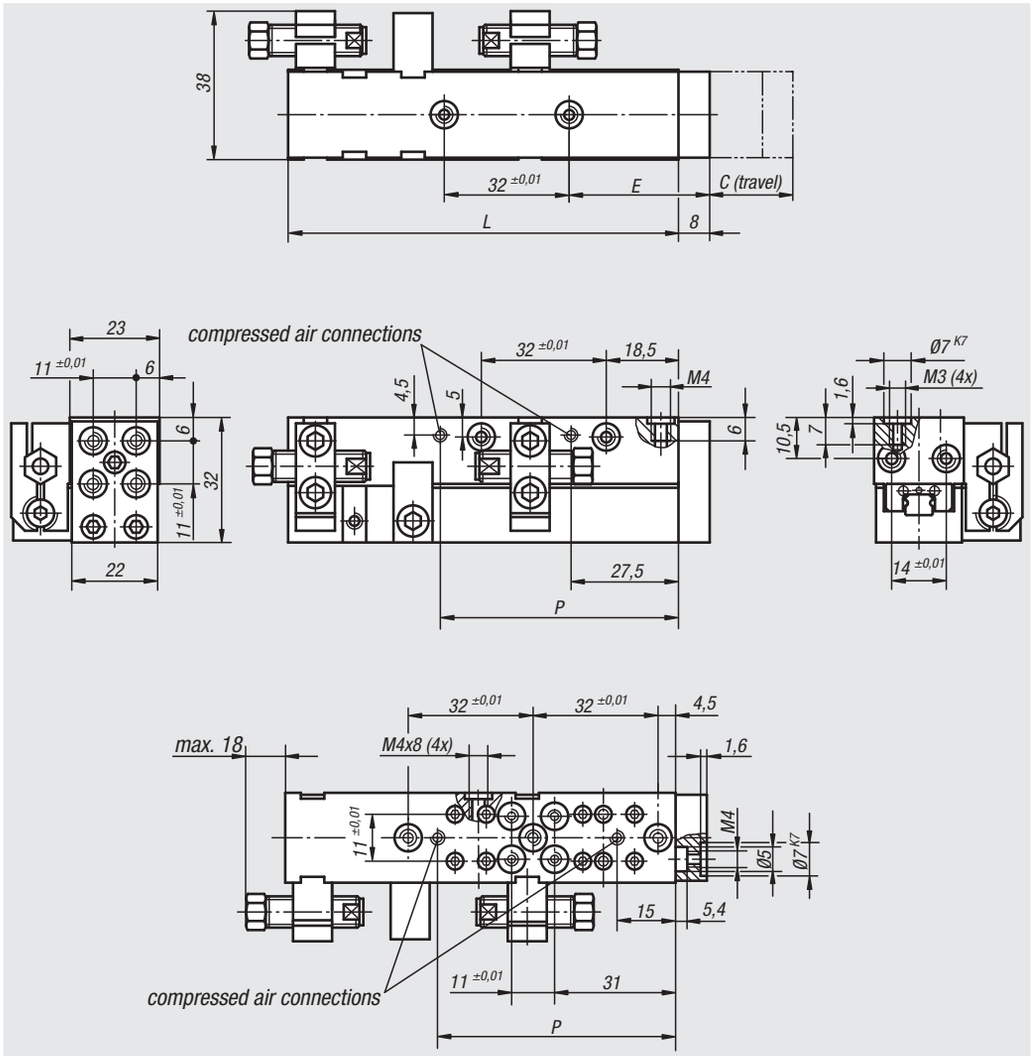
$$L = \left(\frac{C}{F}\right)^3 \times 10^5$$

L = lifespan (m)
C = dynamic base load (N)
F = dynamic load (N)

Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3	Dynamic load rating N	Static load rating N
20030-2020	2	4	4	2	9 + C (travel)	3,5	7	541	951
20030-2035	2	4	4	2	9 + C (travel)	3,5	7	541	951
20030-2050	2	4	4	2	9 + C (travel)	3,5	7	541	951

Linear modules pneumatic

with rail guide



Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20032-4035

Note:
Maintenance-free pneumatic linear modules for small installation spaces with recirculating ball bearing guide and load capacity of max. 12 N. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.
The position of the stop system is variable.

Repeat accuracy ±0.01 mm.

Accessories:
See table for shock absorbers and proximity switches.

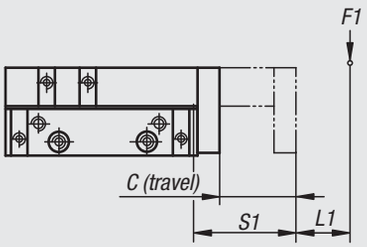
Order No.	Size	C (travel)	E	L	P	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Approx. weight kg
20032-4035	4	35	36	100	61	18	13	8	30,8	0,200
20032-4065	4	65	51	130	91	18	13	8	57,2	0,300

Order No.	Size	Suitable shock absorber	Suitable proximity switch
20032-4035	4	26300-0810008	20900-020X5000
20032-4065	4	26300-0810008	20900-020X5000

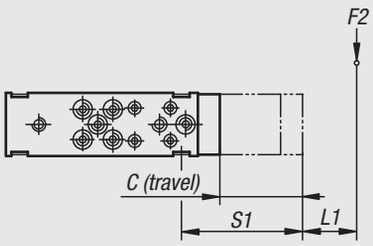
Linear modules pneumatic

with rail guide

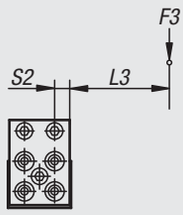
Load data



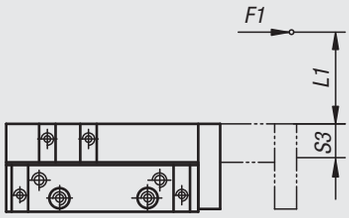
M1 = (S1 + L1) x F1



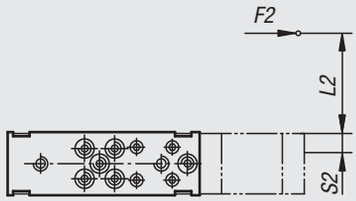
M2 = (S1 + L2) x F2



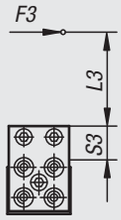
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

$$L = \left(\frac{C}{F}\right)^3 \times 10^5$$

L = lifespan (m)
C = dynamic base load (N)
F = dynamic load (N)

Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3	Dynamic load rating N	Static load rating N
20032-4035	4	8	8	4	13 + C (travel)	7,5	10	1200	1960
20032-4065	4	8	8	4	13 + C (travel)	7,5	10	1200	1960

Linear modules pneumatic

with rail guide

Material:
Housing high-strength aluminium.
Stop system steel.

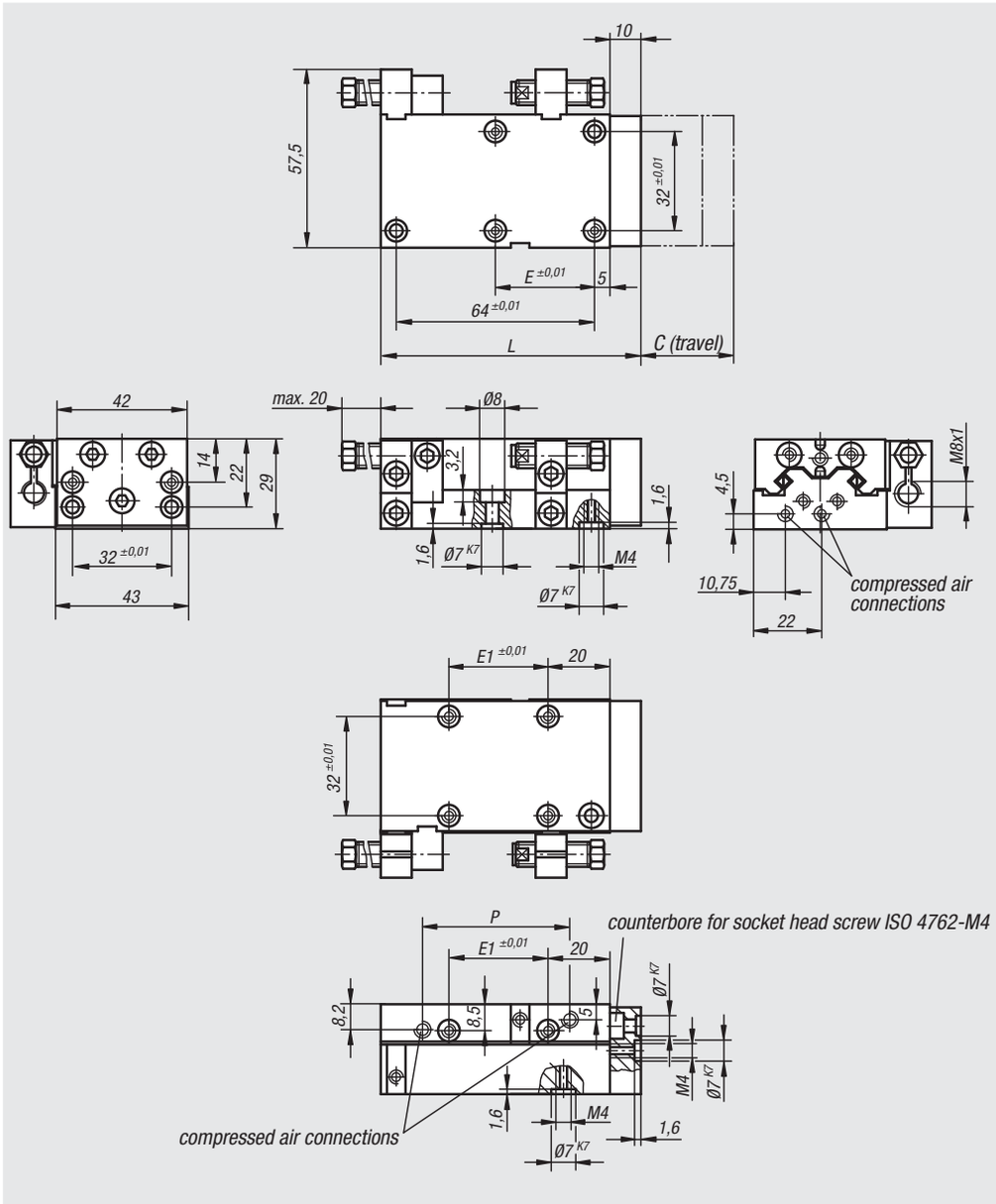
Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20034-4020

Note:
Maintenance-free pneumatic linear modules with recirculating ball bearing guide and load capacity of max. 30 N.
Control by 4/2 or 5/2 directional valve.
Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection M5.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.
The position of the stop system is variable.

Repeat accuracy ±0.01 mm.

Accessories:
See table for shock absorbers and proximity switches.



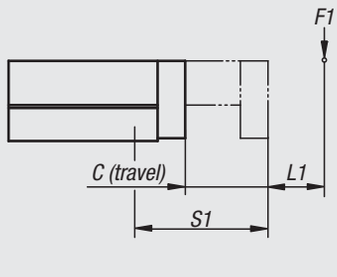
Order No.	Size	C (travel)	E	E1	L	P	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20034-4020	4	20	1 x 32	1 x 32	84	47,5	33	45	12	4
20034-4030	4	30	1 x 32	1 x 32	84	47,5	33	45	12	6
20034-4045	4	45	2 x 32	2 x 32	104	55	33	45	12	10,5
20034-4060	4	60	3 x 32	2 x 32	124	78,5	33	45	12	15
20034-4075	4	75	3 x 32	2 x 32	144	85	33	45	12	21,5
20034-4090	4	90	4 x 32	3 x 32	164	110,5	33	45	12	28

Order No.	Size	Suitable shock absorber	Suitable proximity switch
20034-4020	4	26300-0810008	20900-020X5000
20034-4030	4	26300-0810008	20900-020X5000
20034-4045	4	26300-0810008	20900-020X5000
20034-4060	4	26300-0810008	20900-020X5000
20034-4075	4	26300-0810008	20900-020X5000
20034-4090	4	26300-0810008	20900-020X5000

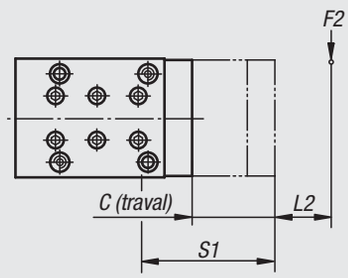
Linear modules pneumatic

with rail guide

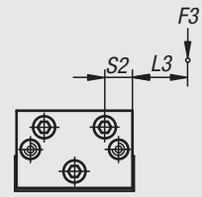
Load data



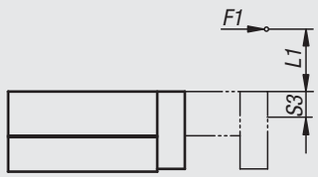
M1 = (S1 + L1) x F1



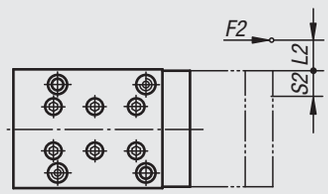
M2 = (S1 + L2) x F2



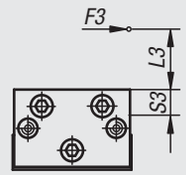
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3
20034-4020	4	12	12	17	29 + stroke C/2	9	13
20034-4030	4	12	12	17	29 + stroke C/2	9	13
20034-4045	4	15	15	20	36 + stroke C/2	9	13
20034-4060	4	18	18	23	44 + stroke C/2	9	13
20034-4075	4	21	21	26	51 + stroke C/2	9	13
20034-4090	4	25	25	29	59 + stroke C/2	9	13

Linear modules pneumatic

with rail guide

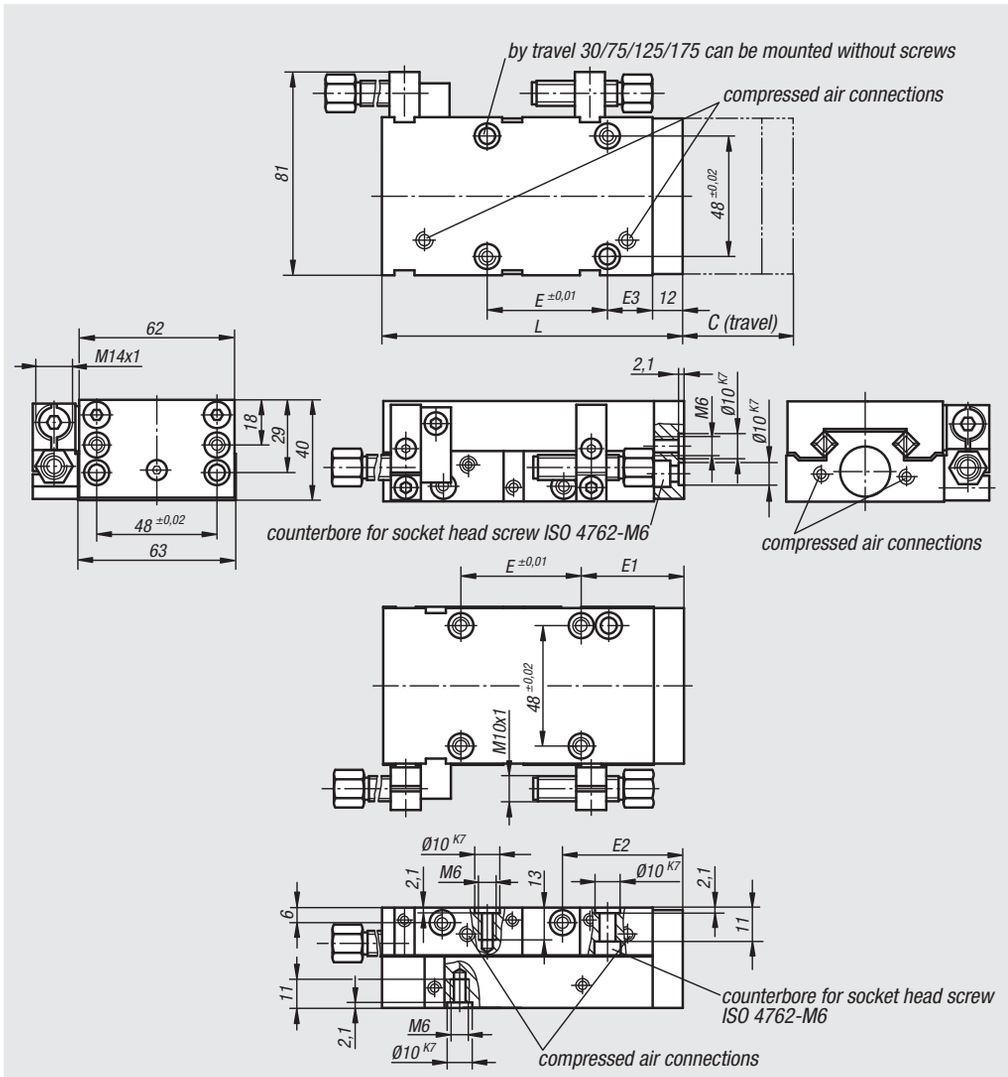
Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20036-6030

Note:
Maintenance-free pneumatic linear modules with recirculating ball bearing guide and load capacity of max. 240 N.
Control by 4/2 or 5/2 directional valve.
pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection M5.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.
The position of the stop system is variable.

Repeat accuracy ±0.01 mm.



Order No.	Size	C (travel)	E	E1	E2	E3	L	Load capacity N	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)
20036-6030	6	30	1 x 48	29	36	18	121	240	76	66	16	11,2
20036-6050	6	50	1 x 48	29	36	18	121	220	76	66	16	18,7
20036-6075	6	75	2 x 48	35	42	21	175	200	76	66	16	28
20036-6100	6	100	2 x 48	35	42	21	175	180	76	66	16	37,4
20036-6125	6	125	3 x 48	17	45	27	231	160	76	66	16	46,8
20036-6150	6	150	3 x 48	17	45	27	231	140	76	66	16	56,1
20036-6175	6	175	4 x 48	26	52	34	288	120	76	66	16	65,5
20036-6200	6	200	4 x 48	26	52	34	288	100	76	66	16	74,8

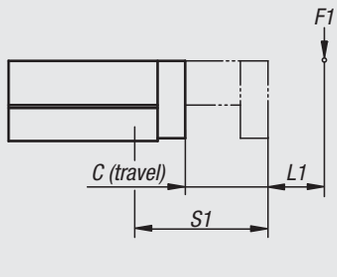
Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20036-6030	6	26310-1410012	20915-020	20950-010X2000
20036-6050	6	26310-1410012	20915-020	20950-010X2000
20036-6075	6	26310-1410012	20915-020	20950-010X2000
20036-6100	6	26310-1410012	20915-020	20950-010X2000
20036-6125	6	26310-1410012	20915-020	20950-010X2000
20036-6150	6	26310-1410012	20915-020	20950-010X2000
20036-6175	6	26310-1410012	20915-020	20950-010X2000
20036-6200	6	26310-1410012	20915-020	20950-010X2000

Linear modules pneumatic

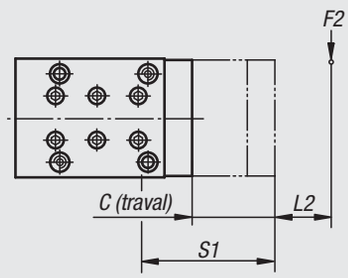
with rail guide

Accessories:
See table for shock absorbers, proximity switches and plug connectors.

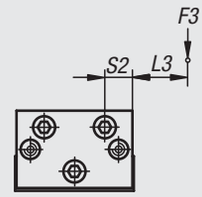
Load data



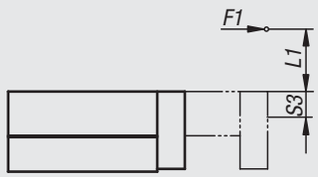
M1 = (S1 + L1) x F1



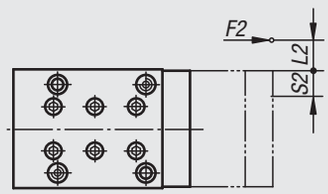
M2 = (S1 + L2) x F2



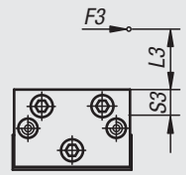
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

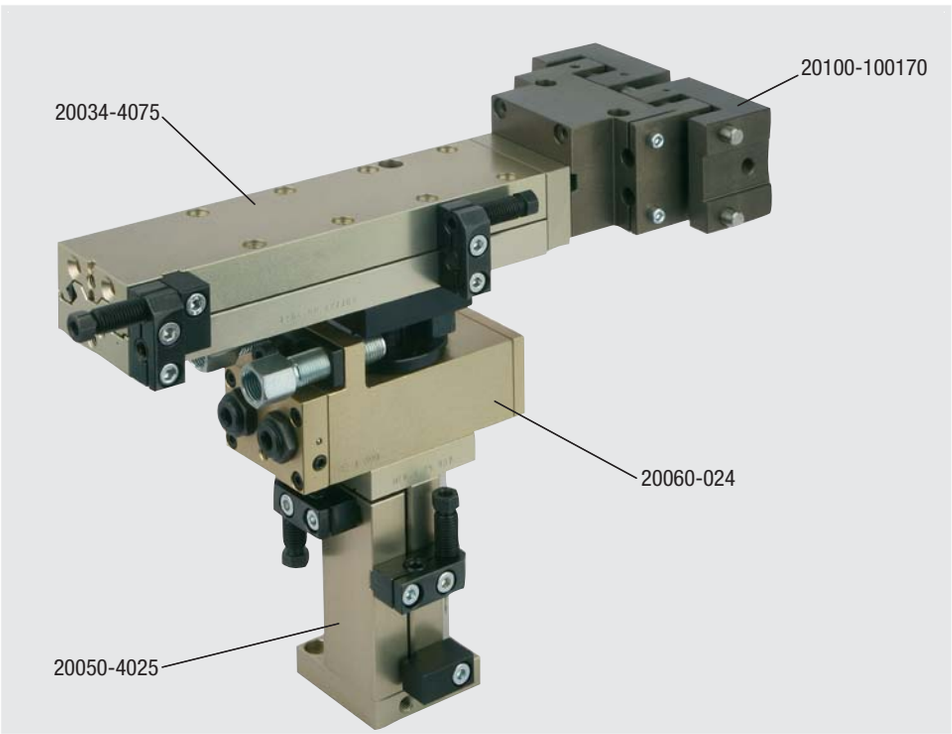
Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3
20036-6030	6	33,2	33,2	44,6	45 + stroke C/2	14	16
20036-6050	6	33,2	33,2	44,6	45 + stroke C/2	14	16
20036-6075	6	38,7	38,7	59,5	70 + stroke C/2	14	16
20036-6100	6	38,7	38,7	59,5	70 + stroke C/2	14	16
20036-6125	6	44,2	44,2	59,5	95 + stroke C/2	14	16
20036-6150	6	44,2	44,2	59,5	95 + stroke C/2	14	16
20036-6175	6	49,7	49,7	74,4	120 + stroke C/2	14	16
20036-6200	6	49,7	49,7	74,4	120 + stroke C/2	14	16

Construction of a lift-swivel unit made of four same size modules



Technical information for pneumatic lifting units

Highly robust lifting units for universal application as short stroke modules. The standardised fastening holes allow diverse combinations with our other units. Precise centring system allows all modules to be combined with one another quickly and easily. Same size combinations without adapter plates.

– piston force at 6 bar: 80 N – 360 N.

– cylinder diameter: 16 mm – 32 mm.

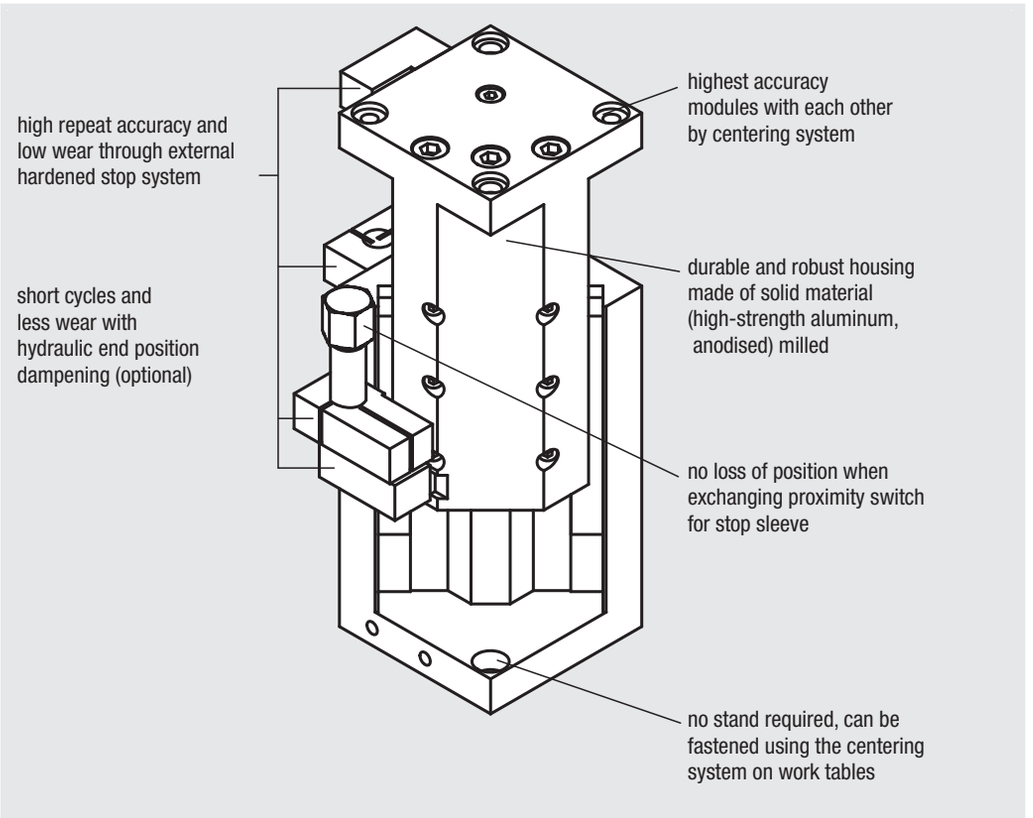
– stroke lengths: 10 mm – 100 mm.

– repeat accuracy: up to ±0.01 mm.

– diverse fastening possibilities.

– double junction rolling guide for high torque loads and precision.

– ball-bearing guide sealed for hard application conditions with high precision.



Travel times				
norelem	**Size**	**Travel lengths (mm)**	**Load (kg)**	**time / cycle (with shock absorbers)**
20050	4	10 / 25	0,200	0,3 s / 0,4 s
20050	6	25 / 50	0,200	0,3 s / 0,4 s
20054	6	50 / 75 / 100	5,000	0,5 s / 0,7 s / 0,8 s
20056	9	50 / 75 / 100	10,000	0,5 s / 0,7 s / 0,9 s

The specified guide values for cycle times were ascertained under operation specific conditions and represent effective values.

Selection overview				
Guidance	Cross roller		Sealed ball guide	
Design	compact	compact	robust	robust
Size	4	6	6	6
Travel lengths (mm)	10 / 25	25 / 50	50 / 75 / 100	50 / 75 / 100
Piston force at 6 bar (N)	80	185	220	360
Cylinder Ø (mm)	16	25	25	32
norelem	**20050**	**20050**	**20054**	**20056**

Lifting units, pneumatic

with rail guide

Material:
Housing high-strength aluminium.
Stop system steel.

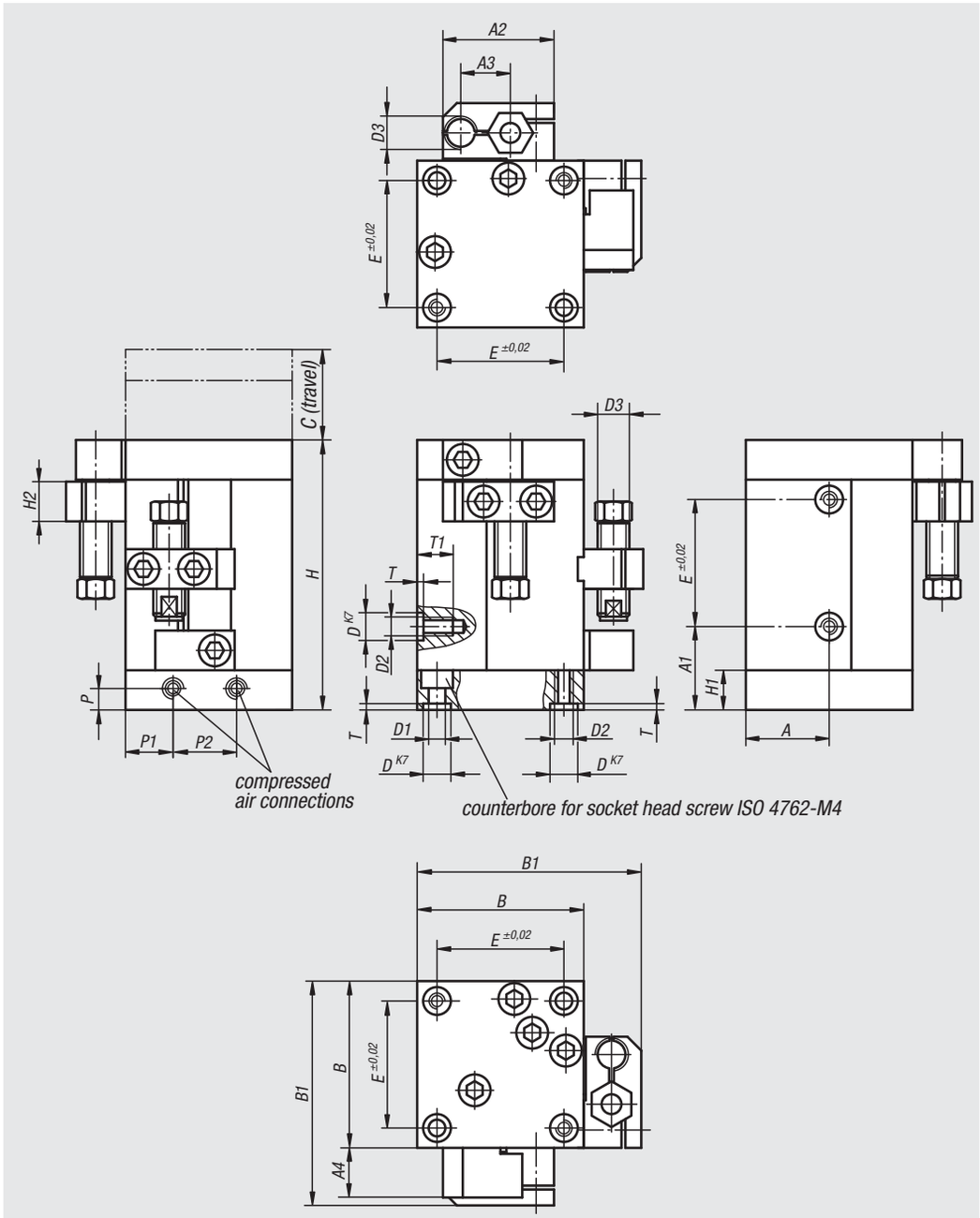
Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20050-4010

Note:
Maintenance-free pneumatic lifting units, compact construction with cross roller guides. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

Repeat accuracy ±0.01 mm.

Accessories:
See table for shock absorbers, proximity switches and plug connectors.



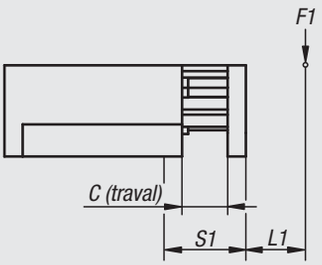
Order No.	Size	C (travel)	A	A1	A2	A3	A4	B	B1	D	D1	D2	D3	E	H	H1	H2	P	P1	P2	T	T1
20050-4010	4	10	21	21	27,5	12	12,5	42	57	7	4,2	M4	M8x1	32	68	10	10	5	12	16	1,6	6
20050-4025	4	25	21	39	27,5	12	12,5	42	57	7	4,2	M4	M8x1	32	86	10	10	5	12	16	1,6	6
20050-6025	6	25	30	38	38	17,5	14	60	78	10	6,4	M6	M14x1	48	104	12	12	6	16	18	2,1	9
20050-6050	6	50	30	63	38	17,5	14	60	78	10	6,4	M6	M14x1	48	129	12	12	6	16	18	2,1	9

Order No.	Size	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20050-4010	4	80	55	16	3,7	26300-0810008	20900-020X5000	-
20050-4025	4	80	55	16	9,3	26300-0810008	20900-020X5000	-
20050-6025	6	185	175	25	23,8	26310-1410012	20915-020	20950-010X2000
20050-6050	6	185	175	25	47,7	26310-1410012	20915-020	20950-010X2000

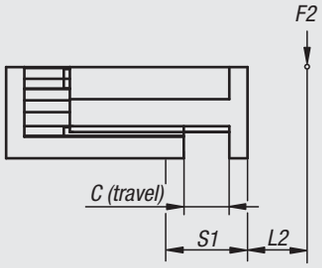
Lifting units, pneumatic

with rail guide

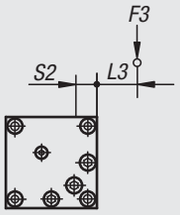
Load data



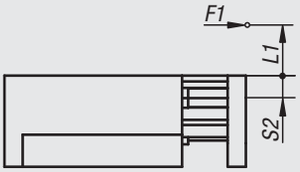
M1 = (S1 + L1) x F1



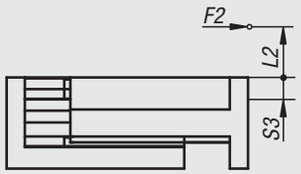
M2 = (S1 + L2) x F2



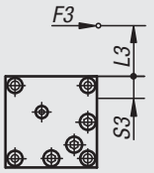
M3 = (S2 + L3) x F3



M1 = (S2 + L1) x F1



M2 = (S3 + L2) x F2



M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3	Dynamic load rating N	Static load rating N
20050-4010	4	12,5	12,5	13,5	19 + C/2 (travel)	10	16,5	1435	1435
20050-4025	4	15	15	18	26 + C/2 (travel)	10	16,5	1640	1640
20050-6025	6	33	33	56	33 + C/2 (travel)	11	17	2600	2600
20050-6050	6	33	33	56	45 + C/2 (travel)	11	17	2600	2600

Lifting units, pneumatic

with round guides

Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

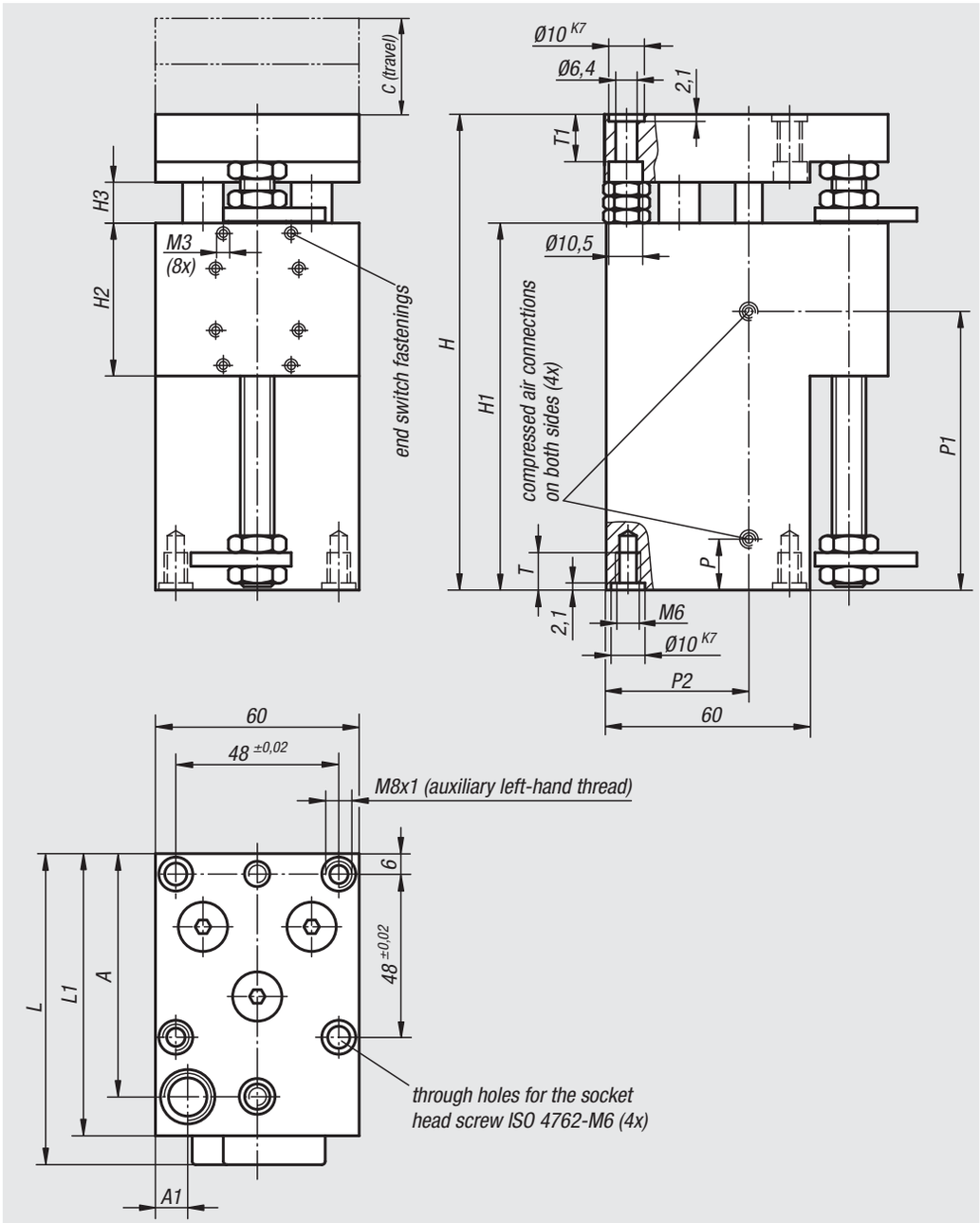
Sample order:
nlm 20054-6050

Note:
Highly robust maintenance-free pneumatic lifting units with sealed ball guide. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

Repeat accuracy ±0.02 mm.

On request:
Lifting units with shorter strokes available.

Accessories:
See table for shock absorbers, proximity switches and plug connectors.



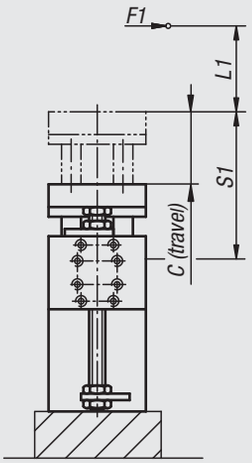
Order No.	Size	C (travel)	A	A1	H	H1	H2	H3	L	L1	P	P1	P2	T	T1
20054-6050	6	50	71,5	10	140	108	45	12	92	83	15	83	41,5	16	13
20054-6075	6	75	71,5	10	165	133	45	12	92	83	15	108	41,5	16	13
20054-6100	6	100	71,5	10	190	158	45	12	92	83	15	133	41,5	16	13

Order No.	Size	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20054-6050	6	220	200	25	33	26310-1410012	20905-010	20950-010X2000
20054-6075	6	220	200	25	50	26310-1410012	20905-010	20950-010X2000
20054-6100	6	220	200	25	66	26310-1410012	20905-010	20950-010X2000

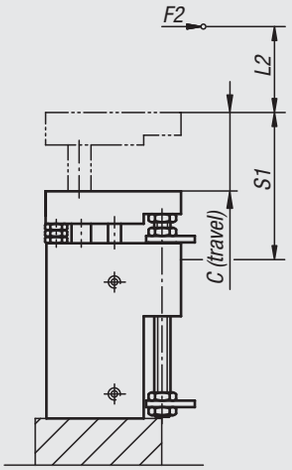
Lifting units, pneumatic

with round guides

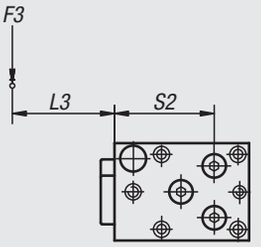
Load data



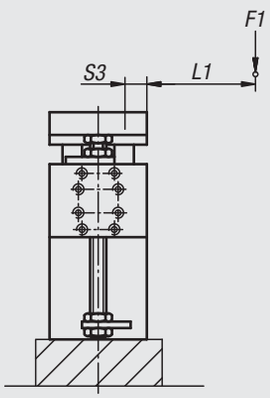
M1 = (S1 + L1) x F1



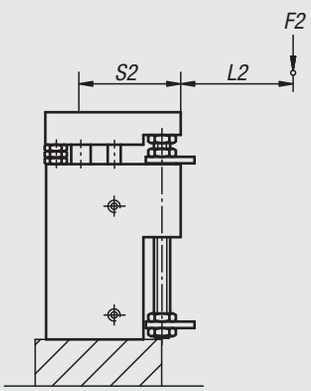
M2 = (S1 + L2) x F2



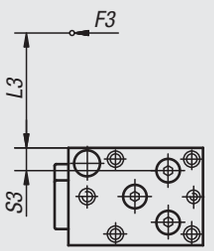
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



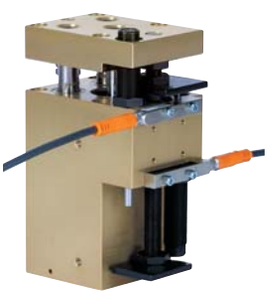
M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)



Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3
20054-6050	6	28	28	30	46 + C/2 (travel)	61	14
20054-6075	6	28	28	30	46 + C/2 (travel)	61	14
20054-6100	6	28	28	30	46 + C/2 (travel)	61	14

Lifting units, pneumatic

with round guides

Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

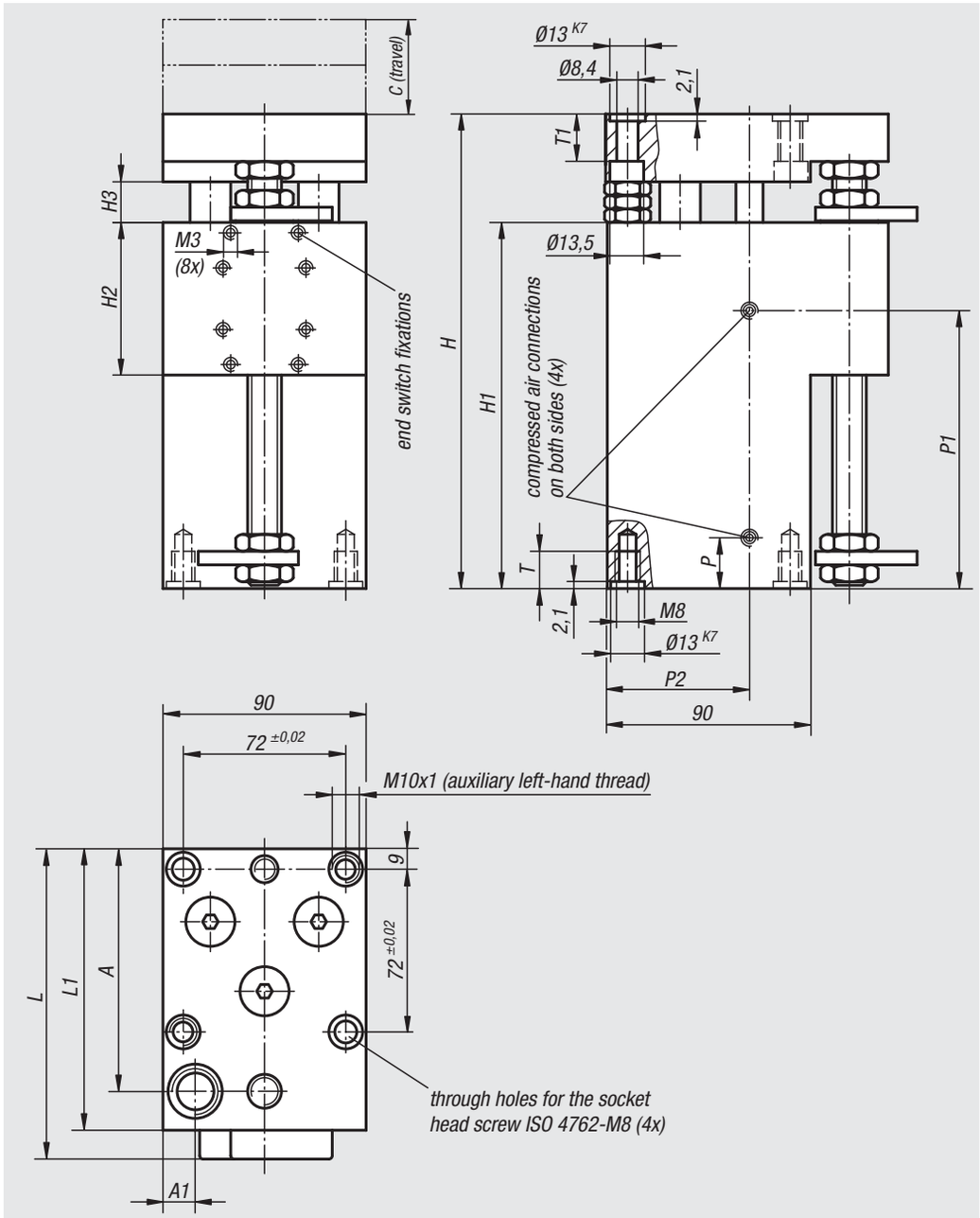
Sample order:
nlm 20056-9050

Note:
Robust maintenance-free pneumatic lifting units with sealed ball guide. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection R1/8. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

Repeat accuracy ±0.02 mm.

On request:
Lifting units with shorter strokes available.

Accessories:
See table for shock absorber, proximitiy switch and plug connector.



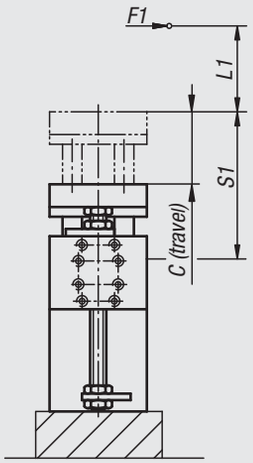
Order No.	Size	C (travel)	A	A1	H	H1	H2	H3	L	L1	P	P1	P2	T	T1
20056-9050	9	50	101,5	24,5	150	108	45	12	121	113	15,5	83	68	16	13
20056-9075	9	75	101,5	24,5	175	133	45	12	121	113	15,5	108	68	16	13
20056-9100	9	100	101,5	24,5	200	158	45	12	121	113	15,5	133	68	16	13

Order No.	Size	Piston force at 6 bar (N)	Retraction force at 6 bars (N)	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20056-9050	9	360	325	32	56	26310-1410012	20905-010	20950-010X2000
20056-9075	9	360	325	32	84	26310-1410012	20905-010	20950-010X2000
20056-9100	9	360	325	32	112	26310-1410012	20905-010	20950-010X2000

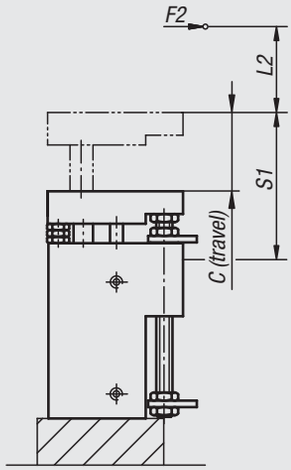
Lifting units, pneumatic

with round guides

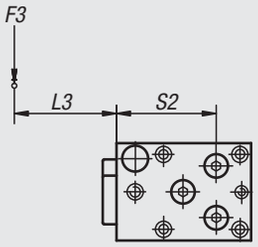
Load data



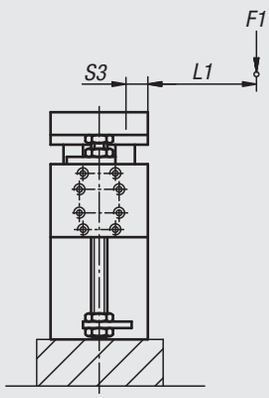
M1 = (S1 + L1) x F1



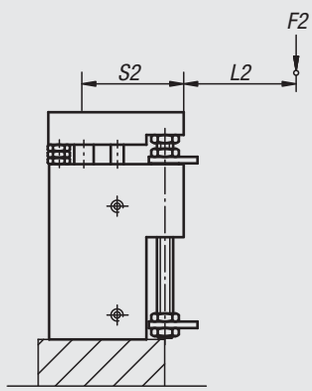
M2 = (S1 + L2) x F2



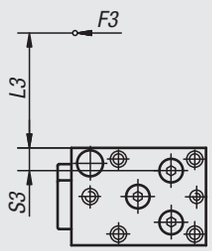
M3 = (S2 + L3) x F3



M1 = (S3 + L1) x F1



M2 = (S2 + L2) x F2



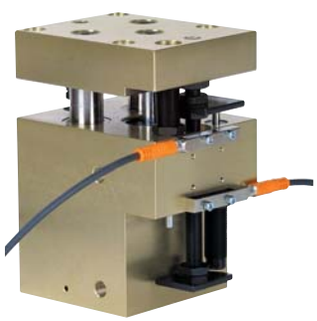
M3 = (S3 + L3) x F3

$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

Calculation of lifespan:

$$L = \left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

L = lifespan (m)
M_{zul} = permissible torque (Nm)
M_{eff} = calculated torque (Nm)

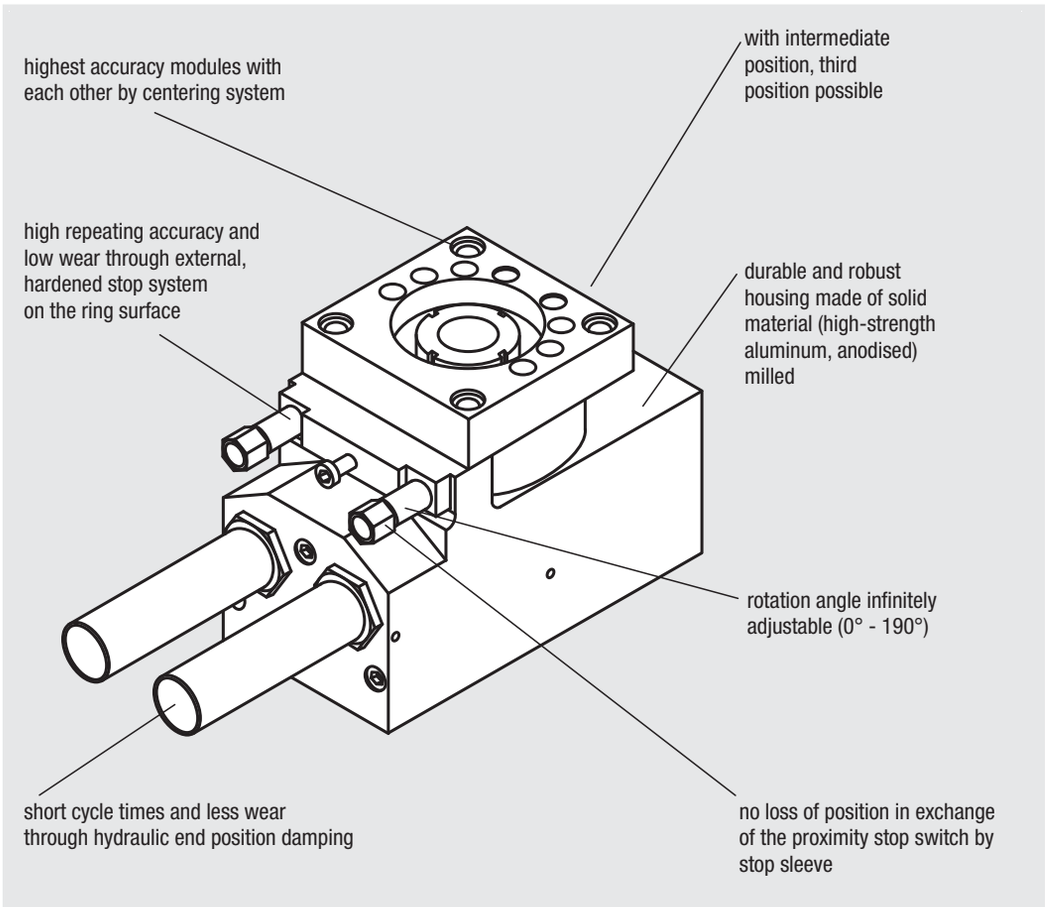


Order No.	Size	M1 Nm	M2 Nm	M3 Nm	S1	S2	S3
20056-9050	9	43	43	72	57 + C/2 (travel)	73	20
20056-9075	9	43	43	72	57 + C/2 (travel)	73	20
20056-9100	9	43	43	72	57 + C/2 (travel)	73	20

Technical information for pneumatic rotary modules

Compact, high-performance rotary modules open many fields of application. They are an indispensable component, when combined with linear modules to reach any point in a given space. Rotary modules can be mounted in any position. The extremely compact design of the rotary modules allow for high load bearing capacity in all directions with high rigidity of the entire system. The 0° – 190° rotation angle for all models is infinitely adjustable. To realise a third position, intermediate positions are available as accessories.

– cylinder diameter: 10 mm – 38 mm.
– axial load: 280 N – 1.800 N.
– radial load: 220 N – 2.400 N.
– repeat accuracy ±0.01°.
– rotary angle infinitely adjustable.
– play-free end positions through double actuated drive cylinders with protected pinion rack drive.
– many applications covered by coordinated increases in torque per size.
– also available for small installation spaces and as heavy-duty versions.
– drive protected by rotation limiter.



Swivel times		
norelem	**Load (kg)**	**time / cycle**
20060-014	0,250	0,3
20060-024	0,400	0,7 s
20062-016	1,500	0,8 s

The specified guide values for cycle times were ascertained under operation specific conditions and represent effective values.

Selection overview						
Design	for small spaces			heavy-duty		heavy-duty
Driving torque	0,28	0,94	3,5	6,5	12	24
Rotation angle	0°-190°	0°-190°	0°-190°	0°-190°	0°-190°	0°-190°
Axial load (N)	300	280	350	1100	1800	1800
Radial load (N)	220	350	450	1600	2400	2400
norelem	**20060-014**	**20060-024**	**20062-016**	**20062-026**	**20065-019**	**20064-029**

Rotary module, pneumatic

Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

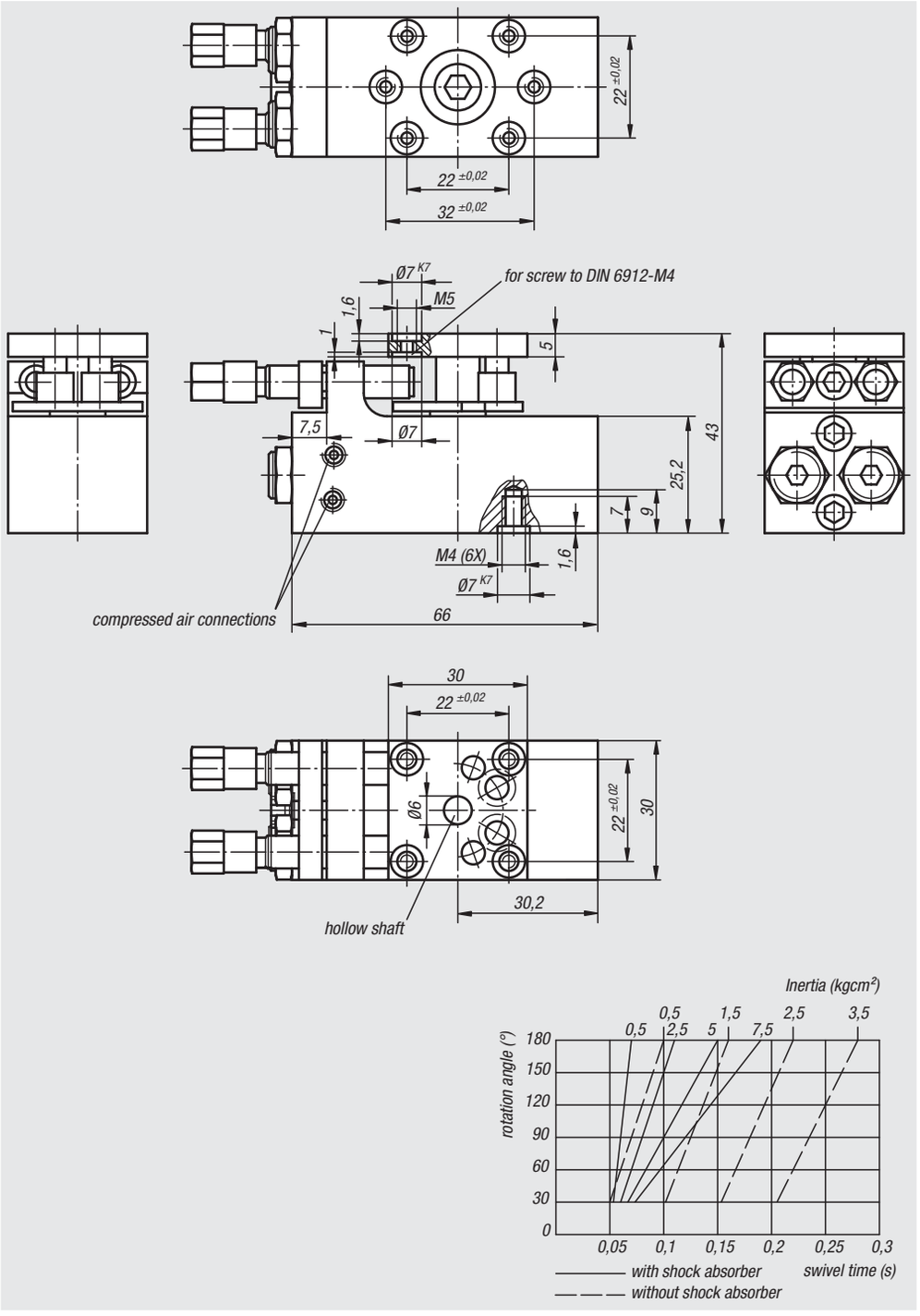
Sample order:
nlm 20060-014

Note:
Maintenance-free pneumatic rotary module for small installation spaces with double actuated drive cylinder. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

The 0° – 190° rotation angle is infinitely adjustable.

Repeat accuracy ±0.01°.

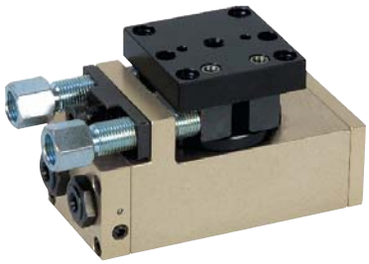
Accessories:
See table for shock absorber, proximitiy switch and plug connector.



Order No.	Size	Driving torque Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20060-014	4	0,28	0° - 190°	300	220	2 x 10	5

Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20060-014	4	26300-1010008	20915-010	20960-010X2000

Rotary module, pneumatic



Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

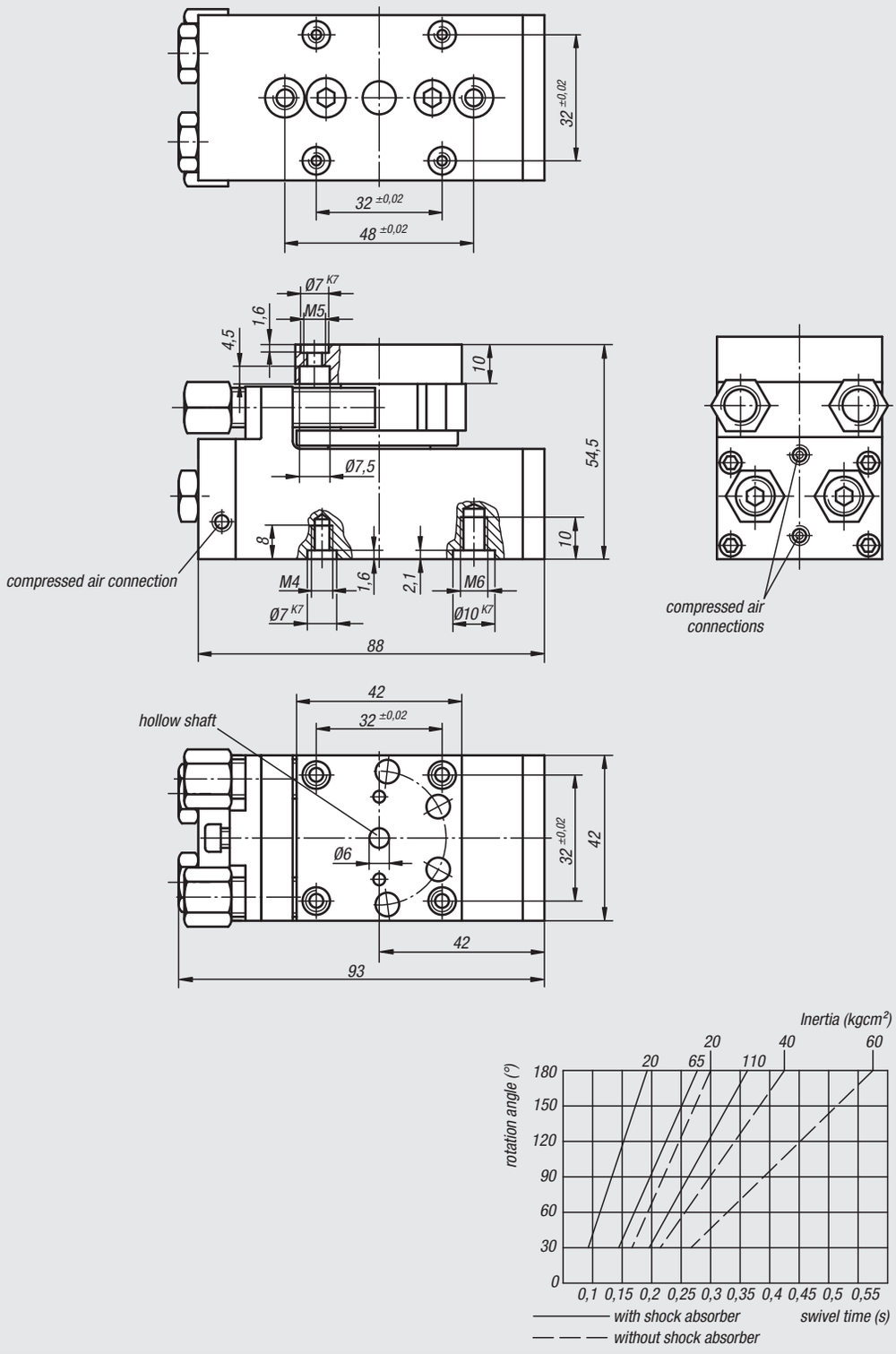
Sample order:
nlm 20060-024

Note:
Maintenance-free pneumatic rotary module with double actuated drive cylinder. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

The 0° – 190° rotation angle is infinitely adjustable.

Repeat accuracy ±0.01°.

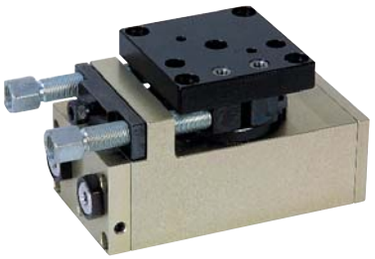
Accessories:
See table for shock absorber, proximitiy switch and plug connector.



Order No.	Size	Driving torque Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20060-024	4	0,94	0° - 190°	280	350	2 x 14	19

Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20060-024	4	26300-1210010	20915-020	20950-010X2000

Rotary module, pneumatic



Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

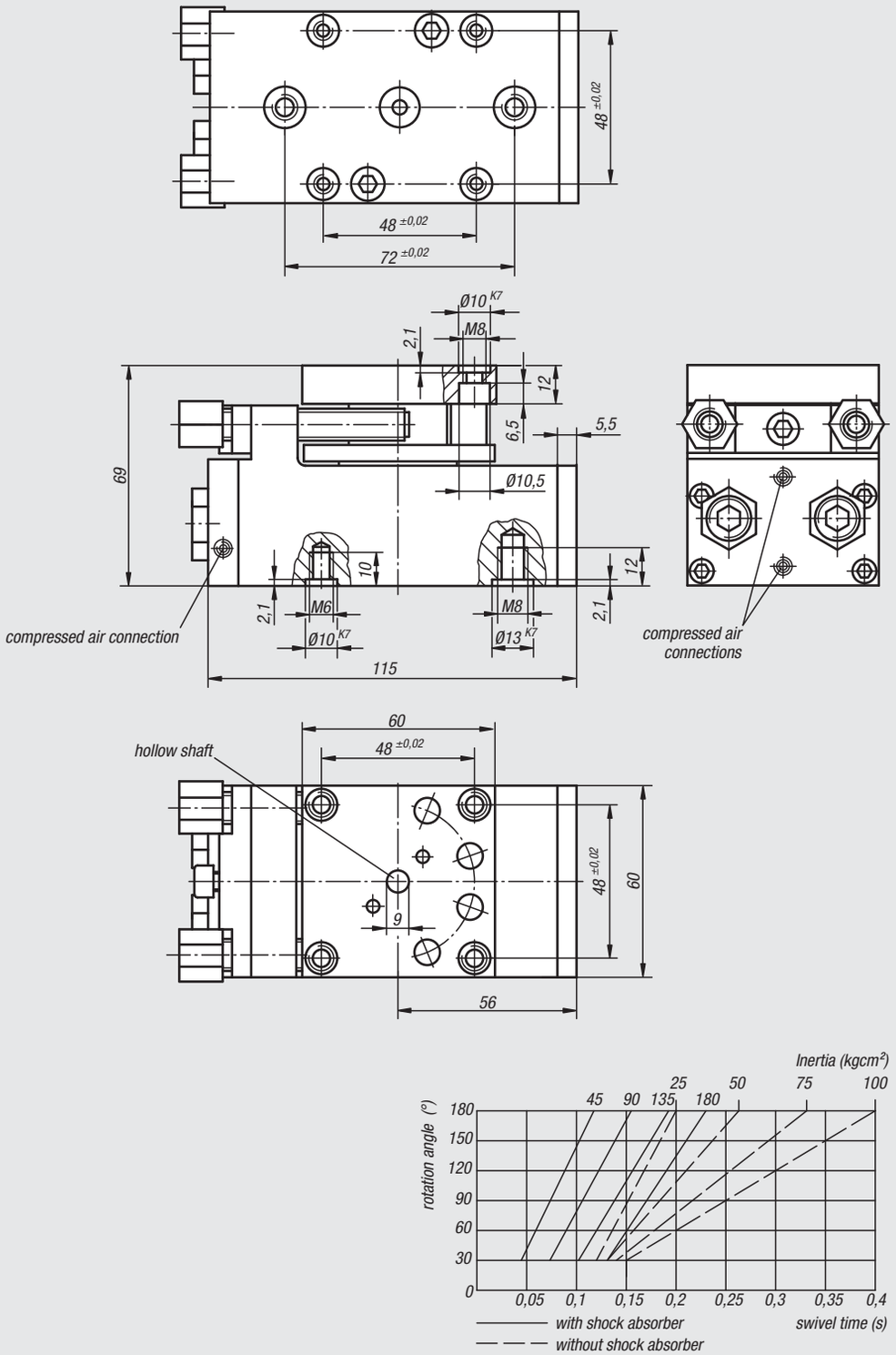
Sample order:
nlm 20062-016

Note:
Maintenance-free pneumatic rotary module with double actuated drive cylinder. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

The 0° – 190° rotation angle is infinitely adjustable.

Repeat accuracy ±0.01°.

Accessories:
See table for shock absorber, proximitiy switch and plug connector.

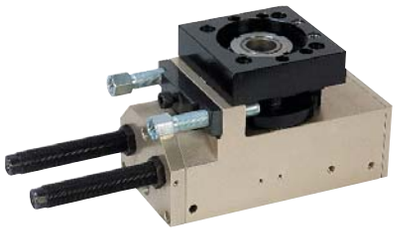


Order No.	Size	Driving torque Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20062-016	6	3,5	0° - 190°	350	450	2 x 22	45

Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20062-016	6	26310-1410012	20915-030	20950-010X2000

Rotary module, pneumatic

heavy duty version



Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20062-026

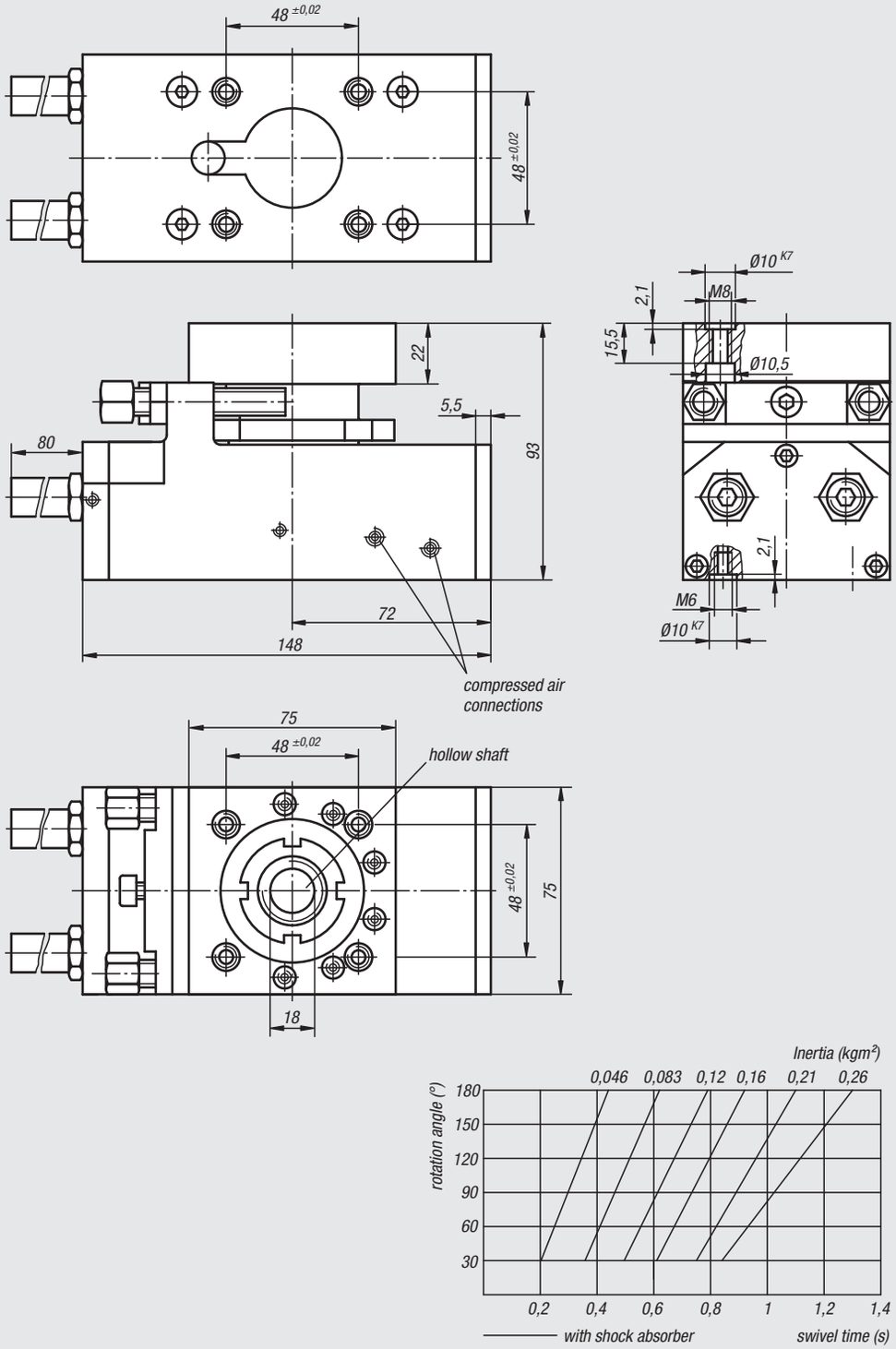
Note:
Maintenance-free pneumatic rotary module with double actuated drive cylinder, heavy duty version. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

The 0° – 190° rotation angle is infinitely adjustable.

Repeat accuracy ±0.01°.

Shock absorbers are supplied.

Accessories:
See table for proximity switches and plug connectors.



Order No.	Size	Driving torque Nm	tilt moment max. Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20062-026	6	6,5	55	0° - 190°	1100	1600	2 x 25	88

Order No.	Size	Suitable proximity switch	Suitable plug connector
20062-026	6	20915-030	20950-010X2000

Rotary module pneumatic

Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20064-019

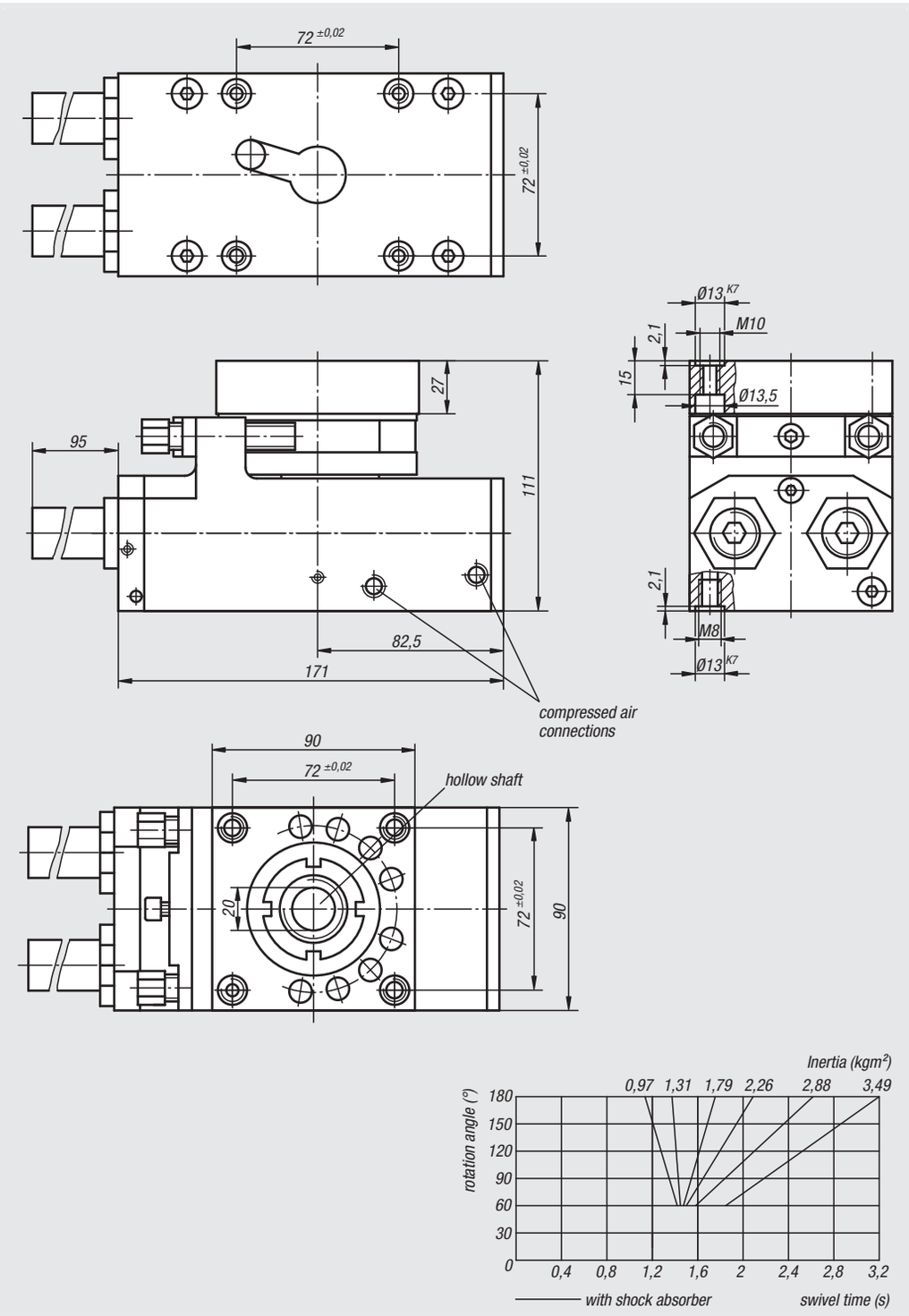
Note:
Maintenance-free pneumatic rotary module with double actuated drive cylinder. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection R1/8. Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

The 0° – 190° rotation angle is infinitely adjustable.

Repeat accuracy ±0.01°.

Shock absorbers are supplied.

Accessories:
See table for proximity switches and plug connectors.

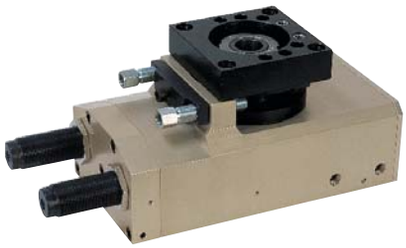


Order No.	Size	Driving torque Nm	tilt moment max. Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20064-019	9	12	110	0° - 190°	1800	2400	2 x 32	161

Order No.	Size	Suitable proximity switch	Suitable plug connector
20064-019	9	20915-030	20950-010X2000

Rotary module, pneumatic

heavy duty version



Material:
Housing high-strength aluminium.
Stop system steel.

Version:
Housing anodized.
Stop system hardened and black oxidised.

Sample order:
nlm 20064-029

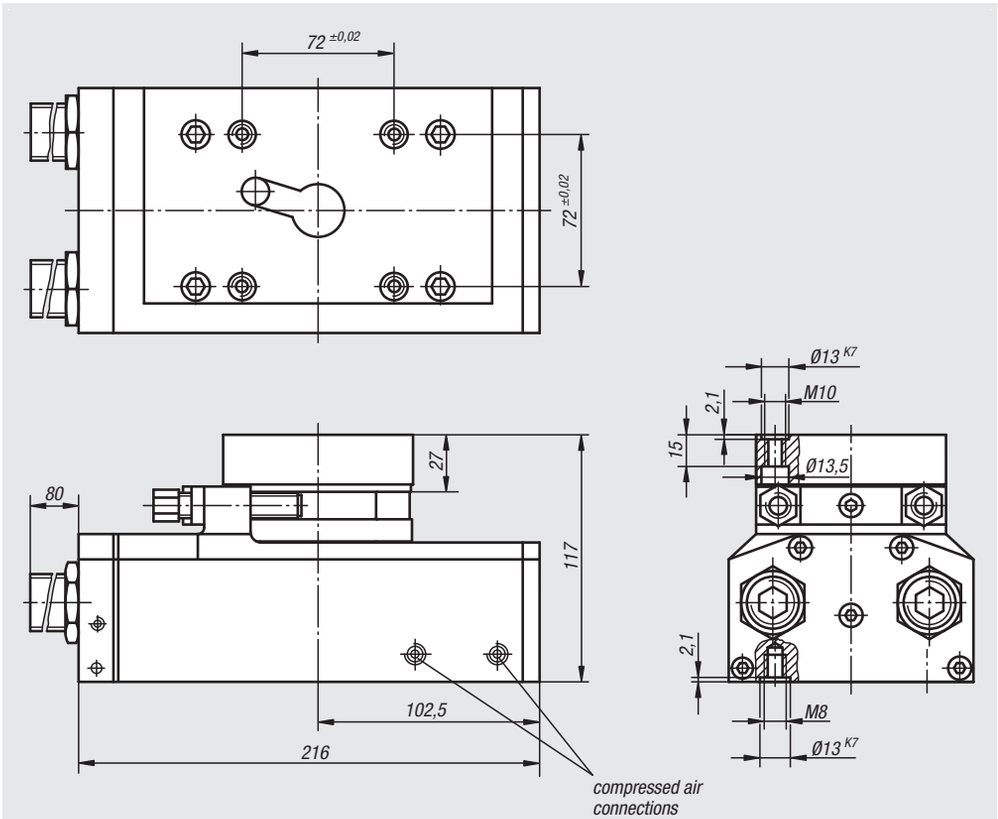
Note:
Maintenance-free pneumatic rotary module with double actuated drive cylinder, heavy-duty version. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection R1/8.
Modules of the same size can be combined with one another without adapter plates via the precise centring system by means of centring rings 20240.

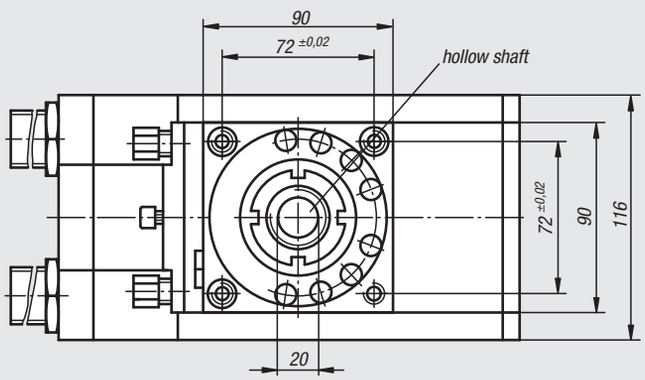
The 0° – 190° rotation angle is infinitely adjustable.

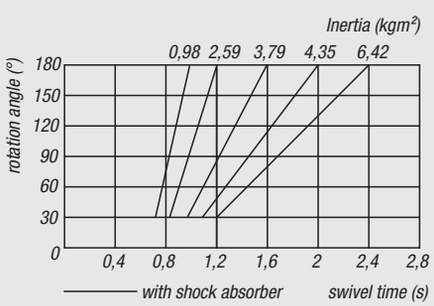
Repeat accuracy ±0.01°.

Shock absorbers are supplied.

Accessories:
See table for proximity switches and plug connectors.





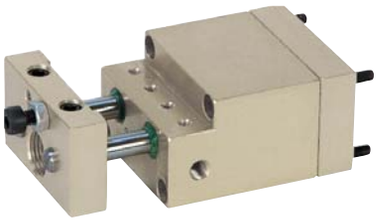


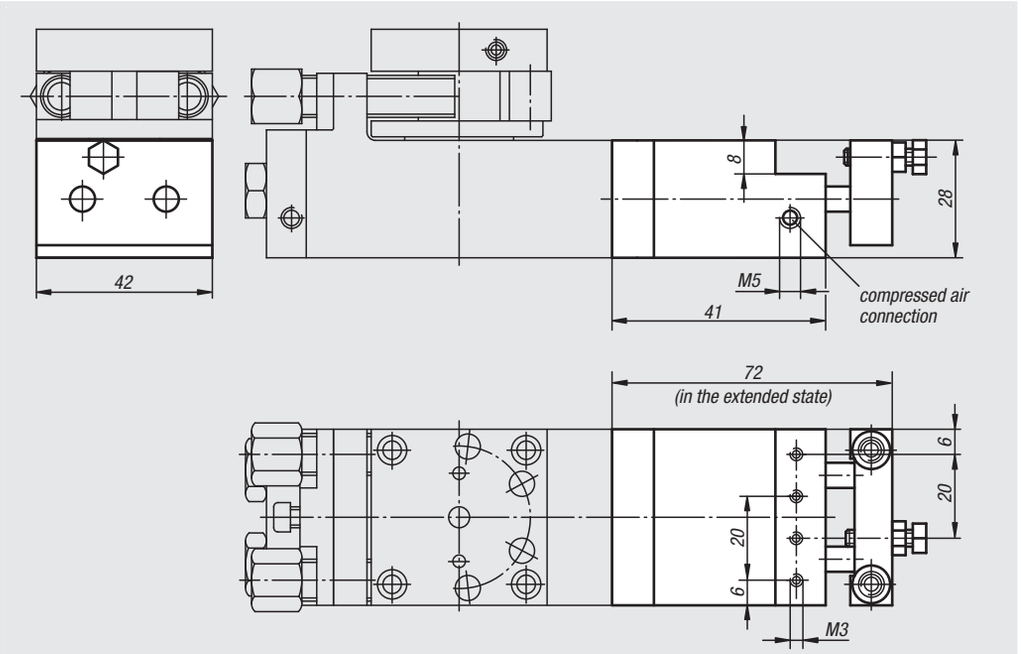
Order No.	Size	Driving torque Nm	tilt moment max. Nm	Rotation angle	Axial load N	Radial load N	Cylinder-Ø	Air consumption per cycle at 6 bar (ccm)
20064-029	9	24	110	0° - 190°	1800	2400	2 x 38	303

Order No.	Size	Suitable proximity switch	Suitable plug connector
20064-029	9	20915-030	20950-010X2000

Intermediate position

for rotary module 20060-024





Material:
Housing high-strength aluminium.

Version:
Housing anodized

Sample order:
nlm 20080-014

Note:
Maintenance-free pneumatic intermediate position.
For realising a third position with rotary module 20060-024.
Control by 3/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection M5.
Adjustment range ±20° starting from 90°.

Repeat accuracy ±0.01°.

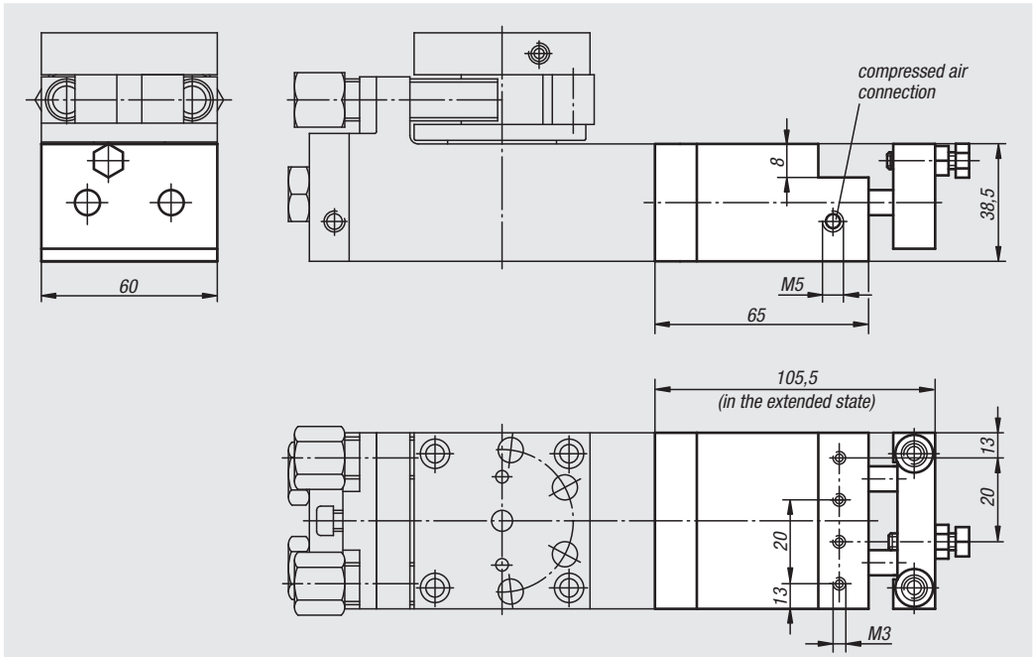
Proximity switch, connector cable and throttle are supplied.

Accessories:
See table for shock absorbers.

Order No.	Size	Driving torque Nm	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber
20080-014	4	0,8	2 x 16	4	26300-1210010

Intermediate position

for rotary module 20062-016



Material:
Housing high-strength aluminium.

Version:
Housing anodized

Sample order:
nlm 20082-016

Note:
Maintenance-free pneumatic intermediate position.
For realising a third position with rotary module 20062-016.
Control by 3/2 directional valve.
Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection M5.
Adjustment range ±20° starting from 90°.

Repeat accuracy ±0.01°.

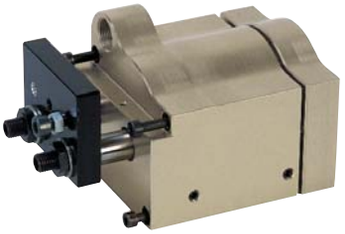
Proximity switch, connector cable and throttle are supplied.

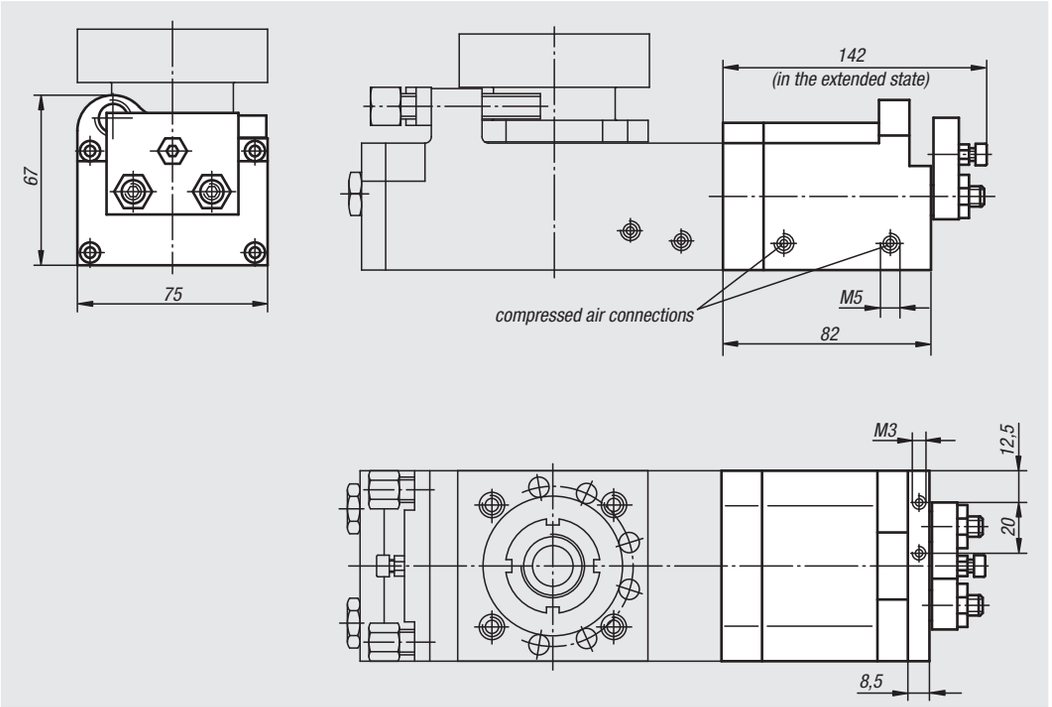
Accessories:
See table for shock absorbers.

Order No.	Size	Driving torque Nm	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber
20082-016	6	3,5	2 x 25	22	26310-1410012

Intermediate position

for rotary module 20062-026





Material:
Housing high-strength aluminium.

Version:
Housing anodized

Sample order:
nlm 20082-026

Note:
Maintenance-free pneumatic intermediate position.
For realising a third position with rotary module 20062-026.
Control by 5/2 directional valve.
Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection M5.
Adjustment range ±20° starting from 90°.

Repeat accuracy ±0.01°.

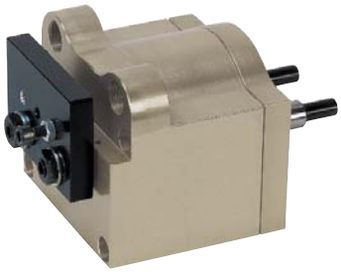
Proximity switch, connector cable and throttle are supplied.

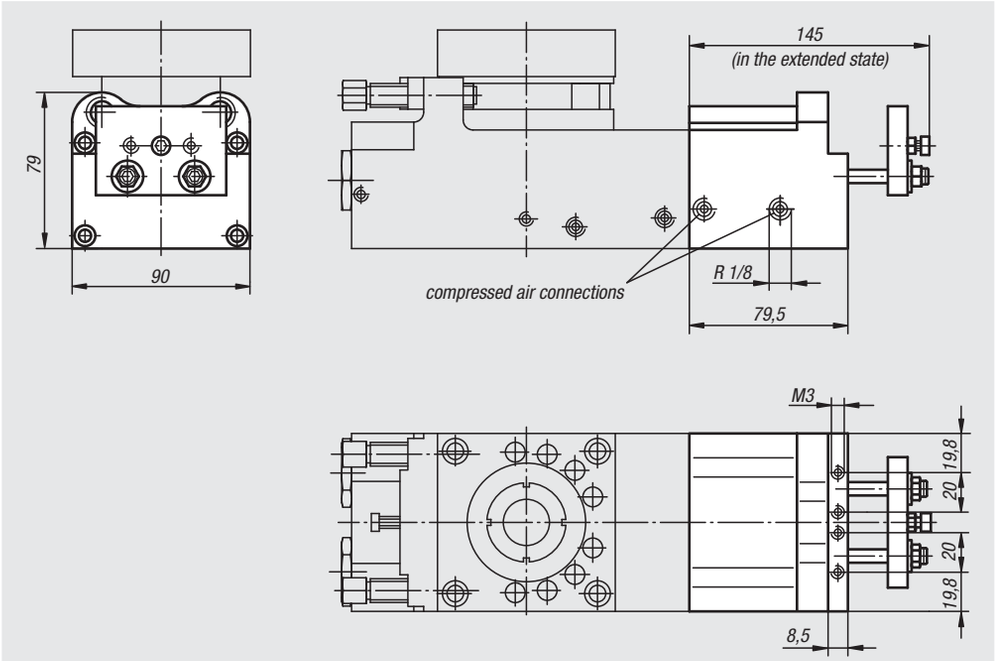
Accessories:
See table for shock absorbers.

Order No.	Size	Torque (swivel unit, pressure-free) Nm	Torque (swivel unit, pressurised at 6 bars) Nm	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber
20082-026	6	10,13	1,92	50	104	26310-1410012

Intermediate position

for rotary module 20064-019





Material:
Housing high-strength aluminium.

Version:
Housing anodized

Sample order:
nlm 20084-019

Note:
Maintenance-free pneumatic intermediate position.
For realising a third position with rotary module 20064-019.
Control by 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled. Compressed air connection R1/8.
Adjustment range ±20° starting from 90°.

Repeat accuracy ±0.01°.

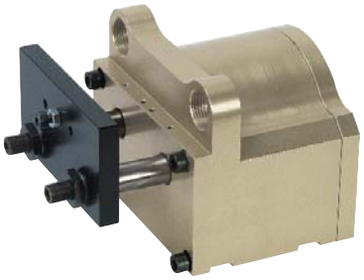
Proximity switch, connector cable and throttle are supplied.

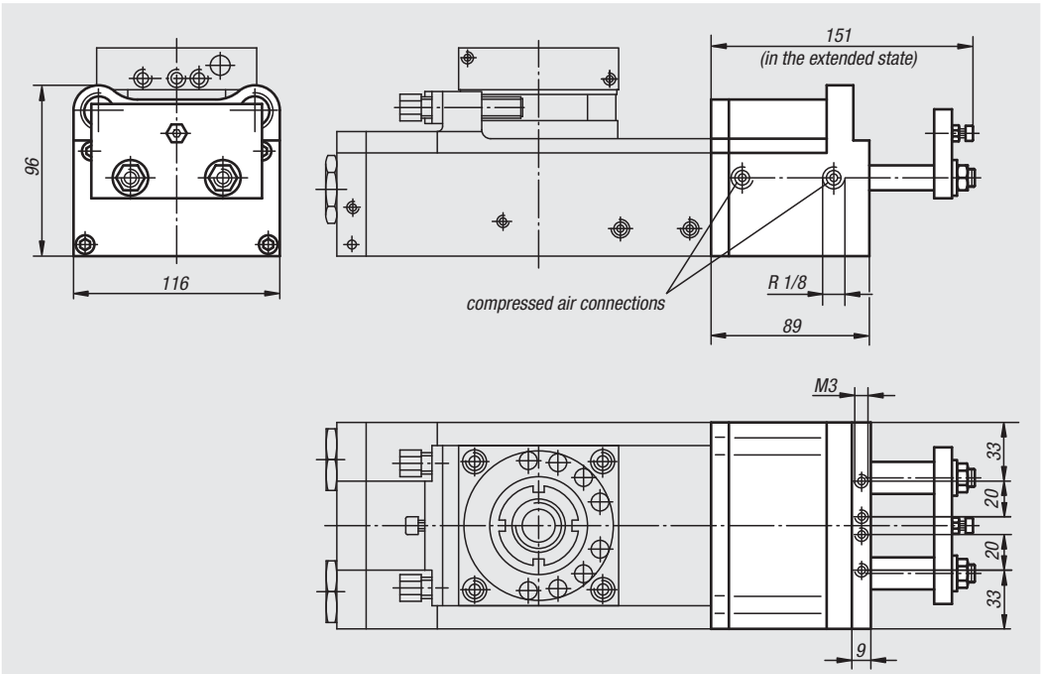
Accessories:
See table for shock absorbers.

Order No.	Size	Torque (swivel unit, pressure-free) Nm	Torque (swivel unit, pressurised at 6 bars) Nm	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber
20084-019	9	20,26	5,36	63	186	26310-1410012

Intermediate position

for rotary module 20064-029





Material:
Housing high-strength aluminium.

Version:
Housing anodized

Sample order:
nlm 20084-029

Note:
Maintenance-free pneumatic intermediate position.
For realising a third position with rotary module 20064-029.
Control by 5/2 directional valve.
Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Compressed air connection R1/8.
Adjustment range ±10° starting from 90°.

Repeat accuracy ±0.01°.

Proximity switch, connector cable and throttle are supplied.

Accessories:
See table for shock absorbers.

Order No.	Size	Torque (swivel unit, pressure-free) Nm	Torque (swivel unit, pressurised at 6 bars) Nm	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable shock absorber
20084-029	9	40	8	80	186	26300-2015016

Notes

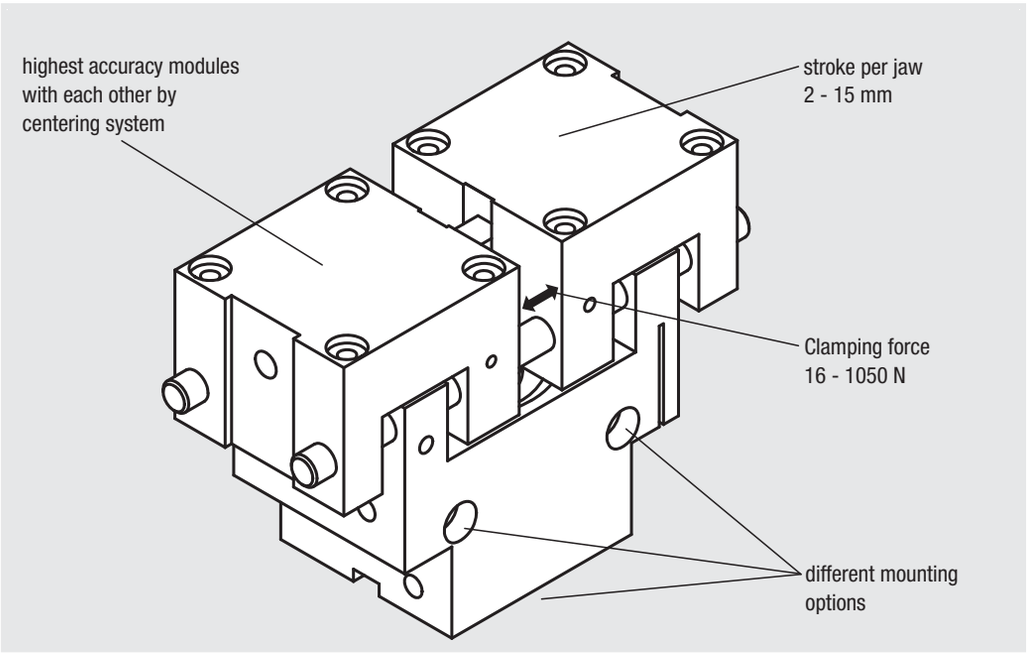
Technical information for grip modules

Grip modules can be mounted in any position. The applications for pneumatic grip modules in assembly and machining are almost limitless.

These components can manage a multitude of functions such as centring, feeding, transposing and loading.

The standardised fastening holes allow diverse combinations with our other units.

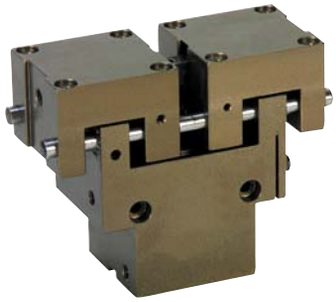
– workpiece weight 0.08 kg – 4.74 kg.
– also for particularly robust use.
– grip force feedback - open, closed, part gripped.
– steel slide – hardened and ground for universal use and long life.



Overview	
Type	Parallel grippers
Guidance	Steel slideways
Design	robust
Stroke per jaw (mm)	2 - 15
Clamping force at 6 bar (N)	16 - 1050
Workpiece weight (kg)	0,08 - 4,74
Finger length max. (mm)	15 - 140
Operating principle	Link rod kinematics
Application	Universal application in clean and lightly contaminated environments
norelem	**20100**

Grip module

parallel grippers



Material:
Housing high-strength aluminium.
Guide shafts and leverage steel.

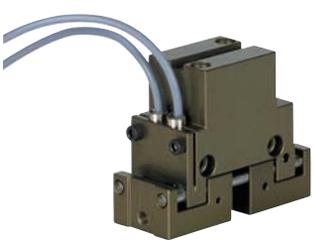
Version:
Housing coated with Hart-Coat®.
Guide shafts hardened and ground.

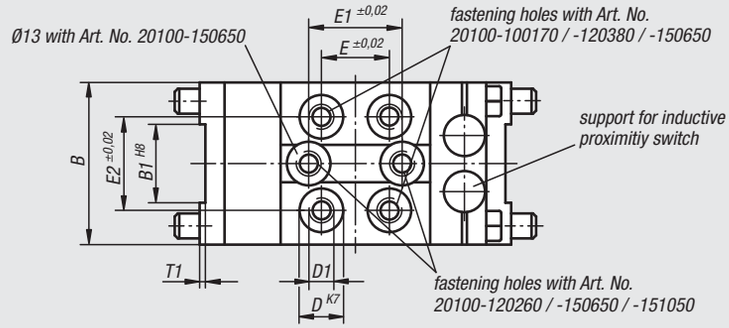
Sample order:
nlm 20100-030025

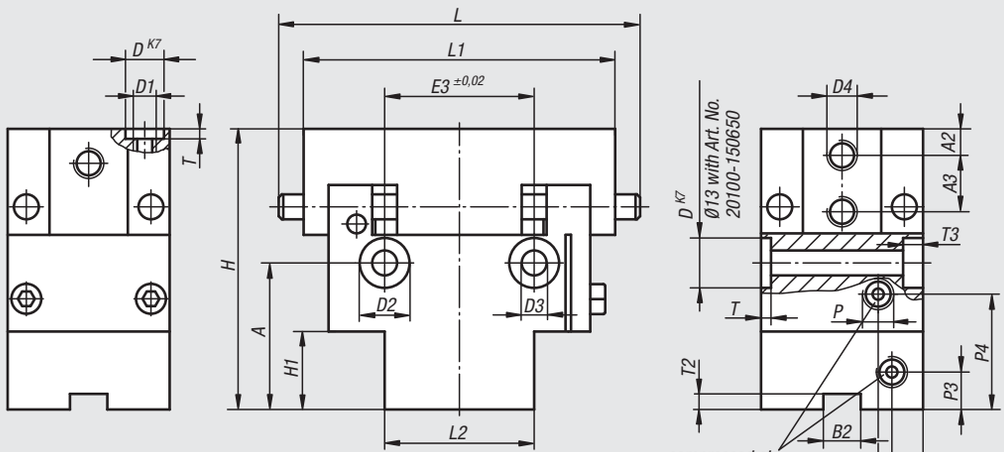
Note:
Maintenance-free pneumatic parallel gripper with leverage kinematics. Control by 4/2 or 5/2 directional valve. Pneumatic drive, 4-8 bar, constant, filtered (10 µm), dried, oiled or unoiled.
Grips absolutely centrally. Can grip internally or externally. Proximity switches (accessories) can be integrated for end position feedback.

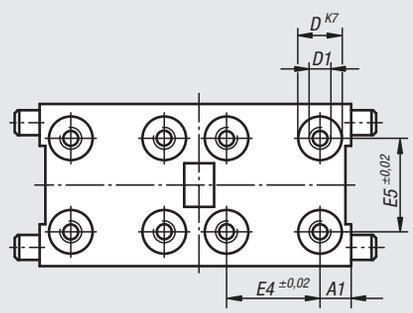
Repeat accuracy ±0.02 mm.

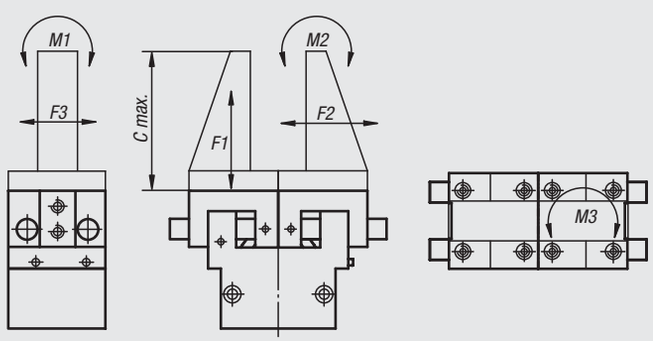
Accessories:
See table for proximity switches and plug connectors.











$$\frac{M1_{eff}}{M1_{zul}} + \frac{M2_{eff}}{M2_{zul}} + \frac{M3_{eff}}{M3_{zul}} \leq 1$$

$$\frac{F1_{eff}}{F1_{zul}} + \frac{F2_{eff}}{F2_{zul}} + \frac{F3_{eff}}{F3_{zul}} \leq 1$$

Grip module

parallel grippers

Order No.	A	A1	A2	A3	B	B1	B2	D	D1	D2	D3	D4	E	E1	E2	E3
20100-030025	21,5	5	4,5	-	19	6	-	7	M3	6	3	M3	11	-	11	17,5
20100-040036	24	5	6	-	26	10	6	7	M4	7,5	4,3	M4	15	-	15	24
20100-050085	33,5	5	5	-	28	12	6	7	M4	7,5	4,3	M5	26	-	15	32
20100-100170	22,5	4,5	10	-	40	16	6	7	M4	7,5	4,3	M6	32	-	32	38
20100-120260	20	8	11	-	45	20	-	10	M6	10,5	6,4	M8	48	48	24	48
20100-120380	21	6	9	16	60	25	-	10	M6	10,5	6,4	M8	48	-	48	58
20100-120660	21	6	9	16	60	25	-	10	M6	10,5	6,4	M8	48	-	48	58
20100-150650	27	11	12	20	75	28	-	10	M6	13,5	8,2	M8	48	72	48	72
20100-151050	27	11	12	20	75	28	-	10	M6	13,5	8,2	M8	48	72	48	72

Order No.	E4	E5	H	H1	L	L1	L2	P	P1	P2	P3	P4	T	T1	T2	T3
20100-030025	-	11	40	13	40	34	19	M5	9,5	9,5	4,5	16	1,6	0,5	-	3,5
20100-040036	15	15	45	12,5	60	50	24	M5	4,5	7	6	18,5	1,6	1	2,5	4,2
20100-050085	20	20	56	20	70	60	34	M5	4	7	6,5	28	1,6	1	2,5	4,5
20100-100170	32	32	67	18,5	100	82	42	M5	9	9	6	27	1,6	1,5	2,5	4,5
20100-120260	32	32	81	23,5	120	96	60	R1/8	8	8	8	30,5	2,1	1,5	-	6,5
20100-120380	48	48	87	39	145	120	70	R1/8	15	15	11,5	30	2,1	2	-	6,5
20100-120660	48	48	87	39	145	120	70	R1/8	15	15	11,5	30	2,1	2	-	6,5
20100-150650	48	48	108	47	171	140	90	R1/8	22	22	15	38	2,1	2	-	9
20100-151050	48	48	108	47	171	140	90	R1/8	22	22	15	38	2,1	2	-	9

Order No.	Travel per jaw	Clamping force at 6 bar (N)	Expanding force at 6 bars (N)	Recommended workpiece weight kg	cylinder Ø	Air consumption per cycle at 6 bar (ccm)	Suitable proximity switch	Suitable plug connector
20100-030025	3	25	35	0,120	14	0,34	20900-010X2000	-
20100-040036	4	36	46	0,170	16	0,8	20900-030X3000	-
20100-050085	5	85	95	0,400	25	2,5	20900-030X3000	-
20100-100170	10	170	170	0,760	32	8	20900-040	20950-010X2000
20100-120260	12	260	260	1,170	40	15,1	20900-050	20950-010X2000
20100-120380	12	380	380	1,780	50	23,6	20900-040	20950-010X2000
20100-120660	12	660	660	2,960	50	23,6	20900-040	20950-010X2000
20100-150650	15	650	650	3,000	63	46,8	20900-050	20950-010X2000
20100-151050	15	1050	1050	4,740	63	46,8	20900-050	20950-010X2000

Order No.	M1 Nm	M2 Nm	M3 Nm	F1 (N)	F2 (N)	F3 (N)	C max.	Moment of inertia (10^{-3} kgm^2)
20100-030025	1,6	1,5	1,5	140	84	140	25	0,00632
20100-040036	3,9	3,7	1,3	250	82	71	40	0,0278
20100-050085	6	6	1,6	280	100	72	50	0,0767
20100-100170	12	14	12	540	150	400	65	0,416
20100-120260	27	30	12	1100	640	340	80	0,787
20100-120380	57	67	95	1500	350	2100	110	1,89
20100-120660	57	67	95	1500	350	2100	110	1,89
20100-150650	87	94	201	1900	890	3700	140	5,36
20100-151050	87	94	201	1900	890	3700	140	5,36

Notes

Technical information for pneumatic portal modules

Note:
Pneumatically activated portal modules in lengths as requested.

Drive is through a rodless cylinder integrated in the slide.

Three sizes are available with rail guide or round guides and travel up to 5000 mm with a repeat accuracy of ±0.02.

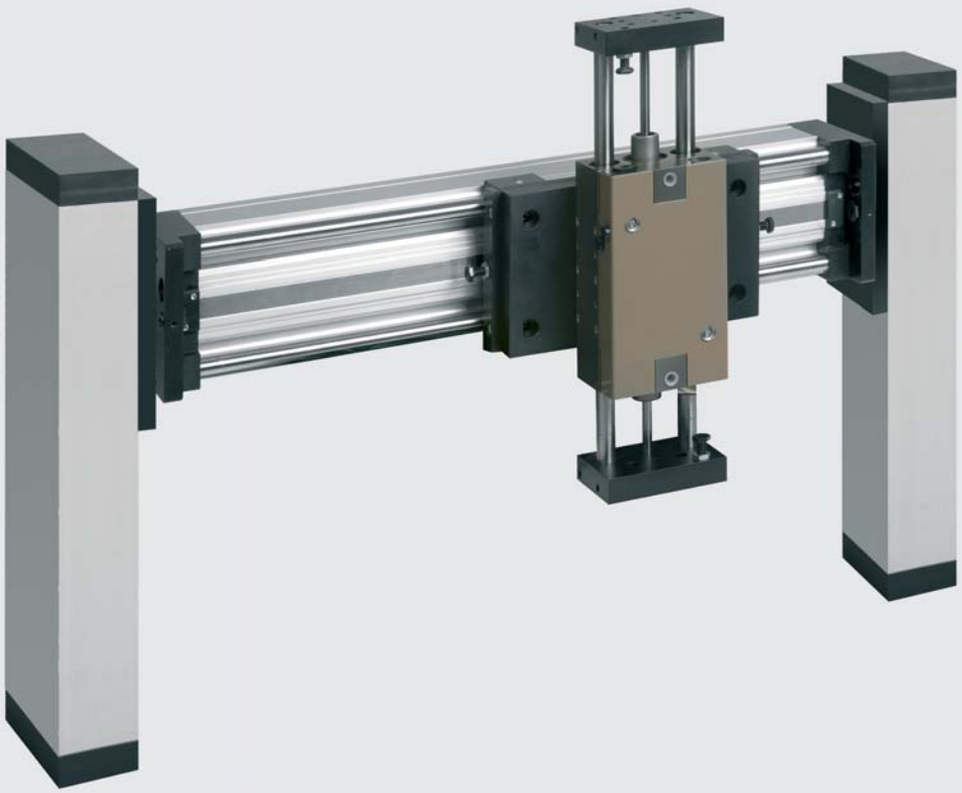
Application:
Portal modules can be used anywhere loads are to be precisely guided. The profile structure with integrated drive cylinder is particularly well suited to cost-efficient integration in machining and assembly plants. The load bearing profile guarantees extreme rigidity with low module weight. The portal module does not require a stable base structure, it is stable on its own and so is a load-bearing and space-saving element within a total system.

Characteristics:
These portal modules are based on a heavy-duty, stiffened aluminium profile. The user can choose between rail guide or round guide system. The structural dimensions of both guidance systems are identical. The profile modules can be mounted in any position.

Advantages:
– low coefficients of friction due to rollers convert piston power almost entirely into motion force.
– low deflection makes high span sizes and long travel possible.
– optimised construction sizes with large piston diameters.
– high run accuracy.
– heavy loads possible due to stiffened self-supporting aluminium profiles.
– integrated shock absorbers and proximity switches can be mounted.
– steel cylinder cover (except for 20200-1065X0500).
– optional: several intermediate positions possible.

Rail guide

Round guide



Portal modules, pneumatic

with rail guides

Material:
Body, carriage and flange plate aluminium alloy.
Guide rails steel

Version:
Body anodized natural colour.
Carriage and flange plate anodized.
Rail guides hardened.

Sample order:
nlm 20200-1065X0500 or to DIN specifications.

Note:
Portal modules with ball rail guides.
Pneumatic drive through a rodless cylinder.
High load rating due to stiffened self-supporting aluminium profiles. The modules can be mounted in any position.
Specified loads apply to dynamic loads.

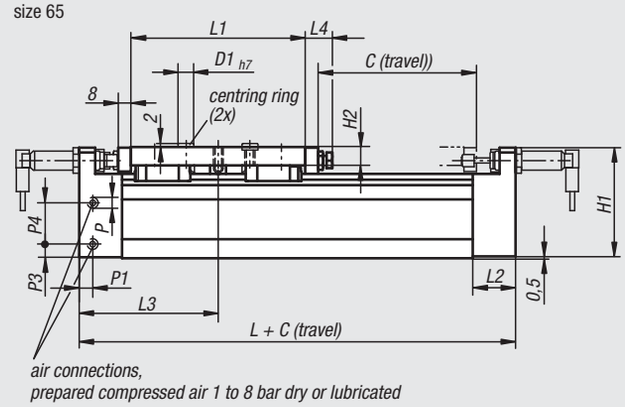
Repeat accuracy ±0.02 mm.

Temperature range:
+5 °C to +70 °C
(+5 °C to +60 °C by size 65)

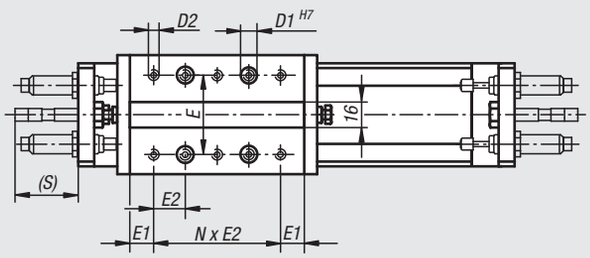
On request:
* Other lengths (travel C max. 5000 mm) and intermediate positions.

Accessories:
See table for shock absorbers, proximity switches and plug connectors.

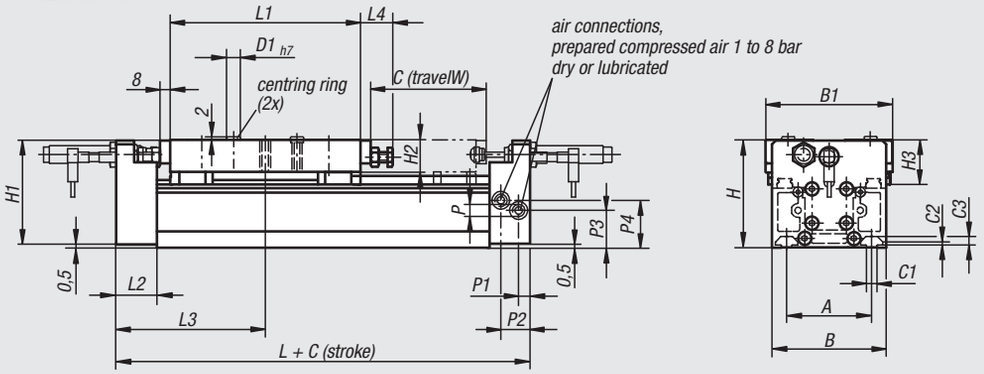
size 65

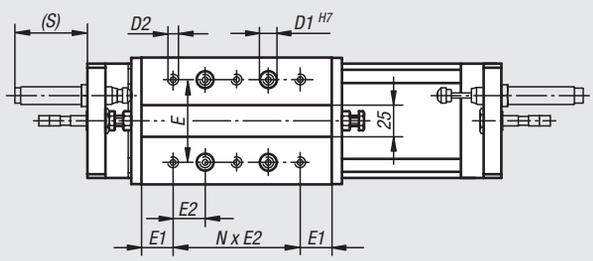


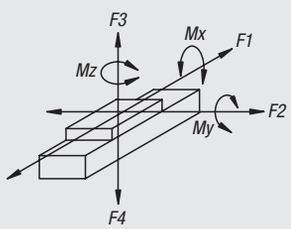
air connections,
prepared compressed air 1 to 8 bar dry or lubricated



sizes 90/115







Portal modules, pneumatic

with rail guides

Order No.	Size	A	B	B1	C1	C2	C3	C (travel)	D1	D2	E	E1	E2	H	H1	H2	H3	L
20200-1065X0500	65	42	65	75	8,1	2,5	6,8	500*	10	M5	50	15	20	70	69,5	11,5	21,5	175
20200-1090X0500	90	67	90	100	8,1	2,5	6,8	500*	10	M6	65	25	25	85	84,5	25	35	235
20200-1115X0500	115	97	125	135	10	5	8,5	500*	13	M8	90	20	30	115	114,5	25	44,8	305

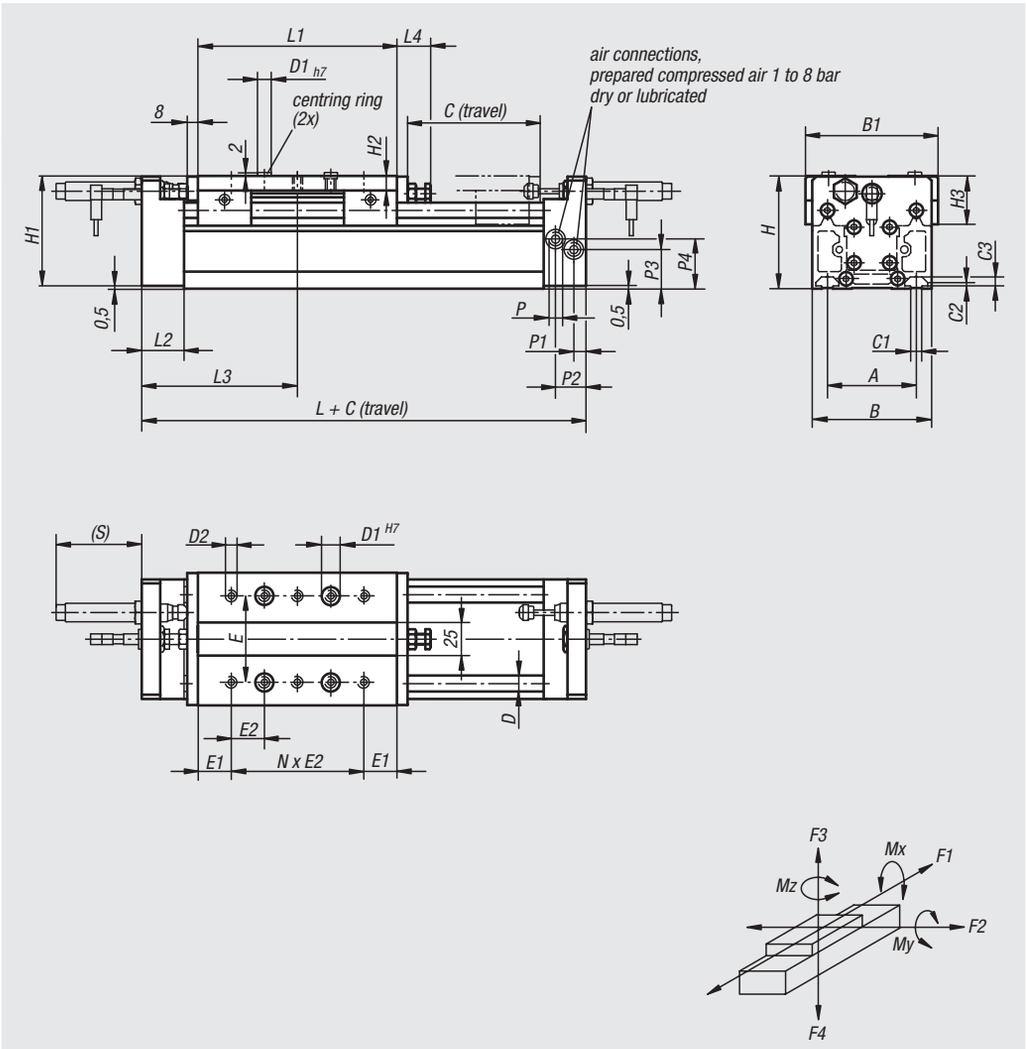
Order No.	Size	L1	L2	L3	L4	N (number)	P	P1	P2	P3	P4	S
20200-1065X0500	65	110	27	87,5	17	4	M5	8,5	-	8,5	25,8	40
20200-1090X0500	90	150	32	117,5	25,5	4	G1/8	9	23	30	38	64,5
20200-1115X0500	115	220	32	152,5	25,5	6	G1/4	15,5	19,5	40,5	60,5	62,5

Order No.	Size	Piston force at 6 bar (N)	Cylinder-Ø	Air consumption per 10 mm travel at 6 bar (ccm)	Mx Nm	My Nm	Mz Nm	F1 (N)	F2 (N)	F3 (N)	F4 (N)
20200-1065X0500	65	150	18	18	155	260	260	460	610	610	610
20200-1090X0500	90	250	25	35	310	410	410	560	750	750	750
20200-1115X0500	115	640	40	88	1570	2270	2270	1550	2070	2070	2070

Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20200-1065X0500	65	26300-1210010	20910-030	20950-010X2000
20200-1090X0500	90	26300-1415010	20910-030	20950-010X2000
20200-1115X0500	115	26300-2015016	20910-030	20950-010X2000

Portal modules, pneumatic

with round guides



Material:
Body, carriage and flange plate aluminium alloy.
Guide shafts steel.

Version:
Body anodised natural colour.
Carriage and flange plate anodized.
Guide shafts hardened.

Sample order:
nlm 20200-2090X0500 or to DIN specifications.

Note:
Portal modules with precision steel shafts and ball guide bushes. Pneumatic drive through a rodless cylinder. High load rating due to stiffened self-supporting aluminium profiles. The modules can be mounted in any position.
Specified loads apply to dynamic loads.

Repeat accuracy ±0.02 mm.

Temperature range:
+5 °C to +70 °C

On request:
* Other lengths (travel C max. 5000 mm) and intermediate positions.

Accessories:
See table for shock absorbers, proximity switches and plug connectors.

Portal modules, pneumatic

with round guides

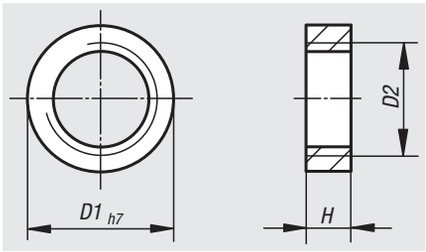
Order No.	Size	A	B	B1	C1	C2	C3	C (travel)	D	D1	D2	E	E1	E2	H	H1	H2	H3	L
20200-2090X0500	90	67	90	100	8,1	2,5	6,8	500*	12	10	M6	65	25	25	85	84,5	11	36,5	235
20200-2115X0500	115	97	125	135	10	5	8,5	500*	16	13	M8	90	20	30	115	114,5	12,5	46,5	305

Order No.	Size	L1	L2	L3	L4	N (number)	P	P1	P2	P3	P4	S
20200-2090X0500	90	150	32	117,5	25,5	4	G1/8	9	23	30	38	64,5
20200-2115X0500	115	220	32	152,5	25,5	6	G1/4	15,5	19,5	40,5	60,5	62,5

Order No.	Size	Piston force at 6 bar (N)	Cylinder-Ø	Air consumption per 10 mm travel at 6 bar (ccm)	Mx Nm	My Nm	Mz Nm	F1 (N)	F2 (N)	F3 (N)	F4 (N)
20200-2090X0500	90	250	25	35	50	65	160	90	45	120	290
20200-2115X0500	115	640	40	88	70	130	310	180	90	145	340

Order No.	Size	Suitable shock absorber	Suitable proximity switch	Suitable plug connector
20200-2090X0500	90	26300-1415010	20910-030	20950-010X2000
20200-2115X0500	115	26300-2015016	20910-030	20950-010X2000

Centring rings



Material:
Stainless steel 1.4301.

Sample order:
nlm 20240-0705

Note:
Centring rings are for joining precisely or mounting modules indirectly by adapter plates.
The internal thread is for removing the centring rings.

Order No.	D1	D2	H
20240-0705	7	M5	3
20240-1008	10	M8	4
20240-1310	13	M10	4

Inductive proximity switches

round housing

Material:
Housing stainless steel.
Active face POM or PBT.

Version:
Voltage: U = 10 – 30 V DC
Function: Normally open
Switch type: PNP
Mounting type: flush
Security type: IP 67

Sample order:
nlm 20900-010X2000 or to DIN specifications.

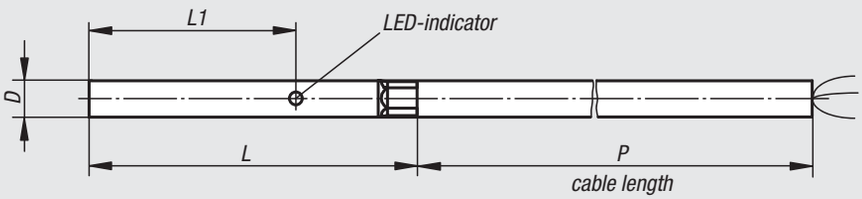
Note:
Non-contact, wear-free operation. High switching frequency and switch accuracy. Non-sensitive to vibration, dust and moisture. Inductive sensors register all metals without contact.

Short-circuit and reverse-polarity proof.

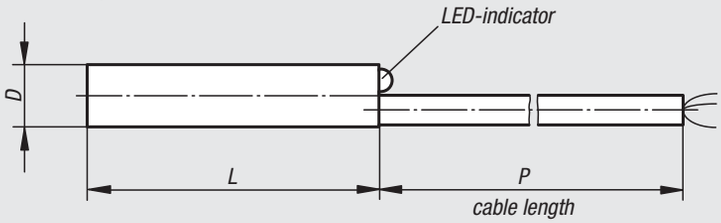
Temperature range:
-25°C to +70 °C

Safety:
This product is not suited as a sensor for the protection of persons.

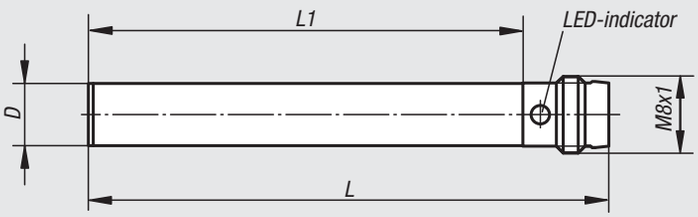
Form A



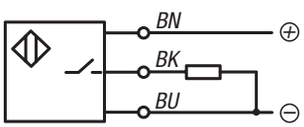
Form B



Form C



Connection diagram:



BN = brown
BK = black
BU = blue

Order No.	Form	D	L	L1	P	material active surface	switching distance Sn (mm)	current I max. (mA)	switching frequency f (Hz)	connection type	No. of conductors x conductor cross-section
20900-010X2000	A	3	27	16,7	2000	POM	1	100	2000	PUR cable	3 x 0,09 mm²
20900-020X5000	A	4	27	15,4	5000	POM	1,5	100	3000	PUR cable	3 x 0,14 mm²
20900-030X3000	B	6,5	30	-	3000	PBT	1,5	200	3000	PVC cable	3 x 0,14 mm²
20900-040	C	6,5	55	43	-	PBT	1,5	200	3000	plug connector	3
20900-050	C	6,5	60	48	-	PBT	1,5	200	5000	plug connector	3

Inductive proximity switches

rectangular housing

Material:
Housing Form A plastic.
Housing Form B die-cast zinc alloy.
Active surface POM.

Version:
Voltage: U = 10 – 30 V DC
Function: Normally open
Switch type: PNP
Mounting type: flush
Security type: IP 67

Sample order:
nlm 20905-010

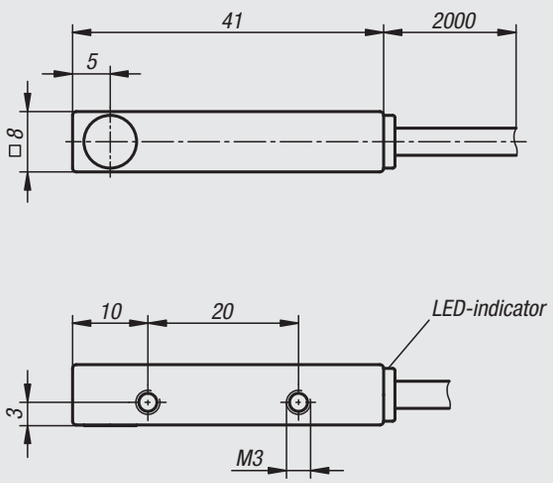
Note:
Non-contact, wear-free operation. High switching frequency and switch accuracy. Non-sensitive to vibration, dust and moisture. Inductive sensors register all metals without contact.

Short-circuit and reverse-polarity proof.

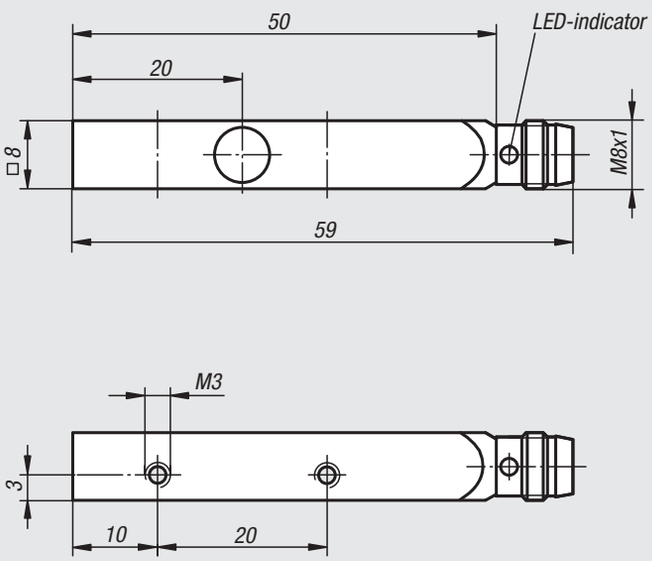
Temperature range:
-25°C to +70 °C

Safety:
This product is not suited as a sensor for the protection of persons.

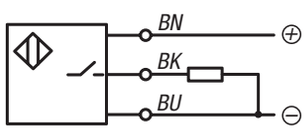
Form A



Form B



Connection diagram:



BN = brown
BK = black
BU = blue

Order No.	Form	switching distance Sn (mm)	current I max. (mA)	switching frequency f (Hz)	connection type	No. of conductors x conductor cross-section
20905-005	A	2	100	1500	PUR cable	3 x 0,14 mm²
20905-010	B	1,5	200	5000	plug connector	3

Inductive proximity switches

threaded housing

Material:
Housing stainless steel or nickel-plated brass.
Active face PBT or PA 12.

Version:
Voltage: U = 10 – 30 V DC
Function: Normally open
Switch type: PNP
Mounting type: flush
Security type: IP 67

Sample order:
nlm 20910-010X5000 or to DIN specifications.

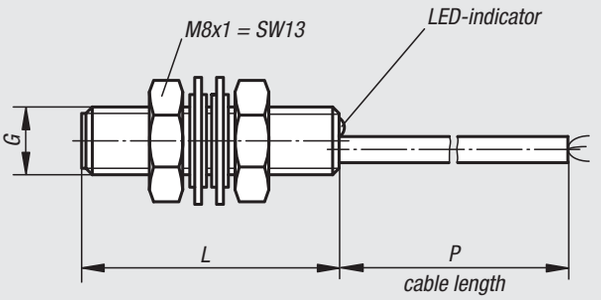
Note:
Non-contact, wear-free operation. High switching frequency and switch accuracy. Non-sensitive to vibration, dust and moisture. Inductive sensors register all metals without contact.

Short-circuit and reverse-polarity proof.

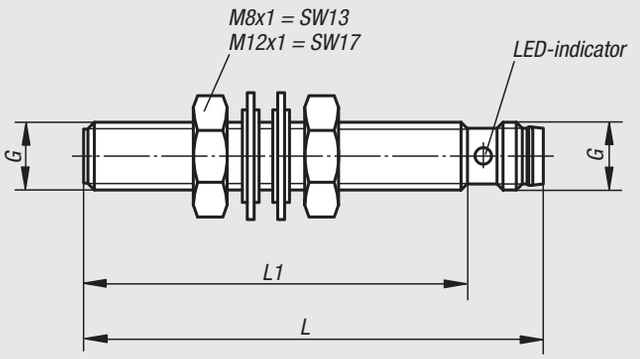
Temperature range:
-25 °C to +70 °C.

Safety:
This product is not suited as a sensor for the protection of persons.

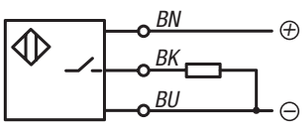
Form A



Form B



Connection diagram:



BN = brown
BK = black
BU = blue

Order No.	Material	Form	G	L	L1	P	Material active surface	switching distance Sn (mm)	current I max. (mA)	switching frequency f (Hz)	connection type	No. of conductors x conductor cross-section
20910-010X5000	stainless steel	A	M8x1	30	-	5000	PBT	1,5	200	3000	PUR cable	3 x 0,14 mm²
20910-020	stainless steel	B	M8x1	45	34,5	-	PBT	2	200	1500	plug connector	3
20910-030	stainless steel	B	M8x1	55	44,5	-	PBT	2	200	1500	plug connector	3
20910-040	brass	B	M8x1	59	50	-	PA 12	1,5	100	1000	plug connector	3
20910-050	brass	B	M8x1	59	50	-	PA 12	2	200	700	plug connector	3
20910-060	brass	B	M12x1	65	50	-	PA 12	2	200	1200	plug connector	3
20910-070	brass	B	M12x1	65	50	-	PA 12	4	200	500	plug connector	3

Plug connectors

with screw fitting

Material:
Cable and housing PUR
Contacts gold-plated bronze.

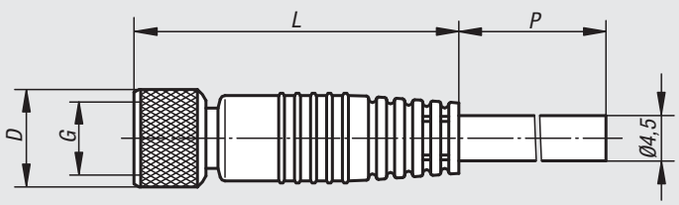
Version:
Bush (female)
Voltage: U max. 60 V
Current: I max. 4 A
Terminals: 3-pin
Security type: IP 67

Sample order:
nlm 20950-010X2000 or to DIN specifications.

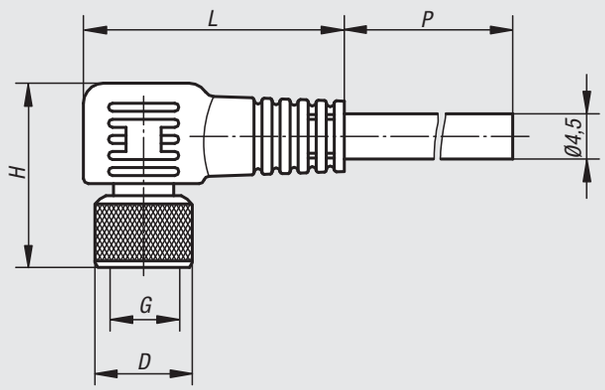
Note:
Plug connector with screw lock.
Plug encapsulated to cable.

Temperature range:
-25°C to +70 °C

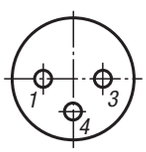
Form A



Form B



Connection diagram of sleeve:



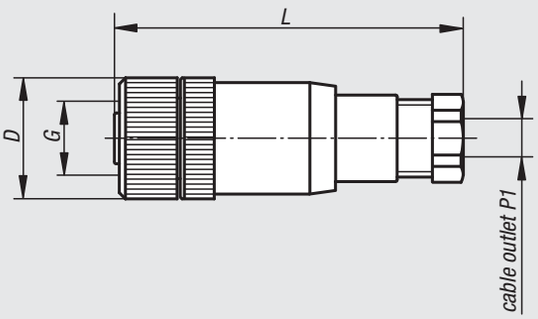
1 = brown (BN)
3 = blue (BU)
4 = black (BK)

Order No.	Form	D	H	G	L	P	No. of conductors x conductor cross-section
20950-010X2000	A	9,7	-	M8x1	32	2000	3 x 0,25 mm²
20950-020X2000	A	14,5	-	M12x1	41,5	2000	3 x 0,34 mm²
20950-030X2000	B	9,7	18,2	M8x1	26	2000	3 x 0,25 mm²
20950-040X2000	B	14,5	26,5	M12x1	38,5	2000	3 x 0,34 mm²

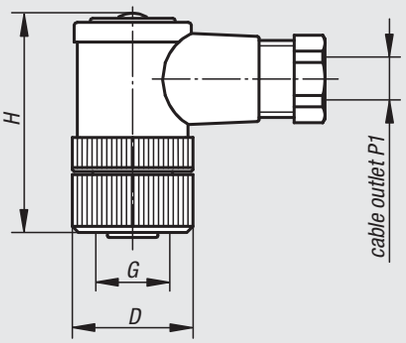
Plug connectors

self-assembly with screw fitting

Form A



Form B



Material:
Housing, plastic
Contacts M8x1 gold-plated bronze.
Contacts M12x1 Optaloy-coated brass.

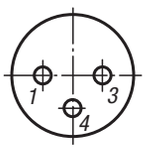
Version:
Bush (female)
Voltage: U max. 60 V
Current: I max. 4 A
Terminals: 3-pin
(4-pin by M12x1)
Security type: IP 67

Sample order:
nlm 20955-010

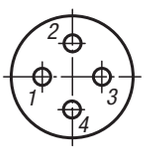
Note:
Plug connector for self-assembly with screw lock.

Temperature range:
-25 °C to +85 °C.

Connection diagram of sleeve:



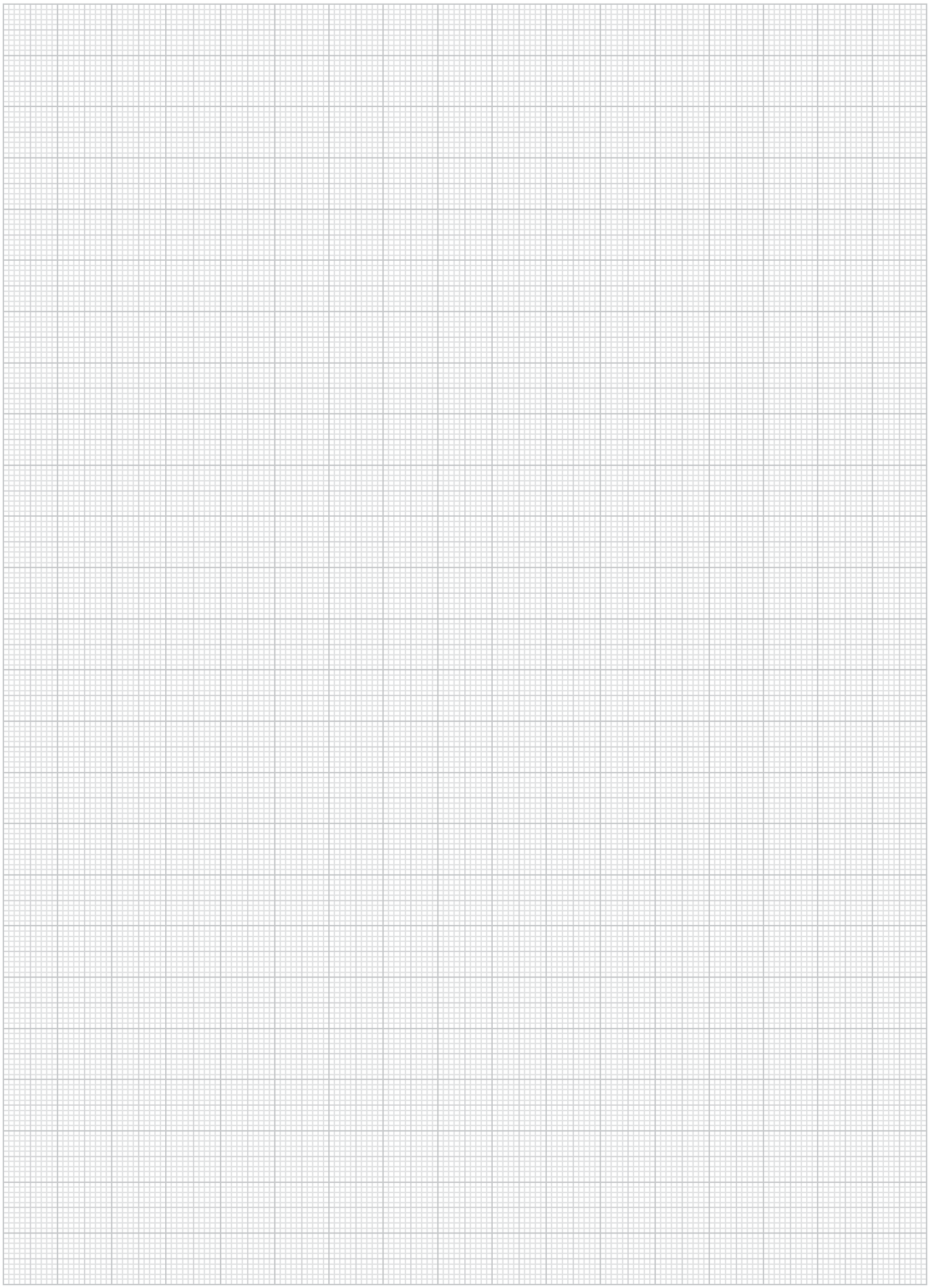
1 = brown (BN)
3 = blue (BU)
4 = black (BK)



1 = brown (BN)
2 = white (WH)
3 = blue (BU)
4 = black (BK)

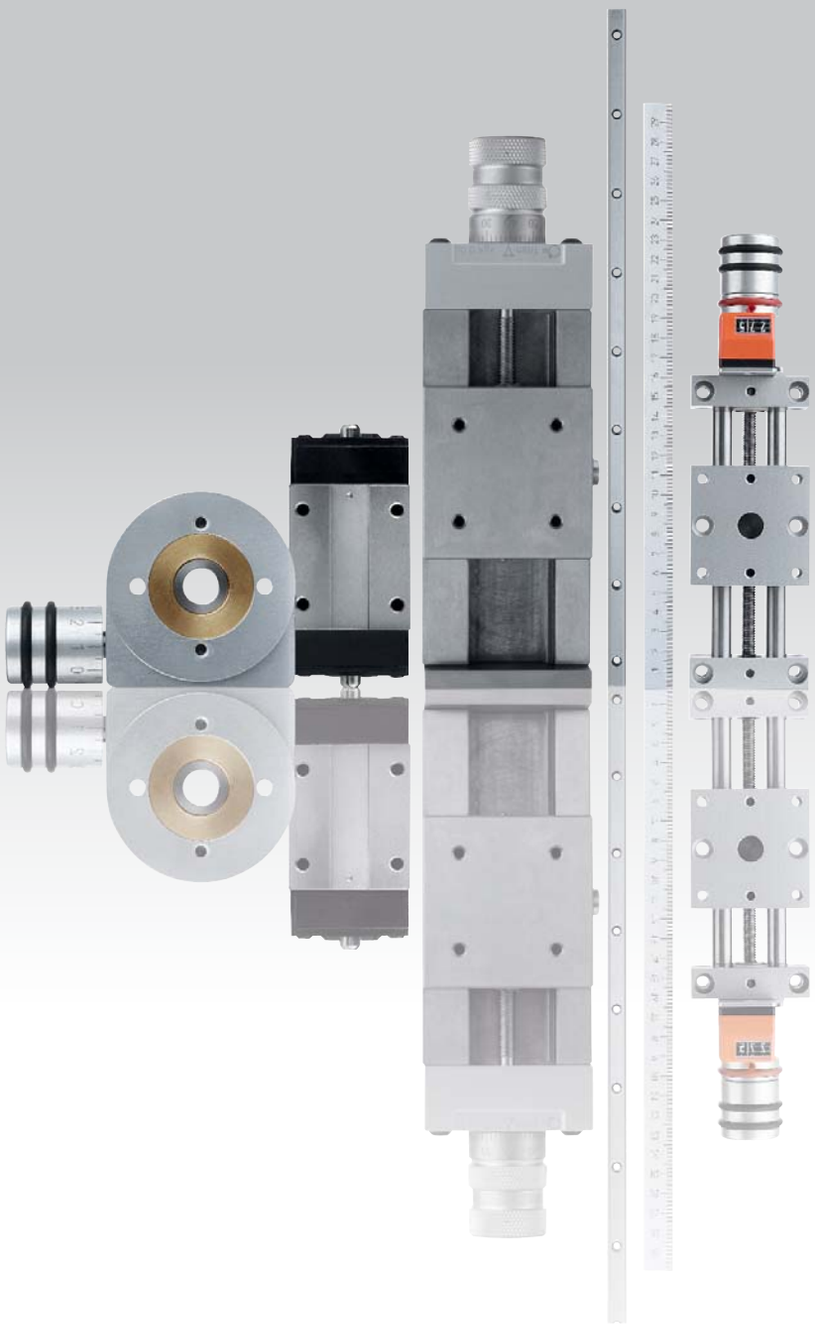
Order No.	Form	D	G	H	L	P1	connection type	Connection cross-section max. (mm^2)
20955-010	A	12	M8x1	-	45	3,5 - 5	screw fitting	0,5
20955-020	A	20	M12x1	-	54	4 - 6	screw fitting	0,75
20955-030	B	12	M8x1	28	-	3,5 - 5	soldered connection	0,25
20955-040	B	20	M12x1	38	-	4 - 6	screw fitting	0,75

Notes



21000

Slides
Guide rails
Positioning tables
Linear guide systems
Position indicators



Dovetail slides

with micrometer spindle

Material:
Aluminium EN AW-6063

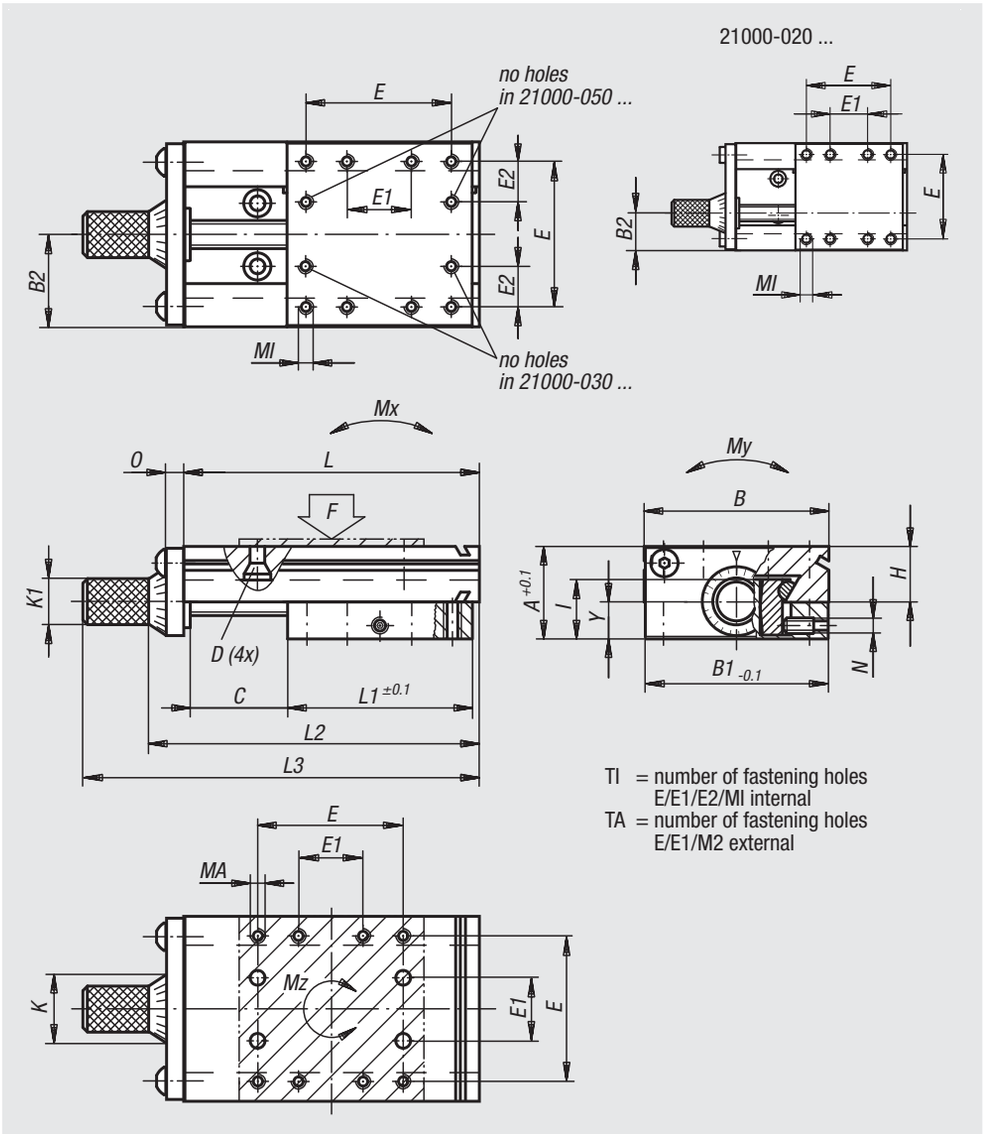
Sample order:
nlm 21000-050105

Note:
These precision dovetail slides find use in machine and fixture construction, inspection instruments, optical instruments and fine mechanics.
The stated permissible load rating (F) is for static loads.
The torque values only apply for centred carriages.

M1 = counterbore for screw.

Advantages:
- Innovative and safe clamping system that has no height or lateral displacement.
- Guides have no play.
- Quick and retrofit combination in the X, Y and Z axes.

Applications:
- Adjustment of machining units, measuring cameras, mirrors, microscopes and laser heads (including the machining of surgical needles).
- Fine adjustment of brazing, plasma and welding heads.
- Focussing of flame nozzles.



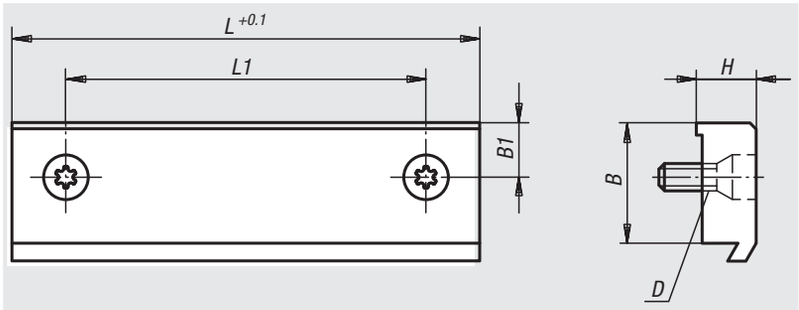
Dovetail slides

with micrometer spindle

Order No.	A	B	B1	B2	C travel	D for screw	E	E1	E2	TI	TA	H	I	K	K1
21000-020030	13	20 -0,3	19,5	8,1	5	M2	12	6	-	8	8	8	8,3	10	6,3
21000-020035	13	20 -0,3	19,5	8,1	10	M2	12	6	-	8	8	8	8,3	10	6,3
21000-020045	13	20 -0,3	19,5	8,1	20	M2	12	6	-	8	8	8	8,3	10	6,3
21000-030040	15	30 -0,3	29,5	13	5	M3	23	8	7,5	10	8	9,8	9,8	10	6,3
21000-030045	15	30 -0,3	29,5	13	10	M3	23	8	7,5	10	8	9,8	9,8	10	6,3
21000-030055	15	30 -0,3	29,5	13	20	M3	23	8	7,5	10	8	9,8	9,8	10	6,3
21000-050067	23	50 -0,3	49,5	25	12	M4	38	16	11	10	8	14,5	15,6	22	14,3
21000-050080	23	50 -0,3	49,5	25	25	M4	38	16	11	10	8	14,5	15,6	22	14,3
21000-050105	23	50 -0,3	49,5	25	50	M4	38	16	11	10	8	14,5	15,6	22	14,3
21000-080110	34	80 -0,5	79,5	40	25	M5	60	34	13	12	8	23	22,5	26	14,3
21000-080135	34	80 -0,5	79,5	40	50	M5	60	34	13	12	8	23	22,5	26	14,3
21000-080160	34	80 -0,5	79,5	40	75	M5	60	34	13	12	8	23	22,5	26	14,3
21000-080185	34	80 -0,5	79,5	40	100	M5	60	34	13	12	8	23	22,5	26	14,3
21000-120150	45	120 -0,5	119	60	25	M5	90	40	25	12	8	30	29	26	14,3
21000-120175	45	120 -0,5	119	60	50	M5	90	40	25	12	8	30	29	26	14,3
21000-120200	45	120 -0,5	119	60	75	M5	90	40	25	12	8	30	29	26	14,3
21000-120225	45	120 -0,5	119	60	100	M5	90	40	25	12	8	30	29	26	14,3

Order No.	L	L1	L2	L3	MI	MA	N	O	Y	Spindle	F (N)	Mx Nm	My Nm	Mz Nm
21000-020030	30	20	38,2	48,2	M2x3	M2x3	M3	3	5,2	M5 x 0,5	180	0,45	2	0,3
21000-020035	35	20	43,2	53,2	M2x3	M2x3	M3	3	5,2	M5 x 0,5	180	0,45	2	0,3
21000-020045	45	20	53,2	63,2	M2x3	M2x3	M3	3	5,2	M5 x 0,5	180	0,45	2	0,3
21000-030040	40	30	48,2	58,2	M3x4,5	M3x4,5	M4	3	5,8	M5 x 0,5	350	1,1	4	1
21000-030045	45	30	53,2	63,2	M3x4,5	M3x4,5	M4	3	5,8	M5 x 0,5	350	1,1	4	1
21000-030055	55	30	63,2	73,2	M3x4,5	M3x4,5	M4	3	5,8	M5 x 0,5	350	1,1	4	1
21000-050067	67	50	78,2	98,2	M4x6	M4x8	M4	5	11,5	M5 x 0,5	540	2,5	8	2,3
21000-050080	80	50	91,2	111,2	M4x6	M4x8	M4	5	11,5	M5 x 0,5	540	2,5	8	2,3
21000-050105	105	50	116,2	136,2	M4x6	M4x8	M4	5	11,5	M5 x 0,5	540	2,5	8	2,3
21000-080110	110	80	128,3	148,3	M5x7,5	M5x10	M6	8	14	M10 x 1	750	8	22	7
21000-080135	135	80	153,3	173,3	M5x7,5	M5x10	M6	8	14	M10 x 1	750	8	22	7
21000-080160	160	80	178,3	198,3	M5x7,5	M5x10	M6	8	14	M10 x 1	750	8	22	7
21000-080185	185	80	203,3	223,3	M5x7,5	M5x10	M6	8	14	M10 x 1	750	8	22	7
21000-120150	150	120	172,3	192,3	M5x10	M5x10	M6	12	18,5	M10 x 1	1500	30	45	18
21000-120175	175	120	197,3	217,3	M5x10	M5x10	M6	12	18,5	M10 x 1	1500	30	45	18
21000-120200	200	120	222,3	242,3	M5x10	M5x10	M6	12	18,5	M10 x 1	1500	30	45	18
21000-120225	225	120	247,3	267,3	M5x10	M5x10	M6	12	18,5	M10 x 1	1500	30	45	18

Straps



Material:
Aluminium EN AW-6063

Sample order:
nlm 21000-020 (1 strap with clamping screw)

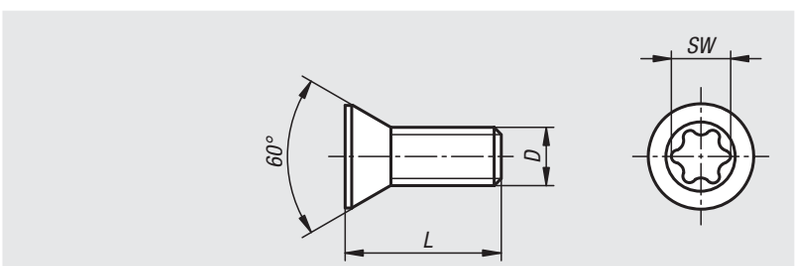
Note:
The straps are used to clamp the dovetail slides in the X, Y and Z axes and to fix the slide unit in the machine.
End mounting will reduce the travel.

Order No.	B	B1	D for screw	H	L	L1	travel reduction	suitable for slide
21000-020	5,7	3,7	M2	3,5	19,5	12	3,5	21000-020 ...
21000-030	5,7	2,85	M3	3,5	29,5	23	3,5	21000-030 ...
21000-050	11,5	5,25	M4	8	49,3	38	8	21000-050 ...
21000-080	11,5	6	M5	8	78,9	60	8	21000-080 ...
21000-120	15	10	M5	11	118,4	90	10	21000-120 ...

21000

Fastening screws

for cross table mounting



Material:
Steel.

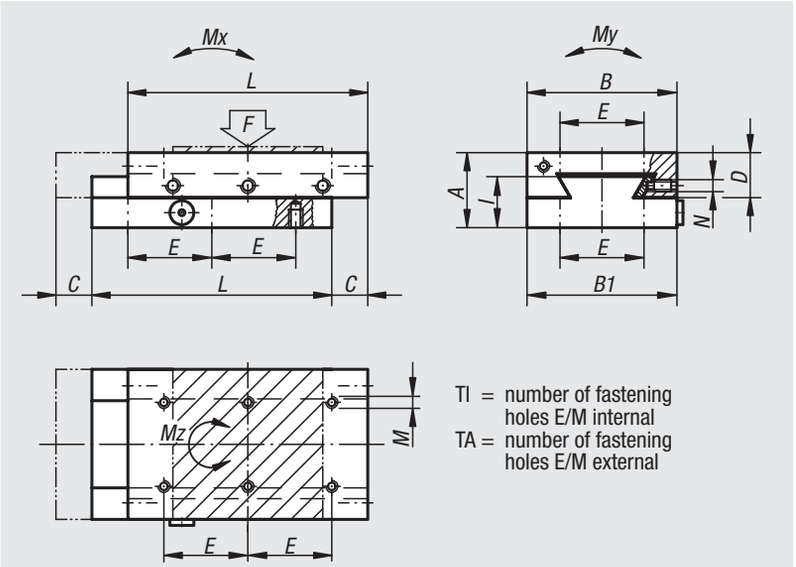
Version:
tempered.

Sample order:
nlm 21000-02055
(Supplied in sets of four)

Note:
Mounting set for constructing a cross table.
Four fastening screws per set.

Order No.	D	L	SW	suitable for slide
21000-02055	M2	5,5	Torx T7	21000-020...
21000-03070	M3	7	Torx T9	21000-030 ...
21000-04100	M4	10	Torx T15	21000-050 ...
21000-05140	M5	17	Torx T20	21000-080 ... / 21000-120 ...

Dovetail slides



Material:
GJL 250.

Version:
Bright, ground.

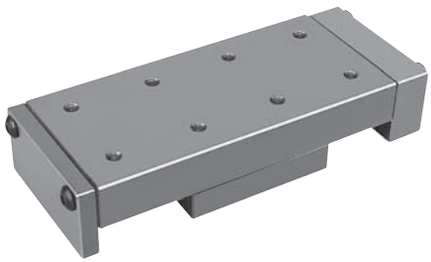
Sample order:
nlm 21030-050105

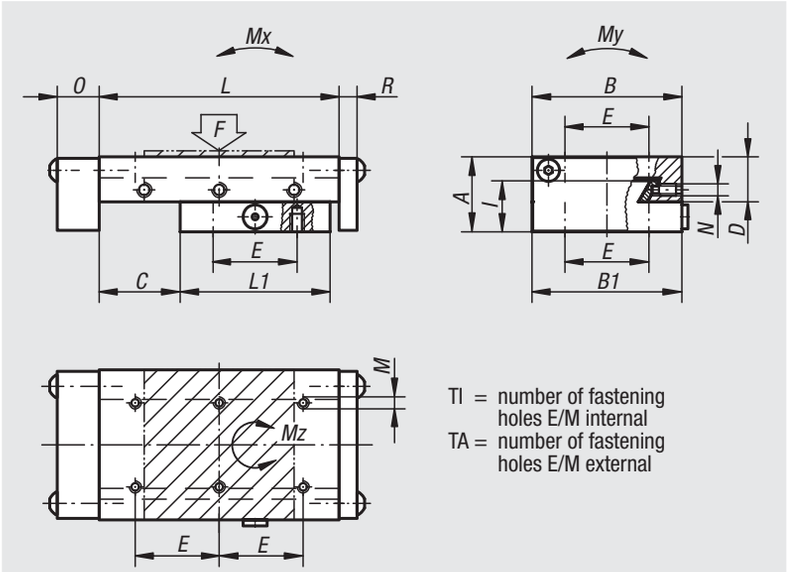
Note:
These precision dovetail slides find use in machine and fixture construction, inspection instruments, optical instruments and fine mechanics. The middle setscrew „N“ can be replaced by clamping lever Art. No. 06460.
The stated permissible load ratings (F) are designed for dynamic loads with a lifespan of 1 million travel cycles.
For static loads 10 times the F value is permitted.
The torque values apply only for centred carriages.

Order No.	A	B	B1	C	D	E	TI	TA	I	L	M	N	F (N)	Mx Nm	My Nm	Mz Nm
21030-050080	25	50	49,5	15	15	28	6	6	17,6	80	M4	M5	72	4	6	5
21030-050105	25	50	49,5	20	15	28	8	8	17,6	105	M4	M5	95	7	7	8
21030-050130	25	50	49,5	25	15	28	10	10	17,6	130	M4	M5	117	10	9	12
21030-075105	32	75	74,5	20	19,5	62	4	4	22,5	105	M5	M5	128	9	15	10
21030-075130	32	75	74,5	25	19,5	62	4	4	22,5	130	M5	M5	159	14	18	15
21030-100110	40	100	99,5	20	24	86	4	4	27,5	110	M6	M6	156	11	26	12
21030-100135	40	100	99,5	25	24	86	4	4	27,5	135	M6	M6	192	17	32	19
21030-100160	40	100	99,5	30	24	86	4	4	27,5	160	M6	M6	227	24	37	26

Dovetail slides

with end plates





Material:
GJL 250.

Version:
Bright, ground.

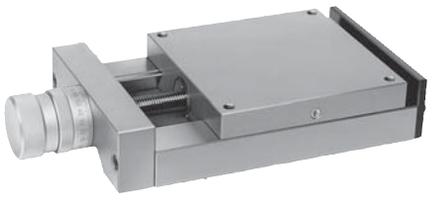
Sample order:
nlm 21031-100135

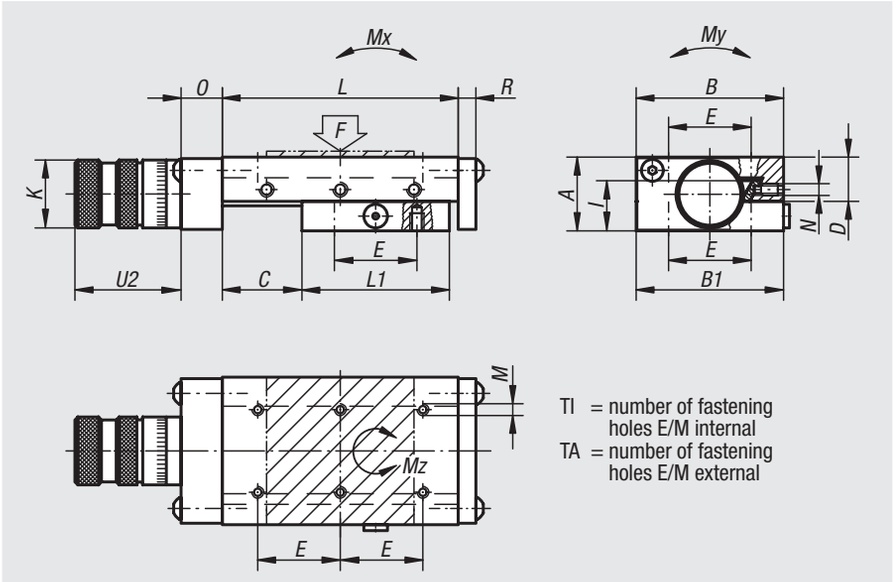
Note:
The central set screw „N“ can be replaced by a clamping lever 06460.
The stated permissible load values (F) are designed for dynamic loads with a lifespan of 1 million travel cycles.
For static loads 10 times the value F is permitted.
The torque values apply only to centred carriages.

Order No.	A	B	B1	C	D	E	TI	TA	I	L	L1	M	N	O	R	F (N)	Mx Nm	My Nm	Mz Nm
21031-050080	25	50	49,5	25	15	28	4	6	17,6	80	50	M4	M5	14	6	109	2	6	2
21031-050105	25	50	49,5	50	15	28	4	8	17,6	105	50	M4	M5	14	6	61	2	6	2
21031-075105	32	75	74,5	25	19,5	62	4	4	22,5	105	75	M5	M5	15	6	290	5	19	6
21031-075130	32	75	74,5	50	19,5	62	4	4	22,5	130	75	M5	M5	15	6	168	5	19	6
21031-100135	40	100	99,5	25	24	86	4	4	27,5	135	100	M6	M6	15	6	586	11	43	12
21031-100160	40	100	99,5	50	24	86	4	4	27,5	160	100	M6	M6	15	6	351	11	43	12
21031-100260	40	100	99,5	100	24	86	4	6	27,5	260	150	M6	M6	15	6	395	23	63	26

Dovetail slides

with micrometer spindle





Material:
GJL 250.

Version:
Bright, ground.

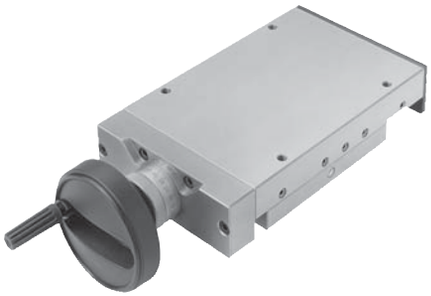
Sample order:
nlm 21032-075130

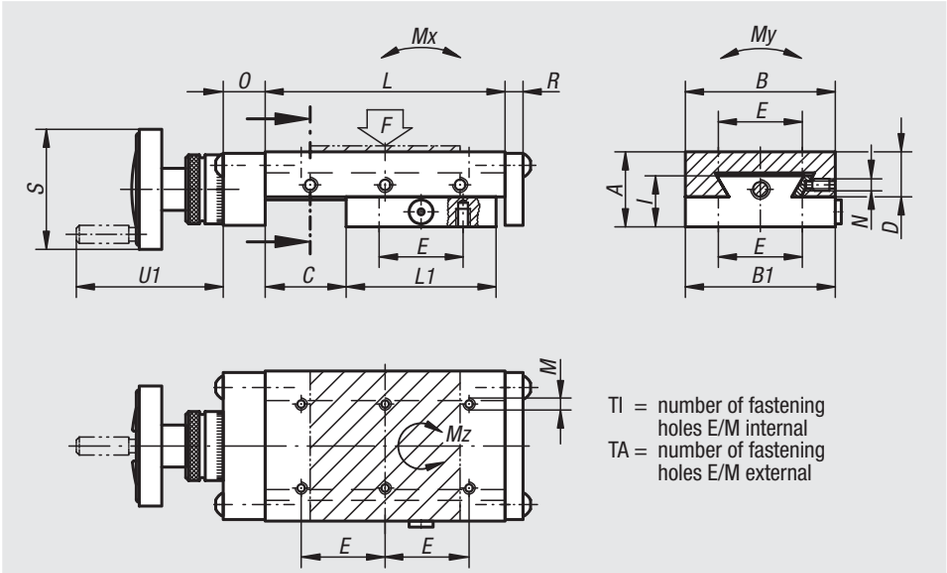
Note:
The central set screw „N“ can be replaced by a clamping lever 06460. The micrometer scale is graduated in 0.02 mm increments. Other graduations available on request.
The stated permissible load values (F) are designed for dynamic loads with a lifespan of 1 million travel cycles. For static loads 10 times the value F is permitted.
The torque values apply only to centred carriages.

Order No.	A	B	B1	C	D	E	TI	TA	I	K	L	L1	M	N	O	R	U2	Spindle	F (N)	Mx Nm	My Nm	Mz Nm
21032-050080	25	50	49,5	25	15	28	4	6	17,6	23	80	50	M4	M5	19	6	31	M6x1	109	2	6	2
21032-050105	25	50	49,5	50	15	28	4	8	17,6	23	105	50	M4	M5	19	6	31	M6x1	61	4	9	4
21032-050205	25	50	49,5	100	15	28	8	16	17,6	23	205	100	M4	M5	19	6	31	M6x1	114	7	12	8
21032-075105	32	75	74,5	25	19,5	62	4	4	22,5	30	105	75	M5	M5	21	6	38	M10x1	290	5	19	6
21032-075130	32	75	74,5	50	19,5	62	4	4	22,5	30	130	75	M5	M5	21	6	38	M10x1	168	5	19	6
21032-075155	32	75	74,5	75	19,5	62	4	4	22,5	30	155	75	M5	M5	21	6	38	M10x1	118	5	19	6
21032-100135	40	100	99,5	25	24	86	4	4	27,5	30	135	100	M6	M6	21	6	38	M10x1	586	11	43	12
21032-100160	40	100	99,5	50	24	86	4	4	27,5	30	160	100	M6	M6	21	6	38	M10x1	351	11	43	12
21032-100260	40	100	99,5	100	24	86	4	6	27,5	30	260	150	M6	M6	21	6	38	M10x1	395	23	63	26
21032-200310	60	200	199	100	37	170	4	4	41,5	47	310	200	M8	M8	28	8	53	Tr16x2	1078	66	283	71

Dovetail slides

with micrometer spindle and handwheel





Material:
GJL 250.

Version:
Bright, ground.

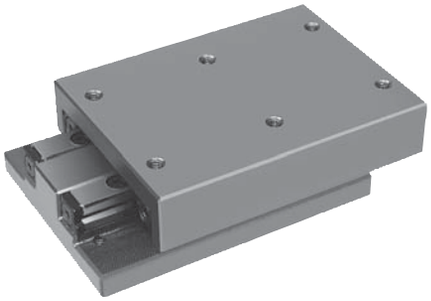
Sample order:
nlm 21033-150310

Note:
The central set screw „N“ can be replaced by a clamping lever 06460. The micrometer scale is graduated in 0.02 mm increments. Other graduations available on request. The revolving grip on the handwheel can fold down.
The stated permissible load values (F) are designed for dynamic loads with a lifespan of 1 million travel cycles.
For static loads 10 times the value F is permitted.
The torque values apply only to centred carriages.

Order No.	A	B	B1	C	D	E	TI	TA	I	L	L1	M	N	O	R	S	U1	Spindle	F (N)	Mx Nm	My Nm	Mz Nm
21033-150210	50	150	149	50	29,5	130	4	4	35,5	210	150	M8	M8	28	8	80	100	Tr16x2	917	31	128	33
21033-150310	50	150	149	100	29,5	130	4	6	35,5	310	200	M8	M8	28	8	80	100	Tr16x2	868	53	169	58

Precision slides

roller mounted

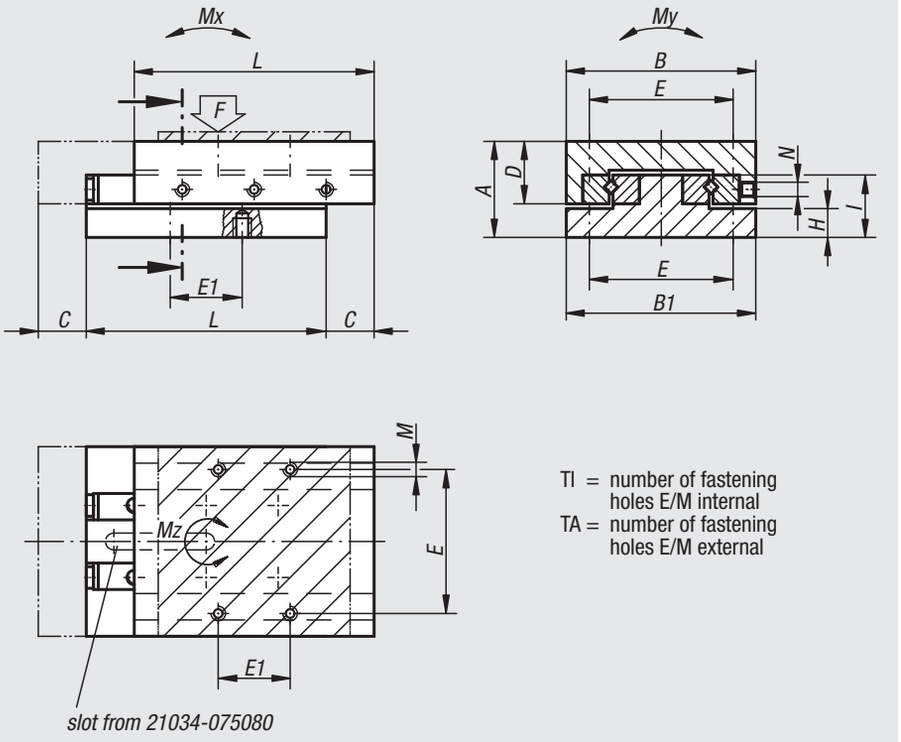


Material:
GJL 250

Version:
Ground

Sample order:
nlm 21034-050105

Note:
A clamp that acts on the side edge without loading the guide geometry can be supplied as an optional extra.
F = permissible dynamic or static load.
The stated permissible loads (F) are for a lifespan of 1 million travel cycles.
The torque values apply only to centred carriages.
Cross slides are also available on request.



Order No.	Type	A	B	B1	C	D	E	E1	TI	TA	H	I	L	M	N	F (N)	Mx Nm	My Nm	Mz Nm
21034-040050	RON	20	40	39,5	10	13	30	15	4	4	6,5	13	50	M3	M3	206	1	4	3
21034-0400501	ROL	20	40	39,5	17,5	13	30	15	4	4	6,5	13	50	M3	M3	85	1	3	2
21034-040065	ROL	20	40	39,5	25	13	30	15	6	6	6,5	13	65	M3	M3	114	1	4	3
21034-040080	ROL	20	40	39,5	32,5	13	30	15	8	8	6,5	13	80	M3	M3	143	3	5	5
21034-050055	RON	25	50	49,5	10	17	28	28	4	4	7,5	18	55	M4	M3	283	4	7	6
21034-050080	ROL	25	50	49,5	30	17	28	28	6	6	7,5	18	80	M4	M3	189	3	9	7
21034-050105	ROL	25	50	49,5	40	17	28	28	8	8	7,5	18	105	M4	M3	301	10	11	15
21034-050155	ROL	25	50	49,5	60	17	28	28	12	12	7,5	18	155	M4	M3	476	23	19	33
21034-060055	RON	25	60	59,5	10	17	34	34	4	4	7,5	18	55	M4	M3	288	4	8	6
21034-060080	ROL	25	60	59,5	30	17	34	34	6	6	7,5	18	80	M4	M3	192	3	11	7
21034-060105	ROL	25	60	59,5	40	17	34	34	6	6	7,5	18	105	M4	M4	305	10	14	15
21034-060155	ROL	25	60	59,5	60	17	34	34	10	10	7,5	18	155	M4	M4	483	23	23	34
21034-075080	RON	32	75	74,5	15	21	62	62	4	4	10,5	23	80	M5	M5	487	10	18	15
21034-075105	RON	32	75	74,5	20	21	62	62	4	4	10,5	23	105	M5	M5	690	18	26	27
21034-075130	RON	32	75	74,5	25	21	62	62	4	4	10,5	23	130	M5	M5	895	29	33	42
21034-100110	RON	40	100	99,5	15	27,5	86	86	4	4	12	28	110	M6	M6	1284	43	59	63
21034-100160	ROL	40	100	99,5	52,5	27,5	86	86	4	4	12	28	160	M6	M6	946	37	79	68
21034-100210	ROL	40	100	99,5	80	27,5	86	86	6	6	12	28	210	M6	M6	1066	60	99	105
21034-100260	ROL	40	100	99,5	105	27,5	86	86	6	6	12	28	260	M6	M6	1228	89	119	151

Slides mini

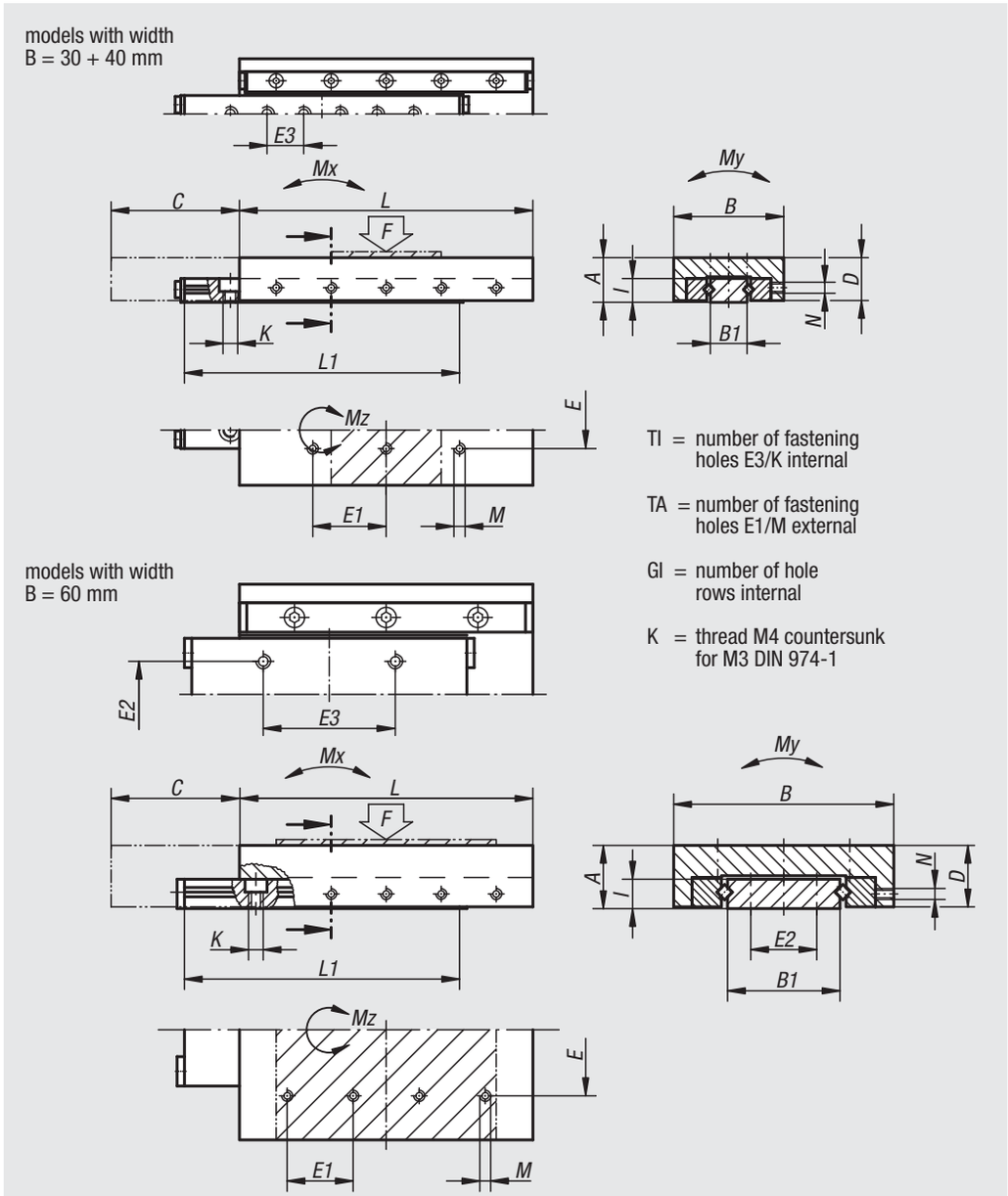
roller mounted

Material:
Outer housing aluminium.
Carriage and bearing steel.

Version:
Outer housing black anodized.
Carriage and bearings ground.
Internal parts hardened.

Sample order:
nlm 21035-030080

Note:
Roller slides run very lightly and can be adjusted with the set screw „N“.
The fastening holes „K“ can be used as tapped holes or through holes.
F = permissible loading for dynamic and static loads.
The stated permissible loads (F) are for a lifespan of 1 million travel cycles.
The torque values apply only to centred carriages.



Order No.	Type	A	B	B1	C	D	E	E1	E2	E3	TI	TA	GI	I	K	L	L1	M	N	F (N)	Mx Nm	My Nm	Mz Nm
21035-030035	MRON	12	30	10	12	11,7	10	10	-	10	2	6	1	6,3	M4	35	30	M3	M3	168	1	1,9	2
21035-030050	MRON	12	30	10	18	11,7	10	10	-	10	2	6	1	6,3	M4	50	45	M3	M3	245	3,5	2,6	5,2
21035-030065	MRON	12	30	10	24	11,7	10	20	-	10	4	6	1	6,3	M4	65	60	M3	M3	361	4,7	3,9	7,9
21035-0300501	MROL	12	30	10	34	11,7	10	10	-	10	2	6	1	6,3	M4	50	45	M3	M3	131	2,2	1,9	3,3
21035-0300651	MROL	12	30	10	48	11,7	10	20	-	10	4	6	1	6,3	M4	65	60	M3	M3	161	3,5	2,6	5,2
21035-030080	MRON	12	30	10	30	11,7	10	20	-	10	6	6	1	6,3	M4	80	75	M3	M3	432	9,1	4,5	13,3
21035-030095	MRON	12	30	10	40	11,7	10	20	-	10	8	10	1	6,3	M4	95	90	M3	M3	466	11,6	5,1	16,9
21035-040055	MRON	15	40	14,4	20	14,7	20	20	-	20	2	6	1	8,3	M4	55	50	M3	M3	231	4,6	4,6	6,8
21035-040080	MRON	15	40	14,4	30	14,7	20	20	-	20	2	6	1	8,3	M4	80	75	M3	M3	487	10,3	7,6	15,3
21035-040105	MRON	15	40	14,4	40	14,7	20	20	-	20	4	10	1	8,3	M4	105	100	M3	M3	689	18,6	10,6	27,3
21035-040155	MROL	15	40	14,4	120	14,7	20	20	-	20	6	14	1	8,3	M4	155	150	M3	M3	489	23,7	12,2	34,8
21035-060055	MRON	17	60	30,6	20	16,7	36	18	18	18	4	4	2	8,3	M4	55	50	M3	M4	294	4,6	7	6,9
21035-060080	MRON	17	60	30,6	30	16,7	36	18	18	36	4	8	2	8,3	M4	80	75	M3	M4	492	10,4	11,6	15,5
21035-060105	MRON	17	60	30,6	40	16,7	36	18	18	36	4	12	2	8,3	M4	105	100	M3	M4	697	18,8	16,2	27,6

Precision slides

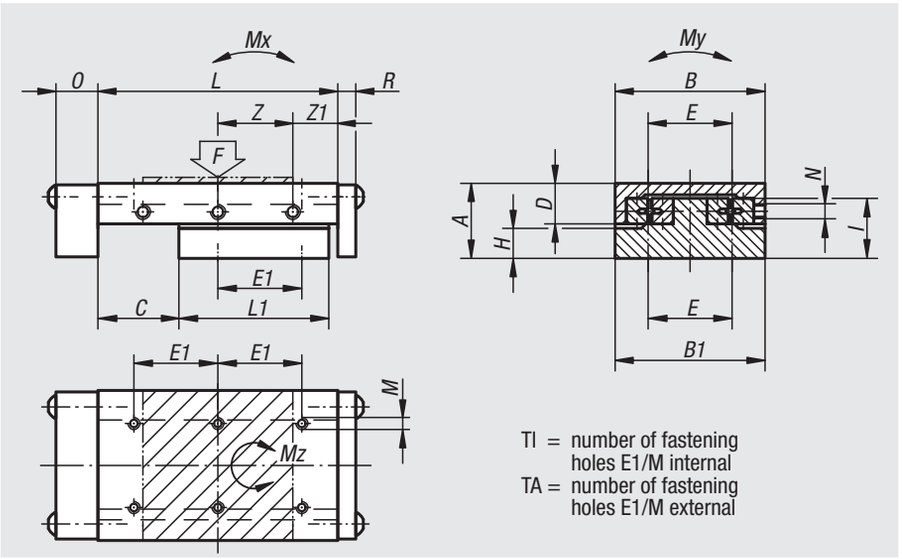
roller mounted with end plates

Material:
GJL 250

Version:
Ground

Sample order:
nlm 21038-040090

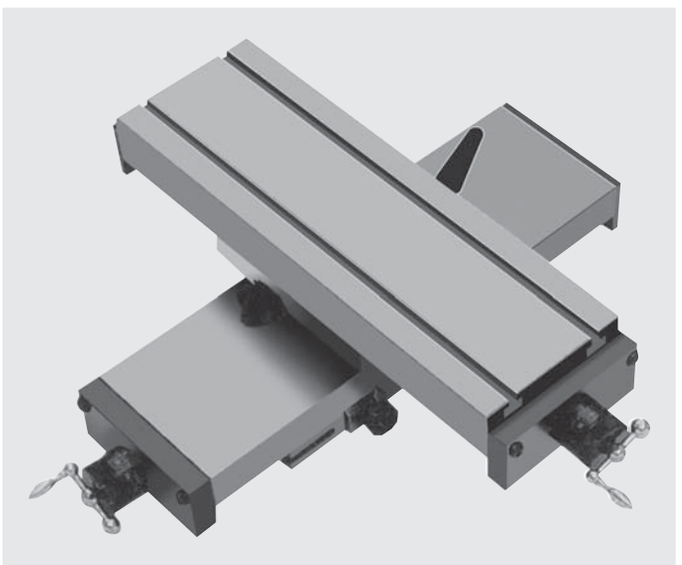
Note:
Slide is also available in aluminium on request.
F = permissible loading for dynamic and static loads.
The stated permissible loads (F) are for a lifespan of 1 million travel cycles.
The torque values apply only to centred carriages.



Order No.	A	B	B1	C	D	E	E1	TI	TA	H	I	L	L1	M	N	O	R	Z	Z1	F (N)	Mx Nm	My Nm	Mz Nm
21038-040090	20	40	39,5	40	13	30	15	6	8	6,5	13	90	45	M3	M3	12	3	15x2	30	77	1	3	2
21038-050105	25	50	49,5	25	17	28	28	6	8	7,5	18	105	75	M4	M3	14	6	25x2	27,5	623	9	14	15
21038-060180	25	60	59,5	75	17	34	34	6	12	7,5	18	180	100	M4	M4	14	6	25x3	52,5	349	9	17	16
21038-100260	40	100	99,5	100	27,5	86	86	4	6	12	28	260	150	M6	M6	15	6	50x2	80	990	37	80	69

Examples of dovetail slides

Example of slides mounted as a manual cross table



Precision slides

roller mounted with micrometer spindle

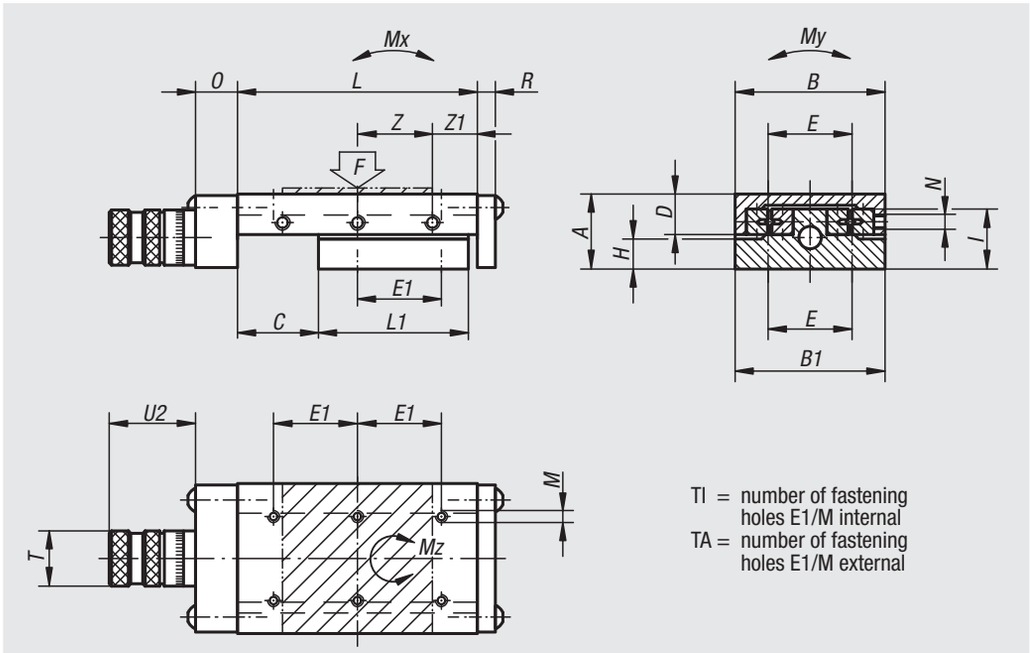
Material:
GJL 250

Version:
Bright, ground.

Sample order:
nlm 21040-040045

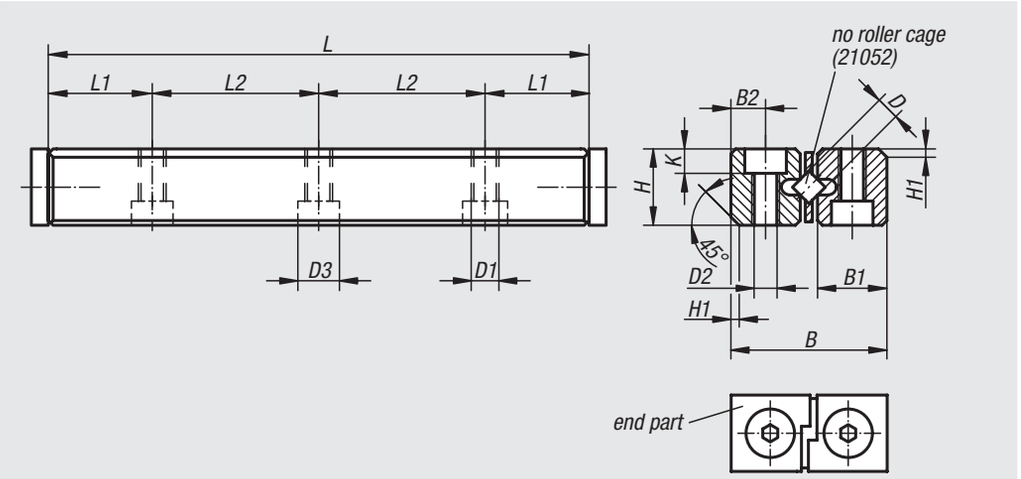
Note:
Slides available in aluminium on request. The micrometer scale is graduated in 0.02 mm increments. The version 21040-040045 is graduated in 0.01 mm increments. Other graduations are available on request.
F = permissible loading for dynamic and static loads.
The stated permissible loads (F) are for a lifespan of 1 million travel cycles.
The torque values apply only to centred carriages.

* Spacing of external fastening holes = 25 mm.



Order No.	A	B	B1	C	D	E	E1	TI	TA	H	I	L	L1	M	N	O	R	T	U2	Z	Z1	Spindle	F (N)	Mx Nm	My Nm	Mz Nm
21040-040045	20	40	39,5	10	13	30	15*	4	4	6,5	13	45	30	M3	M3	12	3	16	25	15x1	15	M5x0,5	183	1	3	2
21040-050075	25	50	49,5	20	17	28	28	4	6	7,5	18	75	50	M4	M3	14	6	23	36	25x1	25	M6x1	286	4	7	6
21040-060075	25	60	59,5	20	17	34	34	4	4	7,5	18	75	50	M4	M4	14	6	23	36	25x1	25	M6x1	289	4	8	6
21040-100360	40	100	99,5	150	27,5	86	86	6	8	12	28	360	200	M6	M6	15	6	30	44	50x3	105	M10x1	1130	61	100	107

Cross roller guide rails



Material:
Guide rail tool steel 1.2842.
End pieces 1.0531.

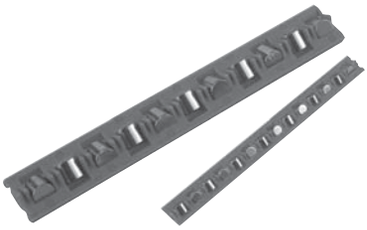
Version:
Guide rails hardened (60-62 HRC) and ground.
End piece black oxidised.

Sample order:
nlm 21050-02030 (1 guide rail, without roller cage)

Note:
See 21052 for the suitable roller cage. These guide rails are mounted on the slides 21034, 21035, 21038 and 21040 and can be used as replacement parts.

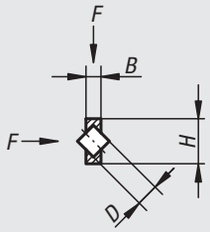
Order No.	D	L	L1	L2	B	B1	B2	H	H1	K	D1	D2	D3
21050-02030	2	30	7,5	1x15	12	5,5	2,5	6	1	2,2	M3	2,55	4,4
21050-02045	2	45	7,5	2x15	12	5,5	2,5	6	1	2,2	M3	2,55	4,4
21050-02060	2	60	7,5	3x15	12	5,5	2,5	6	1	2,2	M3	2,55	4,4
21050-03050	3	50	12,5	1x25	18	8,3	3,5	8	1	3,2	M4	3,4	6
21050-03075	3	75	12,5	2x25	18	8,3	3,5	8	1	3,2	M4	3,4	6
21050-03100	3	100	12,5	3x25	18	8,3	3,5	8	1	3,2	M4	3,4	6
21050-03125	3	125	12,5	4x25	18	8,3	3,5	8	1	3,2	M4	3,4	6
21050-03150	3	150	12,5	5x25	18	8,3	3,5	8	1	3,2	M4	3,4	6
21050-06100	6	100	25	1x50	31	13,9	6	15	1,8	5,2	M6	5,4	10
21050-06150	6	150	25	2x50	31	13,9	6	15	1,8	5,2	M6	5,4	10
21050-06200	6	200	25	3x50	31	13,9	6	15	1,8	5,2	M6	5,4	10
21050-06250	6	250	25	4x50	31	13,9	6	15	1,8	5,2	M6	5,4	10
21050-06300	6	300	25	5x50	31	13,9	6	15	1,8	5,2	M6	5,4	10
21050-06350	6	350	25	6x50	31	13,9	6	15	1,8	5,2	M6	5,4	10

Roller cages



Dimensioning formula:

$$\text{number of rollers in cage} = \frac{\text{length of guide rail - ½ travel}}{\text{division T}}$$

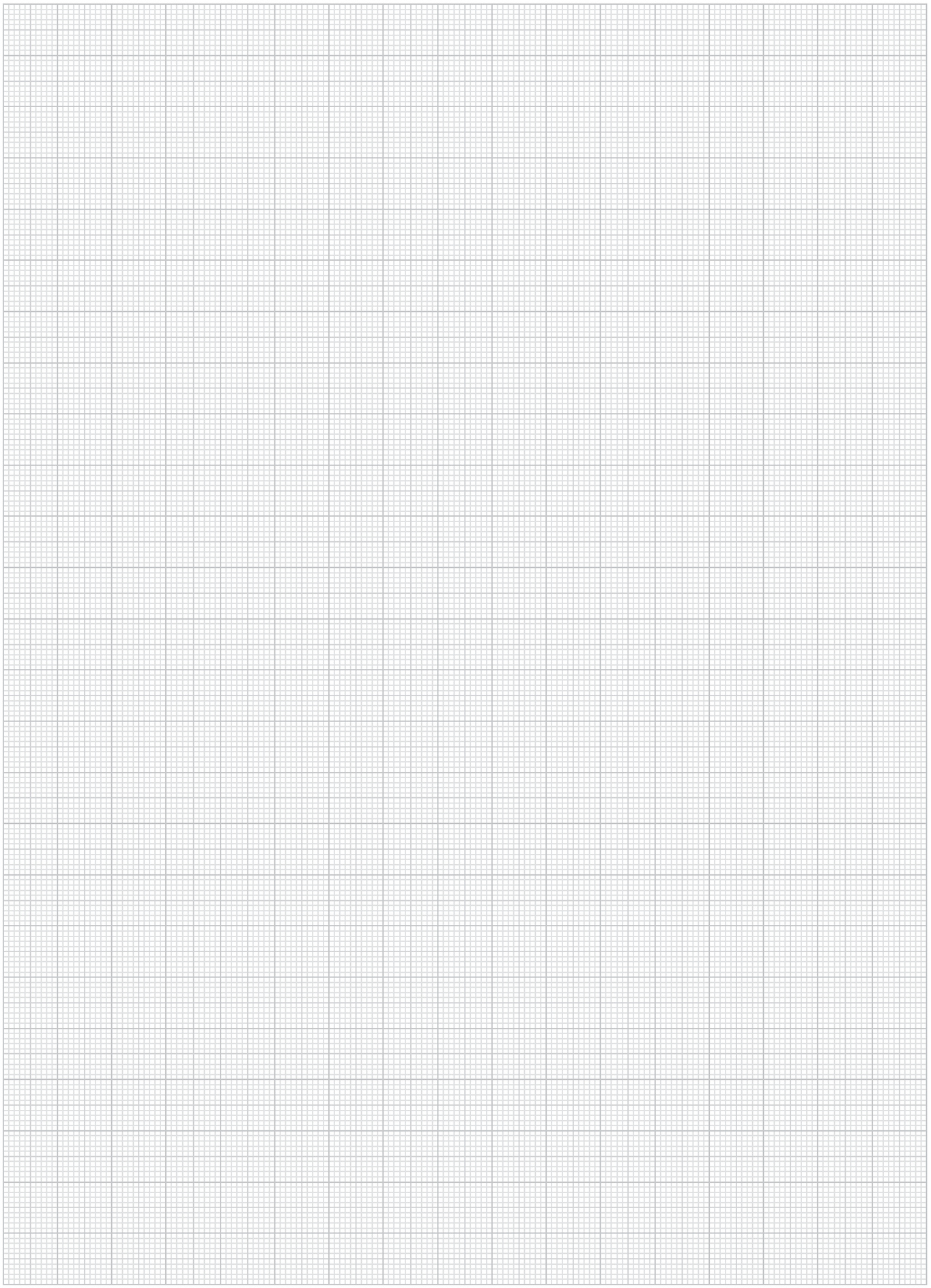


Material:
Cage plastic.
Rollers tool steel 1.2842

Sample order:
nlm 21052-02010 include number of rollers in cage (010 = 10 rollers).
Dimensioning formula see right.

Order No.	D	No. of rollers	B	H	T (division)	Load F N/roller
21052-02* **	2	2-200	0,5	4,5	4	60
21052-03* **	3	2-200	1	7,5	5	100
21052-06* **	6	2-200	2,4	15	9	400

Notes



Positioning tables short

with coaxial electric drive

Material:
Bearing block and carriage aluminium alloy.
Guide column and threaded spindle stainless steel.
Plain bearing for guide columns and spindle nut high-quality special plastic.
Claw coupling aluminium with polyurethane coupling spider.

Version:
Aluminium alloy anodized.
Stainless steel hardened and ground.
Threaded spindle with ball bearing.

Sample order:
nlm 21080-080

Note for ordering:
The unit is supplied with the position of cable outlet or control unit as shown in the drawing. Other combinations can be selected online with our configurator.

Note:
Positioning tables for motorised adjustment and positioning tasks. The plain bearings and spindle nuts are suitable for dry running, however lubrication with a grease for plastic plain bearings is recommended. The suitable programming software and interface cable for the stepper motor with positioning control are available as accessories (21088).
The stepper motor with a resolution of 200 increments per rotation allows a single direction calculated positioning accuracy of 0.005 mm. The absolute single direction positioning accuracy is 0.01 mm. The system can be operated with a switch-on time of 100%.

Can be combined with all other parts of the same size.

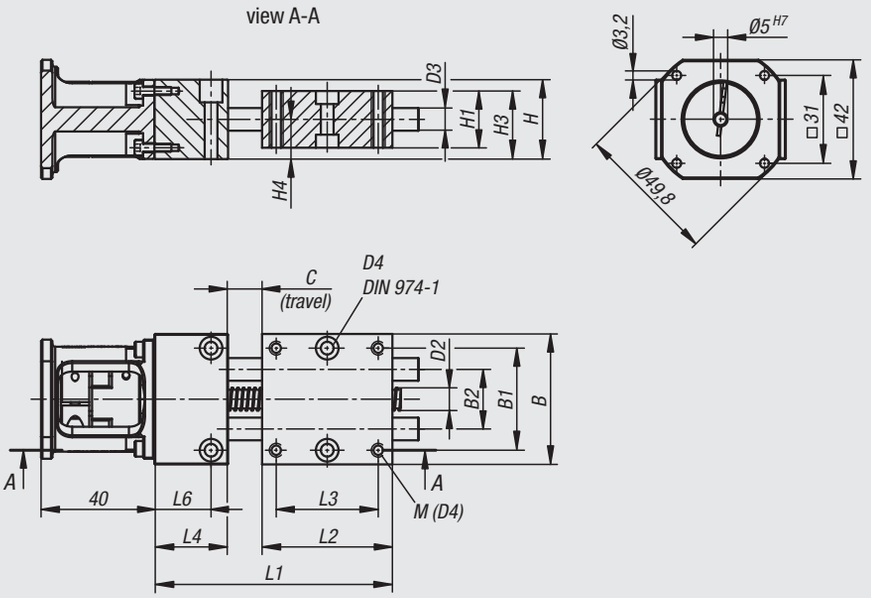
Technical data:
Threaded spindle pitch: 2 mm
Axial backlash of threaded spindle: <0.04 mm
Radial play of guides: <0.02 mm
Max. input speed: 600 rpm
Max. travel speed: 20 mm/s
Max. duty cycle: 100 %
Application temperature: +10 °C to +50 °C

Order No.	Size	Version	Version
21080-080	8	without motor	-
21080-0811	8	with stepper motor	-
21080-0821	8	with stepper motor	with integrated positioning control
21080-120	12	without motor	-
21080-1211	12	with stepper motor	-
21080-1221	12	with stepper motor	with integrated positioning control

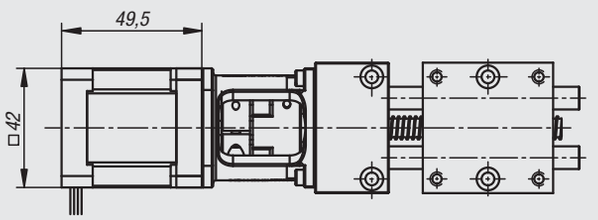
Positioning tables short

with coaxial electric drive

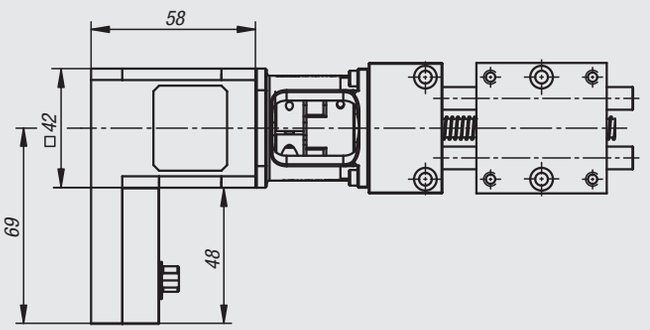
without motor

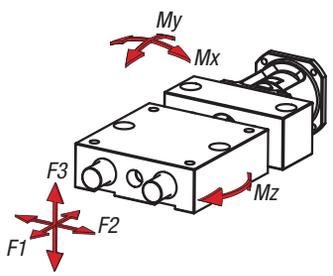


with stepper motor



with stepper motor
and integrated positioning control





Specifications

Size	B	B1	B2	C	D2	D3	D4	H	H1	H3	H4	L1	L2	L3	L4	L6
8	46	36	21	24	8x2	8	4	28	20	24	14	93,5	46	36	26	20
12	75	60	38	30	8x2	12	6	29,5	25	28	15,5	133	75	60	30	15

Force tables

Size	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
8	60	60	30	0,5	0,5	2
12	60	100	60	0,8	0,8	3

Positioning tables short

with lateral electric drive

Material:
Bearing block and carriage aluminium alloy.
Guide column and threaded spindle stainless steel.
Plain bearing for guide columns and spindle nut high-quality special plastic.
Toothed belts neoprene, profile 3M.

Version:
Aluminium alloy anodized.
Stainless steel hardened and ground.
Threaded spindle with ball bearing.

Sample order:
nlm 21081-0810

Note for ordering:
The unit is supplied with the position of the drive unit, cable outlet or control unit as shown in the drawing. Other combinations can be selected online with our configurator.

Note:
Positioning tables for motorised adjustment and positioning tasks. The plain bearings and spindle nuts are suitable for dry running, however lubrication with a grease for plastic plain bearings is recommended. The suitable programming software and interface cable for the stepper motor with positioning control are available as accessories (21088).
The stepper motor with a resolution of 200 increments per rotation allows a single direction calculated positioning accuracy of 0.005 mm. The absolute single direction positioning accuracy is 0.01 mm. The system can be operated with a switch-on time of 100%.

Can be combined with all other parts of the same size.

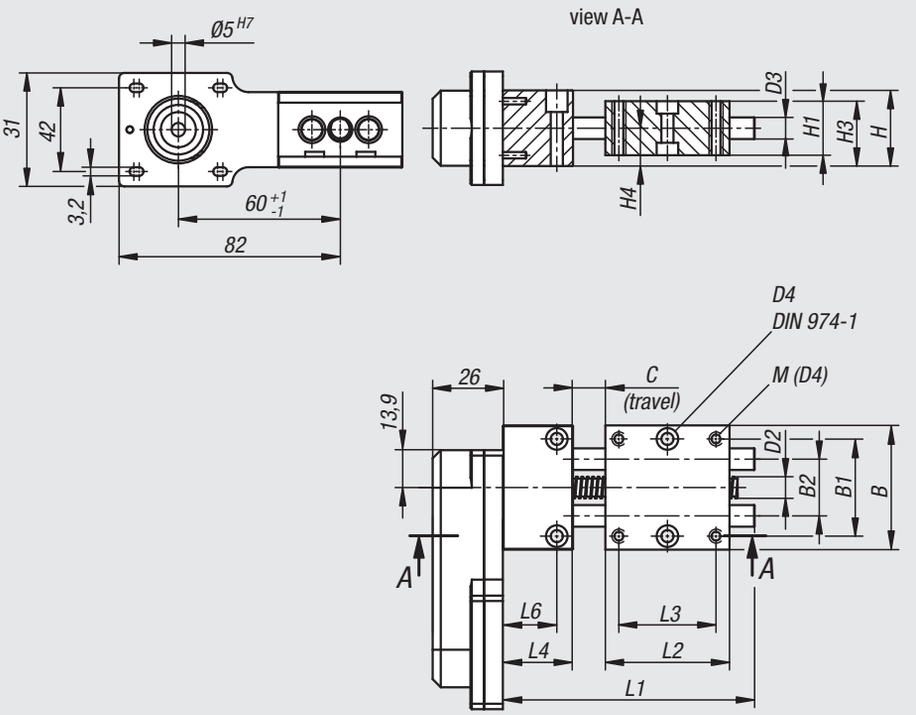
Technical data:
Threaded spindle pitch: 2 mm
Axial backlash of threaded spindle: <0.04 mm
Radial play of guides: <0.02 mm
Max. input speed: 600 rpm
Max. travel speed: 20 mm/s
Max. duty cycle: 100 %
Application temperature: +10 °C to +50 °C

Order No.	Size	Version	Version
21081-0810	8	without motor	-
21081-08111	8	with stepper motor	-
21081-08121	8	with stepper motor	with integrated positioning control
21081-1210	12	without motor	-
21081-12111	12	with stepper motor	-
21081-12121	12	with stepper motor	with integrated positioning control

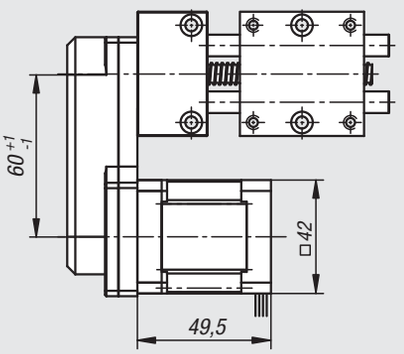
Positioning tables short

with lateral electric drive

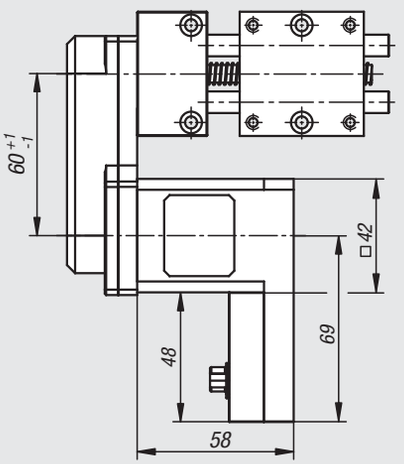
without motor

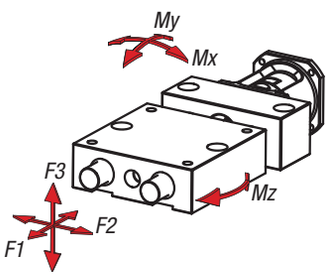


with stepper motor



with stepper motor
and integrated positioning control





Specifications

Size	B	B1	B2	C	D2	D3	D4	H	H1	H3	H4	L1	L2	L3	L4	L6
8	46	36	21	24	8x2	8	4	28	20	24	14	93,5	46	36	26	20
12	75	60	38	30	8x2	12	6	29,5	25	28	15,5	133	75	60	30	15

Force tables

Size	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
8	60	60	30	0,5	0,5	2
12	60	100	60	0,8	0,8	3

Positioning tables long

with coaxial electric drive

Material:
Bearing block and carriage aluminium alloy.
Guide column and threaded spindle stainless steel.
Plain bearing for guide columns and spindle nut high-quality special plastic.
Claw coupling aluminium with polyurethane coupling spider.

Version:
Aluminium alloy anodized.
Stainless steel hardened and ground.
Threaded spindle with ball bearing.

Sample order:
nlm 21082-080

Note for ordering:
The unit is supplied with the position of cable outlet or control unit as shown in the drawing. Other combinations can be selected online with our configurator.

Note:
Positioning tables for motorised adjustment and positioning tasks. The plain bearings and spindle nuts are suitable for dry running, however lubrication with a grease for plastic plain bearings is recommended. The suitable programming software and interface cable for the stepper motor with positioning control are available as accessories (21088).
The stepper motor with a resolution of 200 increments per rotation allows a single direction calculated positioning accuracy of 0.005 mm. The absolute single direction positioning accuracy is 0.01 mm. The system can be operated with a switch-on time of 100%.

Can be combined with all other parts of the same size.

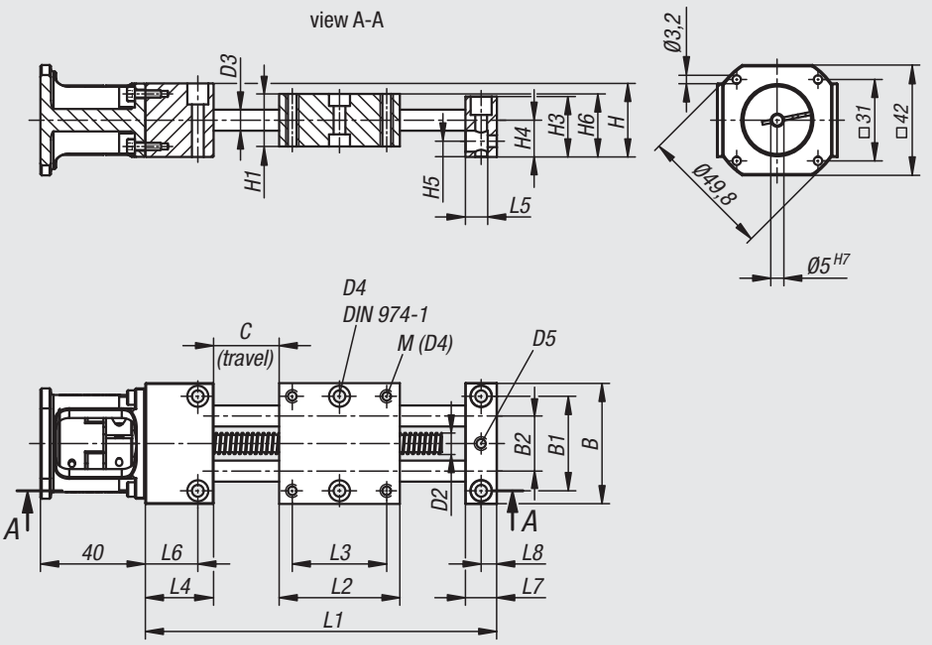
Technical data:
Threaded spindle pitch: 2 mm
Axial backlash of threaded spindle: <0.04 mm
Radial play of guides: <0.02 mm
Max. input speed: 600 rpm
Max. travel speed: 20 mm/s
Max. duty cycle: 100 %
Application temperature: +10 °C to +50 °C

Order No.	Size	Version	Version
21082-080	8	without motor	-
21082-0811	8	with stepper motor	-
21082-0821	8	with stepper motor	with integrated positioning control
21082-120	12	without motor	-
21082-1211	12	with stepper motor	-
21082-1221	12	with stepper motor	with integrated positioning control

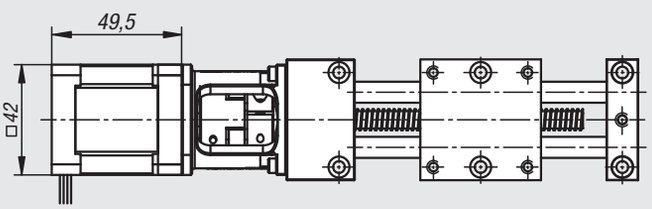
Positioning tables long

with coaxial electric drive

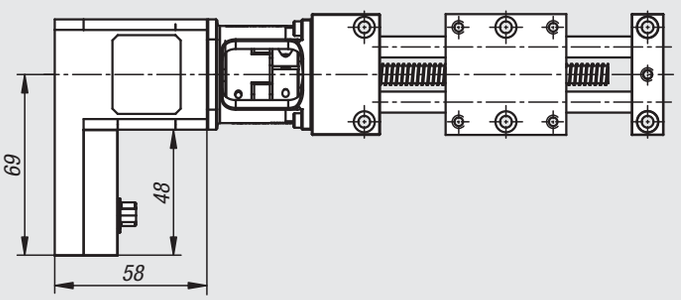
without motor

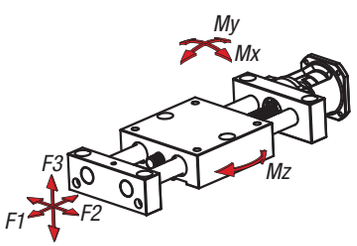


with stepper motor



with stepper motor
and integrated positioning control





Specifications

Size	B	B1	B2	C	D2	D3	D4	D5	H	H1	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6	L7	L8
8	46	36	21	50	8x2	8	4	M4	28	20	23	14	6	24	134	46	36	26	8,5	20	12	6
12	75	60	38	75	8x2	12	6	M4	29,5	25	27	15,5	7	28	180	75	60	15	11	7,5	15	7,5

Force tables

Size	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
8	60	80	60	0,7	0,7	2
12	60	120	100	1	1	3

Positioning tables long

with lateral electric drive

Material:
Bearing block and carriage aluminium alloy.
Guide column and threaded spindle stainless steel.
Plain bearing for guide columns and spindle nut high-quality special plastic.
Toothed belts neoprene, profile 3M.

Version:
Aluminium alloy anodized.
Stainless steel hardened and ground.
Threaded spindle with ball bearing.

Sample order:
nlm 21083-0810

Note for ordering:
The unit is supplied with the position of the drive unit, cable outlet or control unit as shown in the drawing. Other combinations can be selected online with our configurator.

Note:
Positioning tables for motorised adjustment and positioning tasks. The plain bearings and spindle nuts are suitable for dry running, however lubrication with a grease for plastic plain bearings is recommended. The suitable programming software and interface cable for the stepper motor with positioning control are available as accessories (21088).
The stepper motor with a resolution of 200 increments per rotation allows a single direction calculated positioning accuracy of 0.005 mm. The absolute single direction positioning accuracy is 0.01 mm. The system can be operated with a switch-on time of 100%.

Can be combined with all other parts of the same size.

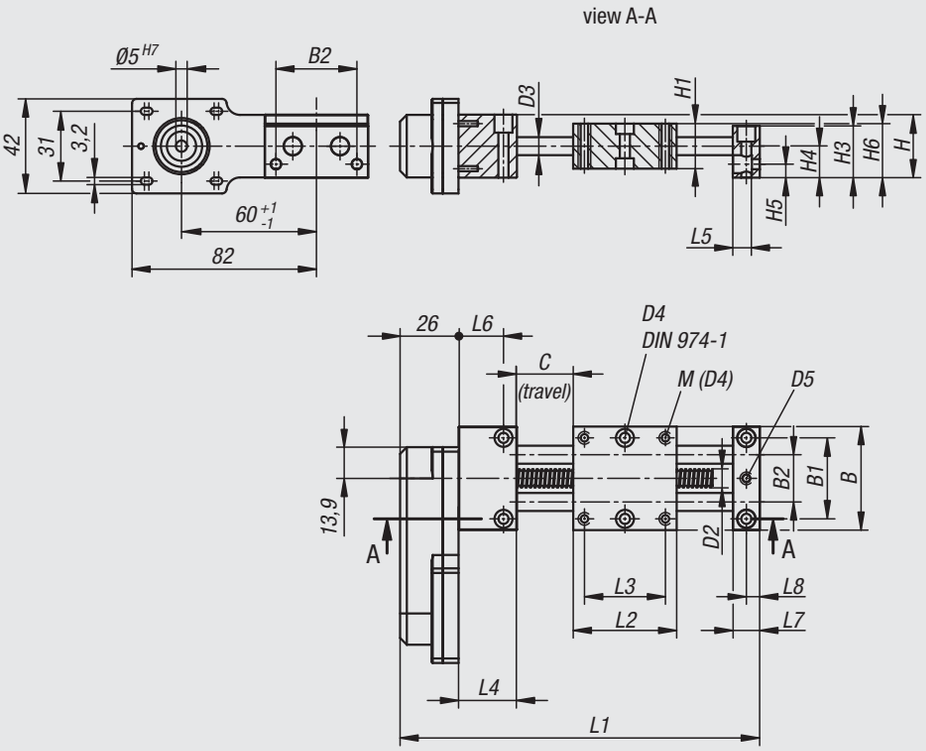
Technical data:
Threaded spindle pitch: 2 mm
Axial backlash of threaded spindle: <0.04 mm
Radial play of guides: <0.02 mm
Max. input speed: 600 rpm
Max. travel speed: 20 mm/s
Max. duty cycle: 100 %
Application temperature: +10 °C to +50 °C

Order No.	Size	Version	Version
21083-0810	8	without motor	-
21083-08111	8	with stepper motor	-
21083-08121	8	with stepper motor	with integrated positioning control
21083-1210	12	without motor	-
21083-12111	12	with stepper motor	-
21083-12121	12	with stepper motor	with integrated positioning control

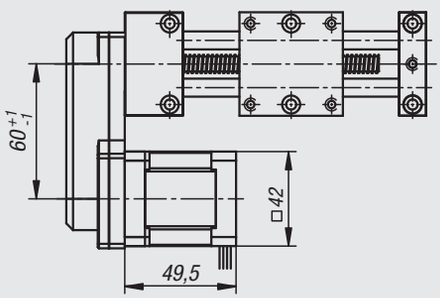
Positioning tables long

with lateral electric drive

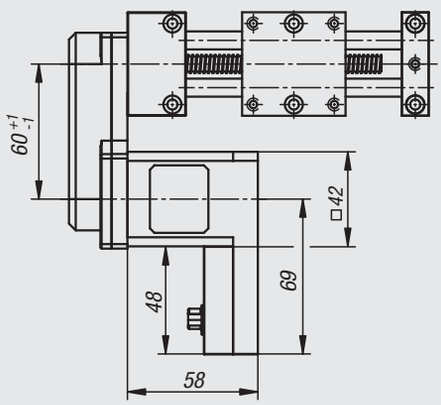
without motor

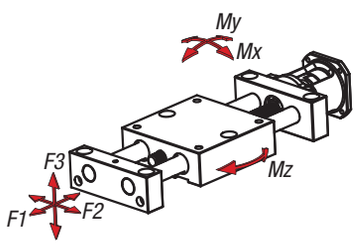


with stepper motor



with stepper motor
and integrated positioning control





Specifications

Size	B	B1	B2	C	D2	D3	D4	D5	H	H1	H3	H4	H5	H6	L1	L2	L3	L4	L5	L6	L7	L8
8	46	36	21	50	8x2	8	4	M4	28	20	23	14	6	24	134	46	36	26	8,5	20	12	6
12	75	60	38	75	8x2	12	6	M4	29,5	25	27	15,5	7	28	180	75	60	15	11	7,5	15	7,5

Force tables

Size	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
8	60	80	60	0,7	0,7	2
12	60	120	100	1	1	3

Positioning tables rotary

with coaxial electric drive

Material:
Base and rotary table aluminium alloy.
Hollow shaft stainless steel.
Pre-loaded worm gear steel.
Claw coupling aluminium with polyurethane coupling spider.

Version:
Aluminium alloy anodized.

Sample order:
nlm 21085-120

Note for ordering:
The unit is supplied with the position of cable outlet or control unit as shown in the drawing. Other combinations can be selected online with our configurator.

Note:
Rotary positioning tables for motorised adjustment and positioning tasks. The pre-loaded worm gear runs virtually play-free. The bearing of the worm shaft offers maximum radial rotational accuracy. Cables can be routed through the large bore in the hollow shaft. The adjustable positioning ring is used to determine the rotational reference point to the position of the assembled part. Proximity switches can be mounted with the optionally available sensor holder (21094). The suitable programming software and interface cable for the stepper motor with positioning control are available as accessories (21088).
The stepper motor with a resolution of 200 increments per rotation allows a single direction calculated positioning accuracy of 0.005 mm. The absolute single direction positioning accuracy is 0.01 mm. The system can be operated with a switch-on time of 100%.

Can be combined with all other parts of the same size.

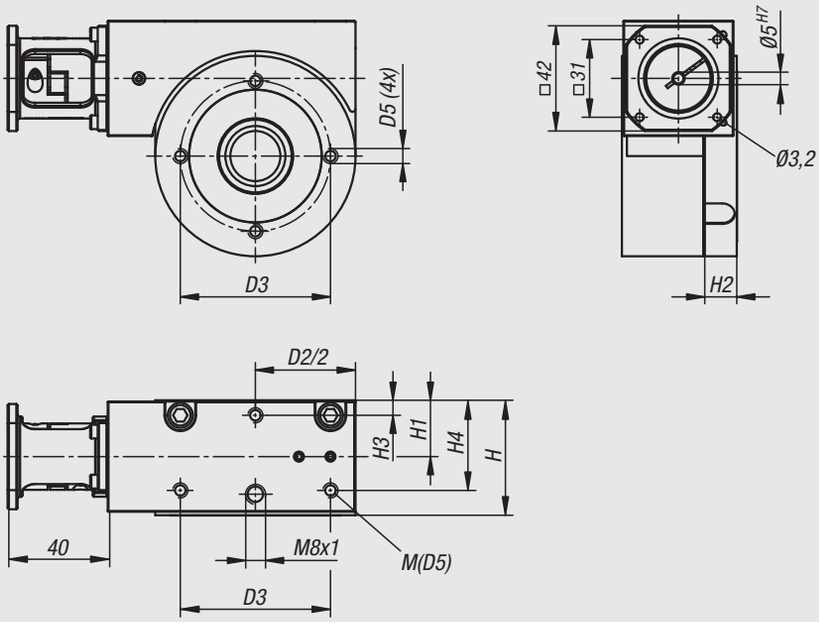
Technical data:
Transmission ratio: 55:1
Backlash: <0,1°
Radial play: <0.02 mm
Max. input speed: 600 rpm
Max. duty cycle: 100 %
Required input torque: 0.15 Nm
Rigidity: see diagram
Rotation: 360°, infinite
Application temperature: +10 °C to +50 °C

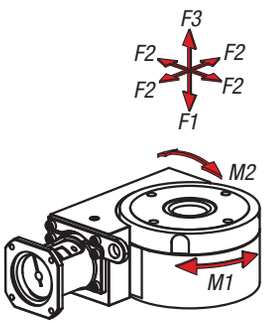
Order No.	Size	Version	Version
21085-120	12	without motor	-
21085-1211	12	with stepper motor	-
21085-1221	12	with stepper motor	with integrated positioning control

Positioning tables rotary

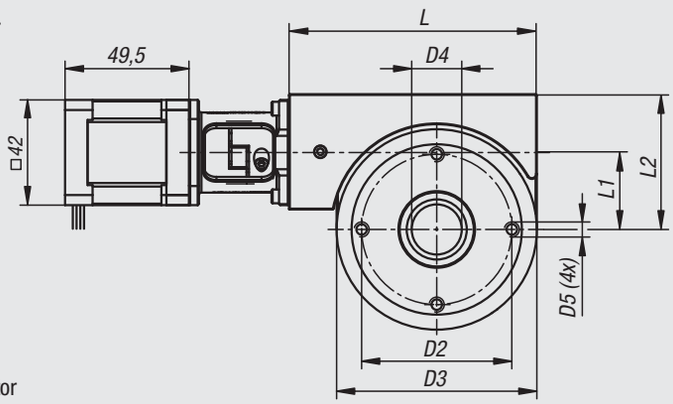
with coaxial electric drive

without motor

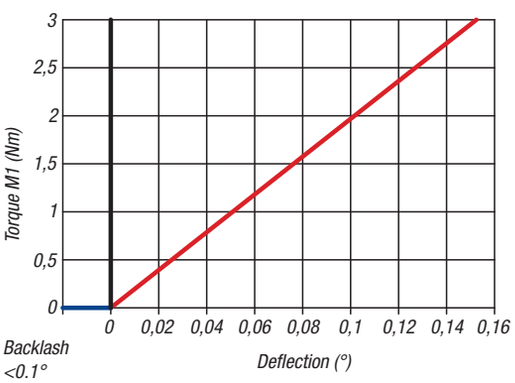




with stepper motor

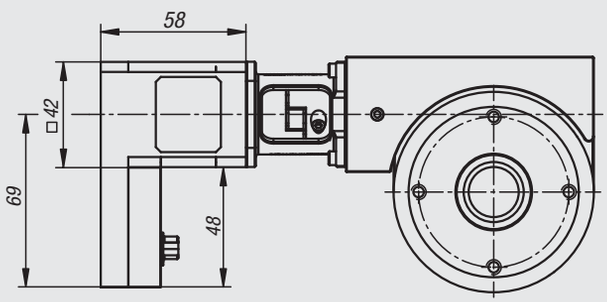


Rigidity chart



Backlash
<0.1°

with stepper motor
and integrated positioning control



Specifications

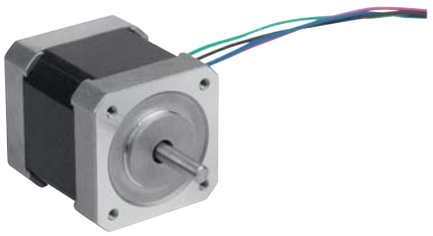
Size	D2	D3	D4	D5	H	H1	H2	H3	H4	L	L1	L2
12	80	60	20	M6	46	22,5	13	6	36	99	31	54

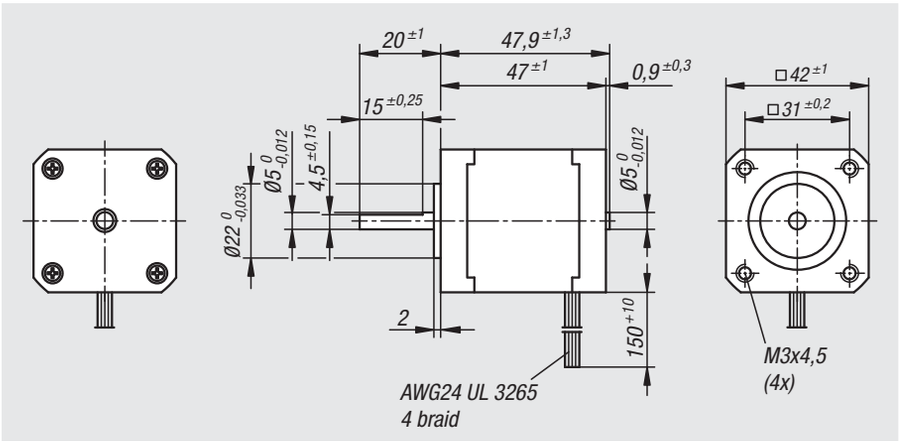
Force tables

Size	F1 (N)	F2 (N)	F3 (N)	M1 Nm	M2 Nm
12	500	500	200	3	3

Notes

Stepper motor





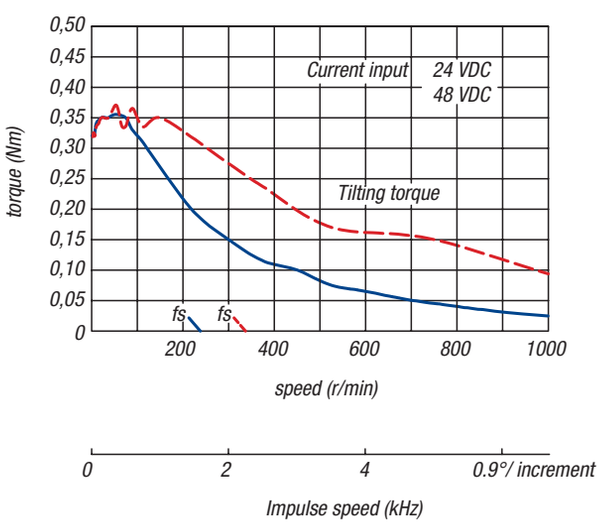
Version:
2-phase high-torque stepper motor in NEMA 17 (42 mm) size and 1.8° increment angle (full increment) with 4-wired connection line.

Sample order:
nlm 21086-1

Note:
The stepper motors deliver a high torque, high level of precision and convenient actuation. They function reliably in diverse ambient conditions. The stepper motors can be connected to conventional motor controllers via 4-wired connection cables.

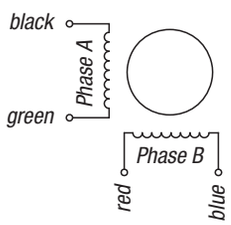
Technical data:
Increment angle: 1.8°
Increments per rotation: 200
Nominal current/phase: 1.7 A
Nominal voltage: 5.6 V DC
Retaining torque: 0.4 Nm
Rotor moment of inertia: 0.068 kgcm²
Resistance/phase: 1.65 Ohm ±15%
Inductivity/phase: 2.8 mH ±20%
Application temperature: -10 °C to +50 °C

Torque characteristic curve



Connection diagram:

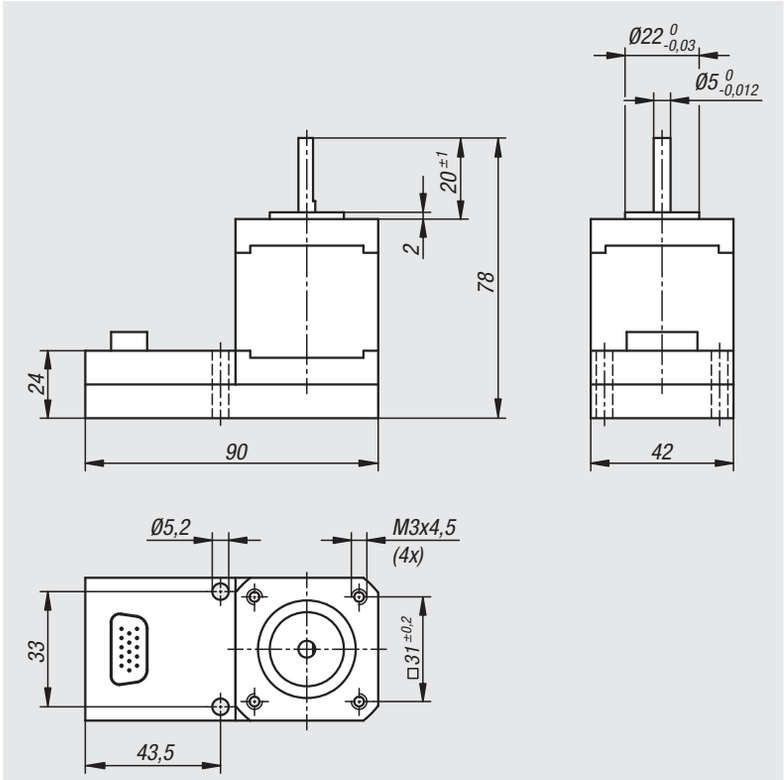
Pin	Colour	Phase	
1	black	A	
2	green	A\	
3	red	B	
4	blue	B\	



Order No.	Article description
21086-1	STEPPER MOTOR

Stepper motor

with integrated positioning control



Version:
2-phase high-torque stepper motor in NEMA 17 (42 mm) size and 1.8° increment angle (full increment) with integrated position control.

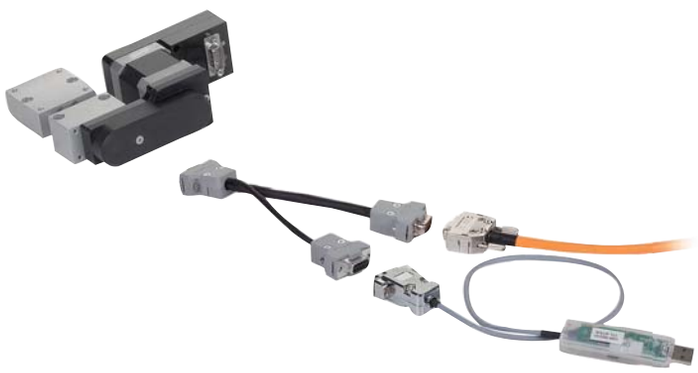
Sample order:
nlm 21088-2

Note:
Stepper motor with integrated positioning control. A convenient unit consisting of stepper motor and intelligent controller. Reference travel is possible on a block with reduced electric current without proximity switch. Integrated rotational monitoring. Smooth running through dynamic switching of increment trip.

Actuation via single I/O interface, 31 position configurations and call-ups.

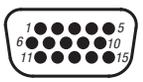
Control unit can be parametrised quickly and conveniently with the software. The software and manual for programming the positioning control are available as free of charge download.

Technical data:
Control voltage: +24 V to +36 V DC
Motor voltage: +24 V to +48 V DC
Interfaces: Digital I/O-BAC, frequency/ direction
Retaining torque: up to 0.45 Nm
Rotor moment of inertia: 0.068 kgcm²
Current drop: adjustable
Inputs: 6 (+24 V to +36 V DC)
Outputs: 2 (+24 V)
Application temperature: 0 °C to +50 °C

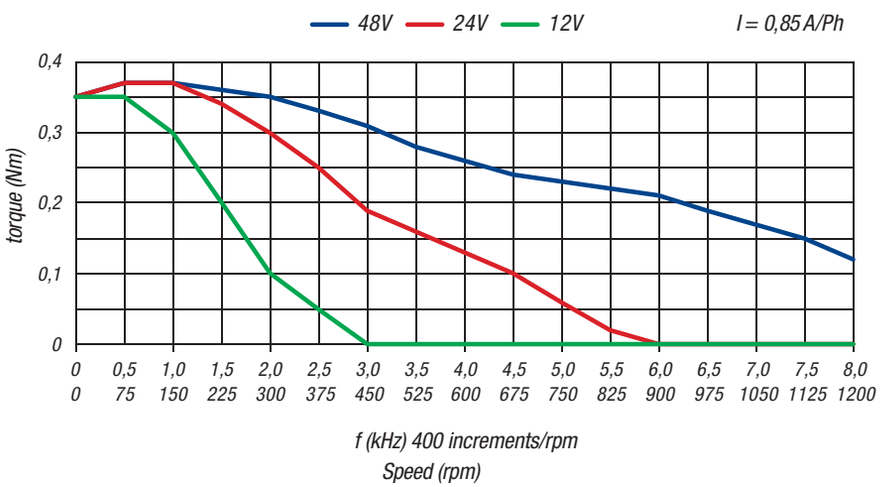


Stepper motor

with integrated positioning control

Pin	Digital I /O BAC	
1	Motor supply +24 V to +48 V DC	
2	Control voltage supply +24 V to +36 V DC	
3	GND	
4	Output "Ready" (RDY)	
5	Output "Motor standing" (MOST)	
6	Input "Start" or "Frequency"	
7	Input I5, or direction, or reference point or analog value	
8	Input 1 (binary 0)	
9	Input 2 (binary 1)	
10	Input 3 (binary 2)	
11	Input 4 (binary 3)	
12	n.c.	
13	n.c.	
14	n.c.	
15	n.c.	

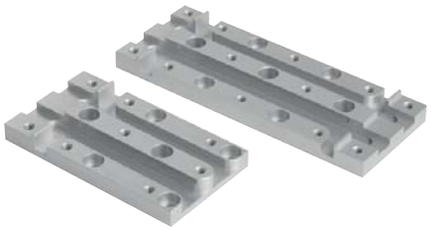
Torque characteristic curve



Order No.	Article description	Application
21088-2	**STEPPER MOTOR POSITIONING CONTROL**	
21088-91	**INTERFACE CONVERTER TTL TO USB**	USB to RS-232 (9-pin SUB-D connector). This USB stick transfers serial data with TTL level to the PC or notebook via the USB interface. Length approx. 500 mm with 1.8 m USB extension cable.
21088-92	**ADAPTER FOR INTERFACE CONVERTER**	15-pin SUB-D socket to 15-pin SUB-D connector and 9-pin SUB-D socket, length approx. 170 mm
21088-93	**CONNECTING CABLE 5 METER**	15-pin SUB-D HD socket, length 5 m. Drag-chain compatible

Notes

Mounting plates horizontal



Material:
Aluminium alloy.

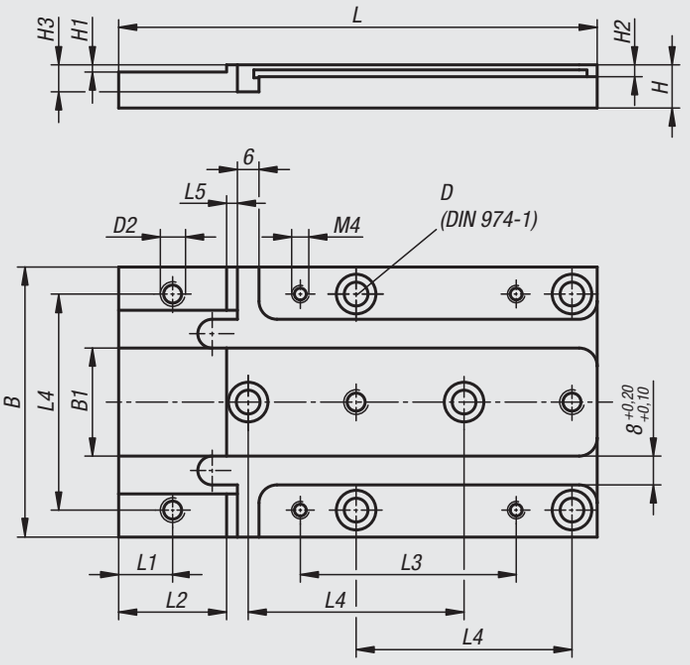
Version:
anodized.

Sample order:
nlm 21090-081

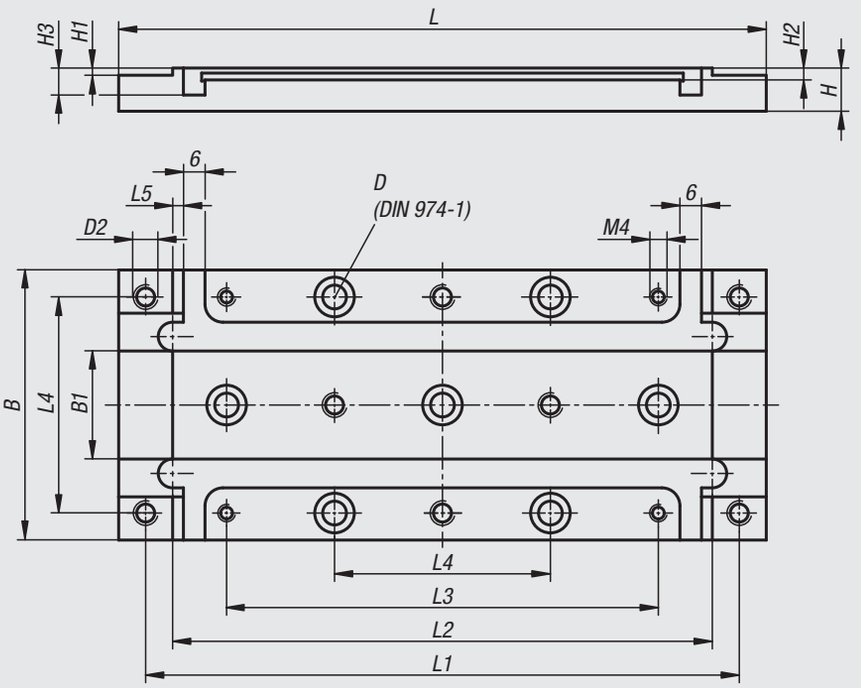
Note:
The mounting plate is used for the horizontal mounting of the short or long positioning tables with electric drive. With slots for direct support of inductive proximity switch (20905-005). The proximity switch can be adjusted when the positioning unit is mounted. The threaded holes M4 are used to fasten the sensor holder 21093.

Can be combined with all other parts of the same size.

short



long



Order No.	Size	Version	B	B1	D	D2	H	H1	H2	H3	L	L1	L2	L3	L4	L5
21090-081	8	short	46	10	4	M4	10	2	2,3	6,5	82,5	9	15	40	36	1,5
21090-121	12	short	75	30	6	M6	12	2	3,3	7,5	133	15	30	60	60	3
21090-082	8	long	46	10	4	M4	10	2	2,3	6,5	120	108	96	72	36	1,5
21090-122	12	long	75	30	6	M6	12	2	3,3	7,5	180	165	150	120	60	3

Mounting plates vertical

Material:
Aluminium alloy.

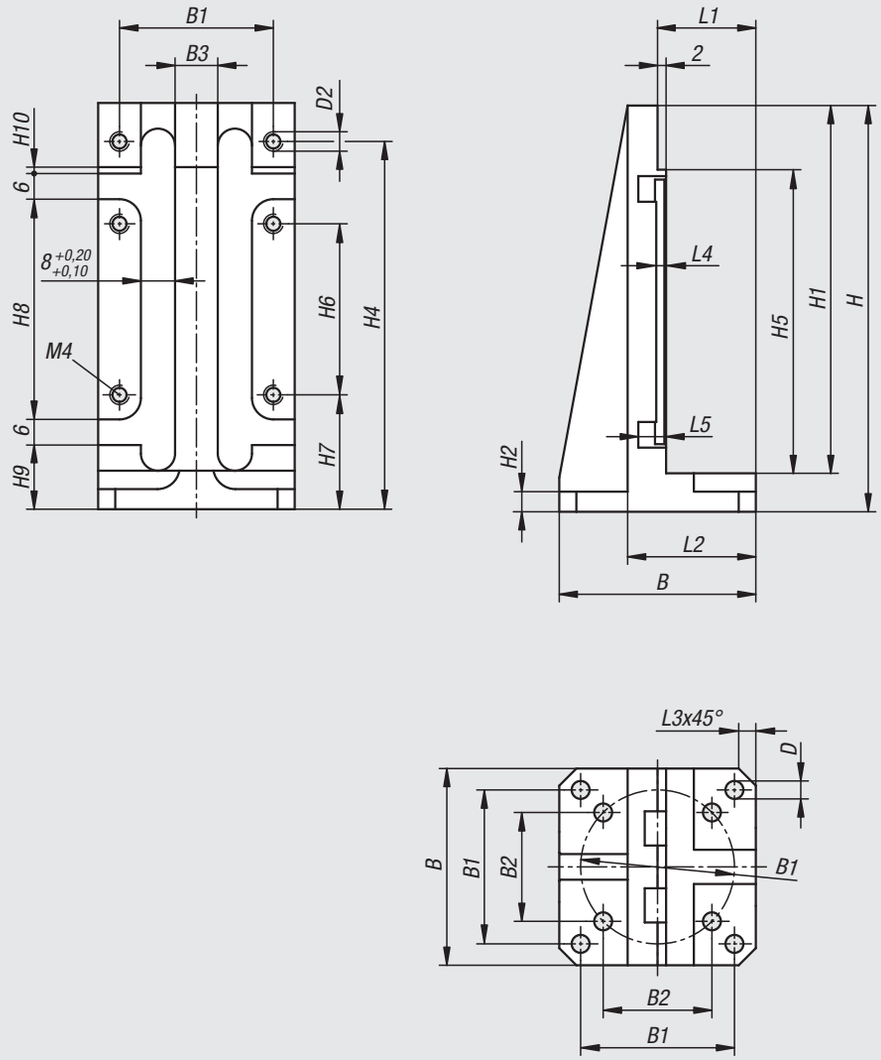
Version:
anodized.

Sample order:
nlm 21091-081

Note:
The mounting plate is used for the vertical mounting of the short or long positioning tables with electric drive. With slots for direct support of inductive proximity switch (20905-005). The proximity switch can be adjusted when the positioning unit is mounted. The threaded holes M4 are used to fasten the sensor holder 21093.

Can be combined with all other parts of the same size.

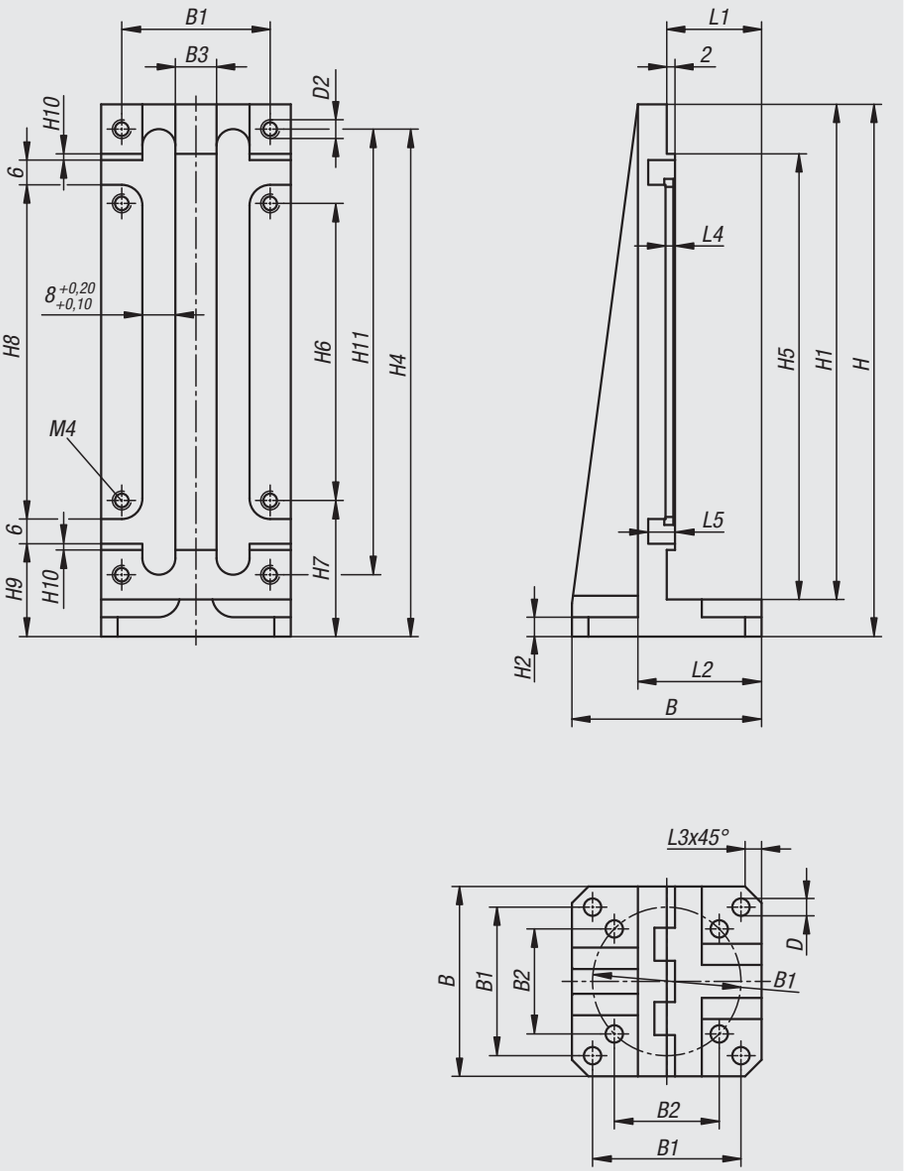
short



Order No.	Size	Version	B	B1	B2	B3	D	D1	D2	H	H1	H2	H4	H5	H6	H7	H8	H9	H10	L1	L2	L3	L4	L5
21091-081	8	short	46	36	25,5	10	4,2	4	M4	95	86	4,7	86	71	40	26,75	51,5	15	1,5	23	30	4	2,3	6,5
21091-121	12	short	75	60	42,4	30	6,4	6	M6	146	136	5,7	131	106	60	35,5	83	18	3	27	36	7	3,3	7,5

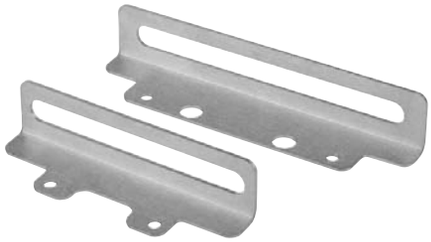
Mounting plates vertical

long



Order No.	Size	Version	B	B1	B2	B3	D	D1	D2	H	H1	H2	H4	H5	H6	H7	H8	H9	H10	H11	L1	L2	L3	L4	L5
21091-082	8	long	46	36	25,5	10	4,2	4	M4	129	120	4,7	123	108	72	33	81	22,9	1,5	108	23	30	4	2,3	6,5
21091-122	12	long	75	60	42,4	30	6,4	6	M6	192	180	5,7	184,5	177	120	42	132	30	3	165	27	36	7	3,3	7,5

Sensor holder



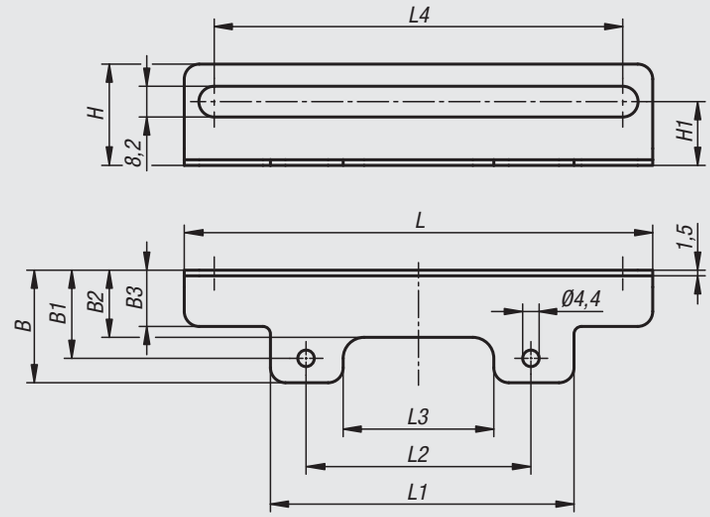
Material:
Aluminium alloy.

Version:
anodized.

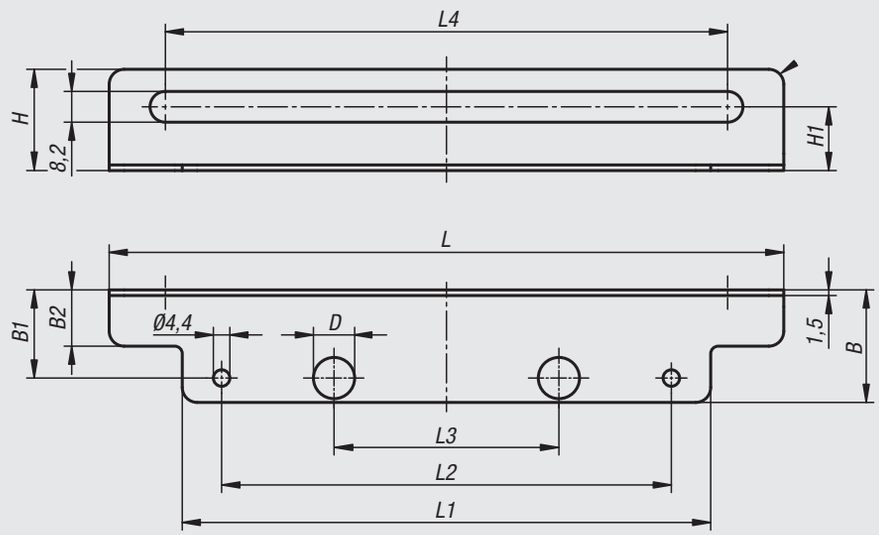
Sample order:
nlm 21093-081

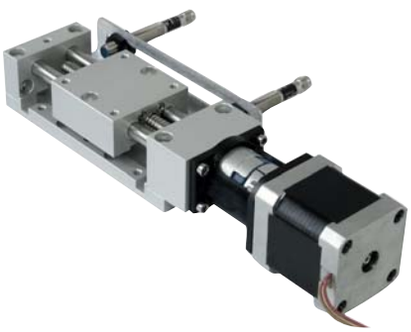
Note:
The sensor holder is used to fasten inductive proximity switches (e.g. 20910-050) to the mounting plate or on the customer‘s part.

short



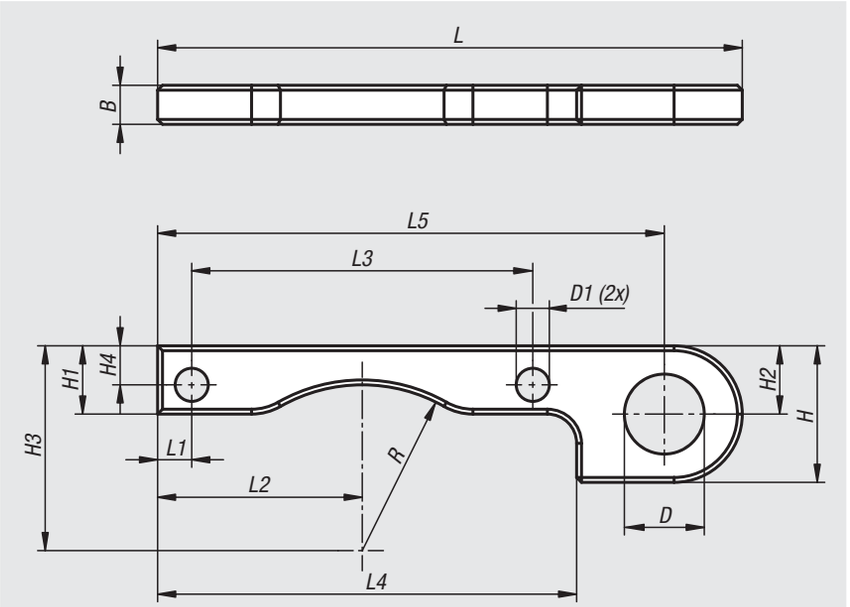
long





Order No.	Size	Version	B	B1	B2	B3	D	H	H1	L	L1	L2	L3	L4
21093-081	8	short	25	20	15,9	13,5	4,1	22	12	90	50	40	21,7	74
21093-121	12	short	30	23,5	17,9	15	5,6	27	17	125	81	60	40,2	109
21093-082	8	long	25	20	12,5	-	8	22	12	120	88	72	36	96
21093-122	12	long	30	23,5	15	-	11	27	17	180	141	120	60	150

Sensor holder



Material:
Aluminium alloy.

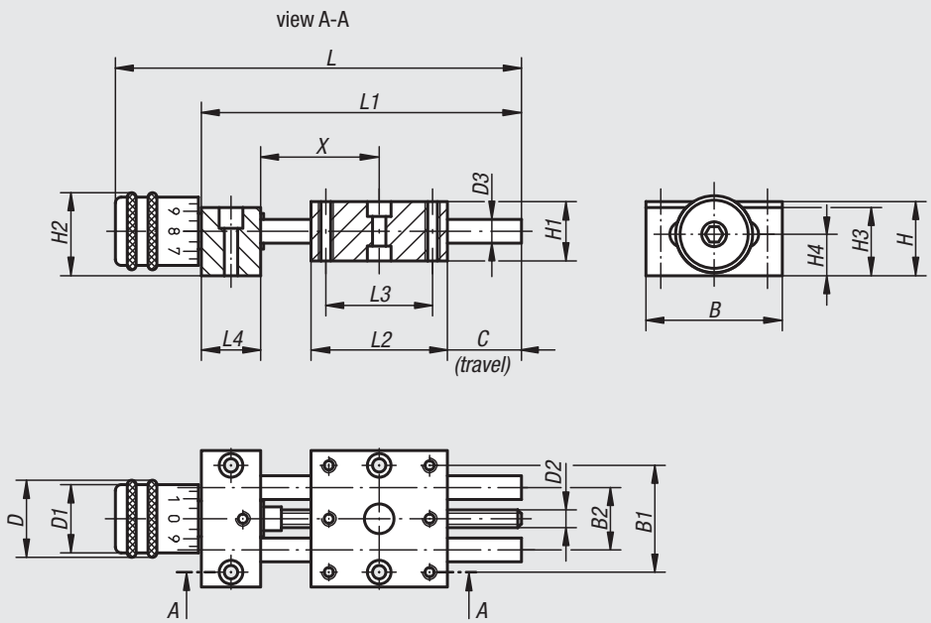
Version:
Black anodized

Sample order:
nlm 21094-12

Note:
The sensor holder is used to fasten inductive proximity switches (e.g. 20910-050) to the rotary positioning table with electric drive allowing the switch point to be positioned anywhere. The ring with the switch slot can be freely rotated counter to the rotary disc.

Order No.	Size	B	D	D1	H	H1	H2	H3	H4	L	L1	L2	L3	L4	L5	R
21094-12	12	4	8,2	3,2	14	7	7	21	4	60	3,5	21	35	43	52	17

Positioning tables short



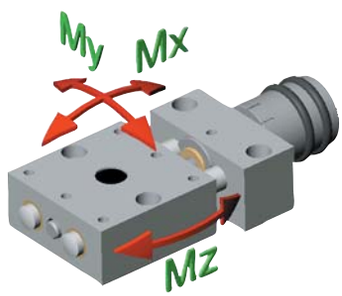
all counterbores DIN 974-1 (D4),
all tapped holes M (D4)

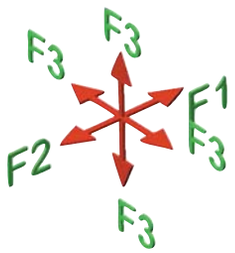
Material:
Bearing block and carriage aluminium alloy, anodized.
Guide columns stainless steel, ground.
Spindle stainless steel, rolled thread.
Guide bearing maintenance-free.

Version:
Radial play on guide < 0.02 mm.
No axial backlash.
Spindle self-locking, with additional lock.

Sample order:
nlm 21100-04

Note:
Due to the practically play-free guides and absolutely play-free spindle, loosening or clamping of the spindle is not required during adjustments.
Scale graduation is 5 or 10 increments, 1 increment is equal to 0.1 mm travel.
Within the respective sizes, the positioning tables can be easily combined in the modular principle.

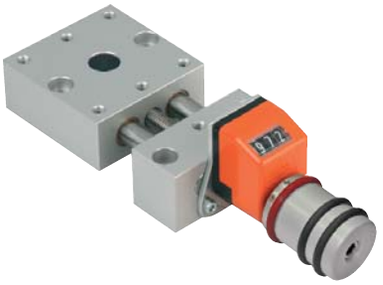




Order No.	B	B1	B2	C	D	D1	D2	D3	D4	H	H1	H2	H3	H4	L	L1	L2	L3	L4	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
21100-04	29	22	12	11	13	11,5	M3x0,5	4	3	14	12	14,5	13	8	64,5	50	29	22	10	70	70	X = 28 (10)	0,25	0,11	0,25
21100-08	46	36	21	14	26	23	M6x1	8	4	24	20	27	23	14	108,5	80	46	36	20	200	200	X = 39 (50)	1,9	0,9	1,9
21100-12	75	60	38	25	26	23	M6x1	12	6	28	25	29	27	15,5	162	133	75	60	30	300	300	X = 58 (100)	5,5	3	5,5

Positioning tables short

with position indicator

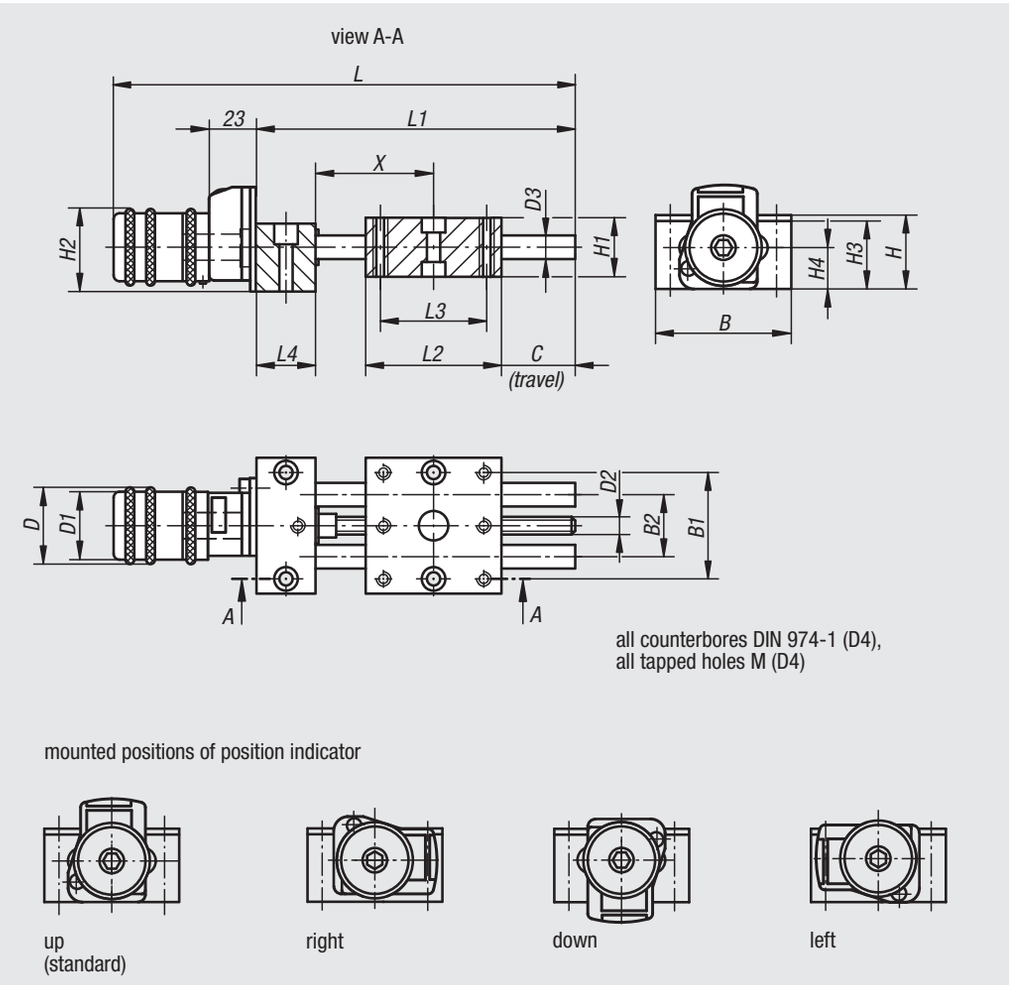


Material:
Bearing block and carriage aluminium alloy, anodized.
Guide columns stainless steel, ground.
Spindle stainless steel, rolled thread.
Guide bearing maintenance-free.
Position indicator plastic.

Version:
Radial play on guide < 0.02 mm.
No axial backlash.
Spindle self-locking, with additional lock.

Sample order:
nlm 21102-08

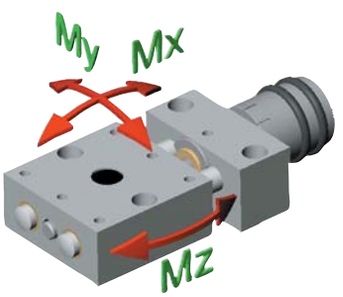
Note:
Due to the practically play-free guides and absolutely play-free spindle, loosening or clamping of the spindle is not required during adjustments.
Digital position indicators with 0.1 mm display accuracy, digits increase with right rotation. The display value of the position indicator can be adjusted by turning the carrier ring. The mounted position of the position indicator can be set in 4 positions with a screw.
Within the respective sizes, the positioning tables can be easily combined in the modular principle.

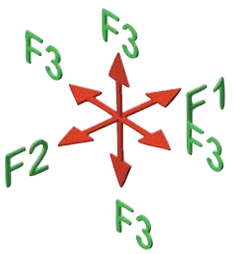


all counterbores DIN 974-1 (D4),
all tapped holes M (D4)

mounted positions of position indicator

up (standard) | right | down | left





Order No.	B	B1	B2	C	D	D1	D2	D3	D4	H	H1	H2	H3	H4	L	L1	L2	L3	L4	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
21102-08	46	36	21	14	26	23	M6x1	8	4	24	20	27	23	14	135	80	46	36	20	200	200	X = 39 (50)	1,9	0,9	1,9
21102-12	75	60	38	25	26	23	M6x1	12	6	28	25	29	27	15,5	187,5	133	75	60	30	300	300	X = 58 (100)	5,5	3	5,5

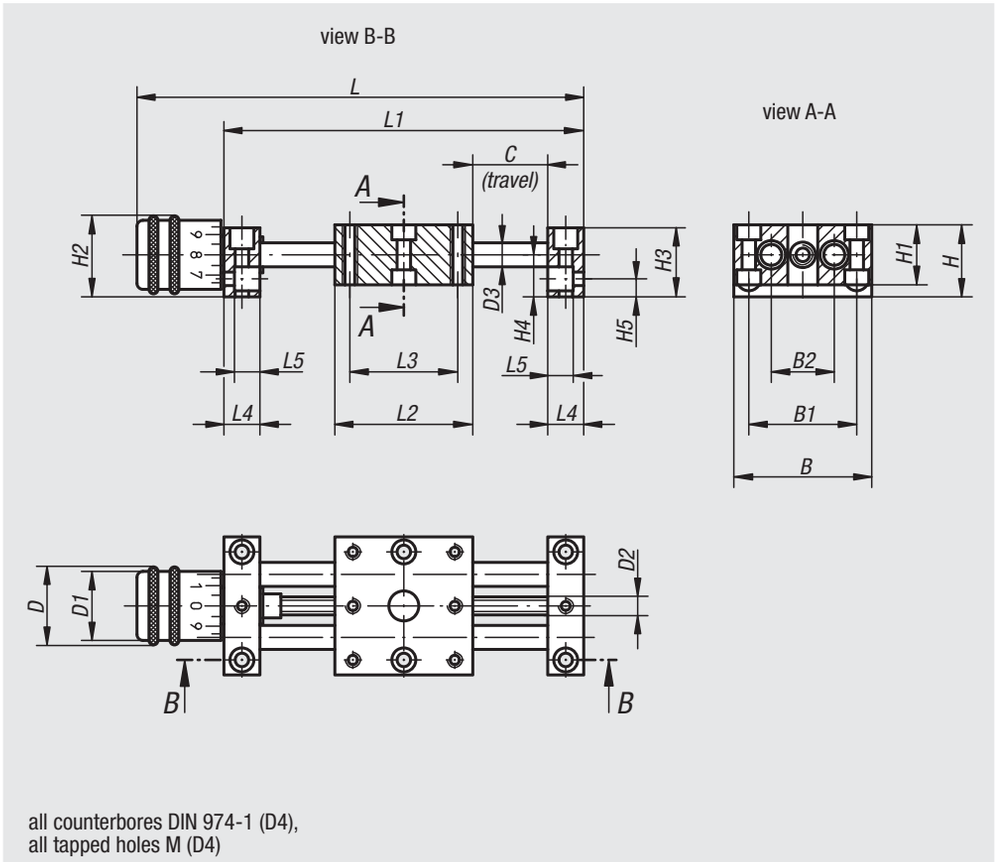
Positioning tables long

Material:
Bearing block and carriage aluminium alloy, anodized.
Guide columns stainless steel, ground.
Spindle stainless steel, rolled thread.
Guide bearing maintenance-free.

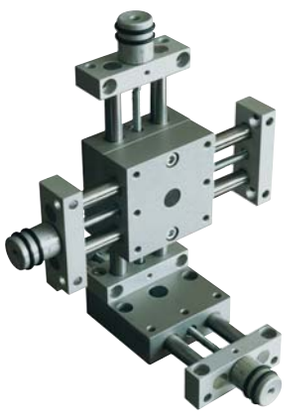
Version:
Radial play on guide < 0.02 mm.
No axial backlash.
Spindle self-locking, with additional lock.

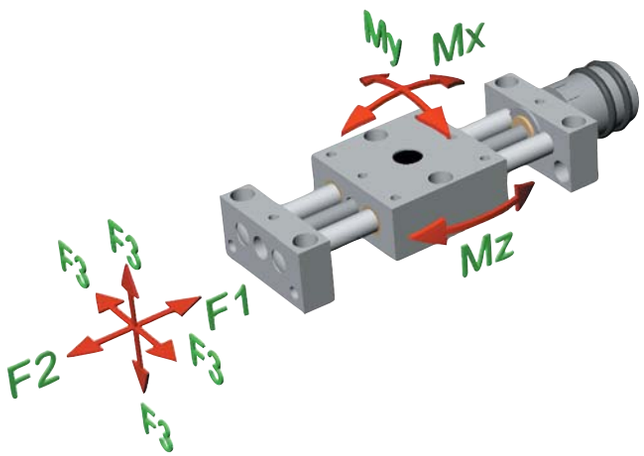
Sample order:
nlm 21120-04

Note:
Due to the practically play-free guides and absolutely play-free spindle, loosening or clamping of the spindle is not required during adjustments.
Scale graduation is 5 or 10 increments, 1 increment is equal to 0.1 mm travel.
Within the respective sizes, the positioning tables can be easily combined in the modular principle.



all counterbores DIN 974-1 (D4),
all tapped holes M (D4)





Order No.	B	B1	B2	C	D	D1	D2	D3	D4	H	H1	H2	H3	H4	H5	L	L1	L2	L3	L4	L5	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
21120-04	29	22	12	23	13	12	M3x0,5	4	3	14	12	14,5	13	8	4	84,5	70	29	22	8	6	70	70	70	0,77	0,77	0,77
21120-08	46	36	21	48	26	23	M6x1	8	4	24	20	27	23	14	6	148,5	120	46	36	12	8,5	200	200	200	3,6	3,6	3,6
21120-12	75	60	38	73	26	23	M6x1	12	6	28	25	28,5	27	15,5	7	209	180	75	60	15	11	300	300	300	18	18	18
21120-25	150	130	90	86	52	46	M16x2	25	10	53	50	54	52	28	13	347	290	150	130	25	18	1000	1000	1000	65	65	65

Positioning tables long

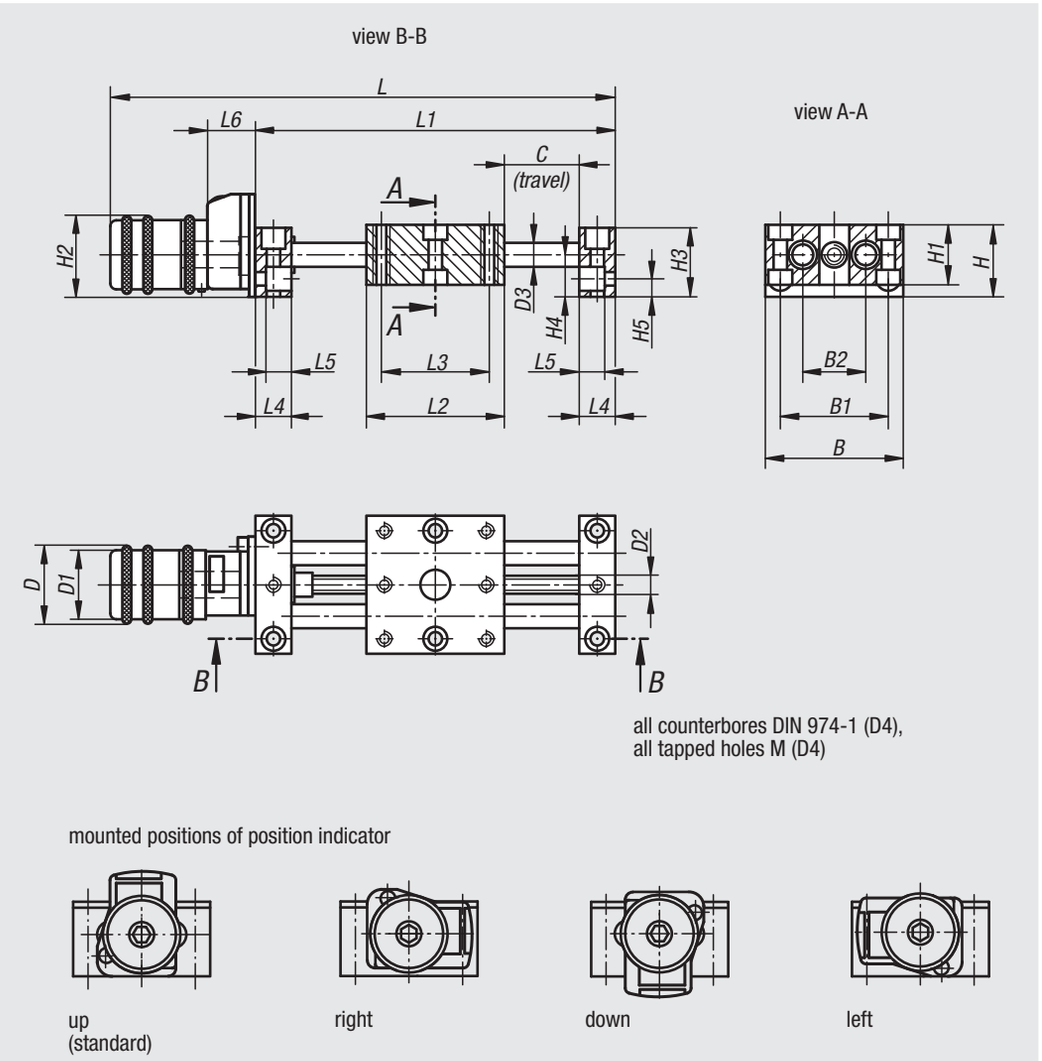
with position indicator

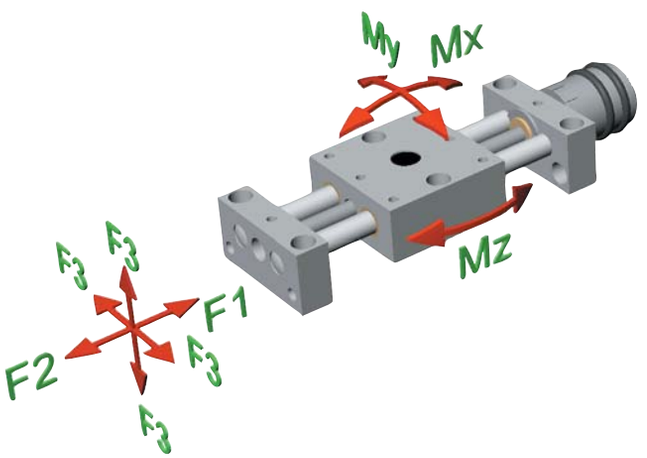
Material:
Bearing block and carriage aluminium alloy, anodized.
Guide columns stainless steel, ground.
Spindle stainless steel, rolled thread.
Guide bearing maintenance-free.
Position indicator plastic.

Version:
Radial play on guide < 0.02 mm.
No axial backlash.
Spindle self-locking, with additional lock.

Sample order:
nlm 21122-08

Note:
Due to the practically play-free guides and absolutely play-free spindle, loosening or clamping of the spindle is not required during adjustments.
Digital position indicators with 0.1 mm display accuracy, digits increase with right rotation. The display value of the position indicator can be adjusted by turning the carrier ring. The mounted position of the position indicator can be set in 4 positions with a screw. Size 25 can be mounted in 3 positions (up, right and left).
Within the respective sizes, the positioning tables can be easily combined in the modular principle.





Order No.	B	B1	B2	C	D	D1	D2	D3	D4	H	H1	H2	H3	H4	H5	L	L1	L2	L3	L4	L5	L6	F1 (N)	F2 (N)	F3 (N)	Mx Nm	My Nm	Mz Nm
21122-08	46	36	21	48	26	23	M6x1	8	4	24	20	27	23	14	6	175	120	46	36	12	8,5	23	200	200	200	3,6	3,6	3,6
21122-12	75	60	38	73	26	23	M6x1	12	6	28	25	28,5	27	15,5	7	235	180	75	60	15	11	23	300	300	300	18	18	18
21122-25	150	130	90	86	52	46	M16x2	25	10	53	50	54	52	28	13	388	290	150	130	25	18	36	1000	1000	1000	65	65	18

Lift tables

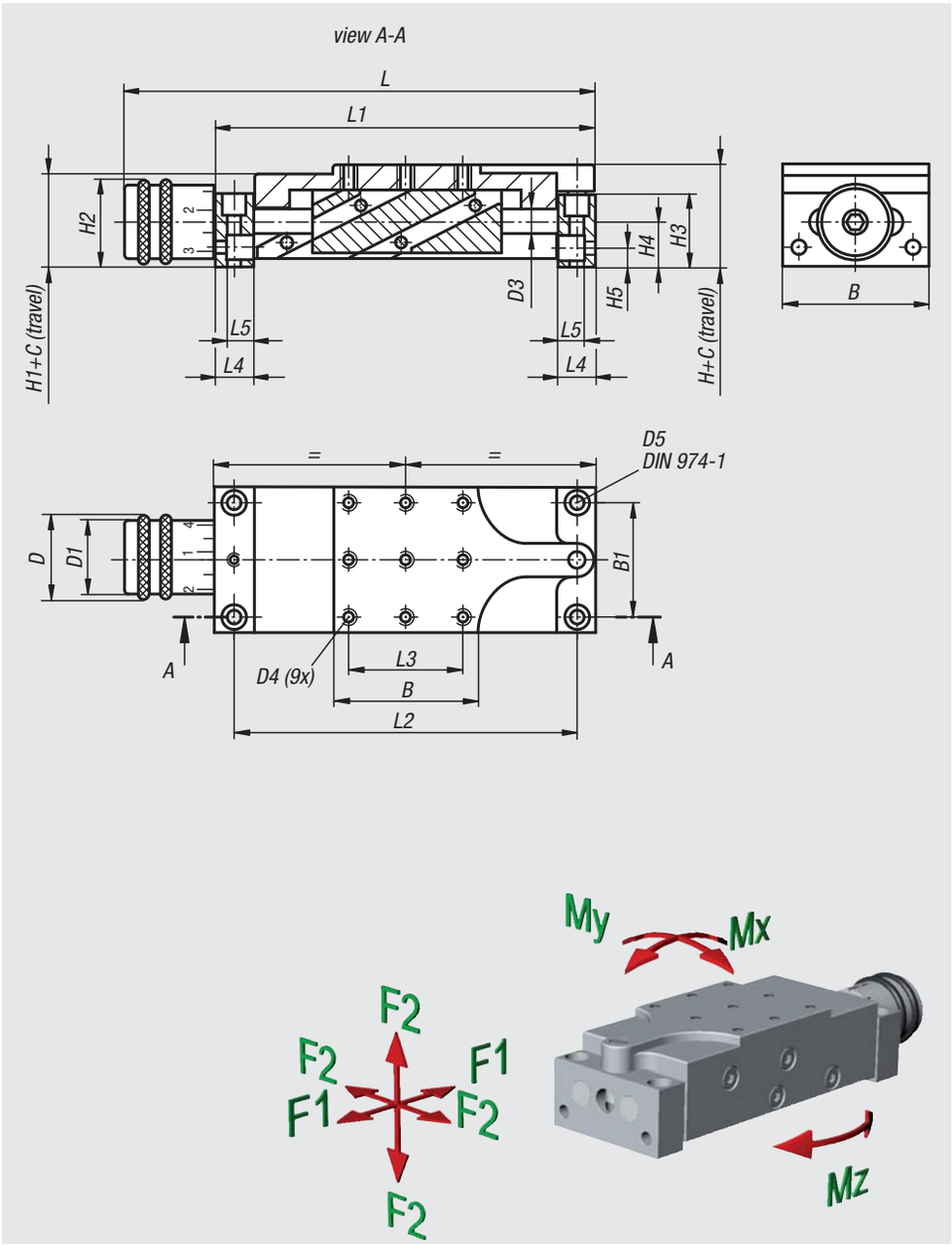
Material:
Lift table, bearing blocks and scale knob Al alloy, anodized.
Guide columns stainless steel, ground.
Spindle stainless steel, rolled thread.
Guide bearing, maintenance-free.

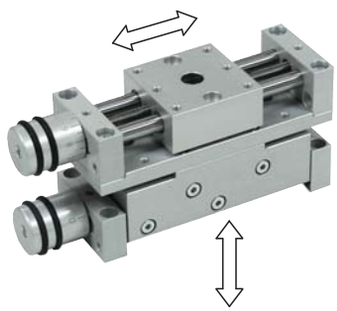
Version:
Guide backlash < 0.05 mm.
Spindle self-locking, with additional lock.

Sample order:
nlm 21140-04

Note:
For positioning the height of all types of components and assemblies e.g. stops, sensors, limit switches, tables, cameras, entire assemblies etc. The height of the table is adjusted manually by turning the scale knob. 1 increment of the scale equals 0.1 mm travel.

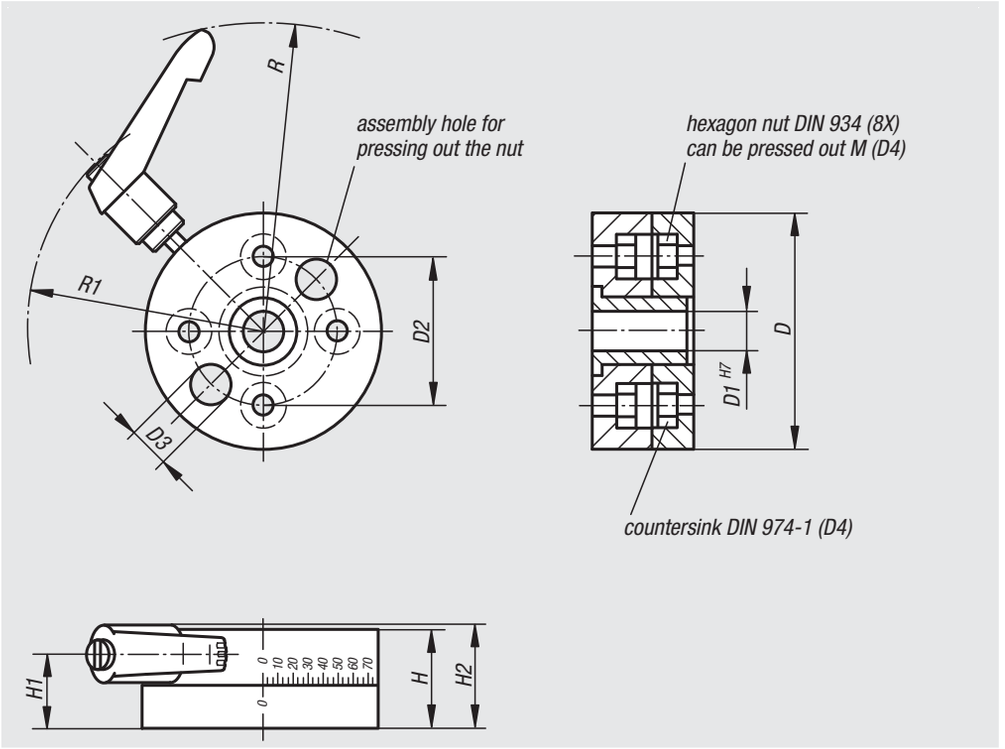
Within the respective sizes, the lift tables can be easily combined in the modular principle.





Order No.	B	B1	C	D	D1	D3	D4	D5	H	H1	H2	H3	H4	H5	L	L1	L2	L3	L4	L5	F1 (N)	F2 (N)	Mx Nm	My Nm	Mz Nm
21140-04	29	22	4	13	12	4	M3	3	19	17	14	13	8	4	84,5	70	62	22	8	6	30	50	0,5	0,5	2
21140-08	46	36	8	26	23	8	M4	4	32	29	27	23	14	6	148,5	120	108	36	12	8,5	80	100	2,5	2,5	5
21140-12	75	60	12	26	23	12	M6	6	38	36	28,5	27	15,5	7	209	180	165	60	15	11	150	200	10	10	20
21140-25	150	130	25	52	46	25	M10	10	68	64	54	52	28	13	347	290	265	130	25	18	500	700	50	50	100

Rotary discs

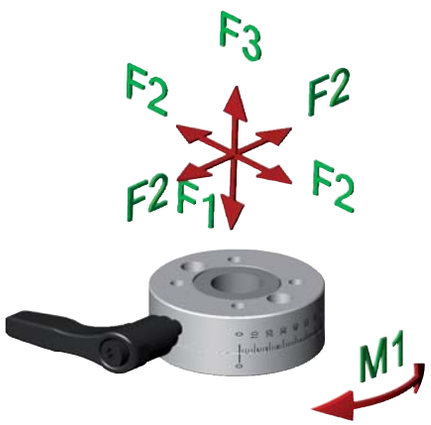


Material:
Body and rotary disc aluminium alloy.
Shaft stainless steel.

Version:
Body and rotary disc anodized.

Sample order:
nlm 21150-04

Note:
Loosen the clamping lever to revolve the rotary disc on the body. Rotates through 360°. The rotary disc indexes every 90° (21150-25 every 45°). Indexing is carried out by a ball plunger which can be easily removed.
Angular adjustment is set by a scale accurate to within 2°.
Within the respective sizes, the rotary disc can be easily combined in the modular principle.



Order No.	D	D1	D2	D3	D4	H	H1	H2	R	R1	F1 (N)	F2 (N)	F3 (N)	M1 Nm
21150-04	35	6	22	6	3	15	9,5	16,5	64	44	200	200	100	2
21150-08	54	16	36	8	4	20	13,5	20,5	73	56	500	500	200	10
21150-12	80	25	60	13	6	25	17,5	24,5	85	69	500	500	200	15
21150-25	150	55	130	18,5	10	40	26	35,5	139	110	1000	500	500	50

Rotary positioning tables

Material:
Body and rotary table aluminium alloy, anodized.
Spindle steel, case-hardened.
Plain spindle bearing maintenance-free.

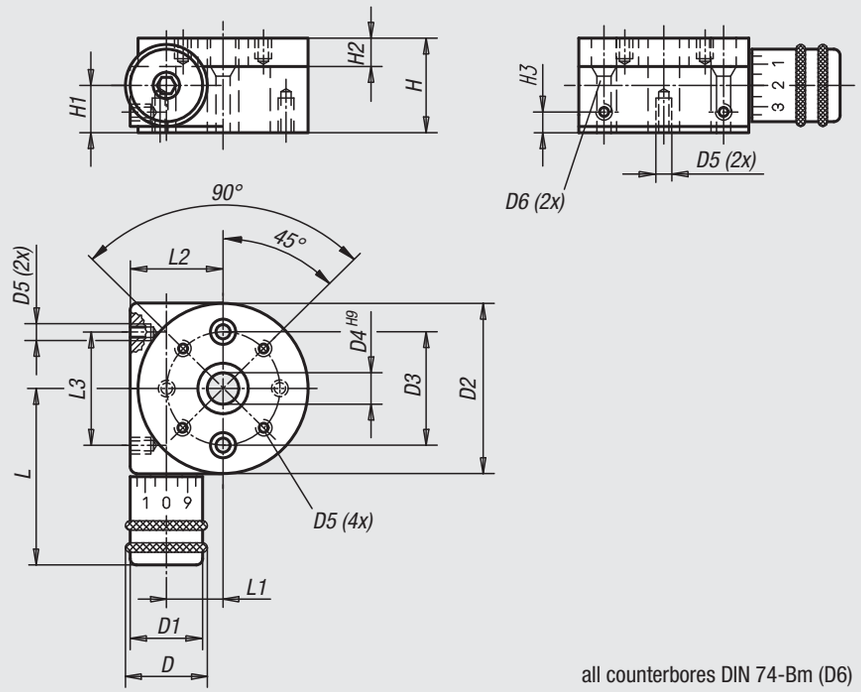
Version:
Radial play of rotation axis < 0.015 mm.
Axial play of rotation axis < 0.02 mm.
Repeat accuracy < 0.05°.
Spindle self-locking.

Sample order:
nlm 21160-08

Note:
360° adjustment, no end stop.
Scale graduation is 10 increments.
Transmission ratio:
21160-08 = 50:1
21160-12 = 55:1
21160-25 = 50:1

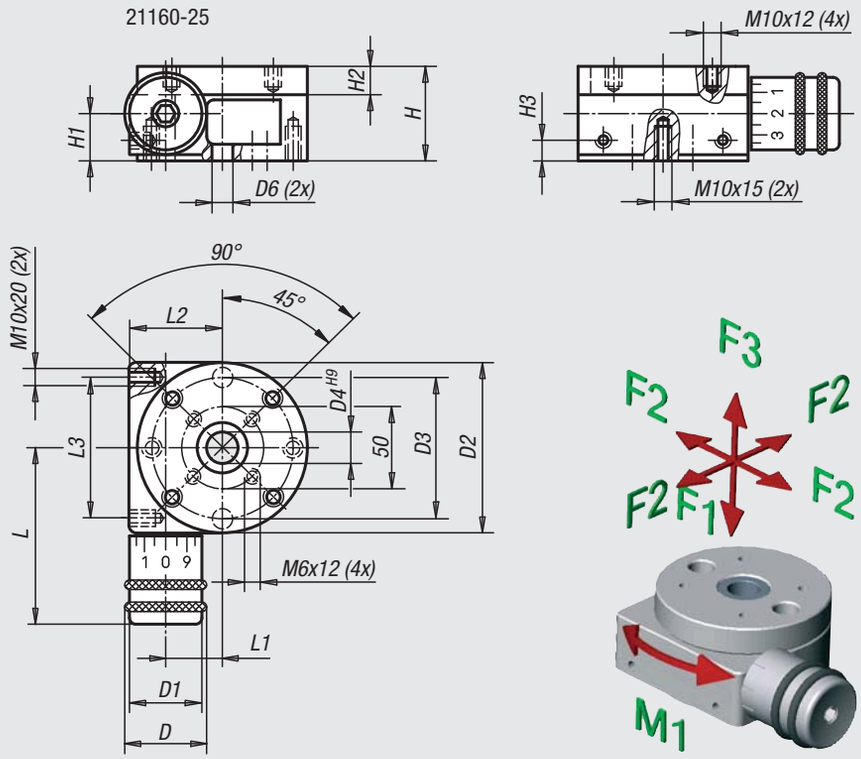
Within the respective sizes, the rotary table can be easily combined in the modular principle.

21160-08 to 21160-12



all counterbores DIN 74-Bm (D6)

21160-25



Order No.	D	D1	D2	D3	D4	D5	D6	H	H1	H2	H3	L	L1	L2	L3	F1 (N)	F2 (N)	F3 (N)	M1 Nm
21160-08	26	23	54	36	10	M4x6	4	30	14	9	6	56	17	29	36	500	500	200	3
21160-12	26	23	80	60	15	M6x9	6	40	17,5	12	6	69	31	43	60	500	500	200	5
21160-25	51	46	150	130	40	-	10,2	75	35	18	12	134	53	80	130	1000	1000	500	10

Rotary positioning tables

with position indicators

Material:
Body and rotary table aluminium alloy, anodized.
Spindle steel, case-hardened.
Plain spindle bearing maintenance-free.
Position indicator plastic.

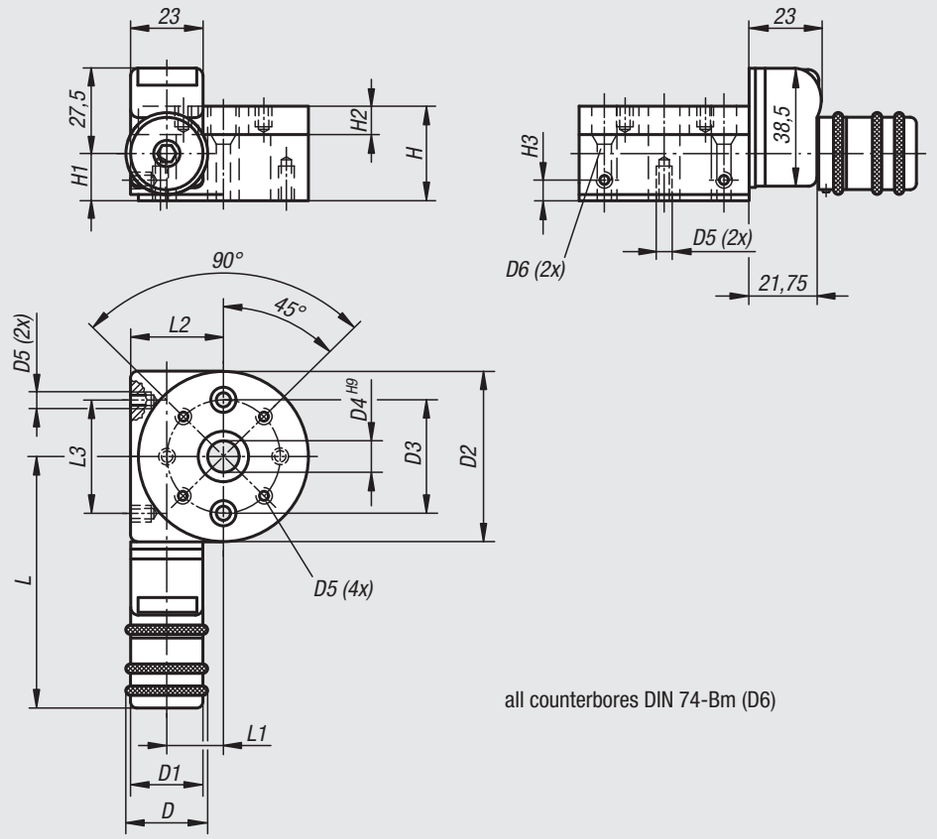
Version:
Radial play of rotation axis < 0.015 mm.
Axial play of rotation axis < 0.02 mm.
Repeat accuracy < 0.05°.
Spindle self-locking.

Sample order:
nlm 21161-08

Note:
360° adjustment, no end stop.
The position indicator reads in increments of 0.1° increasing clockwise from 0.0° to 9.9° while the rotary table rotates counter-clockwise.
A scale on the circumference of the rotary table is marked every 10°.
The position indicator can be mounted in 4 positions with a screw.

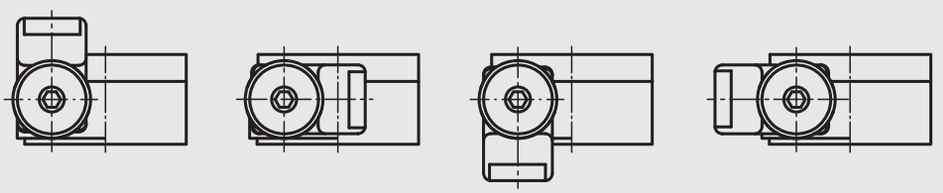
Transmission ratio:
21161-08 = 50:1
21161-12 = 55:1

Within the respective sizes, the rotary table can be easily combined in the modular principle.

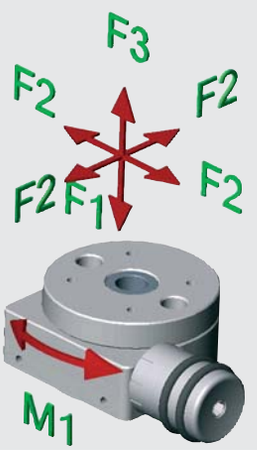


all counterbores DIN 74-Bm (D6)

mounted positions of position indicator



up (standard) | right | down | left



Order No.	D	D1	D2	D3	D4	D5	D6	H	H1	H2	H3	L	L1	L2	L3	F1 (N)	F2 (N)	F3 (N)	M1 Nm
21161-08	26	23	54	36	10	M4x6	4	30	14	9	6	80	18	29	36	500	500	200	3
21161-12	26	23	80	60	15	M6x9	6	40	17,5	12	6	93	31	43	60	500	500	200	5

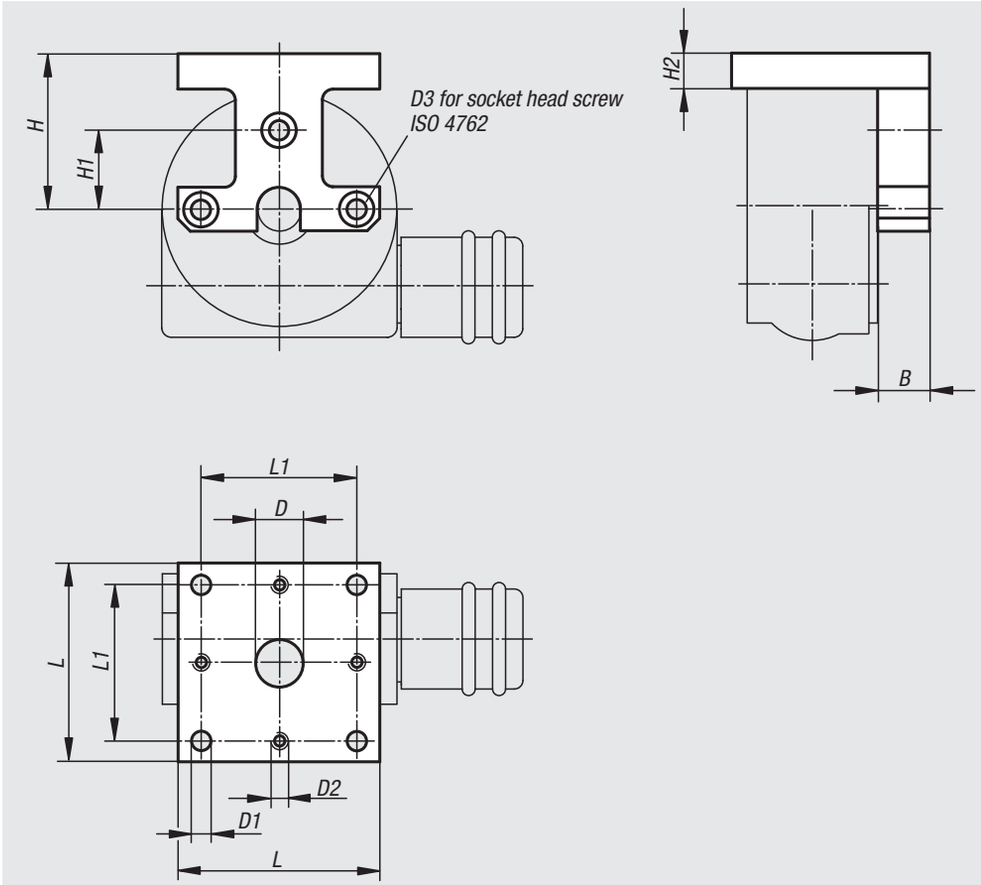
Swivel angles

Material:
Aluminium alloy.

Version:
Milled and anodized

Sample order:
nlm 21162-04

Note:
The swivel angle is mounted on a rotary positioning table and offers further mounting possibilities.
Suitable for 21160 in matching sizes.



Order No.	B	D	D1	D2	D3	H	H1	H2	L	L1
21162-04	7	6	3,3	M3	M3	22	11	6	29	22
21162-08	12	11	4,5	M4	M4	36	18	8	46	36
21162-12	20	16	6,5	M6	M6	51	30	10	75	60
21162-25	25	40	11	M10	M10	98	65	20	150	130

Pivot heads

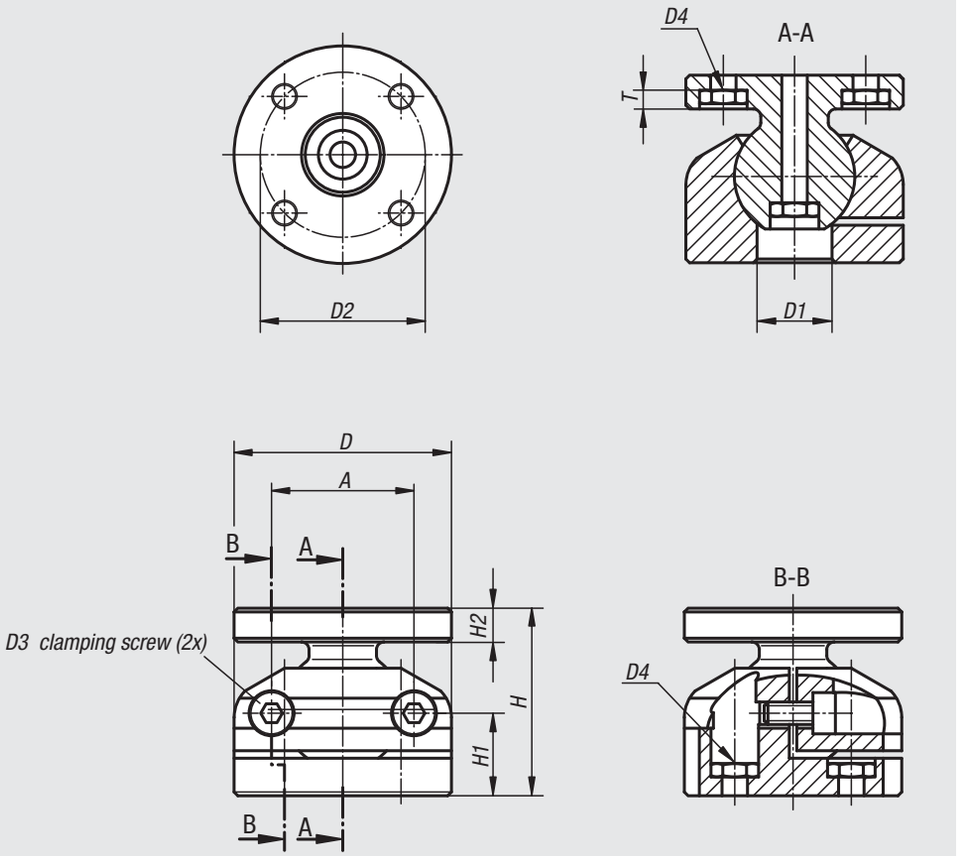
swivel angle 30°

Material:
Aluminium alloy.

Version:
anodized.

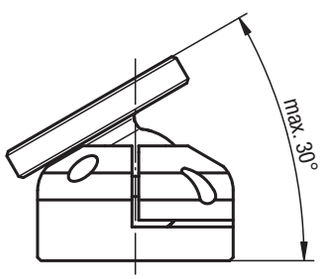
Sample order:
nlm 21170-12

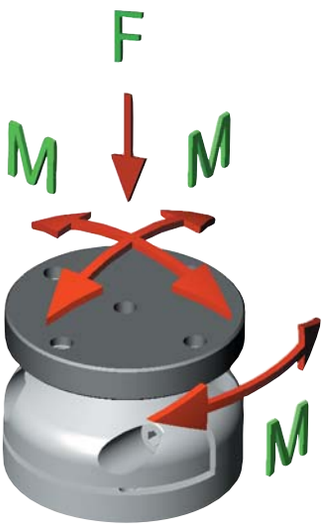
Note:
Suitable for 21100, 21102, 21120, 21122, 21150, 21160, 21162 and 21180.



all (9x) counterbores DIN 974-1 (D4),
all (9x) nuts DIN 934 M (D4)

By pressing out the nuts countersinks for socket screws become available allowing both fastening variations to be used.





Order No.	A	D	D1	D2	D3	D4	H	H1	H2	T	F N	M Nm	Tightening torque of clamping screws (Nm)
21170-04	19	29	10	22	M3	3	25	11	5,5	3,5	300	3	1,11
21170-08	30	46	13	36	M4	4	35	15,5	7	4,5	700	8	2,55
21170-12	46	75	24	60	M6	6	54	23	11	6,6	2200	30	8,6
21170-25	92	150	40	130	M10	10	105	49	20	11	9000	150	42

21180

Base plates

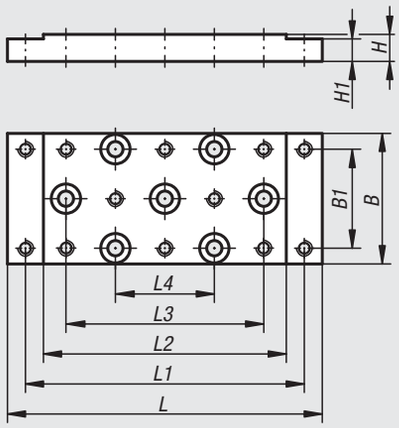
Material:
Aluminium alloy.

Version:
anodized.

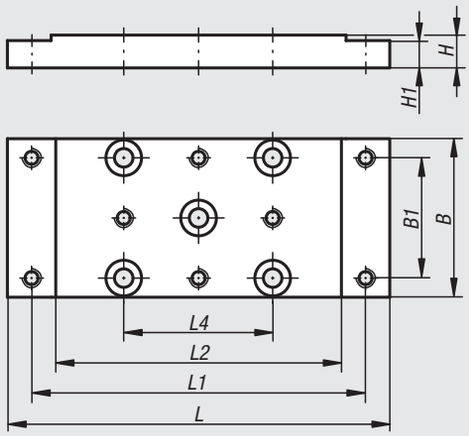
Sample order:
nlm 21180-04

Note:
Suitable for 21100, 21102, 21120, 21122, 21150, 21160, 21162 and 21190 in the respective size.

21180-04 to 21180-12



21180-25



all counterbores DIN 974-1 (D),
all tapped holes M (D)

Order No.	B	B1	D	H	H1	L	L1	L2	L3	L4
21180-04	29	22	3	6	5	70	62	54	44	22
21180-08	46	36	4	8	6	120	108	96	72	36
21180-12	75	60	6	12	10	180	165	150	120	60
21180-25	150	130	10	20	18	290	265	240	-	130

21190

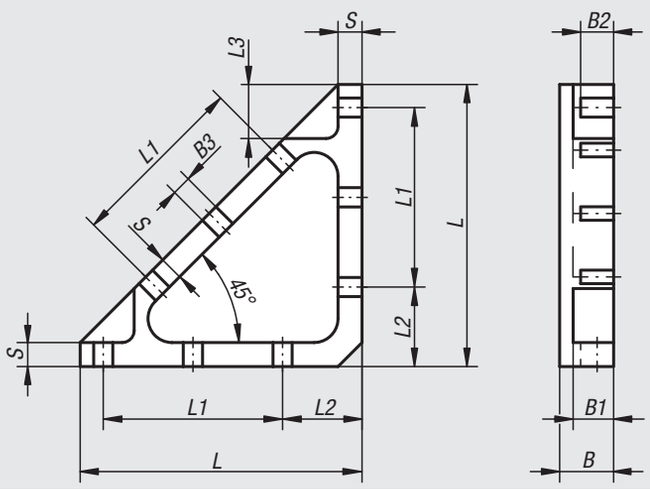
Angle plates

Material:
Aluminium alloy.

Version:
Milled and anodized

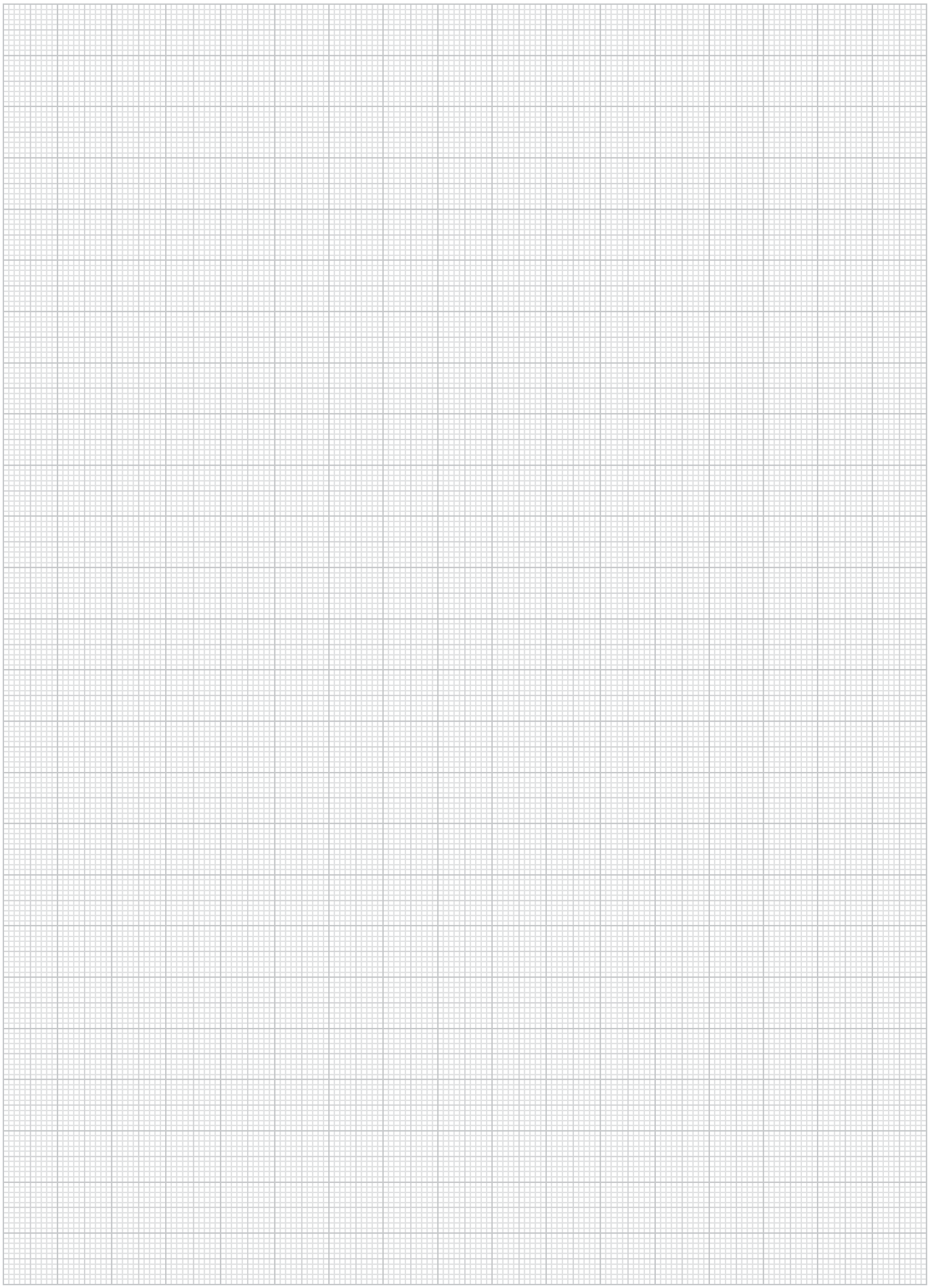
Sample order:
nlm 21190-04

Note:
Suitable for 21100, 21102, 21120, 21122, 21150, 21160, 21162 and 21180 in the respective size.



Order No.	B	B1	B2	B3	L	L1	L2	L3	S
21190-04	8	6	4,5	3,3	40	22	14,5	8	3
21190-08	12	10	8	4,5	58	36	17	11	4
21190-12	18	13,5	10,8	6,6	94	60	26,5	17,5	8
21190-25	25	20	15,5	11	180	130	35	31	15

Notes

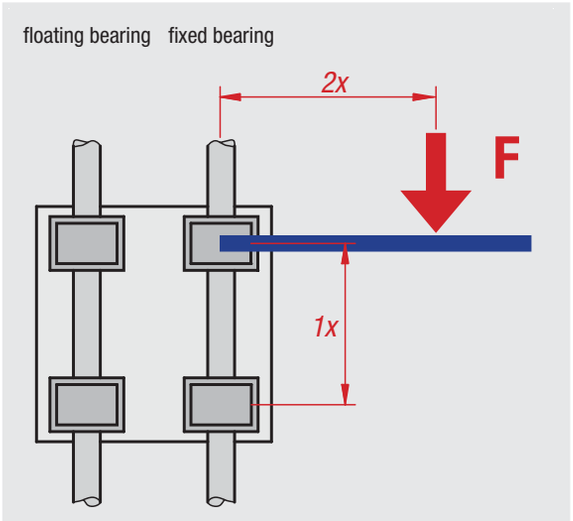


Technical data for slide guides

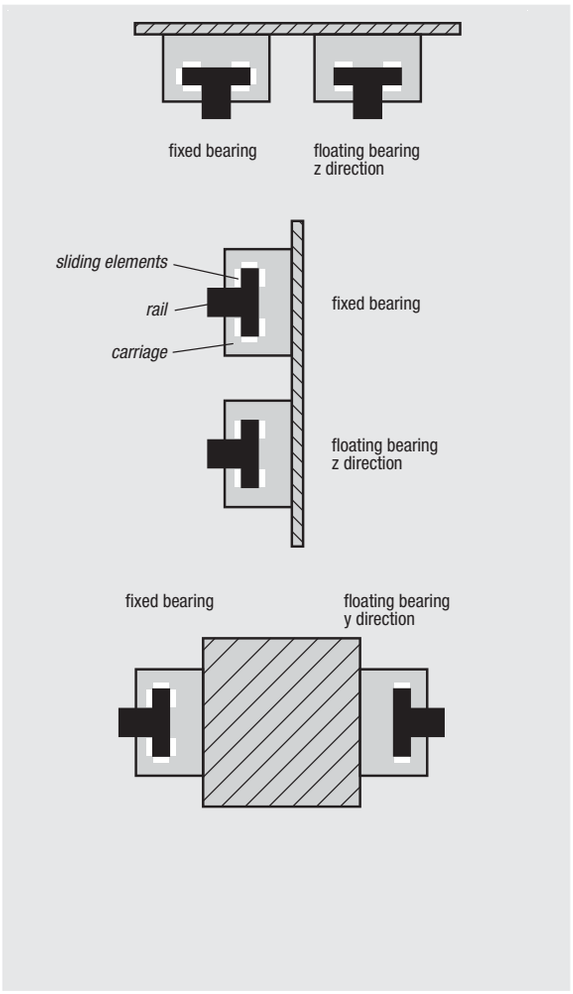
Off-centre forces
The following recommendations should be followed for the successful use of maintenance-free DryLin® linear bearings.
A higher coefficient of friction compared to roller guides results in higher drive forces. The largest possible gap between bearings on a rail and lowest possible torque stress through drive and mass have a positive effect on the running and wear properties of the guide.

Quiet running
Plastic bearings which run on ground shafts or profiled rails are almost silent. Contrary to conventional ball-bearing guides, the noise level does not increase as the speed increases.

Design notes:
When using system with two parallel rails, one side must be designed as the floating bearing. For every fitting position, whether horizontal, vertical or lateral, there is the correct fixed-floating bearing solution. This method of fitting prevents difficulty of access or jamming of the guide in the case of differences in the parallel between the rails.
The floating bearing is produced by removing the statically attuned sliding elements. Therefore an additional degree of freedom occurs on a rail in the direction of the expected error in parallel.
In the case of a fixed-floating bearing errors in parallel between the mounted rails can be compensated up to a maximum range of 0.5 mm. When fitting them, ensure that the floating bearing has an equal amount of play in both directions. You can see the layout of the fixed floating bearing system we recommend from the adjacent images.
The connection surfaces for the rails and guide carriage should have a good evenness (e.g. milled surface), in order to avoid warping in the system. Small amounts of unevenness in the connection surfaces can be individually compensated up to a certain dimension (0.5 mm), by increasing the play. Adjusting the play is only effective in the unstressed state.



The 2:1 Rule
If the 2:1 rule is not followed when using linear slider bearings, uneven movements may occur or the system may even jam. Help can often be provided by relatively easy changes. The principle does not depend on the stress or the drive force. It is a product of friction and always relates to the fixed bearing. The farther away the drive is from the guide bearing, the greater will be the wear and the drive force required. If the distance between the driving force and the fixed bearing is more than double the distance between the bearings (2:1 rule), the guide will jam in theory at coefficient of adhesion of 0.25.



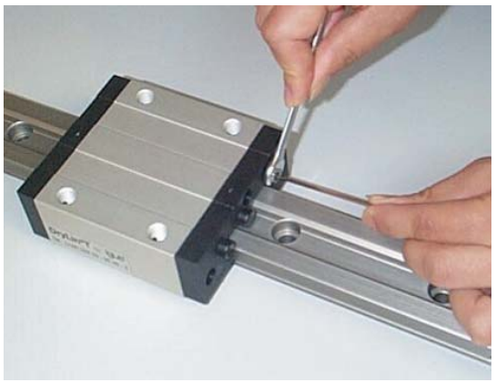
Horizontal variant with the floating bearing in the z-direction

Lateral variant with the floating bearing in the z-direction

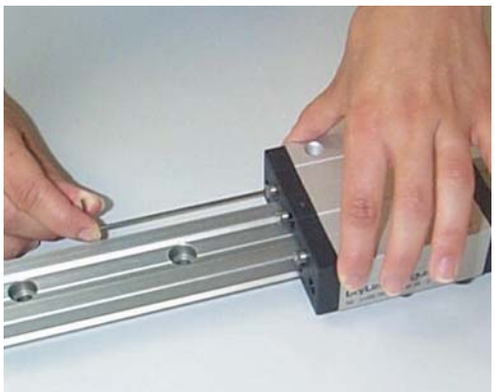
Horizontal variant with lateral positioned guide carriage and floating bearing in the y-direction

Technical data for slide guides

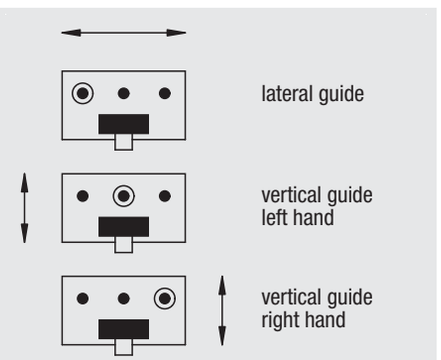
DryLin® T - play adjustment
DryLin® linear guide rails always require a minimum amount of play between the slide and rail. They are supplied ready to use with the play pre-set. If you have special requirements please state whether you require a particularly small or particularly large amount of play. The play in the bearing of the guide slidings can be adjusted later if necessary. This should always be carried out while unloaded.

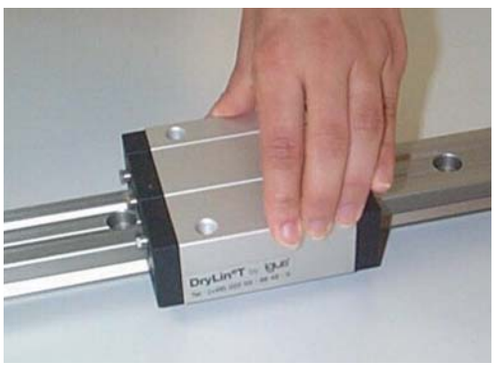


1. Loosen the locknuts after removing the protective caps.
   Spanner size:
   5 mm for 21200-15..
   5 mm for 21200-20..
   7 mm for 21200-25..
   7 mm for 21200-30..

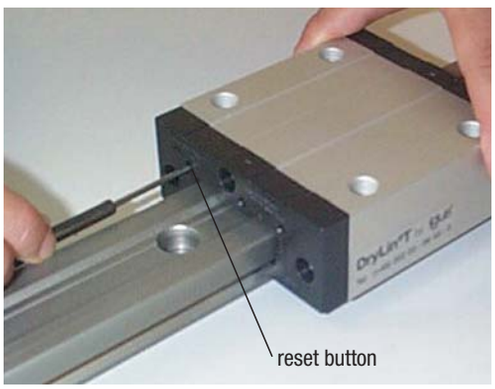


2. Re-adjust the bearing play for the three guide points with a hex key.
   Socket size:
   1.5 mm for 21200-15..
   1.5 mm for 21200-20..
   2.0 mm for 21200-25..
   2.0 mm for 21200-30..



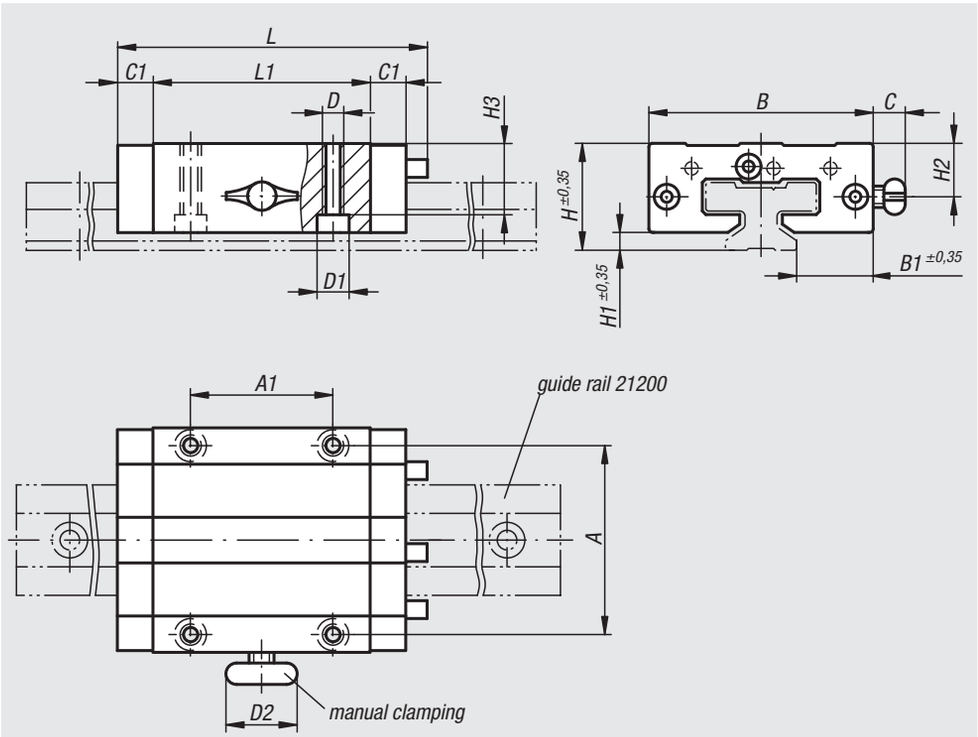


3. Check the play in the guide slides after adjustment. If it is sufficient, tighten the locknuts and replace the protective caps.



4. If too little play has been set so that the guide slide jams, it is not enough just to reset the cap screw. After resetting the screw, press the reset button on the side opposite the screw to release the slide elements.
   For this, use the following sized pins:
   2.5 mm for 21200-15..
   2.5 mm for 21200-20..
   3.0 mm for 21200-25..
   3.0 mm for 21200-30..

Carriages DryLin® T

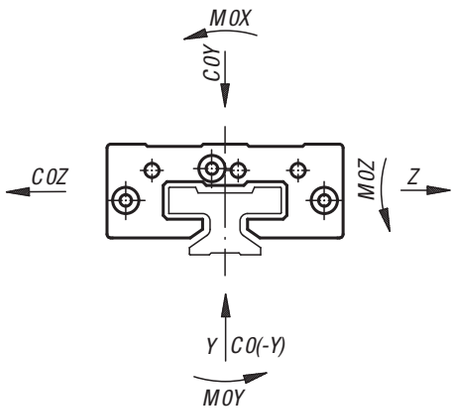


Material:
Sliding carriage: Base structure in extruded section, aluminium EN AW-6060.
Sliding elements: Maintenance free plain bearing iglidur® J.
Cap: Thermoplastic

Version:
Eloxal-coated E6/EV1. Black thermoplastic

Sample order:
nlm 21200-1500

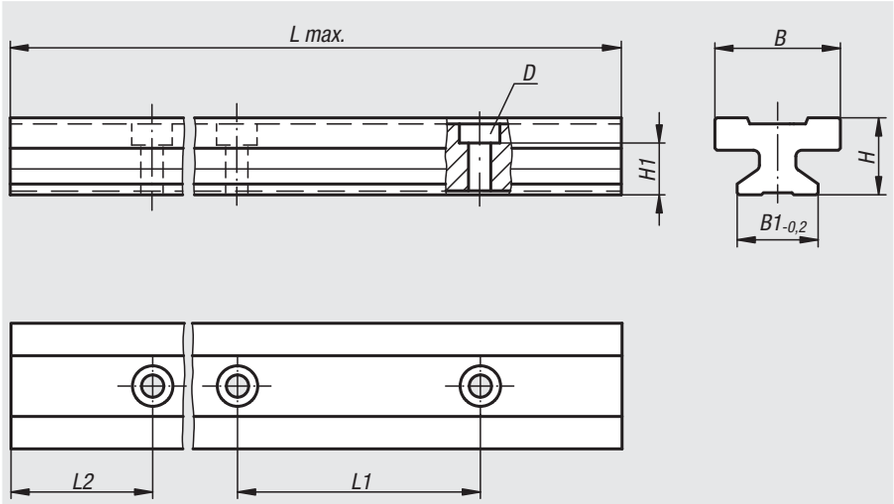
Note:
With a low rate of inerita, high accelerations and short term extreme speeds up to 30 m/s are possible. DryLin® T linear slider guides are resistant to dirt and corrosion. They are maintenance-free, adjustable and quiet.
Application temperature max. 80 °C.
Recommended for use in food, medical, and clean room technologies, since no lubricants are present.
Manual clamping was developed for simple functions. A clamped polymer has a tendency to creep, which causes a decrease in clamping force over time (up to 70%). Therefore, applications for DryLin® T with clamp are restricted.
Suitable Guide Rails see 21200.



Order No. fixed bearing standard	Order No. fixed bearing with manual clamping	Order No. floating bearing in y direction	Order No. floating bearing in z direction	Size	C0Y kN	C0(-Y) kN	C0Z kN	M0X Nm	M0Y Nm	M0Z Nm	A	A1	B	B1
21200-1500	**21200-1510**	**21200-1520**	**21200-1530**	15	4	4	2	32	25	25	38	30	47	16
21200-2000	**21200-2010**	**21200-2020**	**21200-2030**	20	7,4	7,4	3,7	85	45	45	53	40	63	21,5
21200-2500	**21200-2510**	**21200-2520**	**21200-2530**	25	10	10	5	125	65	65	57	45	70	23,5
21200-3000	**21200-3010**	**21200-3020**	**21200-3030**	30	14	14	7	200	100	100	72	52	90	31

Order No. fixed bearing standard	Order No. fixed bearing with manual clamping	Order No. floating bearing in y direction	Order No. floating bearing in z direction	C	C1	D	D1 for screw to DIN 912	D2	H	H1	H2	H3	L	L1	Manual clamp thread
21200-1500	**21200-1510**	**21200-1520**	**21200-1530**	-/19/-/-	9	M5	M4	-/20/-/-	24	4	-/11,5/-/-	16	74	50	-/M6/-/-
21200-2000	**21200-2010**	**21200-2020**	**21200-2030**	-/18/-/-	10	M6	M5	-/28/-/-	30	5	-/15/-/-	19,8	87	61	-/M8/-/-
21200-2500	**21200-2510**	**21200-2520**	**21200-2530**	-/17/-/-	11	M8	M6	-/28/-/-	36	5	-/19/-/-	24,8	96	68	-/M8/-/-
21200-3000	**21200-3010**	**21200-3020**	**21200-3030**	-/20/-/-	12	M10	M8	-/28/-/-	42	6,5	-/21,5/-/-	27	109	79	-/M8/-/-

Guide rails DryLin® T



Material:
Extruded section, aluminium EN AW-6060.

Version:
Hard anodized aluminium, 50 µm. Hardness 500 HV.

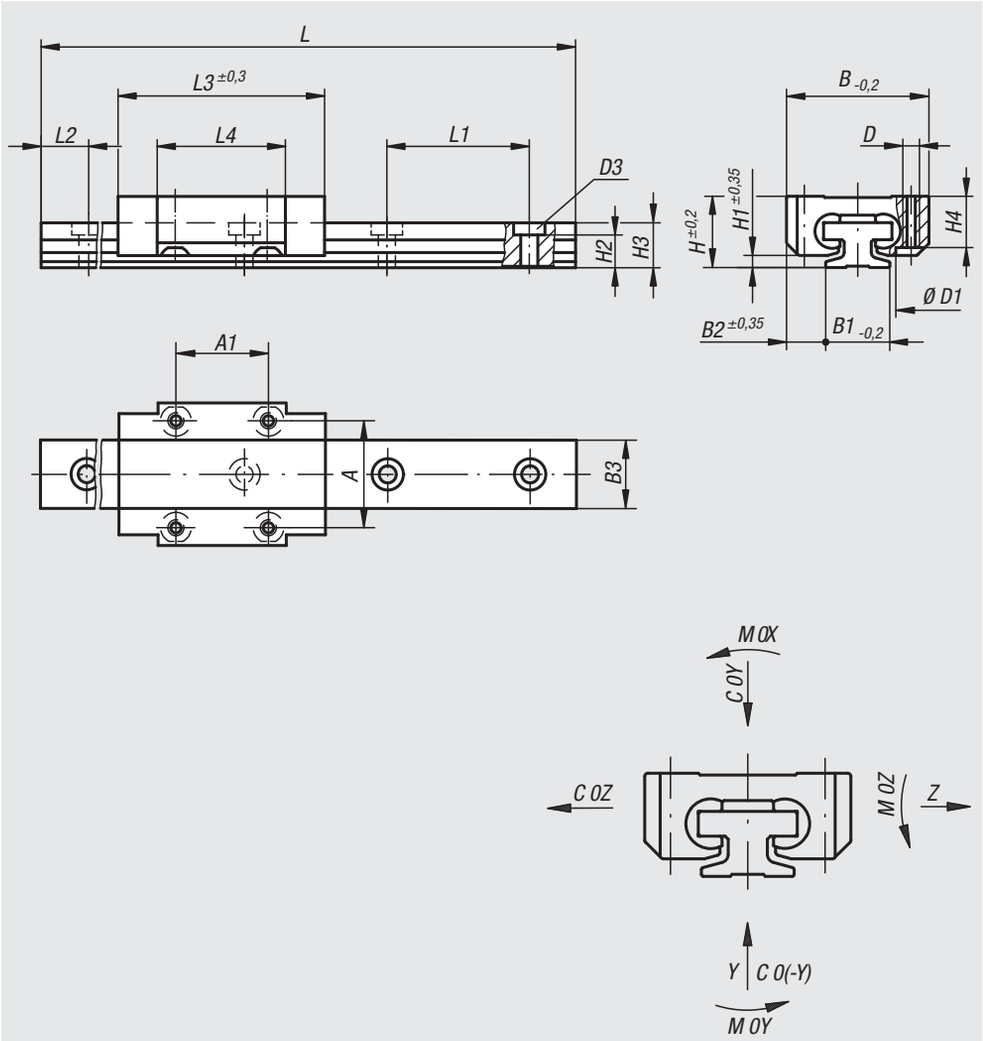
Sample order:
nlm 21200-1530X3960 (L max.)
21200-1520X500 (customer specific guide rail size 15)
** lengths L2 = 20 mm
* and L = 500 mm included
L2 and L only available in full mm.

Note:
The aluminium guide rail has good thermal conductivity and importantly heats only at continuously very high speeds.

Order No.	Version	Size	L max.	L2	B	B1	D for screw DIN 912	H	H1	L1
21200-1530X3960	L max.	15	3960	30	22	15	M4	15,5	10	60
21200-2030X3960	L max.	20	3960	30	31	20	M5	19	12,3	60
21200-2530X3960	L max.	25	3960	30	34	23	M6	21,5	13,8	60
21200-3020X3960	L max.	30	3960	20	40	28	M8	26	15,8	80

Order No.	Version	Size	L max.	L	L2	L2 min.	L2 max.	B	B1	D for screw DIN 912	H	H1	L1
21200-15X***	L2 and L customer specific	15	3960	*	**	20	49	22	15	M4	15,5	10	60
21200-20X***	L2 and L customer specific	20	3960	*	**	20	49	31	20	M5	19	12,3	60
21200-25X***	L2 and L customer specific	25	3960	*	**	20	49	34	23	M6	21,5	13,8	60
21200-30X***	L2 and L customer specific	30	3960	*	**	20	49	40	28	M8	26	15,8	60

Miniature linear guides DryLin® T



Material:
Slide carriage body die-cast zinc.
Slide elements maintenance-free iglidur® J.
Guide rail extruded profile EN AW-6060.

Version:
Hard anodized aluminium, 50 µm. Hardness 500 HV.

Sample order:
nlm 21210-0900 (Carriages)

Ordering example guide rail:
nlm 21210-1212X0800 (L max.)
21210-1512X500 (customer specific guide rail size 15)
** lengths L2 = 12 mm
* and L = 500 mm included
L2 and L only available as full mm.

Note:
Due to their ability to run dry and their resistance to corrosion, miniature linear guides are completely maintenance-free. The slider components in iglidur® J are wear-resistant and replaceable. Can be use in a temperature range up to max. 80 °C. The small dimensions are a major advantage of these miniature linear guides.

Miniature linear guides DryLin® T

Carriages

Order No. fixed bearing standard	Order No. floating bearing in y direction	Order No. floating bearing in z direction	Size	C0Y N	C0(-Y) N	C0Z N	M0X Nm	M0Y Nm	M0Z Nm
21210-0900	**21210-0920**	**21210-0930**	09	480	480	240	3,4	1,8	1,8
21210-1200	**21210-1220**	**21210-1230**	12	960	960	480	9,2	4,4	4,4
21210-1500	**21210-1520**	**21210-1530**	15	1400	1400	700	17	8	8

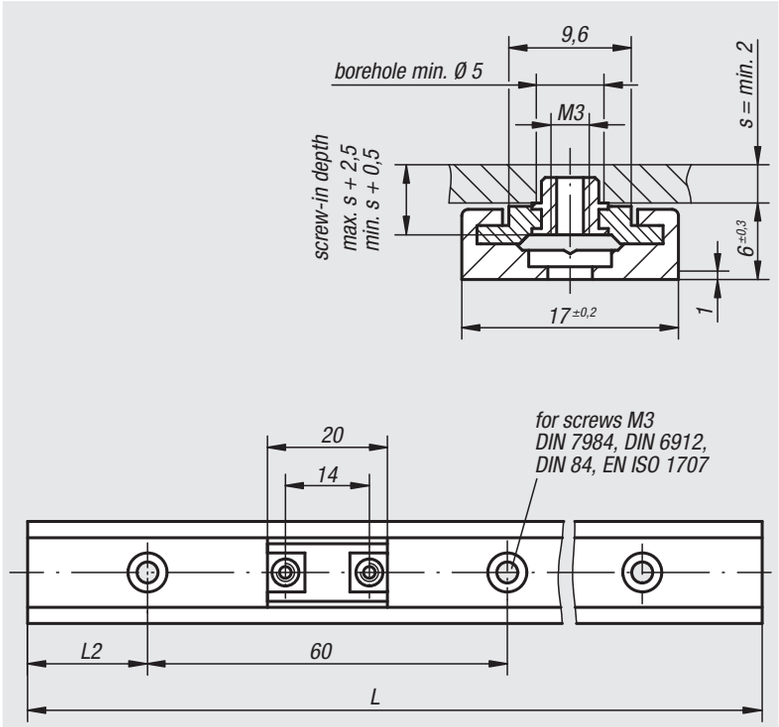
Order No. fixed bearing standard	Order No. floating bearing in y direction	Order No. floating bearing in z direction	Size	A	A1	B	B2	D	D1	H	H1	H4	L3	L4
21210-0900	**21210-0920**	**21210-0930**	09	15	13	20	5,5	M2	4,4	10	1,7	7,2	29	18
21210-1200	**21210-1220**	**21210-1230**	12	20	15	27	7,5	M3	6,5	13	2,2	9,5	34	22
21210-1500	**21210-1520**	**21210-1530**	15	25	20	32	8,5	M3	6,5	16	2,8	11	42	31

Guide rails

Order No.	Version	Size	L max.	L2	B1	B3	D3 for screw to DIN 912	H2	H3	L1
21210-0910X0800	L max.	09	800	10	9	9,6	M2	4,6	6,3	20
21210-1212X0800	L max.	12	800	12,5	12	13	M3	5,9	8,6	25
21210-1520X3000	L max.	15	3000	20	15	17	M3	7	10,8	40

Order No.	Version	Size	L	L2	L2 min.	L2 max.	B1	B3	D3 for screw to DIN 912	H2	H3	L1
21210-09X***	L2 and L customer specific	9	*	**	5	14,5	6	9,6	M2	4,6	6,3	20
21210-12X***	L2 and L customer specific	12	*	**	5	19,5	12	13	M3	5,9	8,6	25
21210-15X***	L2 and L customer specific	15	*	**	10	29,5	15	17	M3	7	10,8	40

Miniature slide guides DryLin® N



Material:
Bearing material maintenance-free iglidur® J.
Rails anodized aluminium.

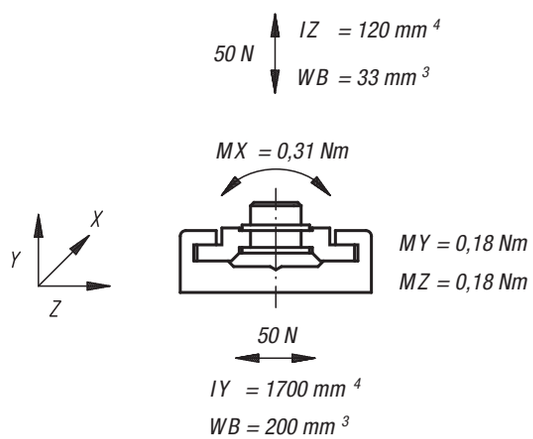
Version:
Guide rail natural colour anodized.
Carriage fastening thread brass.

Sample order:
nlm 21320-1700 (Guide car, fixed bearing)

Ordering example guide rail:
nlm 21230-1720X1960 (L max.)
21230-1720X500 (customer specific guide rail)
** lengths L2 = 20 mm
* and L = 500 mm included
L2 and L only available in full mm.

Note:
Miniature slide guides are maintenance-free and corrosion resistant. Very high speeds and accelerations are possible due to the low weight. Applicable temperature max. 80 °C.
Miniature slide guides are insensitive to dust and ideally suited to dry running.

static load capacity and geometrical moment of inertia



Carriage

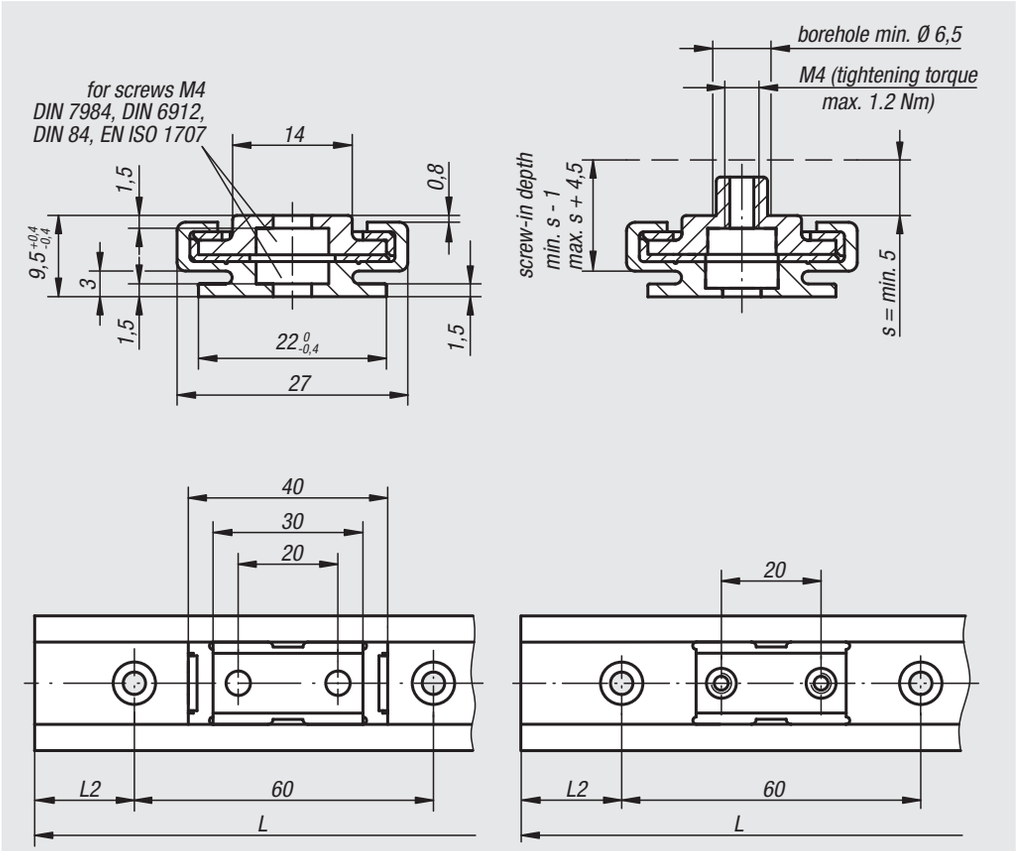
Order No.	Version
21230-1700	fixed bearing
21230-1710	floating bearing

Guide rails

Order No.	Version	L max.	L2
21230-1720X1960	L max.	1960	20

Order No.	Version	L2	L2 min.	L2 max.
21230-17X***	L2 and L customer specific	**	20	49

Miniature slide guides DryLin® N



Material:
Carriage body zinc.
Plastic bearing material iglidur® J.
Rails anodized aluminium.

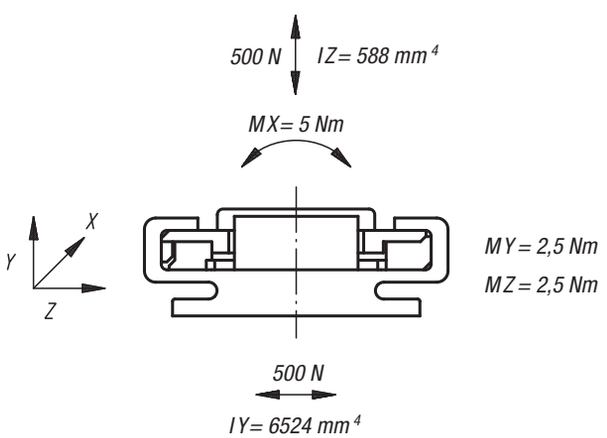
Version:
Body chromed.
Guide rail natural colour anodized.

Sample order:
nlm 21320-2700 (guide carriage with hole, fixed bearing)

Ordering example guide rail:
nlm 21230-2730X3000 (L max.)
21230-2730X1000 (customer specific guide rail)
** length L2 = 30 mm and
* L = 1000 mm included
L2 and L only available in full mm.

Note:
Miniature slide guides are maintenance-free and corrosion resistant. Very high speeds and accelerations are possible due to the low weight. Applicable temperature max. 80 °C.
Miniature slide guides are insensitive to dust and are ideal for dry running.

static load capacity and geometrical moment of inertia



Carriage

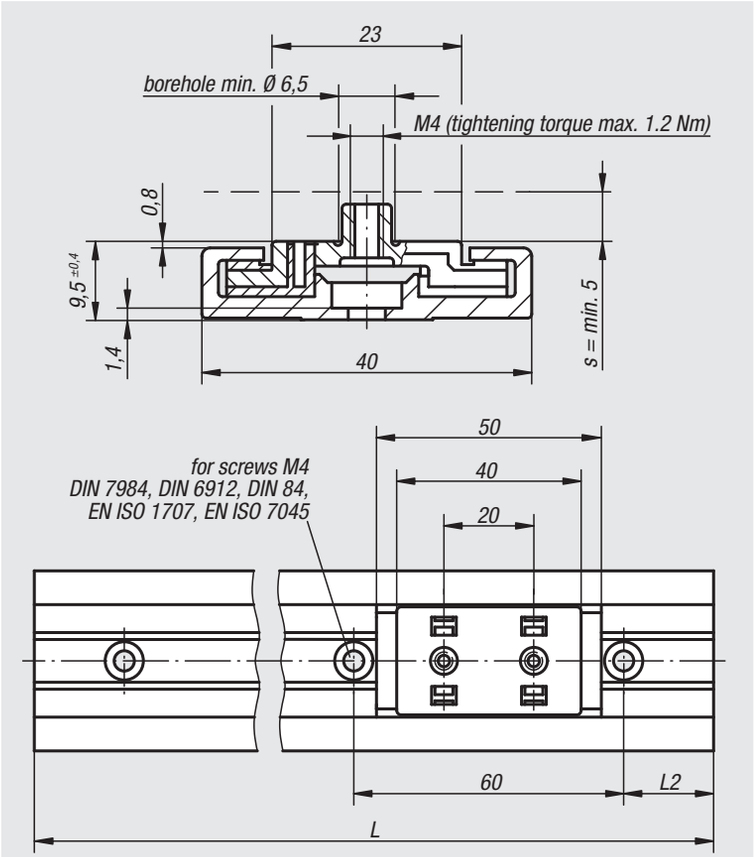
Order No. fixed bearing	Order No. floating bearing	Version
21230-2700	**21230-2701**	Carriages with through hole
21230-2710	**21230-2711**	Carriages with threaded hole

Guide rails

Order No.	Version	L max.	L2
21230-2730X3000	L max.	3000	30

Order No.	Version	L2	L2 min.	L2 max.
21230-27X***	L2 and L customer specific	**	20	49

Miniature slide guides DryLin® N



Material:
Carriage body zink.
Plastic bearing material iglidur® J.
Rail anodized aluminium.

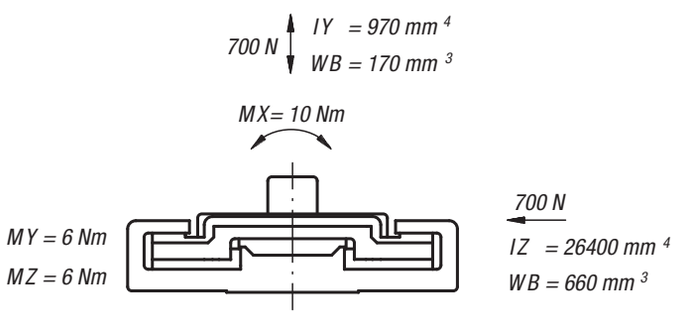
Version:
Body chromed.
Guide rail natural colour anodized.

Sample order:
nlm 21230-4000 (guide carriage, fixed bearing)

Ordering example guide rail:
nlm 21230-4030X3000 (L max.)
21230-4030X1000 (customer specific guide rail)
** length L2 = 30 mm and
* L = 1000 mm included
L2 and L only available in full mm.

Note:
Miniature slide guides are maintenance-free and corrosion resistant. Very high speeds and accelerations are possible due to the low weight. Applicable temperature max. 80 °C.
Miniature slide guides are insensitive to dust and are ideal for dry running.

static load capacity and geometrical moment of inertia



Carriage

Order No.	Version
21230-4000	fixed bearing
21230-4010	floating bearing

Guide rails

Order No.	Version	L max.	L2
21230-4030X3000	L max.	3000	30

Order No.	Version	L2	L2 min.	L2 max.
21230-40X***	L2 and L customer specific	**	20	49

Flat guides DryLin® N

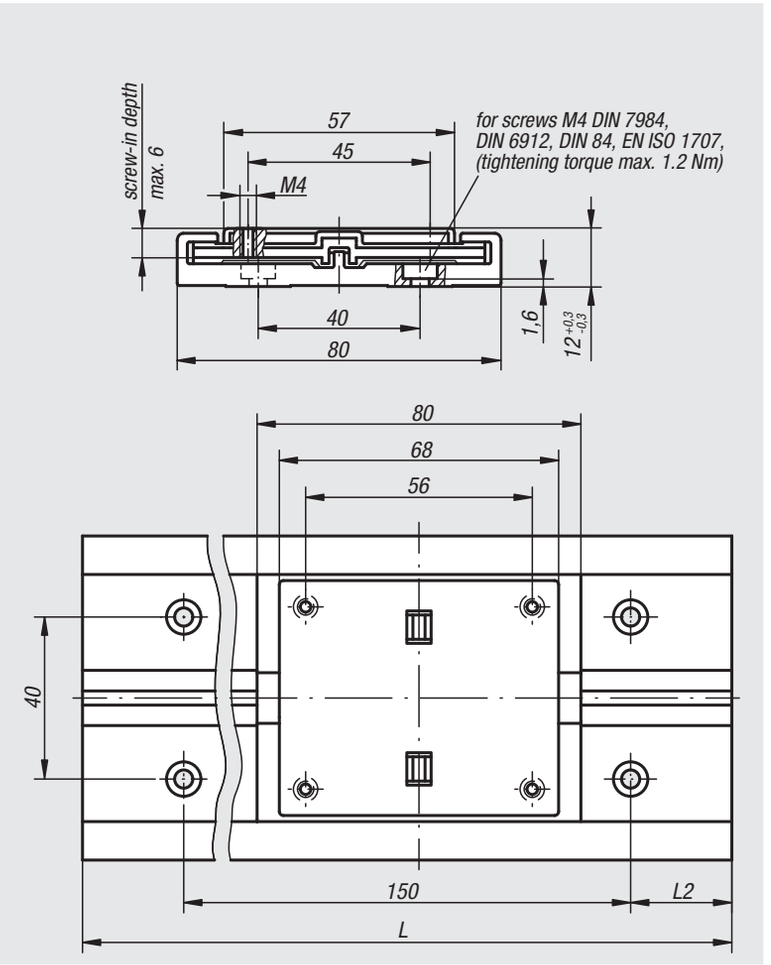
Material:
Carriage body zink.
Plastic bearing material iglidur® J.
Rail anodized aluminium.

Version:
Body chromed.
Guide rail natural colour anodized.

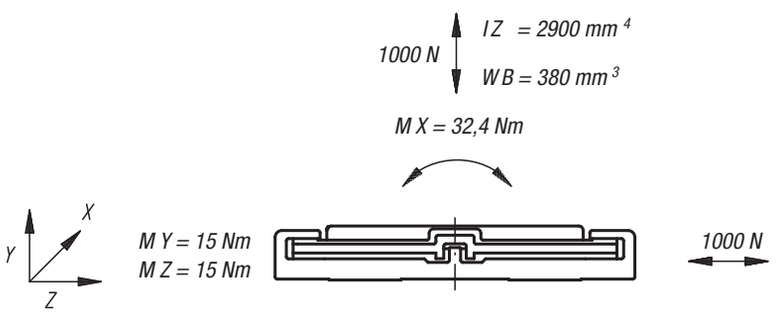
Sample order:
nlm 21230-8000 (guide carriage, fixed bearing)

Ordering example guide rail:
nlm 21230-8030X3960 (L max.)
21230-8030X1000 (customer specific guide rail)
** length L2 = 30 mm and
* L = 1000 mm included
L2 and L only available in full mm.

Note:
Flat slide guides are maintenance-free and corrosion resistant. Very high speeds and accelerations are possible due to the low weight. Applicable temperature max. 80 °C.
Miniature slide guides are insensitive to dust and are ideal for dry running.



static load capacity and geometrical moment of inertia



Carriage

Order No.	Version
21230-8000	fixed bearing
21230-8010	floating bearing

Guide rails

Order No.	Version	L max.	L2
21230-8030X3960	L max.	3960	30

Order No.	Version	L2	L2 min.	L2 max.
21230-80X***	L2 and L customer specific	**	25	100

Carriages DryLin® W

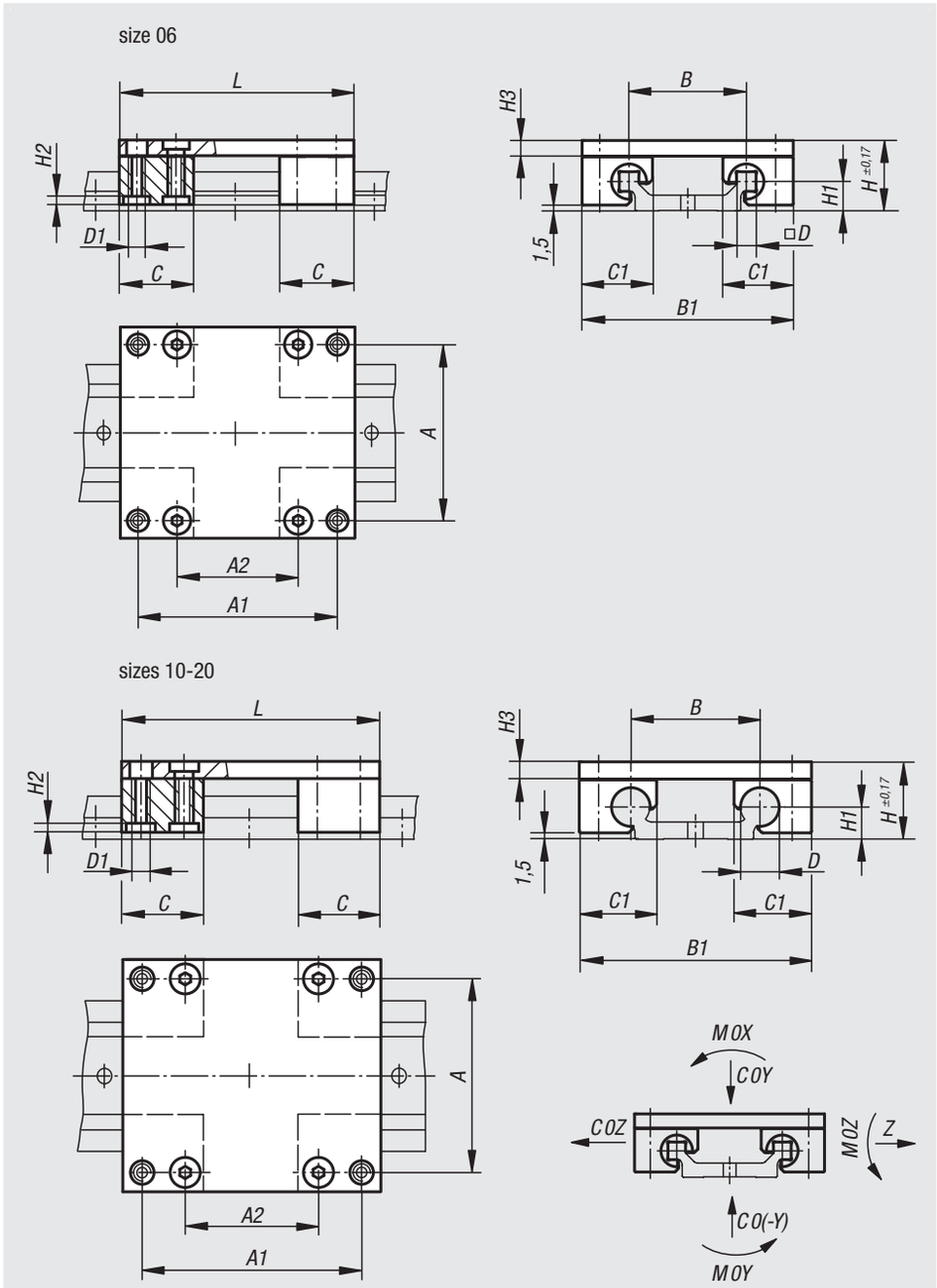
Material:
Carriage die-cast zinc.
Mounting plate aluminium.
Bearing material iglidur® J.

Version:
Carriage chromed.
Mounting plate anodized.

Sample order:
nlm 21240-0600060

Note:
DryLin® W carriages are maintenance-free and corrosion resistant. Lacking the need of lubrication makes the system highly dirt resistant. Low friction coefficient in dry running and very quiet. Due to the flat and wide design, high torques are possible. Speeds up to 15 m/s. Applicable temperature -40 °C to +90 °C.

Accessories:
Double guide rails 21240.



Order No.	Size	A	A1	A2	B	B1	C	C1	D	D1	H	H1	H2	H3	L	C0Y kN	C0(-Y) kN	C0Z kN	M0X Nm	M0Y Nm	M0Z Nm
21240-0600060	06	45	51	31	30	54	19	18	5	M4	18	7,5	2	4	60	1,68	1,68	1,68	25	34	34
21240-0600080	06	45	71	51	30	54	19	18	5	M4	18	7,5	2	4	80	1,68	1,68	1,68	25	51	51
21240-0600100	06	45	91	71	30	54	19	18	5	M4	18	7,5	2	4	100	1,68	1,68	1,68	25	68	68
21240-1000100	10	60	87	55	40	73	29	26	10	M6	24	9	3,5	6	100	4,8	4,8	4,8	96	170	170
21240-1000150	10	60	137	105	40	73	29	26	10	M6	24	9	3,5	6	150	4,8	4,8	4,8	96	290	290
21240-1000200	10	60	187	155	40	73	29	26	10	M6	24	9	3,5	6	200	4,8	4,8	4,8	96	410	410
21240-1600100	16	86	82	46	58	104	36	34,5	16	M8	35	14	4	8	100	8,4	8,4	8,4	240	270	270
21240-1600150	16	86	132	96	58	104	36	34,5	16	M8	35	14	4	8	150	8,4	8,4	8,4	240	480	480
21240-1600200	16	86	182	146	58	104	36	34,5	16	M8	35	14	4	8	200	8,4	8,4	8,4	240	690	690
21240-2000150	20	116	132	78	82	134	45	42,5	20	M8	44	20	4	8	150	12,8	12,8	12,8	525	670	670
21240-2000200	20	116	182	128	82	134	45	42,5	20	M8	44	20	4	8	200	12,8	12,8	12,8	525	990	990
21240-2000250	20	116	232	178	82	134	45	42,5	20	M8	44	20	4	8	250	12,8	12,8	12,8	525	1250	1250

Slide carriages DryLin® W

Material:
Die-cast zinc.
Bearing material iglidur® J.

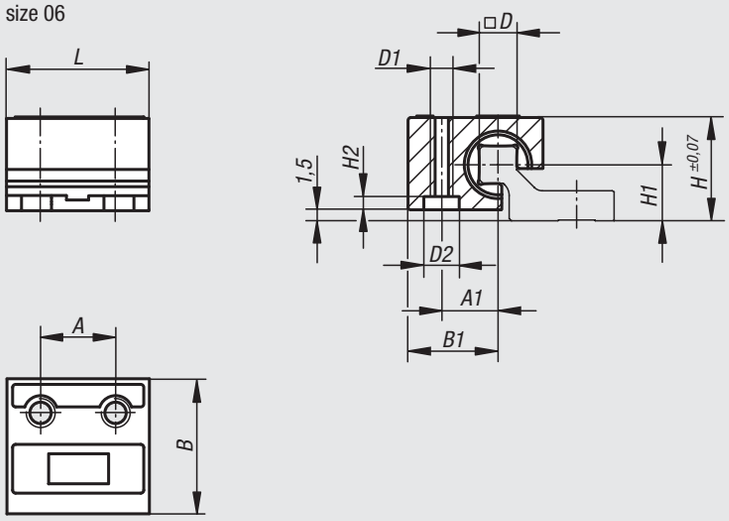
Version:
Chromed

Sample order:
nlm 21240-0600

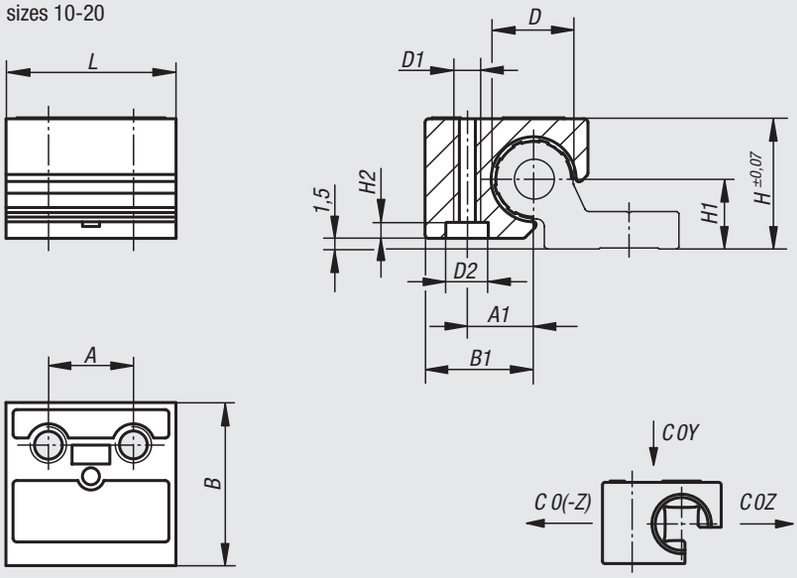
Note:
DryLin® W slide carriages are maintenance-free and corrosion resistant. Lacking the need of lubrication makes the system highly dirt resistant. Low friction coefficient in dry running and very quiet. Suitable for single or double rails. Speeds up to 15 m/s.
Applicable temperature -40 °C to +90 °C.

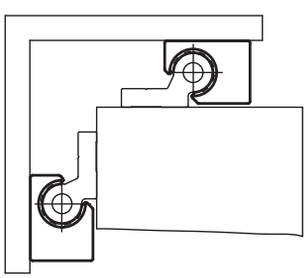
Accessories:
Guide rails 21240

size 06



sizes 10-20





Order No.	Version	Size	A	A1	B	B1	D	D1	D2	H	H1	H2	L	C0Y kN	C0Z kN	C0(-Z) kN
21240-0600	fixed bearing standard	06	10	7,5	18	12	5	M4	7	14	7,5	2	19	0,42	0,42	0,14
21240-0620	floating bearing in y direction	06	10	7,5	18	12	5	M4	7	14	7,5	2	19	0,42	0,42	0,14
21240-0630	floating bearing in z direction	06	10	7,5	18	12	5	M4	7	14	7,5	2	19	0,42	0,42	0,14
21240-1000	fixed bearing standard	10	16	10	26	16,5	10	M6	9,5	18	9	3,5	29	1,2	1,2	0,25
21240-1020	floating bearing	10	16	10	26	16,5	10	M6	9,5	18	9	3,5	29	1,2	1,2	0,25
21240-1600	fixed bearing standard	16	18	14	34,5	23	16	M8	11,5	27	14	4	36	2,1	2,1	0,4
21240-2000	fixed bearing standard	20	27	17	42,5	26	20	M8	11,5	36	20	4	45	3,2	3,2	0,5
21240-2020	floating bearing	20	27	17	42,5	26	20	M8	11,5	36	20	4	45	3,2	3,2	0,5

Guide rails DryLin® W

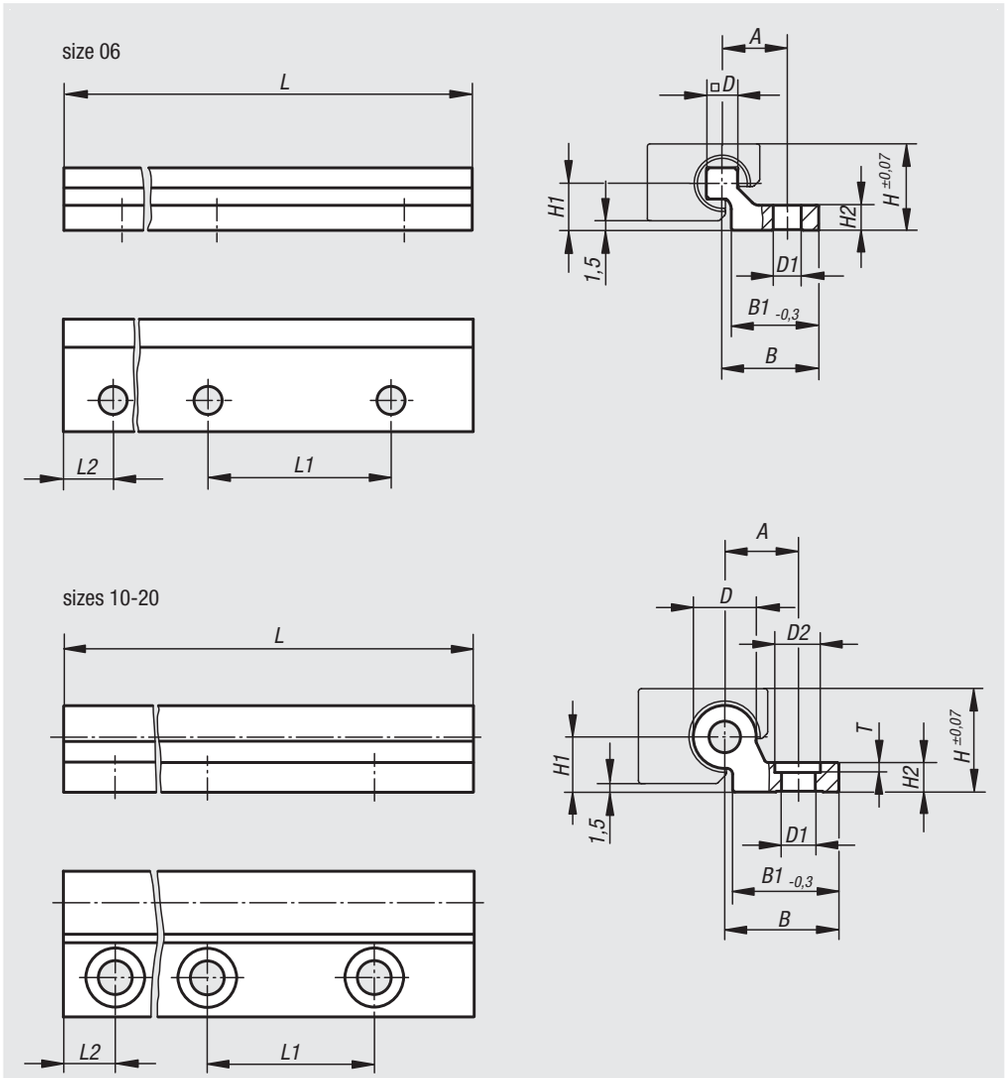
single

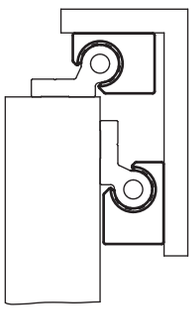
Material:
Aluminium.

Version:
Hard-anodized, layer thickness 50 µm.
Hardness 500 HV

Sample order:
nlm 21240-10630X3000 (L max.)
nlm 21240-10620X500 (customer specific guide rail size 06)
** include length L2 = 20 mm and
* L = 500 mm
L2 and L only available in full mm.

Note:
Single guide rails enable highest flexibility during construction and easy assembly. Can be used to to compensate for height differences in height. Hard anodised aluminium is used as rail material and ensures best friction and wear results. Robust and dirt resistant for transporting heavy loads safely and maintenance-free.





Order No.	Version	Size	L max.	L2	A	B	B1	D	D1	D2	H	H1	H2	L1	T
21240-10630X3000	L max.	06	3000	30	10,5	15,5	14	5	4,5	-	14	7,5	4	60	-
21240-11030X4000	L max.	10	4000	30	17	27	27	10	6,6	-	18	9	5,5	120	-
21240-11630X4000	L max.	16	4000	30	19	29	27	16	9	15	27	14	7,5	120	4
21240-12030X4000	L max.	20	4000	30	21	31	27	20	9	15	36	20	9,5	120	5

Order No.	Version	Size	L max.	L2	L2 min.	L2 max.	A	B	B1	D	D1	D2	H	H1	H2	L1	T
21240-106X***	L2 and L customer specific	06	*	**	20	49,5	10,5	15,5	14	5	4,5	-	14	7,5	4	60	-
21240-110X***	L2 and L customer specific	10	*	**	20	79,5	17	27	27	10	6,6	-	18	9	5,5	120	-
21240-116X***	L2 and L customer specific	16	*	**	20	79,5	19	29	27	16	9	15	27	14	7,5	120	4
21240-120X***	L2 and L customer specific	20	*	**	20	79,5	21	31	27	20	9	15	36	20	9,5	120	5

Guide rails DryLin® W

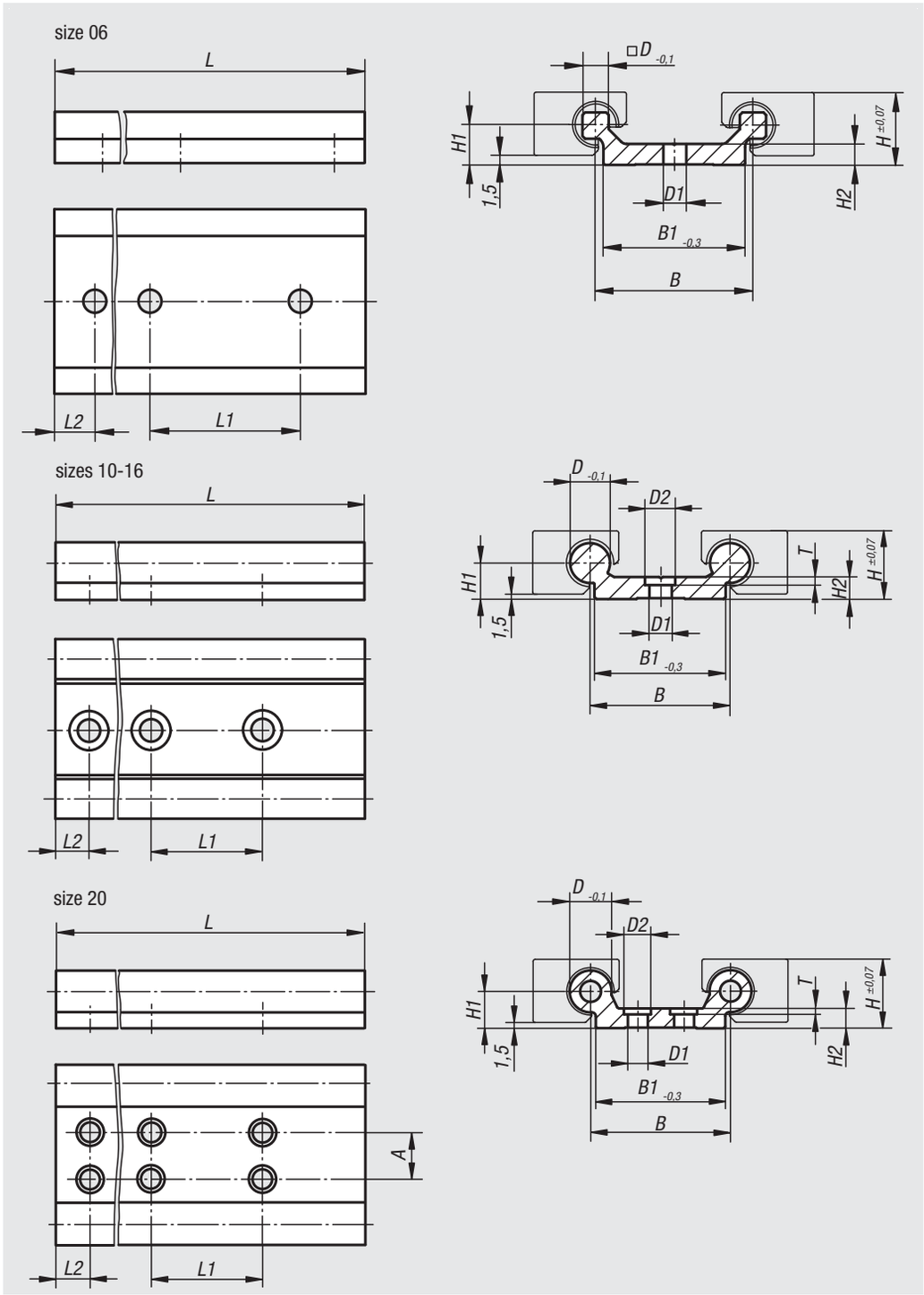
double

Material:
Aluminium.

Version:
Hard-anodized, layer thickness 50 µm.
Hardness 500 HV

Sample order:
nlm 21240-20630X3000 (L max.)
nlm 21240-20620X500 (customer specific guide rail size 06)
** include length L2 = 20 mm and
* L = 500 mm
L2 and L only available in full mm.

Note:
Extremely flat rails with wide guides reaching to the edge for optimally support high torque. Robust and dirt resistant for transporting heavy loads safely and maintenance-free.



Order No.	Version	Size	L max.	L2	L2 min.	L2 max.	A	B	B1	D	D1	D2	H	H1	H2	L1	T
21240-20630X3000	L max.	06	3000	30	-	-	-	30	27	5	4,5	-	14	7,5	4	60	-
21240-21030X4000	L max.	10	4000	30	-	-	-	40	40	10	6,6	-	18	9	5,5	120	-
21240-21630X4000	L max.	16	4000	30	-	-	-	58	54	16	9	15	27	14	7,5	120	4
21240-22030X4000	L max.	20	4000	30	-	-	40	82	74	20	9	15	36	20	9,5	120	5
21240-206X***	L2 and L customer specific	06	*	**	20	49,5	-	30	27	5	4,5	-	14	7,5	4	60	-
21240-210X***	L2 and L customer specific	10	*	**	20	79,5	-	40	40	10	6,6	-	18	9	5,5	120	-
21240-216X***	L2 and L customer specific	16	*	**	20	79,5	-	58	54	16	9	15	27	14	7,5	120	4
21240-220X***	L2 and L customer specific	20	*	**	20	79,5	40	82	74	20	9	15	36	20	9,5	120	5

Roller carriages

compact and heavy-duty version

Material:
Steel.

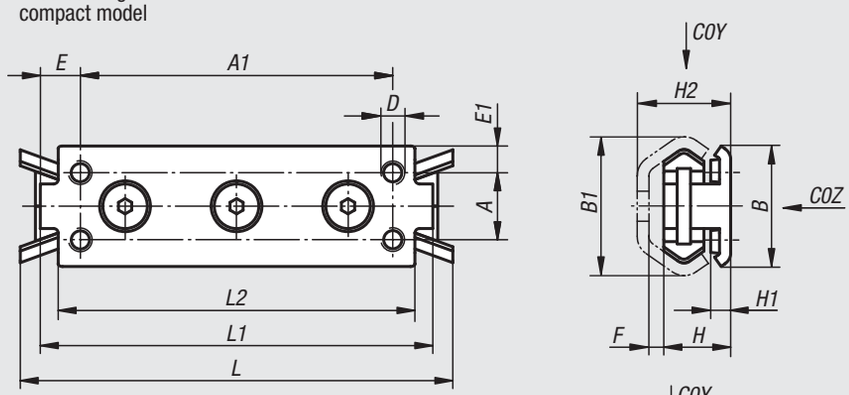
Version:
galvanized

Sample order:
nlm 21320-120080

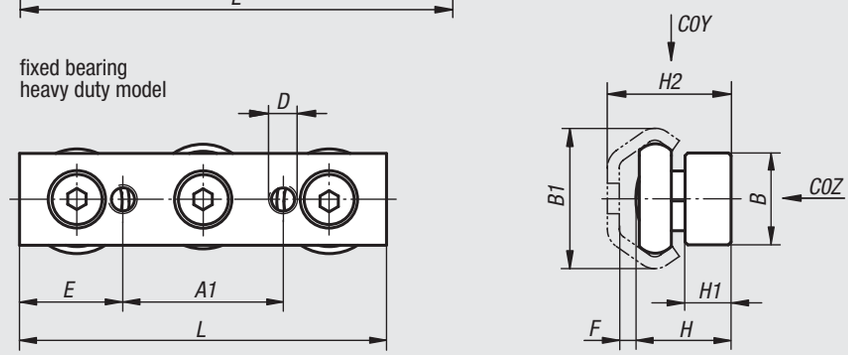
Note:
Roller carriage with low coefficient of friction, therefore very free-running. The roller journals are lifetime-lubricated and have a 2Z (dust cover) seal. By simply moving the centre cam roller, the roller carriage can adjusted to be play-free or under the desired initial tension in the rail. The compact version has a plastic stripper for cleaning the tracks.

Application temperature -30 °C to +120 °C.

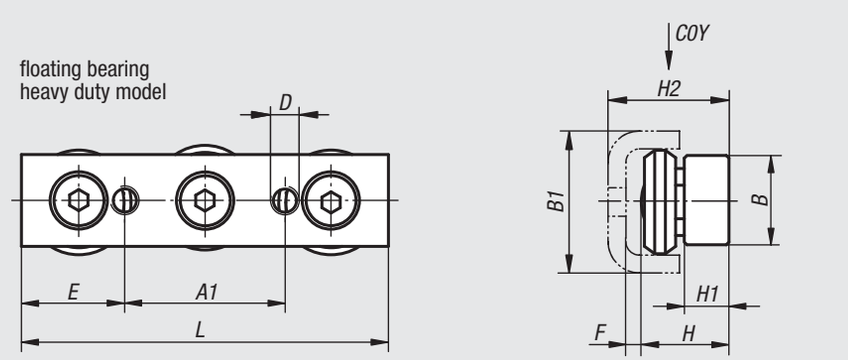
fixed bearing
compact model



fixed bearing
heavy duty model



floating bearing
heavy duty model



Fixed bearing, compact version

Order No.	Size	A	A1	B	B1	D	E	E1	F	H	H1	H2	L	L1	L2	C0Y N	C0Z N
21320-120080	20	-	60	18	19,2	M5	10	9	3	11,5	5,5	16	90	80	71	300	170
21320-130088	30	15	70	27	29,5	M5	5	6	4	15	4,5	20,5	97	88	80	800	400
21320-145150	45	23	120	40	46,4	M6	7,5	8,5	5	22	4	31	160	150	135	1600	860

Fixed bearing, heavy-duty version

Order No.	Size	A1	B	B1	D	E	F	H	H1	H2	L	C0Y N	C0Z N
21320-220060	20	20	10	19,2	M5	20	2,6	13	6	17,8	60	326	185
21320-230080	30	35	20	29,5	M6	22,5	3,3	20,7	10	26,5	80	870	435
21320-245120	45	55	25	46,4	M8	32,5	5,1	28,9	12	38	120	1740	935

Floating bearing, heavy-duty version

Order No.	Size	A1	B	B1	D	E	F	H	H1	H2	L	C0Y N
21320-320060	20	20	10	20,5	M5	20	2,5	11,55	6	18,25 ±0,6	60	300
21320-330080	30	35	20	31,8	M6	22,5	3,5	19,2	10	27,95 ±1,0	80	800
21320-345120	45	55	25	44,8	M8	32,5	5	25,5	12	37,25 ±1,75	120	1600

Roller guide rails

Material:
Steel.

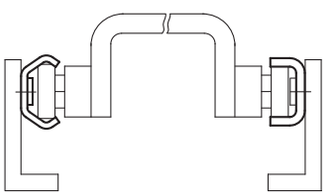
Version:
galvanized

Sample order:
nlm 21320-120X0800 (include length L)

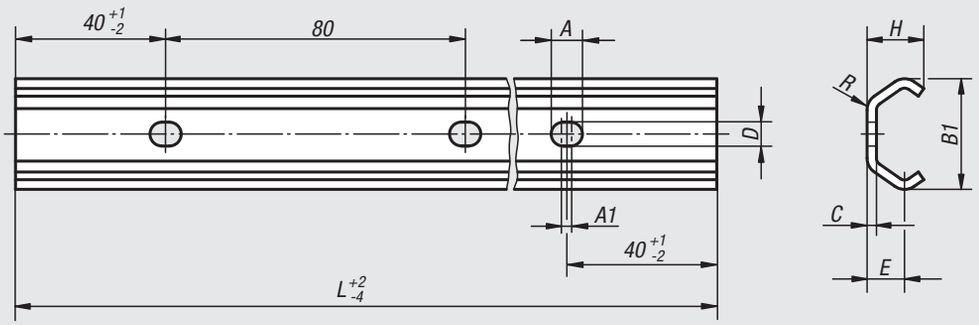
Note:
Stamped and rolled guide rails.

The fixed bearing rail is the main absorber of radial and axial forces. The floating bearing rail serves to absorb the load of radial forces and, in combination with the fixed bearing rail, as a support bearing for absorbing torques that occur. In the connection of the fixed and the floating bearings, the floating bearing rail compensates for parallelism errors and tolerances.

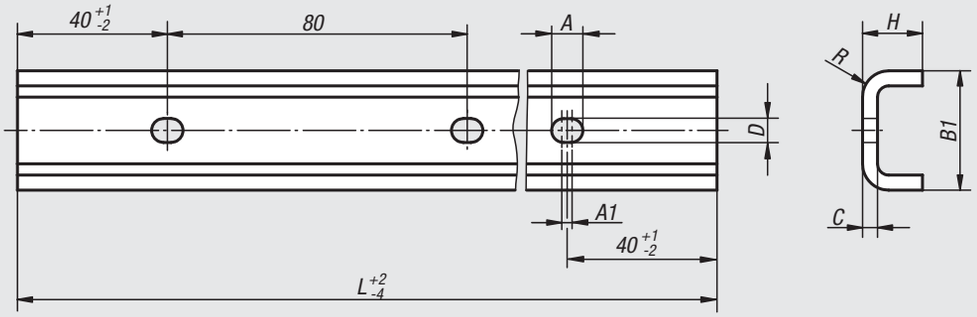
On request:
Lengths up to a max. 3120 mm.



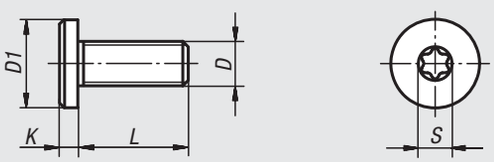
roller guide rail for fixed bearing



roller guide rail for floating bearing



fastening screw



Roller guide rails for fixed bearing

Order No.	Size	A	A1	B1	C	D	E	H	L	R
21320-120X	20	7	2	19,2	2	5	7	10	800/1040/2080/3120	3
21320-130X	30	8,4	2	29,5	2,5	6,4	10	15	800/1040/2080/3120	4,5
21320-145X	45	11	2	46,4	4	9	15,5	24	800/1040/2080/3120	6,5

Roller guide rails for floating bearing

Order No.	Size	A	A1	B1	C	D	H	L	R
21320-220X	20	7	2	20,5	3	5	11	800/1040/2080/3120	5,5
21320-230X	30	8,4	2	31,8	4	6,4	16	800/1040/2080/3120	7
21320-245X	45	11	2	44,8	4,5	9	24,5	800/1040/2080/3120	9,5

Fastening screws

Order No.	D	D1	K	L	S	Suitable for	Tightening torque Nm
21320-0408	M4	8	2	8	T20	size 20	4
21320-0510	M5	10	2	10	T25	size 30	9
21320-0816	M8	16	3	16	T40	size 45	22

Roller carriages

steel

Material:
Slide body, steel;
stripper, modified polyamide;
rollers, steel type 1.3505

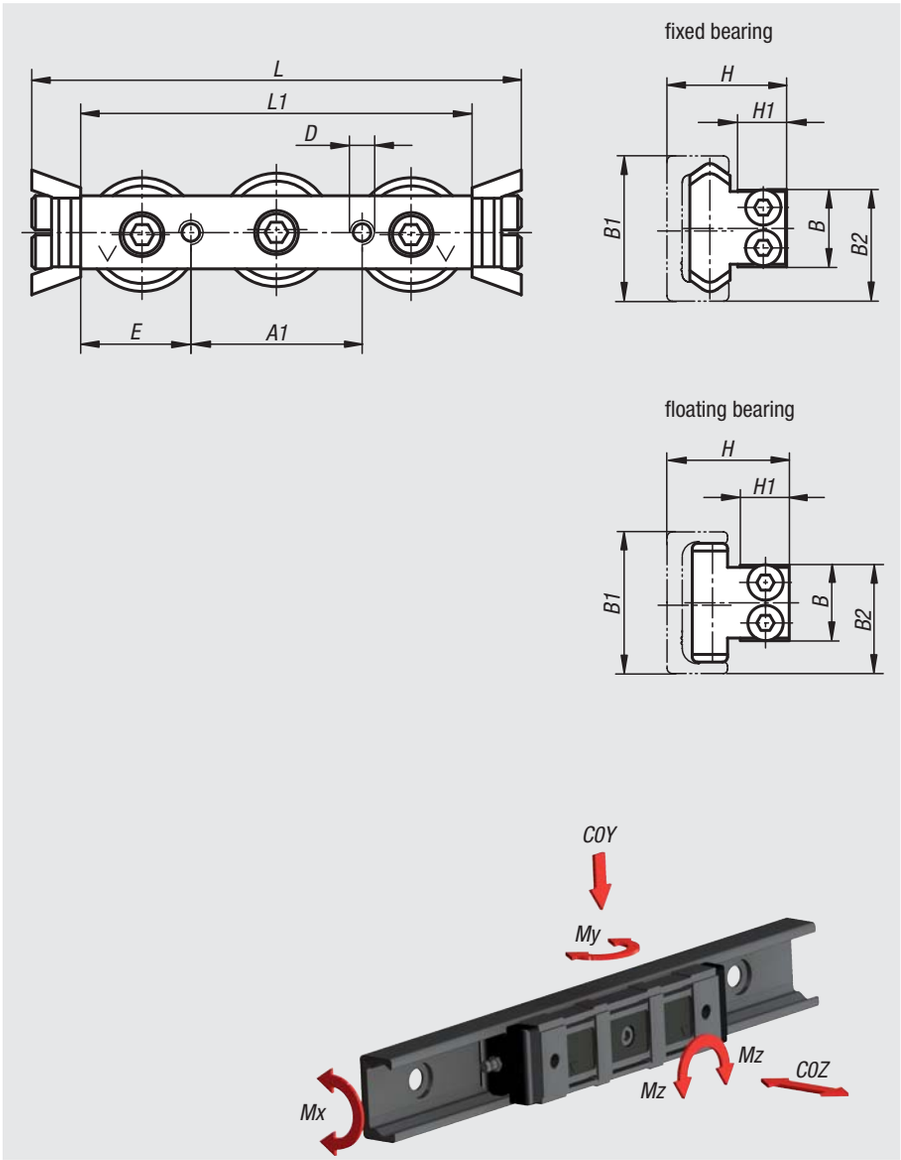
Version:
Slide body, galvanized

Sample order:
nlm 21322-1128080

Note:
Roller carriage with lifetime-lubricated roller bearings and polyamide strippers that protect the tracks from contamination.
By simply moving the centre cam roller, the roller carriage can adjusted to be play-free or under the desired initial tension in the rail.
High traversing speeds up to 7 m/s and extremely low-noise (faster and quieter than systems with ball-bearing guides).

Application temperature -30 °C to +120 °C.

On request:
Roller carriage with 4 or 5 rollers.



Fixed bearing

Order No.	Size	A1	B	B1	B2	D	E	H	H1	L	L1	C dynamic N	C0Y N	C0Z N	Mx Nm	My Nm	Mz Nm
21322-1128080	28	35	14,9	28	21,7	M5	22,5	23,9	9,7	100	80	4260	2170	640	6,2	16	27,2
21322-1143120	43	55	24,9	43	34,3	M8	32,5	37	14,5	140	120	12280	5500	1570	23,6	60	104,5

Floating bearing

Order No.	Size	A1	B	B1	B2	D	E	H min.	H max.	H1	L	L1	C dynamic N	C0Y N	Mz Nm
21322-1228080	28	35	14,9	28	21,7	M5	22,5	23,3	25,2	9,7	100	80	4260	2170	27,2
21322-1243120	43	55	24,9	43	34,3	M8	32,5	35,6	39,5	14,5	140	120	12280	5500	104,5

Roller carriages

aluminium

Material:
Slide body, pressure-cast aluminium;
heads polyester, strippers modified polyamide;
longitudinal sealing lips rubber;
rollers, steel type 1.3505

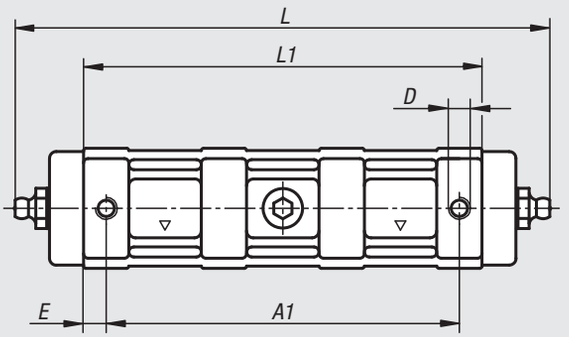
Version:
Slide body nickel-plated

Sample order:
nlm 21322-2128088

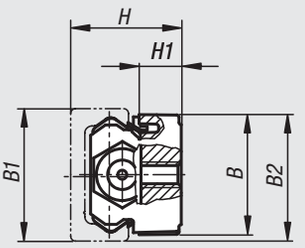
Note:
Roller carriage with lifetime-lubricated roller bearing and patented stripper technology, by which the system is lubricated while in motion.
By simply moving the centre cam roller, the roller carriage can adjusted to be play-free or under the desired initial tension in the rail.
High traversing speeds up to 7 m/s and extremely low-noise (faster and quieter than systems with ball-bearing guides).

Application temperature -30 °C to +120 °C.

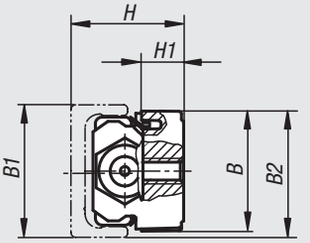
On request:
Roller carriage with 4 or 5 rollers.

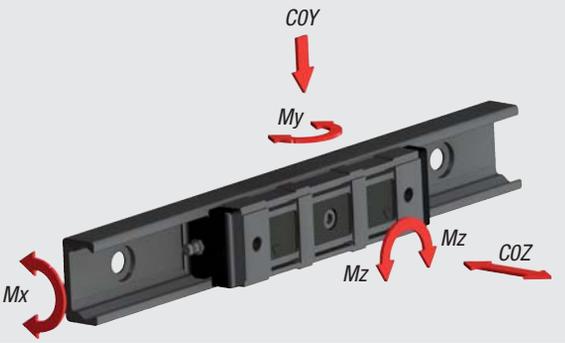


fixed bearing



floating bearing





Fixed bearing

Order No.	Size	A1	B	B1	B2	D	E	H	H1	L	L1	C dynamic N	C0Y N	C0Z N	Mx Nm	My Nm	Mz Nm
21322-2128088	28	78	26,5	28	28	M5	5	24	9,3	124	88	4260	2170	640	6,2	16	27,2
21322-2143134	43	114	41	43	42,7	M8	10	37	13,7	170	134	12280	5500	1570	23,6	60	104,5

Floating bearing

Order No.	Size	A1	B	B1	B2	D	E	H min.	H max.	H1	L	L1	C dynamic N	C0Y N	Mz Nm
21322-2228088	28	78	26,5	28	28	M5	5	24	25,3	9,3	124	88	4260	2170	27,2
21322-2243134	43	114	41	43	42,7	M8	10	37	39,5	13,7	170	134	12280	5500	104,5

Roller guide rails

Material:
Roller bearing steel

Version:
Galvanized; tracks inductively hardened and ground

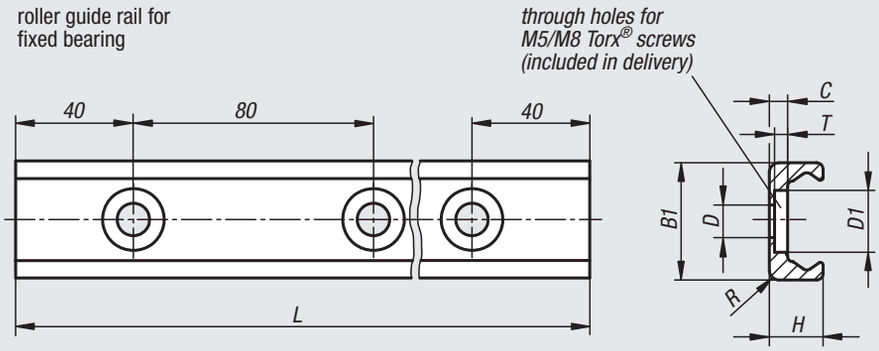
Sample order:
nlm 21322-128X0400 (include length L)

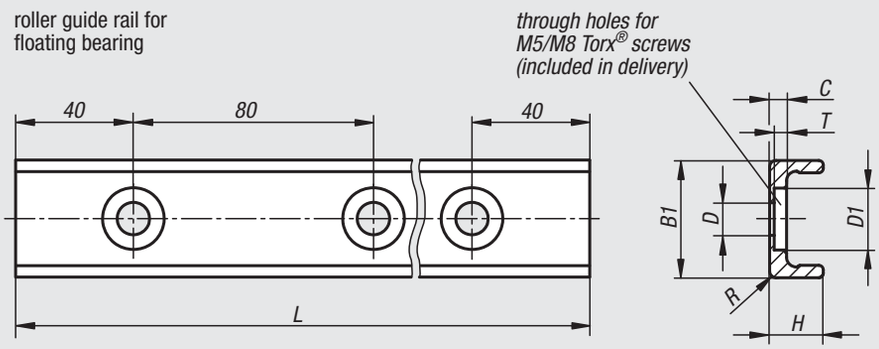
Note:
Compact C-profile guide rails with internal hardened tracks. The system runs with low noise even under heavy loads.

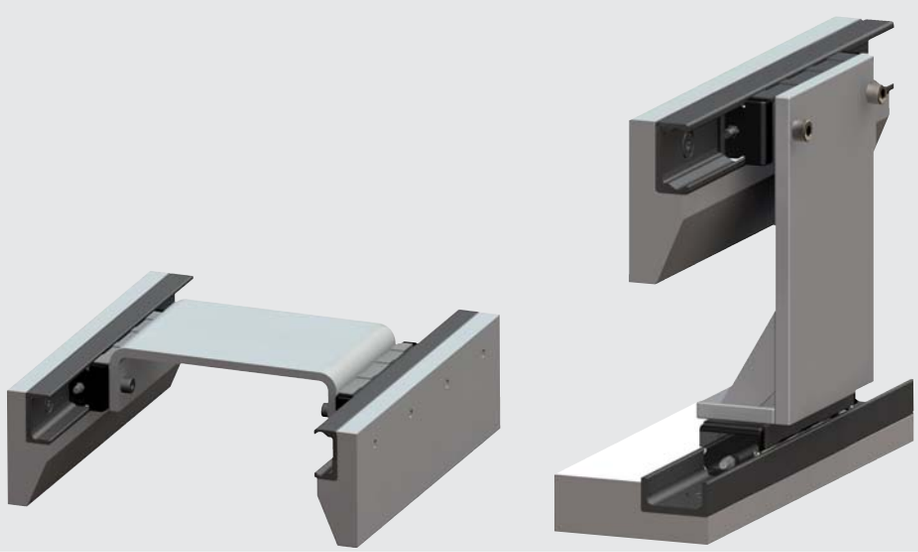
The rail can be aligned during assembly because of a play of the screw in the borehole.

In order to achieve the desired running properties, there must always be a film of lubricant between track and roller, which also provides corrosion protection for the polished tracks.

On request:
Lengths up to a max. 4080 mm.







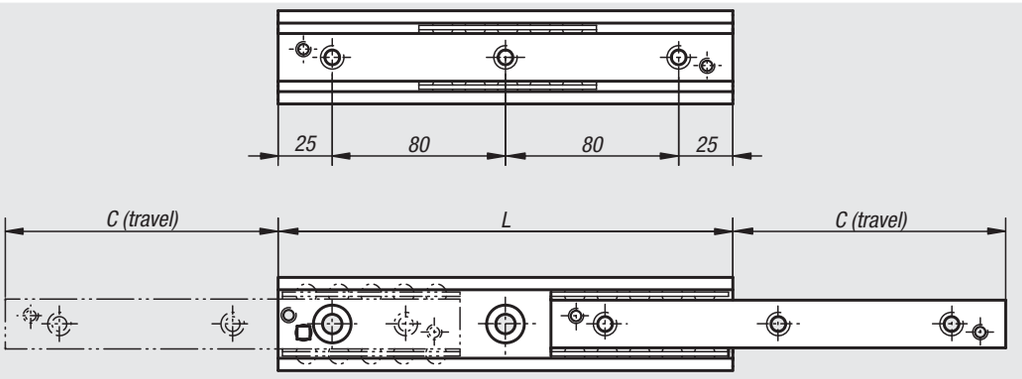
Roller guide rails for fixed bearing

Order No.	Size	B1	C	D	D1	H	L	R	T
21322-128X	28	28	3	6,4	11	12,25	400/560/800/1040/1200	1	2
21322-143X	43	43	4,5	10,5	18	21	400/560/800/1040/1200	2,5	3,1

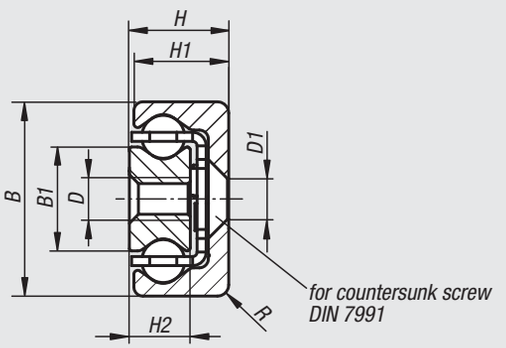
Roller guide rails for floating bearing

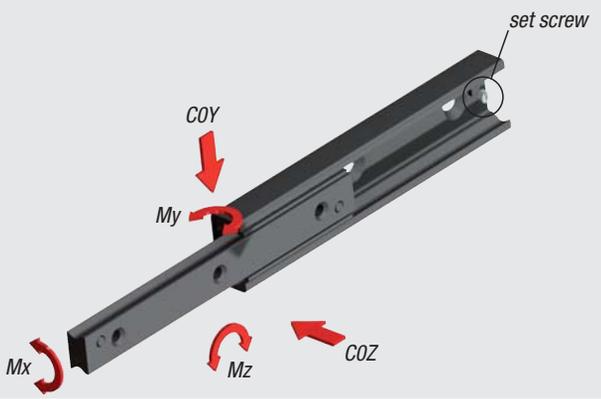
Order No.	Size	B1	C	D	D1	H	L	R	T
21322-228X	28	28	3	6,4	11	12	400/560/800/1040/1200	1	2
21322-243X	43	43	4,5	10,5	18	21	400/560/800/1040/1200	1	3,1

Telescope rails



profile cross-section





Material:
Balls, rails and slides roller bearing steel.

Version:
Rail and slide galvanized.
Tracks inductively hardened.
Balls hardened.

Sample order:
nlm 21340-280290

Note:
Partial extension consisting of a fixed guide rail and a movable slider. The slide can move somewhat more than half the length of the rail (C travel). By removing the locking screw, a partial extension with the travel length C is possible to both sides. The total travel is thus 2C. This compact and simple construction allows very high load ratings. The maximum traversing speed is 0.8 m/s.

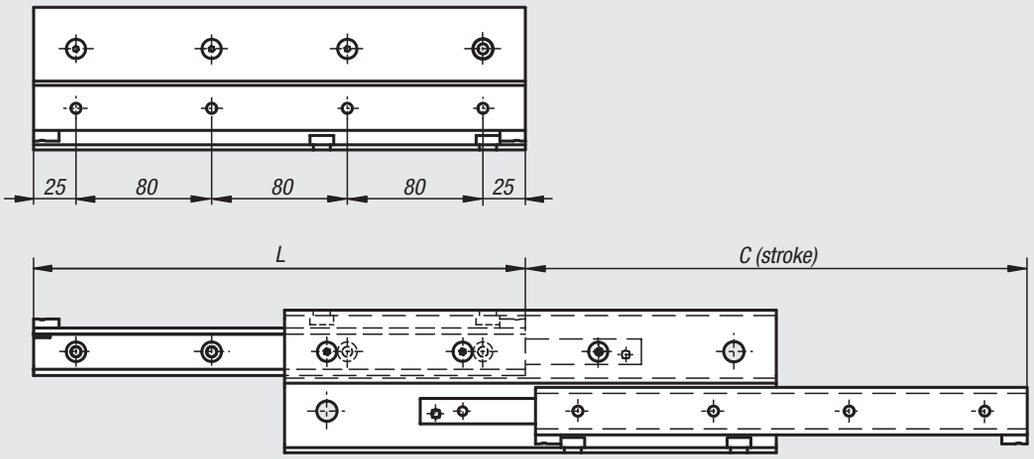
Application temperature -30 °C to +170 °C.

On request:
Other lengths (pitch 80 mm).
Size 28 up to max. 1170 mm.
Size 35 up to max. 1490 mm.
Size 43 up to max. 1970 mm.

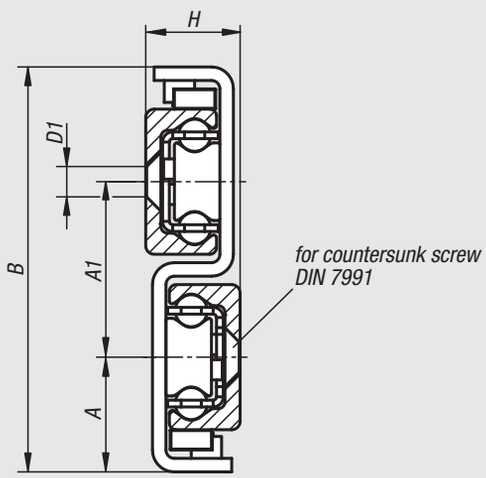
Order No.	Size	B	B1	C (travel)	D	D1	H	H1	H2	L	R	C0Y N	C0Z N	Mx Nm	My Nm	Mz Nm	No off holes
21340-280290	28	28	15	148	M5	M5	13	12,25	7,5	290	1	1934	1345	39,6	132	188	4
21340-280370	28	28	15	190	M5	M5	13	12,25	7,5	370	1	2445	1711	50,4	213	305	5
21340-280450	28	28	15	232	M5	M5	13	12,25	7,5	450	1	2955	2069	61,2	314	449	6
21340-280530	28	28	15	274	M5	M5	13	12,25	7,5	530	1	3466	2426	72	435	621	7
21340-280610	28	28	15	315	M5	M5	13	12,25	7,5	610	1	3986	2790	82,8	575	821	8
21340-350290	35	35	15,8	159	M6	M6	17	16	10	290	2	2060	1442	46,9	146	208	4
21340-350370	35	35	15,8	203	M6	M6	17	16	10	370	2	2638	1847	59,9	238	340	5
21340-350450	35	35	15,8	247	M6	M6	17	16	10	450	2	3217	2252	73	345	505	6
21340-350530	35	35	15,8	279	M6	M6	17	16	10	530	2	4282	2997	90,4	543	775	7
21340-350610	35	35	15,8	323	M6	M6	17	16	10	610	2	4858	3401	103,5	711	1015	8
21340-430290	43	43	23	158	M8	M8	22	21	13,5	290	2,5	2872	2010	93,8	201	288	4
21340-430370	43	43	23	208	M8	M8	22	21	13,5	370	2,5	3377	2364	115,9	308	440	5
21340-430450	43	43	23	243	M8	M8	22	21	13,5	450	2,5	4690	3283	149,2	509	728	6
21340-430530	43	43	23	278	M8	M8	22	21	13,5	530	2,5	6039	4227	182,4	762	1088	7
21340-430610	43	43	23	313	M8	M8	22	21	13,5	610	2,5	7411	5188	215,6	1064	1521	8

Telescope rails

S-form



profile cross-section



Material:
Balls rails and slides roller bearing steel.

Version:
Rail and slide galvanized.
Tracks inductively hardened.
Balls hardened.

Sample order:
nlm 21342-280290

Note:
Full extension consisting of two guide rails as fixed and moving elements and an S-shaped intermediate element. The latter has a high axial angular impulse and high rigidity with a slim construction. This results in a high load rating with a low amount of bending in the extended state. The maximum travel is greater than the closed length of the telescope rail.
The maximum traversing speed is 0.8 m/s.

Application temperature -30 °C to +110 °C.

On request:
Other lengths (pitch 80 mm).
Size 28 up to max. 1490 mm.
Size 43 up to max. 1970 mm.

Order No.	Size	A	A1	B	C (travel)	D1	H	L	C0Y N	No off holes
21342-280290	28	24,5	36	85	296	M5	17	290	570	4 (3 accessible)
21342-280370	28	24,5	36	85	380	M5	17	370	769	5 (4 accessible)
21342-280450	28	24,5	36	85	464	M5	17	450	969	6 (4 accessible)
21342-280530	28	24,5	36	85	548	M5	17	530	1170	7 (6 accessible)
21342-280610	28	24,5	36	85	630	M5	17	610	1376	8 (6 accessible)
21342-430530	43	34	52	120	556	M8	28	530	2061	7 (6 accessible)
21342-430610	43	34	52	120	626	M8	28	610	2603	8 (6 accessible)
21342-430690	43	34	52	120	726	M8	28	690	2775	9 (7 accessible)
21342-430770	43	34	52	120	796	M8	28	770	3319	10 (7 accessible)
21342-430850	43	34	52	120	866	M8	28	850	3873	11 (9 accessible)

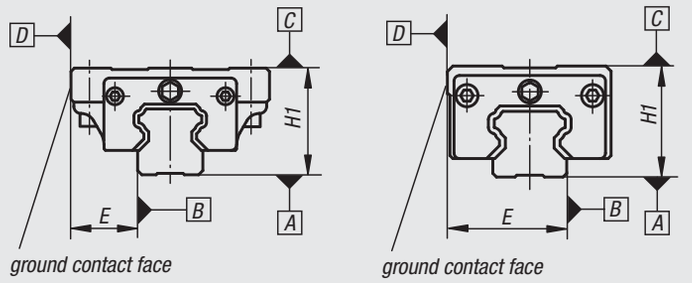
Technical Information for profile guide rails

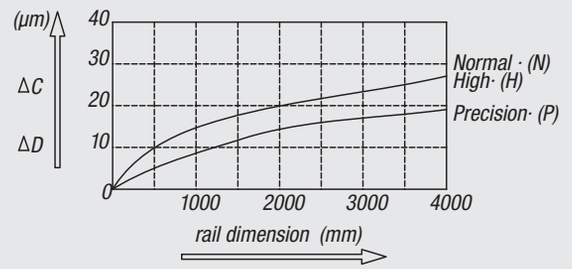
A profile guide rail allow linear motion with the aid of balls. Using balls between rails and carriage allows a profile guide rail to attain extremely precise linear motion. Compared to a conventional slide guide the coefficient of friction is only one fiftieth.

The ball row arrangement based on two-point contact with four ball arrays always at a 45° contact angle lends the profile guide rail consistent load ratings in all primary directions with excellent running properties. The profile guide rail can be employed in various positions for diverse applications.

Profile guide rails of the same size can be exchanged with each other allowing individual carriages or rails to be exchanged or added to at any time. Our profile guide rails correspond to the market standard and can replace linear guides of the same design by other manufacturers.

Accuracy Classes
Profile guide rails are available in three accuracy classes. The maximum relative tolerance of each accuracy class is specified.





		Accuracy Class		
		Normal (N)	High(H)	Precision (P)
maximum deviation for systems with one carriage	height tolerance H1	±0,1	±0,04	-0,04
	tolerances of lengths E	±0,1	±0,04	-0,04
maximum deviation for systems with several carriages	Δ H1	0,03	0,02	0,01
	Δ E	0,03	0,02	0,01
run parallelism of the surface C in terms of the surface A		see diagram		
run parallelism of the surface D in terms of the surface B		see diagram		

Pretensioning Classes
In view of the diverse needs of the user, profile guide rails are available in four different pretensioning classes. A higher pretensioning improves the rigidity and reduces the elastic deformation upon load alternations.

Class	Pretensioning	Pretensioning force	Application with	Application Examples
Z0	without pretensioning	0	- constant direction of load - imprecise assembly surfaces	- linear motion slides - sliding and pulling devices
Z1	light pretensioning	0,02 C (C = dynamic load rating)	- constant direction of load - minor jolts and vibrations - minor loads	- graving machines - packaging machines - industrial handling
Z2	average pretensioning	0,05 C (C = dynamic load rating)	- high accuracy required - torque load	- positioning units - fast feeding units - metrology
Z3	average pretensioning	0,07 C (C = dynamic load rating)	- high requisite rigidity - jolts and vibrations - heavy loads	- processing centres - grinders - large horizontal boring machines

Calculating the lifespan
The nominal lifespan L can be calculated using the following formula:

$$L = \left(\frac{C_{dyn}}{P}\right)^3 \cdot 50000\ m$$

L = nominal lifespan (m)
C_{dyn} = dynamic load rating (N)
P = dynamically equivalent load (N)

Carriages

Material:
Body carbon steel.
Balls roller bearing steel.
Diverters plastic.

Version:
Bright.

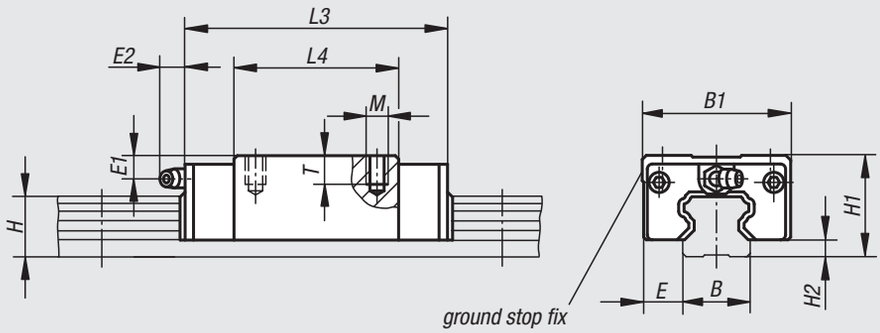
Sample order:
nlm 21400-15106601

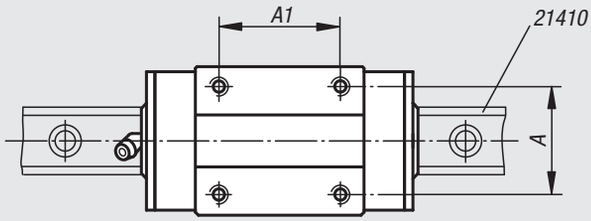
Note:
Standard guide carriage with recirculating ball guidance precision N not preloaded (Z0). With double-sided end seal. 4-row versions with round arch profile. The profile guide rail tracks are arranged at 45° and can accept loads from all directions.

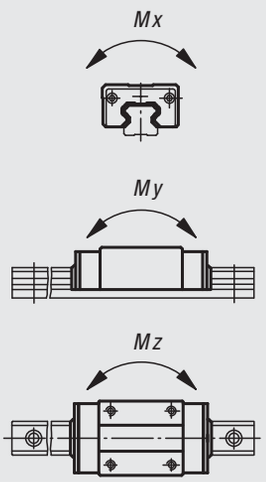
High dynamic values: v = 5 m/s.

Applicable temperature in continuous use max. 80 °C.

On request:
Various precision and preload classes.





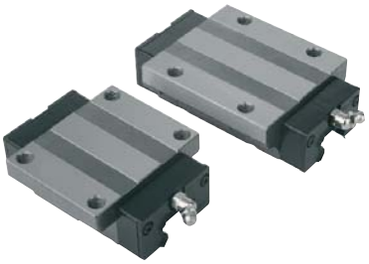


Order No.	Version	Size	Mx Nm	My Nm	Mz Nm	Dynamic load rating N	Static load rating N	Lubrication hole
21400-15106601	standard	15	70	50	50	6850	12700	Ø3
21400-20107801	standard	20	220	180	180	14500	25600	M6x1
21400-25108801	standard	25	360	320	310	21400	40000	M6x1
21400-30110901	standard	30	600	500	490	29800	54900	M6x1
21400-25211001	long	25	504	448	434	29960	56000	M6x1
21400-30213101	long	30	785	650	650	39000	71900	M6x1

Order No.	Version	Size	A	A1	B	B1	E	E1	E2	H	H1	H2	L3	L4	M	T
21400-15106601	standard	15	26	26	15	34	9,5	8,3	5	14	28	4,6	66	40	M4	6,4
21400-20107801	standard	20	32	36	20	44	12	7	13,5	18	30	5	77,8	48,8	M5	8
21400-25108801	standard	25	35	35	23	48	12,5	11	13,5	22	40	7	88	57	M6	9,6
21400-30110901	standard	30	40	40	28	60	16	10	13	26	45	9	109	72	M8	12,8
21400-25211001	long	25	35	50	23	48	12,5	11	13,5	22	40	7	110,1	79,1	M6	9,6
21400-30213101	long	30	40	60	28	60	16	10	13	26	45	9	131,3	94,3	M8	12,8

Carriages

with flange



Material:
Body carbon steel.
Balls roller bearing steel.
Diverters plastic.

Version:
Bright.

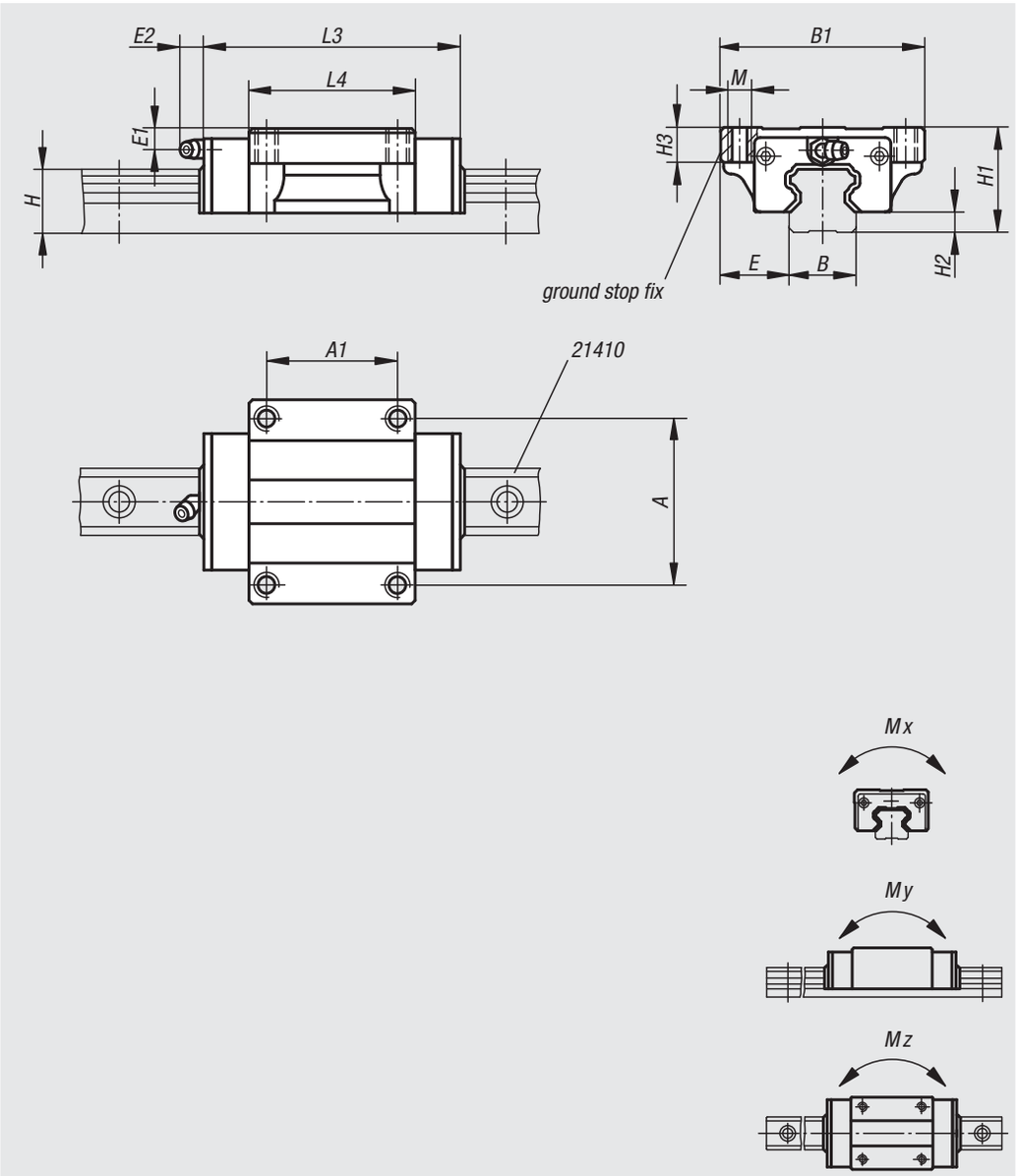
Sample order:
nlm 21402-15106601

Note:
Guide carriage with flange with recirculating ball guidance precision N not preloaded (Z0). With double-sided end seal. 4-row versions with round arch profile. The profile guide rail tracks are arranged at 45° and can accept loads from all directions.

High dynamic values: v = 5 m/s.

Applicable temperature in continuous use max. 80 °C.

On request:
Various precision and preload classes.



Order No.	Version	Size	Mx Nm	My Nm	Mz Nm	Dynamic load rating N	Static load rating N	Lubrication hole
21402-15106601	standard	15	70	50	50	6850	12700	Ø3
21402-20107801	standard	20	220	180	180	14500	25600	M6x1
21402-25108801	standard	25	360	320	310	21400	40000	M6x1
21402-30110901	standard	30	600	500	490	29800	54900	M6x1
21402-25211001	long	25	504	448	434	29960	56000	M6x1
21402-30213101	long	30	785	650	650	39000	71900	M6x1

Order No.	Version	Size	A	A1	B	B1	E	E1	E2	H	H1	H2	H3	L3	L4	M
21402-15106601	standard	15	38	30	15	47	16	4,3	5	14	24	4,6	8	66	40	M5
21402-20107801	standard	20	53	40	20	63	21,5	5	13,5	18	30	5	9	77,8	48,8	M6
21402-25108801	standard	25	57	45	23	70	23,5	5	13,5	22	36	7	12	88	57	M8
21402-30110901	standard	30	72	52	28	90	31	7	13	26	42	9	12	109	72	M10
21402-25211001	long	25	57	45	23	70	23,5	5	13,5	22	36	7	12	110,1	79,1	M8
21402-30213101	long	30	72	52	28	90	31	7	13	26	42	9	12	131,3	94,3	M10

Carriages

compact

Material:
Body carbon steel.
Balls roller bearing steel.
Diverters plastic.

Version:
Bright.

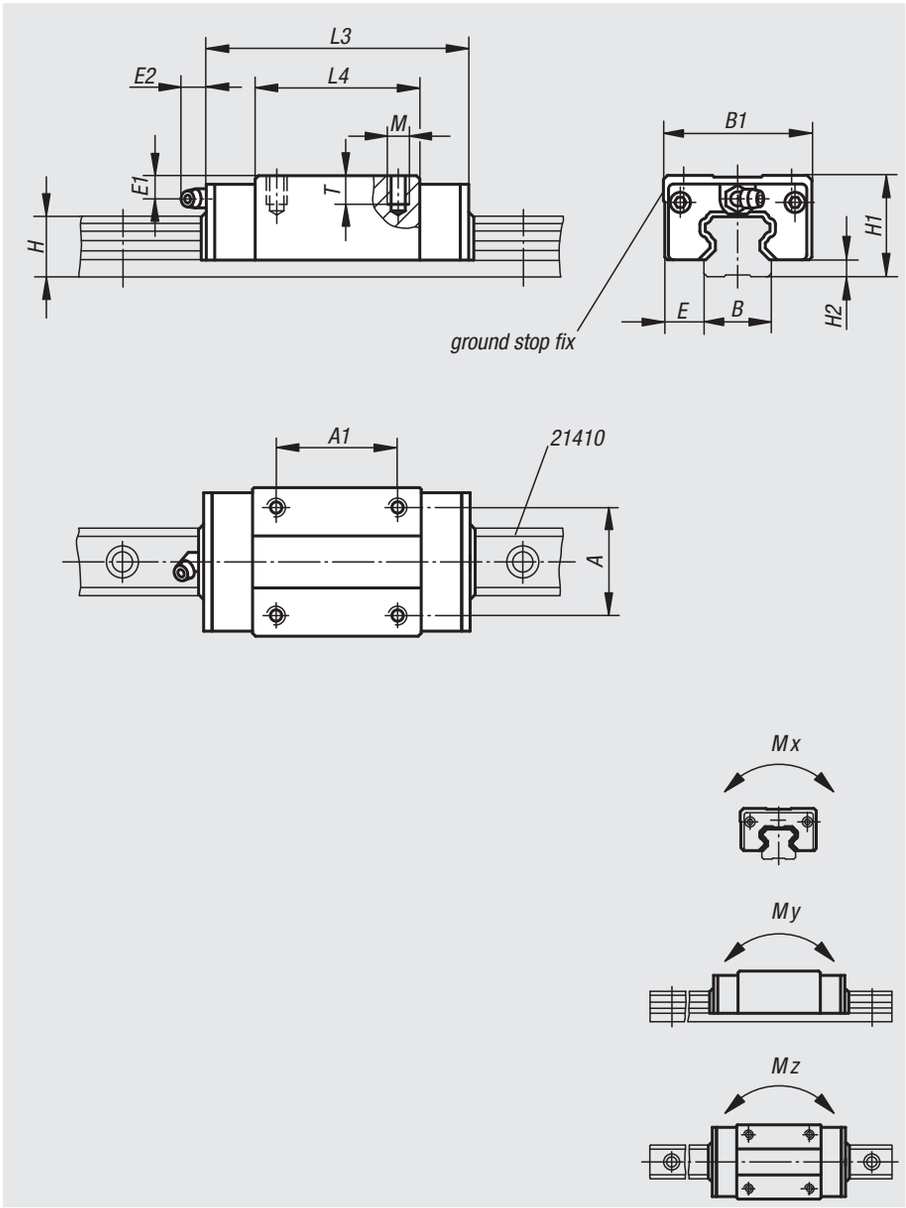
Sample order:
nlm 21404-15106601

Note:
Compact guide carriage with recirculating ball guidance precision N not preloaded (Z0). With double-sided end seal. 4-row versions with round arch profile. The profile guide rail tracks are arranged at 45° and can accept loads from all directions.

High dynamic values: v = 5 m/s.

Applicable temperature in continuous use max. 80 °C.

On request:
Various precision and preload classes.



Order No.	Size	Mx Nm	My Nm	Mz Nm	Dynamic load rating N	Static load rating N	Lubrication hole
21404-15106601	15	70	50	50	6850	12700	Ø3
21404-20107801	20	220	180	180	14500	25600	M6x1
21404-25108801	25	360	320	310	21400	40000	M6x1
21404-30110901	30	600	500	490	29800	54900	M6x1

Order No.	Size	A	A1	B	B1	E	E1	E2	H	H1	H2	L3	L4	M	T
21404-15106601	15	26	26	15	34	9,5	4,3	5	14	24	4,6	66	40	M4	5,6
21404-20107801	20	32	32	20	42	11	5	13,5	18	28	5	77,8	48,8	M5	7
21404-25108801	25	35	35	23	48	12,5	4,8	13,5	22	33	7	88	57	M6	8,4
21404-30110901	30	40	40	28	60	16	7	13	26	42	9	109	72	M8	11,2

Carriages

compact, short

Material:
Body carbon steel.
Balls roller bearing steel.
Diverters plastic.

Version:
Bright.

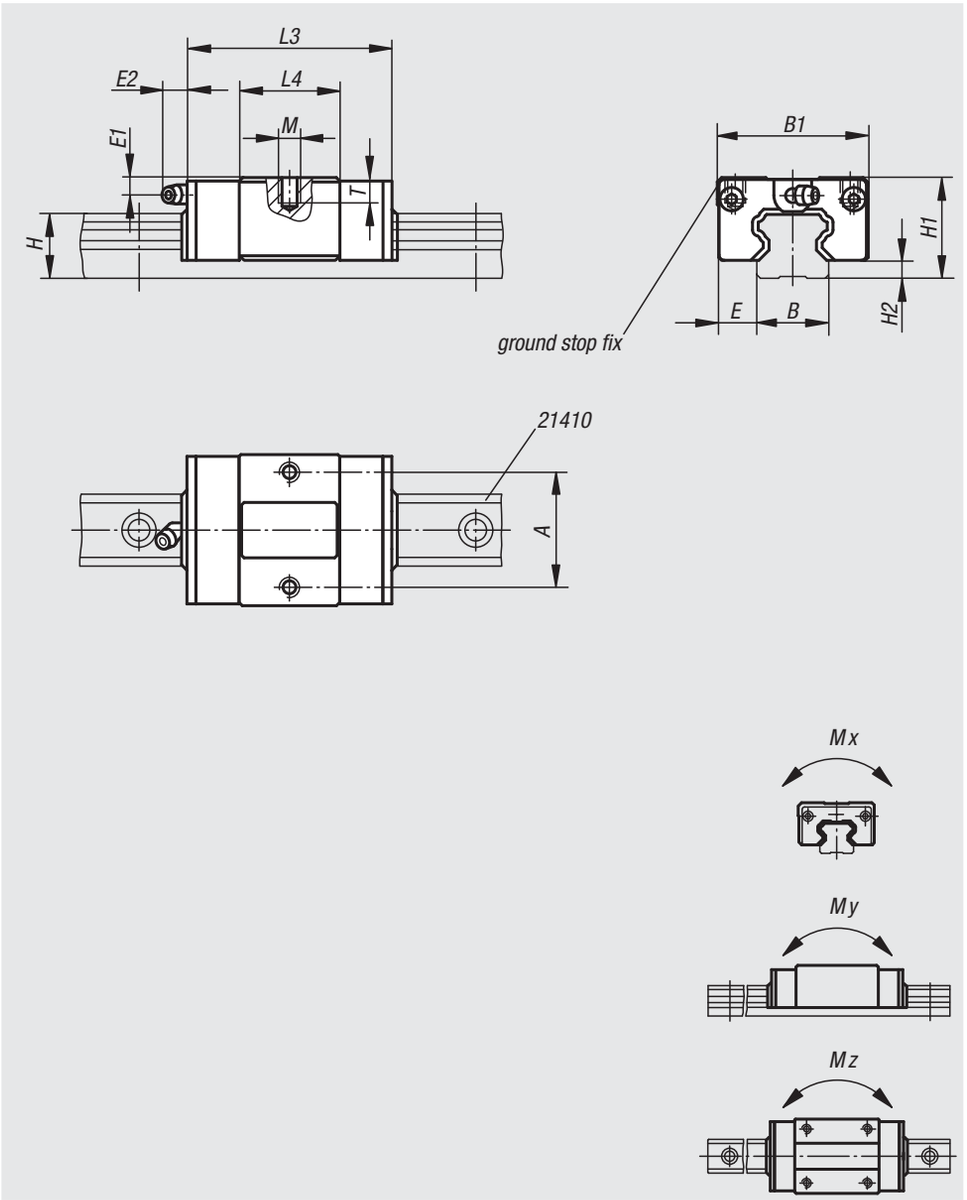
Sample order:
nlm 21406-15004801

Note:
Compact guide carriage with recirculating ball guide precision N not preloaded (Z0). With double-sided end seal. 4-row versions with round arch profile. The profile guide rail tracks are arranged at 45° and can accept loads from all directions.

High dynamic values: v = 5 m/s.

Applicable temperature in continuous use max. 80 °C.

On request:
Various precision and preload classes.



Order No.	Size	Mx Nm	My Nm	Mz Nm	Dynamic load rating N	Static load rating N	Lubrication hole
21406-15004801	15	40	28	28	3900	7250	Ø3
21406-20005801	20	126	103	103	8300	14700	M6x1
21406-25006301	25	200	175	172	11900	22300	M6x1
21406-30007601	30	320	270	270	15950	29400	M6x1

Order No.	Size	A	B	B1	E	E1	E2	H	H1	H2	L3	L4	M	T
21406-15004801	15	26	15	34	9,5	4,3	5	14	24	4,6	47,6	21,6	M4	5,6
21406-20005801	20	32	20	42	11	5	13,5	18	28	5	58	28	M5	7
21406-25006301	25	35	23	48	12,5	4,8	13,5	22	33	7	62,5	31,5	M6	8,4
21406-30007601	30	40	28	60	16	7	13	26	42	9	75,6	38,6	M8	11,2

Profile guide rails

Material:
Steel.

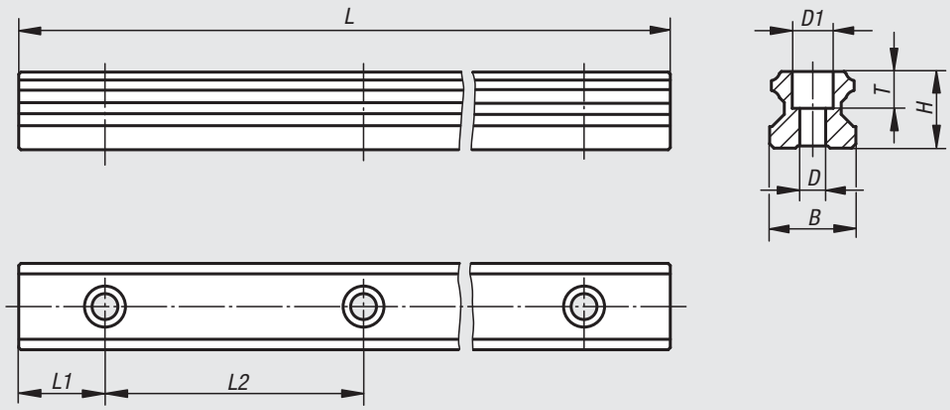
Version:
Tracks inductively hardened and ground.

Sample order:
nlm 21410-1520X0520

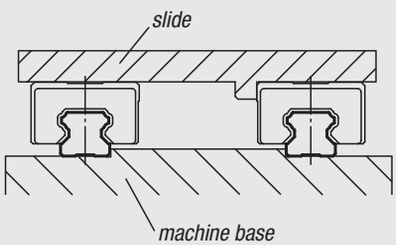
Note:
Profile guide rails can be screwed on from above. The profile guide rails are available in four sizes and one or more carriages can be assembled on them. 4-row versions with round arch profile. The tracks of the profile guide rails are set below an angle of 45° and thus can carry loads from all directions.

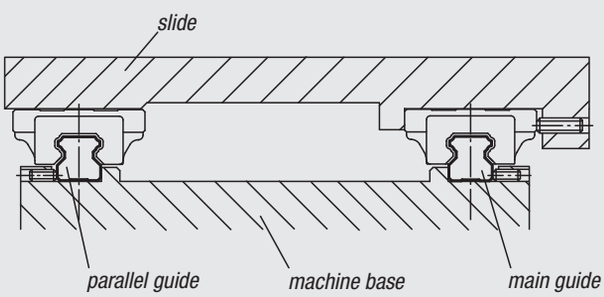
The profile guide rails correspond to the market standard and can replace linear guides of the same design by other manufacturers.

On request:
Lengths up to a max. 3960 mm.



Application example:
makes it possible to arrange the profile guide rails with carriages as a guiding system

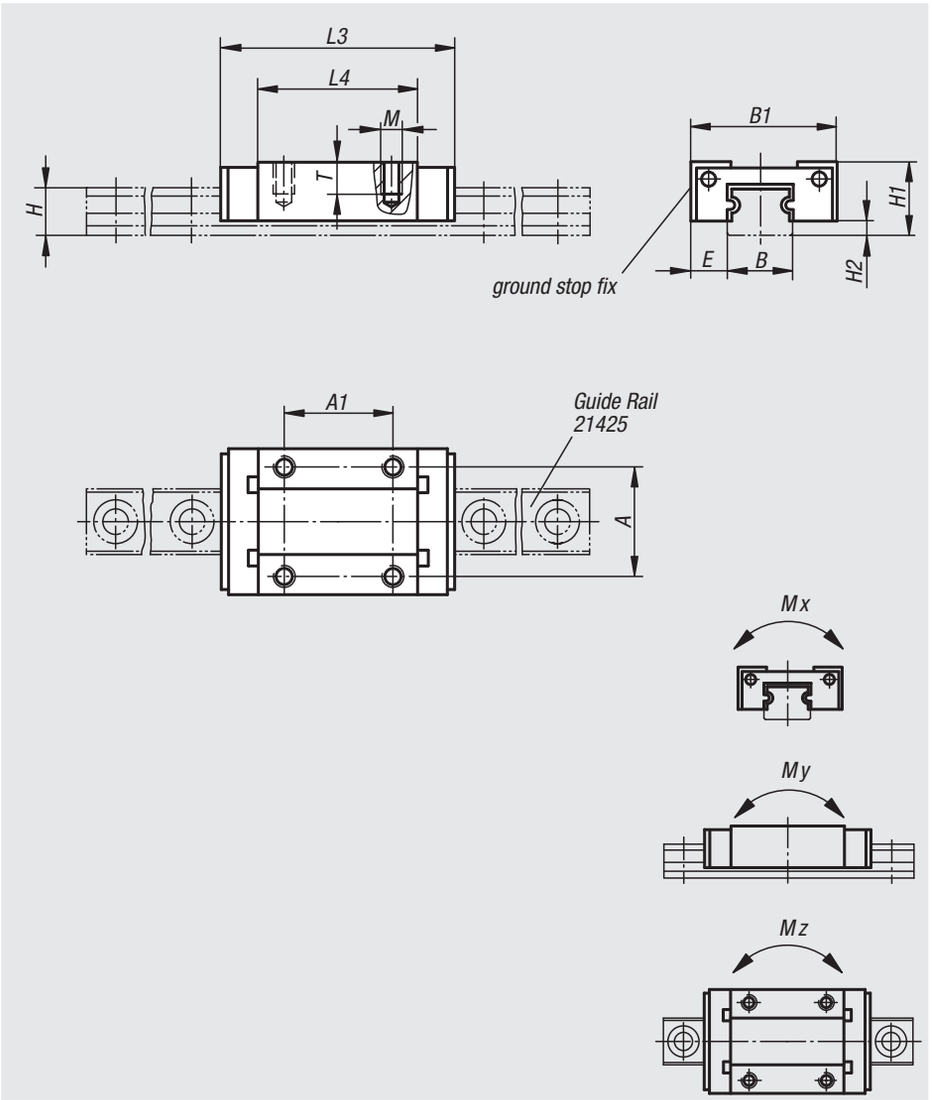




Order No.	Size	B	D	D1	H	L	L1	L2	T
21410-1520X0520	15	15	4,5	7,5	14	520	20	60	5,3
21410-2020X0520	20	20	6	9,5	18	520	20	60	8,5
21410-2520X0520	25	23	7	11	22	520	20	60	9
21410-3020X0520	30	28	9	14	26	520	20	80	12

Miniature carriages

stainless steel



Material:
Body and ball stainless steel 1.4034.
Diverter plastic.

Version:
Bright.

Sample order:
nlm 21420-07102301

Note:
Standard miniature guide carriage with recirculating ball guide precision N not preloaded (Z0). With double-sided end seal.
4-point ball recirculating ball system with equal load angles and 2 recirculating ball guides per carriage allowing loads to be accepted uniformly from all sides.

Max. acceleration: 80 m/s^2.
Maximum traverse speed 3 m/s.
Application temperature -20 °C to +80 °C.

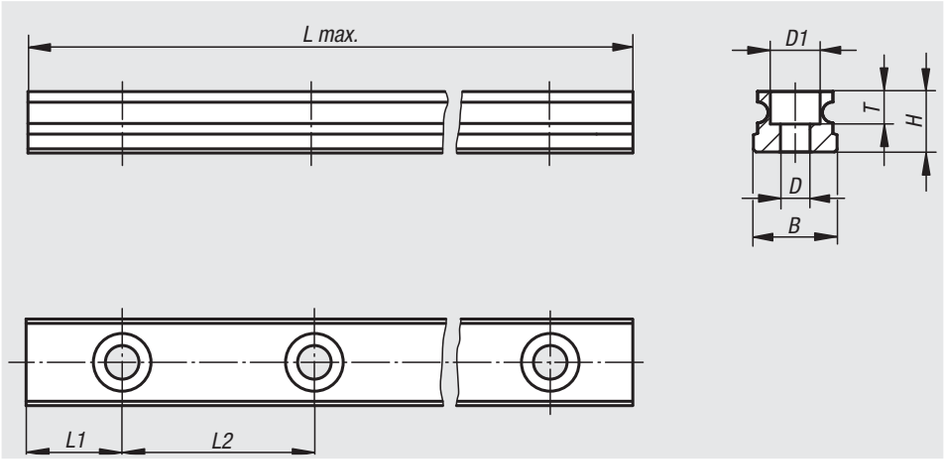
Attention:
Always use the supplied mounting rail as otherwise the ball retainment in the carriage is not guaranteed.

Order No.	Version	Size	Mx Nm	My Nm	Mz Nm	Dynamic load rating N	Static load rating N
21420-07102301	standard	7	5,1	2,55	2,55	880	1370
21420-09103101	standard	9	10,4	5,1	5,1	1470	2250
21420-12103501	standard	12	14,7	8,04	8,72	2665	4020
21420-15104301	standard	15	30,2	16,5	17,9	4410	6570

Order No.	Version	Size	A	A1	B	B1	E	H	H1	H2	L3	L4	M	T
21420-07102301	standard	7	12	8	7	17	5	4,7	8	1,5	23,5	13,5	M2	2,5
21420-09103101	standard	9	15	10	9	20	5,5	5,5	10	2,2	31	20	M3	3
21420-12103501	standard	12	20	15	12	27	7,5	7,5	13	3	35	20,8	M3	3,5
21420-15104301	standard	15	25	20	15	32	8,5	9,5	16	4	43	25,7	M3	4

Miniature profile guide rails

stainless steel



Material:
Stainless steel 1.4034

Version:
Bright.

Sample order:
nlm 21425-0705X0240

Note:
Profile guide rails can be screwed on from above. The profile rails, on which one or more carriages can be mounted, are available in four miniature sizes.
4-point ball bearing system with identical load angles and 2 ball bearings per carriage. Thus loads can be uniformly absorbed from all sides.

Max. acceleration: 80 m/s^2.
Maximum traversing speed 3 m/s.
Application temperature -20 °C to +80 °C.

Combination of the rails is possible.

Order No.	Size	D	D1	H	L max.	L1	L2	B	T
21425-0705X0240	7	2,4	4,2	4,7	240	7,5	15	7	2,3
21425-0907X0495	9	3,5	6	5,5	495	7,5	20	9	3,3
21425-1210X0570	12	3,5	6	7,5	570	10	25	12	4,5
21425-1515X0790	15	3,5	6	9,5	790	15	40	15	4,5

Linear ball bearings

with plastic cage

Material:
Outer jacket ball bearing steel.
Cage plastic.
Balls steel.

Sample order:
nlm 21500-1202

Note:
The linear ball bearings correspond to series 3 of ISO 10285. With double-sided seal. The linear ball bearings have a plastic cage which results in quiet and outstanding running properties. We recommend using linear ball bearing with steel cages for application temperatures over +80 °C. The bearings are secured by DIN 471/472 circlips.

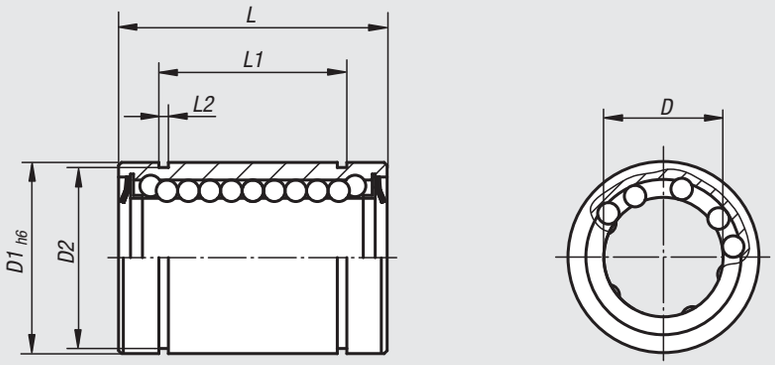
Recommended tolerances:
Shaft: h6
Housing: H7

Linear ball bearings with double-sided seal should be greased before installation.

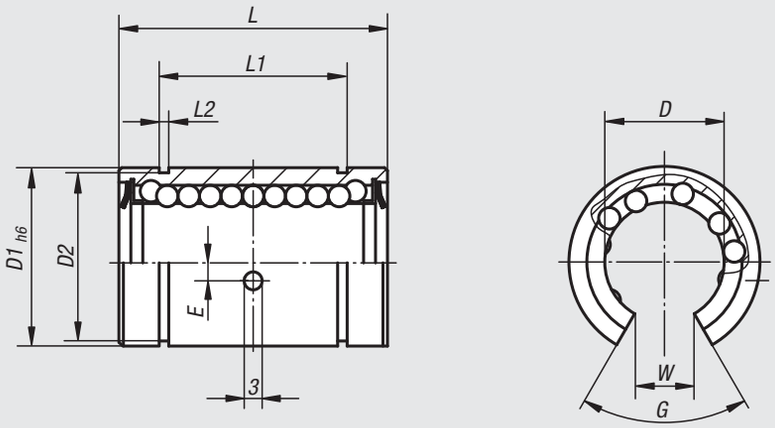
The specified load ratings apply with the use of hardened and ground shafts.

Temperature range:
-20 °C to +80 °C.

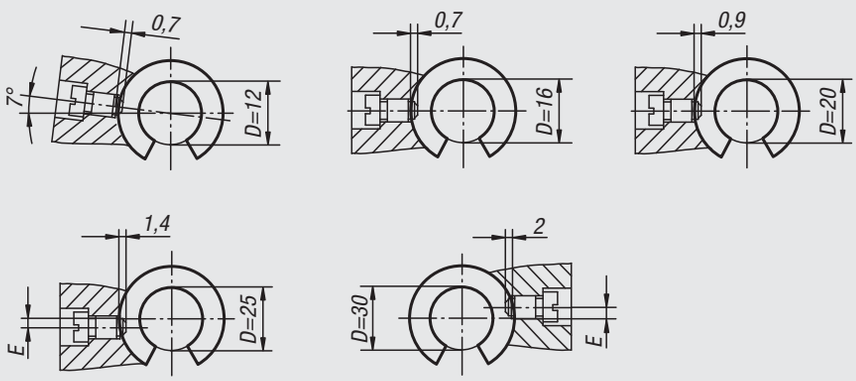
Closed



Open



Position of radial and axial fixation



Order No. closed	Order No. open	D	D1	D2	E	G	L	L1	L2	W	Dynamic load rating N	Static load rating N
21500-1202	**-**	12	22	21	-	-	32 -0,2	22,9 -0,2	1,3	-	520	800
21500-1602	**21500-1612**	16	26	24,9	-/0	-/78°	36 -0,2	24,9 -0,2	1,3	-/10	590	910
21500-2002	**21500-2012**	20	32	30,3	-/0	-/60°	45 -0,2	31,5 -0,2	1,6	-/10	880	1400
21500-2502	**21500-2512**	25	40	37,5	-/1,5	-/60°	58 -0,3	44,1 -0,3	1,85	-/12,5	1000	1600
21500-3002	**21500-3012**	30	47	44,5	-/2	-/50°	68 -0,3	52,1 -0,3	1,85	-/12,5	1600	2800

Linear ball bearings

with steel cage

Material:
Outer jacket ball bearing steel.
Cage steel.
Balls steel.

Sample order:
nlm 21505-1202

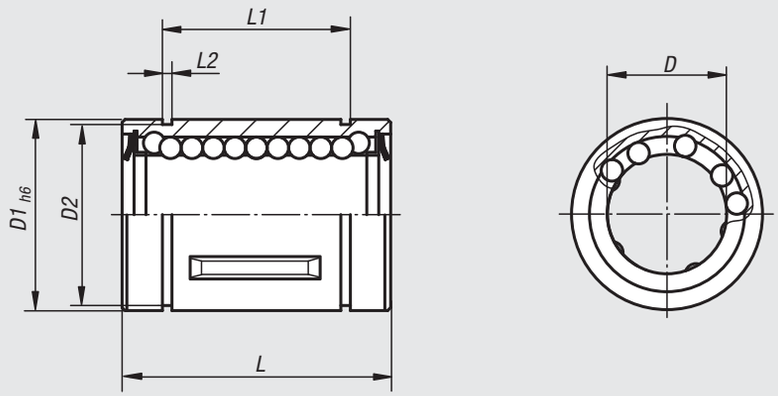
Note:
The linear ball bearings correspond to series 3 of ISO 10285. With double-sided seals and a steel cage. The bearing is secured with DIN 471/472 circlips.

Recommended tolerances:
Shaft: h6
Housing: H7

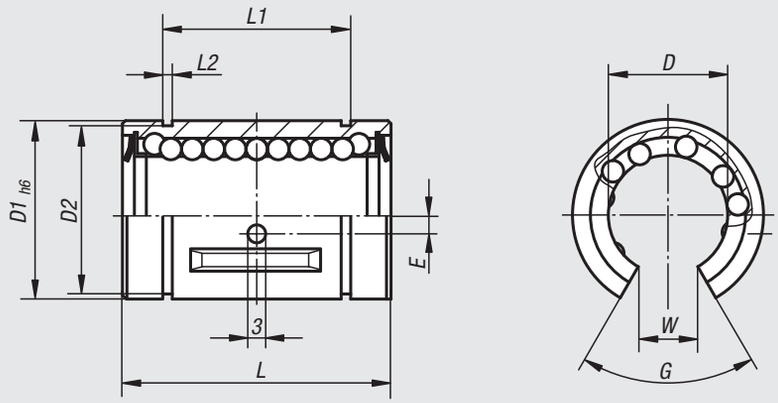
Linear ball bearings with double-sided seals should be greased before installation.

The specified load ratings apply with the use of hardened and ground shafts.

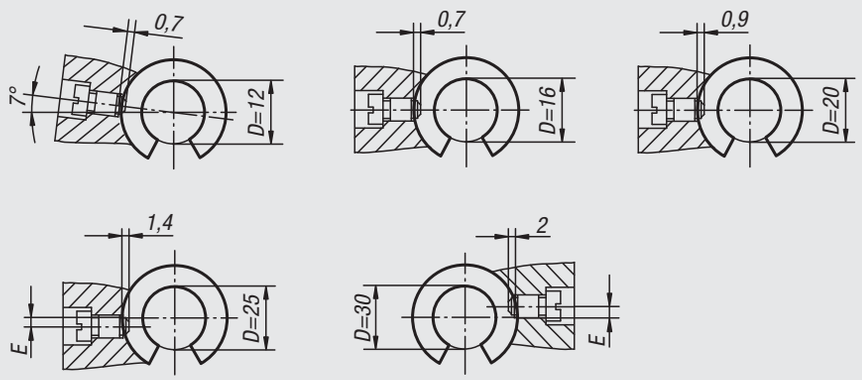
Closed



Open



Position of radial and axial fixation



Order No. closed	Order No. open	D	D1	D2	E	G	L	L1	L2	W	Dynamic load rating N	Static load rating N
21505-1202	**21505-1212**	12	22	21	-/1,35	-/78°	32 -0,2	22,9 -0,2	1,3	-/7,5	420	714
21505-1602	**21505-1612**	16	26	24,9	-/0	-/78°	36 -0,2	24,9 -0,2	1,3	-/10	686	1092
21505-2002	**21505-2012**	20	32	30,3	-/0	-/60°	45 -0,2	31,5 -0,2	1,6	-/10	924	1610
21505-2502	**21505-2512**	25	40	37,5	-/1,5	-/60°	58 -0,3	44,1 -0,3	1,85	-/12,5	1470	2590
21505-3002	**21505-3012**	30	47	44,5	-/2	-/50°	68 -0,3	52,1 -0,3	1,85	-/12,5	2100	3920

Linear ball bearings

self-aligning

Material:
Housing plastic
Raceways ball bearing steel.
Balls steel.

Sample order:
nlm 21510-1202

Note:
The linear ball bearings correspond to the self-aligning series 3 of ISO 10285. With double-sided seal. These bearings consist of high precision injection moulded plastic housings in which ball bearing steel raceway segments are clipped in. The plastic housing serves simultaneously for recycling and as seal retainer. The seal consists of a special polyamide material with a low coefficient of friction. The bearing is secured with DIN 471/472 circlips.

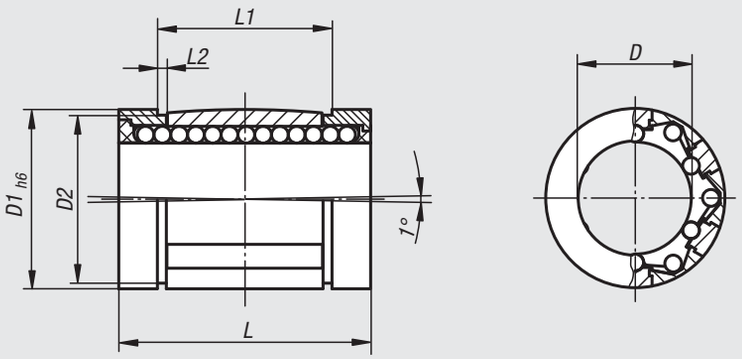
Recommended tolerances:
Shaft: h6
Housing: H7

Linear ball bearings with double-sided seal should be greased before installation.

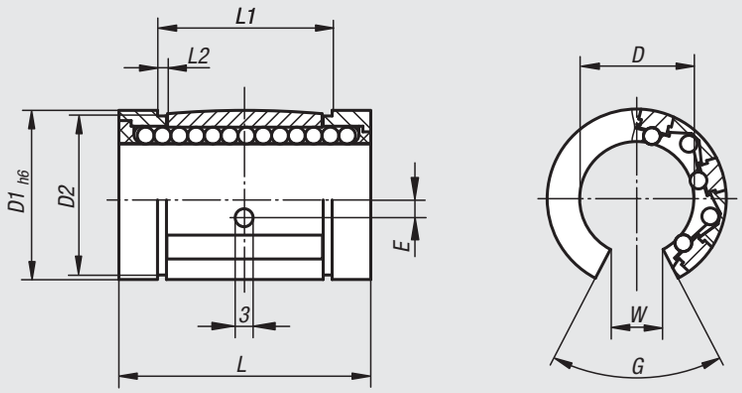
The specified load ratings apply with the use of hardened and ground shafts.

Temperature range:
-20 °C to +80 °C.

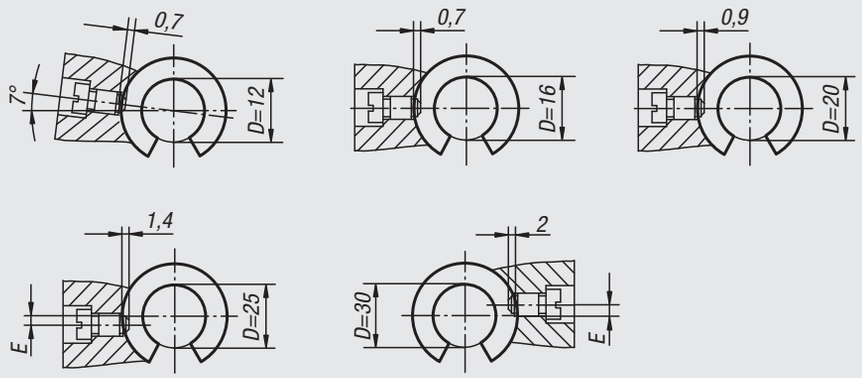
Closed



Open



Position of radial and axial fixation



Order No. closed	Order No. open	D	D1	D2	E	G	L	L1	L2	W	Dynamic load rating N	Static load rating N
21510-1202	**21510-1212**	12	22	21	-/1,35	-/66°	32 -0,2	22,9 -0,2	1,3	-/6,5	650	520
21510-1602	**21510-1612**	16	26	24,9	-/0	-/68°	36 -0,2	24,9 -0,2	1,3	-/9	800	630
21510-2002	**21510-2012**	20	32	30,3	-/0	-/55°	45 -0,2	31,5 -0,2	1,6	-/9	1500	1250
21510-2502	**21510-2512**	25	40	37,5	-/1,5	-/57°	58 -0,3	44,1 -0,3	1,85	-/11,5	2500	2200
21510-3002	**21510-3012**	30	47	44,5	-/2	-/57°	68 -0,3	52,1 -0,3	1,85	-/14	3200	2800

Linear ball bearings

self-aligning, high load rating

Material:
Housing plastic
Raceways ball bearing steel.
Balls steel.

Sample order:
nlm 21515-1202

Note:
The linear ball bearings correspond to series 3 of ISO 10285. With double-lip seal both ends. In comparison to standard linear ball bearings, these bearing have twice the load rating or eight times longer working life. The self-aligning function means that housing bore misalignments or bent shafts can be compensated for, the load distribution optimised and uniform load on all balls over the entire bearing length assured. The bearing is secured with DIN 471/472 circlips.

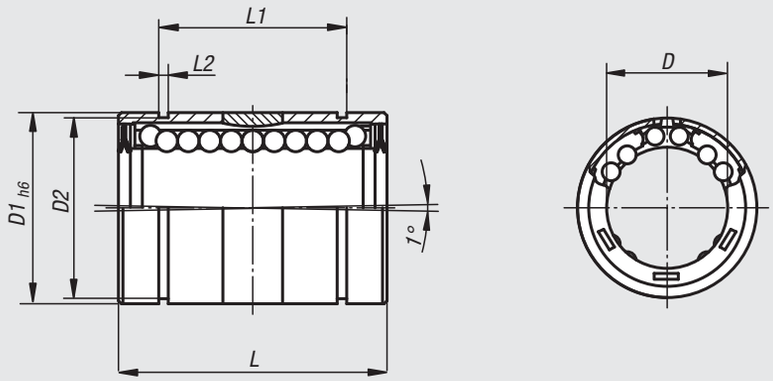
Recommended tolerances:
Shaft: h6
Housing: H7

Linear ball bearings with double-sided seal should be greased before installation.

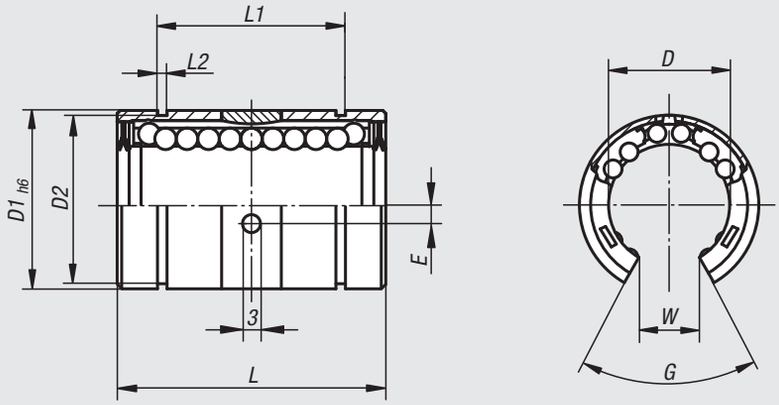
The specified load ratings apply with the use of hardened and ground shafts.

Temperature range:
-20 °C to +80 °C.

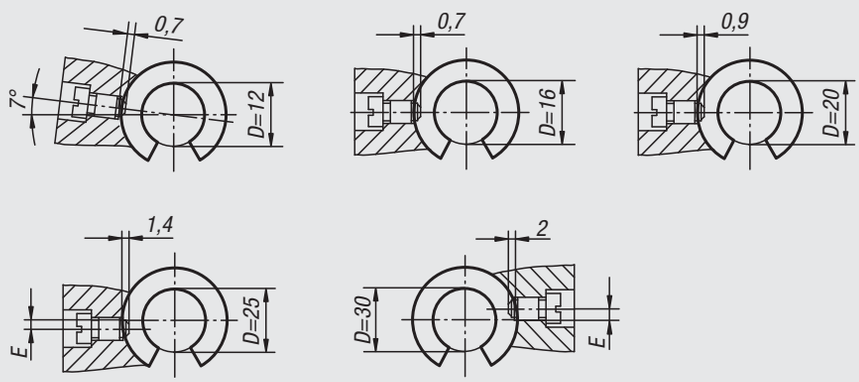
Closed



Open



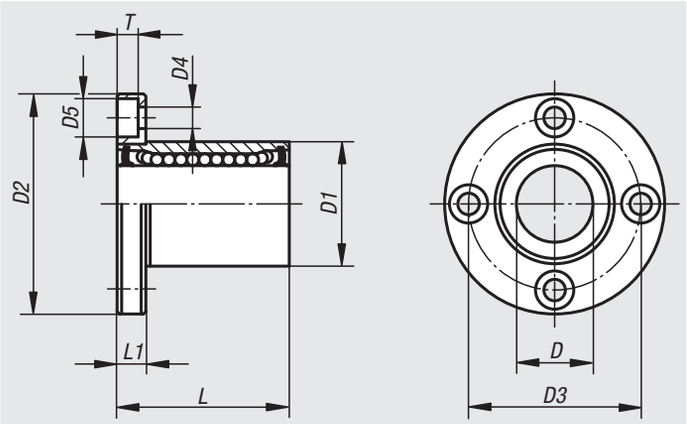
Position of radial and axial fixation



Order No. closed	Order No. open	D	D1	D2	E	G	L	L1	L2	W	Dynamic load rating N	Static load rating N
21515-1202	**21515-1212**	12	22	21	-/1,35	-/70°	32 -0,2	22,6 -0,2	1,3	-/7	750	825
21515-1602	**21515-1612**	16	26	24,9	-/0	-/70°	36 -0,2	24,6 -0,2	1,3	-/9,4	2200	2400
21515-2002	**21515-2012**	20	32	30,3	-/0	-/60°	45 -0,2	31,2 -0,2	1,6	-/10,2	4000	4400
21515-2502	**21515-2512**	25	40	37,5	-/1,5	-/60°	58 -0,3	43,7 -0,3	1,85	-/14,4	6700	7300
21515-3002	**21515-3012**	30	47	44,5	-/2	-/55°	68 -0,3	51,7 -0,3	1,85	-/13,9	8300	9100

Linear ball bearings

with flange



Material:
Housing steel.
Cage plastic.
Balls steel.

Sample order:
nlm 21518-1202

Note:
The linear ball bearings correspond to series 3 of ISO 10285. With double-sided seal. The linear ball bearings have a plastic cage which results in quiet and outstanding running properties. With flange for direct mounting on the housing.

Recommended tolerances:
Shaft: h6
Housing: H7

Linear ball bearings with double-sided seal should be greased before installation.

The specified load ratings apply with the use of hardened and ground shafts.

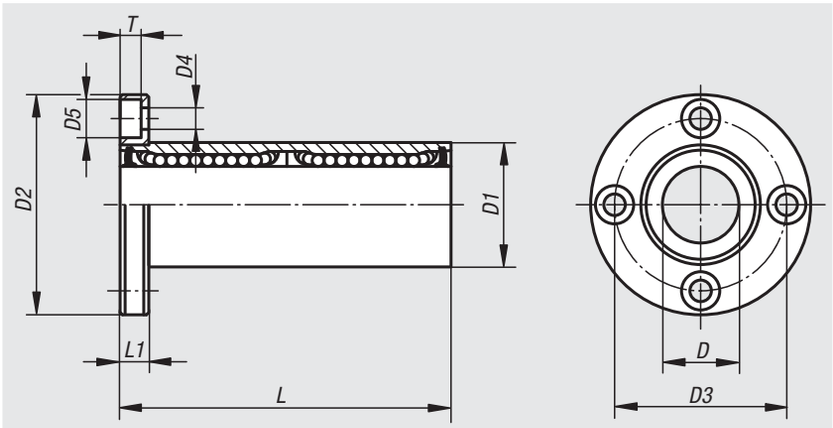
Temperature range:
-20 °C to +80 °C.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160.

Order No.	D	D1	D2	D3	D4	D5	L	L1	T	Dynamic load rating N	Static load rating N
21518-1202	12	22	42	32	4,5	7,5	32	6	4,1	520	790
21518-1602	16	26	46	36	4,5	7,5	36	6	4,1	590	910
21518-2002	20	32	54	43	5,5	9	45	8	5,1	880	1400
21518-2502	25	40	62	51	5,5	9	58	8	5,1	1000	1600
21518-3002	30	47	76	62	6,6	11	68	10	6,1	1600	2800

Linear ball bearings

with flange, double bearing



Material:
Housing steel.
Cage plastic.
Balls steel.

Sample order:
nlm 21520-1202

Note:
The linear ball bearings correspond to series 3 of ISO 10285. With double-sided seal. The linear ball bearings have a plastic cage which results in quiet and outstanding running properties. With flange for direct mounting on the housing. Double bearing version for use under torque loads.

Recommended tolerances:
Shaft: h6
Housing: H7

Linear ball bearings with double-sided seal should be greased before installation.

The specified load ratings apply with the use of hardened and ground shafts.

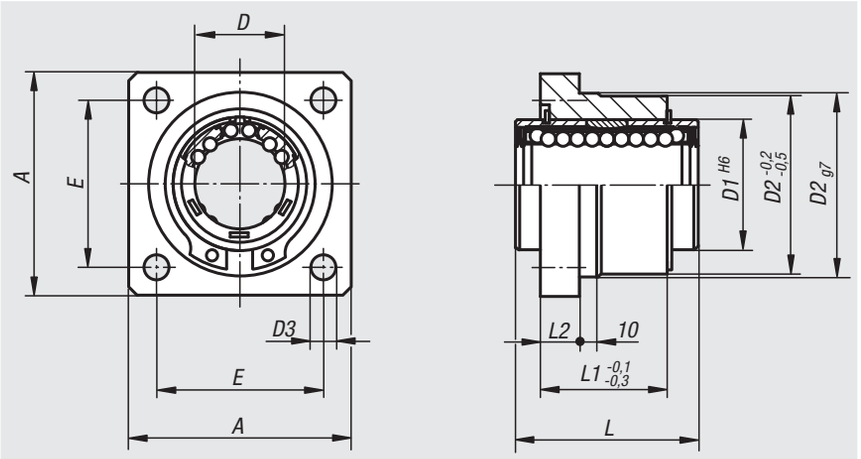
Temperature range:
-20 °C to +80 °C.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160.

Order No.	D	D1	D2	D3	D4	D5	L	L1	T	Dynamic load rating N	Static load rating N
21520-1202	12	22	42	32	4,5	7,5	61	6	4,1	657	1200
21520-1602	16	26	46	36	4,5	7,5	68	6	4,1	1230	2350
21520-2002	20	32	54	43	5,5	9	80	8	5,1	1400	2750
21520-2502	25	40	62	51	5,5	9	112	8	5,1	1560	3140
21520-3002	30	47	76	62	6,6	11	123	10	6,1	2490	5490

Linear housing units

with flange



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21522-121002

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with a self-aligning linear ball bearing 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearings specifications.

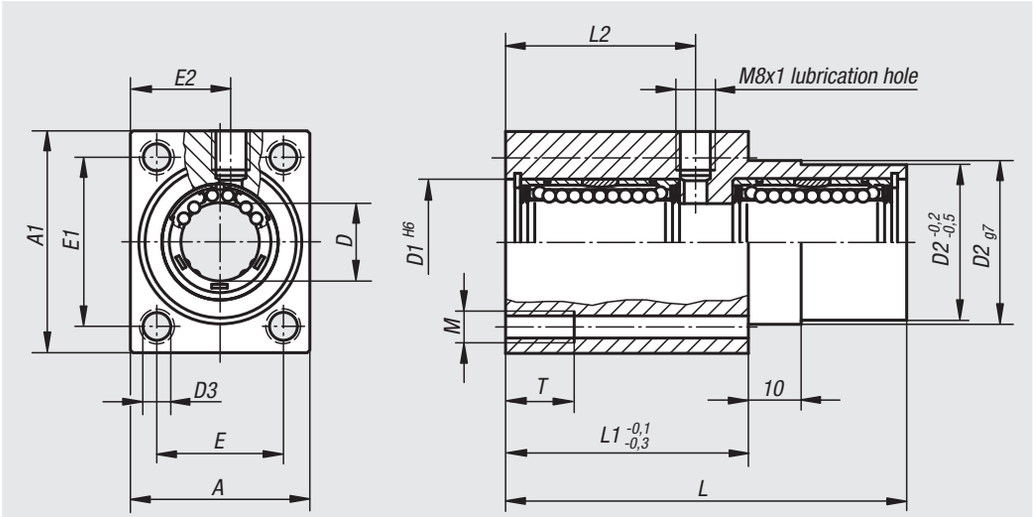
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E	L	L1	L2
21522-121002	40	12	22	32	5,5	30	32	22	6
21522-161002	50	16	26	38	5,5	35	36	24	8
21522-201002	60	20	32	46	6,6	42	45	30	10
21522-251002	70	25	40	58	6,6	54	58	42	12
21522-301002	80	30	47	66	9	60	68	50	14

Linear housing units

with flange, tandem



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21524-121002

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with two self-aligning linear ball bearings 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications (x2).

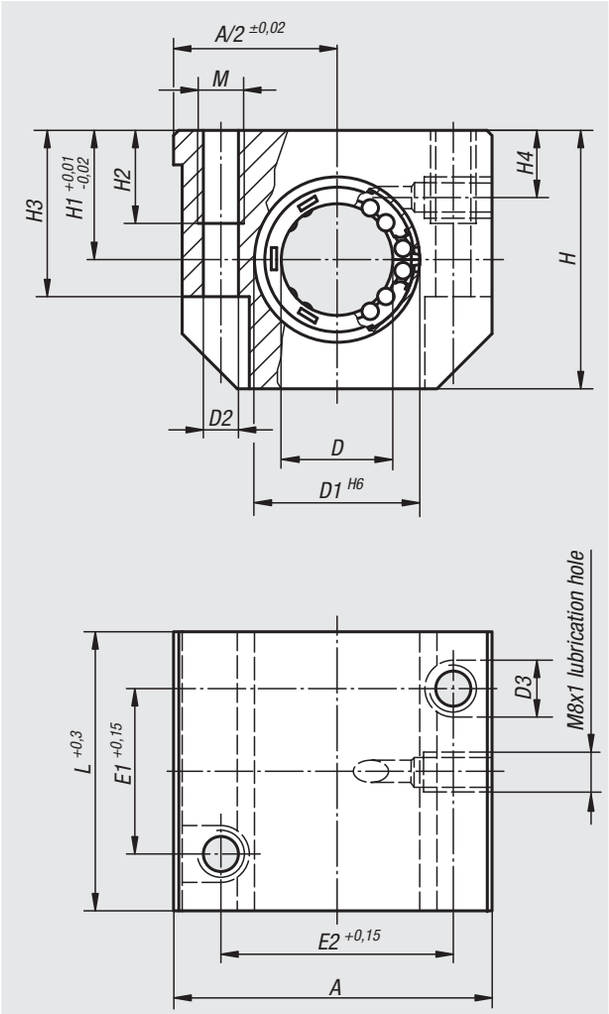
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	A1	D	D1	D2	D3	E	E1	E2	L	L1	L2	M	T
21524-121002	34	42	12	22	30	5,3	24	32	19	76	46	36	M6	13
21524-161002	40	50	16	26	35	6,6	28	38	22	84	50	40	M8	18
21524-201002	50	60	20	32	42	8,4	35	45	27	104	60	50	M10	22
21524-251002	60	74	25	40	52	10,5	42	56	32	130	73	63	M12	26
21524-301002	70	84	30	47	61	13,5	50	64	37	152	82	74	M16	34

Linear housing units

single, closed



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21530-121002

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with a self-aligning linear ball bearing 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications.

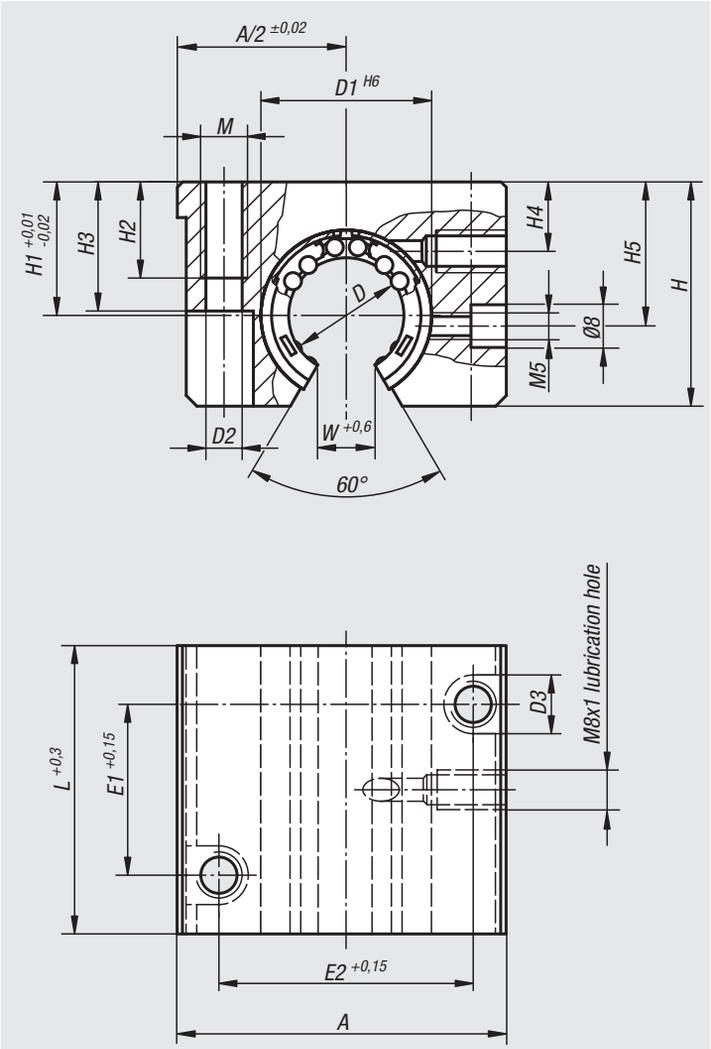
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E1	E2	H	H1	H2	H3	H4	L	M
21530-121002	43	12	22	4,2	8	23	32	35	18	13	25	10	39	M5
21530-161002	53	16	26	5,2	10	26	40	42	22	13	30	12	43	M6
21530-201002	60	20	32	6,8	11	32	45	50	25	18	34	13	54	M8
21530-251002	78	25	40	8,6	15	40	60	60	30	22	40	15	67	M10
21530-301002	87	30	47	8,6	15	45	68	70	35	22	48	16	79	M10

Linear housing units

single, open



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21535-121012

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with a self-aligning linear ball bearing 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications.

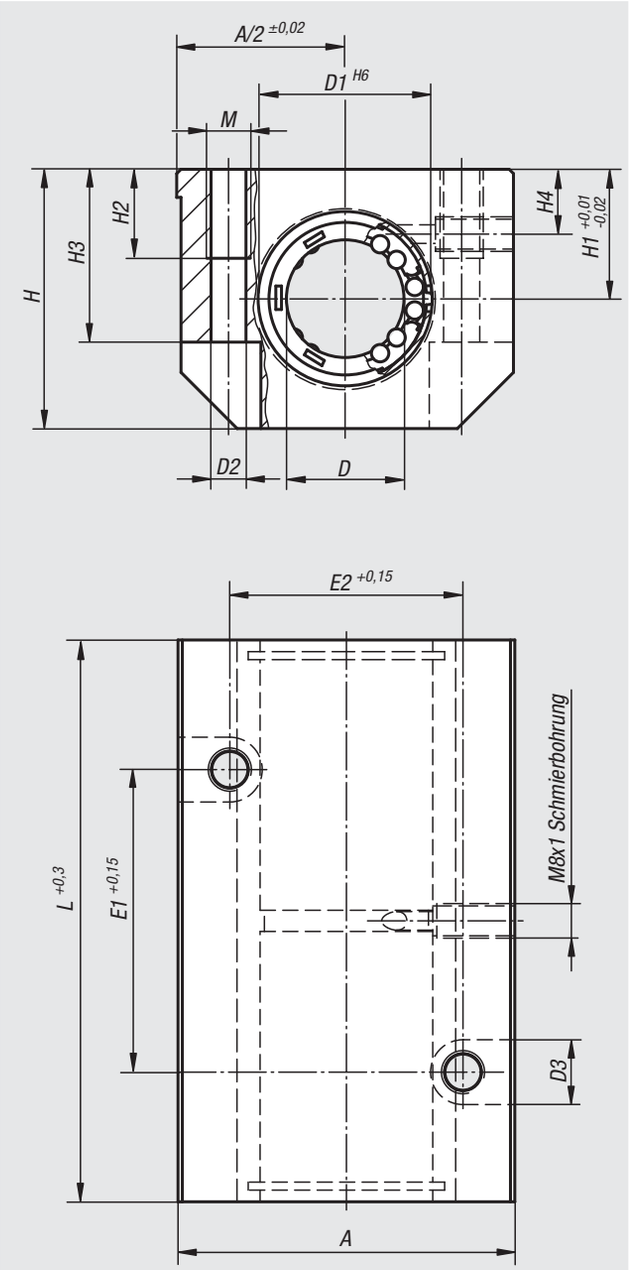
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21590 or 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E1	E2	H	H1	H2	H3	H4	H5	L	M	W
21535-121012	43	12	22	4,2	8	23	32	28	18	11	23,5	8	16,65	39	M5	7
21535-161012	53	16	26	5,2	10	26	40	35	22	13	30	12	22	43	M6	9,4
21535-201012	60	20	32	6,8	11	32	45	42	25	18	34	13	25	54	M8	10,2
21535-251012	78	25	40	8,6	15	40	60	51	30	22	40	15	31,5	67	M10	12,5
21535-301012	87	30	47	8,6	15	45	68	60	35	22	48	16	33	79	M10	13,9

Linear housing units

tandem, closed



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21540-121002

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with two self-aligning linear ball bearings 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications (x2).

On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E1	E2	H	H1	H2	H3	H4	L	M
21540-121002	43	12	22	5,2	10	40	30	35	18	13	25	10	76	M6
21540-161002	53	16	26	5,2	10	45	36	42	22	13	30	12	84	M6
21540-201002	60	20	32	6,8	11	55	45	50	25	18	34	13	104	M8
21540-251002	78	25	40	8,6	15	70	54	60	30	22	40	15	130	M10
21540-301002	87	30	47	10,3	18	85	62	70	35	26	48	16	152	M12

Linear housing units

tandem, open

Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21545-121012

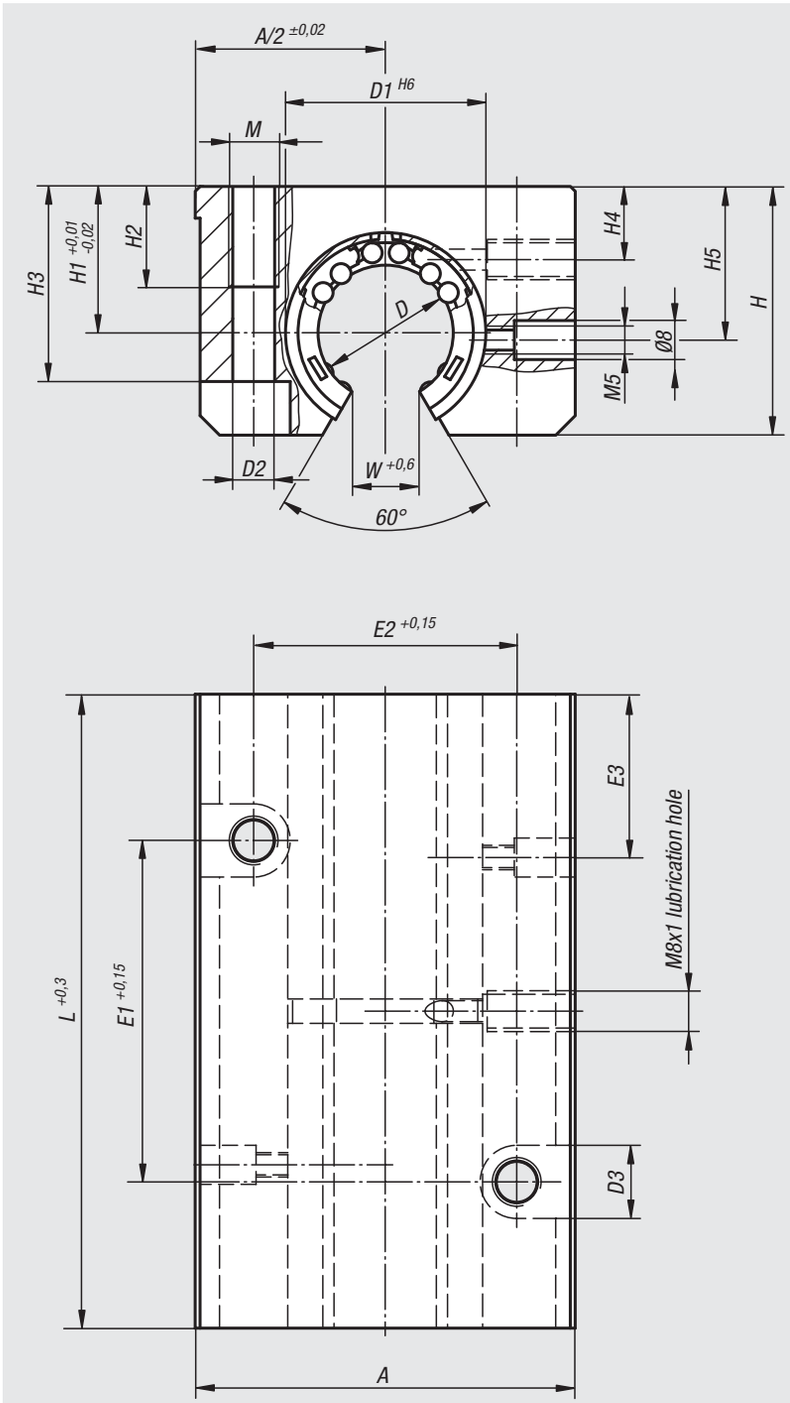
Note:
Ready to install linear housing units consisting of an extruded aluminium housing with two self-aligning linear ball bearings 21510 and seals both sides. The bearings are secured in the housing with cap screws.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications (x2).

On request:
Linear housing units can be equipped with any of our linear ball bearings.

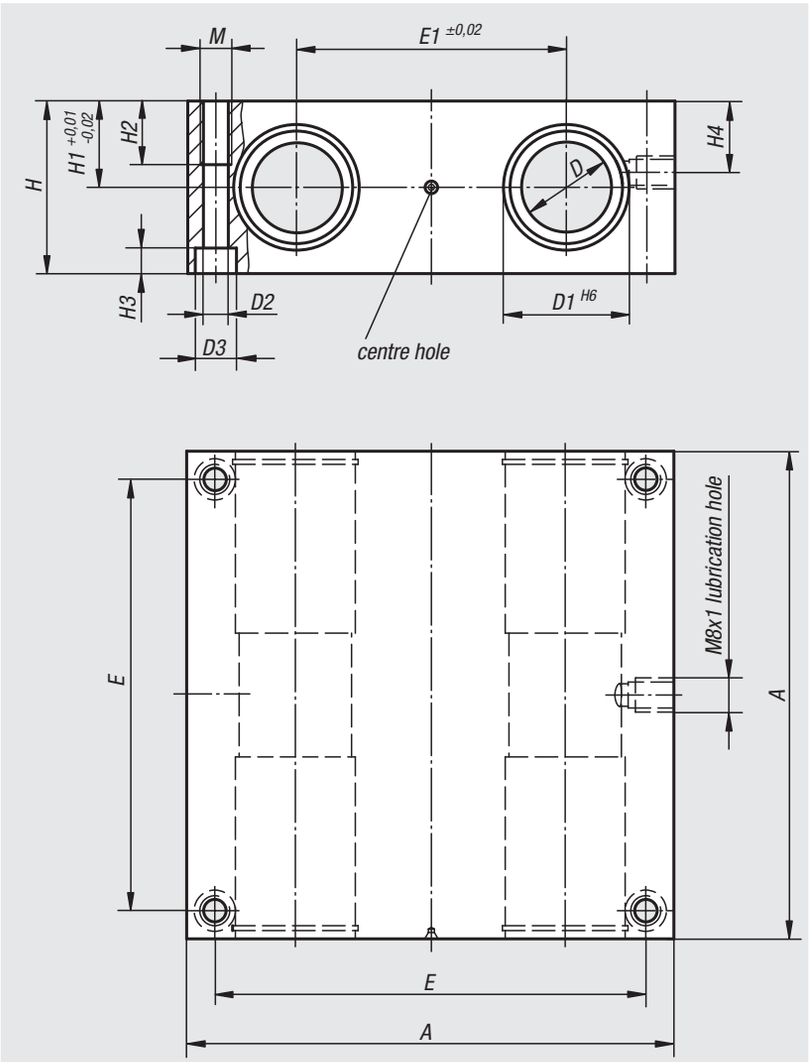
Accessories:
End seals 21560.
Precision guide shafts 21590 or 21595.
Fastening screws 07160 or 07161.



Order No.	A	D	D1	D2	D3	E1	E2	E3	H	H1	H2	H3	H4	H5	L	M	W
21545-121012	43	12	22	5,2	10	40	30	19,5	30	18	13	25	8	16,65	76	M6	7
21545-161012	53	16	26	5,2	10	45	36	21,5	35	22	13	30	12	22	84	M6	9,4
21545-201012	60	20	32	6,8	11	55	45	27	42	25	18	34	13	25	104	M8	10,2
21545-251012	78	25	40	8,6	15	70	54	33,5	51	30	22	40	15	31,5	130	M10	12,9
21545-301012	87	30	47	10,3	18	85	62	39,5	60	35	26	48	16	33	152	M12	14,4

Linear housing units

quadro, closed



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21550-121002

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with four self-aligning linear ball bearings 21510 and seals both sides. The bearings are secured in the housing with DIN 472 circlips.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications (x4).

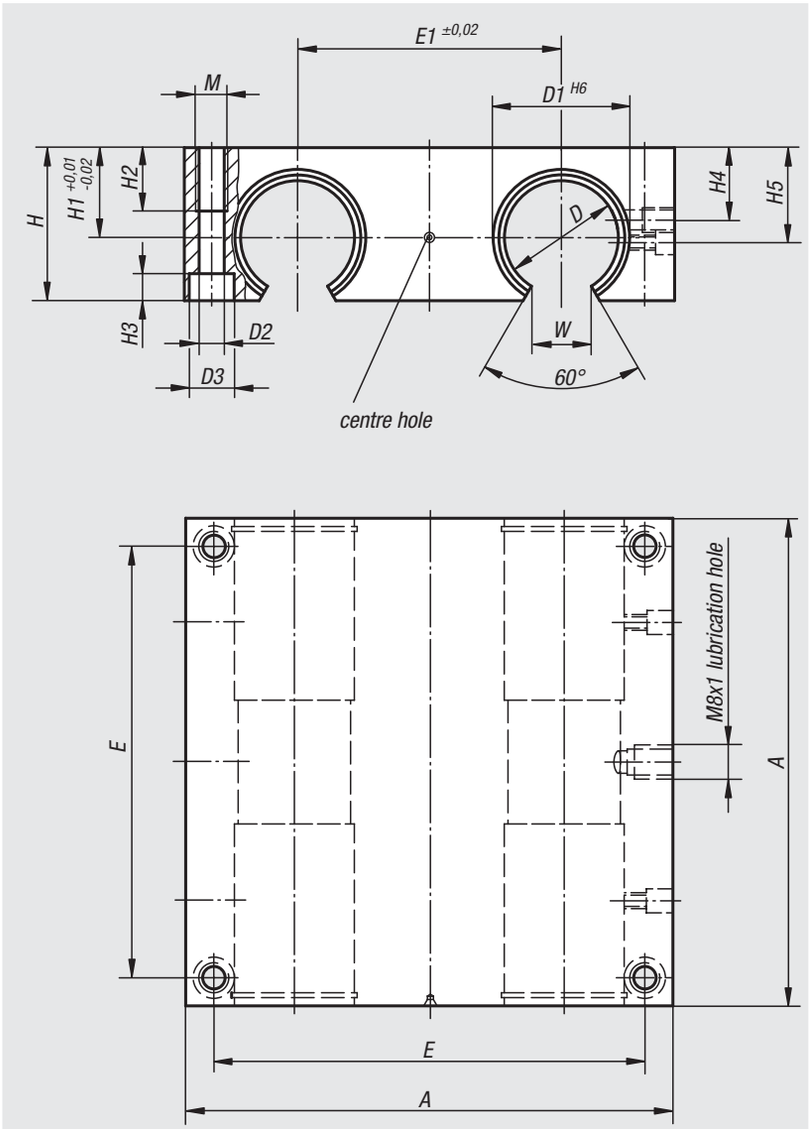
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E	E1	H	H1	H2	H3	H4	M
21550-121002	85	12	22	5,3	10	73	42	32	16	13	5,4	13	M6
21550-161002	100	16	26	5,3	10	88	54	36	18	13	5,4	15	M6
21550-201002	130	20	32	6,8	11	115	72	46	23	18	6,4	19	M8
21550-251002	160	25	40	9	15	140	88	56	28	22	8,6	24	M10
21550-301002	180	30	47	10,5	18	158	96	64	32	26	10,6	27	M12

Linear housing units

quadro, open



Material:
Housing aluminium

Version:
Housing bright.

Sample order:
nlm 21555-121012

Note:
Ready to install linear housing units consisting of an extruded aluminium housing with four self-aligning linear ball bearings 21510 and seals both sides. The bearings are secured in the housing with cap screws.

Recommended shaft tolerance: h6.

Load ratings according to the linear ball bearing specifications (x4).

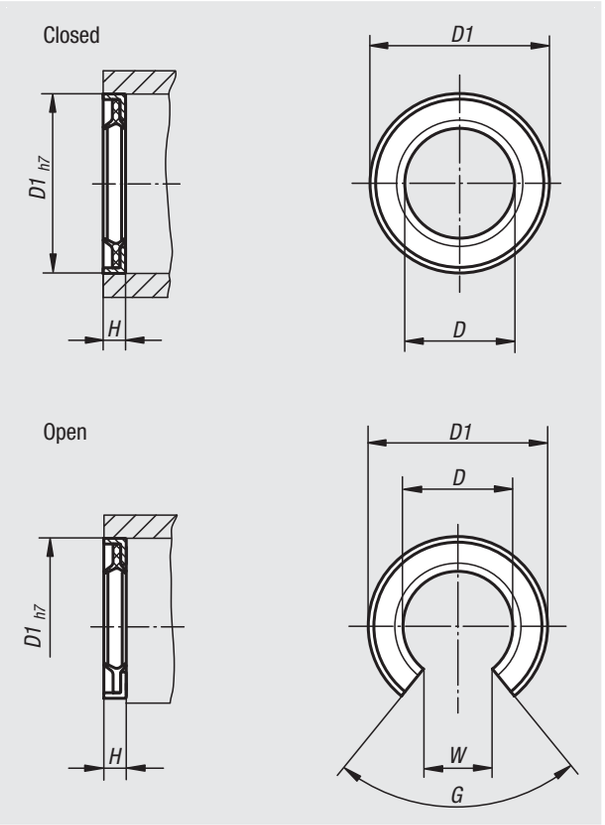
On request:
Linear housing units can be equipped with any of our linear ball bearings.

Accessories:
End seals 21560.
Precision guide shafts 21590 or 21595.
Fastening screws 07160 or 07161.

Order No.	A	D	D1	D2	D3	E	E1	H	H1	H2	H3	H4	H5	M	W
21555-121012	85	12	22	5,3	10	73	42	30	18	13	5,4	10	16,65	M6	7
21555-161012	100	16	26	5,3	10	88	54	35	22	13	5,4	12	22	M6	9,4
21555-201012	130	20	32	6,8	11	115	72	42	25	18	6,4	13	25	M8	10,2
21555-251012	160	25	40	9	15	140	88	51	30	22	8,6	15	31,5	M10	12,9
21555-301012	180	30	47	10,5	18	158	96	60	35	26	10,6	16	33	M12	13,9

End seals

double-lip sealing rings



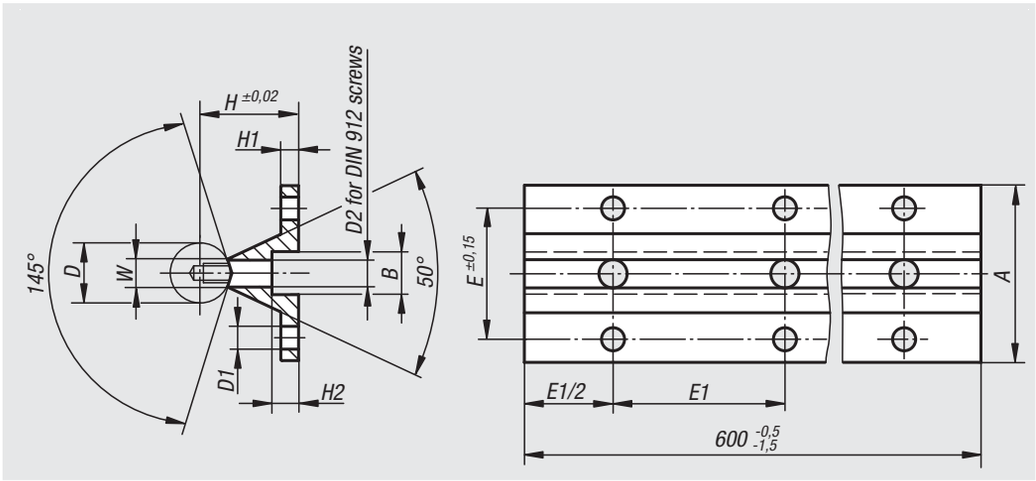
Material:
Ring steel.
Rubber NBR.

Sample order:
nlm 21560-120

Note:
In addition to the standard seals for linear ball bearings, these end seals are also available. The end seals give much better protection from dirt and dust.
The seals are inserted into the housing bores (tolerance H7) in front of the bearings and secured with glue.

Order No. closed	Order No. open	D	D1	H	G	W
21560-120	**21560-121**	12	22	3	-/78°	-/7,5
21560-160	**21560-161**	16	26	3	-/78°	-/10
21560-200	**21560-201**	20	32	4	-/60°	-/10
21560-250	**21560-251**	25	40	4	-/60°	-/12,5
21560-300	**21560-301**	30	47	5	-/50°	-/12,5

Shaft supports



Material:
Aluminium.

Version:
Bright.

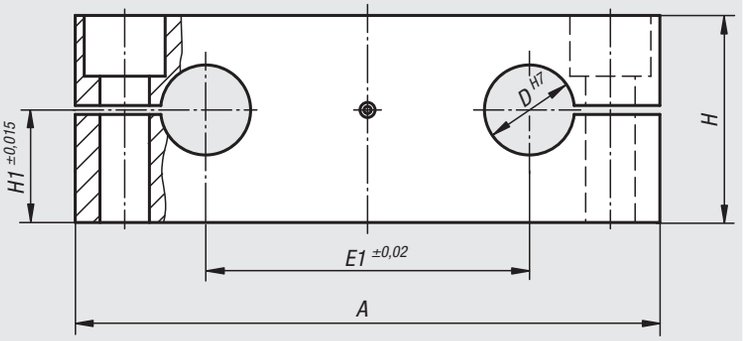
Sample order:
nlm 21565-12375X0600

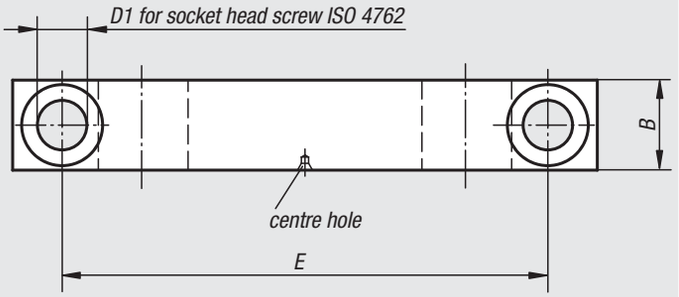
Note:
Shaft supports are required to support shafts in conjunction with open linear ball bearings.
Shafts supported along the entire length result in particularly rigid assemblies, in many cases however, sectional supports suffice.
The standard length of our shaft supports is 600 mm. These can be shortened short or set in series to produce longer supports.

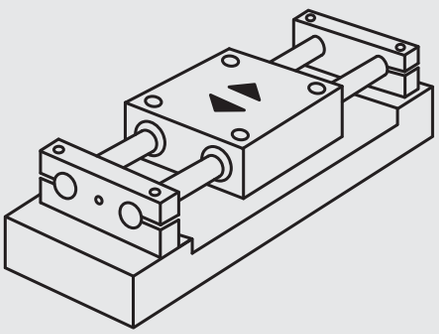
Accessories:
Precision guide shafts with fastening holes 21590.
Fastening screws 07160.

Order No.	Size	A	B	D	D1	D2	E	E1	H	H1	H2	W
21565-12375X0600	12	40	8	12	4,5	M4x16	29	75	22	5	5	5,8
21565-16500X0600	16	45	9,5	16	5,5	M5x20	33	100	26	5	6	7
21565-20500X0600	20	52	11	20	6,6	M6x25	37	100	32	6	6,5	8,3
21565-25600X0600	25	57	14	25	6,6	M8x25	42	120	36	6	8,5	10,8
21565-30750X0600	30	69	17	30	9	M10x30	51	150	42	7	10,5	11

Traverses fixed







Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 21575-12

Note:
Traverse with two bores for easy and secure clamping and fastening of guide shafts. For the assembly of prefabricated table units with our Quadro linear housing units 21550 or 21555.

This version permits the axial motion of the linear bearing unit i.e. the shafts are mounted fixed with the traverses on the machine bed.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	B	D	D1	E	E1	H	H1
21575-12	85	14	12	6,6	70	42	32	18
21575-16	100	18	16	9	82	54	36	20
21575-20	130	20	20	11	108	72	46	25
21575-25	160	25	25	13,5	132	88	56	30
21575-30	180	25	30	13,5	150	96	64	35

Traverses moveable

Material:
Aluminium.

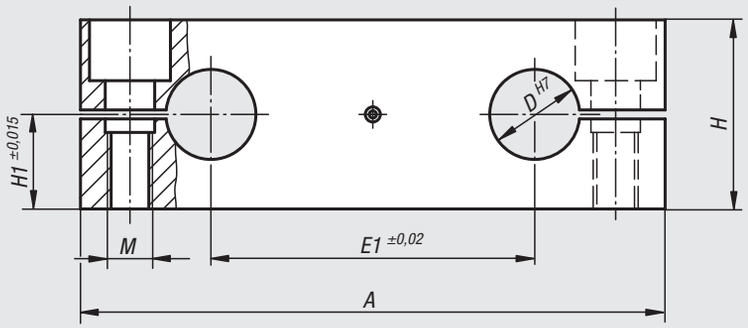
Version:
Bright.

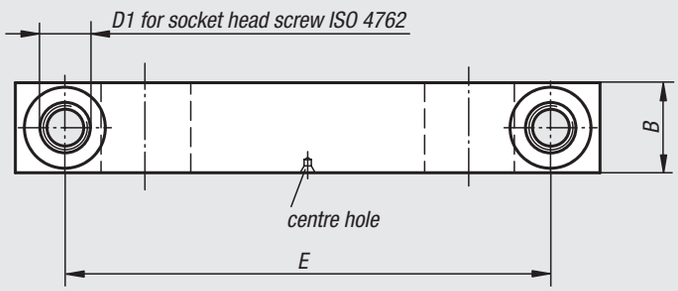
Sample order:
nlm 21577-12

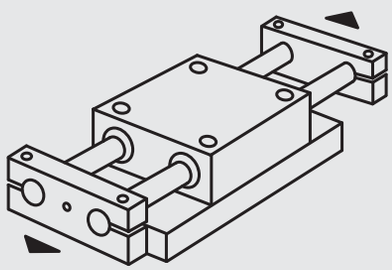
Note:
Traverse with two bores for easy and secure clamping and fastening of guide shafts. For the assembly of prefabricated table units with our Quadro linear housing units 21550 or 21555.

By fixed mounted linear bearing units these traverses permit the shaft to travel with the travers.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

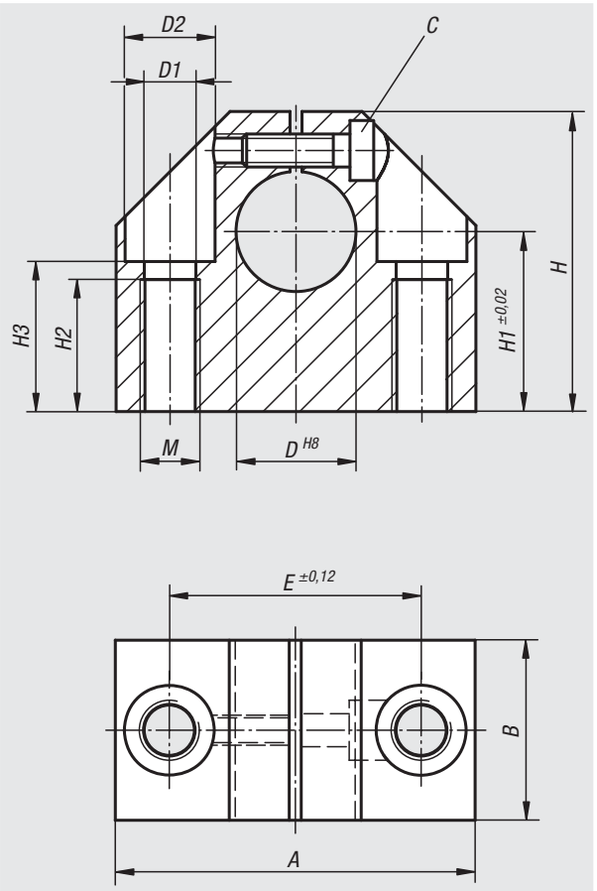






Order No.	A	B	D	D1	E	E1	H	H1	M
21577-12	85	14	12	6,6	70	42	28	14	M6
21577-16	100	18	16	9	82	54	32	16	M8
21577-20	130	20	20	11	108	72	42	21	M10
21577-25	160	25	25	13,5	132	88	52	26	M12
21577-30	180	25	30	13,5	150	96	58	29	M12

Shaft supports



Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 21580-12

Note:
Shaft support with bore for easy and secure clamping and fastening the guide shafts.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.

Order No.	A	B	D	D1	D2	E	H	H1	H2	H3	M	C (DIN 912)
21580-12	43	20	12	5,2	10	30	35	20	13	16,5	M6	M4
21580-16	53	24	16	6,8	11	38	42	25	18	21	M8	M5
21580-20	60	30 -0,6	20	8,6	15	42	50 -0,6	30	22	25	M10	M6
21580-25	78	38	25	10,3	18	56	60	35	26	30	M12	M8
21580-30	87	40 -0,6	30	10,3	18	64	70 -0,6	40	26	34	M12	M8

Shaft supports

standard

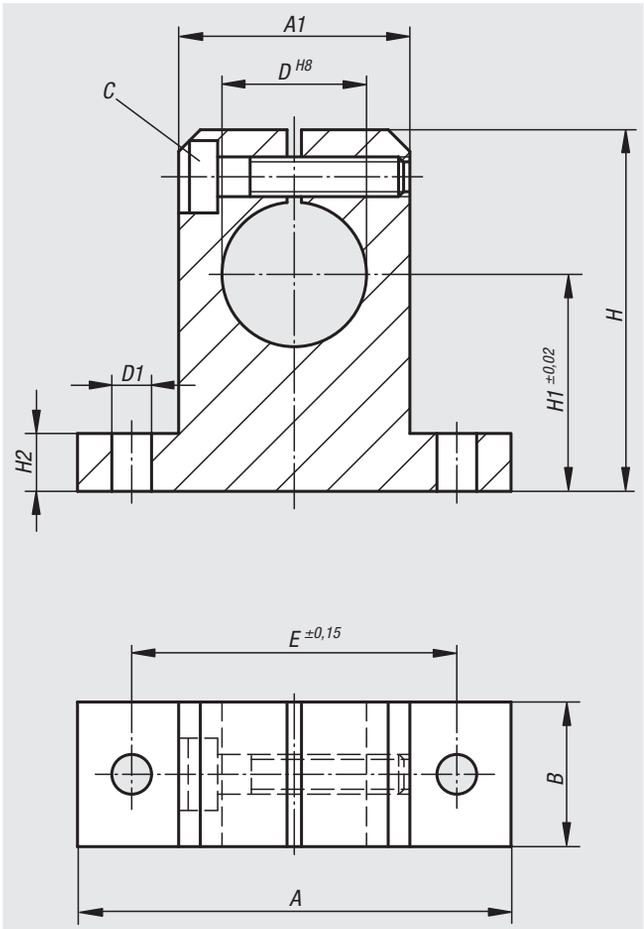
Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 21582-12

Note:
Shaft support with bore for easy and secure clamping and fastening the guide shafts.

Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.



Order No.	A	A1	B	D	D1	E	H	H1	H2	C (DIN 912)
21582-12	42	20	12	12	5,5	32	35	20	5,5	M4
21582-16	50	26	16	16	5,5	40	42	25	6,5	M4
21582-20	60	32	20	20	5,5	45	50	30	8	M4
21582-25	74	38	25	25	6,6	60	58	35	9	M5
21582-30	84	45	28	30	9	68	68	40	10	M6

Shaft supports

flanged

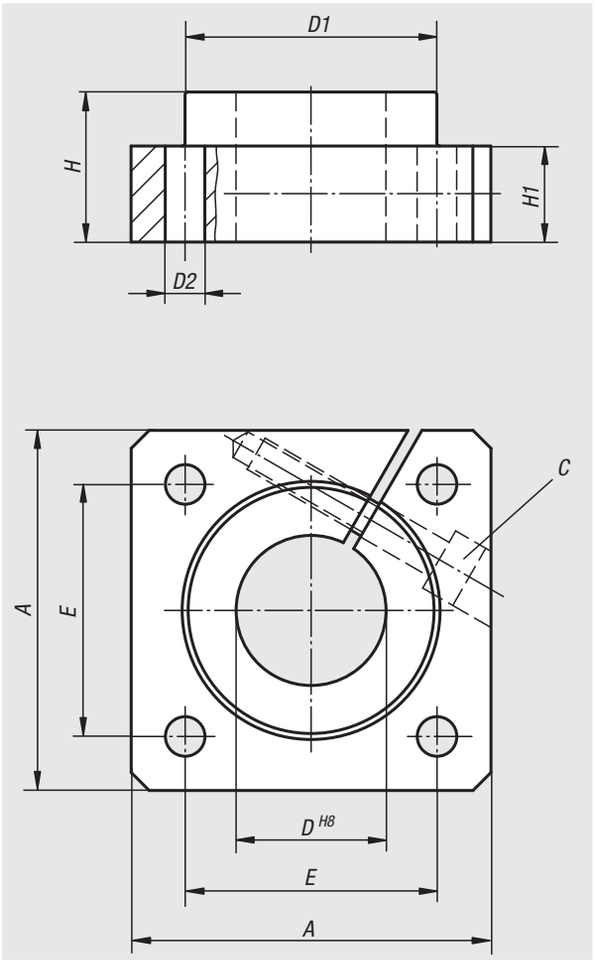
Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 21585-12

Note:
Flanged shaft support with bore for easy and secure clamping and fastening the guide shafts.

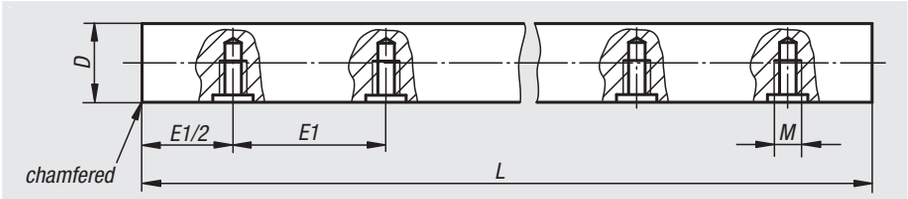
Accessories:
Precision guide shafts 21595.
Fastening screws 07160 or 07161.



Order No.	A	D	D1	D2	E	H	H1	C (DIN 912)
21585-12	40	12	23,5	5,5	30 ±0,12	20	12	M4
21585-16	50	16	27,5	5,5	35 ±0,12	20	12	M4
21585-20	50	20	33,5	6,6	38 ±0,15	23	14	M5
21585-25	60	25	42	6,6	42 ±0,15	25	16	M6
21585-30	70	30	49,5	9	54 ±0,25	30	19	M8

Precision guide shafts

with fastening holes



Material:
Steel 1.1213.
stainless steel 1.4034.

Version:
Steel, ground.
Steel, ground and proportionally hard-chrome plated, chrome layer 5 - 10 µm.
Stainless steel, ground.

The precision steel shafts are in general inductively surface-hardened.

Sample order:
nlm 21590-012375X0600

Note:
The surface value obtained during the inductive hardening process guarantees high surface wear resistance.

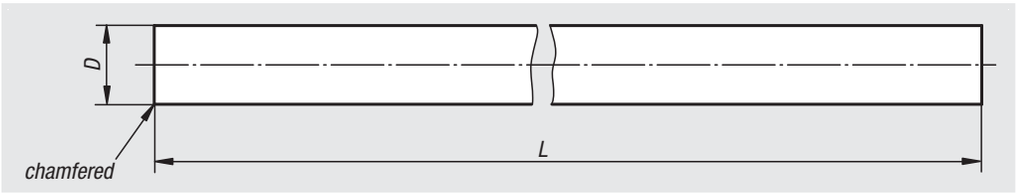
Suitable for shaft supports 21565.

On request:
Lengths up to a max. 4000 mm.

Accessories:
Shaft supports 21565.

Order No.	Material	D	E1	L	M	Hardness penetration depth max.	Surface hardness HRC
21590-012375X0600	steel	12 h6	75	600	M4	1,3	62 ±2
21590-016500X0600	steel	16 h6	100	600	M5	1,6	62 ±2
21590-020500X0600	steel	20 h6	100	600	M6	1,6	62 ±2
21590-025600X0600	steel	25 h6	120	600	M8	1,8	62 ±2
21590-030750X0600	steel	30 h6	150	600	M10	2	62 ±2
21590-112375X0600	steel hard-chrome plated	12 h7	75	600	M4	1,3	65 – 70
21590-116500X0600	steel hard-chrome plated	16 h7	100	600	M5	1,6	65 – 70
21590-120500X0600	steel hard-chrome plated	20 h7	100	600	M6	1,6	65 – 70
21590-125600X0600	steel hard-chrome plated	25 h7	120	600	M8	1,8	65 – 70
21590-130750X0600	steel hard-chrome plated	30 h7	150	600	M10	2	65 – 70
21590-212375X0600	stainless steel	12 h6	75	600	M4	1,3	51 – 55
21590-216500X0600	stainless steel	16 h6	100	600	M5	1,6	51 – 55
21590-220500X0600	stainless steel	20 h6	100	600	M6	1,8	51 – 55
21590-225600X0600	stainless steel	25 h6	120	600	M8	2	51 – 55
21590-230750X0600	stainless steel	30 h6	150	600	M10	2,4	51 – 55

Precision guide shafts



Material:
Steel 1.1213;
stainless steel 1.4034.

Version:
Steel, ground.
Steel, ground and proportionally hard-chrome plated, chrome layer 5 - 10 µm.
Stainless steel, ground.

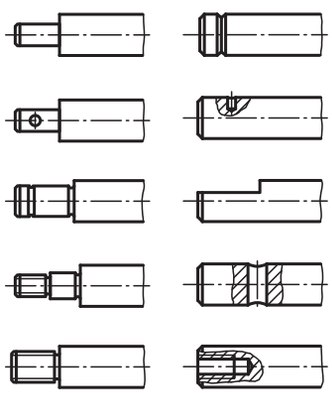
The precision steel shafts are in general inductively surface-hardened.

Sample order:
nlm 21595-012X1000

Note:
The surface value obtained during the inductive hardening process guarantees high surface wear resistance.

On request:
Processing of the ends and cylindrical lateral areas according to customer design.
Lengths up to a max. 4000 mm.

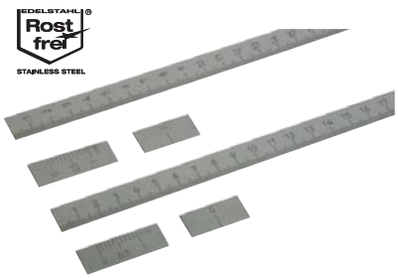
Machining examples:



Order No.	Material	D	L	Hardness penetration depth max.	Surface hardness HRC
21595-012X1000	steel	12 h6	1000	1,3	62 ±2
21595-016X1000	steel	16 h6	1000	1,6	62 ±2
21595-020X1000	steel	20 h6	1000	1,6	62 ±2
21595-025X1000	steel	25 h6	1000	1,8	62 ±2
21595-030X1000	steel	30 h6	1000	2	62 ±2
21595-112X1000	steel hard-chrome plated	12 h7	1000	1,3	65 – 70
21595-116X1000	steel hard-chrome plated	16 h7	1000	1,6	65 – 70
21595-120X1000	steel hard-chrome plated	20 h7	1000	1,6	65 – 70
21595-125X1000	steel hard-chrome plated	25 h7	1000	1,8	65 – 70
21595-130X1000	steel hard-chrome plated	30 h7	1000	2	65 – 70
21595-212X1000	stainless steel	12 h6	1000	1,3	51 – 55
21595-216X1000	stainless steel	16 h6	1000	1,6	51 – 55
21595-220X1000	stainless steel	20 h6	1000	1,8	51 – 55
21595-225X1000	stainless steel	25 h6	1000	2	51 – 55
21595-230X1000	stainless steel	30 h6	1000	2,4	51 – 55

Linear scales

self-adhesive, stainless steel



Material:
Stainless steel 1.4310

Version:
Bright.

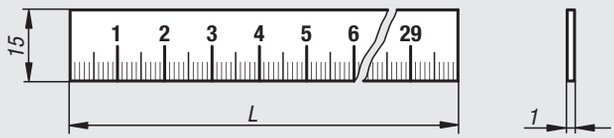
Sample order:
nlm 21880-000010X0300 (include length L)

Note:
Rigid design stainless steel linear scales with self-adhesive back.
Cross section 15 x 1 mm.

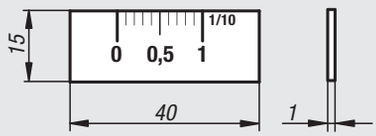
Matt surface and black high contrast graduations. The graduations are deep lasered.

On request:
– Zero mark lower right or centre
– Graduations upper right or both sides
– Other lengths

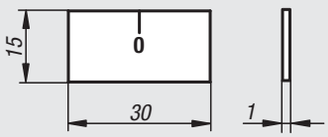
horizontal assembly position



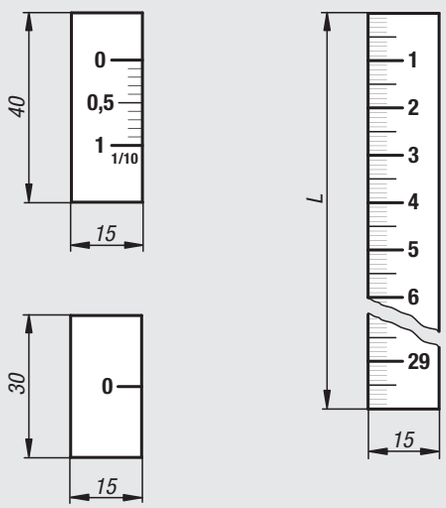
nonius



zero reference mark



vertical assembly position



Stainless steel linear scales, self-adhesive

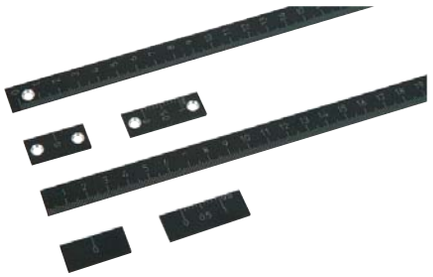
Order No.	Version	Assembly position	Zero point	Division	Graduations	L
21880-000010X	scale	horizontal	left	1 mm	lower	300/500/700/1000
21880-010010X	scale	vertical	upper	1 mm	left	300/500/700/1000

Vernier scale and zero reference, stainless steel, self-adhesive

Order No.	Version	Assembly position	Zero point	Graduations
21880-0001	Vernier scale	horizontal	left	upper
21880-0101	Vernier scale	vertical	upper	right
21880-00	zero mark	horizontal	-	-
21880-01	zero mark	vertical	-	-

Linear scales

self adhesive or with screw holes, aluminium



Material:
Aluminium.

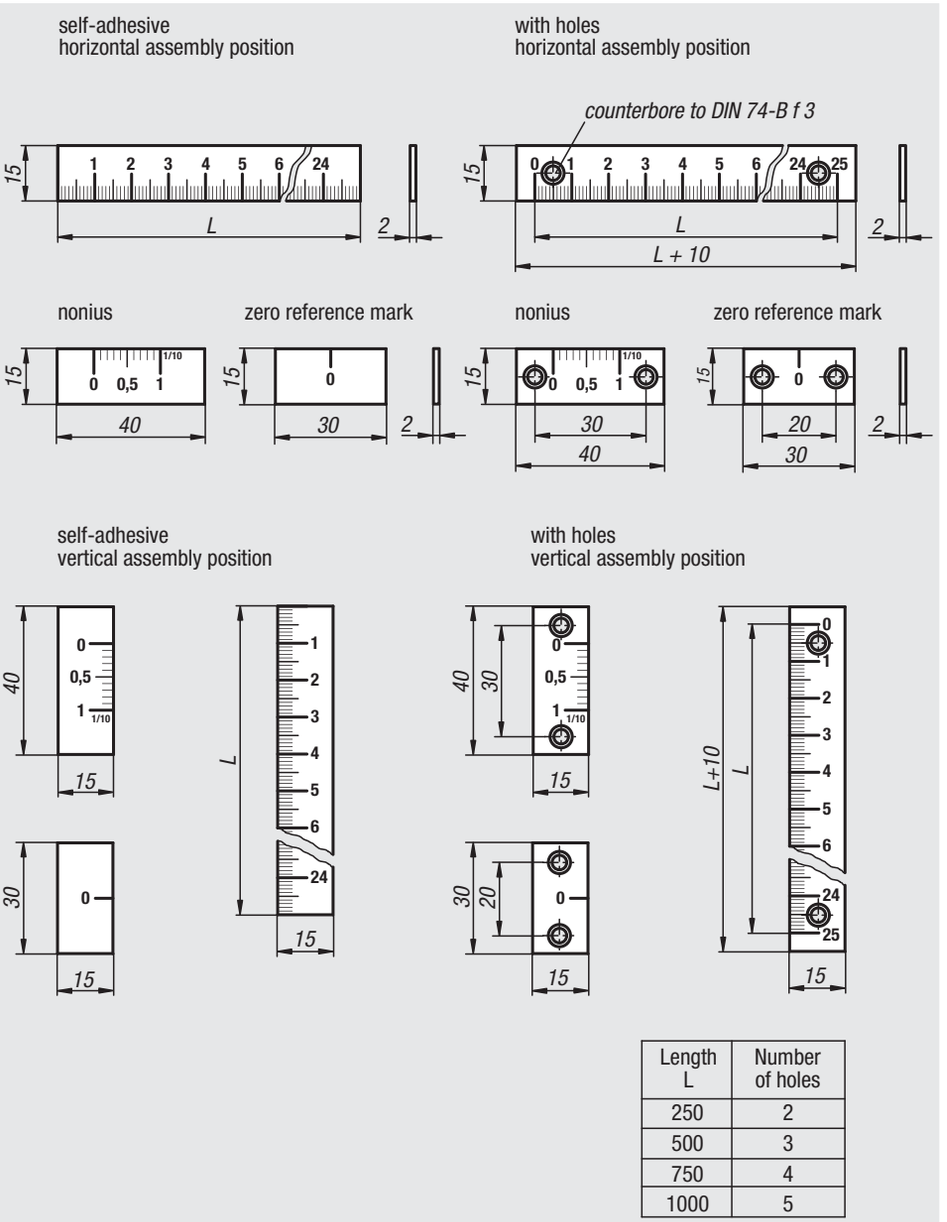
Version:
Black anodized

Sample order:
nlm 21882-000010X0250 (include length L)

Note:
Rigid design aluminium linear scales with self-adhesive back or with screw holes.
Cross section 15 x 2 mm.

Black anodized surface and high contrast graduations for ligibility without shading. The graduations are deep lasered.

On request:
– Zero mark lower right or centre
– Graduations upper right or both sides
– Other lengths



Length L	Number of holes
250	2
500	3
750	4
1000	5

Aluminium liniear scales, self adhesive or with screw holes

Order No. self adhesive	Order No. with holes	Version	Assembly position	Zero point	Division	Graduations	L
21882-000010X	**21882-100010X**	scale	horizontal	left	1 mm	lower	250/500/750/1000
21882-010010X	**21882-110010X**	scale	vertical	upper	1 mm	left	250/500/750/1000

Vernier scale and zero reference, aluminium, self adhesive or with holes

Order No. self adhesive	Order No. with holes	Version	Assembly position	Zero point	Graduations
21882-0001	**21882-1001**	Vernier scale	horizontal	left	upper
21882-0101	**21882-1101**	Vernier scale	vertical	upper	right
21882-00	**21882-10**	zero mark	horizontal	-	-
21882-01	**21882-11**	zero mark	vertical	-	-

Linear scales

self-adhesive or with screw holes, aluminium

Material:
Aluminium.

Version:
Scale surface ground and black anodized

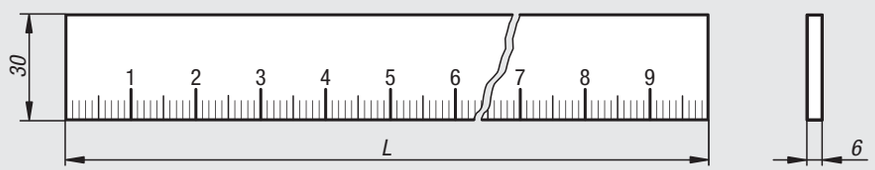
Sample order:
nlm 21884-000010X0500 (include length L)

Note:
Rigid, heavy-duty design aluminium linear scales.
Cross section 30 x 6 mm.

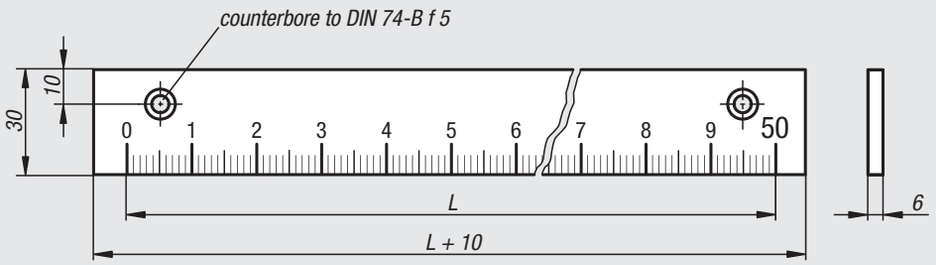
Black anodized surface and high contrast graduations for ligibility without shading.
The graduations are deep lasered.

On request:
– Zero mark right or centre
– Graduations top or both sides
– Other lengths

self-adhesive



with holes



Length L	Number of holes
500	2
1000	3

Order No. self adhesive	Order No. with holes	Assembly position	Zero point	Division	Graduations	L
21884-000010X	**21884-100010X**	horizontal	left	1 mm	bottom	500/1000

Position indicators

Material:
Housing polyamide 6.
Hollow shaft steel.
Screen plastic.
Grub screw steel.

Version:
Impact-resistant housing.
Hollow shaft black oxidised.
Grub screw black.
Dial black, digits white.

Sample order:
nlm 21901-01001111
(Position indicator with 1 mm pitch, decimal point in first position from the right, assembly position 1, direction of count ascending clockwise, colour orange)

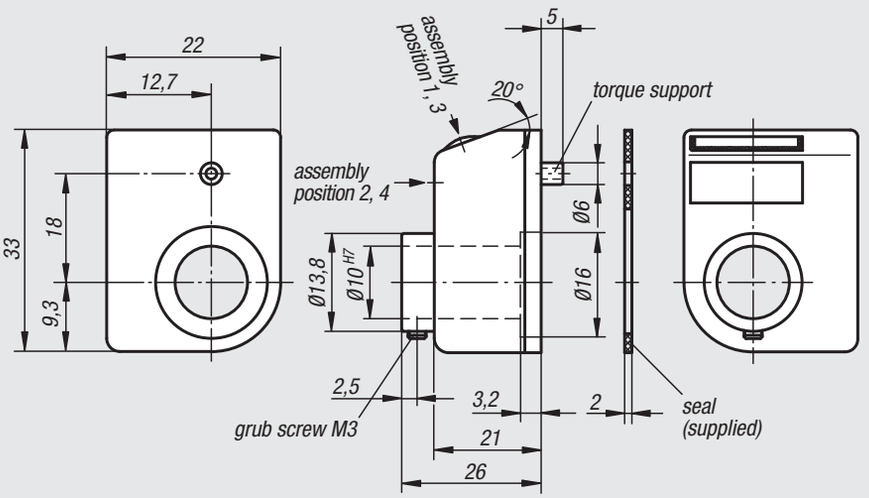
Note:
Position indicators allow direct reading of input measurement values at a glance.
In addition, the value indicated per spindle rotation (corresponding spindle pitch) can be selected and the various indicator values can be operated by a transmission gear. The position indicators are distinguished by their small construction with very clear display.
They are especially suitable for small spindle distances and small shaft diameters and they have a torque support that is located in a drillhole on the other side.

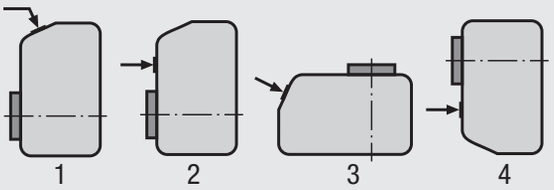
** At the 1st asterisk give assembly position and at the 2nd asterisk give the count direction (see sample order „assembly position, count direction“).

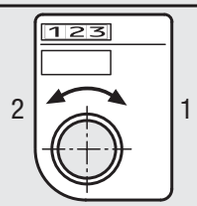
On request:
– Stainless steel driveshaft
– Indicator for inch

Accessories:
– Reducing bushes 21940

Technical data:
– Counter consisting of 3 10-position dials
– Height of figures about 4 mm
– Hollow shaft Ø 10 H7 mm
– Temperature resistant to 80 °C
– Oil and solvent resistant



Display after one rotation, with decimal point:	Assembly position (1 - 4):
	
e. g. 21901-**01001**111 **0100** = 1mm increments **1** = decimal places	e. g. 21901-01001**1**11 = assembly position **1**

Count direction (1 - 2):	Colour (1 - 2):
	
e. g. 21901-0100111**1** **1** = clockwise (ascending values) **2** = anticlockwise (ascending values)	e. g. 21901-0100111**1** **1** = orange **2** = black

Order No. orange	Order No. black	Pitch	Indicator after one rotation	Decimal point in position	max. speed U/min
21901-01001****1**	**21901-01001******2**	1	01,0	1	1500
21901-02001****1**	**21901-02001******2**	2	02,0	1	750
21901-02501****1**	**21901-02501******2**	2,5	02,5	1	600
21901-03001****1**	**21901-03001******2**	3	03,0	1	500
21901-04001****1**	**21901-04001******2**	4	04,0	1	375
21901-05001****1**	**21901-05001******2**	5	05,0	1	300
21901-06001****1**	**21901-06001******2**	6	06,0	1	250
21901-08001****1**	**21901-08001******2**	8	08,0	1	180
21901-10001****1**	**21901-10001******2**	10	10,0	1	150

Position indicators

Material:
Housing polyamide 6.
Hollow shaft steel.
Screen plastic.
Grub screw steel.

Version:
Impact-resistant housing.
Hollow shaft black oxidised.
Grub screw black.
Dial black, digits white.

Sample order:
nlm 21902-01002111
(Position indicator with 1 mm pitch, decimal point in second position from the right, assembly position 1, direction of count ascending clockwise, colour orange)

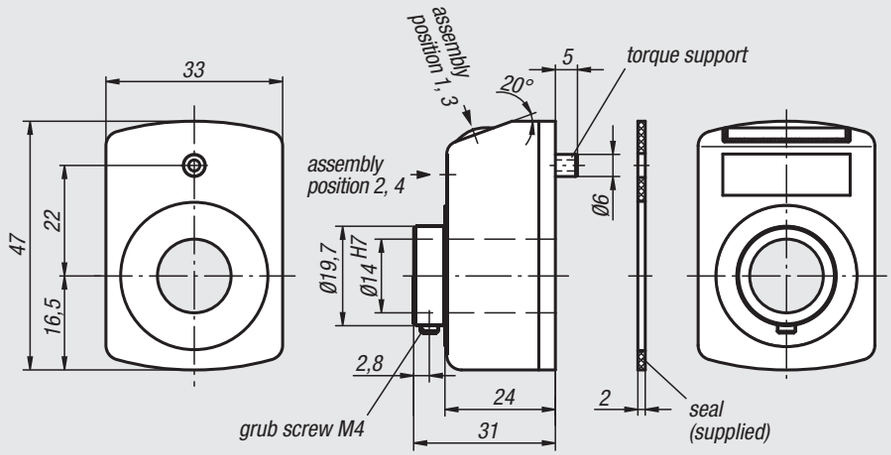
Note:
Position indicators allow direct reading of input measurement values at a glance.
In addition, the value indicated per spindle rotation (corresponding spindle pitch) can be selected and the various indicator values can be operated by a transmission gear. The position indicators are distinguished by their small construction with very clear display and fine scale.
They are especially suitable for small spindle distances and small shaft diameters and they have a torque support that is located in a drillhole on the other side.

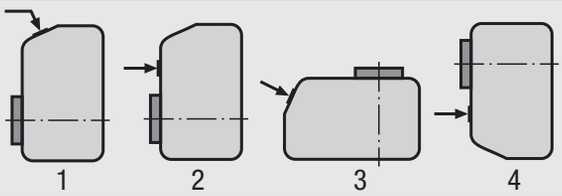
** At the 1st asterisk give assembly position and at the 2nd asterisk give the count direction (see sample order „assembly position, count direction“).

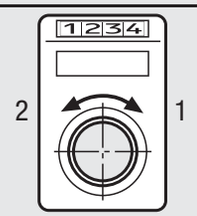
On request:
– Counter cover made of mineral glass
– Stainless steel driveshaft
– Axial sealing (dust-proof)
– Vibration protection

Accessories:
– Reducing bushes 21940
– Insert plate 21942
– Mounting plates 21944

Technical data:
– Counter consisting of 4 10-position dials + fine scale
– Height of figures about 6 mm
– Hollow shaft Ø 14 H7 mm
– Temperature resistant to 80 °C
– Oil and solvent resistant



Display after one rotation, with decimal point:	Assembly position (1 - 4):
	
e. g. 21902-**01002**111 **0100** = 1 mm increments **2** = decimal places	e. g. 21902-01002**1**11 = assembly position **1**

Count direction (1 - 2):	Colour (1 - 2):
	
e. g. 21902-01002**1**1 **1** = clockwise (ascending values) **2** = anticlockwise (ascending values)	e. g. 21902-01002111 **1** = orange **2** = black

Order No. orange	Order No. black	Pitch	Indicator after one rotation	Decimal point in position	max. speed U/min
21902-010021**	**21902-01002**2**	1	00,10	2	1500
21902-010011**	**21902-01001**2**	1	001,0	1	1500
21902-012511**	**21902-01251**2**	1,25	001,2/5	1	1200
21902-015011**	**21902-01501**2**	1,5	001,5	1	1000
21902-020011**	**21902-02001**2**	2	002,0	1	750
21902-025011**	**21902-02501**2**	2,5	002,5	1	600
21902-030011**	**21902-03001**2**	3	003,0	1	500
21902-040011**	**21902-04001**2**	4	004,0	1	375
21902-050011**	**21902-05001**2**	5	005,0	1	300
21902-060011**	**21902-06001**2**	6	006,0	1	250
21902-080011**	**21902-08001**2**	8	008,0	1	180
21902-100011**	**21902-10001**2**	10	010,0	1	150

Position indicators

Material:
Housing polyamide 6.
Hollow shaft steel.
Screen plastic.
Grub screw steel.

Version:
Impact-resistant housing.
Hollow shaft black oxidised.
Grub screw black.
Dial black, digits white.

Sample order:
nlm 21904-01002111
(Position indicator with 1 mm pitch, decimal point in second position from the right, assembly position 1, direction of count ascending clockwise, colour orange)

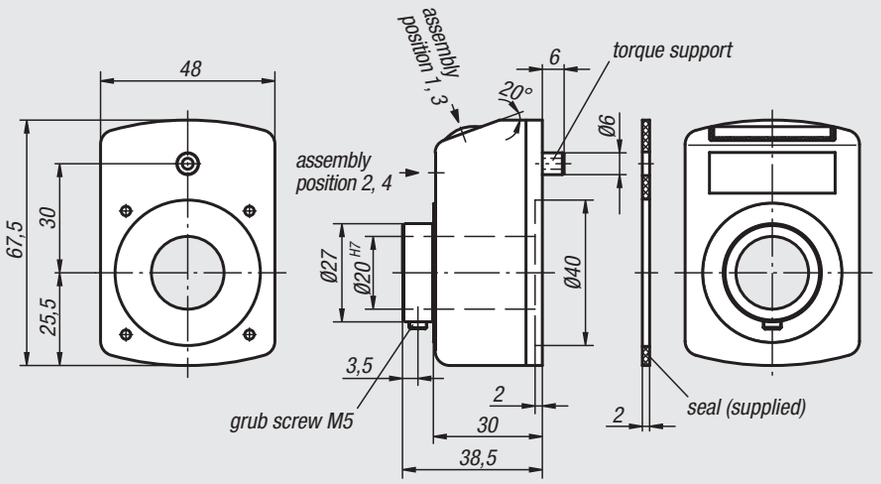
Note:
Position indicators allow direct reading of input measurement values at a glance.
In addition the value indicated per spindle rotation (corresponding spindle pitch) can be selected and the various indicator values can be operated by a transmission gear.
The position indicators are distinguished by their very clear display and fine scale. They have a torque support that is located in a drillhole on the other side.

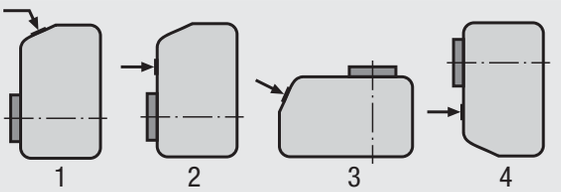
** At the 1st asterisk give assembly position and at the 2nd asterisk give the count direction (see sample order „assembly position, count direction“)

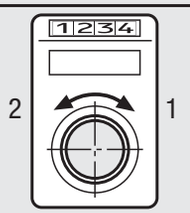
On request:
– Counter cover made of mineral glass
– Stainless steel driveshaft
– Axial sealing (dust-proof)
– Waterproof
– Vibration protection

Accessories:
– Reducing bushes 21940
– Insert plate 21942
– Mounting plates 21944

Technical data:
– Counter consisting of 5 10-position dials + fine scale
– Height of figures about 7 mm
– Hollow shaft Ø 20 H7 mm
– Temperature resistant to 80 °C
– Oil and solvent resistant
– Dust-proof



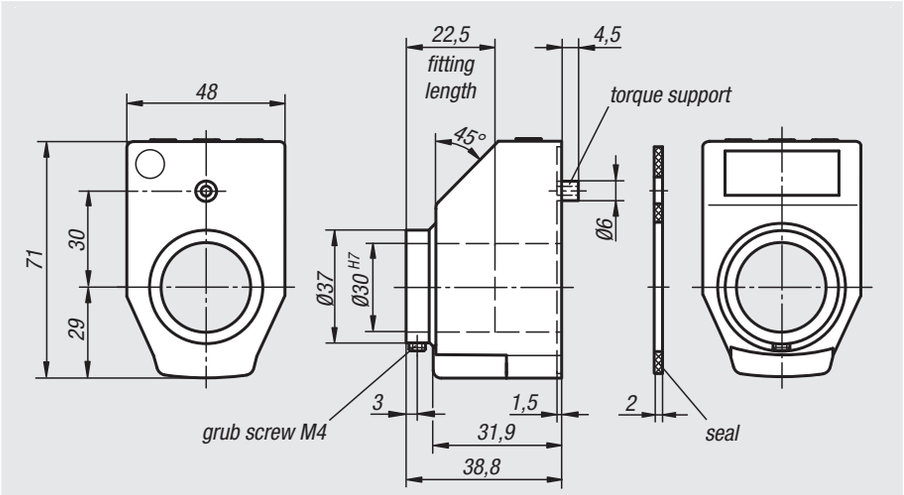
Display after one rotation, with decimal point:	Assembly position (1 - 4):
	
e. g. 21904-**01002**111 **0100** = 1 mm increments **2** = decimal places	e. g. 21904-0100**2**111 = assembly position **1**

Count direction (1 - 2):	Colour (1 - 2):
	
e. g. 21904-0100211 **1** = clockwise (ascending values) **2** = anticlockwise (ascending values)	e. g. 21904-0100211**1** **1** = orange **2** = black

Order No. orange	Order No. black	Pitch	Indicator after one rotation	Decimal point in position	max. speed U/min
21904-010021**	**21904-01002**2**	1	000,10	2	1500
21904-010011**	**21904-01001**2**	1	0001,0	1	1500
21904-015011**	**21904-01501**2**	1,5	0001,5	1	1000
21904-020011**	**21904-02001**2**	2	0002,0	1	750
21904-025011**	**21904-02501**2**	2,5	0002,5	1	600
21904-030011**	**21904-03001**2**	3	0003,0	1	500
21904-040011**	**21904-04001**2**	4	0004,0	1	450
21904-050011**	**21904-05001**2**	5	0005,0	1	300
21904-060011**	**21904-06001**2**	6	0006,0	1	250
21904-100011**	**21904-10001**2**	10	0010,0	1	150

Position indicators

freely programmable



Material:
Housing plastic.
Hollow shaft steel.
Screen LCD display.
Grub screw steel.

Version:
Hollow shaft black oxidised.
Grub screw black.

Sample order not programmed:
nlm 21922-12
(Position indicator with assembly position 1, colour black)

Sample order programmed:
nlm 21922-0200021120
(see ordering example on the next page)

Note:
The electronic position indicators offer diverse opportunities compared to mechanical position indicators because they display angles as well as uncommon spindle pitches and record each fraction of spindle movement.

* Freely programmable parameters using the programming software 21922-09.

Characteristics:
– indicated value and decimal point freely programmable
– linear or angle mode
– function key for zero-point position
– function key for switching between the absolute dimension and chain dimension
– programming of an offset value directly at the device
– easy battery change

Accessories:
– reducing bushes 21940
– programming software 21922-09

Technical data:
– LCD Display with 5 digits
– Digit size approx. 11.5 mm
– Display range from -19999 ... 99999
– Tunular shaft Ø 30 H7 mm
– Operating temperature -10 °C to +60 °C
– Storage temperature -30 °C to +80 °C
– Revolution max. 600 rpm
– Lithium battery Button cell 3V, type CR 2032. service life approx. 2 years
– Vibration-resistance according to DIN IEC 68-2-6 10 g / (5 ... 150 Hz), 20 g / (100 ... 2000 Hz)
– Shock-resistance according to DIN IEC 68-2-27 30 g / 15 ms
– EMC DIN EN 61000-4-2; DIN EN 61000-4-4
– Type of protection IP 51

Position indicators programmed

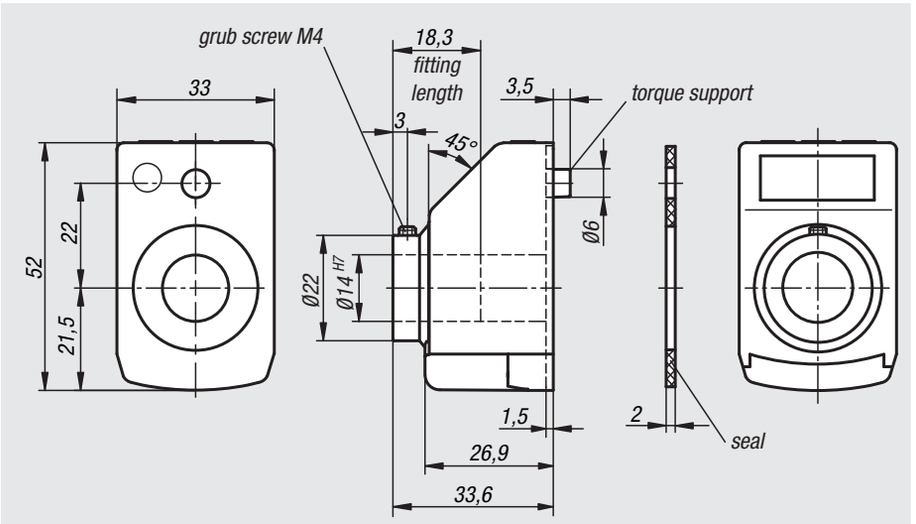
Order No.	Version
21922-	See sample order for Position Indicators, programmed

Position indicators not programmed*

Order No.	Colour	Assembly position	Pitch	Indicator after one rotation	Decimal point in position	Count direction	Zero-point position	Order No. software
21922-11	orange	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21922-12	black	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21922-13	red	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21922-31	orange	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21922-32	black	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21922-33	red	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09

Position indicators

freely programmable



Material:
Housing plastic.
Hollow shaft steel.
Screen LCD display.
Grub screw steel.

Version:
Hollow shaft black oxidised.
Grub screw black.

Sample order not programmed:
nlm 21923-12
(Position indicator with mounted position 1, colour black)

Sample order programmed:
nlm 21923-0200021120
(see ordering example on the next page)

Note:
The electronic position indicators offer diverse opportunities compared to mechanical position indicators because they display angles as well as uncommon spindle pitches and record each fraction of spindle movement.

* Freely programmable parameters using the programming software 21922-09.

Characteristics:
– indicated value and decimal point freely programmable
– linear or angle mode
– function key for zero-point position
– function key for switching between the absolute dimension and chain dimension
– programming of an offset value directly at the device
– easy battery change

Accessories:
– reducing bushes 21940
– programming software 21922-09

Technical data:
– LCD Display with 5 digits
– Digit size approx. 8 mm
– Display range from -19999 ... 99999
– Hollow shaft Ø 14 H7 mm
– Operating temperature -10 °C to +60 °C
– Storage temperature -30 °C to +80 °C
– Revolution max. 600 rpm
– Lithium battery button cell 3V, type CR 2032. service life ca. 2 years
– Vibration-resistance acc. to DIN IEC 68-2-6 10 g / (5 ... 150 Hz), 20 g / (100 ... 2000 Hz)
– Shock-resistance acc. to DIN IEC 68-2-27 30 g / 15 ms
– EMC DIN EN 61000-4-2; DIN EN 61000-4-4
– Protection IP 51

Position indicators programmed

Order No.	Version
21923-	See sample order for Position Indicators, programmed

Position indicators not programmed*

Order No.	Colour	Assembly position	Pitch	Indicator after one rotation	Decimal point in position	Count direction	Zero-point position	Order No. software
21923-11	orange	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21923-12	black	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21923-13	red	1	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21923-31	orange	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21923-32	black	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09
21923-33	red	3	freely programmable	freely programmable	freely programmable	freely programmable	freely programmable	21922-09

Sample order
for Position Indicators programmed 21922 and 21923

Order code:

21922- _ _ _ _ _ | _ | _ | _ | _ | _

Indicator after one rotation:

e.g.
21922-**02000**21120
Please indicate here which value is to be displayed after one rotation (this is usually the spindle pitch).

Important:
Please note the decimal point position!

Angle mode:
(resolution 0.1°)
If you want the display to be in angle mode, enter 03600.

The display in angle mode is 03600 after one rotation and returns to 00000 for the next rotation.

Decimal point position:

e.g.
21922-0200**2**1120
Please indicate here how many decimal places you require.

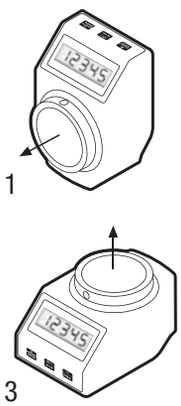
0 = 00000
1 = 0000.0
2 = 000.00
3 = 00.000

Angle mode:
If you want the display to be in angle mode, the decimal point is best put in position 1.

This means the display shows the value 0360.0 after one rotation.

Assembly position:

e.g.
21922-0200**2**1120
1 = Mounting position for horizontal spindle
3 = Mounting position for vertical spindle

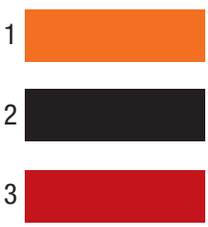


Count direction:

e.g.
21922-0200021**1**20
1 = clockwise (ascending values)
2 = anticlockwise (ascending values)

Colour:

e.g.
21922-0200021**1**2**0**
2 = black
3 = red

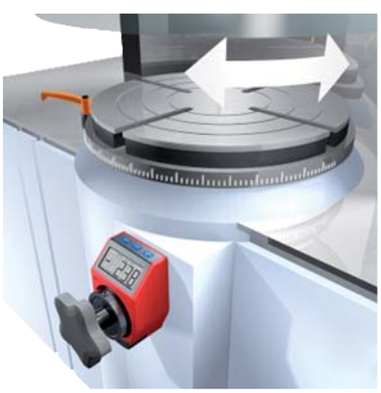


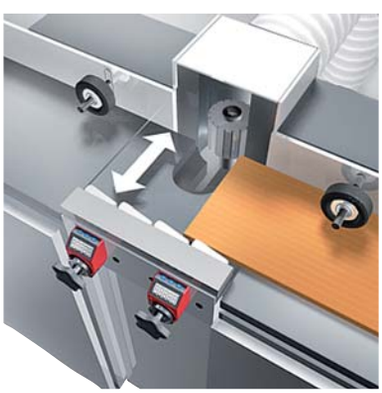
Zero-point position:

e.g.
21922-0200021**1**2**0**
0 = directly
5 = delayed by 5 sec.

The Zero-point position can be delayed by 5 sec. by means of a parameter, in order to avoid accidental zero setting.

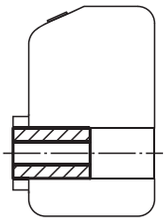
Application using position indicators

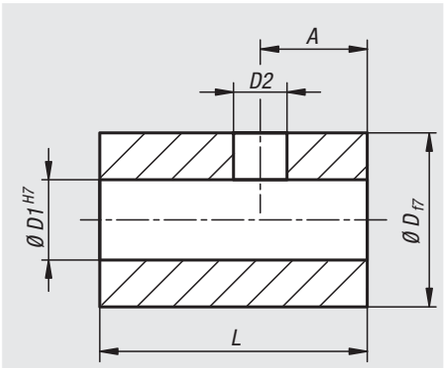




21940

Reducing bushings





Material:
Steel.

Version:
Black oxidised.

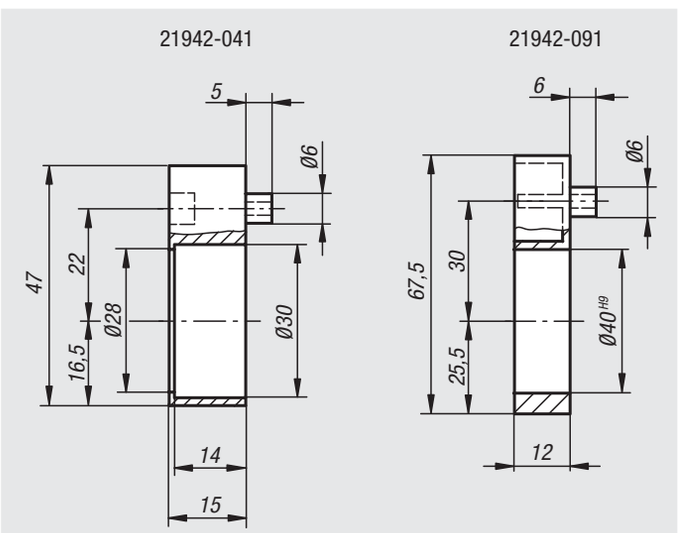
Sample order:
nlm 21940-14**08** (include Ø D1=8)

Note:
Reducing bushes are used for adapting the diameter between position indicator and positioning spindle.

Order No.	A	D	D1	D2	L	Suitable for position indicator
21940-10**	2,5	10	6/8	3,2	14	21901
21940-14**	3,5	14	6/8/10/12	4,2	17	21902, 21952
21940-20**	4,5	20	12/14/16/18	5,5	20	21904
21940-30**	4	30	12/14/16/18/20/25	5,5	30	21922

21942

Intermediate plates



Material:
Plastic

Sample order:
nlm 21942-041

Note:
Insert plates are used for mounting shaft collars and radial shaft seals.

Order No.	Suitable for position indicator
21942-041	21902, 21923
21942-091	21904, 21922

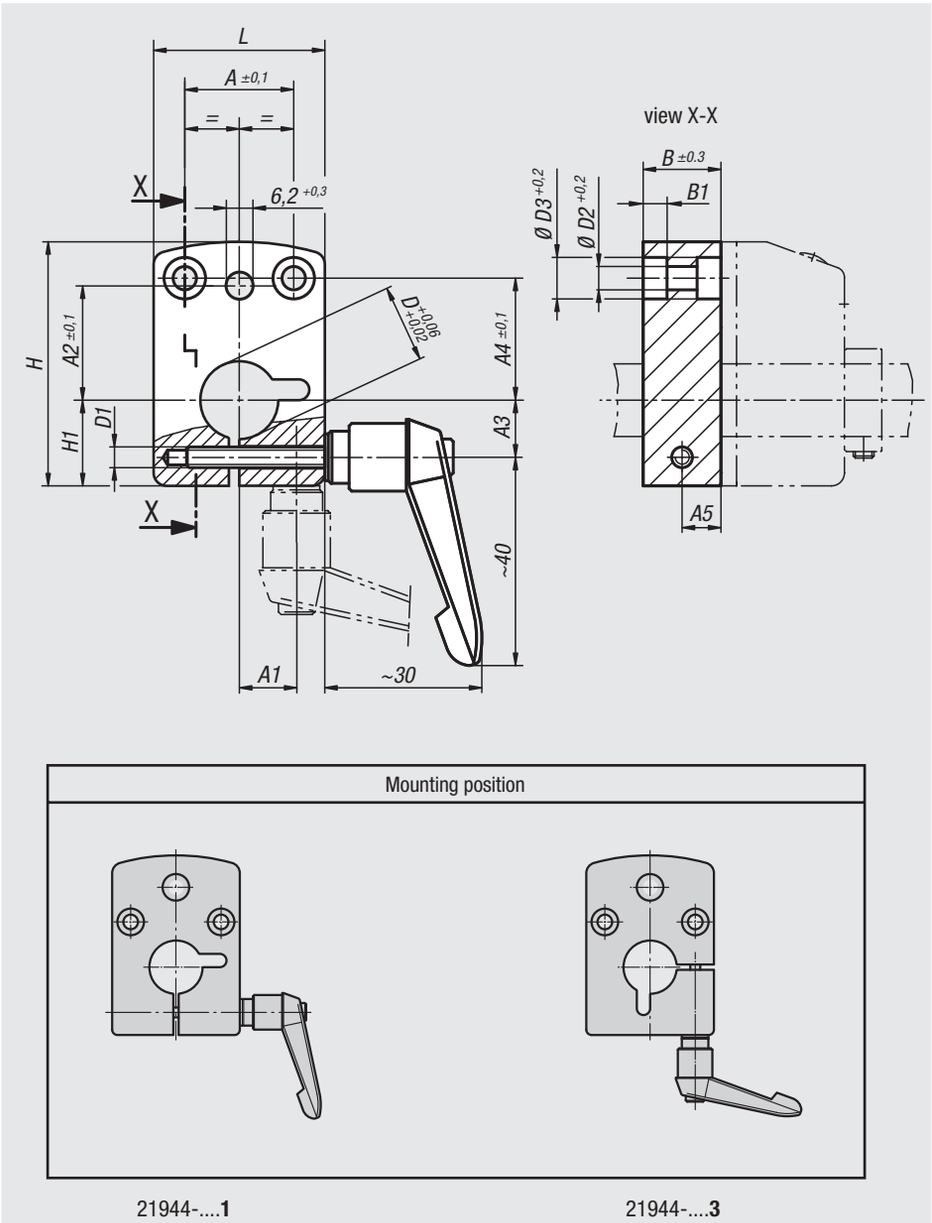
Mounting brackets

Material:
Housing aluminium
Clamping lever plastic.

Version:
Housing anodized.
Clamping lever black grey.

Sample order:
nlm 21944-09121

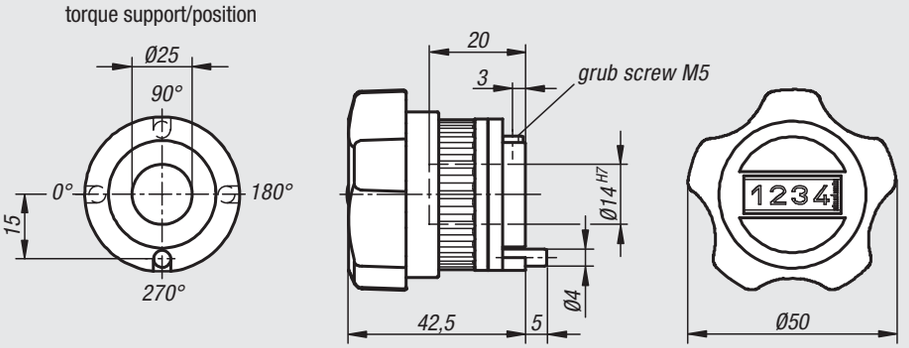
Note:
Mounting brackets and position indicators form a compact unit. The brackets guarantee reliable spindle clamping without additional construction work.
The simple assembly allows the retrofitting on existing equipment.



Order No. assembly position 1	Order No. assembly position 3	A	A1	A2	A3	A4	A5	B	B1	D	D1	D2	D3	H	H1	L	Suitable for position indicator
21944-04081	**21944-04083**	21	-/11	22	11/-	23,5	7,5	15	4,6	8	M4	4,5	8	47	16,5	33	21902
21944-04101	**21944-04103**	21	-/11	22	11/-	23,5	7,5	15	4,6	10	M4	4,5	8	47	16,5	33	21902
21944-04121	**21944-04123**	21	-/11	22	11/-	23,5	7,5	15	4,6	12	M4	4,5	8	47	16,5	33	21902
21944-04141	**21944-04143**	21	-/11	22	11/-	23,5	7,5	15	4,6	14	M4	4,5	8	47	16,5	33	21902
21944-09121	**21944-09123**	34	-/17	30	17/-	17	10	20	5,5	12	M5	5,5	10	67,5	25,5	48	21904
21944-09141	**21944-09143**	34	-/17	30	17/-	17	10	20	5,5	14	M5	5,5	10	67,5	25,5	48	21904
21944-09161	**21944-09163**	34	-/17	30	17/-	17	10	20	5,5	16	M5	5,5	10	67,5	25,5	48	21904
21944-09201	**21944-09203**	34	-/17	30	17/-	17	10	20	5,5	20	M5	5,5	10	67,5	25,5	48	21904

Adjusting knobs with position indicator

digital display



Material:
Housing plastic.
Hollow shaft steel.
Screen plastic.

Version:
Housing fibreglass reinforced.
Hollow shaft black oxidised.

Sample order:
nlm 21952-01501112
(Adjusting knob with 1.5 mm pitch, decimal point in first position from the right, torque support at 270°, direction of count ascending clockwise, colour black)

Note:
Adjusting knobs with integrated position indicators allow direct readout of set measurement values such as lengths, flow rates, speeds, etc, at a glance. In addition, the display value can be selected per spindle rotation (corresponding spindle pitch), with the different display values being realized by a variable ratio transmission. The torque support allows the use of the adjusting knobs in any assembly position, even in case of high vibrations.

** At the 1st asterisk give torque support and at the 2nd asterisk give the count direction (see sample order „torque support, count direction“).

On request:
Other pitches

Accessories:
– Reducing bushes 21940

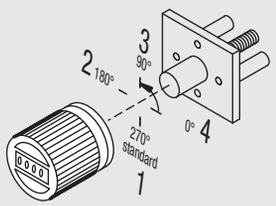
Technical data:
– Counter consisting of 4 10-position dials + fine scale
– Height of figures about 6 mm
– Hollow shaft Ø 14 H7 mm
– Temperature resistant to 80 °C
– Oil and solvent resistant

Indicator after one rotation, decimal point position:

order number	for pitch	display presentation
0150	1.5	001,5
0200	2	002,0
0400	4	004,0
0500	5	005,0
1000	10	010,0

e. g. 21952-**01501**112
0150 = 1.5 mm pitch
1 = decimal point at the 1st position from the right

Torque support (1 - 4):

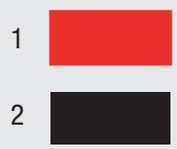


e.g. 21952-01501**1**12
1 = 270° (standard)

Count direction (1 - 2):

e.g. 21952-0150111**2**
1 = clockwise (ascending values)
2 = anticlockwise (ascending values)

Colour (1 - 2):



e.g. 21952-0150111**2**
1 = red
2 = black

Order No. red	Order No. black	Pitch	Indicator after one rotation	Decimal point in position
21952-015011**	**21952-01501**2**	1,5	001,5	1
21952-020011**	**21952-02001**2**	2	002,0	1
21952-040011**	**21952-04001**2**	4	004,0	1
21952-050011**	**21952-05001**2**	5	005,0	1
21952-100011**	**21952-10001**2**	10	010,0	1

Position indicators for handwheels

analogue-digital display

Material:
Housing, screen plastic.

Version:
Housing black, fibreglass reinforced.
Screen dustproof.

Sample order:
nlm 21962-800201

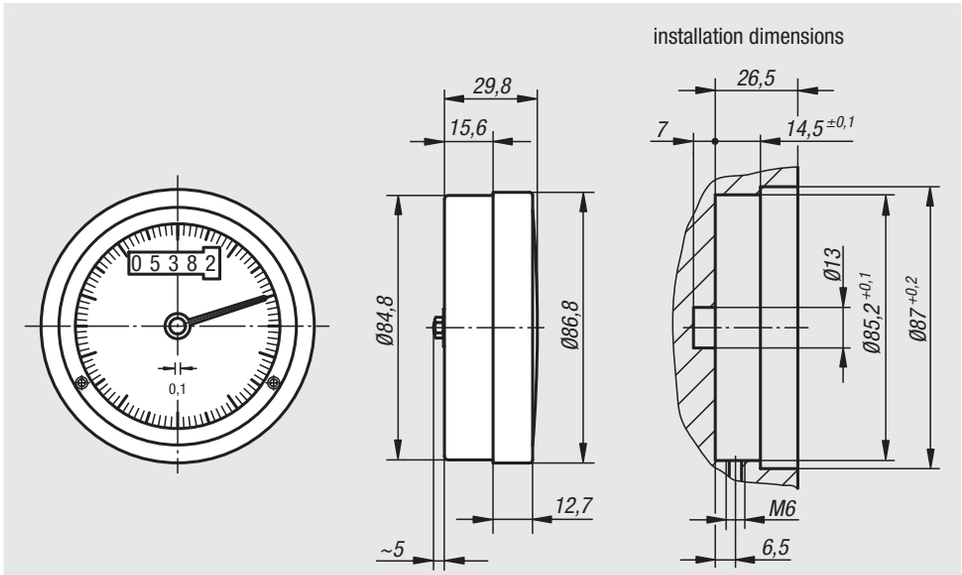
Note:
Position indicators are provided for installation in handwheels. They allow direct readout of set measurement values such as lengths, flow rates, speeds, etc, at a glance.
The measurement values are acquired according to the gravity principle. Conceived for use on horizontal spindles.

One revolution of the black pointer corresponds to one spindle rotation. In combination with the 5-place digital display, a very precise and easy read out of the position is thus obtained

On request:
Other pitches

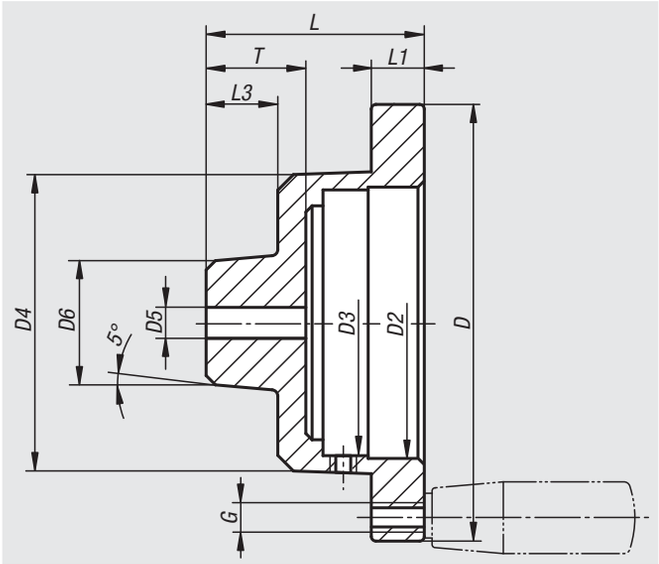
Accessories:
– Handwheels 21970 / 21972

installation dimensions



Order No.	Size	Pitch	Indicator after one rotation	Suitable for
21962-800201	80	2	00002	handwheel size 80
21962-800301	80	3	00003	handwheel size 80
21962-800401	80	4	00004	handwheel size 80
21962-800501	80	5	00005	handwheel size 80
21962-801001	80	10	00010	handwheel size 80

Handwheels for position indicators



Material:
Cast aluminium.

Version:
Bright.

Sample order:
nlm 21972-500801

Note:
The handwheels have a recess for receiving position indicators.

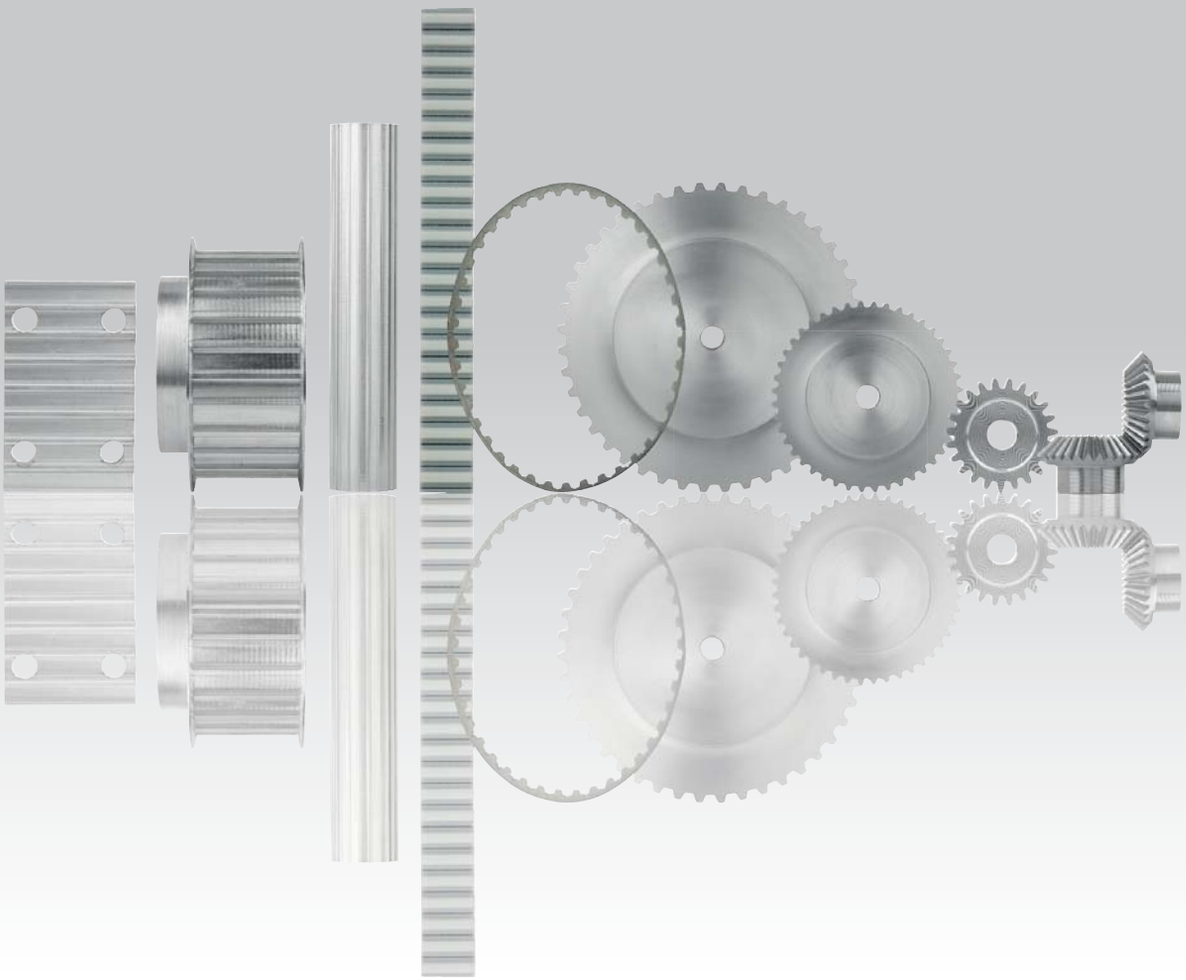
Accessories:
– Position Indicators 21960/21962
– Handles 06290 – 06320

Order No.	Size	D	D2	D3	D4	D5 predrilled	D6	G	L	L1	L3	T	Suitable for
21972-500801	50	80	52	50,5	60	5,8	26	M6	52	14	20	21	position indicator size 50
21972-801201	80	120	87	85,2	95	6,8	40	M6	64	15	23	30	position indicator size 80
21972-801401	80	140	87	85,2	95	6,8	40	M8	70	17	23	30	position indicator size 80

Notes

22000

Drive technology



Technical Information
for toothed belts 22052, 22054, 22057 and 22059

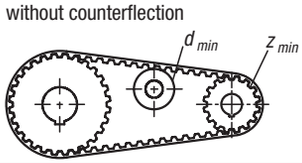
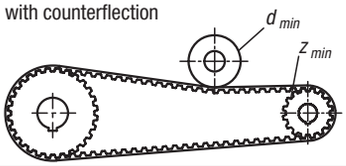
General
Polyurethane toothed belts are made of abrasion-resistant polyurethane and high-tensile reinforced steel cording. They allow for a smooth and synchronous transmission of power. They are maintenance-free and extremely cost-efficient.

Drive installation
Diagrams and performance tables are available on these pages for selecting the size. The axles must be parallel to one another. It is possible to align the toothed pulleys very precisely using a straight edge or laser. Use the largest possible toothed pulleys. Make sure that at least one toothed pulley has rim flanges. When installing the toothed belts, never forcefully lever over the rim flange. Adjustment possibilities should be pre-planned for mounting and setting the correct belt tension.

Belt tension
In order to guarantee a long service life and low-noise operation, correct alignment and pre-tensioning of the drive are absolutely necessary. Idlers are often used on drives with fixed centre distances in order to be able to set the the belt tension accurately. A smooth roller is the preferred idler to use on the slack side of the belt. Smooth idlers produce counter-flection which reduces the service life of the drive. If it is not possible to do without them, the idler should be at least 1.25 times as large as the drive's small toothed pulley and fitted as close as possible to the small pulley in order to maximise the number of teeth in mesh.

Belt storage
Never bend the toothed belt. When storing, prevent bending, direct solar radiation and chemical influences.

Minimum number of teeth and minimum diameter

	Profile		T5	T10	AT5	AT10
without counterflection 	Synchronising wheel	z_{min}	10	12	15	15
	Inner idler on teeth	d_{min} [mm]	30	60	30	50
with counterflection 	Synchronising wheel	z_{min}	15	20	25	25
	Outer idler on belt back	d_{min} [mm]	30	60	60	120

Technical information for toothed belts 22052 and 22057

Specific tooth force
Output „P“ and torque „M“ to be transferred via the belt are calculated using the following formulas:

P = Power [kW]
M = Torque [Nm]
P_{spez} = Specific power
M_{spez} = Specific torque
z_e = Engaging teeth of small gear wheel
z_{emax} = 12 for calculating max. permissible engaging teeth
z_k = Nr. of teeth of small gear wheel
b = Belt width [cm]
A = Centre distance [mm]

$P\ [kW] = P_{spez}$

$[Nm] = M_{spez}$

Division T 5

Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	2,523	0,000	**1200**	1,607	2,019	**3400**	1,248	4,444
20	2,458	0,051	**1300**	1,580	2,151	**3600**	1,229	4,632
40	2,403	0,101	**1400**	1,555	2,279	**3800**	1,209	4,812
60	2,354	0,148	**1440**	1,545	2,330	**4000**	1,191	4,988
80	2,312	0,194	**1500**	1,532	2,406	**4500**	1,149	5,414
100	2,276	0,238	**1600**	1,510	2,529	**5000**	1,111	5,818
200	2,135	0,447	**1700**	1,489	2,651	**5500**	1,078	6,206
300	2,032	0,638	**1800**	1,470	2,770	**6000**	1,046	6,571
400	1,951	0,817	**1900**	1,451	2,888	**6500**	1,017	6,924
500	1,884	0,987	**2000**	1,433	3,001	**7000**	0,991	7,262
600	1,829	1,149	**2200**	1,400	3,226	**7500**	0,966	7,588
700	1,781	1,306	**2400**	1,371	3,445	**8000**	0,943	7,897
800	1,738	1,456	**2600**	1,342	3,654	**8500**	0,920	8,191
900	1,701	1,603	**2800**	1,317	3,860	**9000**	0,900	8,480
1000	1,667	1,745	**3000**	1,306	3,940	**9500**	0,880	8,758
1100	1,635	1,884	**3200**	1,292	4,059	**10000**	0,862	9,027

Division T 10

Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	8,244	0,000	**1200**	4,808	6,042	**3400**	3,460	12,318
20	8,009	0,168	**1300**	4,708	6,409	**3600**	3,385	12,761
40	7,805	0,327	**1400**	4,614	6,764	**3800**	3,312	13,179
60	7,627	0,479	**1440**	4,577	6,902	**4000**	3,245	13,592
80	7,472	0,626	**1500**	4,526	7,109	**4500**	3,088	14,549
100	7,339	0,768	**1600**	4,444	7,445	**5000**	2,946	15,424
200	6,804	1,425	**1700**	4,366	7,771	**5500**	2,817	16,224
300	6,411	2,014	**1800**	4,292	8,090	**6000**	2,701	16,969
400	6,105	2,557	**1900**	4,222	8,401	**6500**	2,593	17,646
500	5,857	3,066	**2000**	4,157	8,706	**7000**	2,492	18,269
600	5,648	3,549	**2200**	4,033	9,291	**7500**	2,398	18,836
700	5,467	4,007	**2400**	3,920	9,851	**8000**	2,311	19,359
800	5,306	4,445	**2600**	3,815	10,386	**8500**	2,228	19,832
900	5,163	4,866	**2800**	3,718	10,901	**9000**	2,150	20,264
1000	5,034	5,271	**3000**	3,680	11,097	**9500**	2,077	20,661
1100	4,916	5,663	**3200**	3,626	11,389	**10000**	2,007	21,015

Division AT 5

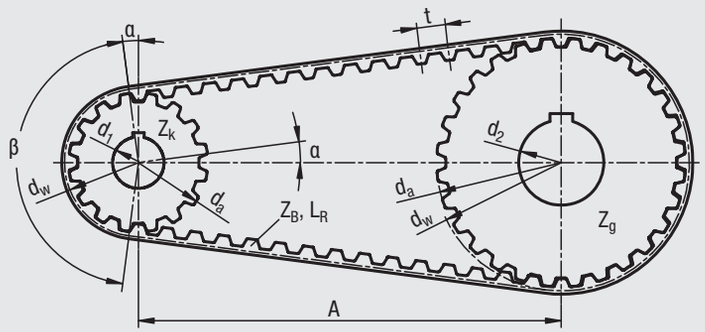
Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	3,813	0,000	**1200**	2,668	3,352	**3400**	1,993	7,096
20	3,758	0,079	**1300**	2,620	3,566	**3600**	1,954	7,368
40	3,708	0,155	**1400**	2,574	3,773	**3800**	1,917	7,627
60	3,663	0,230	**1440**	2,557	3,855	**4000**	1,881	7,879
80	3,623	0,304	**1500**	2,531	3,975	**4500**	1,799	8,479
100	3,586	0,376	**1600**	2,491	4,173	**5000**	1,725	9,032
200	3,448	0,722	**1700**	2,452	4,365	**5500**	1,658	9,549
300	3,343	1,050	**1800**	2,416	4,554	**6000**	1,596	10,029
400	3,235	1,355	**1900**	2,381	4,737	**6500**	1,539	10,473
500	3,137	1,642	**2000**	2,348	4,918	**7000**	1,485	10,887
600	3,050	1,916	**2200**	2,285	5,265	**7500**	1,436	11,278
700	2,972	2,178	**2400**	2,229	5,601	**8000**	1,389	11,635
800	2,900	2,430	**2600**	2,175	5,923	**8500**	1,346	11,980
900	2,834	2,671	**2800**	2,125	6,231	**9000**	1,304	12,289
1000	2,775	2,905	**3000**	2,106	6,352	**9500**	1,264	12,576
1100	2,719	3,132	**3200**	2,079	6,531	**10000**	1,228	12,854

Division AT 10

Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	Speed [min^{-1}]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	15,903	0,000	**1200**	10,174	12,785	**3400**	7,019	24,898
20	15,670	0,328	**1300**	9,945	13,538	**3600**	6,838	25,778
40	15,452	0,647	**1400**	9,731	14,266	**3800**	6,664	26,516
60	15,246	0,958	**1440**	9,649	14,550	**4000**	6,500	27,225
80	15,053	1,261	**1500**	9,529	14,968	**4500**	6,120	28,837
100	14,870	1,557	**1600**	9,340	15,649	**5000**	5,777	30,248
200	14,103	2,954	**1700**	9,160	16,305	**5500**	5,464	31,470
300	13,483	4,236	**1800**	8,990	16,944	**6000**	5,179	32,536
400	12,927	5,414	**1900**	8,828	17,563	**6500**	4,916	33,460
500	12,439	6,513	**2000**	8,672	18,162	**7000**	4,670	34,232
600	12,008	7,545	**2200**	8,380	19,305	**7500**	4,441	34,878
700	11,626	8,522	**2400**	8,113	20,390	**8000**	4,227	35,409
800	11,282	9,451	**2600**	7,866	21,414	**8500**	4,023	35,808
900	10,969	10,337	**2800**	7,632	22,378	**9000**	3,832	36,113
1000	10,683	11,186	**3000**	7,544	22,751	**9500**	3,651	36,322
1100	10,418	12,000	**3200**	7,416	23,296	**10000**	3,479	36,429

Technical information for toothed belts 22052 and 22057

b	(cm)	Belt width
L_R	(mm)	Belt length
z_R	-	Number of belt teeth
B	(mm)	Pulley width
A	(mm)	Centre distance
A_{eff}	(mm)	Effective centre distance
d	(mm)	Diameter of bore
d_a	(mm)	Outer diameter
d_{ak}	(mm)	Outer diameter of small pulley
d_{ag}	(mm)	Outer diameter of large pulley
d_w	(mm)	Effective diameter
d_{wk}	(mm)	Effective diameter of small pulley
d_{wg}	(mm)	Effective diameter of large pulley
F_{Wsta}	(N)	Static shaft power
F_{TV}	(N)	Pre-tensioning force per belt
F_{Tzul}	(N)	Maximum permissible belt tension
F_U	(N)	Peripheral force
M	(Nm)	Torque
P	(kW)	Output
t_{ab}	(s)	Acceleration time
t_{av}	(s)	Deceleration time
v	(m/s)	Speed / peripheral speed
z_e	-	Number of teeth in mesh
z_k	-	Number of teeth on small pulley
z_g	-	Number of teeth on large pulley
i	-	Speed ratio n1 : n2
ρ	(kg/dm3)	Density
J	(kgm 2)	Mass moment of inertia
t	(mm)	Pitch
n	(min-1)	Speed
n_1	(min-1)	Drive pulley speed
ω	(s -1)	Angular speed
β	(°)	Wrap angle



Formula's

Power

$$P = \frac{M \cdot n}{9550}$$

$$P = \frac{F_u \cdot d_w \cdot n}{19100 \cdot 10^3}$$

Circumferential force

$$F_u = \frac{19100 \cdot P \cdot 10^3}{n \cdot d_w}$$

$$F_u = \frac{2000 \cdot M}{d_w}$$

Torque

$$M = \frac{F_u \cdot d_w}{2000}$$

$$M = \frac{9550 \cdot P}{n}$$

Angular velocity

$$\omega = \frac{\pi \cdot n}{30}$$

Circumferential speed

$$v = \frac{d_w \cdot n}{19100}$$

Acceleration torque

$$M_{ab} = \frac{J \cdot \Delta n}{9{,}55 \cdot t_{ab}}$$

Moment of inertia

$$J = 98{,}2 \cdot 10^{-15} \cdot B \cdot \rho \cdot (d_a^4 - d^4)$$

Speed

$$n = \frac{19100 \cdot v}{d_w}$$

Effective diameter

$$d_w = \frac{z \cdot t}{\pi}$$

Belt length for i=1

$$L_R = 2 \cdot A + \pi \cdot d_w$$

$$L_R = 2 \cdot A + z \cdot t$$

Belt length for i ≠ 1
(simplified)

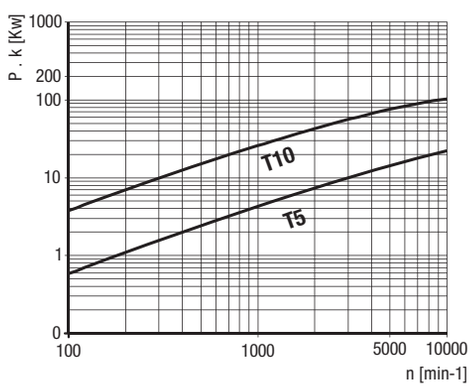
$$L_R \approx \frac{t}{2} \cdot (z_g + z_k) + 2A + \frac{1}{4A} \cdot \left[\frac{(z_g - z_k) \cdot t}{\pi}\right]^2$$

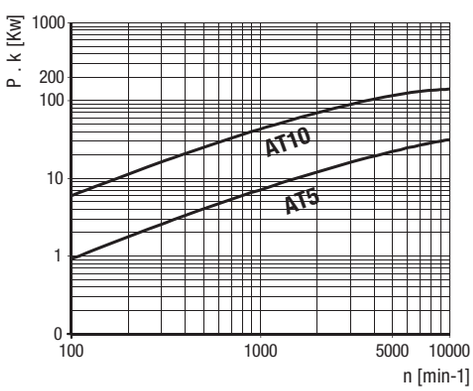
Belt length for i ≠ 1
(for greater accuracy)

$$L_R \approx 2A \cdot \sin \cdot \frac{\beta}{2} + \frac{t}{2} \cdot \left[z_g + z_k + \left(1 - \frac{\beta}{180}\right) \cdot (z_g - z_k)\right]$$

Selection diagram

The selection diagrams enables the selection of the belt profile for the drive task in advance. The application c safety factors and the speed of the small pulley must be taken into account.





Technical information for toothed belts 22052 and 22057

Drive calculation

The following data are required for the calculation:

- drive output to be transferred = P [kW]
- drive speed = n_1 [min-1]
- motor starting torque = M_{ab} [Nm]
- centre distance required = A [mm]
- max. permissible drive pulley diameter = d_{w1} [mm]

Safety factor

Belts are selected for uniform loads. A c1 safety factor must be anticipated for peak and dynamic loads.

drive with uniform load c1 = 1.0

drive with peak or dynamic load:

light c1	=	1.4
medium c1	=	1.7
heavy c1	=	2.0

For speed step-up ratios a c2 acceleration factor must be anticipated:

i = from 0.66 to 1.0 c2	= 1.1
i = from 0.40 to 0.66 c2	= 1.2
i < 0.40 c2	= 1.3

The overall service factor is:

$c_0 = c_1 \times c_2$

Belt and washer selection

Use the selection diagram for belt pre-selection. Selecting the largest permissible pulley is recommended.

Calculating speed ratio i

$$i = \frac{n_1}{n_2}$$

Calculating the number of teeth in mesh

$$z_e = \frac{\beta}{360} \cdot z_k$$

with β [°] = wrap angle

$$\beta = 2 \cdot \arccos \cdot \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A} \right]$$

Determining the belt width

$$b = \frac{P \cdot 1000 \cdot c_0}{z_k \cdot z_e \cdot P_{spez}} \qquad b = \frac{100 \cdot M \cdot c_0}{z_k \cdot z_e \cdot M_{spez}}$$

Checking the permissible belt tension

The permissible belt tension must be greater than the maximum peripheral force anticipated.

$$F_{Tzul} > c_0 \cdot F_U \quad \text{with} \quad F_U = \frac{2000 \cdot M}{d_w}$$

Static shaft power

FWsta = 2 x FTV x cos x β

FWsta = 2 x FTV (for i = 1)

Determining the pretension

The belt is pretensioned correctly if the slack side remains tensioned under every operating condition that occurs. In order to achieve the lowest shaft load possible, care must be taken, though, not to tension more than is required. The correct belt tension also depends on the belt length LR (number of belt teeth zR).

The following pretensioning forces per side are recommended:

2 shaft drives

$z_R < 75$	$F_{TV} = 1/3\ F_U$
$75 < z_R < 150$	$F_{TV} = 1/2\ F_U$
$z_R > 150$	$F_{TV} = 2/3\ F_U$
multi-shaft drives	$F_{TV} > F_U$

Use of an applicable measurement device is recommended to set the pretension correctly.

Calculation example

- motor output to be transferred	10 kW
- drive speed n1	2600 1/min
- drive speed n2	2600 1/min
- motor starting torque	50 Nm
- centre distance required A	400 mm
- max. permissible drive pulley diameter dw	130 mm
- safety factor c1	1.4

Calculating the speed ratio

$$\frac{n_1}{n_2} = 1$$

Belt selection:

Belt pitch T10 is selected from the selection diagram taking into account safety factor 1.4 for calculated output PB of 14 kW corrected as a result.

Calculating the number of washer teeth z:

The number of teeth is calculated from the maximum permissible pulley diameter and the selected belt pitch T10. On the basis of speed ratio i = 1, driving and driven pulley are the same size.

$$z = \frac{130 \cdot \pi}{10} = 40.84 \text{ - selected } z = 40 \text{ with } dw = 127.32 \text{ mm.}$$

The maximum permissible diameter was selected in order to minimise the belt width.

$z_1 = 40, z_2 = 40$

Calculating the belt length

$L_R = 2 \cdot A + \pi \cdot d \cdot w = 2 \cdot A + z \cdot t$

$L_R = 2 \cdot 400 + 40 \cdot 10 = 1200$ mm

Number of teeth in mesh

When i = 1 the number of teeth in mesh on both pulleys is z e = 20.

Determining belt width b:

$$b = \frac{1000 \cdot 10 \cdot 1{,}4}{40 \cdot 12 \cdot 10{,}386} = 2{,}81 \text{ cm} = 28{,}1 \text{ mm}$$

The next largest standard belt width of 32 mm is selected. The belt width selected is checked based on the motor starting torque for speed n = 0.

$$b = \frac{100 \cdot 50}{40 \cdot 12 \cdot 3{,}815} = 2{,}73 \text{ cm} = 27{,}3 \text{ mm}$$

The next largest standard width of 32 mm is selected.

Checking the permissable belt tension FTzul:

$$F_U = \frac{2000 \cdot 50}{127{,}32} = 785{,}4 \text{ N}$$

Pretensioning force via number of belt teeth

$$Z_R = \frac{1200}{10} = 120 \text{ teeth}$$

Belt pretensioning force FTV per side is:

$$F_{TV} = \frac{1}{2} \cdot F_U = 392{,}7 \text{ N with } z_R = 120$$

Flexibility:

The requisite minimum diameters are maintained.

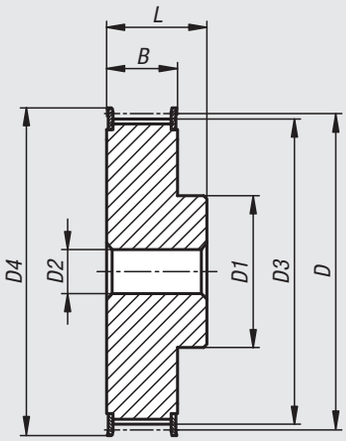
Belt selected:

32 T10 - 1200

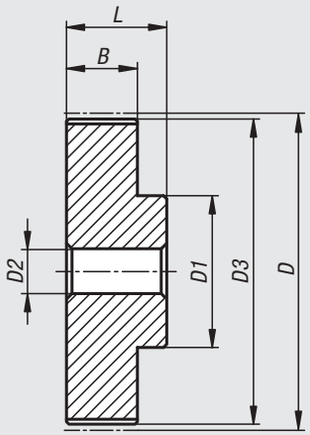
Toothed belt pulleys,

T profile

Form A



Form B



Material:
Aluminium.
Rim flanges, steel.

Version:
Aluminium bright.
Steel galvanized.

Sample order:
nlm 22002-051010

Note:
Standard T-profile to DIN 7721 T2 with metric pitch (trapezoidal toothing). At least one toothed belt pulley must have rim flanges. The toothed belt pulleys have a centre or pilot hole.

Toothed belt pulleys, T5 profile

Order No. belt width 10 mm	Order No. belt width 16 mm	Order No. belt width 25 mm	Form	No. of teeth	D	D1	D2 max.	D3	D4	B	L
22002-051010	**22002-051610**	**22002-052510**	A	10	15,92	8	5	15,05	19,5	15/21/30	21/27/36
22002-051012	**22002-051612**	**22002-052512**	A	12	19,01	10	6	18,25	23	15/21/30	21/27/36
22002-051014	**22002-051614**	**22002-052514**	A	14	22,29	13	8	21,45	25	15/21/30	21/27/36
22002-051015	**22002-051615**	**22002-052515**	A	15	23,88	16	10	23,05	28	15/21/30	21/27/36
22002-051016	**22002-051616**	**22002-052516**	A	16	25,47	18	11	24,6	32	15/21/30	21/27/36
22002-051018	**22002-051618**	**22002-052518**	A	18	28,65	20	12	27,8	30	15/21/30	21/27/36
22002-051019	**22002-051619**	**22002-052519**	A	19	30,25	22	12	29,4	36	15/21/30	21/27/36
22002-051020	**22002-051620**	**22002-052520**	A	20	31,83	23	14	31	36	15/21/30	21/27/36
22002-051022	**22002-051622**	**22002-052522**	A	22	35,12	24	15	34,25	38	15/21/30	21/27/36
22002-051024	**22002-051624**	**22002-052524**	A	24	38,21	26	15	37,4	42	15/21/30	21/27/36
22002-051025	**22002-051625**	**22002-052525**	A	25	39,8	26	15	39	44	15/21/30	21/27/36
22002-051026	**22002-051626**	**22002-052526**	A	26	41,47	26	16	40,6	44	15/21/30	21/27/36
22002-051027	**22002-051627**	**22002-052527**	A	27	42,98	30	18	42,2	48	15/21/30	21/27/36
22002-051028	**22002-051628**	**22002-052528**	A	28	44,62	32	18	43,75	48	15/21/30	21/27/36
22002-051030	**22002-051630**	**22002-052530**	A	30	47,76	34	18	46,95	51	15/21/30	21/27/36
22002-051032	**22002-051632**	**22002-052532**	A	32	50,94	38	22	50,1	54	15/21/30	21/27/36
22002-051036	**22002-051636**	**22002-052536**	A	36	57,31	38	22	56,45	63	15/21/30	21/27/36
22002-051040	**22002-051640**	**22002-052540**	A	40	63,66	40	23	62,85	66	15/21/30	21/27/36
22002-051042	**22002-051642**	**22002-052542**	A	42	66,87	40	24	66	71	15/21/30	21/27/36
22002-051044	**22002-051644**	**22002-052544**	B	44	70,07	45	26	69,2	-	15/21/30	21/27/36
22002-051048	**22002-051648**	**22002-052548**	B	48	76,42	50	28	75,55	-	15/21/30	21/27/36
22002-051060	**22002-051660**	**22002-052560**	B	60	95,52	65	35	94,65	-	15/21/30	21/27/36

Toothed belt pulleys,

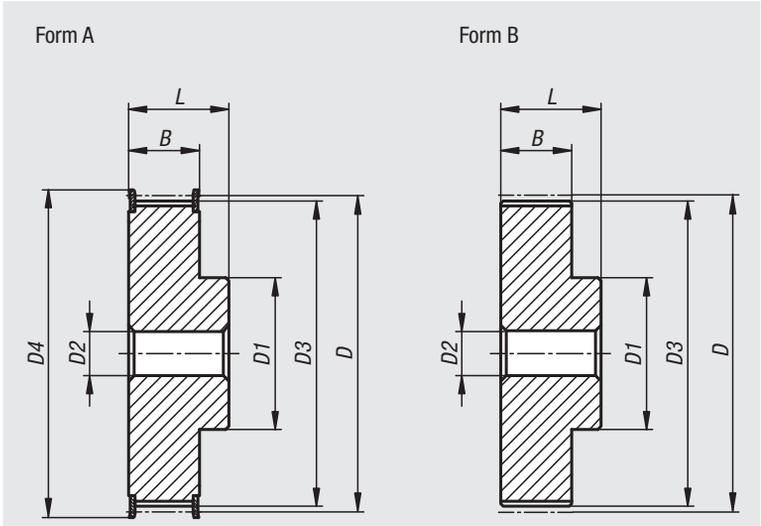
T profile

Toothed belt pulleys, T10 profile

Order No. belt width 16 mm	Order No. belt width 25 mm	Order No. belt width 32 mm	Form	No. of teeth	D	D1	D2 max.	D3	D4	B	L
22002-101612	**22002-102512**	**-**	A	12	38,2	28	16	36,35	42	21/30	31/40
22002-101614	**22002-102514**	**-**	A	14	44,56	32	18	42,7	48	21/30	31/40
22002-101615	**22002-102515**	**-**	A	15	47,75	32	18	45,9	51	21/30	31/40
22002-101616	**22002-102516**	**-**	A	16	50,93	35	20	49,05	54	21/30	31/40
22002-101618	**22002-102518**	**22002-103218**	A	18	57,29	40	22	55,45	60	21/30/37	31/40/47
22002-101619	**22002-102519**	**22002-103219**	A	19	60,48	44	22	58,6	66	21/30/37	31/40/47
22002-101620	**22002-102520**	**22002-103220**	A	20	63,66	46	24	61,8	66	21/30/37	31/40/47
22002-101622	**22002-102522**	**22002-103222**	A	22	70,03	52	28	68,15	75	21/30/37	31/40/47
22002-101624	**22002-102524**	**22002-103224**	A	24	76,39	58	30	74,55	83	21/30/37	31/40/47
22002-101625	**22002-102525**	**22002-103225**	A	25	79,58	60	30	77,7	83	21/30/37	31/40/47
22002-101626	**22002-102526**	**22002-103226**	A	26	82,76	60	30	80,9	87	21/30/37	31/40/47
22002-101627	**22002-102527**	**22002-103227**	A	27	85,95	60	30	84,1	91	21/30/37	31/40/47
22002-101628	**22002-102528**	**22002-103228**	A	28	89,13	60	30	87,25	93	21/30/37	31/40/47
22002-101630	**22002-102530**	**22002-103230**	A	30	95,49	60	30	93,65	97	21/30/37	31/40/47
22002-101632	**22002-102532**	**22002-103232**	A	32	101,86	65	32	100	106	21/30/37	31/40/47
22002-101636	**22002-102536**	**22002-103236**	A	36	114,59	70	35	112,75	119	21/30/37	31/40/47
22002-101640	**22002-102540**	**22002-103240**	A	40	127,32	80	40	125,45	131	21/30/37	31/40/47
22002-101644	**22002-102544**	**22002-103244**	B	44	140,06	88	46	138,2	-	21/30/37	31/40/47
22002-101648	**22002-102548**	**22002-103248**	B	48	152,78	95	48	150,95	-	21/30/37	31/40/47
22002-101660	**22002-102560**	**22002-103260**	B	60	190,98	110	60	189,1	-	21/30/37	31/40/47

Toothed belt pulleys,

AT profile



Material:
Aluminium.
Rim flanges, steel.

Version:
Aluminium bright.
Steel galvanized.

Sample order:
nlm 22003-051012

Note:
Standard AT-profile with metric pitch (trapezoidal toothing). At least one toothed belt pulley must have rim flanges. The toothed belt pulleys have a centre or pilot hole.

Toothed belt pulleys, AT5 profile

Order No. belt width 10 mm	Order No. belt width 16 mm	Order No. belt width 25 mm	Form	No. of teeth	D	D1	D2 max.	D3	D4	B	L
22003-051012	**22003-051612**	**22003-052512**	A	12	19,01	10	6	17,85	23	15/21/30	21/27/36
22003-051014	**22003-051614**	**22003-052514**	A	14	22,29	13	8	21,05	25	15/21/30	21/27/36
22003-051015	**22003-051615**	**22003-052515**	A	15	23,88	16	10	22,65	28	15/21/30	21/27/36
22003-051016	**22003-051616**	**22003-052516**	A	16	25,47	18	11	24,2	32	15/21/30	21/27/36
22003-051018	**22003-051618**	**22003-052518**	A	18	28,65	20	12	27,4	32	15/21/30	21/27/36
22003-051019	**22003-051619**	**22003-052519**	A	19	30,25	22	12	29	36	15/21/30	21/27/36
22003-051020	**22003-051620**	**22003-052520**	A	20	31,83	23	14	30,6	36	15/21/30	21/27/36
22003-051022	**22003-051622**	**22003-052522**	A	22	35,12	24	15	33,85	38	15/21/30	21/27/36
22003-051024	**22003-051624**	**22003-052524**	A	24	38,21	26	15	37	42	15/21/30	21/27/36
22003-051025	**22003-051625**	**22003-052525**	A	25	39,8	26	15	38,6	44	15/21/30	21/27/36
22003-051026	**22003-051626**	**22003-052526**	A	26	41,47	26	16	40,2	44	15/21/30	21/27/36
22003-051027	**22003-051627**	**22003-052527**	A	27	42,98	30	18	41,8	48	15/21/30	21/27/36
22003-051028	**22003-051628**	**22003-052528**	A	28	44,62	32	18	43,35	48	15/21/30	21/27/36
22003-051030	**22003-051630**	**22003-052530**	A	30	47,76	34	18	46,55	51	15/21/30	21/27/36
22003-051032	**22003-051632**	**22003-052532**	A	32	50,94	38	22	49,7	54	15/21/30	21/27/36
22003-051036	**22003-051636**	**22003-052536**	A	36	57,31	38	22	56,05	63	15/21/30	21/27/36
22003-051040	**22003-051640**	**22003-052540**	A	40	63,66	40	23	62,45	66	15/21/30	21/27/36
22003-051042	**22003-051642**	**22003-052542**	A	42	66,87	40	24	65,6	71	15/21/30	21/27/36
22003-051044	**22003-051644**	**22003-052544**	B	44	70,07	45	26	68,8	-	15/21/30	21/27/36
22003-051048	**22003-051648**	**22003-052548**	B	48	76,42	50	28	75,15	-	15/21/30	21/27/36
22003-051060	**22003-051660**	**22003-052560**	B	60	95,52	65	35	94,25	-	15/21/30	21/27/36

Toothed belt pulleys,

AT profile

Toothed belt pulleys, AT10 profile

Order No. belt width 16 mm	Order No. belt width 25 mm	Order No. belt width 32 mm	Form	No. of teeth	D	D1	D2 max.	D3	D4	B	L
22003-101615	**22003-102515**	**-**	A	15	47,75	32	18	45,9	51	21/30	31/40
22003-101616	**22003-102516**	**-**	A	16	50,93	35	20	49,05	54	21/30	31/40
22003-101618	**22003-102518**	**22003-103218**	A	18	57,29	40	22	55,45	60	21/30/37	31/40/47
22003-101619	**22003-102519**	**22003-103219**	A	19	60,48	44	22	58,6	66	21/30/37	31/40/47
22003-101620	**22003-102520**	**22003-103220**	A	20	63,66	46	24	61,8	66	21/30/37	31/40/47
22003-101622	**22003-102522**	**22003-103222**	A	22	70,03	52	28	68,15	75	21/30/37	31/40/47
22003-101624	**22003-102524**	**22003-103224**	A	24	76,39	58	30	74,55	83	21/30/37	31/40/47
22003-101625	**22003-102525**	**22003-103225**	A	25	79,58	60	30	77,7	83	21/30/37	31/40/47
22003-101626	**22003-102526**	**22003-103226**	A	26	82,76	60	30	80,9	87	21/30/37	31/40/47
22003-101627	**22003-102527**	**22003-103227**	A	27	85,95	60	30	84,1	91	21/30/37	31/40/47
22003-101628	**22003-102528**	**22003-103228**	A	28	89,13	60	30	87,25	93	21/30/37	31/40/47
22003-101630	**22003-102530**	**22003-103230**	A	30	95,49	60	30	93,65	97	21/30/37	31/40/47
22003-101632	**22003-102532**	**22003-103232**	A	32	101,86	65	32	100	106	21/30/37	31/40/47
22003-101636	**22003-102536**	**22003-103236**	A	36	114,59	70	35	112,75	119	21/30/37	31/40/47
22003-101640	**22003-102540**	**22003-103240**	A	40	127,32	80	40	125,45	131	21/30/37	31/40/47
22003-101644	**22003-102544**	**22003-103244**	B	44	140,06	88	46	138,2	-	21/30/37	31/40/47
22003-101648	**22003-102548**	**22003-103248**	B	48	152,78	95	48	150,95	-	21/30/37	31/40/47
22003-101660	**22003-102560**	**22003-103260**	B	60	190,98	110	60	189,1	-	21/30/37	31/40/47

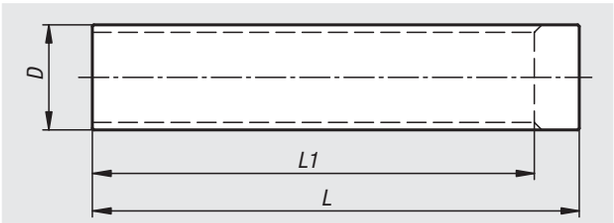
Splined shafts

T profile

Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 22007-05010



Note:
Standard T-profile to DIN 7721 T2 with metric pitch (trapezoidal toothing).
For manufacturing your own toothed wheels

Splined shafts, T5 profile

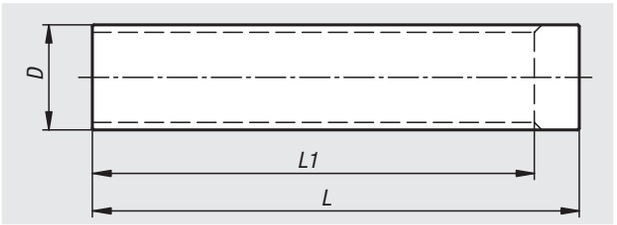
Order No.	Profile	No. of teeth	D	L	L1
22007-05010	T5	10	15,05	140	125
22007-05011	T5	11	16,65	140	125
22007-05012	T5	12	18,25	140	125
22007-05013	T5	13	19,85	140	125
22007-05014	T5	14	21,45	140	132
22007-05015	T5	15	23,05	140	132
22007-05016	T5	16	24,6	140	140
22007-05017	T5	17	26,2	140	140
22007-05018	T5	18	27,8	140	140
22007-05019	T5	19	29,4	140	140
22007-05020	T5	20	31	160	160
22007-05021	T5	21	32,7	160	160
22007-05022	T5	22	34,15	160	160
22007-05023	T5	23	35,85	160	160
22007-05024	T5	24	37,4	160	160
22007-05025	T5	25	38,95	160	160
22007-05026	T5	26	40,6	160	160
22007-05027	T5	27	42,2	160	160
22007-05028	T5	28	43,75	160	160
22007-05029	T5	29	45,35	160	160
22007-05030	T5	30	46,95	160	160
22007-05032	T5	32	50,1	160	160
22007-05034	T5	34	53,25	160	160
22007-05035	T5	35	54,85	160	160
22007-05036	T5	36	56,45	160	160
22007-05037	T5	37	58,06	160	160
22007-05038	T5	38	59,65	160	160
22007-05040	T5	40	62,85	160	160
22007-05042	T5	42	66	160	160
22007-05044	T5	44	69,2	160	160
22007-05045	T5	45	70,8	160	160
22007-05046	T5	46	72,4	160	160
22007-05048	T5	48	75,55	160	160
22007-05050	T5	50	78,75	160	160
22007-05060	T5	60	94,65	160	160
22007-05072	T5	72	113,75	160	160
22007-05080	T5	80	126,48	160	160
22007-05090	T5	90	142,4	160	160
22007-05100	T5	100	158,31	160	160

Splined shafts, T10 profile

Order No.	Profile	No. of teeth	D	L	L1
22007-10010	T10	10	29,98	140	140
22007-10011	T10	11	33,16	140	140
22007-10012	T10	12	36,35	140	140
22007-10013	T10	13	39,5	140	140
22007-10014	T10	14	42,7	160	160
22007-10015	T10	15	45,9	160	160
22007-10016	T10	16	49,1	160	160
22007-10017	T10	17	52,25	160	160
22007-10018	T10	18	55,45	160	160
22007-10019	T10	19	58,65	160	160
22007-10020	T10	20	61,8	160	160
22007-10021	T10	21	65	160	160
22007-10022	T10	22	68,2	160	160
22007-10023	T10	23	71,35	160	160
22007-10024	T10	24	74,55	160	160
22007-10026	T10	26	80,9	160	160
22007-10028	T10	28	87,25	160	160
22007-10030	T10	30	93,65	160	160
22007-10032	T10	32	100	160	160
22007-10034	T10	34	106,4	160	160
22007-10036	T10	36	112,75	160	160
22007-10038	T10	38	119,1	160	160
22007-10040	T10	40	125,45	160	160
22007-10045	T10	45	141,4	160	160
22007-10048	T10	48	150,95	160	160
22007-10060	T10	60	189,1	160	160
22007-10072	T10	72	227,29	160	160

Splined shafts

AT profile



Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 22008-05012

Note:
Standard AT-profile with metric pitch (trapezoidal toothing).
For manufacturing your own toothed wheels

Splined shafts, AT5 profile

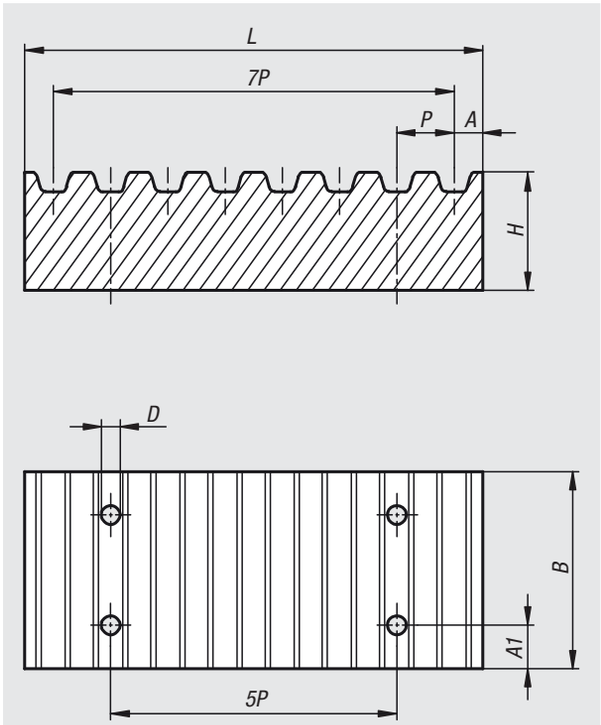
Order No.	Profile	No. of teeth	D	L	L1
22008-05012	AT5	12	17,85	140	125
22008-05013	AT5	13	19,45	140	125
22008-05014	AT5	14	21,05	140	132
22008-05015	AT5	15	22,65	140	132
22008-05016	AT5	16	24,2	140	140
22008-05017	AT5	17	25,8	140	140
22008-05018	AT5	18	27,4	140	140
22008-05019	AT5	19	29	140	140
22008-05020	AT5	20	30,6	160	160
22008-05021	AT5	21	32,3	160	160
22008-05022	AT5	22	33,85	160	160
22008-05023	AT5	23	35,45	160	160
22008-05024	AT5	24	37	160	160
22008-05025	AT5	25	38,6	160	160
22008-05026	AT5	26	40,2	160	160
22008-05027	AT5	27	41,8	160	160
22008-05028	AT5	28	43,35	160	160
22008-05030	AT5	30	46,55	160	160
22008-05032	AT5	32	49,7	160	160
22008-05034	AT5	34	52,85	160	160
22008-05036	AT5	36	56,05	160	160
22008-05038	AT5	38	59,25	160	160
22008-05040	AT5	40	62,45	160	160
22008-05042	AT5	42	65,6	160	160
22008-05044	AT5	44	68,8	160	160
22008-05046	AT5	46	72	160	160
22008-05048	AT5	48	75,15	160	160
22008-05052	AT5	52	81,55	160	160
22008-05056	AT5	56	87,9	160	160
22008-05058	AT5	58	91,1	160	160
22008-05060	AT5	60	94,25	160	160
22008-05064	AT5	64	100,65	160	160
22008-05072	AT5	72	113,25	160	160

Splined shafts, AT10 profile

Order No.	Profile	No. of teeth	D	L	L1
22008-10015	AT10	15	45,9	160	160
22008-10016	AT10	16	49,05	160	160
22008-10017	AT10	17	52,25	160	160
22008-10018	AT10	18	55,45	160	160
22008-10019	AT10	19	58,6	160	160
22008-10020	AT10	20	61,8	160	160
22008-10021	AT10	21	65	160	160
22008-10022	AT10	22	68,15	160	160
22008-10023	AT10	23	71,35	160	160
22008-10024	AT10	24	74,55	160	160
22008-10025	AT10	25	77,7	160	160
22008-10026	AT10	26	80,9	160	160
22008-10027	AT10	27	84,1	160	160
22008-10028	AT10	28	87,25	160	160
22008-10030	AT10	30	93,65	160	160
22008-10032	AT10	32	100	160	160
22008-10034	AT10	34	106,4	160	160
22008-10036	AT10	36	112,75	160	160
22008-10038	AT10	38	119,1	160	160
22008-10040	AT10	40	125,45	160	160
22008-10042	AT10	42	131,85	160	160
22008-10044	AT10	44	138,2	160	160
22008-10046	AT10	46	144,55	160	160
22008-10048	AT10	48	150,95	160	160
22008-10052	AT10	52	163,65	160	160
22008-10056	AT10	56	176,4	160	160
22008-10058	AT10	58	182,75	160	160
22008-10060	AT10	60	189,1	160	160
22008-10070	AT10	70	220,95	160	160

Clamp plates for toothed belts

profile T and AT

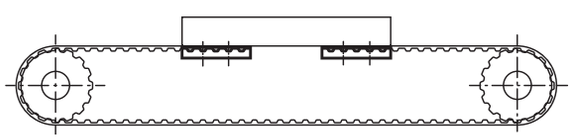


Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 22012-05101

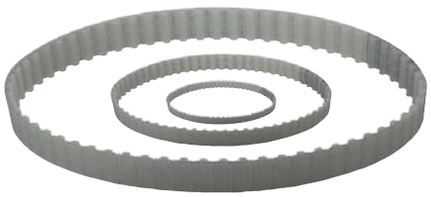
Note:
Clamp plates are used to mechanically secure the free belt end for numerous linear applications. The clamp plates must have matching tooth profiles to the belts to be secure to apply a uniform clamping force. For standard applications at least 7 belt teeth per belt end and must be engaged.



Order No.	Profile	Belt width	P	A	A1	B	D	H	L
22012-05101	T5	10	5	3,4	6	29	5,5	8	41,8
22012-05161	T5	16	5	3,4	6	35	5,5	8	41,8
22012-05251	T5	25	5	3,4	6	44	5,5	8	41,8
22012-10161	T10	16	10	5	8	41	9	15	80
22012-10251	T10	25	10	5	8	50	9	15	80
22012-10321	T10	32	10	5	8	57	9	15	80
22012-05102	AT5	10	5	3,4	6	29	5,5	8	41,8
22012-05162	AT5	16	5	3,4	6	35	5,5	8	41,8
22012-05252	AT5	25	5	3,4	6	44	5,5	8	41,8
22012-10162	AT10	16	10	5	8	41	9	15	80
22012-10252	AT10	25	10	5	8	50	9	15	80
22012-10322	AT10	32	10	5	8	57	9	15	80

Toothed belts

T profile



Material:
Polyurethane (PU) with steel cord reinforcement.

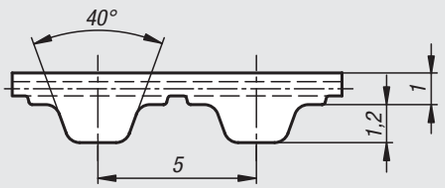
Sample order:
nlm 22052-0510X0165

Note:
Endless toothed belt with trapezoidal profile to DIN 7721 T1 with metric pitch. Ideal for drives with high belt flexibility. Permits smallest pulley diameters. The toothed belts are intended for drives where precision is a requirement, safety is important and the effects of chemicals are a concern.

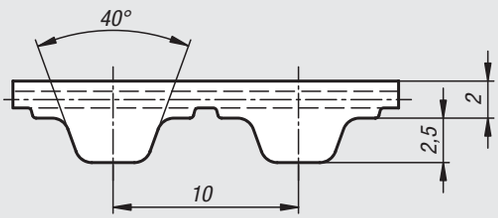
Temperature range:
from -30°C to +90°C

Characteristics:
- maintenance-free
- high-power transmission
- minimal belt extension
- accurate positioning and angles
- very good chemical resistance, especially to oils, greases and fuels
- extremely high abrasion resistance
- transmits power up to 30 kW
- reliable speed up to 10,000 rpm

Profile T5



Profile T10



Toothed belts T5 profile

Order No. Belt width 10	Order No. Belt width 16	Order No. Belt width 25	No. of teeth	Effective length
22052-0510X0165	22052-0516X0165	22052-0525X0165	33	165
22052-0510X0185	22052-0516X0185	22052-0525X0185	37	185
22052-0510X0200	22052-0516X0200	22052-0525X0200	40	200
22052-0510X0215	22052-0516X0215	22052-0525X0215	43	215
22052-0510X0220	22052-0516X0220	22052-0525X0220	44	220
22052-0510X0225	22052-0516X0225	22052-0525X0225	45	225
22052-0510X0245	22052-0516X0245	22052-0525X0245	49	245
22052-0510X0250	22052-0516X0250	22052-0525X0250	50	250
22052-0510X0255	22052-0516X0255	22052-0525X0255	51	255
22052-0510X0260	22052-0516X0260	22052-0525X0260	52	260
22052-0510X0270	22052-0516X0270	22052-0525X0270	54	270
22052-0510X0275	22052-0516X0275	22052-0525X0275	55	275
22052-0510X0280	22052-0516X0280	22052-0525X0280	56	280
22052-0510X0295	22052-0516X0295	22052-0525X0295	59	295
22052-0510X0300	22052-0516X0300	22052-0525X0300	60	300
22052-0510X0305	22052-0516X0305	22052-0525X0305	61	305
22052-0510X0325	22052-0516X0325	22052-0525X0325	65	325
22052-0510X0330	22052-0516X0330	22052-0525X0330	66	330
22052-0510X0340	22052-0516X0340	22052-0525X0340	68	340
22052-0510X0350	22052-0516X0350	22052-0525X0350	70	350
22052-0510X0355	22052-0516X0355	22052-0525X0355	71	355
22052-0510X0365	22052-0516X0365	22052-0525X0365	73	365
22052-0510X0375	22052-0516X0375	22052-0525X0375	75	375
22052-0510X0390	22052-0516X0390	22052-0525X0390	78	390
22052-0510X0400	22052-0516X0400	22052-0525X0400	80	400
22052-0510X0410	22052-0516X0410	22052-0525X0410	82	410
22052-0510X0420	22052-0516X0420	22052-0525X0420	84	420
22052-0510X0425	22052-0516X0425	22052-0525X0425	85	425
22052-0510X0450	22052-0516X0450	22052-0525X0450	90	450
22052-0510X0455	22052-0516X0455	22052-0525X0455	91	455
22052-0510X0475	22052-0516X0475	22052-0525X0475	95	475

Toothed belts

T profile

Toothed belts T5 profile

Order No. Belt width 10	Order No. Belt width 16	Order No. Belt width 25	No. of teeth	Effective length
22052-0510X0480	22052-0516X0480	22052-0525X0480	96	480
22052-0510X0500	22052-0516X0500	22052-0525X0500	100	500
22052-0510X0510	22052-0516X0510	22052-0525X0510	102	510
22052-0510X0525	22052-0516X0525	22052-0525X0525	105	525
22052-0510X0545	22052-0516X0545	22052-0525X0545	109	545
22052-0510X0550	22052-0516X0550	22052-0525X0550	110	550
22052-0510X0560	22052-0516X0560	22052-0525X0560	112	560
22052-0510X0575	22052-0516X0575	22052-0525X0575	115	575
22052-0510X0600	22052-0516X0600	22052-0525X0600	120	600
22052-0510X0610	22052-0516X0610	22052-0525X0610	122	610
22052-0510X0620	22052-0516X0620	22052-0525X0620	124	620
22052-0510X0630	22052-0516X0630	22052-0525X0630	126	630
22052-0510X0640	22052-0516X0640	22052-0525X0640	128	640
22052-0510X0650	22052-0516X0650	22052-0525X0650	130	650
22052-0510X0660	22052-0516X0660	22052-0525X0660	132	660
22052-0510X0690	22052-0516X0690	22052-0525X0690	138	690
22052-0510X0700	22052-0516X0700	22052-0525X0700	140	700
22052-0510X0720	22052-0516X0720	22052-0525X0720	144	720
22052-0510X0750	22052-0516X0750	22052-0525X0750	150	750
22052-0510X0780	22052-0516X0780	22052-0525X0780	156	780
22052-0510X0815	22052-0516X0815	22052-0525X0815	163	815
22052-0510X0840	22052-0516X0840	22052-0525X0840	168	840
22052-0510X0850	22052-0516X0850	22052-0525X0850	170	850
22052-0510X0900	22052-0516X0900	22052-0525X0900	180	900
22052-0510X0990	22052-0516X0990	22052-0525X0990	198	990
22052-0510X1000	22052-0516X1000	22052-0525X1000	200	1000
22052-0510X1075	22052-0516X1075	22052-0525X1075	215	1075
22052-0510X1100	22052-0516X1100	22052-0525X1100	220	1100
22052-0510X1215	22052-0516X1215	22052-0525X1215	243	1215
22052-0510X1380	22052-0516X1380	22052-0525X1380	276	1380
22052-0510X1440	22052-0516X1440	22052-0525X1440	288	1440

Toothed belts T10 profile

Order No. Belt width 16	Order No. Belt width 25	Order No. Belt width 32	No. of teeth	Effective length
22052-1016X0260	22052-1025X0260	22052-1032X0260	26	260
22052-1016X0370	22052-1025X0370	22052-1032X0370	37	370
22052-1016X0400	22052-1025X0400	22052-1032X0400	40	400
22052-1016X0410	22052-1025X0410	22052-1032X0410	41	410
22052-1016X0440	22052-1025X0440	22052-1032X0440	44	440
22052-1016X0450	22052-1025X0450	22052-1032X0450	45	450
22052-1016X0500	22052-1025X0500	22052-1032X0500	50	500
22052-1016X0530	22052-1025X0530	22052-1032X0530	53	530

Toothed belts

T profile

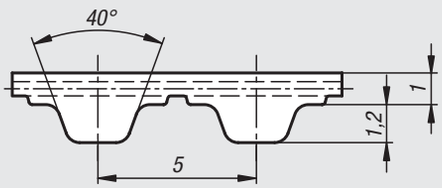
Toothed belts T10 profile

Order No. Belt width 16	Order No. Belt width 25	Order No. Belt width 32	No. of teeth	Effective length
22052-1016X0560	22052-1025X0560	22052-1032X0560	56	560
22052-1016X0610	22052-1025X0610	22052-1032X0610	61	610
22052-1016X0630	22052-1025X0630	22052-1032X0630	63	630
22052-1016X0660	22052-1025X0660	22052-1032X0660	66	660
22052-1016X0690	22052-1025X0690	22052-1032X0690	69	690
22052-1016X0700	22052-1025X0700	22052-1032X0700	70	700
22052-1016X0720	22052-1025X0720	22052-1032X0720	72	720
22052-1016X0750	22052-1025X0750	22052-1032X0750	75	750
22052-1016X0780	22052-1025X0780	22052-1032X0780	78	780
22052-1016X0810	22052-1025X0810	22052-1032X0810	81	810
22052-1016X0840	22052-1025X0840	22052-1032X0840	84	840
22052-1016X0880	22052-1025X0880	22052-1032X0880	88	880
22052-1016X0890	22052-1025X0890	22052-1032X0890	89	890
22052-1016X0900	22052-1025X0900	22052-1032X0900	90	900
22052-1016X0920	22052-1025X0920	22052-1032X0920	92	920
22052-1016X0960	22052-1025X0960	22052-1032X0960	96	960
22052-1016X0970	22052-1025X0970	22052-1032X0970	97	970
22052-1016X0980	22052-1025X0980	22052-1032X0980	98	980
22052-1016X1010	22052-1025X1010	22052-1032X1010	101	1010
22052-1016X1080	22052-1025X1080	22052-1032X1080	108	1080
22052-1016X1110	22052-1025X1110	22052-1032X1110	111	1110
22052-1016X1140	22052-1025X1140	22052-1032X1140	114	1140
22052-1016X1150	22052-1025X1150	22052-1032X1150	115	1150
22052-1016X1210	22052-1025X1210	22052-1032X1210	121	1210
22052-1016X1240	22052-1025X1240	22052-1032X1240	124	1240
22052-1016X1250	22052-1025X1250	22052-1032X1250	125	1250
22052-1016X1300	22052-1025X1300	22052-1032X1300	130	1300
22052-1016X1320	22052-1025X1320	22052-1032X1320	132	1320
22052-1016X1350	22052-1025X1350	22052-1032X1350	135	1350
22052-1016X1390	22052-1025X1390	22052-1032X1390	139	1390
22052-1016X1400	22052-1025X1400	22052-1032X1400	140	1400
22052-1016X1420	22052-1025X1420	22052-1032X1420	142	1420
22052-1016X1440	22052-1025X1440	22052-1032X1440	144	1440
22052-1016X1450	22052-1025X1450	22052-1032X1450	145	1450
22052-1016X1460	22052-1025X1460	22052-1032X1460	146	1460
22052-1016X1500	22052-1025X1500	22052-1032X1500	150	1500
22052-1016X1560	22052-1025X1560	22052-1032X1560	156	1560
22052-1016X1610	22052-1025X1610	22052-1032X1610	161	1610
22052-1016X1750	22052-1025X1750	22052-1032X1750	175	1750
22052-1016X1780	22052-1025X1780	22052-1032X1780	178	1780
22052-1016X1880	22052-1025X1880	22052-1032X1880	188	1880
22052-1016X1960	22052-1025X1960	22052-1032X1960	196	1960
22052-1016X2250	22052-1025X2250	22052-1032X2250	225	2250

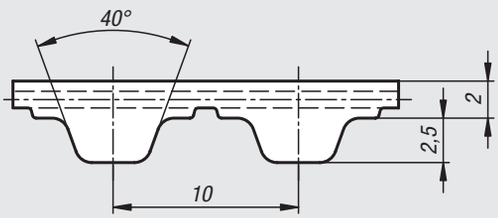
Toothed belts by the metre

T profile

Profile T5



Profile T10



Material:
Polyurethane (PU) with steel cord reinforcement.

Sample order:
nlm 22054-0510X0500
(include length L)

Note:
Toothed belt with trapezoidal profile to DIN 7721 T1. Intended especially for drives subject to high bending loads. May be used for pulleys with a very small diameter. Generally used for linear drives, low-power transmission and transport applications. Polyurethane belts may be welded. The power transmission rating of welded belts drops by about 50%.

Width tolerance: ±0.5 mm
Thickness tolerance: ±0.2 mm

On request:
Other lengths.
With T5 pitch, in 5 mm increments.
With T10 pitch, in 10 mm increments.
Maximum belt length 100 metres.

Order No.	Profile	Belt width	Tension max. N	Length	matching clamp plate
22054-0510X	T5	10	320	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05101
22054-0516X	T5	16	540	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05161
22054-0525X	T5	25	900	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05251
22054-1016X	T10	16	1610	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10161
22054-1025X	T10	25	2650	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10251
22054-1032X	T10	32	3450	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10321

Toothed belts by the metre

T profile

Specific tooth force

The specific tooth force F_{Uspez} is the maximum force that a single engaged belt tooth 1 cm wide can transmit.
This force depends on the speed of the drive pulley. To calculate the transmissible longitudinal force F_U for the belt cross-section, the number z_e of engaged
teeth is multiplied by the specific tooth force F_{Uspez} and the belt width b.

$$F_U = F_{Uspec} \bullet z_e \bullet b$$

F_U = transmissible longitudinal force
F_{Uspec} = specific tooth force
z_e = number of engaged teeth
z_{emax} = for the calculation, perm. maximum number of engaged teeth = 12
b = belt width in cm

Pitch T5

rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)
0	24,70	800	17,02	1900	14,21	4500	11,25
20	24,07	900	16,65	2000	14,03	5000	10,88
40	23,53	1000	16,32	2200	13,71	5500	10,55
60	23,05	1100	16,01	2400	13,42	6000	10,24
80	22,64	1200	15,73	2600	13,14	6500	9,96
100	22,28	1300	15,47	2800	12,89	7000	9,70
200	20,90	1400	15,22	3000	12,65	7500	9,46
300	19,89	1440	15,13	3200	12,43	8000	9,23
400	19,10	1500	15,00	3400	12,22	8500	9,01
500	18,45	1600	14,78	3600	12,03	9000	8,81
600	17,91	1700	14,58	3800	11,84	9500	8,62
700	17,44	1800	14,39	4000	11,66	10000	8,44

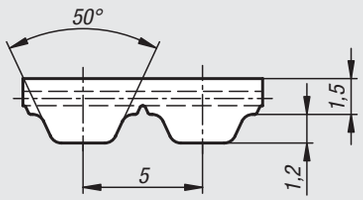
Pitch T10

rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)
0	51,80	800	33,34	1900	26,53	4500	19,40
20	50,32	900	32,44	2000	26,12	5000	18,51
40	49,04	1000	31,63	2200	25,34	5500	17,70
60	47,92	1100	30,89	2400	24,63	6000	16,97
80	46,95	1200	30,21	2600	23,97	6500	16,29
100	46,11	1300	29,58	2800	23,36	7000	15,66
200	42,75	1400	28,99	3000	22,78	7500	15,07
300	40,28	1440	28,76	3200	22,25	8000	14,52
400	38,36	1500	28,44	3400	21,74	8500	14,00
500	36,80	1600	27,92	3600	21,27	9000	13,51
600	35,49	1700	27,43	3800	20,81	9500	13,05
700	34,35	1800	26,97	4000	20,39	10000	12,61

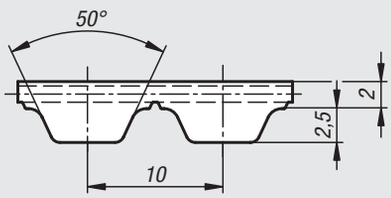
Toothed belts

AT profile

Profile AT5



Profile AT10



Material:
Polyurethane (PU) with steel cord reinforcement.

Sample order:
nlm 22057-0510X0225

Note:
Endless toothed belt with trapezoidal profile and reinforced steel cord (compared to T-Series) with metric pitch. Optimised tooth profile for more uniform force distribution and lower tooth deformation under load. Reduced polygon effect for quieter belt operation. The toothed belts are intended for drives where precision is a requirement, safety is important and the effects of chemicals are a concern.

Temperature range:
from -30°C to +90°C

Characteristics:
- maintenance-free
- high-power transmission
- minimal belt extension
- accurate positioning and angles
- very good chemical resistance, especially to oils, greases and fuels
- extremely high abrasion resistance
- transmits power up to 70 kW
- reliable speed up to 10,000 rpm

Toothed belts AT5 profile

Order No. Belt width 10	Order No. Belt width 16	Order No. Belt width 25	No. of teeth	Effective length
22057-0510X0225	22057-0516X0225	22057-0525X0225	45	225
22057-0510X0255	22057-0516X0255	22057-0525X0255	51	255
22057-0510X0280	22057-0516X0280	22057-0525X0280	56	280
22057-0510X0300	22057-0516X0300	22057-0525X0300	60	300
22057-0510X0340	22057-0516X0340	22057-0525X0340	68	340
22057-0510X0375	22057-0516X0375	22057-0525X0375	75	375
22057-0510X0390	22057-0516X0390	22057-0525X0390	78	390
22057-0510X0420	22057-0516X0420	22057-0525X0420	84	420
22057-0510X0455	22057-0516X0455	22057-0525X0455	91	455
22057-0510X0500	22057-0516X0500	22057-0525X0500	100	500
22057-0510X0545	22057-0516X0545	22057-0525X0545	109	545
22057-0510X0600	22057-0516X0600	22057-0525X0600	120	600
22057-0510X0610	22057-0516X0610	22057-0525X0610	122	610
22057-0510X0660	22057-0516X0660	22057-0525X0660	132	660
22057-0510X0720	22057-0516X0720	22057-0525X0720	144	720
22057-0510X0750	22057-0516X0750	22057-0525X0750	150	750
22057-0510X0780	22057-0516X0780	22057-0525X0780	156	780
22057-0510X0825	22057-0516X0825	22057-0525X0825	165	825
22057-0510X0975	22057-0516X0975	22057-0525X0975	195	975
22057-0510X1050	22057-0516X1050	22057-0525X1050	210	1.050
22057-0510X1125	22057-0516X1125	22057-0525X1125	225	1.125
22057-0510X1500	22057-0516X1500	22057-0525X1500	300	1.500

Toothed belts

AT profile

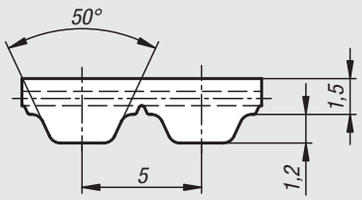
Toothed belts AT10 profile

Order No. Belt width 16	Order No. Belt width 25	Order No. Belt width 32	No. of teeth	Effective length
22057-1016X0500	22057-1025X0500	22057-1032X0500	50	500
22057-1016X0560	22057-1025X0560	22057-1032X0560	56	560
22057-1016X0610	22057-1025X0610	22057-1032X0610	61	610
22057-1016X0660	22057-1025X0660	22057-1032X0660	66	660
22057-1016X0700	22057-1025X0700	22057-1032X0700	70	700
22057-1016X0730	22057-1025X0730	22057-1032X0730	73	730
22057-1016X0780	22057-1025X0780	22057-1032X0780	78	780
22057-1016X0800	22057-1025X0800	22057-1032X0800	80	800
22057-1016X0840	22057-1025X0840	22057-1032X0840	84	840
22057-1016X0890	22057-1025X0890	22057-1032X0890	89	890
22057-1016X0920	22057-1025X0920	22057-1032X0920	92	920
22057-1016X0960	22057-1025X0960	22057-1032X0960	96	960
22057-1016X0980	22057-1025X0980	22057-1032X0980	98	980
22057-1016X1010	22057-1025X1010	22057-1032X1010	101	1.010
22057-1016X1050	22057-1025X1050	22057-1032X1050	105	1.050
22057-1016X1080	22057-1025X1080	22057-1032X1080	108	1.080
22057-1016X1150	22057-1025X1150	22057-1032X1150	115	1.150
22057-1016X1210	22057-1025X1210	22057-1032X1210	121	1.210
22057-1016X1250	22057-1025X1250	22057-1032X1250	125	1.250
22057-1016X1320	22057-1025X1320	22057-1032X1320	132	1.320
22057-1016X1400	22057-1025X1400	22057-1032X1400	140	1.400
22057-1016X1500	22057-1025X1500	22057-1032X1500	150	1.500
22057-1016X1600	22057-1025X1600	22057-1032X1600	160	1.600
22057-1016X1700	22057-1025X1700	22057-1032X1700	170	1.700
22057-1016X1800	22057-1025X1800	22057-1032X1800	180	1.800

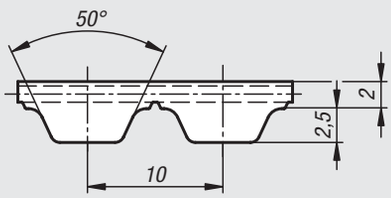
Toothed belts by the meter

AT profile

Profile AT5



Profile AT10



Material:
Polyurethane (PU) with steel cord reinforcement.

Sample order:
nlm 22059-0510X0500
(include length L)

Note:
Toothed belt with trapezoidal profile and reinforced steel cord (compared to T-Series). Optimised tooth profile for more uniform force distribution and lower tooth deformation under load. High-performance steel cord reinforcement for high breaking strength and low belt extension. Reduced polygon effect for quieter belt operation. Especially well-suited for linear drives and low power transmission where exact axial and angular positioning are required. Polyurethane belts may be welded. The power transmission rating of welded belts drops by about 50%.

Width tolerance: ±0.5 mm
Thickness tolerance: ±0.2 mm

On request:
Other lengths.
AT5 pitch in 5 mm length increases.
AT10 pitch in 10 mm length increases.
Maximum belt length 100 metres.

Order No.	Profile	Belt width	Tension max. N	Length	matching clamp plate
22059-0510X	AT5	10	640	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05102
22059-0516X	AT5	16	1120	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05162
22059-0525X	AT5	25	1840	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-05252
22059-1016X	AT10	16	2450	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10162
22059-1025X	AT10	25	4170	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10252
22059-1032X	AT10	32	5390	500/1000/1500/2000/2500/3000/3500/4000/5000	22012-10322

Toothed belts by the meter

AT profile

Specific tooth force

The specific tooth force F_{Uspez} is the maximum force that a single engaged belt tooth 1 cm wide can transmit.
This force depends on the speed of the drive pulley. To calculate the transmissible longitudinal force F_U for the belt cross-section, the number z_e of engaged
teeth is multiplied by the specific tooth force F_{Uspez} and the belt width b.

$$F_U = F_{Uspec} \bullet z_e \bullet b$$

F_U = transmissible longitudinal force
F_{Uspec} = specific tooth force
z_e = number of engaged teeth
z_{emax} = for the calculation, perm. maximum number of engaged teeth = 12
b = belt width in cm

Pitch AT5

rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)
0	36,40	800	27,69	1900	22,73	4500	17,18
20	35,88	900	27,06	2000	22,42	5000	16,47
40	35,40	1000	26,49	2200	21,82	5500	15,83
60	34,97	1100	25,96	2400	21,28	6000	15,24
80	34,59	1200	25,47	2600	20,77	6500	14,69
100	34,24	1300	25,01	2800	20,29	7000	14,18
200	32,92	1400	24,57	3000	19,85	7500	13,71
300	31,92	1440	24,41	3200	19,43	8000	13,26
400	30,89	1500	24,16	3400	19,03	8500	12,85
500	29,95	1600	23,78	3600	18,66	9000	12,45
600	29,12	1700	23,41	3800	18,30	9500	12,07
700	28,37	1800	23,07	4000	17,96	10000	11,72

Pitch AT10

rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)	rpm	F_{Uspec} (N/cm)
0	75,70	800	53,70	1900	42,02	4500	29,13
20	74,59	900	52,21	2000	41,28	5000	27,50
40	73,55	1000	50,85	2200	39,89	5500	26,01
60	72,57	1100	49,59	2400	38,62	6000	24,65
80	71,65	1200	48,43	2600	37,44	6500	23,40
100	70,78	1300	47,34	2800	36,33	7000	22,23
200	67,13	1400	46,32	3000	35,30	7500	21,14
300	64,18	1440	45,93	3200	34,33	8000	20,12
400	61,53	1500	45,36	3400	33,41	8500	19,15
500	59,21	1600	44,46	3600	32,55	9000	18,24
600	57,16	1700	43,60	3800	31,72	9500	17,38
700	55,34	1800	42,79	4000	30,94	10000	16,56

Spur gears in steel, module 1

toothing milled, straight teeth, engagement angle 20°

Material:
Steel 1.0503 (C45).

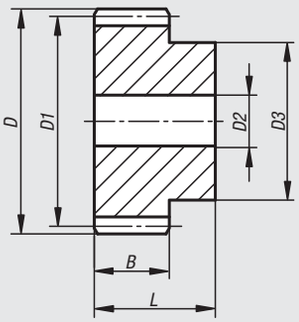
Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

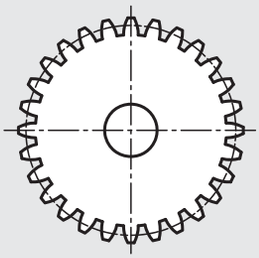
Sample order:
nlm 22400-0110150012

Note:
Up to 70 teeth with hub, from 72 teeth disc form.

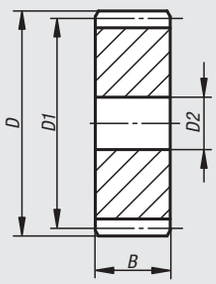
On request:
Spur gears pre-bored with keyway.

Form A
with hub





Form B
without hub



Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0110150012	A	12	14	12	-	9	15	25
22400-0110150013	A	13	15	13	-	10	15	25
22400-0110150014	A	14	16	14	-	11	15	25
22400-0110150015	A	15	17	15	-	12	15	25
22400-0110150016	A	16	18	16	-	13	15	25
22400-0110150017	A	17	19	17	-	14	15	25
22400-0110150018	A	18	20	18	8	15	15	25
22400-0110150019	A	19	21	19	8	15	15	25
22400-0110150020	A	20	22	20	8	16	15	25
22400-0110150021	A	21	23	21	8	16	15	25
22400-0110150022	A	22	24	22	8	16	15	25
22400-0110150023	A	23	25	23	8	18	15	25
22400-0110150024	A	24	26	24	10	20	15	25
22400-0110150025	A	25	27	25	10	20	15	25
22400-0110150026	A	26	28	26	10	20	15	25
22400-0110150027	A	27	29	27	10	20	15	25
22400-0110150028	A	28	30	28	10	20	15	25
22400-0110150029	A	29	31	29	10	20	15	25
22400-0110150030	A	30	32	30	10	20	15	25
22400-0110150031	A	31	33	31	10	25	15	25
22400-0110150032	A	32	34	32	10	25	15	25
22400-0110150033	A	33	35	33	10	25	15	25
22400-0110150034	A	34	36	34	10	25	15	25
22400-0110150035	A	35	37	35	10	25	15	25
22400-0110150036	A	36	38	36	10	25	15	25
22400-0110150037	A	37	39	37	10	25	15	25
22400-0110150038	A	38	40	38	10	25	15	25
22400-0110150039	A	39	41	39	10	25	15	25

Spur gears in steel, module 1

toothing milled, straight teeth, engagement angle 20°

Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0110150040	A	40	42	40	10	25	15	25
22400-0110150041	A	41	43	41	10	30	15	25
22400-0110150042	A	42	44	42	10	30	15	25
22400-0110150043	A	43	45	43	10	30	15	25
22400-0110150044	A	44	46	44	10	30	15	25
22400-0110150045	A	45	47	45	10	30	15	25
22400-0110150046	A	46	48	46	10	30	15	25
22400-0110150047	A	47	49	47	10	30	15	25
22400-0110150048	A	48	50	48	10	30	15	25
22400-0110150049	A	49	51	49	10	30	15	25
22400-0110150050	A	50	52	50	12	30	15	25
22400-0110150051	A	51	53	51	12	40	15	25
22400-0110150052	A	52	54	52	12	40	15	25
22400-0110150053	A	53	55	53	12	40	15	25
22400-0110150054	A	54	56	54	12	40	15	25
22400-0110150055	A	55	57	55	12	40	15	25
22400-0110150056	A	56	58	56	12	40	15	25
22400-0110150057	A	57	59	57	12	40	15	25
22400-0110150058	A	58	60	58	12	40	15	25
22400-0110150059	A	59	61	59	12	40	15	25
22400-0110150060	A	60	62	60	12	40	15	25
22400-0110150061	A	61	63	61	12	50	15	25
22400-0110150062	A	62	64	62	12	50	15	25
22400-0110150063	A	63	65	63	12	50	15	25
22400-0110150064	A	64	66	64	12	50	15	25
22400-0110150065	A	65	67	65	12	50	15	25
22400-0110150066	A	66	68	66	12	50	15	25
22400-0110150067	A	67	69	67	12	50	15	25
22400-0110150068	A	68	70	68	12	50	15	25
22400-0110150069	A	69	71	69	12	50	15	25
22400-0110150070	A	70	72	70	12	50	15	25
22400-0210150072	B	72	74	72	12	-	15	-
22400-0210150075	B	75	77	75	12	-	15	-
22400-0210150076	B	76	78	76	12	-	15	-
22400-0210150080	B	80	82	80	12	-	15	-
22400-0210150085	B	85	87	85	12	-	15	-
22400-0210150090	B	90	92	90	12	-	15	-
22400-0210150095	B	95	97	95	12	-	15	-
22400-0210150100	B	100	102	100	12	-	15	-
22400-0210150110	B	110	112	110	12	-	15	-
22400-0210150114	B	114	116	114	12	-	15	-
22400-0210150120	B	120	122	120	12	-	15	-
22400-0210150127	B	127	129	127	12	-	15	-

Spur gears in steel, module 1.5

toothing milled, straight teeth, engagement angle 20°

Material:
Steel 1.0503 (C45).

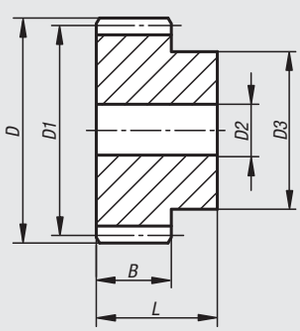
Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

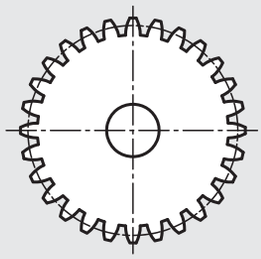
Sample order:
nlm 22400-0115170012

Note:
Up to 70 teeth with hub, from 72 teeth disc form.

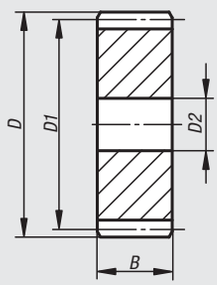
On request:
Spur gears pre-bored with keyway.

Form A
with hub





Form B
without hub



Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0115170012	A	12	21	18	8	14	17	30
22400-0115170013	A	13	22,5	19,5	8	15	17	30
22400-0115170014	A	14	24	21	8	17	17	30
22400-0115170015	A	15	25,5	22,5	8	18	17	30
22400-0115170016	A	16	27	24	8	19	17	30
22400-0115170017	A	17	28,5	25,5	8	20	17	30
22400-0115170018	A	18	30	27	8	20	17	30
22400-0115170019	A	19	31,5	28,5	8	20	17	30
22400-0115170020	A	20	33	30	8	25	17	30
22400-0115170021	A	21	34,5	31,5	10	25	17	30
22400-0115170022	A	22	36	33	10	25	17	30
22400-0115170023	A	23	37,5	34,5	10	25	17	30
22400-0115170024	A	24	39	36	10	25	17	30
22400-0115170025	A	25	40,5	37,5	10	25	17	30
22400-0115170026	A	26	42	39	12	30	17	30
22400-0115170027	A	27	43,5	40,5	12	30	17	30
22400-0115170028	A	28	45	42	12	30	17	30
22400-0115170029	A	29	46,5	43,5	12	30	17	30
22400-0115170030	A	30	48	45	12	30	17	30
22400-0115170031	A	31	49,5	46,5	12	35	17	30
22400-0115170032	A	32	51	48	12	35	17	30
22400-0115170033	A	33	52,5	49,5	12	35	17	30
22400-0115170034	A	34	54	51	12	35	17	30
22400-0115170035	A	35	55,5	52,5	12	35	17	30
22400-0115170036	A	36	57	54	12	35	17	30
22400-0115170037	A	37	58,5	55,5	12	40	17	30
22400-0115170038	A	38	60	57	12	40	17	30
22400-0115170039	A	39	61,5	58,5	12	40	17	30

Spur gears in steel, module 1.5

toothing milled, straight teeth, engagement angle 20°

Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0115170040	A	40	63	60	12	40	17	30
22400-0115170041	A	41	64,5	61,5	12	40	17	30
22400-0115170042	A	42	66	63	12	50	17	30
22400-0115170043	A	43	67,5	64,5	12	50	17	30
22400-0115170044	A	44	69	66	12	50	17	30
22400-0115170045	A	45	70,5	67,5	12	50	17	30
22400-0115170046	A	46	72	69	14	50	17	30
22400-0115170047	A	47	73,5	70,5	14	50	17	30
22400-0115170048	A	48	75	72	14	50	17	30
22400-0115170049	A	49	76,5	73,5	14	50	17	30
22400-0115170050	A	50	78	75	14	50	17	30
22400-0115170051	A	51	79,5	76,5	14	60	17	30
22400-0115170052	A	52	81	78	14	60	17	30
22400-0115170053	A	53	82,5	79,5	14	60	17	30
22400-0115170054	A	54	84	81	14	60	17	30
22400-0115170055	A	55	85,5	82,5	14	60	17	30
22400-0115170056	A	56	87	84	16	60	17	30
22400-0115170057	A	57	88,5	85,5	16	60	17	30
22400-0115170058	A	58	90	87	16	60	17	30
22400-0115170059	A	59	91,5	88,5	16	60	17	30
22400-0115170060	A	60	93	90	16	60	17	30
22400-0115170061	A	61	94,5	91,5	16	70	17	30
22400-0115170062	A	62	96	93	16	70	17	30
22400-0115170063	A	63	97,5	94,5	16	70	17	30
22400-0115170064	A	64	99	96	16	70	17	30
22400-0115170065	A	65	100,5	97,5	16	70	17	30
22400-0115170066	A	66	102	99	16	70	17	30
22400-0115170067	A	67	103,5	100,5	16	70	17	30
22400-0115170068	A	68	105	102	16	70	17	30
22400-0115170069	A	69	106,5	103,5	16	70	17	30
22400-0115170070	A	70	108	105	16	70	17	30
22400-0215170072	B	72	111	108	16	-	17	-
22400-0215170075	B	75	115,5	112,5	16	-	17	-
22400-0215170076	B	76	117	114	16	-	17	-
22400-0215170080	B	80	123	120	16	-	17	-
22400-0215170085	B	85	130,5	127,5	16	-	17	-
22400-0215170090	B	90	138	135	16	-	17	-
22400-0215170095	B	95	145,5	142,5	16	-	17	-
22400-0215170100	B	100	153	150	16	-	17	-
22400-0215170110	B	110	168	165	16	-	17	-
22400-0215170114	B	114	174	171	16	-	17	-
22400-0215170120	B	120	183	180	16	-	17	-
22400-0215170127	B	127	193,5	190,5	16	-	17	-

Spur gears in steel, module 2

toothing milled, straight teeth, engagement angle 20°

Material:
Steel 1.0503 (C45).

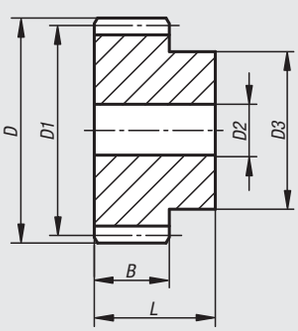
Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

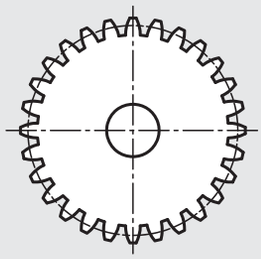
Sample order:
nlm 22400-0120200012

Note:
Up to 70 teeth with hub, from 72 teeth disc form.

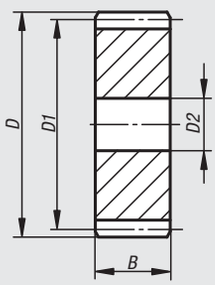
On request:
Spur gears pre-bored with keyway.

Form A
with hub





Form B
without hub



Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0120200012	A	12	28	24	10	18	20	35
22400-0120200013	A	13	30	26	10	20	20	35
22400-0120200014	A	14	32	28	10	22	20	35
22400-0120200015	A	15	34	30	10	24	20	35
22400-0120200016	A	16	36	32	10	25	20	35
22400-0120200017	A	17	38	34	10	25	20	35
22400-0120200018	A	18	40	36	10	25	20	35
22400-0120200019	A	19	42	38	10	25	20	35
22400-0120200020	A	20	44	40	10	30	20	35
22400-0120200021	A	21	46	42	12	30	20	35
22400-0120200022	A	22	48	44	12	30	20	35
22400-0120200023	A	23	50	46	12	30	20	35
22400-0120200024	A	24	52	48	12	35	20	35
22400-0120200025	A	25	54	50	12	35	20	35
22400-0120200026	A	26	56	52	12	40	20	35
22400-0120200027	A	27	58	54	12	40	20	35
22400-0120200028	A	28	60	56	12	40	20	35
22400-0120200029	A	29	62	58	14	40	20	35
22400-0120200030	A	30	64	60	14	40	20	35
22400-0120200031	A	31	66	62	14	45	20	35
22400-0120200032	A	32	68	64	14	45	20	35
22400-0120200033	A	33	70	66	14	45	20	35
22400-0120200034	A	34	72	68	14	45	20	35
22400-0120200035	A	35	74	70	14	45	20	35
22400-0120200036	A	36	76	72	14	45	20	35
22400-0120200037	A	37	78	74	14	50	20	35
22400-0120200038	A	38	80	76	14	50	20	35
22400-0120200039	A	39	82	78	14	50	20	35

Spur gears in steel, module 2

toothing milled, straight teeth, engagement angle 20°

Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0120200040	A	40	84	80	14	50	20	35
22400-0120200041	A	41	86	82	16	55	20	35
22400-0120200042	A	42	88	84	16	55	20	35
22400-0120200043	A	43	90	86	16	55	20	35
22400-0120200044	A	44	92	88	16	60	20	35
22400-0120200045	A	45	94	90	16	60	20	35
22400-0120200046	A	46	96	92	16	60	20	35
22400-0120200047	A	47	98	94	16	70	20	35
22400-0120200048	A	48	100	96	16	70	20	35
22400-0120200049	A	49	102	98	16	70	20	35
22400-0120200050	A	50	104	100	16	70	20	35
22400-0120200051	A	51	106	102	16	70	20	35
22400-0120200052	A	52	108	104	16	70	20	35
22400-0120200053	A	53	110	106	16	70	20	35
22400-0120200054	A	54	112	108	16	70	20	35
22400-0120200055	A	55	114	110	16	70	20	35
22400-0120200056	A	56	116	112	16	70	20	35
22400-0120200057	A	57	118	114	16	70	20	35
22400-0120200058	A	58	120	116	16	70	20	35
22400-0120200059	A	59	122	118	16	70	20	35
22400-0120200060	A	60	124	120	16	70	20	35
22400-0120200061	A	61	126	122	16	80	20	35
22400-0120200062	A	62	128	124	16	80	20	35
22400-0120200063	A	63	130	126	16	80	20	35
22400-0120200064	A	64	132	128	16	80	20	35
22400-0120200065	A	65	134	130	16	80	20	35
22400-0120200066	A	66	136	132	16	80	20	35
22400-0120200067	A	67	138	134	16	80	20	35
22400-0120200068	A	68	140	136	16	80	20	35
22400-0120200069	A	69	142	138	16	80	20	35
22400-0120200070	A	70	144	140	16	80	20	35
22400-0220200072	B	72	148	144	16	-	20	-
22400-0220200075	B	75	154	150	20	-	20	-
22400-0220200076	B	76	156	152	20	-	20	-
22400-0220200080	B	80	164	160	20	-	20	-
22400-0220200085	B	85	174	170	20	-	20	-
22400-0220200090	B	90	184	180	20	-	20	-
22400-0220200095	B	95	194	190	20	-	20	-
22400-0220200100	B	100	204	200	20	-	20	-
22400-0220200110	B	110	224	220	20	-	20	-
22400-0220200114	B	114	232	228	20	-	20	-
22400-0220200120	B	120	244	240	20	-	20	-
22400-0220200127	B	127	258	254	20	-	20	-

Spur gears in steel, module 2.5

toothing milled, straight teeth, engagement angle 20°

Material:
Steel 1.0503 (C45).

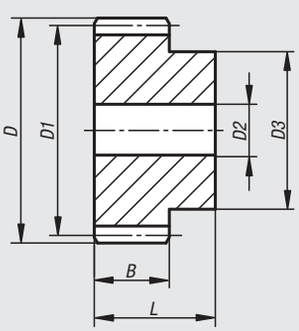
Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

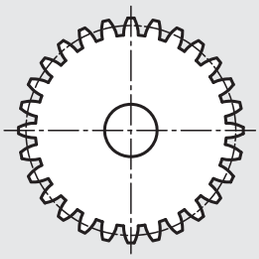
Note for ordering:
22400-0125250012

Note:
Up to 60 teeth with hub, from 65 teeth disc form.

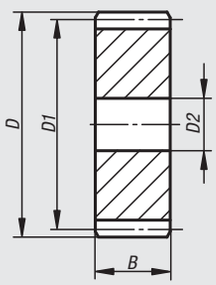
On request:
Spur gears pre-bored with keyway.

Form A
with hub





Form B
without hub



Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0125250012	A	12	35	30	10	22	25	45
22400-0125250013	A	13	37,5	32,5	10	25	25	45
22400-0125250014	A	14	40	35	10	28	25	45
22400-0125250015	A	15	42,5	37,5	10	30	25	45
22400-0125250016	A	16	45	40	12	32	25	45
22400-0125250017	A	17	47,5	42,5	12	35	25	45
22400-0125250018	A	18	50	45	12	35	25	45
22400-0125250019	A	19	52,5	47,5	12	35	25	45
22400-0125250020	A	20	55	50	12	40	25	45
22400-0125250021	A	21	57,5	52,5	14	40	25	45
22400-0125250022	A	22	60	55	14	45	25	45
22400-0125250023	A	23	62,5	57,5	14	45	25	45
22400-0125250024	A	24	65	60	14	45	25	45
22400-0125250025	A	25	67,5	62,5	14	50	25	45
22400-0125250026	A	26	70	65	14	50	25	45
22400-0125250027	A	27	72,5	67,5	14	50	25	45
22400-0125250028	A	28	75	70	14	50	25	45
22400-0125250029	A	29	77,5	72,5	14	50	25	45
22400-0125250030	A	30	80	75	14	55	25	45
22400-0125250031	A	31	82,5	77,5	16	55	25	45
22400-0125250032	A	32	85	80	16	55	25	45
22400-0125250033	A	33	87,5	82,5	16	55	25	45
22400-0125250034	A	34	90	85	16	55	25	45
22400-0125250035	A	35	92,5	87,5	16	60	25	45
22400-0125250036	A	36	95	90	16	60	25	45
22400-0125250037	A	37	97,5	92,5	16	60	25	45
22400-0125250038	A	38	100	95	16	60	25	45
22400-0125250039	A	39	102,5	97,5	16	60	25	45

Spur gears in steel, module 2.5

toothing milled, straight teeth, engagement angle 20°

Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0125250040	A	40	105	100	16	70	25	45
22400-0125250041	A	41	107,5	102,5	16	70	25	45
22400-0125250042	A	42	110	105	16	70	25	45
22400-0125250043	A	43	112,5	107,5	16	70	25	45
22400-0125250044	A	44	115	110	16	70	25	45
22400-0125250045	A	45	117,5	112,5	16	70	25	45
22400-0125250046	A	46	120	115	20	70	25	45
22400-0125250047	A	47	122,5	117,5	20	80	25	45
22400-0125250048	A	48	125	120	20	80	25	45
22400-0125250049	A	49	127,5	122,5	20	80	25	45
22400-0125250050	A	50	130	125	20	80	25	45
22400-0125250051	A	51	132,5	127,5	20	80	25	45
22400-0125250052	A	52	135	130	20	90	25	45
22400-0125250053	A	53	137,5	132,5	20	90	25	45
22400-0125250054	A	54	140	135	20	90	25	45
22400-0125250055	A	55	142,5	137,5	20	90	25	45
22400-0125250056	A	56	145	140	20	100	25	45
22400-0125250057	A	57	147,5	142,5	20	100	25	45
22400-0125250058	A	58	150	145	20	100	25	45
22400-0125250059	A	59	152,5	147,5	20	100	25	45
22400-0125250060	A	60	155	150	20	100	25	45
22400-0225250065	B	65	167,5	162,5	20	-	25	-
22400-0225250070	B	70	180	175	20	-	25	-
22400-0225250072	B	72	185	180	20	-	25	-
22400-0225250075	B	75	192,5	187,5	20	-	25	-
22400-0225250076	B	76	195	190	20	-	25	-
22400-0225250080	B	80	205	200	25	-	25	-
22400-0225250085	B	85	217,5	212,5	25	-	25	-
22400-0225250090	B	90	230	225	25	-	25	-
22400-0225250095	B	95	242,5	237,5	25	-	25	-
22400-0225250100	B	100	255	250	25	-	25	-
22400-0225250110	B	110	280	275	25	-	25	-
22400-0225250114	B	114	290	285	25	-	25	-
22400-0225250120	B	120	305	300	25	-	25	-
22400-0225250127	B	127	322,5	317,5	25	-	25	-

Spur gears in steel, module 3

toothing milled, straight teeth, engagement angle 20°

Material:
Steel 1.0503 (C45).

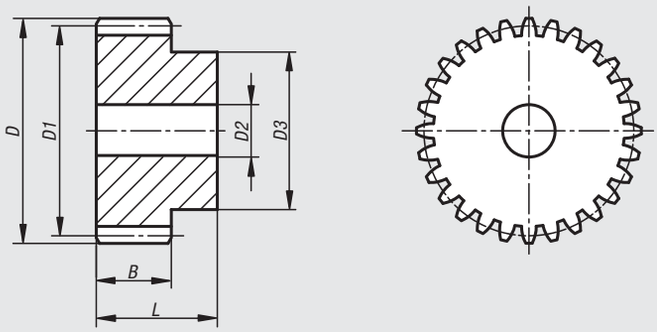
Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

Sample order:
nlm 22400-0130300012

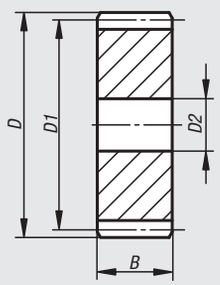
Note:
Up to 48 teeth with hub, from 50 teeth disc form.

On request:
Spur gears pre-bored with keyway.

Form A
with hub



Form B
without hub



Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0130300012	A	12	42	36	12	27	30	50
22400-0130300013	A	13	45	39	12	30	30	50
22400-0130300014	A	14	48	42	12	33	30	50
22400-0130300015	A	15	51	45	12	35	30	50
22400-0130300016	A	16	54	48	14	38	30	50
22400-0130300017	A	17	57	51	14	42	30	50
22400-0130300018	A	18	60	54	14	45	30	50
22400-0130300019	A	19	63	57	14	45	30	50
22400-0130300020	A	20	66	60	14	45	30	50
22400-0130300021	A	21	69	63	16	45	30	50
22400-0130300022	A	22	72	66	16	50	30	50
22400-0130300023	A	23	75	69	16	50	30	50
22400-0130300024	A	24	78	72	16	50	30	50
22400-0130300025	A	25	81	75	16	60	30	50
22400-0130300026	A	26	84	78	16	60	30	50
22400-0130300027	A	27	87	81	16	60	30	50
22400-0130300028	A	28	90	84	16	60	30	50
22400-0130300029	A	29	93	87	16	60	30	50

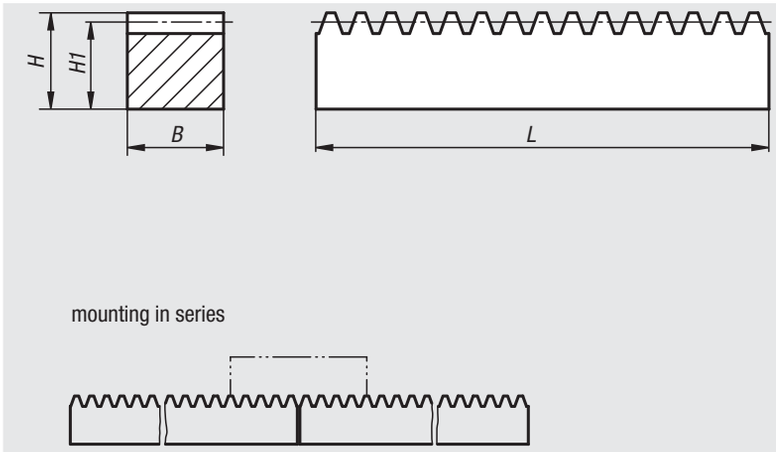
Spur gears in steel, module 3

toothing milled, straight teeth, engagement angle 20°

Order No.	Form	No. of teeth	D	D1	D2	D3	B	L
22400-0130300030	A	30	96	90	16	60	30	50
22400-0130300031	A	31	99	93	16	60	30	50
22400-0130300032	A	32	102	96	16	70	30	50
22400-0130300033	A	33	105	99	16	70	30	50
22400-0130300034	A	34	108	102	16	70	30	50
22400-0130300035	A	35	111	105	16	70	30	50
22400-0130300036	A	36	114	108	20	70	30	50
22400-0130300037	A	37	117	111	20	70	30	50
22400-0130300038	A	38	120	114	20	80	30	50
22400-0130300039	A	39	123	117	20	80	30	50
22400-0130300040	A	40	126	120	20	80	30	50
22400-0130300041	A	41	129	123	20	80	30	50
22400-0130300042	A	42	132	126	20	80	30	50
22400-0130300043	A	43	135	129	20	80	30	50
22400-0130300044	A	44	138	132	20	90	30	50
22400-0130300045	A	45	141	135	20	90	30	50
22400-0130300046	A	46	144	138	20	90	30	50
22400-0130300047	A	47	147	141	20	100	30	50
22400-0130300048	A	48	150	144	20	100	30	50
22400-0230300050	B	50	156	150	20	-	30	-
22400-0230300052	B	52	162	156	20	-	30	-
22400-0230300055	B	55	171	165	20	-	30	-
22400-0230300057	B	57	177	171	20	-	30	-
22400-0230300060	B	60	186	180	20	-	30	-
22400-0230300065	B	65	201	195	20	-	30	-
22400-0230300070	B	70	216	210	25	-	30	-
22400-0230300072	B	72	222	216	25	-	30	-
22400-0230300075	B	75	231	225	25	-	30	-
22400-0230300076	B	76	234	228	25	-	30	-
22400-0230300080	B	80	246	240	25	-	30	-
22400-0230300085	B	85	261	255	25	-	30	-
22400-0230300090	B	90	276	270	25	-	30	-
22400-0230300095	B	95	291	285	25	-	30	-
22400-0230300100	B	100	306	300	25	-	30	-
22400-0230300110	B	110	336	320	25	-	30	-
22400-0230300114	B	114	348	342	30	-	30	-
22400-0230300120	B	120	366	360	30	-	30	-
22400-0230300127	B	127	387	381	30	-	30	-

Gear racks in steel

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.

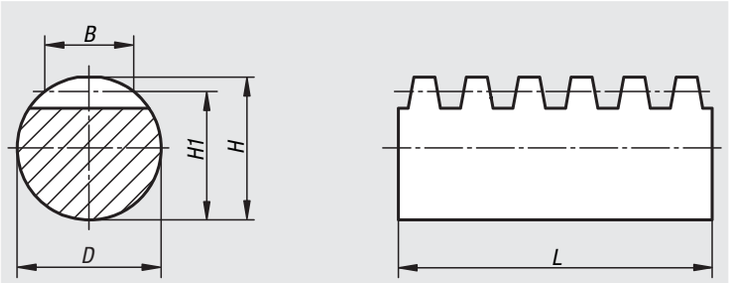
Sample order:
nlm 22420-010150X500

Note:
The gear racks are suitable for mounting in series.

Order No.	Module	B	H	H1	L Nom. length	L Actual length
22420-010150X500	1	15	15	14	500	499,51
22420-010150X1000	1	15	15	14	1.000	1.002,17
22420-010150X2000	1	15	15	14	2.000	2.001,19
22420-015170X500	1,5	17	17	15,5	500	504,22
22420-015170X1000	1,5	17	17	15,5	1.000	1.003,74
22420-015170X2000	1,5	17	17	15,5	2.000	2.002,77
22420-020200X500	2	20	20	18	500	502,65
22420-020200X1000	2	20	20	18	1.000	1.005,31
22420-020200X2000	2	20	20	18	2.000	2.004,34
22420-025250X500	2,5	25	25	22,5	500	502,65
22420-025250X1000	2,5	25	25	22,5	1.000	1.005,31
22420-025250X2000	2,5	25	25	22,5	2.000	2.002,77
22420-030300X500	3	30	30	27	500	508,94
22420-030300X1000	3	30	30	27	1.000	1.008,45
22420-030300X2000	3	30	30	27	2.000	2.007,48

Gear racks in steel

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.
Outside diameter ground, tolerance h6.

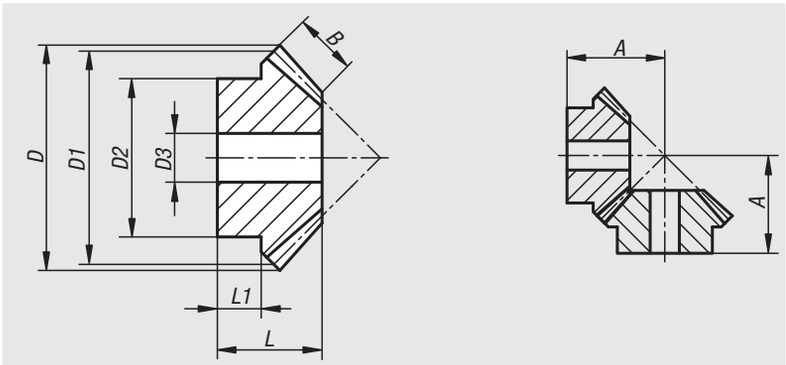
Sample order:
nlm 22425-010060X500

Note:
The gear rack teeth are cut using a hob mill.
This results in minus tolerances for dimensions H and H1:
up to module 2: -0.2 mm.
module 2.5 to 3: -0.3 mm.

Order No.	Module	B	D	H	H1	L
22425-010060X500	1	6	10	10	9	500
22425-010060X1000	1	6	10	10	9	1.000
22425-010060X2000	1	6	10	10	9	2.000
22425-015090X500	1,5	9	15	15	13,5	500
22425-015090X1000	1,5	9	15	15	13,5	1.000
22425-015090X2000	1,5	9	15	15	13,5	2.000
22425-020120X500	2	12	20	20	18	500
22425-020120X1000	2	12	20	20	18	1.000
22425-020120X2000	2	12	20	20	18	2.000
22425-025150X500	2,5	15	25	25	22,5	500
22425-025150X1000	2,5	15	25	25	22,5	1.000
22425-025150X2000	2,5	15	25	25	22,5	2.000
22425-030180X500	3	18	30	30	27	500
22425-030180X1000	3	18	30	30	27	1.000
22425-030180X2000	3	18	30	30	27	2.000

Bevel gears in steel, ratio 1:1

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.
Axis angle = 90°.

Sample order:
nlm 22430-010110016

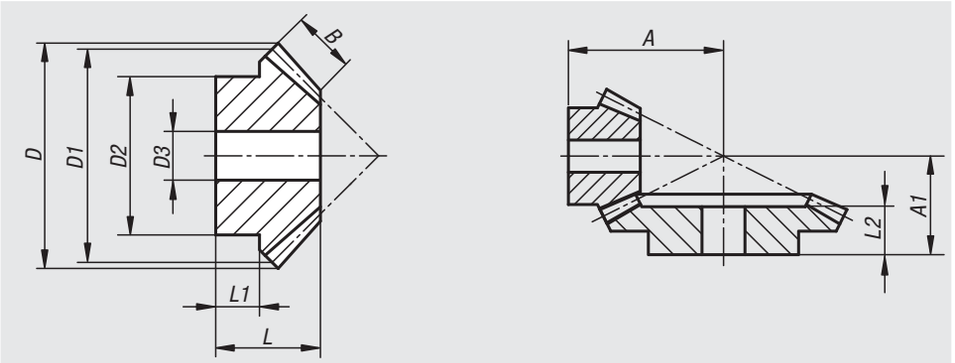
Note for ordering:
Bevel gears are supplied singly. To obtain a pair of bevel gears, please order the specified mating gear as well.

On request:
Bevel gears pre-bored with keyway.

Order No.	Transmission ratio	Module	No. of teeth	A	B	D	D1	D2	D3	L	L1	matching opposing gear
22430-010110016	1:1	1	16	16	4	17,4	16	13,3	4	11,2	6,7	22430-010110016
22430-010110019	1:1	1	19	18	4	20,4	19	15,3	4	11,8	6,6	22430-010110019
22430-010110022	1:1	1	22	20	4,7	23,4	22	16,3	5	12,8	6,1	22430-010110022
22430-010110026	1:1	1	26	22	5,5	27,4	26	20,3	5	13,3	7	22430-010110026
22430-010110030	1:1	1	30	26	6,4	31,4	30	20,3	5	16	8	22430-010110030
22430-015110016	1:1	1,5	16	26	6	26,1	24	20,3	8	18,9	12,2	22430-015110016
22430-015110019	1:1	1,5	19	30	7	30,6	28,5	20,3	8	21,3	11,6	22430-015110019
22430-015110022	1:1	1,5	22	33	7,5	35,1	33	25,3	8	22,5	12,7	22430-015110022
22430-015110026	1:1	1,5	26	36	8,5	41,1	39	28,3	8	23,2	12	22430-015110026
22430-015110030	1:1	1,5	30	42	10	47,1	45	30	12	27,2	12,1	22430-015110030
22430-020110016	1:1	2	16	33	8	34,8	32	25,3	8	23,5	13,6	22430-020110016
22430-020110019	1:1	2	19	36	9	40,8	38	25,3	8	24,2	12	22430-020110019
22430-020110022	1:1	2	22	42	10	46,8	44	30,3	10	27,9	14	22430-020110022
22430-020110026	1:1	2	26	48	12	54,8	52	35,3	12	31,4	13,7	22430-020110026
22430-020110030	1:1	2	30	54	13	62,8	60	40,3	12	34,1	17	22430-020110030
22430-025110016	1:1	2,5	16	40	10	43,5	40	30,3	12	28,1	15,2	22430-025110016
22430-025110019	1:1	2,5	19	42	11	51	47,5	35,3	12	27,1	13	22430-025110019
22430-025110022	1:1	2,5	22	48	12	58,5	55	45,3	12	30,1	15,7	22430-025110022
22430-025110026	1:1	2,5	26	54	15	68,5	65	45,3	15	33,2	16	22430-025110026
22430-025110030	1:1	2,5	30	64	16	78,5	75	50,3	15	39	20	22430-025110030
22430-030110016	1:1	3	16	46	12	52,2	48	40,3	12	31,7	18,1	22430-030110016
22430-030110019	1:1	3	19	54	13	61,2	57	40,3	14	36	17,1	22430-030110019
22430-030110022	1:1	3	22	58	15	70,2	66	50,3	15	36,9	17,1	22430-030110022
22430-030110026	1:1	3	26	64	17	82,2	78	50,3	15	38,4	18	22430-030110026
22430-030110030	1:1	3	30	74	19	94,2	90	60,3	20	43,8	22	22430-030110030

Bevel gears in steel, ratio 1:2

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.
Axis angle = 90°.

Sample order:
nlm 22430-010120015

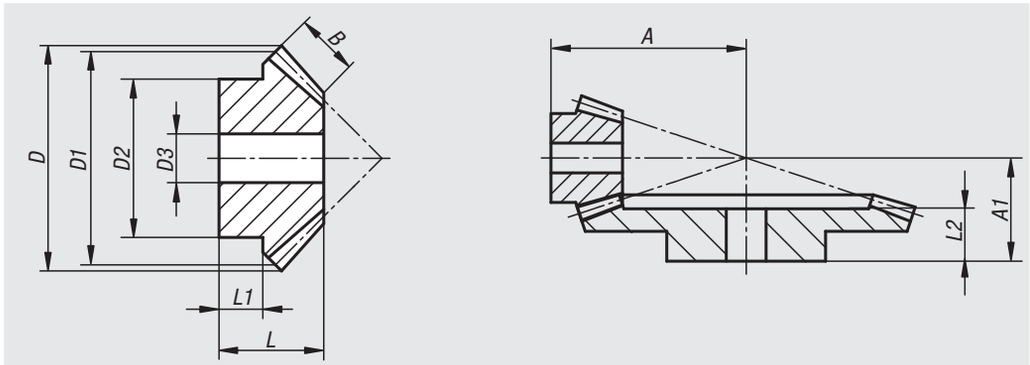
Note for ordering:
Bevel gears are supplied singly. To obtain a pair of bevel gears, please order the specified mating gear as well.

On request:
Bevel gears pre-bored with keyway.

Order No.	Transmission ratio	Module	No. of teeth	A	A1	B	D	D1	D2	D3	L	L1	L2	matching opposing gear
22430-010120015	1:2	1	15	22	-	5	17,4	15	13,3	4	11,9	6,6	-	22430-010120030
22430-010120030	1:2	1	30	-	20	5	30,6	30	20,3	5	15,1	9	14	22430-010120015
22430-015120015	1:2	1,5	15	35	-	9	26,1	22,5	20,3	8	21,1	12	-	22430-015120030
22430-015120030	1:2	1,5	30	-	32	9	45,9	45	32,3	8	25,2	16	23	22430-015120015
22430-020120015	1:2	2	15	45	-	11,5	34,8	30	25,3	8	26	13,8	-	22430-020120030
22430-020120030	1:2	2	30	-	39	11,5	61,2	60	40,3	12	29,8	18	27	22430-020120015
22430-025120015	1:2	2,5	15	55	-	15	43,5	37,5	32,3	12	31,8	16,2	-	22430-025120030
22430-025120030	1:2	2,5	30	-	45	15	76,5	75	45,3	15	33,7	20	30	22430-025120015
22430-030120015	1:2	3	15	66	-	17	52,2	45	40,3	12	37,3	19,8	-	22430-030120030
22430-030120030	1:2	3	30	-	56	17	91,8	90	55,3	15	42,1	25	38	22430-030120015

Bevel gears in steel, ratio 1:3

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.
Axis angle = 90°.

Sample order:
nlm 22430-010130015

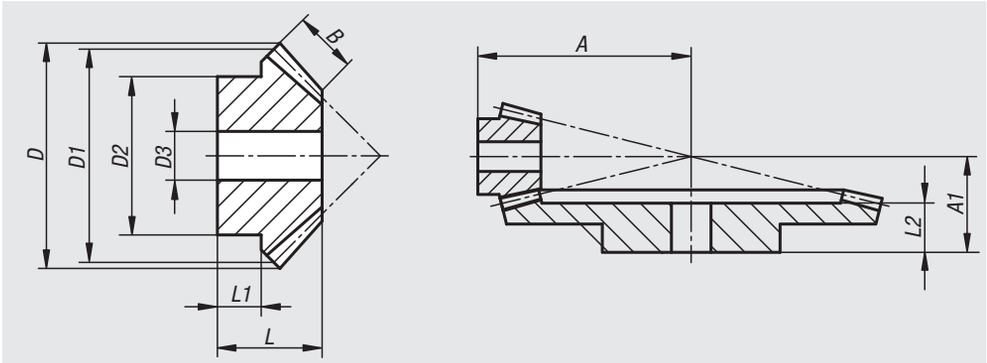
Note for ordering:
Bevel gears are supplied singly. To obtain a pair of bevel gears, please order the specified mating gear as well.

On request:
Bevel gears pre-bored with keyway.

Order No.	Transmission ratio	Module	No. of teeth	A	A1	B	D	D1	D2	D3	L	L1	L2	matching opposing gear
22430-010130015	1:3	1	15	32	-	7,1	17,7	15	13,3	4	16,6	9,3	-	22430-010130045
22430-010130045	1:3	1	45	-	22	7,1	45,3	45	25,3	8	17,1	10	15	22430-010130015
22430-015130015	1:3	1,5	15	46	-	10,5	26,5	22,5	19,3	8	22,6	11,7	-	22430-015130045
22430-015130045	1:3	1,5	45	-	37	10,5	68,1	67,5	45,3	14	29,6	20	27	22430-015130015
22430-020130015	1:3	2	15	60	-	14	35,4	30	25,3	8	28,9	14,2	-	22430-020130045
22430-020130045	1:3	2	45	-	42	14	90,8	90	45,3	15	32,1	20	29	22430-020130015
22430-025130015	1:3	2,5	15	73	-	18	44,2	37,5	32,3	12	34,6	15,9	-	22430-025130045
22430-025130045	1:3	2,5	45	-	52	18	113,4	112,5	60,3	20	39,7	25	36	22430-025130015
22430-030130015	1:3	3	15	88	-	21	53	45	40,3	15	41,3	19,7	-	22430-030130045
22430-030130045	1:3	3	45	-	62	21	136,1	135	60,3	20	47,2	30	42,5	22430-030130015

Bevel gears in steel, ratio 1:4

toothing milled, straight teeth, engagement angle 20°



Material:
Steel 1.0503 (C45).

Version:
Milled toothing, straight teeth.
Engagement angle 20°, bright.
Axis angle = 90°.

Sample order:
nlm 22430-010140015

Note for ordering:
Bevel gears are supplied singly. To obtain a pair of bevel gears, please order the specified mating gear as well.

On request:
Bevel gears pre-bored with keyway.

Order No.	Transmission ratio	Module	No. of teeth	A	A1	B	D	D1	D2	D3	L	L1	L2	matching opposing gear
22430-010140015	1:4	1	15	38	-	9,3	17,8	15	13,3	4	17,2	7,7	-	22430-010140060
22430-010140060	1:4	1	60	-	22	9,3	60,3	60	30,3	8	17,1	10	15	22430-010140015
22430-015140015	1:4	1,5	15	57	-	11	26,7	22,5	20,3	8	23	11,7	-	22430-015140060
22430-015140060	1:4	1,5	60	-	42	11	90,4	90	50,3	15	34	25	31	22430-015140015
22430-020140015	1:4	2	15	75	-	16	35,6	30	25,3	8	31	14,4	-	22430-020140060
22430-020140060	1:4	2	60	-	48	16	120,6	120	60,3	16	37,6	25	34	22430-020140015
22430-025140015	1:4	2,5	15	94	-	19	44,5	37,5	32,3	14	38,1	18,4	-	22430-025140060
22430-025140060	1:4	2,5	60	-	58	19	150,7	150	60,3	20	44,8	30	40	22430-025140015
22430-030140015	1:4	3	15	115	-	23	53,3	45	40,3	15	48,1	24,5	-	22430-030140060
22430-030140060	1:4	3	60	-	69	23	180,8	180	80,3	20	53,2	35	48	22430-030140015

Notes

23000

Couplings
Rigid couplings
Conical clamping rings
Cardan joints
Quick-fit couplings
Bearings

Technical information for couplings

Note:
The zero backlash, flexible metal bellows or elastomer couplings are particularly suited to highly accurate drives with average torque values. They are the ideal solution for accurately connecting two shaft journals at a true angle. Axial, radial and angular displacement between two ends of a shaft can be compensated within defined limits. This produces minimal bearing stresses as a result of the low restoring forces. A strong shaft to hub connection guarantees zero backlash transmission of torque, even without additional parallel key. Low mass moments of inertia and a high quality kinetic energy guarantee excellent dynamic behaviour, even at high revolutions. As a basic principle, the couplings are wear and maintenance-free. The range of possible uses extends from challenging drive systems in general mechanical engineering through applications in metrology and automatic control to the spindle and axial drives of machine tools. Other typical examples of their use include textile, packaging and timber processing machines as well as industrial robots and multi-spindle drilling heads.

Technology

Comparison	Metal bellows couplings	Elastomer couplings	Spring bar coupling devices
Major functional features	– very high torsion resistance, therefore accurate transfer of the angle of rotation – low mass moments of inertia – full metal version – minimal restoring forces on the bearing	– plug-in (blind assembly is possible) – vibration dampening – no-play, due to pre-tensioning of the coupling star in the claws – 23021 DIN 69002 suitable for the highest speeds	– compact design – play-free, absolute synchronism – high torsion resistance – low mass moments of inertia – full metal version – models in aluminium and stainless steel
Connection or compensating elements	– metal bellows of stainless steel	– elastomer star in polyurethane	– full metal version with slotted structure
Hub version	– easy to assemble clamp hub (strong, no-play)	– easy to assemble clamp hub – conical connection to clamping ring hub	– easy to assemble clamp hub, fixed or removable (strong, no-play)
Temperature range	to max. 300 °C	-30 °C up to +90 °C	-50 °C up to +150 °C
Revolutions	Couplings are prebalanced. Additional balancing is recommended for revolutions in excess of 5000 r.p.m.	Version with clamping ring hub (23021) is suitable for up to 20000 r.p.m..	Depending on model, suitable for speeds up to 10000 r.p.m.

Layout

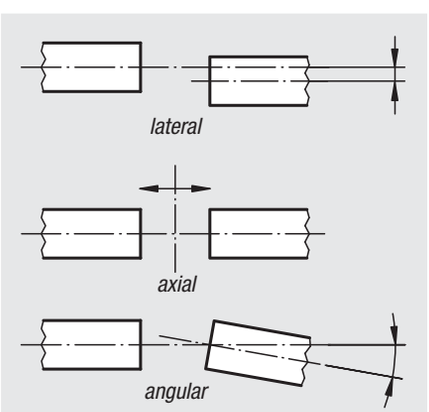
Judgement calculation:

$$\mathbf{M_N \geqq 1{,}5 \cdot M_{max.}\ [Nm]}$$

$M_N \triangleq$ nom. torque of coupling

$M_{max.} \triangleq$ max. motor torque

For an accurate layout, the actual acting torques must be calculated from the cutting or acceleration forces. For short periods in exceptional cases such as collision, for example, increased stress up to twice the nominal torque is possible.

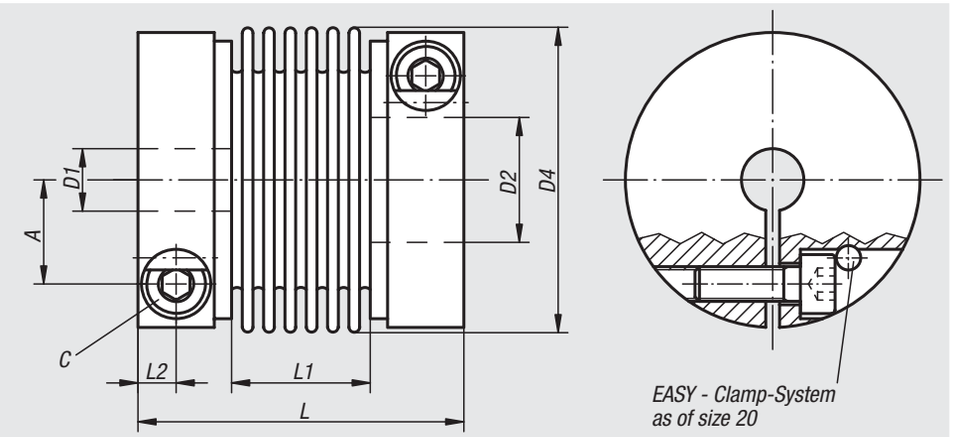


Shaft displacement

Axial and angular displacement are generally not a problem and are also easy to check. Conversely, great attention should be paid to radial shaft displacement, i.e. the lateral parallel displacement of the axes of rotation. This error must not exceed the value prescribed in the table.

Metal bellows couplings

with radial clamping hub



Material:
Hub aluminium.
Bellows stainless steel.

Version:
Bright.

Sample order:
nlm 23000-012,
D1 = 6
D2 = 6
(The hubs are supplied pre-bored).

Note:
Radial clamping of the hub for short mounting times and easy installation even in difficult to reach spaces.
Take note of the required clamping screw tightening torque.

Assembly:
The shaft to hub bore fit should be a transition fit. The play should be min. 0.01 mm and max. 0.04 mm. i.e:
shaft Ø 28 k6
bore Ø 28 F6.
Bores smaller than D min. are possible, however an optimal transfer of the nominal torque is no longer guaranteed.
As the metal bellows are made of thin stainless steel plate, special care should be taken during installation and removal. Damages to the bellows can render the coupling unusable.

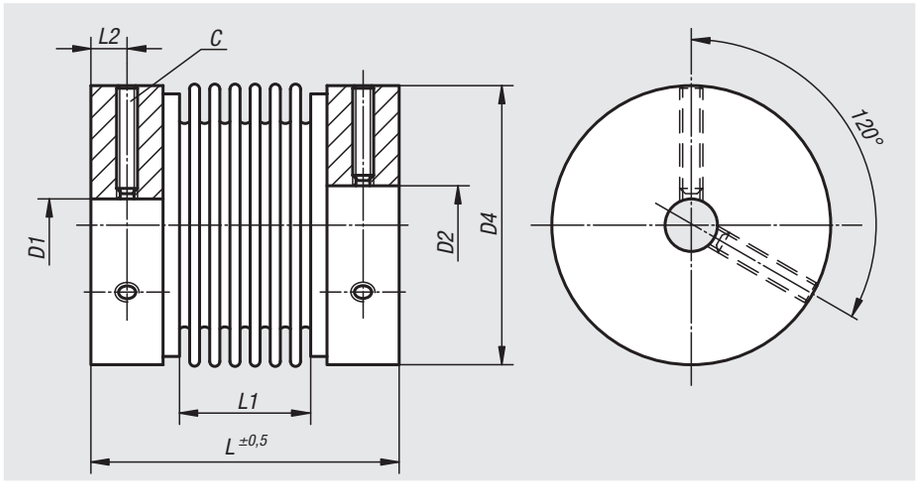
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Torsion resistance Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm	Tightening torque of screws (Nm)
23000-001	1	1	0,0004	0,09	0,3	0,2	21	26	1
23000-004	4	4	0,003	0,46	0,4	0,2	35	65	2
23000-007	7	7	0,014	1,1	0,6	0,25	45	60	4
23000-012	12	12	0,03	2,05	0,7	0,25	40	70	7
23000-020	20	20	0,14	5,2	0,8	0,25	51	190	14
23000-060	60	60	0,29	8,7	0,9	0,3	49	260	35
23000-170	170	170	0,83	17,5	1	0,3	80	470	65
23000-400	400	400	2,42	47,1	1	0,3	100	640	115
23000-600	600	600	4,7	66,9	1	0,3	100	980	200

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	A	C (DIN 912-10.9)	L	L1	L2
23000-001	3	3	6	16,5	4,6	M2,5	31,5	13,5	3,3
23000-004	4	5	10	24,5	7,5	M3	43,5	17,5	4,4
23000-007	5	6	17	34	11	M4	57	29	5
23000-012	5	6	19	39,5	13	M5	62	29	6
23000-020	7	9	30	56	19	M6	70	30	7,5
23000-060	12	18	34	66	22	M8	77	33	8,5
23000-170	15	22	43	82	28,5	M10	92	40	10,5
23000-400	24	34	55	101	35	M12	106	48	12
23000-600	31	35	70	122	43,5	M14	116	52	13,5

Metal bellows couplings

clamping with grub screw



Material:
Hub aluminium.
Bellows stainless steel.

Version:
Bright.

Sample order:
nlm 23002-0004,
D1 = 3
D2 = 3
(The hubs are supplied pre-bored).

Note:
Clamping the hub with a grub screw is a cost-effective alternative to the metal bellows couplings with radial clamping hub (23000). Short mounting times and an easy installation even in difficult to reach places. Take note of the required tightening torque for the grub screw. To ease removal, a flat milled on the shaft is recommended.

Temperature range:
-20 °C up to +150 °C.

Assembly:
The shaft to hub bore fit should be a transition fit. The play should be min. 0.01 mm and max. 0.04 mm. i.e:
shaft Ø 5 k6
bore Ø 5 G7.
Bores smaller than D min. are possible, however an optimal transfer of the nominal torque is no longer guaranteed.
As the metal bellows are made of thin stainless steel plate, special care should be taken during installation and removal. Damages to the bellows can render the coupling unusable.

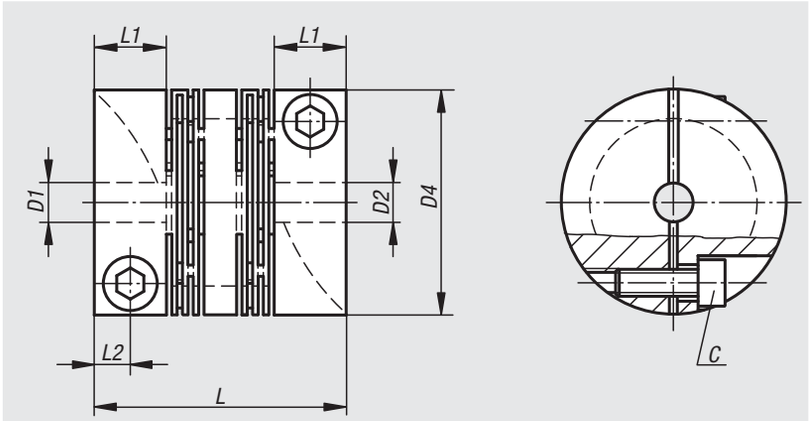
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Torsion resistance (10^{-3} Nm/arcmin)	Max. axial shaft displacement ±	Max. lateral shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm
23002-0004	0,4	0,4	0,00019	50	0,35	0,1	10	15
23002-0005	0,9	0,9	0,00019	90	0,3	0,1	21	26
23002-0020	2	2	0,0029	230	0,5	0,1	15	15
23002-0040	4	4	0,0032	460	0,4	0,1	35	65
23002-0060	6	6	0,016	1100	0,6	0,25	45	60
23002-0080	8	9	0,028	1300	0,8	0,25	16	24

Order No.	Tightening torque of screws (Nm)	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	C (DIN 916)	L	L1	L2
23002-0004	1	3	3	8	16	M3	26	12	2,3
23002-0005	1	3	3	8	16	M3	27	13	2,3
23002-0020	4	5	5	15	25	M4	38	16	3,5
23002-0040	4	5	5	15	25	M4	39	17	3,5
23002-0060	8	6	6	20	35	M5	54	29	4,3
23002-0080	10	6	6	26	41	M6	54	26	5

Beam couplings

with radial clamping hub, aluminium



Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 23010-1016,
D1 = 2.5
D2 = 2.5
(The hubs are supplied pre-bored).

Note:
Zero backlash, torsionally rigid, resiliently flexible and maintenance-free full metal coupling for transmitting angle synchronous rotary movement. The innovative slit structure makes possible a very good axial, radial and angular flexibility with low reset force. Ideal for servomotors.

Temperature range:
-50 °C to +150 °C.

Assembly:
Recommended shaft tolerances h7.

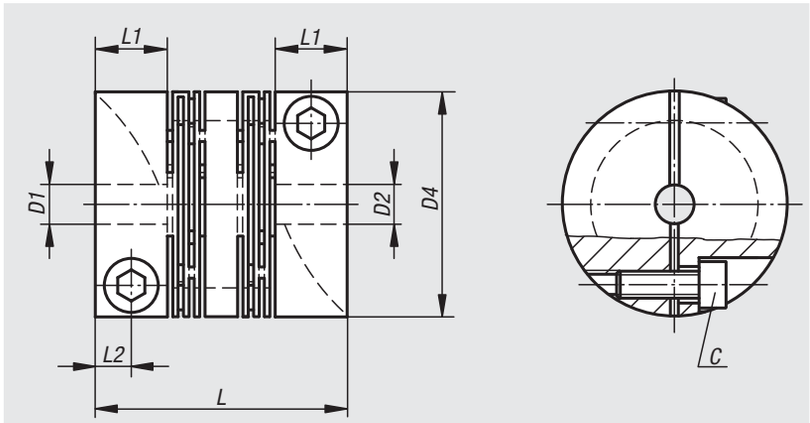
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Torsion resistance Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Max. angular shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm	max. speed U/min
23010-1016	16	3	0,001	0,09	0,3	0,2	1°	155	234	10000
23010-1018	18	3	0,0003	0,12	0,3	0,2	1°	39	176	10000
23010-1020	20	5	0,0015	0,15	0,3	0,2	1°	192	243	9500
23010-1022	22	3	0,0008	0,17	0,3	0,2	1°	80	369	9500
23010-1025	25	7	0,0043	1,02	0,3	0,2	1°	140	437	8000
23010-1030	30	10	0,011	1,45	0,4	0,3	1°	170	363	6000
23010-1040	40	19	0,035	3,35	0,4	0,3	1°	270	379	5000
23010-1050	50	35	0,114	10,18	0,5	0,3	1°	410	853	5000
23010-1060	60	70	0,285	20,65	0,5	0,3	1°	510	1201	4500
23010-1070	70	130	0,480	27,55	0,5	0,3	1°	1900	2002	4000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L2	C (DIN 912-12.9)	Tightening torque of screws (Nm)
23010-1016	2,5	3	6	16	23	7	3,5	M2,5x6	1
23010-1018	2,5	3	6	18	16,6	5,5	2,75	M2,5x8	1
23010-1020	2,5	3	8	20	28	8	4	M2,5x8	1
23010-1022	2,5	3	10	22	20	5,5	2,75	M2,5x8	1
23010-1025	3,5	4	12	25	28	8	4	M3x10	2
23010-1030	5,5	6	14	30	40	11	5,5	M4x10	4
23010-1040	5,5	6	18	40	48	11	5,5	M5x14	9
23010-1050	9,5	10	26	50	65	19	9,5	M6x16	14
23010-1060	9,5	10	30	60	80	25	12,5	M8x18	30
23010-1070	14,5	15	35	70	95	25	12,5	M8x25	30

Beam couplings

with radial clamping hub, stainless steel



Material:
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 23010-2016,
D1 = 2.5
D2 = 2.5
(The hubs are supplied pre-bored).

Note:
Zero backlash, torsionally rigid, resiliently flexible and maintenance-free full metal coupling for transmitting angle synchronous rotary movement. The innovative slit structure makes possible a very good axial, radial and angular flexibility with low reset force. Ideal for servomotors.

Temperature range:
-50 °C to +150 °C.

Assembly:
Recommended shaft tolerances h7.

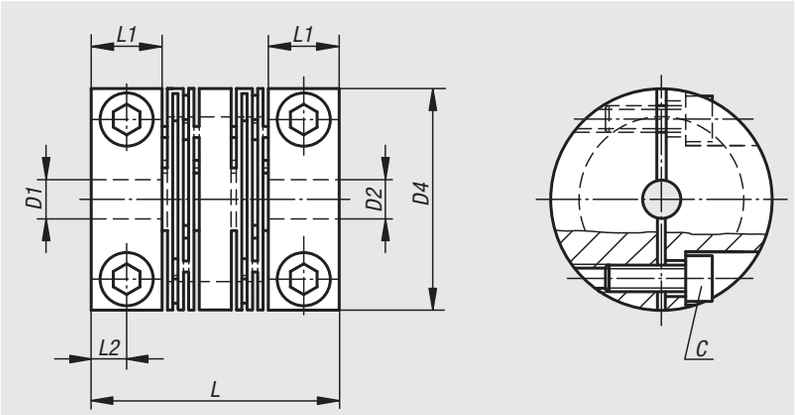
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Torsion resistance Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Max. angular shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm	max. speed U/min
23010-2016	16	6	0,0025	0,23	0,3	0,2	1°	325	940	10000
23010-2018	18	6	0,001	0,2	0,3	0,2	1°	98	435	10000
23010-2020	20	12	0,0032	0,23	0,3	0,2	1°	435	508	9500
23010-2022	22	6	0,0024	0,9	0,3	0,2	1°	136	450	9500
23010-2025	25	16	0,00784	1,45	0,3	0,2	1°	285	927	8000
23010-2030	30	25	0,022	2,47	0,4	0,3	1°	400	903	6000
23010-2040	40	36	0,09	5,82	0,4	0,3	1°	660	1229	5000
23010-2050	50	73	0,254	16	0,5	0,3	1°	950	1619	5000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L2	C (DIN 912-12.9)	Tightening torque of screws (Nm)
23010-2016	2,5	3	6	16	23	7	3,5	M2,5x6	1
23010-2018	2,5	3	6	18	16,6	5,5	2,75	M2,5x8	1
23010-2020	2,5	3	8	20	28	8	4	M2,5x8	1
23010-2022	2,5	3	10	22	20	5,5	2,75	M2,5x8	1
23010-2025	3,5	6	12	25	28	8	4	M3x10	2
23010-2030	5,5	6	14	30	40	11	5,5	M4x10	4
23010-2040	5,5	6	18	40	48	11	5,5	M5x14	9
23010-2050	9,5	10	26	50	65	19	9,5	M6x16	14

Beam couplings

with removable clamping hub, aluminium



Material:
Aluminium.

Version:
Bright.

Sample order:
nlm 23012-1025,
D1 = 5.5
D2 = 5.5

Note:
Zero backlash, torsionally rigid, resiliently flexible and maintenance-free full metal coupling for transmitting angle synchronous rotary movement. The innovative slit structure makes possible a very good axial, radial and angular flexibility with low reset force. Ideal for servomotors.

Temperature range:
-50 °C to +150 °C.

Assembly:
Recommended shaft tolerances h7.

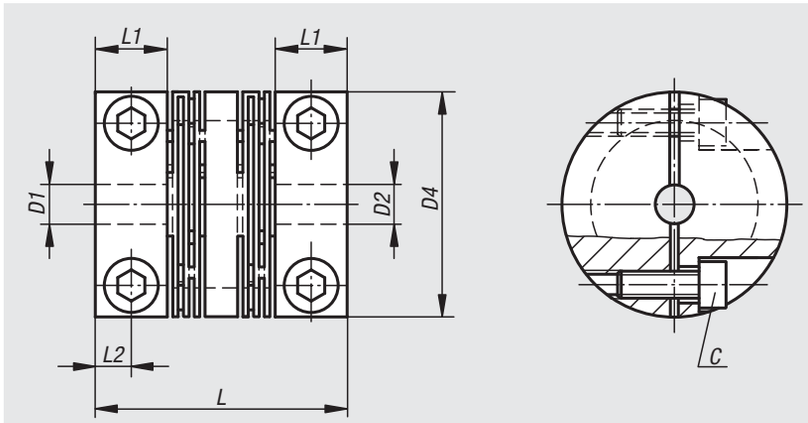
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Max. axial shaft displacement ±	Max. lateral shaft displacement	Torsion resistance Nm/arcmin	Max. angular shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm	max. speed U/min
23012-1025	25	7	0,0043	0,3	0,2	1,02	1°	140	437	8000
23012-1030	30	10	0,011	0,4	0,3	1,45	1°	170	363	6000
23012-1040	40	19	0,035	0,4	0,3	3,35	1°	270	379	5000
23012-1050	50	35	0,114	0,5	0,3	10,18	1°	410	853	5000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L2	C (DIN 912-12.9)	Tightening torque of screws (Nm)
23012-1025	3,5	4	12	25	28	8	4	M3x10	2
23012-1030	5,5	6	14	30	40	11	5,5	M4x10	4
23012-1040	5,5	6	18	40	48	11	5,5	M5x14	9
23012-1050	9,5	10	26	50	65	19	9,5	M6x16	14

Beam couplings

with removable clamping hub, stainless steel



Material:
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 23012-2025,
D1 = 5.5
D2 = 5.5

Note:
Zero backlash, torsionally rigid, resiliently flexible and maintenance-free full metal coupling for transmitting angle synchronous rotary movement. The innovative slit structure makes possible a very good axial, radial and angular flexibility with low reset force. Ideal for servomotors.

Temperature range:
-50 °C to +150 °C.

Assembly:
Recommended shaft tolerances h7.

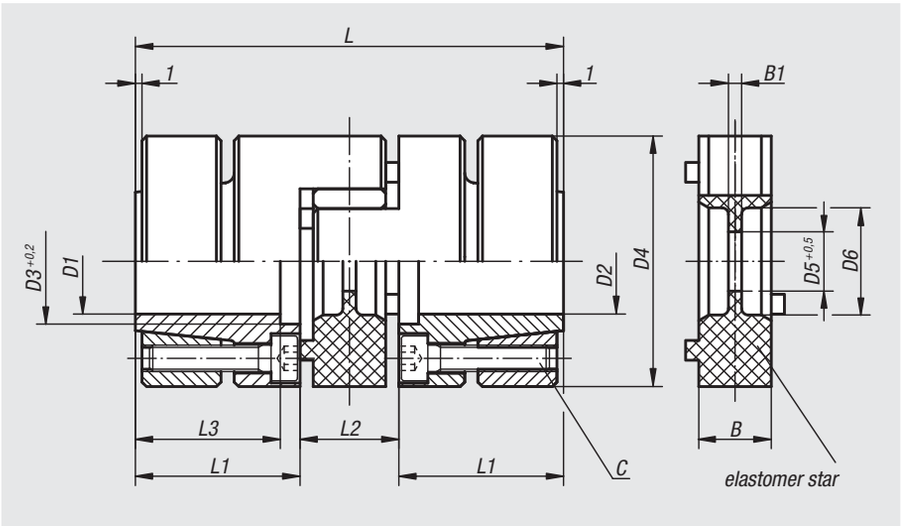
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Torsion resistance Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Max. angular shaft displacement	Axial spring stiffness N/mm	Lateral spring stiffness N/mm	max. speed U/min
23012-2025	25	16	0,00784	1,45	0,3	0,2	1°	285	927	8000
23012-2030	30	25	0,022	2,47	0,4	0,3	1°	400	903	6000
23012-2040	40	36	0,09	5,82	0,4	0,3	1°	660	1229	5000
23012-2050	50	73	0,254	16	0,5	0,3	1°	950	1619	5000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L2	C (DIN 912-12.9)	Tightening torque of screws (Nm)
23012-2025	5,5	6	12	25	28	8	4	M3x10	2
23012-2030	5,5	6	14	30	40	11	5,5	M4x10	4
23012-2040	5,5	6	18	40	48	11	5,5	M5x14	9
23012-2050	9,5	10	26	50	65	19	9,5	M6x16	14

Elastomer dog couplings

with conical hub and clamping ring (similar to DIN 69002)



Material:
Elastomer spider polyurethane with Shore hardness 98-A.
Hub aluminium.
Conical ring carbon steel.

Sample order:
nlm 23021-010,
D1 = 6
D2 = 6
(The hubs are supplied pre-bored).

Note:
This coupling series is particularly suitable for use in high speed main spindle or drill spindle drives. Before the plug-in assembly, both clamping ring hubs must be fastened to the shafts with the correct tightening torque. Lightly oil the spider to ease assembly.

Assembly:
The shaft to hub bore fit should be a transition fit. The play should be max. 0.02 mm. i.e:
shaft Ø 25 k6
bore Ø 25 G6.
Bores smaller than D min. are possible, however an optimal transfer of the nominal torque is no longer guaranteed.

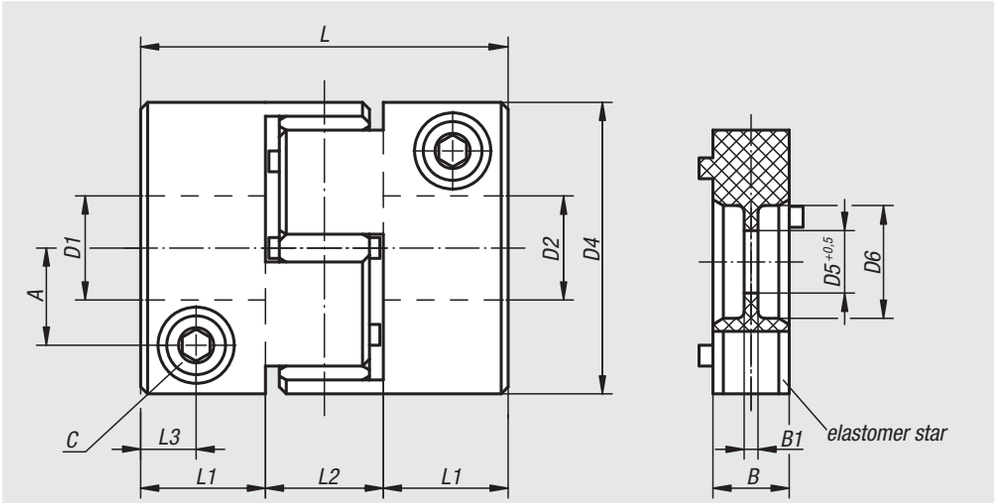
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Static resistance to torsion Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Radial spring stiffness N/mm	Tightening torque of screws (Nm)	max. speed U/min
23021-010	10	10	0,015	0,04	0,5	0,1	600	1,8	30000
23021-017	17	17	0,05	0,24	0,5	0,1	2100	4	24000
23021-043	43	43	0,19	0,4	0,5	0,1	2500	8	19000
23021-060	60	60	0,28	0,6	0,5	0,1	2600	8	17500
23021-150	150	150	0,65	1,05	1	0,1	3300	8	15000
23021-320	320	320	2	2	1	0,12	4500	35	12000
23021-500	500	500	5,6	5,8	1	0,15	5900	67	9500
23021-700	700	700	13	8	1	0,15	7000	115	8000

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D3	D4	D5	D6	L	L1	L2	L3	B	B1	C (DIN 912-12.9)
23021-010	6	6	14	17	32	8,5	10,5	50	18,5	13	15,5	10	2	4x M3
23021-017	9	9	19	22	40	9,5	18	66	25	16	21	12	3	6x M4
23021-043	10	12	24	29	50	12,5	27	78	30	18	25	14	3	4x M5
23021-060	12	12	26	30	55	12,5	27	78	30	18	25	14	3	4x M5
23021-150	12	17	36	40	65	14,5	30	90	35	20	30	15	4	8x M5
23021-320	18	20	40	46	80	16,5	38	114	45	24	40	18	4	4x M8
23021-500	20	22	48	58	100	20,5	47	138	55	28	49	22	5	4x M10
23021-700	24	25	60	72	120	22,5	58	155	61	33	54	25	6	4x M12

Elastomer dog couplings

with radial clamping hub



Material:
Elastomer spider polyurethane Shore hardness 98-A.
Hub aluminium.

Version:
Bright.

Sample order:
nlm 23022-008,
D1 = 6
D2 = 6
(The hubs are supplied pre-bored).

Note:
Radial clamping of the hub for short mounting times. The couplings can be mounted completely assembled or a plug-in assembly is also possible. Lightly oil the spider to ease assembly. Take note of the require tightening torque for the clamping screw.

Assembly:
The shaft to hub bore fit is a transition fit. The play should be min. 0.01 mm and max. 0.04 mm i.e.
shaft: Ø 28 k6
hub: Ø 28 F6
Diameters smaller than D min are possible, however an optimal transfer of the couplings nominal torque is no longer guaranteed.

On request:
Hub bores D1 and D2 with separate tolerance class or range.

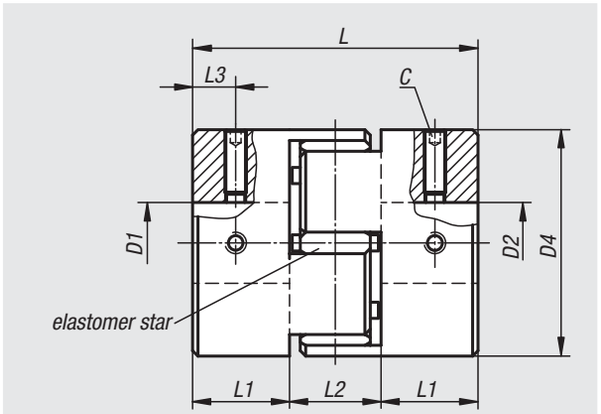
Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Static resistance to torsion Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Radial spring stiffness N/mm	Tightening torque of screws (Nm)
23022-002	2	2	0,00016	0,007	0,6	0,1	405	0,5
23022-005	5	5	0,0011	0,016	0,8	0,1	510	1
23022-008	8	8	0,01	0,04	0,5	0,1	600	4
23022-015	15	15	0,03	0,24	0,5	0,1	2100	8
23022-030	30	30	0,09	0,41	0,5	0,1	2500	14
23022-060	60	60	0,18	0,61	0,5	0,1	2600	35
23022-150	150	150	0,38	1,05	1	0,1	3300	67
23022-300	300	300	1	2	1	0,12	4500	115
23022-500	500	500	2,2	5,8	1	0,15	5900	115
23022-700	700	700	5,2	8	1	0,15	7000	185

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	D5	D6	A	L	L1	L2	L3	B	B1	C (DIN 912-10.9)
23022-002	3	3	5	14	-	-	4	22	7	8	3,5	6	-	M2
23022-005	5	5	8	20	-	-	6,5	30	10	10	5	8	-	M2,5
23022-008	5	8	15	32	8,5	10,5	10,5	40	13,5	13	6	10	2	M4
23022-015	7	10	20	40	9,5	18	13,5	50	17	16	8	12	3	M5
23022-030	9	13	26	50	12,5	27	16,5	58	20	18	9	14	3	M6
23022-060	12	15	29	60	12,5	27	19,5	62	22	18	10	14	3	M8
23022-150	15	22	33	70	14,5	30	23	73	26,5	20	12	15	4	M10
23022-300	18	30	42	85	16,5	38	29	86	31	24	14	18	4	M12
23022-500	20	38	56	100	20,5	47	36	94	33	28	16	22	5	M12
23022-700	24	40	70	120	22,5	58	44	109	38	33	18	25	6	M14

Elastomer dog couplings

clamping with grub screw

miniature



Material:
Elastomer spider polyurethane Shore hardness 98-A.
Hub aluminium.

Version:
Bright.

Sample order:
nlm 23023-0020,
D1 = 3
D2 = 3
(The hubs are supplied pre-bored).

Note:
Clamping the hub with a grub screw is a cost-effective alternative to the elastomer dog couplings with radial clamping hub (23022). Short mounting times.
The couplings can be mounted completely assembled or plug-in mounting is also possible. Lightly oil the spider to ease assembly. Take note of the required tightening torque for the grub screw. To ease removal we recommend milling a flat on the shaft.

Assembly:
The shaft to hub bore fit is a transition fit. The play should be min. 0.01 mm and max. 0.04 mm i.e.
shaft: Ø 6 f7
hub: Ø 6 H8.
Diameters smaller than D min are possible, however an optimal transfer of the couplings nominal torque is no longer guaranteed.

On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm^2)	Static resistance to torsion Nm/arcmin	Max. axial shaft displacement ±	Max. lateral shaft displacement	Tightening torque of screws (Nm)
23023-0020	2	2	0,00021	0,007	0,6	0,1	0,7
23023-0050	5	5	0,001	0,016	0,8	0,1	0,7
23023-0125	12,5	12,5	0,0059	0,038	1	0,1	1,7

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L2	L3	C (DIN 916)
23023-0020	3	3	6	14	22	7	8	3,5	M3
23023-0050	5	5	9,53	20	30	10	10	5	M3
23023-0125	8	8	14	30	35	11	13	5,5	M4

Elastomer dog couplings

with radial clamping hub and intermediate tube

Material:
Spider polyurethane Shore hardness 98-A.
Hub and tube aluminium.

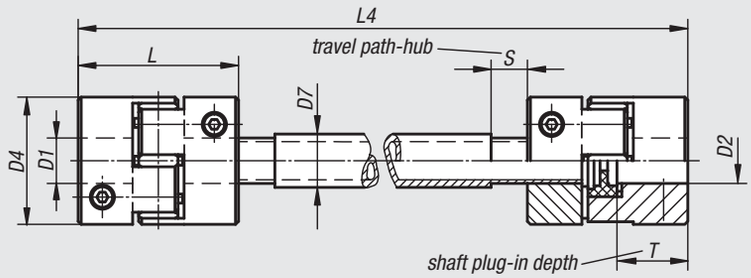
Version:
Bright.

Sample order:
nlm 23025-020X0500
(length L4 = 500 mm included)
D1 = 7
D2 = 7
(The hubs are supplied pre-bored).

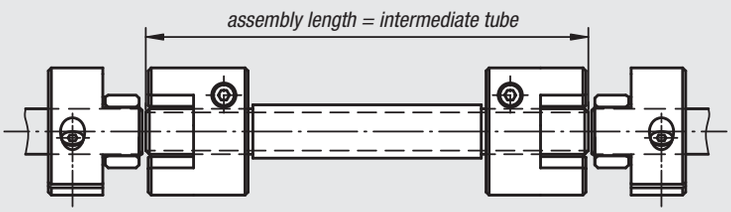
Note:
This coupling series is a simple, cost-effective version with a variable length centre tube and elastomer dog couplings (see 23022) on both ends.
Benefits are the very low moment of inertia, low weight and high permissible displacement values for shaft alignment. These low maintenance, rust-free couplings have proven to be a good alternative in linear robots for packaging and printing machines.
For the clamping screw tightening torques see technical data for 23022. Please contact us for couplings with speeds in excess of 1500 rpm L4 lengths of more than 2 m.
Max. permissible axial displacement: ±1 mm.
Max. permissible lateral displacement: 5 mm per meter.

Advantages:
- Plug-in, play-free, vibration absorbing
- For long lengths up to 3 m
- Mounting friendly radial clamping hub
- Up to 400 Nm

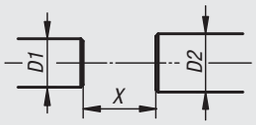
On request:
Hub bores D1 and D2 with separate tolerance class or range.



Determining assembly and length:
The combination of the easy assembly clamp hub version of 23022 and push fits on the intermediate tube guarantee quick and easy assembly or dismantling of 23025. There is no need of axial displacement as either half of the coupling on the intermediate tube can be inserted between the ends of the shaft as a spacer. Plug-in connection of the coupling hub to the elastomer spider requires little manual axial force. The hubs are each attached to the shaft or the ends of the tube by only one radial clamping screw taking account of the length L.



L4 = X + 2T



X = shaft distance
T = plug-in depth

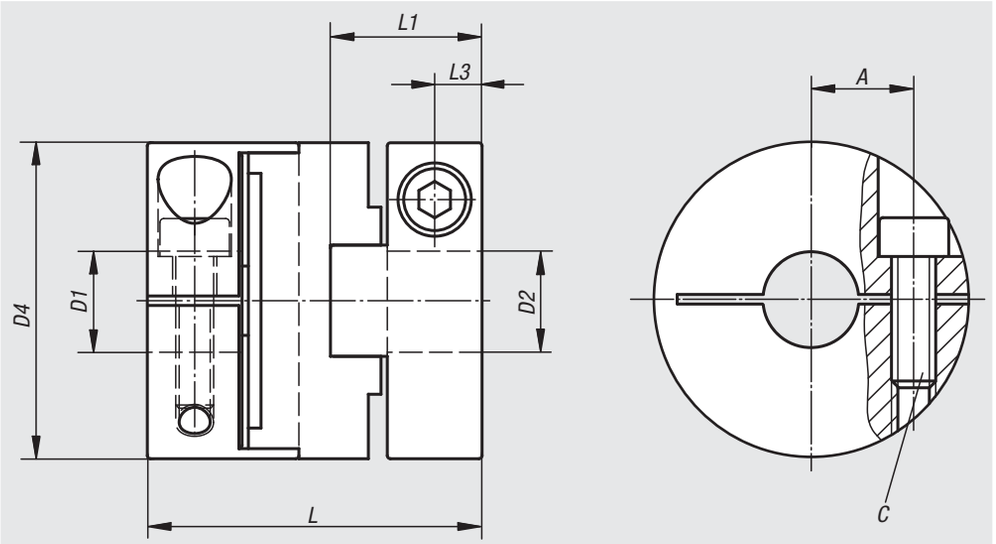
Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm²) 0,5 m	Moment of inertia (10^{-3} kgm²) 1,0 m	Moment of inertia (10^{-3} kgm²) 2,0 m	Torsion resistance Nm/arcmin 0,5 m	Torsion resistance Nm/arcmin 1,0 m	Torsion resistance Nm/arcmin 2,0 m
23025-020X	20	20	0,08	0,1	-	0,1	0,07	-
23025-045X	45	45	0,27	0,36	0,56	0,25	0,19	0,13
23025-090X	90	90	0,45	0,54	0,74	0,3	0,23	0,15
23025-200X	200	200	0,9	1,1	1,4	0,5	0,4	0,3
23025-400X	400	400	2,5	3,2	4,5	1,2	1	0,8

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	D7	L	L4 min.	S	T min.	T max.
23025-020X	7	10	20	40	35	50	132	16	16	20
23025-045X	9	13	26	50	50	58	152	18	18	25
23025-090X	12	15	29	60	50	62	160	18	20	26
23025-200X	15	22	33	70	60	73	186	20	23	30
23025-400X	18	30	42	85	80	86	220	24	28	35

Oldham-type couplings

miniature

with radial clamping hub



Material:
Centre disc polyacetal.
Hub aluminium.

Sample order:
nlm 23030-0016,
D1 = 3
D2 = 3
(The hubs are supplied pre-bored).

Note:
Short mounting times with radial clamping hub. The couplings can be mounted completely assembled or a plug-in assembly is also possible. Take note of the required tightening torque for the of the clamping screw.

Assembly:
The shaft to hub hole fit is a transition fit. The play should be min. 0.01 mm and max. 0.04 mm i.e.
shaft: Ø 6 f7
hub: Ø 6 H8.

Advantages:
- robust
- plug-in
- play-free
- short design

On request:
Hub bores D1 and D2 with separate tolerance class or range.

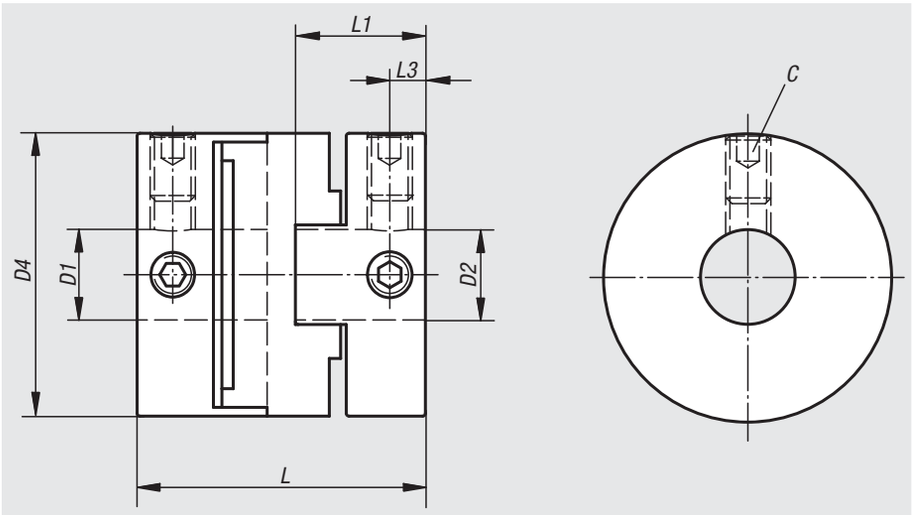
Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-6} kgm^2)	Static resistance to torsion Nm/arcmin	Max. angular shaft displacement	Max. lateral shaft displacement	max. speed U/min	Tightening torque of screws (Nm)
23030-0016	16	1	0,0032	0,019	2°	1	8000	1
23030-0020	20	1,5	0,0082	0,035	2°	1,5	7000	1
23030-0025	25	2,5	0,026	0,058	2°	2	6000	1,5
23030-0032	32	7	0,083	0,18	2°	2,5	4800	2,5

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	A	L	L1	L3	C (DIN 912-10.9)
23030-0016	3	3	6	16	5	21	9,5	3	M2,6
23030-0020	5	5	8	20	6,5	22,5	10	3	M2,6
23030-0025	6,35	6,35	10	25	8	27	12	4	M3
23030-0032	8	8	14	32	11	35	16	5	M4

Oldham-type couplings

clamping with grub screw

miniature



Material:
Centre disc polyacetal.
Hub aluminium.

Sample order:
nlm 23032-0016,
D1 = 4
D2 = 4
(The hubs are supplied pre-bored).

Note:
Clamping the hub with a grub screw is a cost-effective alternative to the Oldham-type couplings with radial clamping hub (23030). Short mounting times.
The couplings can be mounted completely assembled or a plug-in assembly is also possible. Take note of the tightening torque for the grub screw. To ease removal we recommend milling a flat on the shaft.

Assembly:
The shaft to hub hole fit is a transition fit. The play should be min. 0.01 mm and max. 0.04 mm i.e.
shaft: Ø 6 f7
hub: Ø 6 H8.

Advantages:
- robust
- plug-in
- play-free
- short design

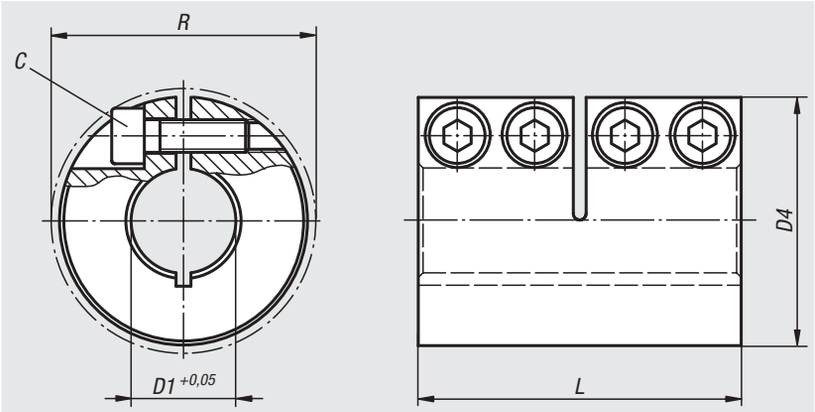
On request:
Hub bores D1 and D2 with separate tolerance class or range.

Order No.	Size	Nominal torque Nm	Moment of inertia (10^{-3} kgm²)	Static resistance to torsion Nm/arcmin	Max. angular shaft displacement	Max. lateral shaft displacement	max. speed U/min	Tightening torque of screws (Nm)
23032-0016	16	1	0,0024	0,019	2°	1	8000	1
23032-0020	20	1,5	0,081	0,035	2°	1,5	7000	1,7
23032-0025	25	2,5	0,018	0,058	2°	2	6000	1,7
23032-0032	32	7	0,067	0,18	2°	2,5	4800	4

Order No.	D1/D2 predrilled	D1/D2 min.	D1/D2 max.	D4	L	L1	L3	C (DIN 916)
23032-0016	4	4	6,35	16	18	8	2,3	M3
23032-0020	4	4	8	20	20	9	2,5	M4
23032-0025	5	5	10	25	25,5	11,5	3	M4
23032-0032	8	8	14	32	32	14,5	4	M5

Rigid couplings

one-piece



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 23050-1100

Note:
Rigid couplings transmit high torques without rotational play. They are used when there are no shaft displacements or alignment errors. Wear-free and maintenance-free. Because screws are secured, no vibration-induced loosening of screws

Is only possible to achieve the transmission of the maximum torque with optimal installation and dimensional decision of the shafts.

Maximum speed 4000 rpm.

Temperature range:
-40 °C up to +175 °C.

On request:
Other dimensions.

Slotted rigid couplings, steel

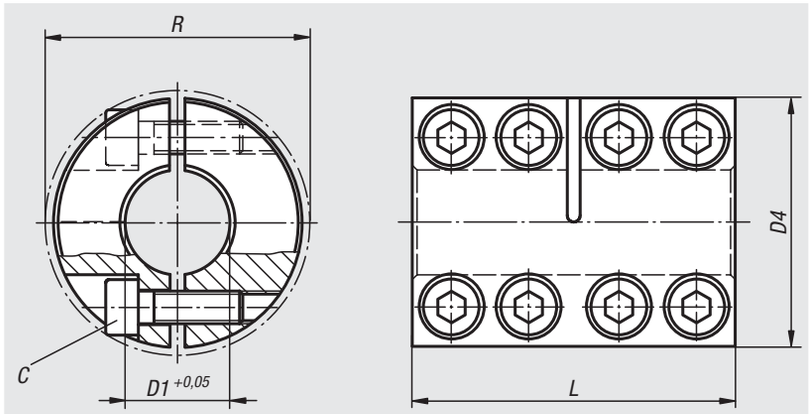
Order No.	Material	C (DIN 912-12.9)	Tightening torque of screws (Nm)	D1	D4	L	R	Nominal torque Nm
23050-1100	steel	M4x12	4,6	10	29	45	32,7	70
23050-1120	steel	M4x12	4,6	12	29	45	32,7	70
23050-1140	steel	M5x16	9,5	14	34	50	39,4	190
23050-1150	steel	M5x16	9,5	15	34	50	39,4	190
23050-1160	steel	M5x16	9,5	16	34	50	39,4	190
23050-1190	steel	M6x18	16	19	42	65	48,2	300
23050-1200	steel	M6x18	16	20	42	65	48,2	350
23050-1250	steel	M6x18	16	25	45	75	50,8	390
23050-1300	steel	M6x18	16	30	54	83	58,6	475

Slotted rigid couplings, stainless steel

Order No.	Material	C (DIN 912 A2-70)	Tightening torque of screws (Nm)	D1	D4	L	R	Nominal torque Nm
23050-2100	stainless steel	M4x12	2,5	10	29	45	32,7	70
23050-2120	stainless steel	M4x12	2,5	12	29	45	32,7	70
23050-2140	stainless steel	M5x16	5,4	14	34	50	39,4	160
23050-2150	stainless steel	M5x16	5,4	15	34	50	39,4	160
23050-2160	stainless steel	M5x16	5,4	16	34	50	39,4	160
23050-2190	stainless steel	M6x18	9,6	19	42	65	48,2	260
23050-2200	stainless steel	M6x18	9,6	20	42	65	48,2	300
23050-2250	stainless steel	M6x18	9,6	25	45	75	50,8	325
23050-2300	stainless steel	M6x18	9,6	30	54	83	58,6	400

Rigid couplings

two-piece



Material:
Steel 1.0718.
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 23052-1100

Note:
Rigid couplings transmit high torques without rotational play. They are used when there are no shaft displacements or alignment errors. Wear-free and maintenance-free. Because screws are secured, no vibration-induced loosening of screws

Is only possible to achieve the transmission of the maximum torque with optimal installation and dimensional decision of the shafts.

Maximum speed 4000 rpm.

Temperature range:
-40 °C up to +175 °C.

On request:
Other dimensions.
Version with DIN 6885/1 parallel keyway, tolerance P9.

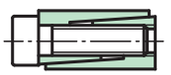
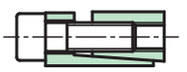
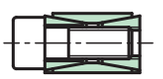
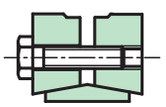
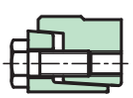
Divided rigid couplings, steel

Order No.	Material	C (DIN 912-12.9)	Tightening torque of screws (Nm)	D1	D4	L	R	Nominal torque Nm
23052-1100	steel	M4x12	4,6	10	29	45	32,7	70
23052-1120	steel	M4x12	4,6	12	29	45	32,7	70
23052-1140	steel	M5x16	9,5	14	34	50	39,4	190
23052-1150	steel	M5x16	9,5	15	34	50	39,4	190
23052-1160	steel	M5x16	9,5	16	34	50	39,4	190
23052-1190	steel	M6x18	16	19	42	65	48,2	300
23052-1200	steel	M6x18	16	20	42	65	48,2	350
23052-1250	steel	M6x18	16	25	45	75	50,8	390
23052-1300	steel	M6x18	16	30	54	83	58,6	475

Divided rigid couplings, stainless steel

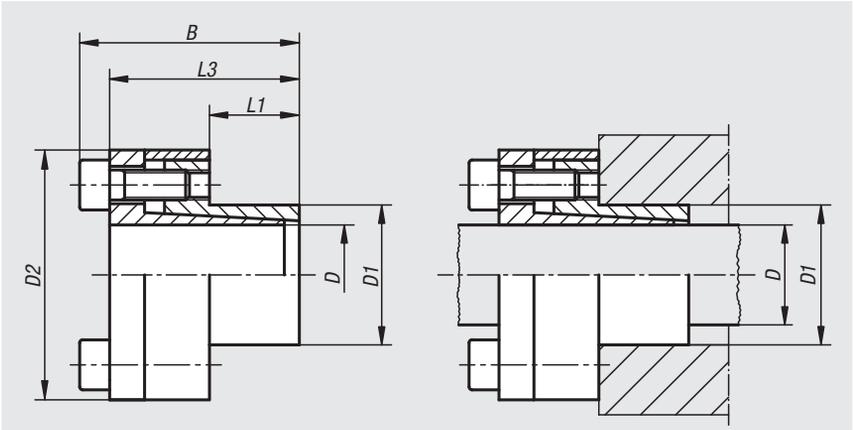
Order No.	Material	C (DIN 912 A2-70)	Tightening torque of screws (Nm)	D1	D4	L	R	Nominal torque Nm
23052-2100	stainless steel	M4x12	2,5	10	29	45	32,7	70
23052-2120	stainless steel	M4x12	2,5	12	29	45	32,7	70
23052-2140	stainless steel	M5x16	5,4	14	34	50	39,4	160
23052-2150	stainless steel	M5x16	5,4	15	34	50	39,4	160
23052-2160	stainless steel	M5x16	5,4	16	34	50	39,4	160
23052-2190	stainless steel	M6x18	9,6	19	42	65	48,2	260
23052-2200	stainless steel	M6x18	9,6	20	42	65	48,2	300
23052-2250	stainless steel	M6x18	9,6	25	45	75	50,8	325
23052-2300	stainless steel	M6x18	9,6	30	54	83	58,6	400

Overview keyless locking couplings and shrink discs

Series			Shaft diameter from	transmissible torque	Surface pressure on the hub	Self-centring	Axial displacement of the hub during assembly	Total height D2 / D			Overall length		
								flat	medium	high	short	medium	long
Tapered shaft locks	23350		8 mm	medium	low	Yes	No	X					X
	23351		19 mm	high	medium	Yes	Yes			X		X	
	23352		19 mm	medium	low	Yes	No			X		X	
	23354		6 mm	medium	low	Yes	Yes		X		X		
	23356		19 mm	medium	medium	Yes	Yes			X	X		
	23358		19 mm	medium	medium	Yes	No			X	X		
	23360		19 mm	medium	high	No	No			X	X		
	23362		25 mm	high	medium	Yes	Yes			X			X
	23368		5 mm	low	low	Yes	Yes	X				X	
Shrink disc	23380		14 mm	high	-	Yes	No		X			X	
	23382		18 mm	high	-	Yes	No		X			X	

Keyless locking couplings Form A

for thin walled hubs



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23350-0815

Note:
Particularly compact self-centring keyless locking coupling without axial offset.

- for shaft diameters from 8 to 85 mm
- for medium torques
- suitable for hubs with low wall thickness
- no axial offset
- self-centring

Order No.	D	D1	D2	B	L1	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23350-0815	8	15	27	30	12	26	30	7
23350-0916	9	16	28	31	14	27	34	7
23350-1016	10	16	28	31	14	27	37	7
23350-1118	11	18	32	31	14	27	51	10
23350-1218	12	18	32	31	14	27	56	10
23350-1423	14	23	38	31	14	27	65	10
23350-1524	15	24	44	42	16	36	110	17
23350-1624	16	24	44	42	16	36	120	17
23350-1826	18	26	47	44	18	38	180	22
23350-1927	19	27	48	44	18	38	190	22
23350-2028	20	28	49	44	18	38	200	21
23350-2232	22	32	53	51	25	45	230	21
23350-2434	24	34	55	51	25	45	255	21
23350-2534	25	34	55	51	25	45	255	21
23350-2839	28	39	60	51	25	45	370	31
23350-3041	30	41	62	51	25	45	475	31
23350-3243	32	43	64	56	30	50	505	31
23350-3547	35	47	68	56	30	50	740	42
23350-3850	38	50	71	56	30	50	800	42
23350-4053	40	53	74	58	32	52	950	53
23350-4255	42	55	77	58	32	52	995	78
23350-4559	45	59	85	72	40	64	1750	78
23350-4862	48	62	87	72	40	64	1870	78
23350-5065	50	65	91	82	50	74	2430	97
23350-5571	55	71	98	82	50	74	2670	97
23350-6077	60	77	103	82	50	74	2920	97
23350-6584	65	84	110	82	50	74	3160	97
23350-7090	70	90	119	101	60	91	4330	123
23350-7595	75	95	126	101	60	91	5310	142
23350-80100	80	100	131	106	65	96	7580	190
23350-85106	85	106	137	106	65	96	7990	190

Keyless locking couplings Form A

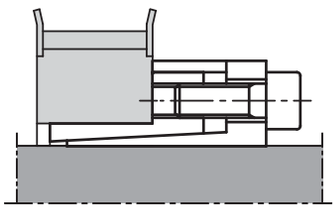
for thin walled hubs

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

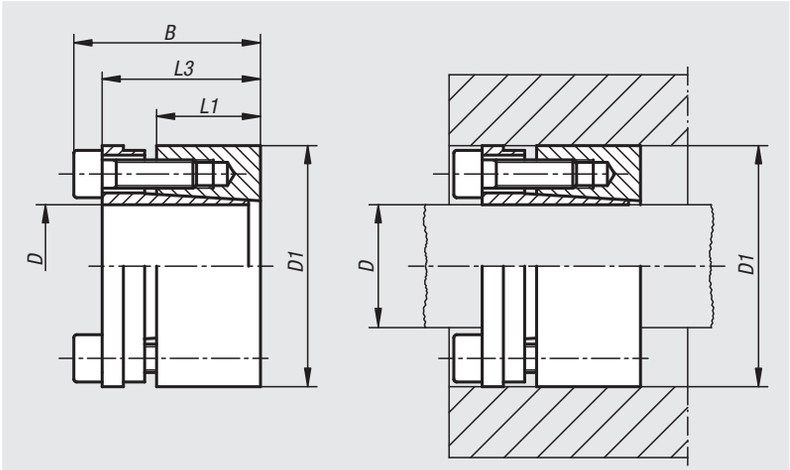
Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23350-0815	230	120	4 x M4	4
23350-0916	170	100	4 x M4	4
23350-1016	160	100	4 x M4	4
23350-1118	180	110	4 x M4	5
23350-1218	155	110	4 x M4	5
23350-1423	140	85	4 x M4	5
23350-1524	180	115	3 x M6	17
23350-1624	170	115	3 x M6	17
23350-1826	180	135	4 x M6	17
23350-1927	170	125	4 x M6	17
23350-2028	150	115	4 x M6	17
23350-2232	115	80	4 x M6	17
23350-2434	105	75	4 x M6	17
23350-2534	100	75	4 x M6	17
23350-2839	110	80	5 x M6	17
23350-3041	125	90	6 x M6	17
23350-3243	95	75	6 x M6	17
23350-3547	120	90	8 x M6	17
23350-3850	110	85	8 x M6	17
23350-4053	110	85	8 x M6	17
23350-4255	105	80	8 x M6	17
23350-4559	130	100	8 x M8	41
23350-4862	120	95	8 x M8	41
23350-5065	115	90	10 x M8	41
23350-5571	105	80	10 x M8	41
23350-6077	95	75	10 x M8	41
23350-6584	90	70	10 x M8	41
23350-7090	85	70	8 x M10	83
23350-7595	90	75	9 x M10	83
23350-80100	110	85	12 x M10	83
23350-85106	100	80	12 x M10	83

Keyless locking couplings Form B



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23351-1947

Note:
The keyless locking coupling can be fully recessed in a hub connection.

- for shaft diameters from 19 to 85 mm
- for high torques
- minimum axial offset possible
- self-centring

Order No.	D	D1	B	L1	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23351-1947	19	47	45	26	39	530	56
23351-2047	20	47	45	26	39	550	56
23351-2247	22	47	45	26	39	610	56
23351-2450	24	50	45	26	39	660	56
23351-2550	25	50	45	26	39	690	56
23351-2855	28	55	45	26	39	770	56
23351-3055	30	55	45	26	39	830	56
23351-3260	32	60	45	26	39	1180	74
23351-3560	35	60	45	26	39	1295	74
23351-3865	38	65	45	26	39	1400	74
23351-4065	40	65	45	26	39	1480	74
23351-4275	42	75	55	30	47	2120	101
23351-4575	45	75	55	30	47	2270	101
23351-4880	48	80	55	30	47	3230	135
23351-5080	50	80	55	30	47	3365	135
23351-5585	55	85	55	30	47	3700	135
23351-6090	60	90	55	30	47	4035	135
23351-6595	65	95	55	30	47	4370	135
23351-70110	70	110	67	40	62	7615	218
23351-75115	75	115	72	40	62	8160	218
23351-80120	80	120	72	40	62	8700	218
23351-85125	85	125	72	40	62	11560	272

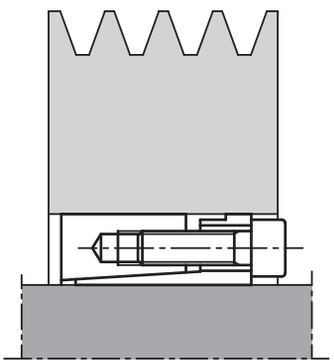
Keyless locking couplings Form B

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

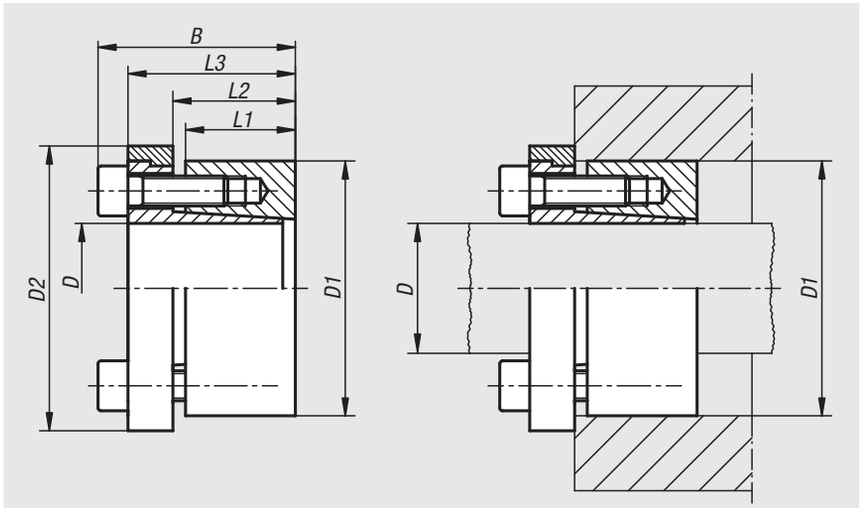
Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23351-1947	298	120	6 x M6	17
23351-2047	283	120	6 x M6	17
23351-2247	257	120	6 x M6	17
23351-2450	236	115	6 x M6	17
23351-2550	227	115	6 x M6	17
23351-2855	202	105	6 x M6	17
23351-3055	190	105	6 x M6	17
23351-3260	235	125	8 x M6	17
23351-3560	216	126	8 x M6	17
23351-3865	200	116	8 x M6	17
23351-4065	190	116	8 x M6	17
23351-4275	212	120	6 x M8	41
23351-4575	198	120	6 x M8	41
23351-4880	250	150	8 x M8	41
23351-5080	240	150	8 x M8	41
23351-5585	216	140	8 x M8	41
23351-6090	200	135	8 x M8	41
23351-6595	183	125	8 x M8	41
23351-70110	206	131	8 x M10	83
23351-75115	192	126	8 x M10	83
23351-80120	180	120	8 x M10	83
23351-85125	212	145	10 x M10	83

Keyless locking couplings Form C

with axial ring



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23352-1947

Note:
These keyless locking couplings are universally applicable.

- for shaft diameters from 19 to 85 mm
- for medium to high torques
- suitable for hubs with low wall thickness
- no axial offset
- self-centring

Order No.	D	D1	D2	B	L1	L2	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23352-1947	19	47	53	45	26	31	39	320	33
23352-2047	20	47	53	45	26	31	39	330	33
23352-2247	22	47	53	45	26	31	39	370	33
23352-2450	24	50	56	45	26	31	39	400	33
23352-2550	25	50	56	45	26	31	39	420	33
23352-2855	28	55	61	45	26	31	39	470	33
23352-3055	30	55	61	45	26	31	39	500	33
23352-3260	32	60	66	45	26	31	39	710	44
23352-3560	35	60	66	45	26	31	39	780	44
23352-3865	38	65	71	45	26	31	39	850	44
23352-4065	40	65	71	45	26	31	39	890	44
23352-4275	42	75	81	55	30	36	47	1270	61
23352-4575	45	75	81	55	30	36	47	1360	61
23352-4880	48	80	86	55	30	36	47	1940	81
23352-5080	50	80	86	55	30	36	47	2020	81
23352-5585	55	85	91	55	30	36	47	2220	81
23352-6090	60	90	96	55	30	36	47	2430	81
23352-6595	65	95	101	55	30	36	47	2630	81
23352-70110	70	110	116	72	40	46	62	4580	131
23352-75115	75	115	121	72	40	46	62	4900	131
23352-80120	80	120	126	72	40	46	62	5230	131
23352-85125	85	125	131	72	40	46	62	6950	163

Keyless locking couplings Form C

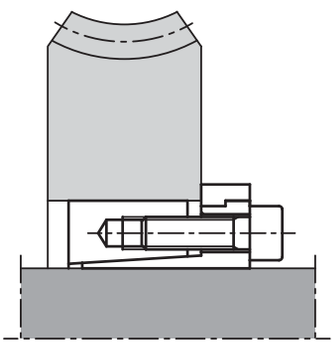
with axial ring

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23352-1947	180	70	6 x M6	17
23352-2047	170	70	6 x M6	17
23352-2247	155	70	6 x M6	17
23352-2450	140	70	6 x M6	17
23352-2550	135	70	6 x M6	17
23352-2855	120	60	6 x M6	17
23352-3055	115	60	6 x M6	17
23352-3260	140	75	8 x M6	17
23352-3560	130	75	8 x M6	17
23352-3865	120	70	8 x M6	17
23352-4065	110	70	8 x M6	17
23352-4275	130	70	6 x M8	41
23352-4575	120	70	6 x M8	41
23352-4880	150	90	8 x M8	41
23352-5080	145	90	8 x M8	41
23352-5585	130	85	8 x M8	41
23352-6090	120	80	8 x M8	41
23352-6595	110	75	8 x M8	41
23352-70110	125	80	8 x M10	83
23352-75115	115	75	8 x M10	83
23352-80120	110	70	8 x M10	83
23352-85125	125	85	10 x M10	83

Keyless locking couplings Form D

compact design

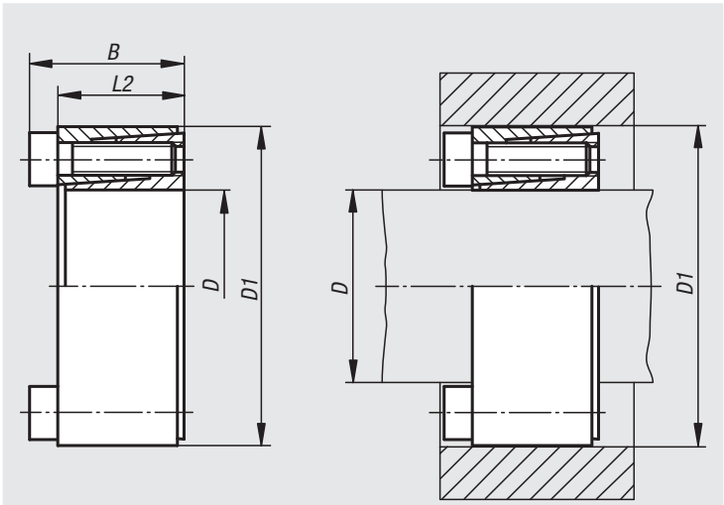
Material:
Steel.

Version:
Bright.

Sample order:
nlm 23354-0516

Note:
For applications that require a small construction volume and low surface pressure. The keyless locking coupling can be fully recessed in a hub connection.

- for shaft diameters from 5 to 50 mm
- for medium torques
- suitable for hubs with low wall thickness
- minimum axial offset possible
- self-centring



Order No.	D	D1	B	L2	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23354-0516	5	16	13,5	11	6	2
23354-0616	6	16	13,5	11	6	2
23354-063516	6,35	16	13,5	11	6	2
23354-0717	7	17	13,5	11	8	2
23354-0818	8	18	13,5	11	10	2,5
23354-0920	9	20	15,5	13	15	3
23354-095320	9,53	20	15,5	13	15	3
23354-1020	10	20	15,5	13	15	3
23354-1122	11	22	15,5	13	18	3
23354-1222	12	22	15,5	13	20	3
23354-1426	14	26	20	17	35	5
23354-1528	15	28	20	17	40	5
23354-1632	16	32	21	17	70	8
23354-1735	17	35	25	21	75	8
23354-1835	18	35	25	21	80	8
23354-1935	19	35	25	21	85	8
23354-2038	20	38	26	21	150	15
23354-2240	22	40	26	21	160	14
23354-2447	24	47	32	26	250	20
23354-2547	25	47	32	26	260	20
23354-25447	25,4	47	32	26	265	20
23354-2850	28	50	32	26	440	30
23354-3055	30	55	32	26	470	30
23354-3255	32	55	32	26	500	30
23354-3560	35	60	37	29	730	40
23354-3865	38	65	37	29	800	40
23354-4065	40	65	37	29	840	40
23354-4275	42	75	44	36	1200	55
23354-4575	45	75	44	36	1300	55
23354-4880	48	80	44	36	1850	75
23354-5080	50	80	44	36	1900	75

Keyless locking couplings Form D

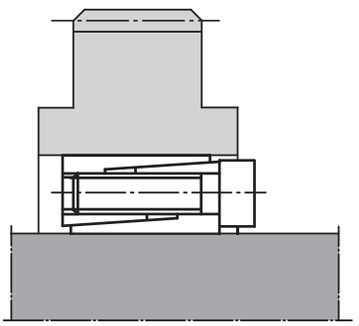
compact design

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

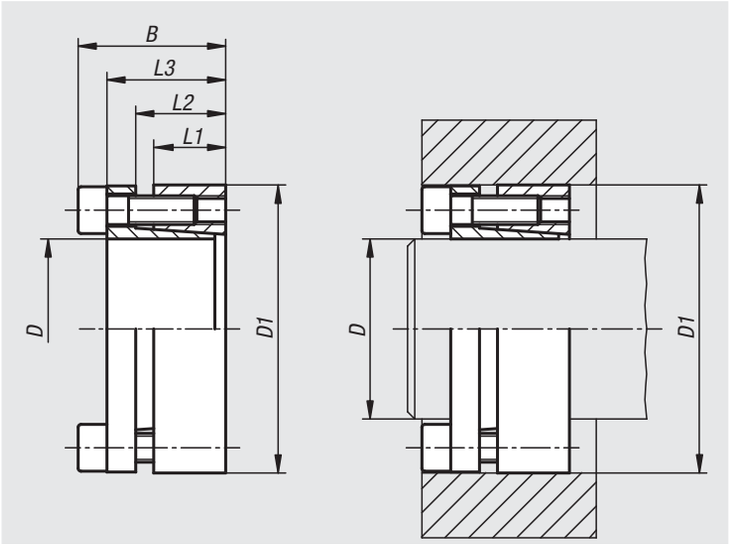
Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23354-0516	150	55	3 x M2,5	1,2
23354-0616	150	55	3 x M2,5	1,2
23354-063516	140	55	3 x M2,5	1,2
23354-0717	125	55	3 x M2,5	1,2
23354-0818	110	50	3 x M2,5	1,2
23354-0920	120	55	4 x M2,5	1,2
23354-095320	110	55	4 x M2,5	1,2
23354-1020	110	55	4 x M2,5	1,2
23354-1122	100	50	4 x M2,5	1,2
23354-1222	90	50	4 x M2,5	1,2
23354-1426	105	55	4 x M3	2,1
23354-1528	100	50	4 x M3	2,1
23354-1632	130	65	4 x M4	4,9
23354-1735	120	60	4 x M4	4,9
23354-1835	115	60	4 x M4	4,9
23354-1935	110	60	4 x M4	4,9
23354-2038	140	75	4 x M5	9,7
23354-2240	130	70	4 x M5	17
23354-2447	140	75	4 x M6	17
23354-2547	135	75	4 x M6	17
23354-25447	130	75	4 x M6	17
23354-2850	185	100	6 x M6	17
23354-3055	175	95	6 x M6	17
23354-3255	165	95	6 x M6	17
23354-3560	165	95	8 x M6	17
23354-3865	155	90	8 x M6	17
23354-4065	145	90	8 x M6	17
23354-4275	165	90	6 x M8	41
23354-4575	155	90	6 x M8	41
23354-4880	195	115	8 x M8	41
23354-5080	185	115	8 x M8	41

Keyless locking couplings Form E

short version



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23356-1947

Note:
Keyless locking coupling with short axial width. The keyless locking coupling can be fully recessed in a hub connection.

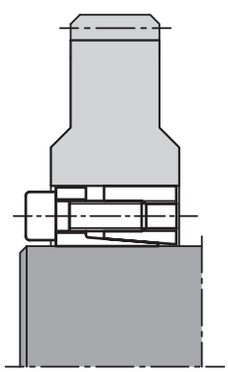
- for shaft diameters from 19 to 85 mm
- for medium to high torques
- minimum axial offset when mounting
- self-centring

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Keyless locking couplings Form E

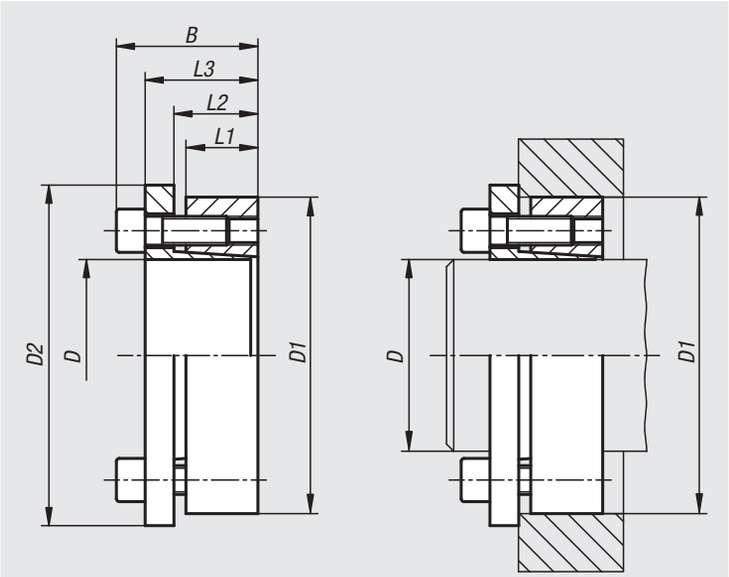
short version

Order No.	D	D1	B	L1	L2	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23356-1947	19	47	34	17	22	28	355	31
23356-2047	20	47	34	17	22	28	360	33
23356-2247	22	47	34	17	22	28	400	33
23356-2450	24	50	34	17	22	28	440	36
23356-2550	25	50	34	17	22	28	560	36
23356-2855	28	55	34	17	22	28	625	36
23356-3055	30	55	34	17	22	28	650	36
23356-3260	32	60	34	17	22	28	950	50
23356-3560	35	60	34	17	22	28	1050	50
23356-3865	38	65	34	17	22	28	1140	50
23356-4065	40	65	34	17	22	28	1200	50
23356-4275	42	75	41	20	25	33	2030	70
23356-4575	45	75	41	20	25	33	2180	70
23356-4880	48	80	41	20	24	33	2330	80
23356-5080	50	80	41	20	24	33	2430	85
23356-5585	55	85	41	20	24	33	3050	100
23356-6090	60	90	41	20	24	33	3350	100
23356-6595	65	95	41	20	24	33	4080	110
23356-70110	70	110	50	24	29	40	6280	160
23356-75115	75	115	50	24	29	40	6680	160
23356-80120	80	120	50	24	29	40	7130	160
23356-85125	85	125	50	24	29	40	8750	180

Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23356-1947	280	120	5 x M6	14
23356-2047	280	120	5 x M6	14
23356-2247	260	125	5 x M6	14
23356-2450	245	120	6 x M6	14
23356-2550	280	140	6 x M6	14
23356-2855	250	130	6 x M6	14
23356-3055	235	130	6 x M6	14
23356-3260	290	150	8 x M6	14
23356-3560	290	150	8 x M6	14
23356-3865	250	145	8 x M6	14
23356-4065	230	145	8 x M6	14
23356-4275	305	170	7 x M8	35
23356-4575	285	170	7 x M8	35
23356-4880	270	160	7 x M8	35
23356-5080	260	160	7 x M8	35
23356-5585	270	175	8 x M8	35
23356-6090	245	165	8 x M8	35
23356-6595	255	175	9 x M8	35
23356-70110	280	180	8 x M10	70
23356-75115	260	170	8 x M10	70
23356-80120	250	170	8 x M10	70
23356-85125	260	180	9 x M10	70

Keyless locking couplings Form F

short version with axial ring



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23358-1947

Note:
Keyless locking coupling with short axial width.

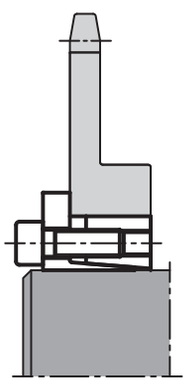
- for shaft diameters from 19 to 85 mm
- for medium to high torques
- no axial offset when mounting
- self-centring

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Keyless locking couplings Form F

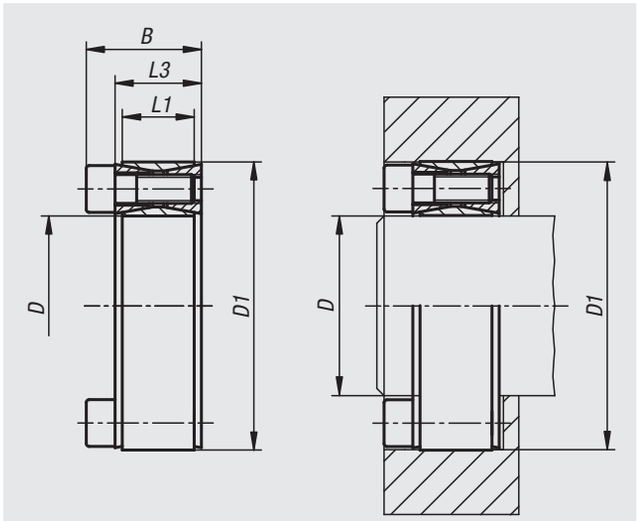
short version with axial ring

Order No.	D	D1	D2	B	L1	L2	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23358-1947	19	47	56	34	17	23	28	270	28
23358-2047	20	47	56	34	17	23	28	280	28
23358-2247	22	47	56	34	17	23	28	310	28
23358-2450	24	50	59	34	17	23	28	400	32
23358-2550	25	50	59	34	17	23	28	440	34
23358-2855	28	55	64	34	17	23	28	490	34
23358-3055	30	55	64	34	17	23	28	530	34
23358-3260	32	60	69	34	17	23	28	750	46
23358-3560	35	60	69	34	17	23	28	820	46
23358-3865	38	65	74	34	17	23	28	890	46
23358-4065	40	65	74	34	17	23	28	940	46
23358-4275	42	75	84	41	20	27	33	1600	70
23358-4575	45	75	84	41	20	27	33	1720	70
23358-4880	48	80	89	41	20	27	33	1740	70
23358-5080	50	80	89	41	20	27	33	1890	74
23358-5585	55	85	94	41	20	27	33	2400	76
23358-6090	60	90	99	41	20	27	33	2650	76
23358-6595	65	95	104	41	20	27	33	3190	80
23358-70110	70	110	119	50	24	32	40	4910	130
23358-75115	75	115	124	50	24	32	40	5150	130
23358-80120	80	120	129	50	24	32	40	5490	130
23358-85125	85	125	134	50	24	32	40	6620	140

Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23358-1947	215	95	5 x M6	17
23358-2047	215	95	5 x M6	17
23358-2247	195	95	5 x M6	17
23358-2450	215	105	6 x M6	17
23358-2550	210	105	6 x M6	17
23358-2855	195	100	6 x M6	17
23358-3055	185	100	6 x M6	17
23358-3260	210	110	8 x M6	17
23358-3560	185	110	8 x M6	17
23358-3865	190	110	8 x M6	17
23358-4065	185	110	8 x M6	17
23358-4275	240	130	7 x M8	41
23358-4575	225	130	7 x M8	41
23358-4880	234	130	7 x M8	41
23358-5080	205	125	7 x M8	41
23358-5585	210	130	8 x M8	41
23358-6090	185	120	8 x M8	41
23358-6595	195	130	9 x M8	41
23358-70110	215	135	8 x M10	83
23358-75115	195	125	8 x M10	83
23358-80120	185	120	8 x M10	83
23358-85125	195	130	9 x M10	83

Keyless locking couplings Form G

increased tolerance range



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23360-1947

Note:
Keyless locking coupling with increased tolerance range for shaft and hub. Extremely small design ideal for use when there is lack of space. Self-release when dismantling.

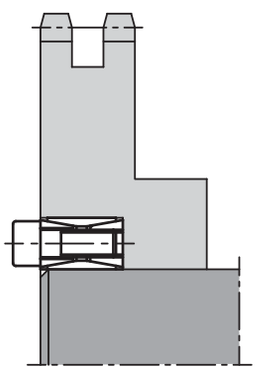
- for shaft diameters from 19 to 85 mm
- for high torques
- no axial offset when mounting
- not self-centring (concentricity of hub to shaft depends on the fit and length of the guide)

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h11.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H11.
Surface quality Rz ≤ 16 µm.



Keyless locking couplings Form G

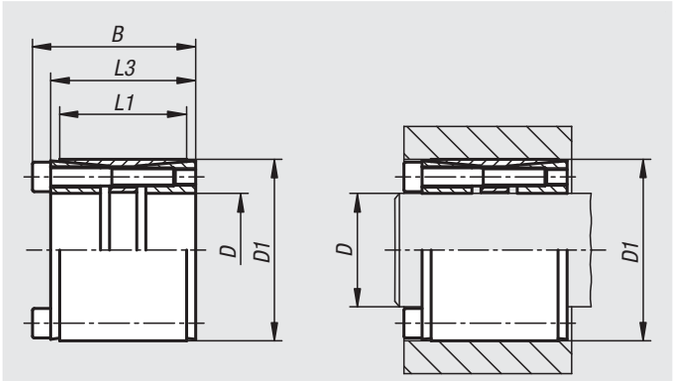
increased tolerance range

Order No.	D	D1	B	L1	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23360-1947	19	47	27,5	17	20	306	32
23360-2047	20	47	27,5	17	20	321	32
23360-2247	22	47	27,5	17	20	351	32
23360-2450	24	50	27,5	17	20	429	36
23360-2550	25	50	27,5	17	20	446	36
23360-2855	28	55	27,5	17	20	496	35
23360-3055	30	55	27,5	17	20	529	35
23360-3260	32	60	27,5	17	20	749	47
23360-3560	35	60	27,5	17	20	815	47
23360-3865	38	65	27,5	17	20	1101	58
23360-4065	40	65	27,5	17	20	1154	58
23360-4275	42	75	33,5	20	24	1768	84
23360-4575	45	75	33,5	20	24	1886	84
23360-4880	48	80	33,5	20	24	2004	83
23360-5080	50	80	33,5	20	24	2082	83
23360-5585	55	85	33,5	20	24	2656	97
23360-6090	60	90	33,5	20	24	2881	96
23360-6595	65	95	33,5	20	24	3550	109
23360-70110	70	110	39,5	24	28	5432	155
23360-75115	75	115	39,5	24	28	5795	155
23360-80120	80	120	39,5	24	28	6156	154
23360-85125	85	125	39,5	24	28	7447	175

Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23360-1947	265	107	8 x M6	17
23360-2047	251	107	8 x M6	17
23360-2247	227	106	8 x M6	17
23360-2450	232	112	9 x M6	17
23360-2550	223	111	9 x M6	17
23360-2855	197	100	9 x M6	17
23360-3055	183	100	9 x M6	17
23360-3260	228	122	12 x M6	17
23360-3560	208	121	12 x M6	17
23360-3865	238	139	15 x M6	17
23360-4065	225	139	15 x M6	17
23360-4275	266	149	12 x M8	41
23360-4575	247	148	12 x M8	41
23360-4880	231	138	12 x M8	41
23360-5080	221	138	12 x M8	41
23360-5585	233	151	14 x M8	41
23360-6090	212	142	14 x M8	41
23360-6595	223	153	16 x M8	41
23360-70110	245	156	14 x M10	83
23360-75115	228	149	14 x M10	83
23360-80120	213	142	14 x M10	83
23360-85125	228	155	16 x M10	83

Keyless locking couplings Form H

for high torques



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23362-2555

Note:
Keyless locking coupling for extremely high torques.

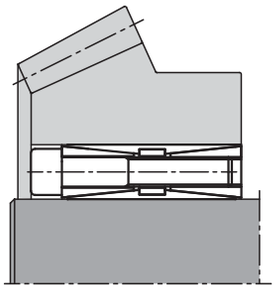
- for shaft diameters from 25 to 85 mm
- for high torques
- minimum axial offset when mounting
- self-centring

Assembly:
Lightly oil keyless locking coupling on the tapered faces and contact points of the shaft and hub. Do not use MoS2 or grease. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten screws crosswise in several increments to the defined tightening torque.

Dismantling: Remove all screws and screw into the extraction threads of the front flange. Tighten screws crosswise in several steps until the keyless locking coupling loosens.

Tolerances:
Shaft:
Recommended tolerance h8.
Surface quality Rz ≤ 16 µm.

Hub:
Recommended tolerance H8.
Surface quality Rz ≤ 16 µm.



Keyless locking couplings Form H

for high torques

Order No.	D	D1	B	L1	L3	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS
23362-2555	25	55	46	32	40	649	64
23362-2855	28	55	46	32	40	875	64
23362-3055	30	55	46	32	40	950	64
23362-3560	35	60	60	44	54	1300	74
23362-3865	38	65	60	45	54	1600	84
23362-4065	40	65	60	45	54	1680	84
23362-4275	42	75	62	44	54	2800	135
23362-4575	45	75	62	44	54	3050	135
23362-4880	48	80	75	56	67	3700	155
23362-5080	50	80	74	56	66	3950	155
23362-5585	55	85	74	56	66	4900	174
23362-6090	60	90	74	56	66	5900	193
23362-6595	65	95	74	56	66	6450	193
23362-70110	70	110	90	70	80	10950	313
23362-75115	75	115	90	70	80	11700	313
23362-80120	80	120	90	70	80	13750	344
23362-85125	85	125	90	70	80	16000	375

Order No.	Surface pressure on shaft P N/mm²	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23362-2555	155	80	6 X M6	17
23362-2855	250	95	6 x M6	17
23362-3055	235	95	6 x M6	17
23362-3560	165	75	7 x M6	17
23362-3865	165	95	8 x M6	17
23362-4065	155	95	8 x M6	17
23362-4275	250	110	7 x M8	41
23362-4575	235	110	7 x M8	41
23362-4880	195	90	8 x M8	41
23362-5080	185	90	8 x M8	41
23362-5585	190	100	9 x M8	41
23362-6090	195	100	10 x M8	41
23362-6595	180	95	10 x M8	41
23362-70110	210	110	10 x M10	83
23362-75115	200	105	10 x M10	83
23362-80120	205	110	11 x M10	83
23362-85125	210	115	12 x M10	83

Keyless locking couplings with central nut

Material:
Steel.

Version:
Bright.

Sample order:
nlm 23368-0516

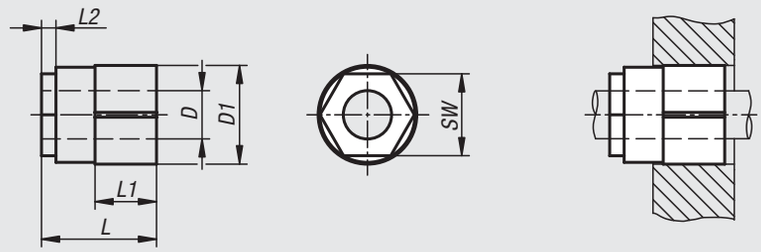
Note:
Keyless locking coupling with low mass and moment of inertia. Easy to connect and release – no jamming on the shaft. Perfect for zero backlash connections. Excellent concentricity and running. Suitable for keyed and keyless shafts.

- for shaft diameters from 5 to 35 mm
- for high torques
- minimum axial offset when mounting
- self-centring

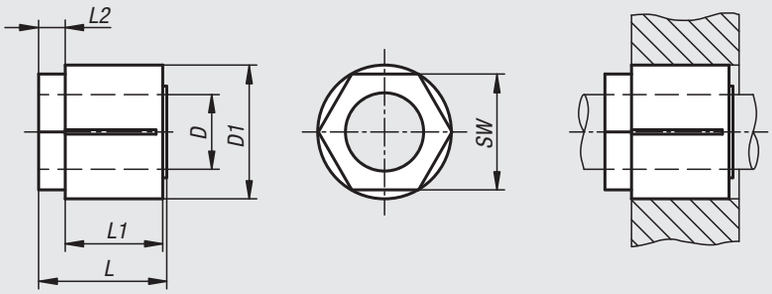
Assembly:
Shaft and hub must be free of oil, grease and dirt. Do not lubricate keyless locking coupling. Insert keyless locking coupling in the hub seat and slide onto shaft. Tighten nut by hand and use a torque wrench to tighten to the defined tightening torque.

Tolerances:
Shaft diameter and hub hole
Form A ±0.04 mm.
Form B ±0.08 mm.
Surface quality Rz ≤ 16 µm.

Form A



Form B

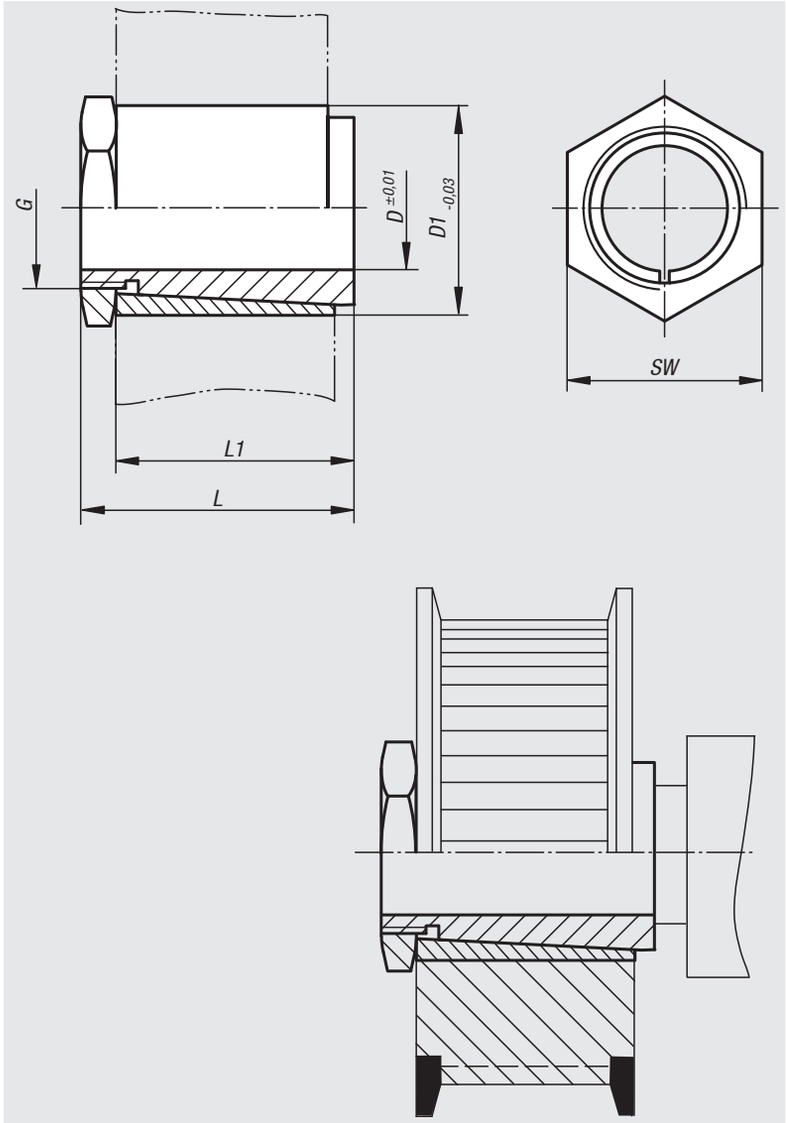


Keyless locking couplings with central nut

Order No.	Form	D	D1	L	L1	L2	SW	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS	Surface pressure on hub P N/mm²	Clamping screws tightening torque MS in Nm
23368-0516	A	5	16	19	9,5	3	13	10	4	110	18
23368-0616	A	6	16	19	9,5	3	13	13	4,3	110	18
23368-0720	A	7	20	22	11	3	16	13	3,7	65	20
23368-0820	A	8	20	22	11	3	16	15	3,75	65	20
23368-0920	A	9	20	22	11	3	16	18	4	65	20
23368-1023	A	10	23	25,5	12,5	5	19	23	4,6	55	25
23368-1123	A	11	23	25,5	12,5	5	19	25	4,5	55	25
23368-1223	A	12	23	25,5	12,5	5	19	28	4,6	55	25
23368-1426	A	14	26	28,5	16	5	22	46	6,6	64	50
23368-1526	A	15	26	28,5	16	5	22	49	6,59	64	50
23368-1626	A	16	26	28,5	16	5	22	52	6,5	64	50
23368-1732	B	17	32	33	21	11	30	174	18	100	110
23368-1832	B	18	32	33	21	11	30	198	21	92	110
23368-2035	B	20	35	35	23	11	32	258	26	82	150
23368-2235	B	22	35	35	23	11	32	293	27	80	150
23368-2438	B	24	38	35	23	11	36	330	29	87	185
23368-2538	B	25	38	35	23	11	36	368	31	94	185
23368-3045	B	30	45	37	25	11	46	550	45	108	300
23368-3250	B	32	50	41	28	12	50	616	44	100	265
23368-3550	B	35	50	41	28	12	50	681	42	91	265

Shaft-hub clamping sets

stainless steel



Material:
Stainless steel 1.4301.

Version:
Bright.

Sample order:
nlm 23370-040008

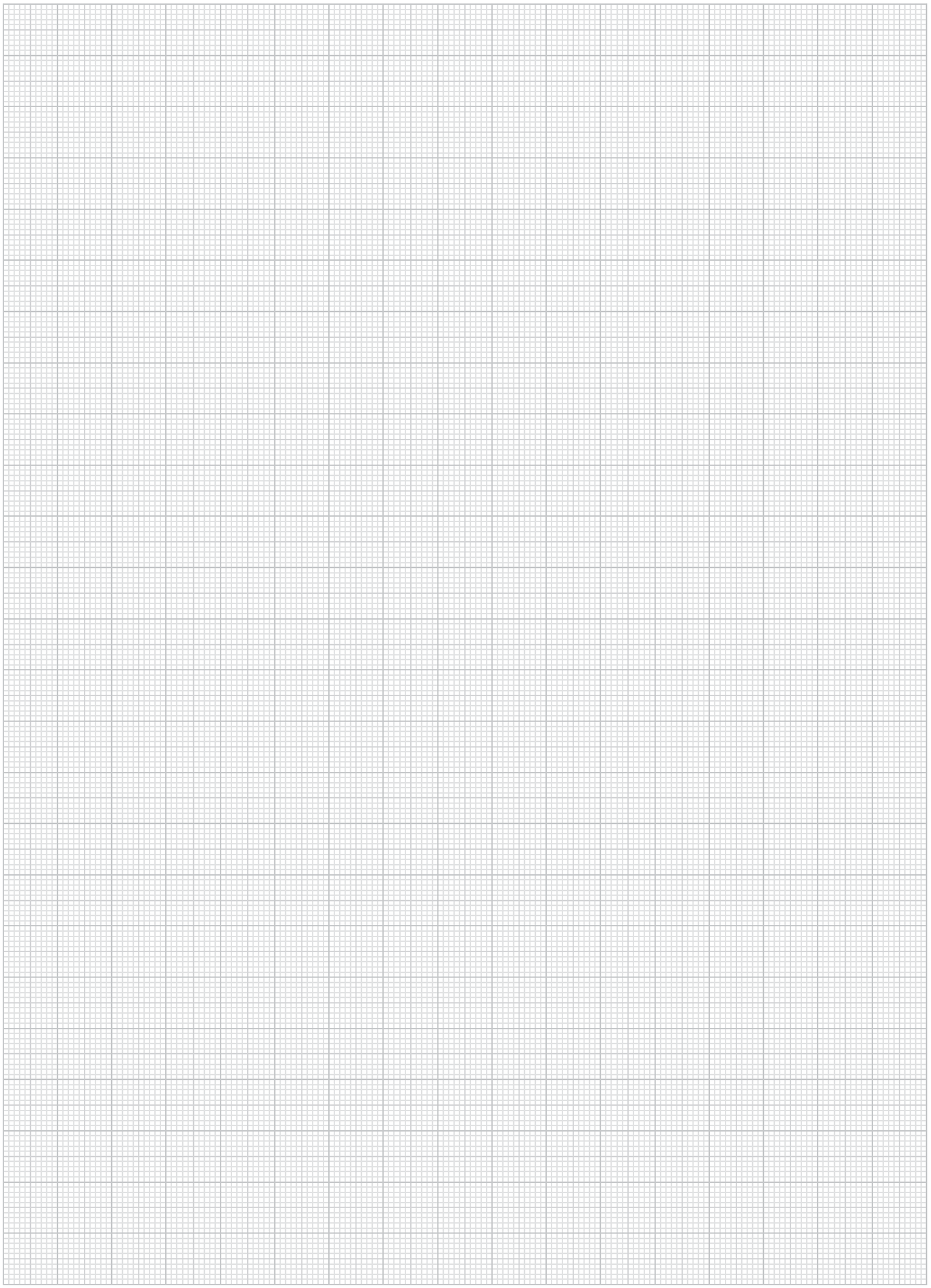
Note:
Self-centring and play-free shaft-hub clamping sets with a very low moment of inertia and minimal space required. The clamping sets produce a connection between shaft and hub actuated by spring. Quick assembly and disassembly with a central nut. The connection can be disassembled by means of an extractor. Run-out accuracy of the clamping sets ±0.01 mm.

Assembly:
In order to reach the specified torque, the clamping set must be installed free of grease. The clamping set must seat solidly with the entire length upon the shaft. For maximal torque, shaft and hub must be sufficiently firm (lowest elastic limit 350 N/mm², e.g., C45).

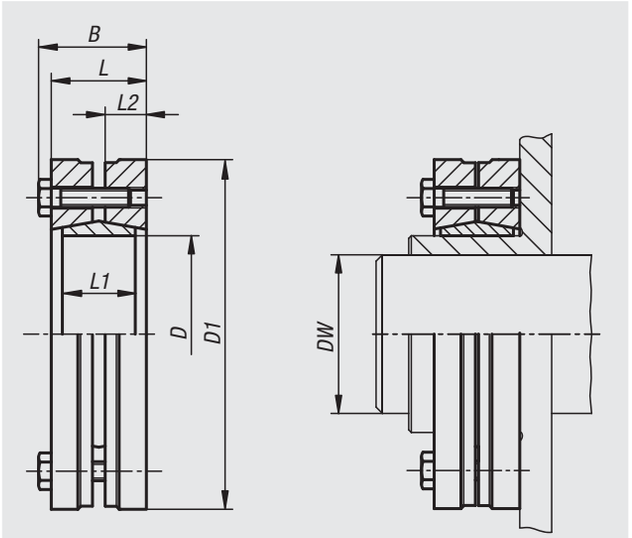
Requisite tolerances:
Shaft: h7
Hub: H7

Order No.	D	D1	L	L1	G	SW	Tightening torque max. Nm	Torque transmissible T Nm
23370-040008	4	8	15	12,5	M6x0,5	8	4	3
23370-050010	5	10	15	12,5	M8x0,5	10	5	4
23370-060010	6	10	15	12,5	M8x0,5	10	8	7
23370-063510	6,35	10	15	12,5	M8x0,5	10	8	7
23370-080014	8	14	22	19	M12x1	17	15	14
23370-090014	9	14	22	19	M12x1	17	15	14
23370-100017	10	17	22	18,5	M15x1	19	19	18
23370-120017	12	17	22	18,5	M15x1	19	19	18
23370-140020	14	20	28	23	M17x1	22	25	24
23370-150020	15	20	28	23	M17x1	22	25	24
23370-160023	16	23	28	23	M20x1	27	27	26
23370-190025	19	25	28	23	M22x1	27	30	29
23370-200028	20	28	28	23	M25x1	30	32	31

Notes



Shrink discs Form A



Material:
Steel.

Version:
Bright.

Sample order:
nlm 23380-1437

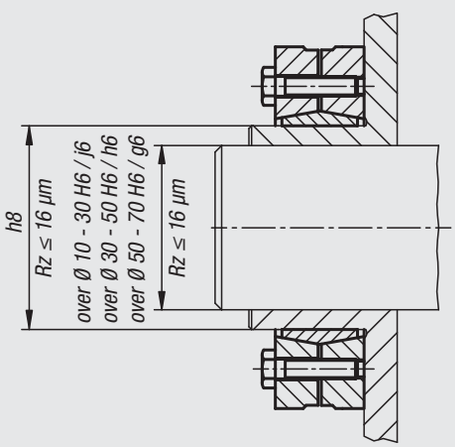
Note:
Shrink disc to connect a hollow shaft to a shaft. They are attached to the outside of the hub and generate a tension on the hub by reducing its internal diameter over tapered surfaces. This creates a press fit between the hub and shaft. They are suitable for static, dynamic and shock loads.

- for extremely high torques
- no axial shaft/hub offset when assembling
- self-centring

Assembly:
Remove existing transportation locks. Clean and lightly oil shaft, internal and external hub diameters. Do not use MoS2 or grease. Slide shrink disc onto hub. Then slide unit (shrink disc/hub) onto shaft and position correctly. Gently tighten clamping screws one after the other by hand. Then use a torque wrench to tighten the clamping screws one after the other in several increments to the defined tightening torque MS.
1st increment approx. 33% MS
2nd increment approx. 66% MS
3rd increment 100% MS

Dismantling: Gradually loosen all screws one after the other but do not fully remove from the thread. The shrinking disc usually loosens itself.

Production tolerances



Shrink discs Form A

Order No.	D	D1	DW	B	L	L1	L2	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23380-1437	14	37	10	14,8	12	9	5	30	8	278	3 x M4	2,4
			11					37	8			
			12					48	10			
23380-1641	16	41	12	18,5	15	12	6,25	70	15	336	4 x M5	4
			13					90	18			
			14					110	20			
23380-1844	18	44	14	18,5	15	12	6,25	90	16	299	4 x M5	4
			15					100	18			
			16					120	20			
23380-2046	20	46	15	21	17,5	12	7	110	20	336	5 x M5	4
			16					140	22			
			17					160	24			
23380-2150	21	50	16	22,5	19	15	8	200	31	384	6 x M5	5
			17					230	34			
			18					260	37			
23380-2450	24	50	19	22,5	19	15	8	240	32	336	6 x M5	5
			20					270	35			
			21					300	38			
23380-3052	30	52	24	26	22,5	18	9,5	350	38	261	7 x M5	5
			25					400	41			
			26					440	43			
23380-3672	36	72	28	27,5	23,5	18	10	590	53	303	5 x M6	12
			30					690	58			
			31					700	58			
23380-3872	38	72	29	30	26	21	10,5	700	62	295	6 x M6	12
			30					770	65			
			31					780	63			
23380-4072	40	72	30	28,5	24,5	19	10,5	720	61	310	6 x M6	12
			31					730	59			
			32					790	62			
23380-4480	44	80	32	30	26	20	11	800	63	312	7 x M6	12
			35					1000	73			
			36					1050	76			
23380-4880	48	80	36	30	26	22	11	900	65	260	7 x M6	12
			38					1050	72			
			40					1200	78			
23380-5090	50	90	38	31,5	27,5	22,5	12	1350	89	314	8 x M6	12
			40					1500	96			
			42					1700	103			
23380-55100	55	100	42	34,5	30,5	23	13	1300	78	248	8 x M6	12
			45					1550	87			
			48					1800	96			
23380-62110	62	110	48	34,5	30,5	23	13	2400	126	330	12 x M6	12
			50					2650	133			
			52					2800	136			
23380-68115	68	115	50	34,5	30,5	23,5	13	1900	95	245	10 x M6	12
			55					2250	104			
			60					2850	121			
23380-75138	75	138	55	37,8	32,5	25	14	2650	121	277	7 x M8	30
			60					3300	139			
			65					4050	158			
23380-80145	80	145	60	37,8	32,5	25	14	3200	126	259	7 x M8	30
			65					3900	143			
			70					4600	160			

Shrink discs Form B

Material:
Steel.

Version:
Bright.

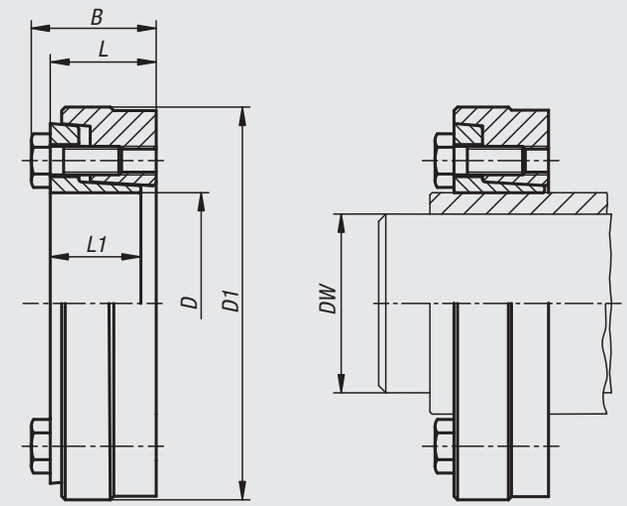
Sample order:
nlm 23382-1844

Note:
Shrink disc to connect a hollow shaft to a shaft. They are attached to the outside of the hub and generate a tension on the hub by reducing its internal diameter over tapered surfaces. This creates a press fit between the hub and shaft. They are suitable for static, dynamic and shock loads.

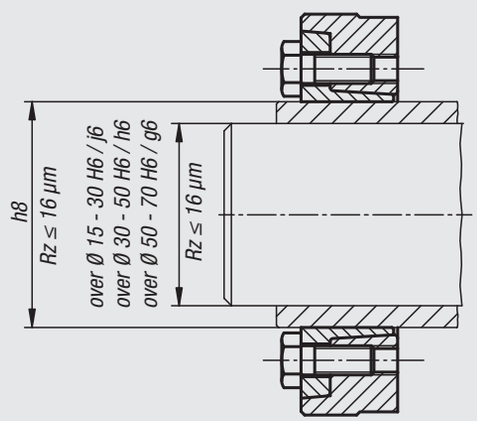
- for extremely high torques
- no axial shaft/hub offset when assembling
- self-centring

Assembly:
Remove existing transportation locks. Clean and lightly oil shaft, internal and external hub diameters. Do not use MoS2 or grease. Slide shrink disc onto hub. Then slide unit (shrink disc/hub) onto shaft and position correctly. Gently tighten clamping screws one after the other by hand. Then use a torque wrench to tighten the clamping screws one after the other in several increments to the defined tightening torque MS.
1st increment approx. 33% MS
2nd increment approx. 66% MS
3rd increment 100% MS

Dismantling: Gradually loosen all screws one after the other but do not fully remove from the thread. The shrinking disc usually loosens itself.



Production tolerances

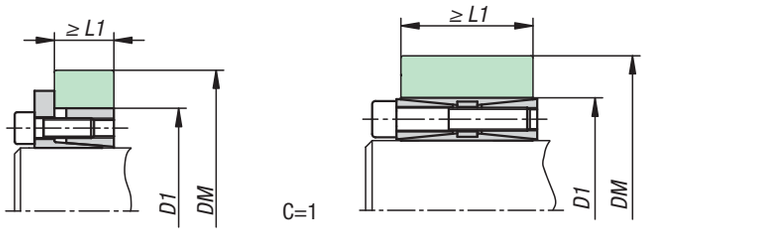


Shrink discs Form B

Order No.	D	D1	DW	B	L	L1	Torque M Nm transmissible at tightening torque MS	Axial force F kN transmissible at tightening torque MS	Surface pressure on hub P N/mm²	Number of clamping screws	Clamping screws tightening torque MS in Nm
23382-1844	18	44	15	19	15	13	80	11	389	4 x M6	12
			16				110	14			
23382-2047	20	47	17	19,3	15,3	13,5	150	18	342	4 x M6	12
			18				180	20			
23382-2450	24	50	19	22	18	15	160	17	329	5 x M6	12
			20				210	20			
			22				280	25			
23382-3060	30	60	24	24	20	17	270	23	341	6 x M6	12
			25				320	25			
			26				360	28			
23382-3672	36	72	27	27,5	22	18,5	510	37	483	5 x M8	35
			30				710	47			
			33				950	58			
23382-3872	38	72	27	27,5	22	18,5	480	36	460	5 x M8	35
			30				650	43			
			33				860	52			
23382-4080	40	80	34	29,5	24	20,5	810	48	339	6 x M8	35
			35				880	50			
			37				960	52			
23382-4480	44	80	35	29,5	24	20,5	800	52	341	6 x M8	35
			36				890	57			
			37				1050	60			
23382-5090	50	90	38	31,5	26	22	1500	79	386	8 x M8	35
			40				1700	87			
			42				2000	94			
23382-55100	55	100	42	34,5	29	25	1600	78	360	8 x M8	35
			45				2000	88			
			48				2400	99			
23382-60110	60	110	48	34,5	29	24,5	2200	92	316	9 x M8	35
			50				2500	98			
			52				2700	105			
23382-62110	62	110	48	34,5	29	24,5	2200	92	318	9 x M8	35
			50				2500	98			
			52				2700	105			
23382-68115	68	115	50	34,5	29	24,5	2400	94	329	9 x M8	35
			55				3000	111			
			60				3800	128			
23382-75138	75	138	55	37,5	31	26,3	3700	135	424	10 x M10	70
			60				4700	156			
			65				5800	177			
23382-80141	80	141	60	37,5	31	26	4200	141	399	10 x M10	70
			65				5200	160			
			70				6300	180			

Calculating the minimum hub diameter

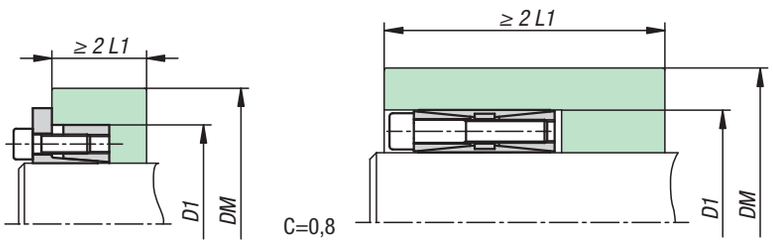
The required minimum hub diameter depends on the hub form, the hub cross section and the yield point of the hub material.The formulas and values listed here are used to roughly estimate the minimum hub diameter. If the hub is weakened by boreholes, then the required outer diameter of the hub should be increased by the respective diameter of the drill hole.



To calculate the minimum hub diameter, the following formula applies:

$DM \geq D1 \bullet K$

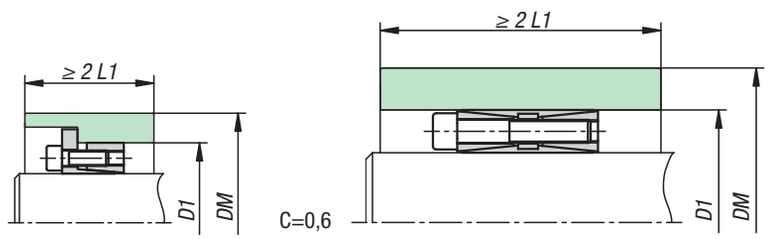
D1 = outer diameter keyless locking coupling (mm)
K = factor (see table)



If factor K is not specified in the table, then the following formula applies:

$$K = \sqrt{\frac{\sigma_{0,2} + (C \bullet PN)}{\sigma_{0,2} - (C \bullet PN)}} \text{ (mm)}$$

$\sigma_{0,2}$ = yield point of the hub material (N/mm²)
c = factor for hub form
PN = surface pressure on hub (N/mm²)



Sample calculation:

shaft diameter D=40 mm
hub material GGG40
yield point $\sigma_{0,2}$ = 250 N/mm²
Selected keyless locking coupling:
23360-4090 keyless locking coupling form G
with D = 40 mm, D1 = 90 mm and PN = 139 N/mm²
hub width and form accordingly C = 1
factor K from table = 1.88 (approximate value from table PN = 140 n/mm² with C = 1)
DM = 90 mm • 1.88 = **169.2 mm**

For clamping connections with hollow shafts, the required internal diameter of the hollow shaft is calculated with the following formula:

$$DW_{innen} \leq D \bullet \sqrt{\frac{\sigma_{0,2\ shaft} - 2 \bullet PW \bullet 0,8)}{\sigma_{0,2\ shaft}}} \text{ (mm)}$$

$DW_{internal}$ = hollow shaft internal diameter (mm)
D = internal diameter of the clamping set (mm)
$\sigma_{0,2\ shaft}$ = yield point of the shaft material (N/mm²)
PW = surface pressure on shaft (N/mm²)

Calculating the minimum hub diameter

Table for factor K												
		σ 0.2 yield point N/mm²										
		150	180	200	220	250	270	300	350	400	450	600
		hub materials										
PN N/mm²	Hub form C	GG20	GG25 GS38	GG30 GTS35	GS45 St 37-2	GGG40 GS52	St 50-2 C35	GGG50 GS60 St 60-2	GGG60 GS62 St 70-2	GGG70 GS70 C60		
60	C = 0,6	128	125	120	118	115	114	112	110	109	108	106
	C = 0,8	139	130	124	123	122	120	118	115	112	111	108
	C = 1	152	142	136	132	128	125	122	118	116	114	110
65	C = 0,6	130	125	122	120	118	115	113	111	110	109	107
	C = 0,8	144	135	130	128	124	122	120	116	114	112	109
	C = 1	160	145	140	135	130	128	124	120	118	116	112
70	C = 0,6	134	126	124	122	118	116	115	112	111	110	107
	C = 0,8	148	138	134	130	125	123	120	118	115	113	110
	C = 1	165	150	145	140	134	130	126	122	120	117	113
75	C = 0,6	130	128	125	123	120	118	116	114	112	111	108
	C = 0,8	152	142	136	132	128	125	122	118	116	114	111
	C = 1	174	155	148	142	136	133	130	125	120	118	113
80	C = 0,6	139	131	128	125	121	120	118	115	113	111	108
	C = 0,8	158	145	139	135	130	127	124	120	118	115	111
	C = 1	181	161	153	146	139	136	131	126	122	120	114
85	C = 0,6	142	134	130	127	123	121	119	116	114	112	109
	C = 0,8	163	149	142	138	132	129	126	122	119	116	112
	C = 1	190	167	157	150	142	139	134	128	124	121	115
90	C = 0,6	146	136	132	128	125	122	120	117	115	113	109
	C = 0,8	169	153	146	140	134	131	128	123	120	118	113
	C = 1	200	173	162	154	146	141	136	130	126	122	116
95	C = 0,6	149	139	134	130	126	124	121	118	115	114	110
	C = 0,8	175	157	149	143	137	134	130	125	121	119	114
	C = 1	211	180	168	159	149	144	139	132	127	124	117
100	C = 0,6	153	141	136	132	128	125	122	119	116	114	111
	C = 0,8	181	161	153	146	139	136	131	126	122	120	114
	C = 1	224	187	173	163	153	148	141	134	129	125	118
105	C = 0,6	156	144	139	134	129	127	124	120	117	115	111
	C = 0,8	188	166	156	150	142	138	133	128	124	121	115
	C = 1	238	195	179	168	156	151	144	136	131	127	119
110	C = 0,6	160	147	141	136	131	128	125	121	118	116	112
	C = 0,8	196	171	160	153	144	141	135	129	125	122	116
	C = 1	255	204	186	173	160	154	147	138	133	128	120
115	C = 0,6	164	150	143	136	133	130	126	122	119	117	112
	C = 0,8	204	176	164	156	147	143	137	131	126	123	117
	C = 1	275	213	193	179	164	158	150	141	134	130	121
120	C = 0,6	169	153	146	140	134	131	128	123	120	118	113
	C = 0,8	213	181	169	160	150	145	139	133	128	124	118
	C = 1	300	224	200	184	169	161	153	143	136	131	122
125	C = 0,6	173	156	148	143	136	133	129	124	121	118	113
	C = 0,8	224	187	173	163	153	148	141	134	129	125	118
	C = 1	332	235	208	191	173	165	156	145	138	133	124
130	C = 0,6	178	159	151	145	138	135	130	125	122	119	114
	C = 0,8	235	193	178	167	156	150	144	136	130	127	119
	C = 1	374	249	217	197	178	169	159	148	140	135	125
135	C = 0,6	183	162	154	147	140	136	132	127	123	120	115
	C = 0,8	248	200	183	171	159	153	146	138	132	128	120
	C = 1	436	265	227	204	183	173	162	150	142	136	126
140	C = 0,6	188	166	156	150	142	138	133	128	124	121	115
	C = 0,8	263	207	188	175	162	155	148	139	133	129	121
	C = 1	539	283	238	212	188	178	166	153	144	138	127
145	C = 0,6	194	169	159	152	144	140	135	129	125	122	116
	C = 0,8	280	215	194	180	165	158	150	141	135	130	122
	C = 1	768	305	250	221	194	182	169	155	146	140	128
150	C = 0,6	200	173	162	154	146	141	136	130	126	123	116
	C = 0,8	300	224	200	184	169	161	153	143	136	131	123
	C = 1	-	332	265	230	200	187	173	158	148	141	129
155	C = 0,6	206	177	165	157	148	143	138	131	127	124	117
	C = 0,8	325	233	206	189	172	165	155	145	138	133	123
	C = 1	-	366	280	240	206	192	177	161	151	143	130
160	C = 0,6	213	181	169	160	150	145	139	133	128	124	118
	C = 0,8	355	243	213	194	176	167	158	147	139	134	124
	C = 1	-	412	300	252	213	198	181	164	153	145	131
165	C = 0,6	221	186	172	162	152	147	141	134	129	125	118
	C = 0,8	396	255	221	200	180	171	160	149	141	135	125
	C = 1	-	480	323	265	221	204	186	167	155	147	133

Cardan shafts: mounting and maintenance

Universal joints:
Universal joints are used for mechanical power transmission at high speeds. The speed limit is dependent on the working angle. The widest working angle is 45° for all joint types (double joint 90°). Lower speeds should be used at angles over 20° (40° double joint). Standard universal joints can be used up to 2000 rpm and joints with needle bearings up to 4000 rpm. Needle bearing mounted joints are normally only used at speds over 1000 rpm.

Movement progression
Single joints transfer uniform induced movement irregularly because by one by revolution of the driving shaft, the driven shaft is accelerated twice and retarded twice. The degree of irregularity depends on the working angle (see Figures 1 and 2).

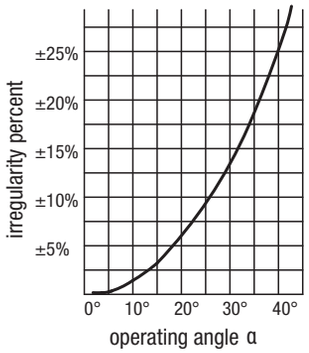


Fig 1

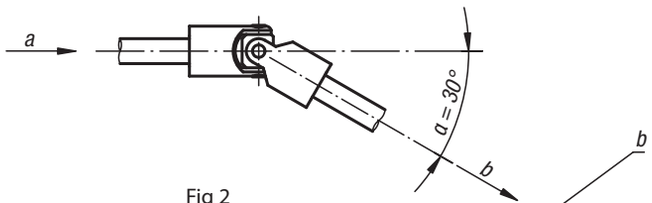
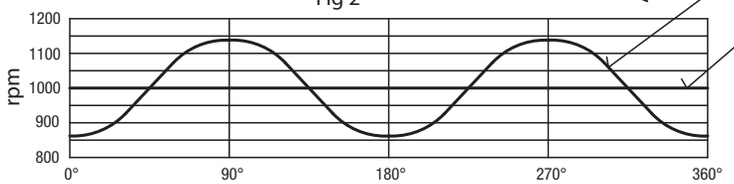
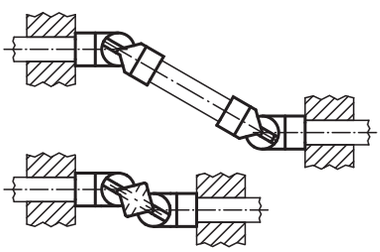


Fig 2

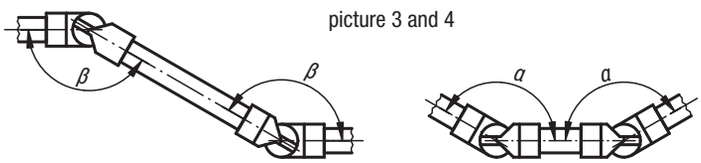


To achieve uniform movement 2 single or one double joint must be used. Where slight irregularities in rotation can be accepted or only small angles of diffraction are concerned, a single joint may be used. Furthermore, for universal rotation transfer the diffraction angle at both ends of the intermediate shaft must be the same (Figures 3 and 4).

Note:
It should be ensured that the bearing is located as closely as possible to the joint.



picture 3 and 4

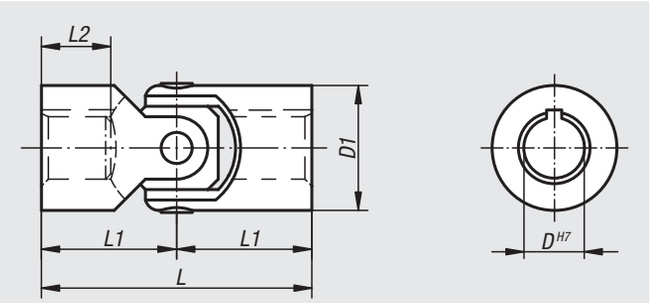


Maintenance
The joints should be lubricated at least once per day where they are in uninterrupted use. In dirty conditions we recommend covering the joints with a protective rubber sheath.

Where mounting is questionable, please consult our technical sales staff.

Universal joints single with plain bearing

DIN 808



Material:
Steel.

Version:
Joint and bearing hardened

Sample order:
nlm 23403-06034

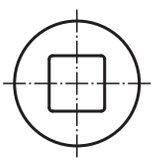
Note:
Universal joints with plain bearing can be swivelled by 45°.

Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

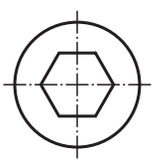
* Bore depth is less than by DIN 808.

On request:

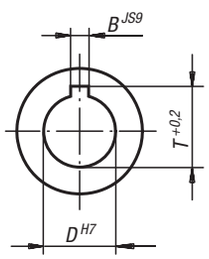
square



hexagon



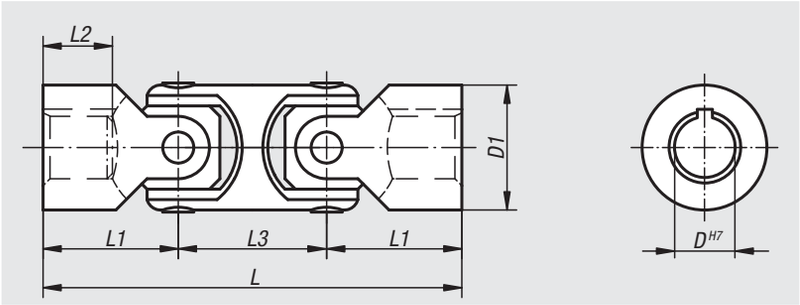
keyway DIN 6885-1



Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	B	T	Max. torque Nm	static fracture torque in Nm
23403-06034	-	6	16	34	17	9*	2	7	7	40
23403-08040	**23403-108040**	8	16	40	20	11*	2	9	7	40
23403-10048	**23403-110048**	10	20	48	24	12*	3	11,4	16	90
23403-12056	**23403-112056**	12	25	56	28	14*	4	13,8	26	150
23403-16068	**23403-116068**	16	32	68	34	16*	5	18,3	52	300
23403-20082	**23403-120082**	20	40	82	41	20*	6	22,8	100	650
23403-25104	**23403-125104**	25	50	104	52	25*	8	28,3	210	1200

Universal joints double with plain bearing

DIN 808



Material:
Steel.

Version:
Joint and bearing hardened

Sample order:
nlm 23404-06056

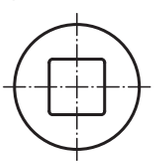
Note:
Double universal joints with plain bearing can be swivelled by 90°.

Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

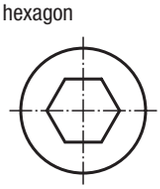
* Bore depth is less than by DIN 808.

On request:

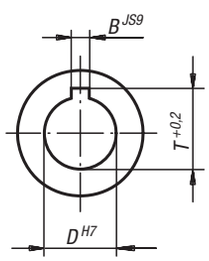
square



hexagon



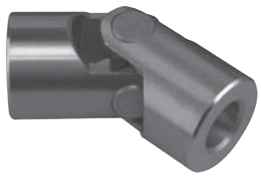
keyway DIN 6885-1

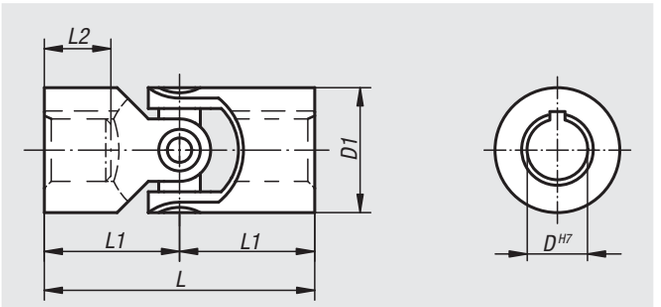


Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	L3	B	T	Max. torque Nm	static fracture torque in Nm
23404-06056	**-**	6	16	56	17	9*	22	2	7	7	40
23404-08062	**23404-108062**	8	16	62	20	11*	22	2	9	7	40
23404-10074	**23404-110074**	10	20	74	24	12*	26	3	11,4	16	90
23404-12086	**23404-112086**	12	25	86	28	14*	30	4	13,8	26	150
23404-16104	**23404-116104**	16	32	104	34	16*	37	5	18,3	52	300
23404-20128	**23404-120128**	20	40	128	41	20*	47	6	22,8	100	650
23404-25160	**23404-125160**	25	50	160	52	25*	56	8	28,3	210	1200

Universal joints single with needle bearing

DIN 808





Material:
Steel.

Version:
Joint ground, bright.

Sample order:
nlm 23406-10048

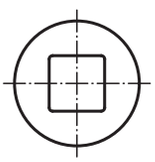
Note:
Single universal joints with needle bearings are used for speeds of 1000 to 4000 rpm.
They have minimal play and are maintenance-free.

Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

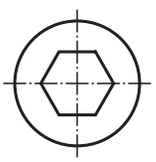
* Bore depth is less than by DIN 808.

On request:

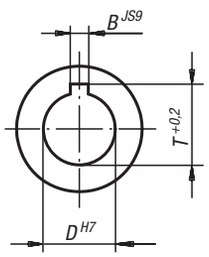
square



hexagon



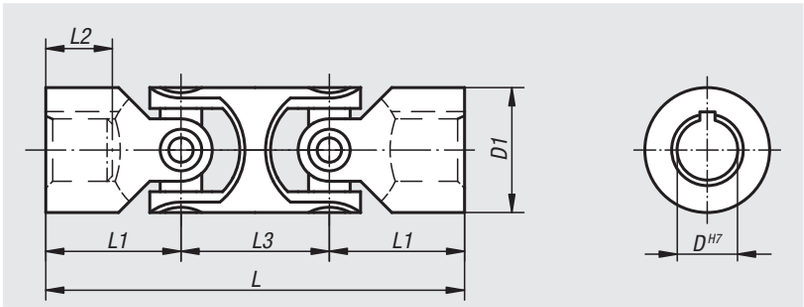
keyway DIN 6885-1



Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	B	T	Max. torque Nm	static fracture torque in Nm
23406-10048	**23406-110048**	10	20	48	24	12*	3	11,4	10	80
23406-12056	**23406-112056**	12	25	56	28	14*	4	13,8	16	120
23406-16068	**23406-116068**	16	32	68	34	16*	5	18,3	35	250
23406-20082	**23406-120082**	20	40	82	41	20*	6	22,8	80	500
23406-25104	**23406-125104**	25	50	104	52	25*	8	28,3	130	800
23406-30166	**23406-130166**	30	63	166	83	38*	8	33,3	240	1500
23406-35140	**23406-135140**	35	70	140	70	35*	10	38,3	360	2200

Universal joints double with needle bearing

DIN 808



Material:
Steel.

Version:
Joint ground, bright.

Sample order:
nlm 23407-12086

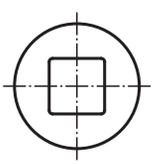
Note:
Double universal joints with needle bearing are used for speeds of 1000 to 4000 rpm.
They have minimal play and are maintenance-free.

Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

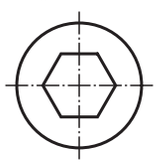
* Bore depth is less than by DIN 808.

On request:

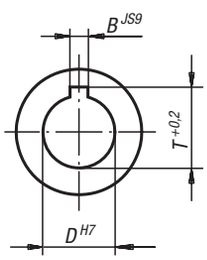
square



hexagon



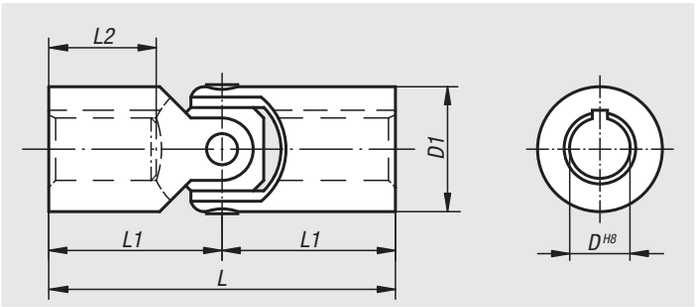
keyway DIN 6885-1



Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	L3	B	T	Max. torque Nm	static fracture torque in Nm
23407-10074	**23407-110074**	10	20	74	24	12*	26	3	11,4	10	80
23407-12086	**23407-112086**	12	25	86	28	14*	30	4	13,8	16	120
23407-16104	**23407-116104**	16	32	104	34	16*	37	5	18,3	35	250
23407-20128	**23407-120128**	20	40	128	41	20*	47	6	22,8	80	500
23407-25160	**23407-125160**	25	50	160	52	25*	56	8	28,3	130	800
23407-30238	**23407-130238**	30	63	238	83	38*	72	8	33,3	240	1500
23407-35212	**23407-135212**	35	70	212	70	35*	72	10	38,3	360	2200

Universal joints single with plain bearing

robust version DIN 808



Material:
Steel.

Version:
Bright.

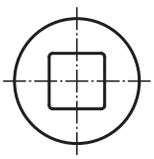
Sample order:
nlm 23409-08042

Note:
Robust universal joints are suitable for manual drives on elevating platforms, slides, shutters etc. or for short-time machine drives at low speed.
Single universal joints with plain bearing can be swivelled by 35°.

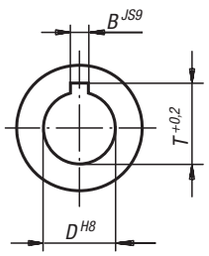
Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

On request:

square



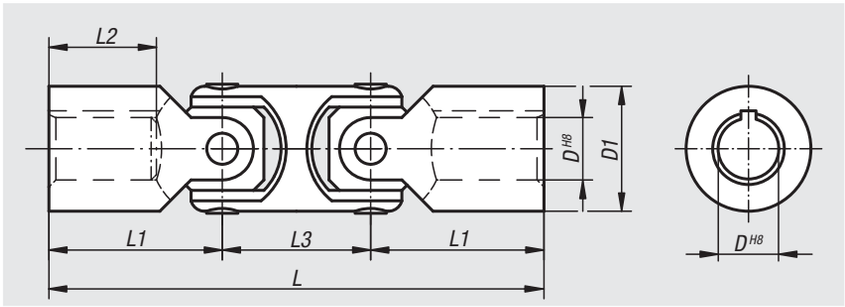
keyway DIN 6885-1



Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	B	T	Max. torque Nm	static fracture torque in Nm
23409-08042	**23409-108042**	8	13	42	21	11	2	9	4	25
23409-10052	**23409-110052**	10	16	52	26	15	3	11,4	6	35
23409-12062	**23409-112062**	12	20	62	31	18	4	13,8	13	80
23409-16074	**23409-116074**	16	25	74	37	22	5	18,3	23	140
23409-20086	**23409-120086**	20	32	86	43	25	6	22,8	46	280
23409-25108	**23409-125108**	25	40	108	54	32	8	28,3	90	600
23409-32132	**23409-132132**	32	50	132	66	40	10	35,3	180	1100

Universal joints double with plain bearing

robust version DIN 808



Material:
Steel.

Version:
Bright.

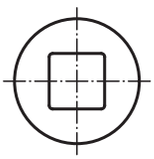
Sample order:
nlm 23410-10074

Note:
Robust universal joints are suitable for manual drives of elevating platforms, slides, shutters etc. or for short-time machine drives at low speed.
Double universal joints with plain bearing can be swivelled by 70°.

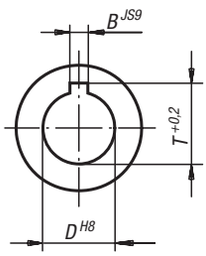
Max. transferable torque (Nm) at 150 rpm, operation angle α < 5°.

On request:

square

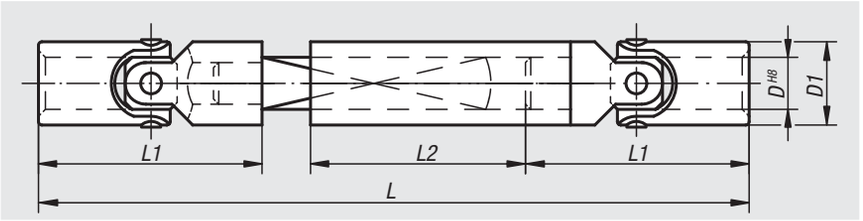


keyway DIN 6885-1



Order No. Locating hole without slot	Order No. Locating hole with slot	D	D1	L	L1	L2	L3	B	T	Max. torque Nm	static fracture torque in Nm
23410-08060	**23410-108060**	8	13	60	21	11	18	2	9	4	25
23410-10074	**23410-110074**	10	16	74	26	15	22	3	11,4	6	35
23410-12088	**23410-112088**	12	20	88	31	18	26	4	13,8	13	80
23410-16104	**23410-116104**	16	25	104	37	22	30	5	18,3	23	140
23410-20124	**23410-120124**	20	32	124	43	25	37	6	22,8	46	280
23410-25156	**23410-125156**	25	40	156	54	32	47	8	28,3	90	600
23410-32188	**23410-132188**	32	50	188	66	40	56	10	35,3	180	1100

Cardan shafts telescopic



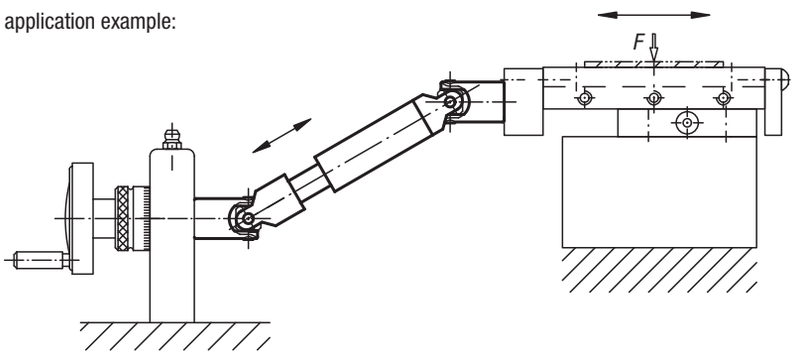
Material:
Steel.

Version:
Bright.

Sample order:
nlm 23412-120260

Note:
These cardan shafts consist of two robust universal joints, one square shaft and a sliding sleeve. They are available in any desired length. Telescopic cardan shafts are suitable for manual drives or short-term machine drives at low speed.

application example:



Order No.	D	D1	L	L1	L2	Retractability	Shaft profile square	static fracture torque in Nm
23412-100230	10	16	230	52	120	80	8	35
23412-120260	12	20	260	62	130	90	10	80
23412-160340	16	25	340	74	160	110	12	140
23412-200420	20	32	420	86	200	130	16	280

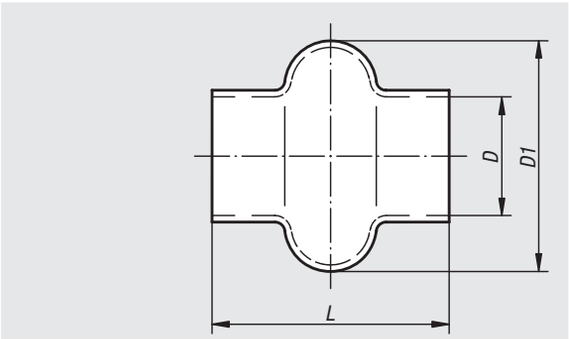
23414

Rubber sleeves

for ball and socket or single universal joints

Sample order:
nlm 23414-16

Note:
These rubber sleeves fit over single joints from 16 mm OD. They are made of an elastic, oil-resistant plastic and are produced by a dipping method.
The No. 23414-50 is supplied with 4x bellows.



Order No.	D	D1	L	Suitable for single joints of shaft Ø (D1)
23414-16	16	35	32	16
23414-20	20	36	40	20
23414-24	24	44	45	24
23414-28	28	51	50	28
23414-32	32	62	55	32
23414-36	36	65	65	36
23414-40	40	73	75	40
23414-45	45	80	85	45
23414-50	50	90	95	50
23414-65	65	110	125	63
23414-70	70	125	137	70

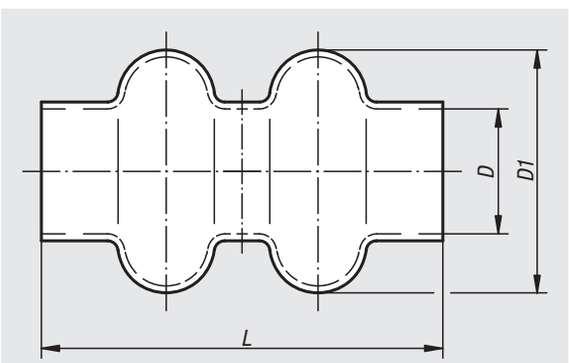
23415

Rubber sleeves

for ball and socket or double universal joints

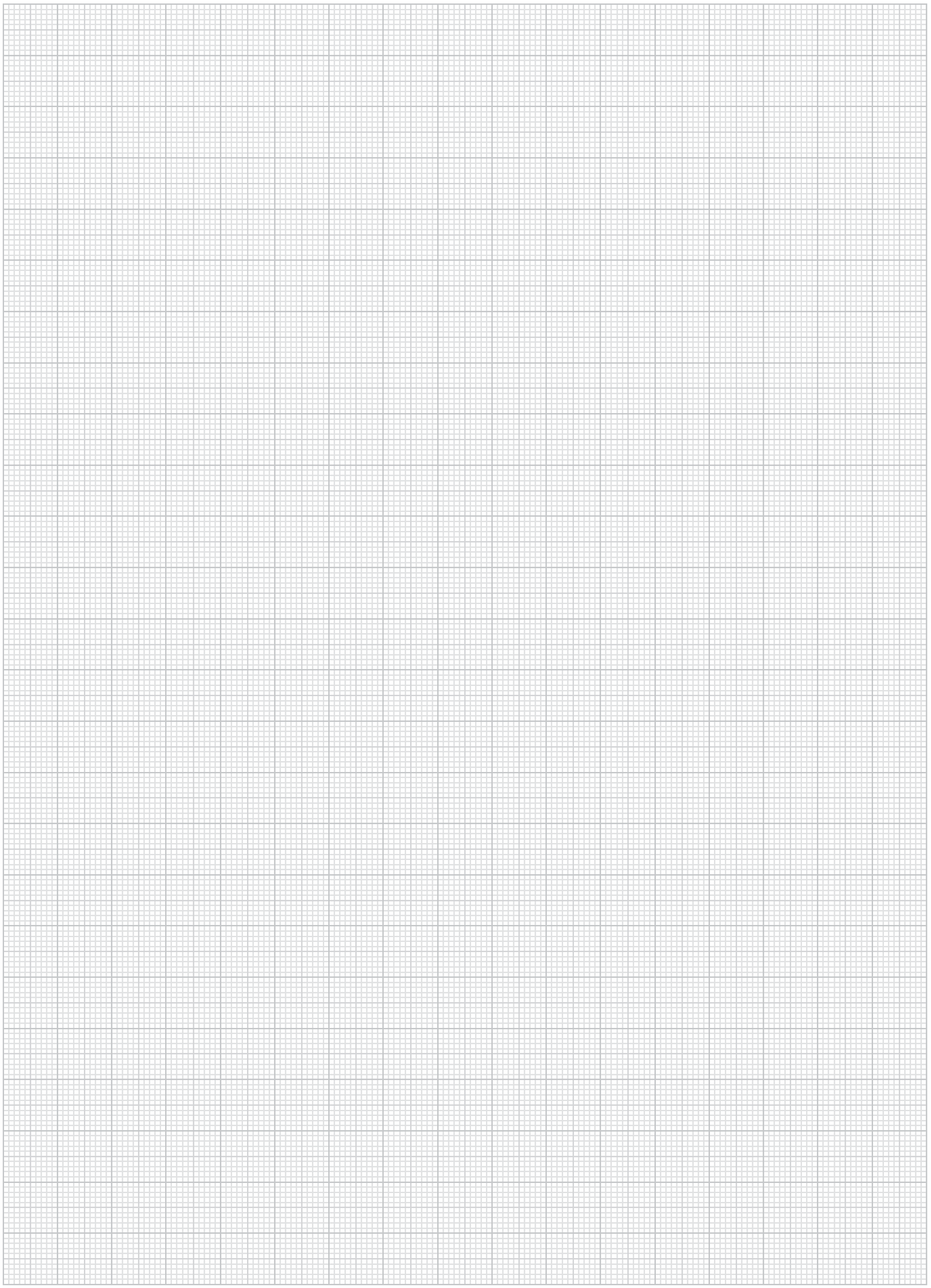
Sample order:
nlm 23415-16

Note:
These rubber sleeves fit over double joints from 16 mm OD. They are made of an elastic, oil-resistant plastic and are produced by a dipping method.



Order No.	D	D1	L	Suitable for double joints of shaft Ø (D1)
23415-16	16	35	55	16
23415-20	20	36	65	20
23415-24	24	44	70	24
23415-28	28	51	80	28
23415-32	32	62	90	32
23415-40	40	73	120	40
23415-50	50	90	155	50

Notes



Quick-fit couplings

with radial offset compensation

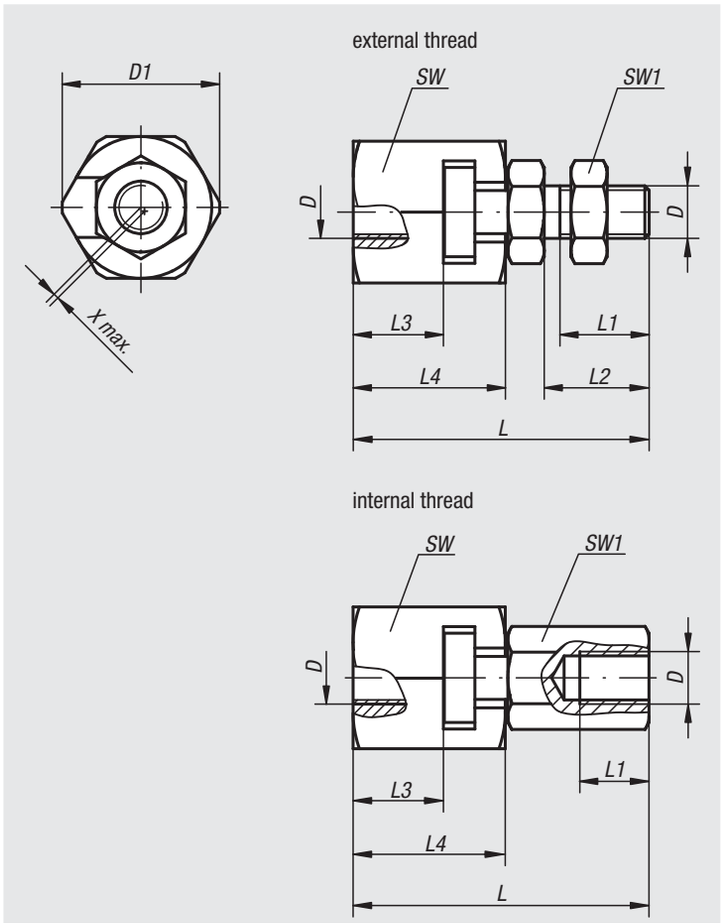
Material:
Coupling part and claw in steel.
Nut (DIN 439) in steel, grade 8.8.

Version:
Coupling part and claw tempered and phosphated.
Nut steel, black oxidised.

Sample order:
nlm 23450-16

Note:
Quick-fit couplings with radial offset compensation for multiple applications, e.g. as a link between a piston rod and a linear-movement unit. Assembly and disassembly of this simple, solid and two-part coupling is carried out by means of a T-slot; a manual re-adjustment is not necessary. The quick-fit coupling can be linked to all commonly used pneumatic and hydraulic lifting cylinders via the connecting thread.

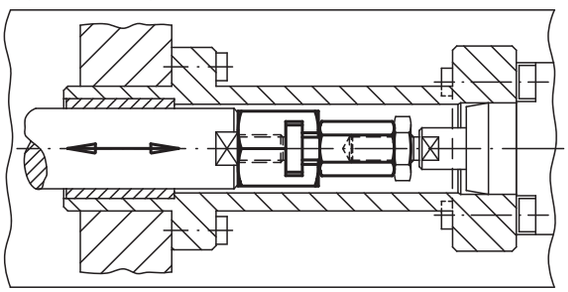
The quick-fit coupling does not transmit any torque.



Quick-fit couplings

with radial offset compensation

application example:



Order No.	Version	D	D1	~L	L1 min.	L2	L3 min.	L4	SW	SW1	Max. radial shift compensation	Max. permissible tensile and compressive stress in kN
23450-06	Internal thread	M6	21	37,5	11	-	9	18	19	10	0,6	2,5
23450-08	Internal thread	M8	26	45	13,5	-	11,5	22,5	24	13	0,7	4,5
23450-10	Internal thread	M10	30	56,2	15	-	16	29	27	17	0,7	6,5
23450-101	Internal thread	M10x1,25	30	56,2	15	-	16	29	27	17	0,7	6,5
23450-12	Internal thread	M12	32,5	66,7	17,5	-	17	34	30	19	0,8	10
23450-121	Internal thread	M12x1,25	32,5	66,7	17,5	-	17	34	30	19	0,8	10
23450-16	Internal thread	M16	39	83	22	-	23	42	36	24	1	18
23450-161	Internal thread	M16x1,5	39	83	22	-	23	42	36	24	1	18
23450-20	Internal thread	M20	44	93,5	25	-	23,5	45,5	41	30	1	30
23450-201	Internal thread	M20x1,5	44	93,5	25	-	23,5	45,5	41	30	1	30
23450-0614	External thread	M6	21	37,5	11	14	9	18	19	10	0,6	2,5
23450-0817	External thread	M8	26	45	13,5	17	11,5	22,5	24	13	0,7	4,5
23450-1020	External thread	M10	30	56,2	16	20	16	29	27	17	0,7	6,5
23450-10201	External thread	M10x1,25	30	56,2	16	20	16	29	27	17	0,7	6,5
23450-1225	External thread	M12	32,5	66,7	21	25	17	34	30	19	0,8	10
23450-12251	External thread	M12x1,25	32,5	66,7	21	25	17	34	30	19	0,8	10
23450-1630	External thread	M16	39	83	25	30	23	42	36	24	1	18
23450-16301	External thread	M16x1,5	39	83	25	30	23	42	36	24	1	18
23450-2035	External thread	M20	44	93,5	29	35	23,5	45,5	41	30	1	30
23450-20351	External thread	M20x1,5	44	93,5	29	35	23,5	45,5	41	30	1	30

Quick-fit couplings

with radial offset compensation and mounting flange

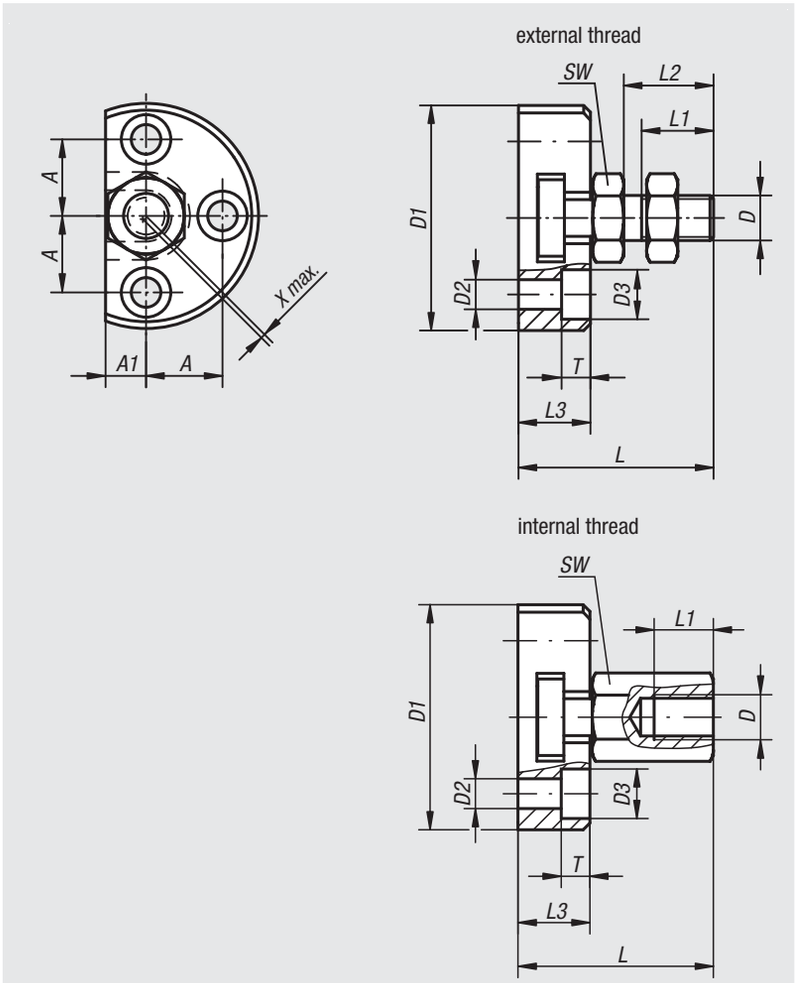
Material:
Coupling part and steel flange.
Nut (DIN 439), grade 8.8.

Version:
Coupling part and flange tempered and phosphated.
Nut black oxidised.

Sample order:
nlm 23452-20351

Note:
Space saving quick-fit couplings with radial offset compensation suitable for multiple applications, e.g. as a link between a piston rod and a linear-movement unit. Assembly and disassembly of this simple, solid and two-part coupling is with a T-slot, a manual re-adjustment is not necessary. The quick-fit coupling can be linked to all commonly used pneumatic and hydraulic lifting cylinders via the connecting thread.

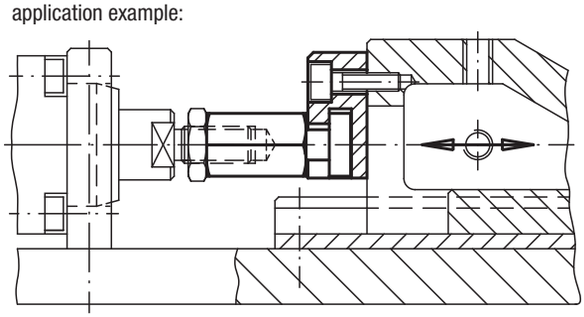
The quick-fit coupling does not transmit any torque.



Quick-fit couplings

with radial offset compensation and mounting flange

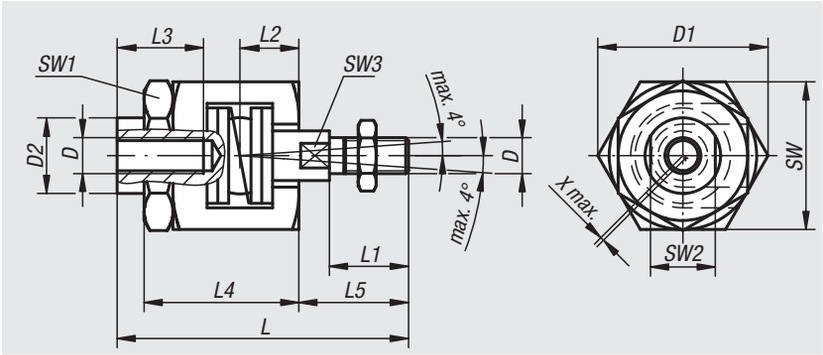
application example:



Order No.	Version	D	D1	D2	D3	A	A1	~L	L1 min.	L2	L3	T	SW	Max. radial shift compensation	Max. permissible tensile and compressive stress in kN
23452-06	Internal thread	M6	42	5,5	10	14	7	30,5	11	-	11	5,4	10	0,6	2,5
23452-08	Internal thread	M8	48	6,6	11	16	8	35,5	13,5	-	13	6,4	13	0,7	4,5
23452-10	Internal thread	M10	50	6,6	11	17	9	43,2	15	-	16	6,4	17	0,7	6,5
23452-101	Internal thread	M10x1,25	50	6,6	11	17	9	43,2	15	-	16	6,4	17	0,7	6,5
23452-12	Internal thread	M12	55	6,6	11	19	10	53,2	17,5	-	20,5	6,4	19	0,8	10
23452-121	Internal thread	M12x1,25	55	6,6	11	19	10	53,2	17,5	-	20,5	6,4	19	0,8	10
23452-16	Internal thread	M16	65	9	15	22,5	12,5	64	22	-	23	8,5	24	1	18
23452-161	Internal thread	M16x1,5	65	9	15	22,5	12,5	64	22	-	23	8,5	24	1	18
23452-20	Internal thread	M20	80	11	18	28	17	74	25	-	26	10	30	1	30
23452-201	Internal thread	M20x1,5	80	11	18	28	17	74	25	-	26	10	30	1	30
23452-0614	External thread	M6	42	5,5	10	14	7	30,5	11	14	11	5,4	10	0,6	2,5
23452-0817	External thread	M8	48	6,6	11	16	8	35,5	13,5	17	13	6,4	13	0,7	4,5
23452-1020	External thread	M10	50	6,6	11	17	9	43,2	16	20	16	6,4	17	0,7	6,5
23452-10201	External thread	M10x1,25	50	6,6	11	17	9	43,2	16	20	16	6,4	17	0,7	6,5
23452-1225	External thread	M12	55	6,6	11	19	10	53,2	21	25	20,5	6,4	19	0,8	10
23452-12251	External thread	M12x1,25	55	6,6	11	19	10	53,2	21	25	20,5	6,4	19	0,8	10
23452-1630	External thread	M16	65	9	15	22,5	12,5	64	25	30	23	8,5	24	1	18
23452-16301	External thread	M16x1,5	65	9	15	22,5	12,5	64	25	30	23	8,5	24	1	18
23452-2035	External thread	M20	80	11	18	28	17	74	29	35	26	10	30	1	30
23452-20351	External thread	M20x1,5	80	11	18	28	17	74	29	35	26	10	30	1	30

Quick-fit couplings

with angular and radial offset compensation



Material:
Coupling part in carbon steel.
Claw and seat in steel.Carbon steel nut.
Locking nut (EN 24035) in steel, grade 8.8
stainless steel spring.

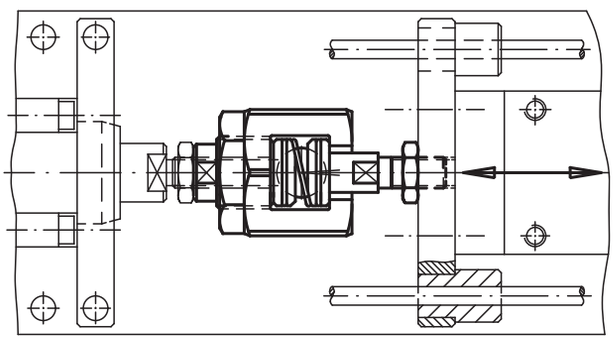
Version:
Coupling part, nitrided, black.
Claw and seat, tempered and phosphated.Phosphated nut.
Black locking nut.

Sample order:
nlm 23454-12

Note:
Quick-fit coupling, adjustable without axial play, including angular and radial offset compensation. Suitable for multiple applications, e.g. for non-aligned linear-movements. Solid and compact design, no loose elements. Assembly and disassembly with a T-slot; a manual re-adjustment is not necessary. The quick-fit coupling can be linked to all commonly used pneumatic and hydraulic lifting cylinders via the connecting thread.

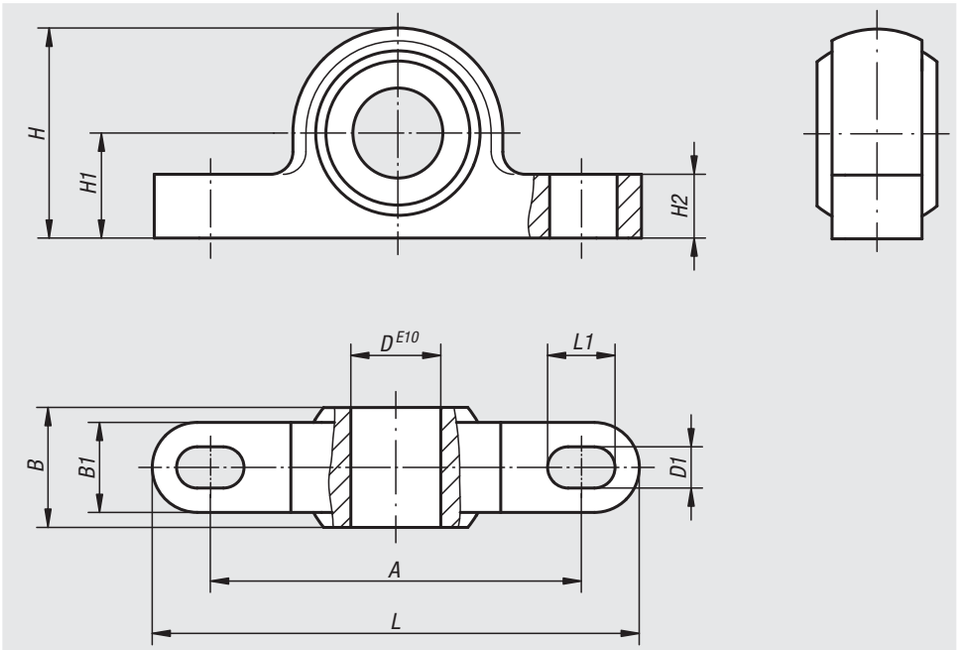
The quick-fit coupling does not transmit any torque.

application example:



Order No.	D	D1	D2	~L	L1	L2	L3 min.	L4	L5	SW	SW1	SW2	SW3	Max. radial shift compensation	Max. permissible tensile and compressive stress in kN
23454-06	M6	24,5	9,6	52	14	9,5	13	29	18,5	22	19	8	5	0,6	2,5
23454-08	M8	30	15	63	18	11,5	16	33	23,5	27	24	13	7	0,6	4,5
23454-10	M10	44	21	81	22	16	24	43	30,5	41	36	18	12	0,7	6,5
23454-101	M10x1,25	44	21	81	22	16	24	43	30,5	41	36	18	12	0,7	6,5
23454-12	M12	44	21	85	26	16	24	43	34,5	41	36	18	12	0,7	10
23454-121	M12x1,25	44	21	85	26	16	24	43	34,5	41	36	18	12	0,7	10
23454-16	M16	60	32	121	34	26	34	62	45	55	46	27	18	1	18
23454-161	M16x1,5	60	32	121	34	26	34	62	45	55	46	27	18	1	18
23454-20	M20	60	32	129	42	26	34	62	53	55	46	27	18	1	30
23454-201	M20x1,5	60	32	129	42	26	34	62	53	55	46	27	18	1	30

igubal® pillow block bearings



Material:
Housing igumid® G, spherical ball in iglidur® W300

Version:
Black

Sample order:
nlm 23500-05

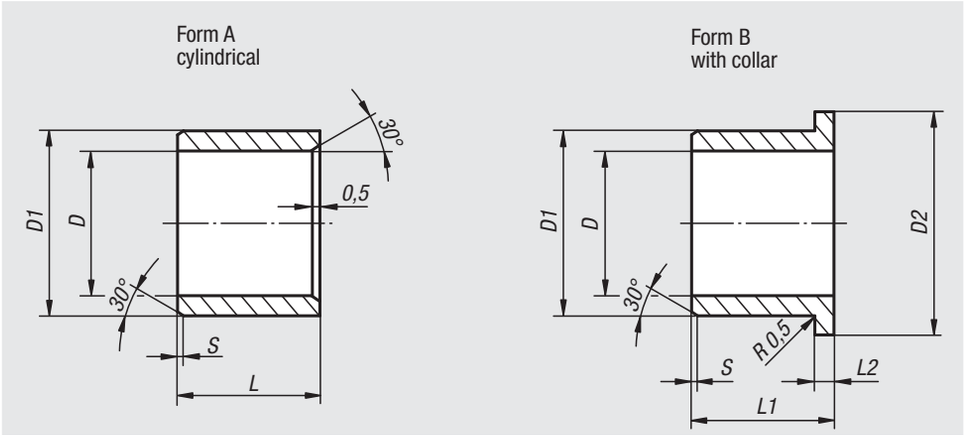
Note:
The ability to pivot allows pillow block bearings to compensate for misalignment and possible shaft deflection. They are easy to install and suitable for the accomodation of rotating, oscillating and linear movements.
igubal® pillow block bearings are maintenance free and conceived for dry running condition.

Assembly:
Pillow block bearings are designed for mounting with 2 screws.

Pillow block bearings are designed with a inside diameter tolerance of E10. The matching shaft should be made to tolerance class h6 and h9.

Order No.	A	B	B1	D	D1	H	H1	H2	L	L1	Max. swivel angle	Max. static tensile stress N short-term	Max. static tensile stress N long-term	Max. static axial pressure stress N	Max. tightening torque for oblong holes Nm
23500-05	26,7	8	6	5	3,3	14	7	4	34	5	30°	700	350	400	0,6
23500-06	34,5	9	7	6	4,5	18	10	5,5	43	6	29°	1100	550	400	1,3
23500-08	35,5	12	9	8	4,5	20	10	6	47	7	25°	1300	650	800	1,3
23500-10	48,5	14	10,5	10	5,5	26	14	7,5	62	8	25°	1500	750	1100	2,5
23500-12	49,5	16	12	12	5,5	28	14	8,5	65	9	25°	2200	1100	1150	2,5
23500-14	64,4	19	13,5	14	6,6	34	18	9,5	82	11	23°	2400	1200	1200	4,5
23500-16	65,4	21	15	16	6,6	36	18	10,5	86	12	23°	3000	1500	1800	4,5
23500-18	72	23	16,5	18	9	42	22	11,5	93	13	23°	3500	1750	1900	10,5
23500-20	73	25	18	20	9	44	22	13	98	14	23°	4700	2350	2500	10,5
23500-22	81	28	20	22	9	48	24	14	108	16	22°	6100	3050	2700	10,5
23500-25	94	31	22	25	9	54	27	16	124	17	22°	6600	3300	3200	10,5
23500-30	105	37	25	30	11	64	32	17	139	20	22°	8100	4050	3750	21,5

Plain bearings plastic



Material:
High-performance polymer iglidur® G, iglidur® J or iglidur® X.

Version:
iglidur® G matte grey;
iglidur® J yellow;
iglidur® X black

Sample order:
nlm 23710-11030403

Note:
Plastic high-performance polymer plain bearings.

– maintenance-free
– lubricant-free
– corrosion-resistant
– resistant to dirt
– high dimensional precision
– high pressure resistance
– good heat dissipation
– very low creep tendencies
– high mechanical damping
– resistant to UV radiation.

Assembly:
The bearings are designed for press fits in H7 bores. After pressing in, the ID of the bearing will be diameter D with the relative tolerance.

The bearings are suitable for shafts with h tolerance (recommended min. h9).

		longest endurance times in dry run	for high loads	for high temperatures	low friction/ high speed	dirt-resistant	chemical-resistant	low water absorption	good for edge pressing	possible under water	cost-effective	electrically conducting
Material	Note											
iglidur® G	the all-rounder	●	●			●					●	
iglidur® J	low coefficients of friction	●			●			●	●		●	
iglidur® X	temperature and chemical resistant	●	●	●			●	●		●		●

Plain bearings plastic

Plastic plain bearing iglidur® G

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	S	Tolerance D after force fitting	Max. permissible static surface pressure N/mm²	Temperature range
23710-11050705	**23710-12050705**	5	7	-/11	5	-/5	-/1	0,3	E10	80	-40 °C up to +130 °C
23710-11060806	**23710-12060808**	6	8	-/12	6	-/8	-/1	0,5	E10	80	-40 °C up to +130 °C
23710-11081008	**23710-12081007**	8	10	-/15	8	-/7,5	-/1	0,5	E10	80	-40 °C up to +130 °C
23710-11101210	**23710-12101209**	10	12	-/18	10	-/9	-/1	0,5	E10	80	-40 °C up to +130 °C
23710-11121410	**23710-12121412**	12	14	-/20	10	-/12	-/1	0,8	E10	80	-40 °C up to +130 °C
23710-11141615	**23710-12141612**	14	16	-/22	15	-/12	-/1	0,8	E10	80	-40 °C up to +130 °C
23710-11151720	**23710-12151712**	15	17	-/23	20	-/12	-/1	0,8	E10	80	-40 °C up to +130 °C
23710-11161820	**23710-12161817**	16	18	-/24	20	-/17	-/1	0,8	E10	80	-40 °C up to +130 °C
23710-11202320	**23710-12202321**	20	23	-/30	20	-/21	-/1,5	0,8	E10	80	-40 °C up to +130 °C
23710-11252820	**23710-12252821**	25	28	-/35	20	-/21	-/1,5	0,8	E10	80	-40 °C up to +130 °C
23710-11303430	**23710-12303426**	30	34	-/42	30	-/26	-/2	0,8	E10	80	-40 °C up to +130 °C

Plastic plain bearing iglidur® J

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	S	Tolerance D after force fitting	Max. permissible static surface pressure N/mm²	Temperature range
23710-21050705	**23710-22050705**	5	7	-/11	5	-/5	-/1	0,3	E10	35	-50 °C up to +90 °C
23710-21060806	**23710-22060808**	6	8	-/12	6	-/8	-/1	0,5	E10	35	-50 °C up to +90 °C
23710-21081008	**23710-22081007**	8	10	-/15	8	-/7,5	-/1	0,5	E10	35	-50 °C up to +90 °C
23710-21101210	**23710-22101209**	10	12	-/18	10	-/9	-/1	0,5	E10	35	-50 °C up to +90 °C
23710-21121410	**23710-22121412**	12	14	-/20	10	-/12	-/1	0,8	E10	35	-50 °C up to +90 °C
23710-21141615	**23710-22141612**	14	16	-/22	15	-/12	-/1	0,8	E10	35	-50 °C up to +90 °C
23710-21151720	**23710-22151712**	15	17	-/23	20	-/12	-/1	0,8	E10	35	-50 °C up to +90 °C
23710-21161820	**23710-22161817**	16	18	-/24	20	-/17	-/1	0,8	E10	35	-50 °C up to +90 °C
23710-21202320	**23710-22202321**	20	23	-/30	20	-/21	-/1,5	0,8	E10	35	-50 °C up to +90 °C
23710-21252820	**23710-22252821**	25	28	-/35	20	-/21	-/1,5	0,8	E10	35	-50 °C up to +90 °C
23710-21303430	**23710-22303426**	30	34	-/42	30	-/26	-/2	0,8	E10	35	-50 °C up to +90 °C

Plastic plain bearing iglidur® X

Order No. Form A	Order No. Form B	D	D1	D2	L	L1	L2	S	Tolerance D after force fitting	Max. permissible static surface pressure N/mm²	Temperature range
23710-31050705	**23710-32050705**	5	7	-/11	5	-/5	-/1	0,3	F10	150	-100 °C up to +250 °C
23710-31060806	**23710-32060808**	6	8	-/12	6	-/8	-/1	0,5	F10	150	-100 °C up to +250 °C
23710-31081008	**23710-32081007**	8	10	-/15	8	-/7,5	-/1	0,5	F10	150	-100 °C up to +250 °C
23710-31101210	**23710-32101209**	10	12	-/18	10	-/9	-/1	0,5	F10	150	-100 °C up to +250 °C
23710-31121410	**23710-32121412**	12	14	-/20	10	-/12	-/1	0,8	F10	150	-100 °C up to +250 °C
23710-31141615	**23710-32141612**	14	16	-/22	15	-/12	-/1	0,8	F10	150	-100 °C up to +250 °C
23710-31151720	**23710-32151712**	15	17	-/23	20	-/12	-/1	0,8	F10	150	-100 °C up to +250 °C
23710-31161820	**23710-32161817**	16	18	-/24	20	-/17	-/1	0,8	F10	150	-100 °C up to +250 °C
23710-31202320	**23710-32202321**	20	23	-/30	20	-/21	-/1,5	0,8	F10	150	-100 °C up to +250 °C
23710-31252820	**23710-32252821**	25	28	-/35	20	-/21	-/1,5	0,8	F10	150	-100 °C up to +250 °C
23710-31303430	**23710-32303426**	30	34	-/42	30	-/26	-/2	0,8	F10	150	-100 °C up to +250 °C

Notes

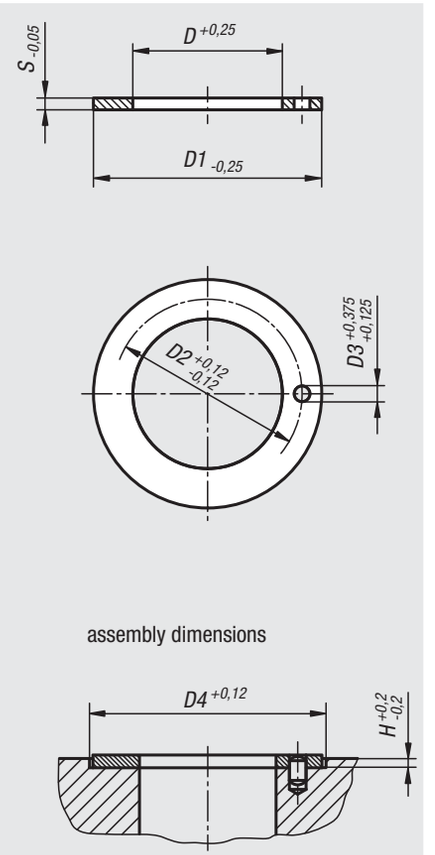
Thrust washers, plastic

Material:
High-performance polymer iglidur® G.

Version:
matte grey.

Sample order:
nlm 23715-1050906

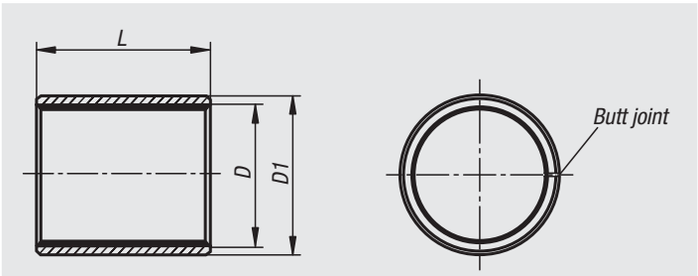
Note:
Maintenance-free and lubricant-free thrust washers. They serve to receive axial loads in a rotational motion. The axial loads that occur can be both alternating and permanent.
Electrically insulating. Resistant to UV radiation.



Order No.	D	D1	D2	D3	D4	H	S	Max. permissible static surface pressure N/mm²	Temperature range
23715-1050906	5	9,5	-	-	9,5	0,3	0,6	80	-40 °C up to +130 °C
23715-1061515	6	15	-	-	15	1	1,5	80	-40 °C up to +130 °C
23715-1081810	8	18	-	-	18	0,7	1	80	-40 °C up to +130 °C
23715-1101810	10	18	-	-	18	0,7	1	80	-40 °C up to +130 °C
23715-1122415	12	24	18	1,5	24	1	1,5	80	-40 °C up to +130 °C
23715-1142015	14	20	-	-	20	1	1,5	80	-40 °C up to +130 °C
23715-1152415	15	24	19,5	1,5	24	1	1,5	80	-40 °C up to +130 °C
23715-1163015	16	30	22	2	30	1	1,5	80	-40 °C up to +130 °C
23715-1183215	18	32	25	2	32	1	1,5	80	-40 °C up to +130 °C
23715-1203615	20	36	28	3	36	1	1,5	80	-40 °C up to +130 °C
23715-1223815	22	38	30	3	38	1	1,5	80	-40 °C up to +130 °C
23715-1244215	24	42	33	3	42	1	1,5	80	-40 °C up to +130 °C
23715-1264415	26	44	35	3	44	1	1,5	80	-40 °C up to +130 °C
23715-1284815	28	48	38	4	48	1	1,5	80	-40 °C up to +130 °C

Plain bearing

cylindrical



Material:
Base material, steel.
Intermediate layer sintered bronze.
Bearing surface PTFE.

Version:
Steel galvanized.

Sample order:
nlm 23730-00300404

Note:
Maintenance-free rolled composite steel plain bearings particularly suitable for dry running. Also highly suitable for lubricated applications (oil lubrication). Very low wear and friction, no stick-slip effect. Suitable for rotary and oscillating movements, high chemical resistance, low water absorption.

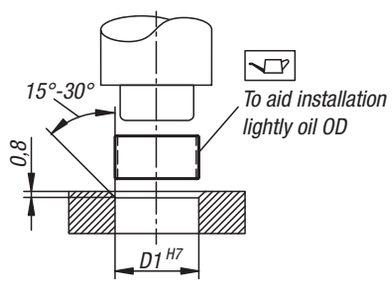
Assembly:
The use of a suitable press mandrel is recommended to avoid damaging the bearing surface. The butt joint must be opposite the load zone. The bearing has an interference fit after installation. Gluing is possible but not required.

Tolerances:
Housing:
Recommended tolerance H7.
Surface finish Ra 0.8 to 1.6.
Chamfer (press-in side 0.8 to 1.2 x 15°).

Shaft:
Recommended tolerance h8 to f7. For applications at a low speed and small loads drawn shafts with h9 can also be used.
Shaft surface Ra 0.4 to 0.8 (preferably ground shafts) for drawn shafts Ra 1.6 to 3.2.

Technical data:
Static load: max. 250 N/mm²
Dynamic load: max. 140 N/mm²
Friction coefficient, dry: 0.03 to 0.20
Sliding speed, dry: max. 2 m/s
Sliding speed, oil lubricated: max. 5 m/s
Thermal conductivity: 42 W(m*K)-1
Thermal expansion coefficient: 11*10-6 K-1
Temperature range: -195°C to +280°C

Assembly:



Order No.	D	D1	L
23730-00300404	3	4,5	4
23730-00300405	3	4,5	5
23730-00300406	3	4,5	6
23730-00400504	4	5,5	4
23730-00400506	4	5,5	6
23730-00400508	4	5,5	8
23730-00500705	5	7	5
23730-00500708	5	7	8
23730-00600805	6	8	5
23730-00600806	6	8	6
23730-00600810	6	8	10
23730-00700910	7	9	10
23730-00801006	8	10	6
23730-00801008	8	10	8
23730-00801010	8	10	10
23730-01001206	10	12	6
23730-01001208	10	12	8
23730-01001210	10	12	10
23730-01001212	10	12	12
23730-01001215	10	12	15
23730-01001220	10	12	20

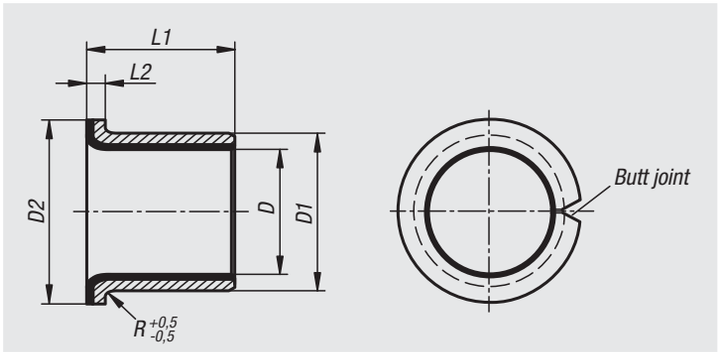
Plain bearing

cylindrical

Order No.	D	D1	L
23730-01201406	12	14	6
23730-01201408	12	14	8
23730-01201410	12	14	10
23730-01201412	12	14	12
23730-01201415	12	14	15
23730-01201420	12	14	20
23730-01401610	14	16	10
23730-01401620	14	16	20
23730-01501710	15	17	10
23730-01501712	15	17	12
23730-01501715	15	17	15
23730-01501720	15	17	20
23730-01601810	16	18	10
23730-01601815	16	18	15
23730-01601820	16	18	20
23730-01601825	16	18	25
23730-01802020	18	20	20
23730-02002310	20	23	10
23730-02002312	20	23	12
23730-02002315	20	23	15
23730-02002320	20	23	20
23730-02002330	20	23	30
23730-02202520	22	25	20
23730-02402725	24	27	25
23730-02502815	25	28	15
23730-02502820	25	28	20
23730-02502825	25	28	25
23730-02502830	25	28	30
23730-02502840	25	28	40
23730-02602915	26	29	15
23730-02602920	26	29	20
23730-02602930	26	29	30
23730-02803220	28	32	20
23730-02803225	28	32	25
23730-03003412	30	34	12
23730-03003415	30	34	15
23730-03003420	30	34	20
23730-03003430	30	34	30
23730-03003435	30	34	35
23730-03203620	32	36	20
23730-03203625	32	36	25
23730-03503920	35	39	20
23730-03503940	35	39	40
23730-03804225	38	42	25
23730-04004420	40	44	20
23730-04004430	40	44	30
23730-04004450	40	44	50
23730-05005530	50	55	30
23730-05005550	50	55	50

Plain bearing

with collar



Material:
Base material, steel.
Intermediate layer sintered bronze.
Bearing surface PTFE.

Version:
Steel galvanized.

Sample order:
nlm 23731-00400505

Note:
Maintenance-free rolled composite steel plain bearings particularly suitable for dry running. Also highly suitable for lubricated applications (oil lubrication). Very low wear and friction, no stick-slip effect. Suitable for rotary and oscillating movements, high chemical resistance, low water absorption.

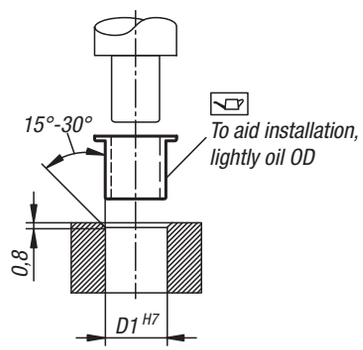
Assembly:
The use of a suitable press mandrel is recommended to avoid damaging the bearing surface. The butt joint must be opposite the load zone. The bearing has an interference fit after installation. Gluing is possible but not required.

Tolerances:
Housing:
Recommended tolerance H7.
Surface finish Ra 0.8 to 1.6.
Chamfer (press-in side 0.8 to 1.2 x 15°).

Shaft:
Recommended tolerance h8 to f7. For applications at a low speed and small loads drawn shafts with h9 can also be used.
Shaft surface Ra 0.4 to 0.8 (preferably ground shafts) for drawn shafts Ra 1.6 to 3.2.

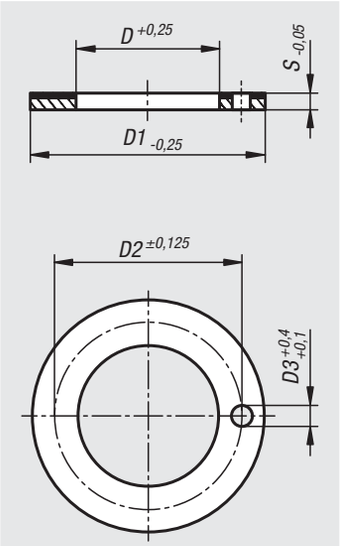
Technical data:
Static load: max. 250 N/mm²
Dynamic load: max. 140 N/mm²
Friction coefficient, dry: 0.03 to 0.20
Sliding speed, dry: max. 2 m/s
Sliding speed, oil lubricated: max. 5 m/s
Thermal conductivity: 42 W(m*K)-1
Thermal expansion coefficient: 11*10-6 K-1
Temperature range: -195°C to +280°C

Assembly:



Order No.	D	D1	D2	L1	L2	R
23731-00400505	4	5,5	9	5,6	1	0,5
23731-00600807	6	8	12	7	1	1
23731-00801005	8	10	15	5,5	1	1
23731-00801009	8	10	15	9,5	1	1
23731-01001209	10	12	18	9	1	1
23731-01001212	10	12	18	12	1	1
23731-01201417	12	14	20	17	1	1
23731-01401617	14	16	22	17	1	1
23731-01501712	15	17	23	12	1	1
23731-01501717	15	17	23	17	1	1
23731-01601817	16	18	24	17	1	1
23731-01802012	18	20	26	12	1	1
23731-02002311	20	23	30	11,5	1,5	1,5
23731-02202521	22	25	32	21,5	1,5	1,5
23731-02502826	25	28	35	26,5	1,5	1,5
23731-03003430	30	34	42	30	2	2
23731-03503926	35	39	47	26	2	2
23731-04004426	40	44	53	26	2	2
23731-05005522	50	55	65	22	2,5	2

Thrust washers



Material:
Base material, steel.
Intermediate layer sintered bronze.
Bearing surface PTFE.

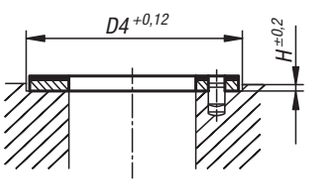
Version:
Steel galvanized.

Sample order:
nlm 23732-01002015

Note:
Maintenance-free steel composite bearings particularly suitable for dry running. Also highly suitable for lubricated applications (oil lubrication). They take up axial loads by rotating movements. The axial loads that occur can be both cyclic or permanent. Very low wear and friction, no stick-slip effect. High chemical resistance, low water absorption.

Technical data:
Static load: max. 250 N/mm²
Dynamic load: max. 140 N/mm²
Friction coefficient, dry: 0.03 to 0.20
Sliding speed, dry: max. 2 m/s
Sliding speed, oil lubricated: max. 5 m/s
Thermal conductivity: 42 W(m*K)-1
Thermal expansion coefficient: 11*10-6 K-1
Temperature range: -195°C to +280°C

Mounting dimensions

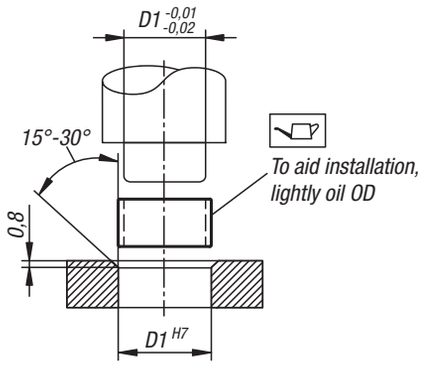


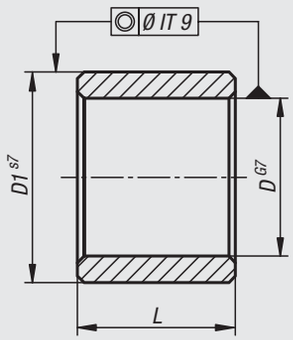
Order No.	D	D1	D2	D3	D4	H	S
23732-01002015	10	20	15	1,5	20	1	1,5
23732-01202415	12	24	18	1,5	24	1	1,5
23732-01402615	14	26	20	2	26	1	1,5
23732-01603015	16	30	23	2	30	1	1,5
23732-01803215	18	32	25	2	32	1	1,5
23732-02003615	20	36	28	3	36	1	1,5
23732-02203815	22	38	30	3	38	1	1,5
23732-02404215	24	42	33	3	42	1	1,5
23732-02604415	26	44	35	3	44	1	1,5
23732-02804815	28	48	38	4	48	1	1,5
23732-03205415	32	54	43	4	54	1	1,5
23732-03806215	38	62	50	4	62	1	1,5
23732-04206615	42	66	54	4	66	1	1,5
23732-04807420	48	74	61	4	74	1,5	2
23732-05207820	52	78	65	4	78	1,5	2
23732-06209020	62	90	76	4	90	1,5	2

Plain bearing sintered bronze

cylindrical

Assembly:





After pressing into a housing with H7 hole, the diameter D has a H7 tolerance.

Material:
Sintered bronze similar to SINT A50.

Version:
Oil impregnated (ca. 25 percent by volume oil).
Hardness min. 25 HB.

Sample order:
nlm 23760-00300604

Note:
The sintered bronze plain bearings are oil impregnated, self-lubricating, maintenance-free and ready for installation. During rotation the oil is applied to the shaft and absorbed by the bearing through capillary effect when stationary. Additional lubrication is not required under normal operating conditions.

Assembly:
Press in plain bearings, do not hammer in. The use of a suitable press mandrel is advisable. Without a mandrel there is a risk that the bearing may deform during installation. After press-fitting into a housing with bore H7 the bore D has a H7 tolerance.

Tolerances:
Housing:
Recommended tolerance H7.

Shaft:
Recommended tolerance h6 to h9. Hardened or non-hardened ground shafts can be used (for secondary applications drawn shafts can also be used).

Technical data:
Static load: max. 50 N/mm²
Dynamic load: max. 10 N/mm²
Friction coefficient, dry: 0.05 to 0.10
Sliding speed: max. 5 m/s
Maximum pv value: 1.6 N/mm² * m/s
Temperature range: -20 °C to +100 °C

Order No.	D	D1	L
23760-00300604	3	6	4
23760-00300606	3	6	6
23760-00400704	4	7	4
23760-00400804	4	8	4
23760-00500808	5	8	8
23760-00500810	5	8	10
23760-00500816	5	8	16
23760-00600906	6	9	6
23760-00600910	6	9	10
23760-00600912	6	9	12
23760-00600916	6	9	16
23760-00601006	6	10	6
23760-00601010	6	10	10
23760-00601012	6	10	12
23760-00601016	6	10	16
23760-00601206	6	12	6
23760-00801108	8	11	8
23760-00801112	8	11	12
23760-00801208	8	12	8
23760-00801212	8	12	12
23760-00801220	8	12	20
23760-01001310	10	13	10
23760-01001416	10	14	16
23760-01001610	10	16	10
23760-01201512	12	15	12
23760-01201520	12	15	20
23760-01201612	12	16	12
23760-01201812	12	18	12
23760-01201816	12	18	16
23760-01201820	12	18	20
23760-01401822	14	18	22
23760-01402014	14	20	14
23760-01402018	14	20	18
23760-01501920	15	19	20
23760-01502116	15	21	16

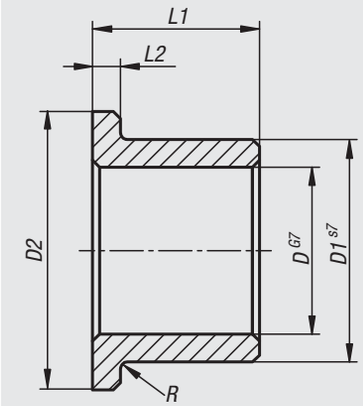
Plain bearing sintered bronze

cylindrical

Order No.	D	D1	L
23760-01602016	16	20	16
23760-01602020	16	20	20
23760-01602025	16	20	25
23760-01602032	16	20	32
23760-01602216	16	22	16
23760-01602220	16	22	20
23760-01602232	16	22	32
23760-01802218	18	22	18
23760-01802418	18	24	18
23760-01802428	18	24	28
23760-01802518	18	25	18
23760-02002432	20	24	32
23760-02002516	20	25	16
23760-02002520	20	25	20
23760-02002525	20	25	25
23760-02002532	20	25	32
23760-02002620	20	26	20
23760-02002625	20	26	25
23760-02002632	20	26	32
23760-02002825	20	28	25
23760-02202822	22	28	22
23760-02503020	25	30	20
23760-02503025	25	30	25
23760-02503032	25	30	32
23760-02503040	25	30	40
23760-02503220	25	32	20
23760-02503225	25	32	25
23760-02503232	25	32	32
23760-02503240	25	32	40
23760-02803628	28	36	28
23760-03003824	30	38	24
23760-03003830	30	38	30
23760-03003838	30	38	38
23760-03204032	32	40	32
23760-03504428	35	44	28
23760-03504435	35	44	35
23760-03504535	35	45	35
23760-03604536	36	45	36
23760-04004632	40	46	32
23760-04004640	40	46	40
23760-04005025	40	50	25
23760-04005040	40	50	40
23760-04505545	45	55	45
23760-04505645	45	56	45
23760-05005632	50	56	32
23760-05005650	50	56	50
23760-05006032	50	60	32
23760-05006040	50	60	40
23760-05006050	50	60	50

Plain bearing sintered bronze

with collar



After pressing into a housing with H7 hole, the diameter D has a H7 tolerance.

Material:
Sintered bronze similar to SINT A50.

Version:
Oil impregnated (ca. 25 percent by volume oil).
Hardness min. 25 HB.

Sample order:
nlm 23761-00400804

Note:
The sintered bronze plain bearings are oil impregnated, self-lubricating, maintenance-free and ready for installation. During rotation the oil is applied to the shaft and absorbed by the bearing through capillary effect when stationary. Additional lubrication is not required under normal operating conditions.

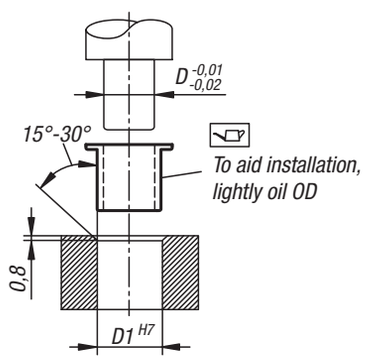
Assembly:
Press in plain bearings, do not hammer in. The use of a suitable press mandrel is advisable. Without a mandrel there is a risk that the bearing may deform during installation. After press-fitting into a housing with bore H7 the bore D has a H7 tolerance.

Tolerances:
Housing:
Recommended tolerance H7.

Shaft:
Recommended tolerance h6 to h9. Hardened or non-hardened ground shafts can be used (for secondary applications drawn shafts can also be used).

Technical data:
Static load: max. 50 N/mm²
Dynamic load: max. 10 N/mm²
Friction coefficient, dry: 0.05 to 0.10
Sliding speed: max. 5 m/s
Maximum pv value: 1.6 N/mm² * m/s
Temperature range: -20 °C to +100 °C

Assembly:



Order No.	D	D1	D2	L1	L2	R
23761-00400804	4	8	12	4	2	0,3
23761-00400808	4	8	12	8	2	0,3
23761-00601006	6	10	14	6	2	0,3
23761-00601010	6	10	14	10	2	0,3
23761-00601016	6	10	14	16	2	0,3
23761-00801208	8	12	16	8	2	0,3
23761-00801212	8	12	16	12	2	0,3
23761-00801216	8	12	16	16	2	0,3
23761-01001310	10	13	16	10	1,5	0,6
23761-01001316	10	13	16	16	1,5	0,6
23761-01001510	10	15	20	10	2,5	0,6
23761-01001516	10	15	20	16	2,5	0,6
23761-01001610	10	16	22	10	3	0,6
23761-01001616	10	16	22	16	3	0,6

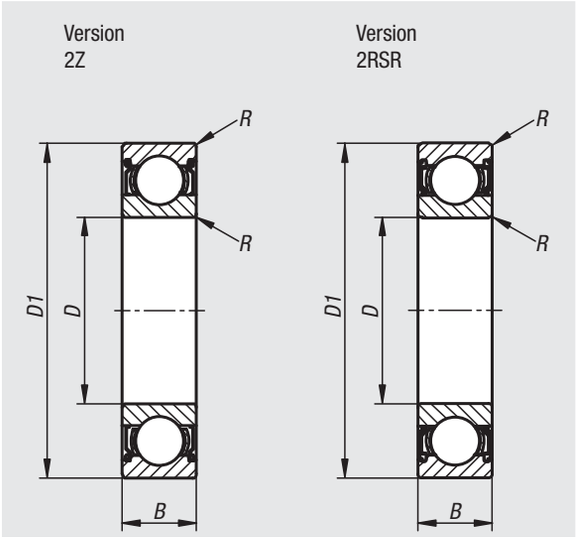
Plain bearing sintered bronze

with collar

Order No.	D	D1	D2	L1	L2	R
23761-01201512	12	15	18	12	1,5	0,6
23761-01201516	12	15	18	16	1,5	0,6
23761-01201712	12	17	22	12	2,5	0,6
23761-01201716	12	17	22	16	2,5	0,6
23761-01201812	12	18	24	12	3	0,6
23761-01201820	12	18	24	20	3	0,6
23761-01401814	14	18	22	14	2	0,6
23761-01402014	14	20	26	14	3	0,6
23761-01502015	15	20	25	15	3	0,6
23761-01502020	15	20	25	20	3	0,6
23761-01602016	16	20	24	16	2	0,6
23761-01602020	16	20	24	20	2	0,6
23761-01602216	16	22	28	16	3	0,6
23761-01602220	16	22	28	20	3	0,6
23761-01602225	16	22	28	25	3	0,6
23761-01802218	18	22	26	18	2	0,6
23761-01802418	18	24	30	18	3	0,6
23761-02002416	20	24	28	16	2	0,6
23761-02002420	20	24	28	20	2	0,6
23761-02002616	20	26	32	16	3	0,6
23761-02002620	20	26	32	20	3	0,6
23761-02002625	20	26	32	25	3	0,6
23761-02002632	20	26	32	32	3	0,6
23761-02202815	22	28	34	15	3	0,6
23761-02202820	22	28	34	20	3	0,6
23761-02202825	22	28	34	25	3	0,6
23761-02503020	25	30	35	20	2,5	0,8
23761-02503025	25	30	35	25	2,5	0,8
23761-02503220	25	32	39	20	3,5	0,8
23761-02503225	25	32	39	25	3,5	0,8
23761-02803322	28	33	38	22	2,5	0,8
23761-02803336	28	33	38	36	2,5	0,8
23761-02803622	28	36	44	22	4	0,8
23761-02803636	28	36	44	36	4	0,8
23761-03003820	30	38	46	20	4	0,8
23761-03003825	30	38	46	25	4	0,8
23761-03003830	30	38	46	30	4	0,8
23761-03204020	32	40	48	20	4	0,8
23761-03204025	32	40	48	25	4	0,8
23761-03204030	32	40	48	30	4	0,8
23761-03604528	36	45	54	28	4,5	0,8
23761-03604536	36	45	54	36	4,5	0,8
23761-04005025	40	50	60	25	5	0,8
23761-04005040	40	50	60	40	5	0,8
23761-05006032	50	60	70	32	5	1
23761-05006050	50	60	70	50	5	1

Deep groove ball bearing

FAG single row



Material:
Inner ring, outer ring and rolling elements, bearing steel.
Cage sheet steel.
Labyrinth seal sheet steel. Lip seal NBR.

Version:
2Z = sealed both sides with non-contact labyrinth seals.
2RSR = sealed both sides with contact lip seals.

Sample order:
nlm 23800-100301004

Note:
Deep groove ball bearings accept high radial and axial loads. Axial loads are absorbed in both directions. The versions 2Z and 2RSR are lubricated for life with a high quality grease.

The main dimensions of the deep groove ball bearings conform to DIN 625-1. Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. The radial internal clearance corresponds to the clearance CN acc. to DIN 620-4. These tolerance classes are standard and well suited for most applications.

Temperature range:
-30 °C to +110 °C.

On request:
Open deep groove ball bearing.
Other dimensions and versions.

Order No.	Abbreviation	Version	D	D1	B	R min.	Dynamic load rating N	Static load rating N	Speed limit r/min.
23800-100301004	623-2Z	2Z	3	10	4	0,15	640	220	45.000
23800-100401305	624-2Z	2Z	4	13	5	0,2	1.290	490	38.000
23800-100501605	625-2Z	2Z	5	16	5	0,3	1.320	440	36.000
23800-200501605	625-2RSR	2RSR	5	16	5	0,3	1.320	440	24.000
23800-100601906	626-2Z	2Z	6	19	6	0,3	2.600	1.100	32.000
23800-200601906	626-2RSR	2RSR	6	19	6	0,3	2.600	1.100	22.000
23800-100701906	607-2Z	2Z	7	19	6	0,3	2.600	1.100	32.000
23800-200701906	607-2RSR	2RSR	7	19	6	0,3	2.600	1.100	22.000
23800-100702207	627-2Z	2Z	7	22	7	0,3	3.250	1.370	30.000
23800-200702207	627-2RSR	2RSR	7	22	7	0,3	3.250	1.370	20.000
23800-100802207	608-2Z	2Z	8	22	7	0,3	3.250	1.370	30.000
23800-200802207	608-2RSR	2RSR	8	22	7	0,3	3.250	1.370	20.000
23800-100902407	609-2Z	2Z	9	24	7	0,3	3.650	1.630	30.000
23800-200902407	609-2RSR	2RSR	9	24	7	0,3	3.650	1.630	20.000
23800-100902608	629-2Z	2Z	9	26	8	0,3	4.550	1.960	28.000
23800-200902608	629-2RSR	2RSR	9	26	8	0,3	4.550	1.960	19.000

Deep groove ball bearing

FAG single row

Order No.	Abbreviation	Version	D	D1	B	R min.	Dynamic load rating N	Static load rating N	Speed limit r/min.
23800-101001905	61800-2Z	2Z	10	19	5	0,3	1.450	590	36.000
23800-201001905	61800-2RSR	2RSR	10	19	5	0,3	1.450	590	18.000
23800-101002608	6000-2Z	2Z	10	26	8	0,3	4.550	1.960	28.000
23800-201002608	6000-2RSR	2RSR	10	26	8	0,3	4.550	1.960	19.000
23800-101003009	6200-2Z	2Z	10	30	9	0,6	6.000	2.600	26.000
23800-201003009	6200-2RSR	2RSR	10	30	9	0,6	6.000	2.600	17.000
23800-101003511	6300-2Z	2Z	10	35	11	0,6	8.150	3.450	22.000
23800-201003511	6300-2RSR	2RSR	10	35	11	0,6	8.150	3.450	15.000
23800-101202105	61801-2Z	2Z	12	21	5	0,3	1.520	670	32.000
23800-201202105	61801-2RSR	2RSR	12	21	5	0,3	1.520	670	18.000
23800-101202808	6001-2Z	2Z	12	28	8	0,3	5.100	2.360	26.000
23800-201202808	6001-2RSR	2RSR	12	28	8	0,3	5.100	2.360	18.000
23800-101203210	6201-2Z	2Z	12	32	10	0,6	6.950	3.100	24.000
23800-201203210	6201-2RSR	2RSR	12	32	10	0,6	6.950	3.100	16.000
23800-101203712	6301-2Z	2Z	12	37	12	1	9.650	4.150	20.000
23800-201203712	6301-2RSR	2RSR	12	37	12	1	9.650	4.150	13.000
23800-101502405	61802-2Z	2Z	15	24	5	0,3	1.650	800	28.000
23800-201502405	61802-2RSR	2RSR	15	24	5	0,3	1.650	800	16.000
23800-101503209	6002-2Z	2Z	15	32	9	0,3	5.600	2.850	24.000
23800-201503209	6002-2RSR	2RSR	15	32	9	0,3	5.600	2.850	16.000
23800-101503511	6202-2Z	2Z	15	35	11	0,6	7.800	3.750	20.000
23800-201503511	6202-2RSR	2RSR	15	35	11	0,6	7.800	3.750	14.000
23800-101504213	6302-2Z	2Z	15	42	13	1	11.400	5.400	18.000
23800-201504213	6302-2RSR	2RSR	15	42	13	1	11.400	5.400	12.000
23800-101703510	6003-2Z	2Z	17	35	10	0,3	6.000	3.250	22.000
23800-201703510	6003-2RSR	2RSR	17	35	10	0,3	6.000	3.250	14.000
23800-101704012	6203-2Z	2Z	17	40	12	0,6	9.500	4.750	18.000
23800-201704012	6203-2RSR	2RSR	17	40	12	0,6	9.500	4.750	12.000
23800-101704714	6303-2Z	2Z	17	47	14	1	13.400	6.550	16.000
23800-201704714	6303-2RSR	2RSR	17	47	14	1	13.400	6.550	11.000
23800-102004212	6004-2Z	2Z	20	42	12	0,6	9.300	5.000	17.000
23800-202004212	6004-2RSR	2RSR	20	42	12	0,6	9.300	5.000	12.000
23800-102004714	6204-2Z	2Z	20	47	14	1	12.700	6.550	15.000
23800-202004714	6204-2RSR	2RSR	20	47	14	1	12.700	6.550	10.000
23800-102005215	6304-2Z	2Z	20	52	15	1,1	16.000	7.800	14.000
23800-202005215	6304-2RSR	2RSR	20	52	15	1,1	16.000	7.800	9.500
23800-102504712	6005-2Z	2Z	25	47	12	0,6	10.000	5.850	15.000
23800-202504712	6005-2RSR	2RSR	25	47	12	0,6	10.000	5.850	10.000
23800-102505215	6205-2Z	2Z	25	52	15	1	14.000	7.800	14.000
23800-202505215	6205-2RSR	2RSR	25	52	15	1	14.000	7.800	9.000
23800-102506217	6305-2Z	2Z	25	62	17	1,1	22.400	11.400	11.000
23800-202506217	6305-2RSR	2RSR	25	62	17	1,1	22.400	11.400	7.500

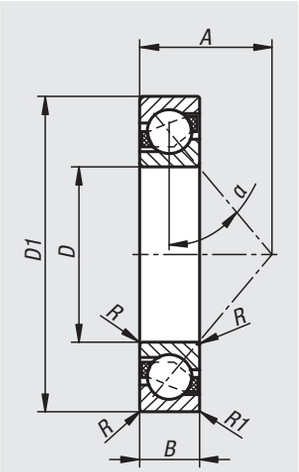
Deep groove ball bearing

FAG single row

Order No.	Abbreviation	Version	D	D1	B	R min.	Dynamic load rating N	Static load rating N	Speed limit r/min.
23800-103005513	6006-2Z	2Z	30	55	13	1	12.700	8.000	13.000
23800-203005513	6006-2RSR	2RSR	30	55	13	1	12.700	8.000	8.500
23800-103006216	6206-2Z	2Z	30	62	16	1	19.300	11.200	11.000
23800-203006216	6206-2RSR	2RSR	30	62	16	1	19.300	11.200	7.500
23800-103007219	6306-2Z	2Z	30	72	19	1,1	29.000	16.300	9.500
23800-203007219	6306-2RSR	2RSR	30	72	19	1,1	29.000	16.300	6.300
23800-103506214	6007-2Z	2Z	35	62	14	1	16.000	10.200	11.000
23800-203506214	6007-2RSR	2RSR	35	62	14	1	16.000	10.200	7.500
23800-103507217	6207-2Z	2Z	35	72	17	1,1	22.500	15.300	9.500
23800-203507217	6207-2RSR	2RSR	35	72	17	1,1	22.500	15.300	6.300
23800-103508021	6307-2Z	2Z	35	80	21	1,5	33.500	19.000	8.500
23800-203508021	6307-2RSR	2RSR	35	80	21	1,5	33.500	19.000	5.600
23800-104006815	6008-2Z	2Z	40	68	15	1	16.600	11.600	10.000
23800-204006815	6008-2RSR	2RSR	40	68	15	1	16.600	11.600	6.700
23800-104008018	6208-2Z	2Z	40	80	18	1,1	29.000	18.000	8.500
23800-204008018	6208-2RSR	2RSR	40	80	18	1,1	29.000	18.000	5.600
23800-104009023	6308-2Z	2Z	40	90	23	1,5	42.500	25.000	7.500
23800-204009023	6308-2RSR	2RSR	40	90	23	1,5	42.500	25.000	5.000
23800-104507516	6009-2Z	2Z	45	75	16	1	20.000	14.300	9.000
23800-204507516	6009-2RSR	2RSR	45	75	16	1	20.000	14.300	6.000
23800-104508519	6209-2Z	2Z	45	85	19	1,1	31.000	20.400	8.000
23800-204508519	6209-2RSR	2RSR	45	85	19	1,1	31.000	20.400	5.300
23800-104510025	6309-2Z	2Z	45	100	25	1,5	53.000	31.500	6.700
23800-204510025	6309-2RSR	2RSR	45	100	25	1,5	53.000	31.500	4.500
23800-105008016	6010-2Z	2Z	50	80	16	1	20.800	15.600	8.500
23800-205008016	6010-2RSR	2RSR	50	80	16	1	20.800	15.600	5.600
23800-105009020	6210-2Z	2Z	50	90	20	1,1	36.500	24.000	7.500
23800-205009020	6210-2RSR	2RSR	50	90	20	1,1	36.500	24.000	4.800
23800-105011027	6310-2Z	2Z	50	110	27	2	62.000	38.000	6.000
23800-205011027	6310-2RSR	2RSR	50	110	27	2	62.000	38.000	4.000

Angular contact ball bearing FAG

single-row



Material:
Inner ring, outer ring and rolling elements, bearing steel.
Cage reinforced fibre glass polyamide.

Version:
open.

Sample order:
nlm 23805-001003009

Note:
Single row angular contact ball bearings accept high radial and axial loads. Axial loads are absorbed in only one direction against the shoulder guide. For axial counter support a second bearing mounted inverse is required. The pressure angle of 40° make these bearings highly resilient. Suitable for high speeds.

The main dimensions of angular contact ball bearings conform to DIN 628-1. Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. These tolerance classes are standard and are well suited for most applications.

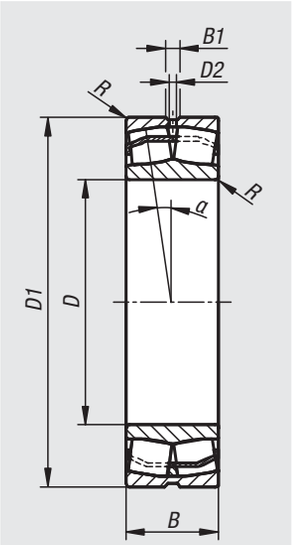
Temperature range:
-30 °C to +120 °C.

On request:
Sealed both sides with NBR contact lip seals. Other dimensions and versions.

Order No.	Abbreviation	Version	D	D1	B	R min.	R1 min.	α	A	Dynamic load rating N	Static load rating N	Speed limit r/min.
23805-001003009	7200-B-TVP	Open	10	30	9	0,6	0,3	40°	13	5.300	2.600	32.000
23805-001203210	7201-B-TVP	Open	12	32	10	0,6	0,3	40°	14	7.400	3.550	28.000
23805-001503511	7202-B-TVP	Open	15	35	11	0,6	0,3	40°	16	8.400	4.450	24.000
23805-001704012	7203-B-TVP	Open	17	40	12	0,6	0,3	40°	18	10.500	5.700	20.000
23805-002004714	7204-B-TVP	Open	20	47	14	1	0,6	40°	21	14.400	7.800	18.000
23805-002505215	7205-B-TVP	Open	25	52	15	1	0,6	40°	24	15.300	9.000	16.000
23805-003006216	7206-B-TVP	Open	30	62	16	1	0,6	40°	27	21.700	14.100	13.000
23805-003507217	7207-B-TVP	Open	35	72	17	1,1	0,6	40°	31	28.000	19.000	11.000
23805-004008018	7208-B-TVP	Open	40	80	18	1,1	0,6	40°	34	34.000	23.500	9.500
23805-004508519	7209-B-TVP	Open	45	85	19	1,1	0,6	40°	37	37.500	27.000	8.500
23805-005009020	7210-B-TVP	Open	50	90	20	1,1	0,6	40°	39	39.000	28.500	8.000

Spherical roller bearing FAG

cylindrical bore



Material:
Inner ring, outer ring and rolling elements, bearing steel.
Cage, steel.

Version:
open.

Sample order:
nlm 23815-002505218

Note:
Spherical roller bearings accept high radial and axial loads. Axial loads are absorbed in both directions. They are designed for high loading. Spherical roller bearings compensate for angular errors (set angle α). With groove and lubrication holes.

The main dimensions of the spherical roller bearing conform to DIN 625-2. Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. The radial internal clearance corresponds to the clearance CN acc. to DIN 620-4. These tolerance classes are standard and well suited for most applications.

Temperature range:
-30 °C to +200 °C.

On request:
Other dimensions and versions.

Order No.	Abbreviation	Version	D	D1	D2	B	B1	R min.	α	Dynamic load rating N	Static load rating N	Speed limit r/min.
23815-002505218	22205-E1	Open	25	52	3,2	18	4,8	1	1,5°	48.000	42.500	17.000
23815-003006220	22206-E1	Open	30	62	3,2	20	4,8	1	1,5°	64.000	57.000	13.000
23815-003507223	22207-E1	Open	35	72	3,2	23	4,8	1,1	1,5°	88.000	81.500	11.000
23815-004008023	22208-E1	Open	40	80	3,2	23	4,8	1,1	1,5°	101.000	91.000	10.000
23815-004508523	22209-E1	Open	45	85	3,2	23	4,8	1,1	1,5°	104.000	99.000	10.000
23815-005009023	22210-E1	Open	50	90	3,2	23	4,8	1,1	1,5°	109.000	107.000	9.500

Cylinder roller bearing FAG

with cage

Material:
Inner ring, outer ring and rolling elements, bearing steel.
Cage reinforced fibre glass polyamide.

Version:
NU floating bearing.
NJ support bearing.

Sample order:
nlm 23820-001503511

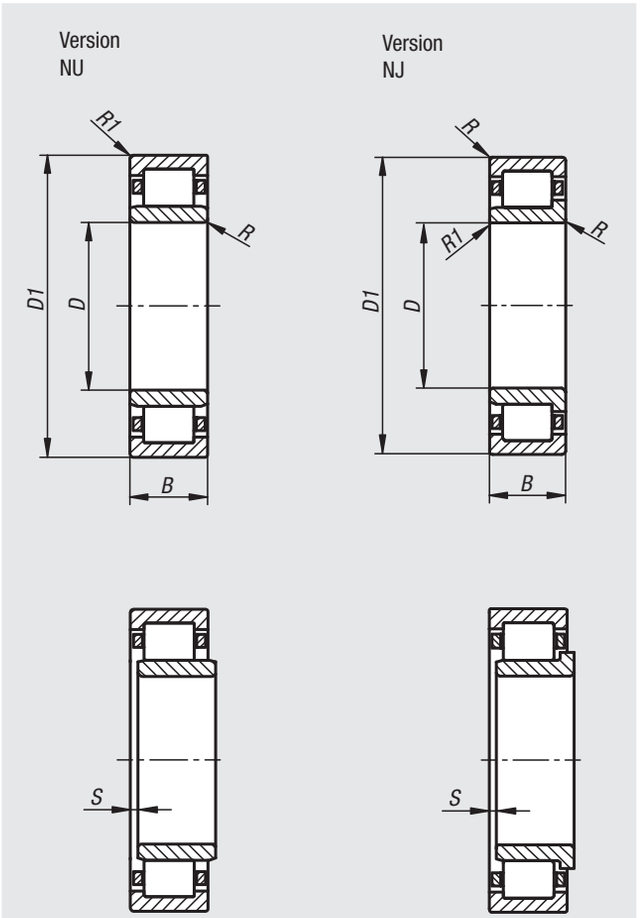
Note:
Cylinder roller bearings accept high radial loads. The bearings are separable. The bearing parts can be fitted independently of each other. This means that both bearing rings can have a tight fit. The bearings are supplied without seals. They can be lubricated with grease or oil from the side. Suitable for high speeds.
NU version are floating bearings and accept only radial forces. The outer ring has two flanges, the inner ring has none. Outer and inner rings can be displaced by the value S in both directions.

NJ versions are support bearings and accept axial loads in one direction in addition to radial loads. The outer ring has two flanges, the inner ring has one flange. Outer and inner rings can be displaced in one direction by the value S.

Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. This radial clearance corresponds to the clearance CN acc. to DIN 620-4. These tolerance classes are standard and are well suited for most applications.

Temperature range:
-30 °C to +120 °C.

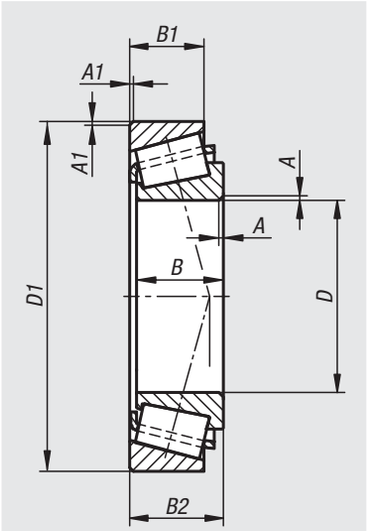
On request:
Other dimensions and versions.



Order No.	Abbreviation	Version	D	D1	B	R min.	R1 min.	S	Dynamic load rating N	Static load rating N	Speed limit r/min.
23820-001503511	NU-202-E-TVP2	NU floating bearing	15	35	11	0,6	0,3	1,6	15.100	10.400	22.000
23820-101503511	NJ-202-E-TVP2	NJ support bearing	15	35	11	0,6	0,3	1,6	15.100	10.400	22.000
23820-001704012	NU-203-E-TVP2	NU floating bearing	17	40	12	0,6	0,3	1,2	20.800	14.600	18.000
23820-101704012	NJ-203-E-TVP2	NJ support bearing	17	40	12	0,6	0,3	1,2	20.800	14.600	18.000
23820-002004714	NU-204-E-TVP2	NU floating bearing	20	47	14	1	0,6	0,8	32.500	24.700	16.000
23820-102004714	NJ-204-E-TVP2	NJ support bearing	20	47	14	1	0,6	1	32.500	24.700	16.000
23820-002505215	NU-205-E-TVP2	NU floating bearing	25	52	15	1	0,6	1,3	34.500	27.500	15.000
23820-102505215	NJ-205-E-TVP2	NJ support bearing	25	52	15	1	0,6	1,2	34.500	27.500	15.000
23820-003006216	NU-206-E-TVP2	NU floating bearing	30	62	16	1	0,6	1,5	45.000	36.000	12.000
23820-103006216	NJ-206-E-TVP2	NJ support bearing	30	62	16	1	0,6	1,5	45.000	36.000	12.000
23820-003507217	NU-207-E-TVP2	NU floating bearing	35	72	17	1,1	0,6	0,7	58.000	48.500	10.000
23820-103507217	NJ-207-E-TVP2	NJ support bearing	35	72	17	1,1	0,6	0,7	58.000	48.500	10.000
23820-004008018	NU-208-E-TVP2	NU floating bearing	40	80	18	1,1	1,1	1	63.000	53.000	9.000
23820-104008018	NJ-208-E-TVP2	NJ support bearing	40	80	18	1,1	1,1	1	63.000	53.000	9.000
23820-004508519	NU-209-E-TVP2	NU floating bearing	45	85	19	1,1	1,1	1	72.000	63.000	8.500
23820-104508519	NJ-209-E-TVP2	NJ support bearing	45	85	19	1,1	1,1	1,9	72.000	63.000	8.500
23820-005009020	NU-210-E-TVP2	NU floating bearing	50	90	20	1,1	1,1	1,3	75.000	69.000	8.000
23820-105009020	NJ-210-E-TVP2	NJ support bearing	50	90	20	1,1	1,1	1,3	75.000	69.000	8.000

Tapered roller bearing FAG

single row



Material:
Inner ring, outer ring and rolling elements, bearing steel.
Cage, steel.

Version:
Series 302
Series 303
Series 320 (ISO dimension)

Sample order:
nlm 23825-101504213

Note:
Tapered roller bearings can accept high radial and axial loads. Axial loads are absorbed in only one direction. For axial counter support a second bearing mounted inverse is required. Suitable for medium speeds.

The bearings are separable. This means the bearing parts can be fitted independently of each other. The bearings are supplied without seals. They can be lubricated with grease or oil from the side.

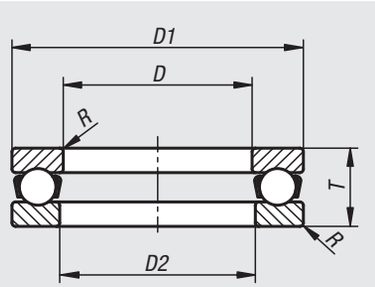
The main dimensions of the tapered roller bearings conform to DIN ISO 355 and DIN 720. Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. These tolerance classes are standard and are well suited for most applications.

Temperature range:
-30 °C to +120 °C.

On request:
Other dimensions and versions.

Order No.	Abbreviation	Version	D	D1	B	B1	B2	A	A1	Dynamic load rating N	Static load rating N	Speed limit r/min.
23825-101504213	30302-A	Series 303	15	42	13	11	14,25	1	1	23.000	20.500	21.000
23825-001704012	30203-A	Series 302	17	40	12	11	13,25	1	1	18.500	17.800	21.000
23825-101704714	30303-A	Series 303	17	47	14	12	15,25	1	1	27.500	24.500	18.200
23825-302004215	32004-X	Series 320 (ISO dimensions)	20	42	15	12	15	0,6	0,6	24.000	28.500	18.200
23825-002004714	30204-A	Series 302	20	47	14	12	15,25	1	1	27.000	27.000	16.800
23825-102005215	30304-A	Series 303	20	52	15	13	16,25	1,5	1,5	34.000	32.500	15.400
23825-302504715	32005-X	Series 320 (ISO dimensions)	25	47	15	11,5	15	0,6	0,6	26.500	33.500	15.400
23825-102506217	30305-A	Series 303	25	62	17	15	18,25	1,5	1,5	47.000	45.500	12.600
23825-303005517	32006-X	Series 320 (ISO dimensions)	30	55	17	13	17	1	1	38.500	46.500	12.600
23825-003006216	30206-A	Series 302	30	62	16	14	17,25	1	1	43.500	48.000	11.900
23825-103007219	30306-A	Series 303	30	72	19	16	20,75	1,5	1,5	60.000	61.000	10.500
23825-303506218	32007-X	Series 320 (ISO dimensions)	35	62	18	14	18	1	1	45.500	57.000	11.200
23825-003507217	30207-A	Series 302	35	72	17	15	18,25	1,5	1,5	54.000	59.000	9.800
23825-103508021	30307-A	Series 303	35	80	21	18	22,75	2	1,5	73.000	75.000	9.400
23825-304006819	32008-XA	Series 320 (ISO dimensions)	40	68	19	14,5	19	1	1	53.000	71.000	9.800
23825-004008018	30208-A	Series 302	40	80	18	16	19,75	1,5	1,5	61.000	67.000	8.800
23825-104009023	30308-A	Series 303	40	90	23	20	25,25	2	1,5	91.000	102.000	7.800
23825-304507520	32009-XA	Series 320 (ISO dimensions)	45	75	20	15,5	20	1	1	61.000	86.000	8.800
23825-104510025	30309-A	Series 303	45	100	25	18	27,25	2	1,5	96.000	108.000	6.700
23825-305008020	32010-X	Series 320 (ISO dimensions)	50	80	20	15,5	20	1	1	64.000	93.000	7.800
23825-105011027	30310-A	Series 303	50	110	27	23	29,25	2,5	2	130.000	148.000	6.300

Axial ball bearing FAG single direction.



Material:
Housing washer, shaft washer and rolling elements, bearing steel.
Cage, steel.

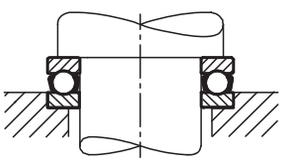
Sample order:
nlm 23830-001002409

Note:
Axial ball bearings accept high axial loads from one direction but may not be loaded radially.
The bearings are separable. This means the bearing parts can be fitted independently of each other.

The main dimensions of the axial ball bearing conform to ISO 104 and DIN 711. Dimensional and running tolerances correspond to tolerance class PN acc. to DIN 620. These tolerance classes are standard and are well suited for most applications.

Temperature range:
-30 °C to +150 °C.

On request:
Other dimensions and versions.

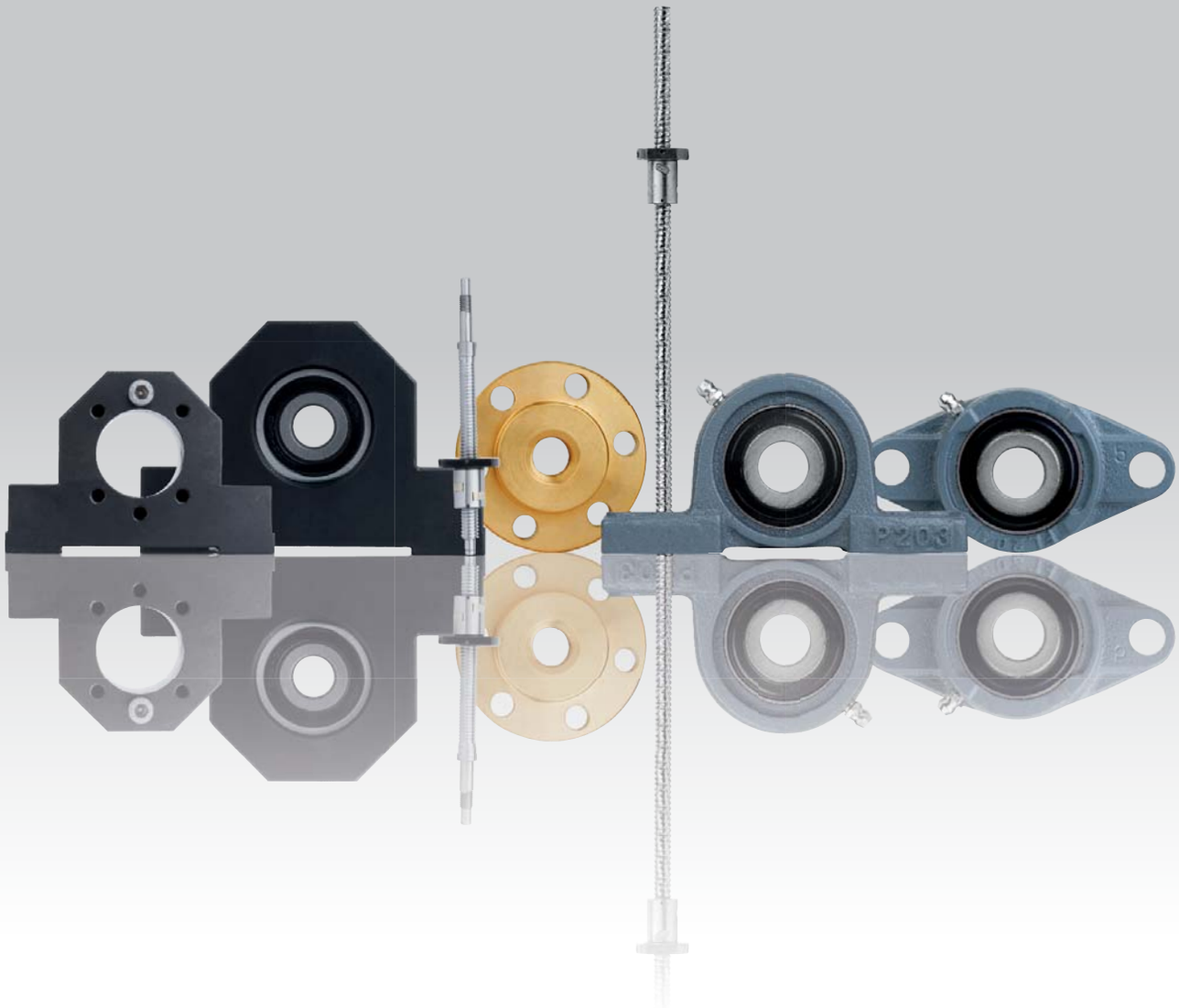


Order No.	Abbreviation	D	D1	D2	T	R min.	Dynamic load rating N	Static load rating N	Speed limit r/min.
23830-01002409	51100	10	24	11	9	0,3	10.000	14.000	13.000
23830-01202609	51101	12	26	13	9	0,3	10.400	15.300	13.000
23830-01202811	51201	12	28	14	11	0,6	13.200	19.000	10.000
23830-01502809	51102	15	28	16	9	0,3	10.600	16.600	12.000
23830-01503212	51202	15	32	17	12	0,6	16.600	25.000	9.000
23830-01703009	51103	17	30	18	9	0,3	11.400	19.600	11.000
23830-01703512	51203	17	35	19	12	0,6	17.300	27.500	8.500
23830-02003510	51104	20	35	21	10	0,3	15.000	26.500	9.500
23830-02004014	51204	20	40	22	14	0,6	22.400	37.500	7.500
23830-02504211	51105	25	42	26	11	0,6	18.000	35.500	9.000
23830-02504715	51205	25	47	27	15	0,6	28.000	50.000	6.700
23830-03004711	51106	30	47	32	11	0,6	19.000	40.000	8.000
23830-03005216	51206	30	52	32	16	0,6	25.000	46.500	6.300
23830-03505212	51107	35	52	37	12	0,6	20.000	46.500	7.500
23830-03506218	51207	35	62	37	18	1	35.500	67.000	5.300
23830-04006013	51108	40	60	42	13	0,6	27.000	63.000	6.300
23830-04006819	51208	40	68	42	19	1	46.500	98.000	4.800
23830-04506514	51109	45	65	47	14	0,6	28.000	69.500	6.000
23830-04507320	51209	45	73	47	20	1	39.000	80.000	4.800
23830-05007014	51110	50	70	52	14	0,6	29.000	75.000	5.600
23830-05007822	51210	50	78	52	22	1	50.000	106.000	4.300

Notes

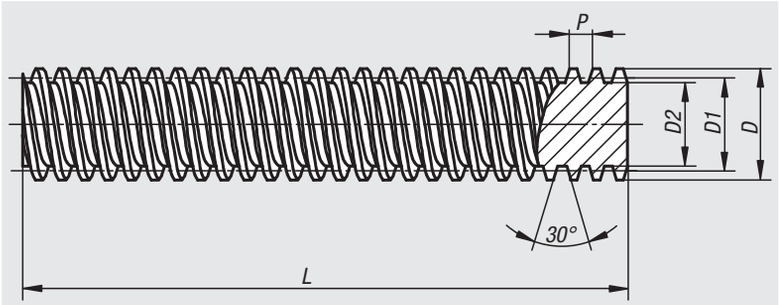
24000

Trapezoidal thread spindles
Ball screw linear actuators
Pillow block bearings



Trapezoidal rolled thread spindles

RH thread, single-start



Material:
Steel 1.0401 (C15).

Version:
Rolled, bright.

Sample order:
nlm 24000-100311X1000

Note:
Trapezoidal threads are transmission threads with relatively high friction. Standard thread forms are self-locking. This has the advantage that it generally does not need to be secured in the rest position.

DIN 103. Pitch Tr 10x3 is not DIN 103
Tolerance class 7e
Pitch precision 0.3/300 mm

On request:
Lengths max. 3000 mm.

Order No.	DxP	D1 min.	D1 max.	D2	L
24000-100311X1000	Tr 10x3	8,191	8,415	5,84	1000
24000-120311X1000	Tr 12x3	10,191	10,415	7,84	1000
24000-160411X1000	Tr 16x4	13,64	13,905	10,8	1000
24000-200411X1000	Tr 20x4	17,64	17,905	14,8	1000
24000-240511X1000	Tr 24x5	21,094	21,394	17,5	1000
24000-260511X1000	Tr 26x5	23,094	23,394	19,5	1000
24000-300611X1000	Tr 30x6	26,547	26,882	21,9	1000

24003

Trapezoidal thread round nuts

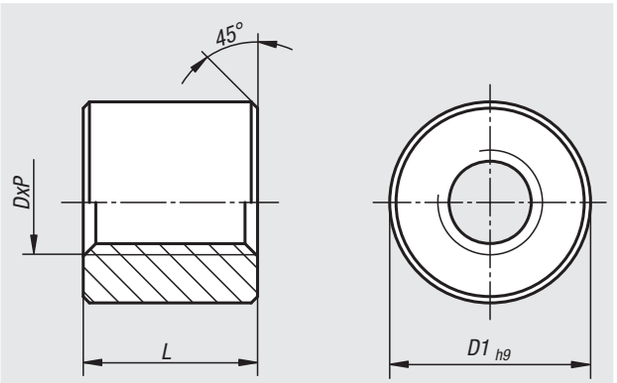
RH thread, single-start

Material:
Gunmetal Rg7

Version:
Bright.

Sample order:
nlm 24003-1003132

Note:
For low and medium speed linear actuators. By inadequate lubrication gunmetal trapezoidal thread nuts have good dry-running properties on steel spindles.



Tolerance class 7H.

Order No.	DxP	D1	L
24003-1003132	Tr 10x3	22	20
24003-1203132	Tr 12x3	26	24
24003-1604132	Tr 16x4	36	32
24003-2004132	Tr 20x4	45	40
24003-2405132	Tr 24x5	50	48
24003-2605132	Tr 26x5	60	52
24003-3006132	Tr 30x6	60	60

24005

Trapezoidal thread flange nuts

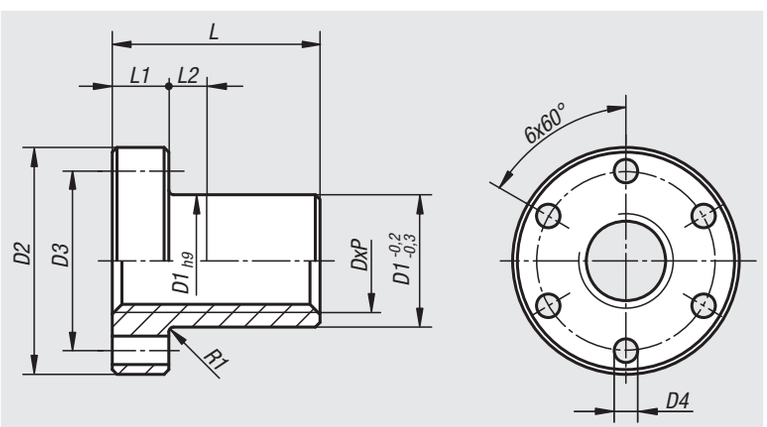
RH thread, single-start

Material:
Gunmetal Rg7

Version:
Bright.

Sample order:
nlm 24005-160411

Note:
For low and medium speed linear actuators. By inadequate lubrication gunmetal trapezoidal thread nuts have good dry-running properties on steel spindles.



Tolerance class 7H.

Order No.	DxP	D1	D2	D3	D4	L	L1	L2
24005-100313	Tr 10x3	25	42	34	5	15	10	5
24005-120313	Tr 12x3	28	48	38	6	18	12	6
24005-160413	Tr 16x4	28	48	38	6	24	12	12
24005-200413	Tr 20x4	32	55	45	7	30	12	8
24005-240513	Tr 24x5	32	55	45	7	36	12	8
24005-260513	Tr 26x5	38	62	50	7	39	14	8
24005-300613	Tr 30x6	38	62	50	7	45	14	8

Technical information for ball screw linear actuators

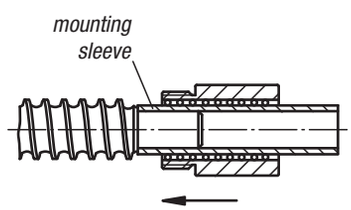
Efficiency and self-locking:
The low rolling friction of ball screw linear actuators give them a mechanical efficiency of up to 95%. Operating duration can be 100%. Due to low rolling friction ball screw linear actuators are not self-locking. A brake mechanism must be installed where self-locking is required (reduction gear or motor brake). This is a must by vertical installations.

Operating temperature:
Ball screw linear actuators can be used with normal loads within a temperature range of -20 to +80 °C. Temporarily up to +110 °C. A prerequisite is constant lubrication.

Lubrication:
Correct lubrication is important for ball screw linear actuators to achieve the calculated lifespan, avoid overheating and guarantee smooth and quiet operation. The same lubricants are used for ball screw linear actuators as those used for roller bearings. They should always be protected from dirt. This is normally carried out by the wiper in the ball screw nut. This wiper also prevents the lubricant seeping out of the ball screw nut.

Installation information:
When ordering ball screw nuts individually, they come mounted on a sleeve. This sleeve must not be removed prior to installation, as the balls could fall out of the ball screw nut. To install (Figure 1), hold the sleeve on the end of the spindle, then slide the nut over the sleeve while simultaneously and without force twisting onto the spindle thread. Now the lubrication should be applied through the hole in the ball screw nut. To avoid damaging the ball screw linear actuator, limit switches and end position dampers should be installed on the machine.

Figure 1



Note:
Ball screw linear actuators consist of a ball screw spindle, a ball screw nut in which the balls are integrated and a ball re-circulator. They are used to convert a rotary motion into a linear motion and vice-versa. They are very accurate and highly efficient.

Manufacturing process:
The rolled threads of ball screw linear actuators are produced by a precision rolling process. The thread on the spindle and nut has a Gothic arch profile. The load angle is 45°. As by precision screw drives, the flank of the spindle nut is ground to give smooth running properties and a long life.

Gradient deviations:

Thread length over	Thread length under	Accuracy class C 3 (µm)	C 5 (µm)	C 7 (µm)	C 10 (µm)
0	315	8	18	±50 / 300 mm	±210 / 300 mm
315	500	10	20		
500	630	12	23		
630	800	13	25		
800	1000	15	27		
1000	1250	16	30		
1250	1600	18	35		
1600	2000	21	40		
2000	2500	24	46		
2500	3150	29	54		
3150	4000	35	65		
4000	5000	41	77		

Axial backlash and preload:
Differentiation is made between a play-afflicted (axial play > 0) and a play-free or preloaded (axial play < 0) ball screw linear actuator. Preloaded nuts have considerably less elastic deformation occurrence than in nuts without preloading. Preloaded nuts are recommended when positioning accuracy under load is required.

Spindle Ø	Axial backlash P0 (mm)	Zero backlash P1 (mm)	Light pre-tensioning P2 single nut loosening torque N
16x5	0,08	0	1 - 3
20x5			1 - 3
25x5			2 - 5
32x5			2 - 5
32x10			3 - 6

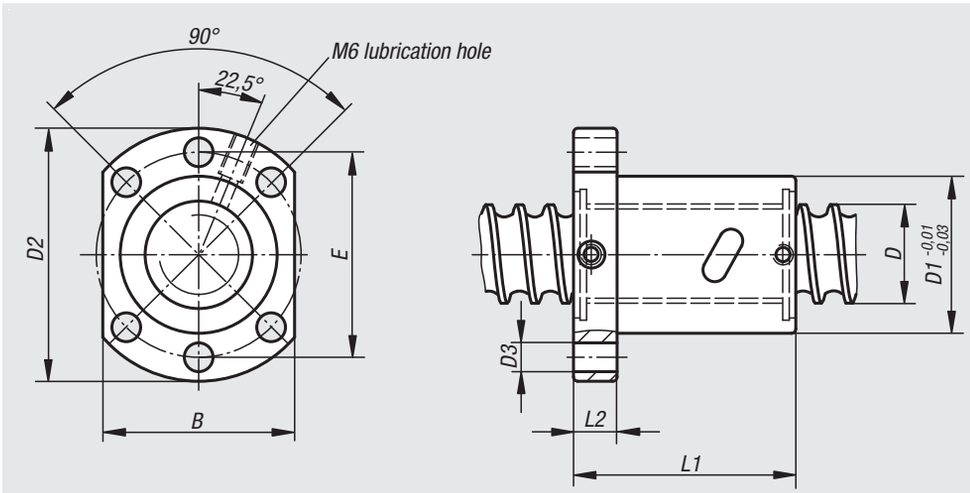
Assessment of the lifespan:
The lifespan can be calculated from the ratio of dynamic load rating and average load.

$$L = \left(\frac{C_{dyn}}{F_m}\right)^3 \cdot 10^6$$

L	=	lifespan in rotations
Cdyn	=	dynamic load rating (N)
Fm	=	average load (N)

Ball screw linear actuators

rolled, with flange nut DIN 69051 Part 5



Material:
Spindle, steel 1.1213.
Nut steel 1.3505.
Wiper plastic.

Version:
Spindle rolled, induction hardened to 62 ±2 HRC and polished.
Nut ground, flank induction hardened to 62 ±2 HRC and polished.

Sample order:
nlm 24055-16052X0600
(include total length L)
For spindle end form a detailed customer drawing is required.

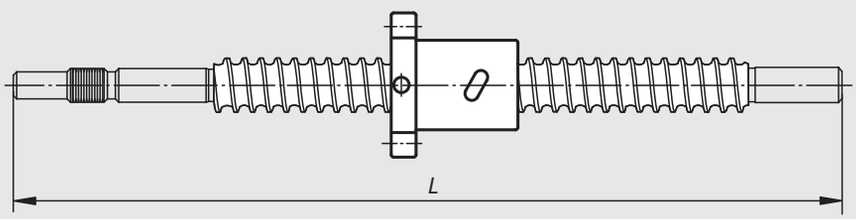
Note:
Ball screw linear actuators with Gothic arch profile and 5 mm or 10 mm pitch. Single-start, right-hand. Ball screw flange nut acc. to DIN 69051 Part 5 with flange.
Manufactured acc. to precision class C7 (tolerance ±50 µ / 300 mm). Without preloading with axial backlash P0 (max. 0.08 mm)

On request:
We can make ball screw spindles to your design from a detailed drawing.
Max. production lengths 5600 mm.

Other precision classes and preloading are available (see technical information).

Attention:
The flange nut must not be removed from the spindle without a mounting aid as the balls will fall out.

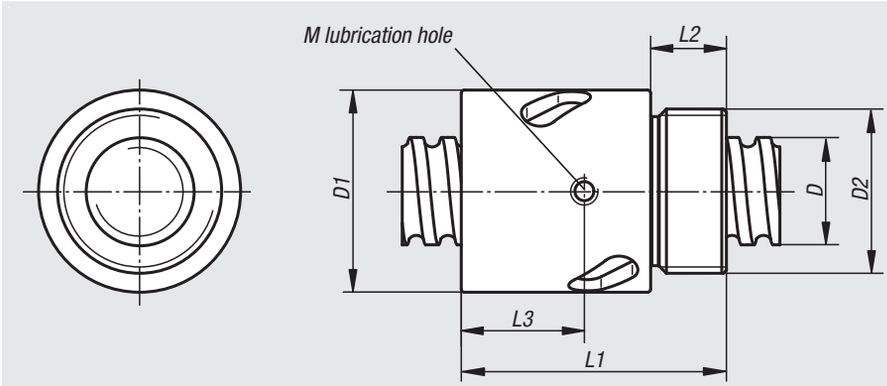
Example of shaft machining:



Order No.	D	D1	Pitch	D2	D3	B	E	L1	L2	Ball-Ø	No. of support circulations	Dynamic load rating N	Static load rating N	Stiffness K (N/µm)
24055-16052X	16	28	5	48	5,5	40	38	50	10	3,175	4	8880	15250	200
24055-20052X	20	36	5	58	6,6	44	47	51	10	3,175	4	9990	19950	250
24055-25052X	25	40	5	62	6,6	48	51	51	10	3,175	4	11190	25810	350
24055-32052X	32	50	5	80	9	62	65	52	12	3,175	4	12640	34030	400
24055-32102X	32	50	10	80	9	62	65	90	12	6,35	4	30930	61020	400

Ball screw linear actuators

rolled, with screw-in cylinder nut



Material:
Spindle steel 1.1213.
Nut steel 1.3505.
Wiper plastic.

Version:
Spindle rolled, induction hardened to 62 ±2 HRC and polished.
Nut ground, flank induction hardened to 62 ±2 HRC and polished.

Sample order:
nlm 24060-16052X0600
(include total length L)
For spindle end form a detailed customer drawing is required.

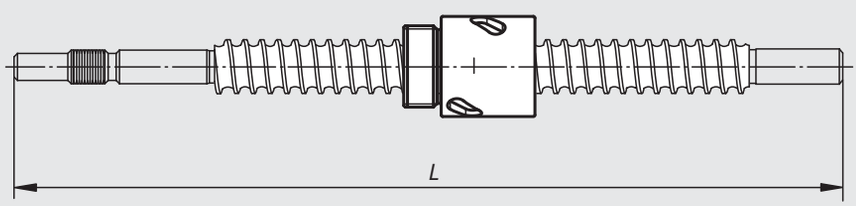
Note:
Ball screw linear actuators with Gothic arch profile and 5 mm or 10 mm pitch. Single-start, right-hand.
Ball screw cylinder nut with screw-in thread acc. to ISO 3408 (DIN 69051).
Manufactured acc. to precision class C7 (tolerance ±50 µ / 300 mm). Without preloading with axial backlash P0 (max. 0.08 mm).

On request:
We can make ball screw spindles to your design from a detailed drawing.
Max. production lengths 5600 mm.

Other precision classes and preloading are available (see technical information).

Attention:
The nut must not be removed from the spindle without a mounting aid as the balls will fall out.

Example of shaft machining:



Order No.	D	Pitch	D1	D2	L1	L2	L3	M	Ball-Ø	No. of support circulations	Dynamic load rating N	Static load rating N	Stiffness K (N/µm)
24060-16052X	16	5	32,5	M26x1,5	42	12	-	-	3,175	4	8880	15250	200
24060-20052X	20	5	38	M35x1,5	45	15	-	-	3,175	4	9990	19950	250
24060-25052X	25	5	43	M40x1,5	69	19	32	M6	3,175	4	11190	25810	350

Housings

for flange nuts

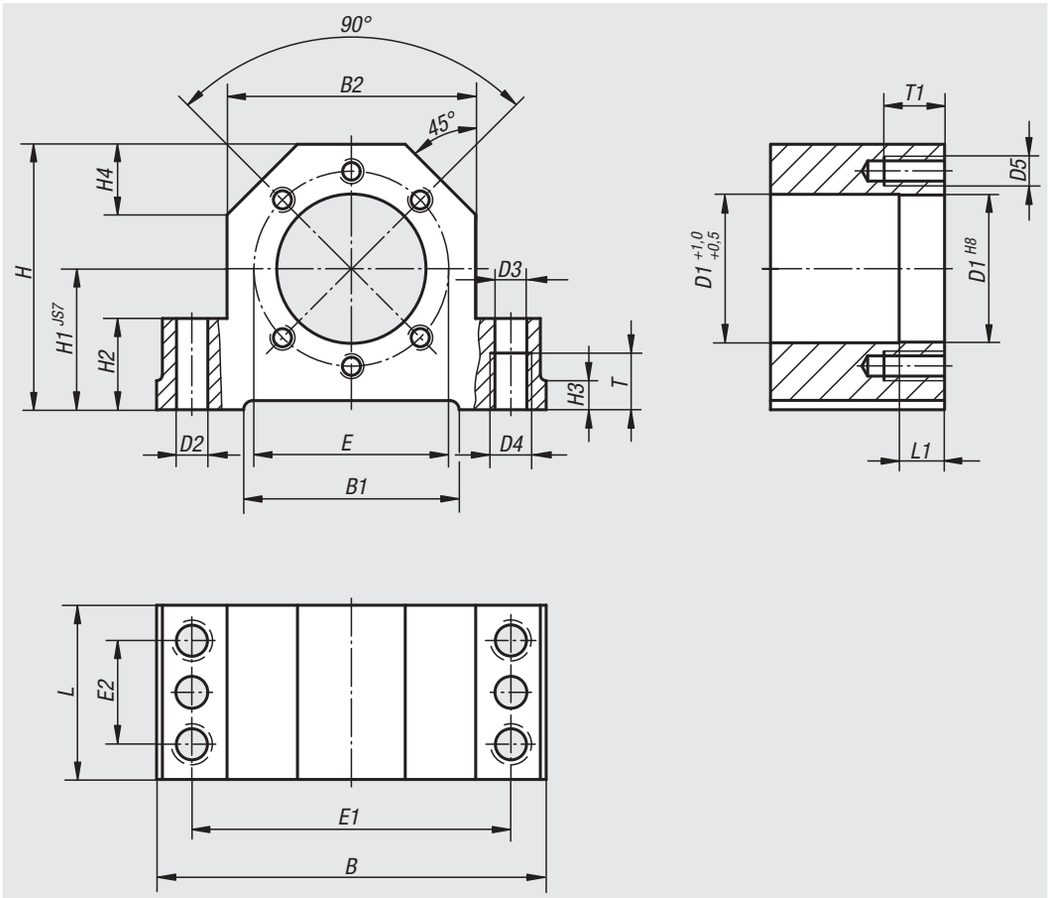
Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 24070-016

Note:
The housings are suitable for installing flange nuts acc. to DIN 69051 Part 5. The axis height of the spindle bearings is matched to the fixed bearing units 24072 and floating bearing units 24074. The housings can be screwed on from above or below and pinned with two taper pins or cylindrical pins.

Supplied with 6 fastening screws grade 8.8.



Ball-type linear drive with flange nut installed in a housing

Order No.	Suitable for spindel-Ø	B	B1	B2	D1	D2	D3	D4	D5	E	E1	E2	H	H1	H2	H3	H4	L	L1	T	T1
24070-016	16	86	50	52	28	7,7	8,4	M10	M5	38	68	23	58	32	22	7	15	42	10	15	12
24070-020	20	94	58	60	36	7,7	8,4	M10	M6	47	77	25	64	34	22	7	17	46	16	15	15
24070-025	25	108	63	66	40	9,7	10,5	M12	M6	51	88	29	72	39	27	10	19	46	16	18	15
24070-032	32	112	70	72	50	9,7	10,5	M12	M8	65	92	29	82	42	27	10	19	49	16	18	20

Fixed bearing units

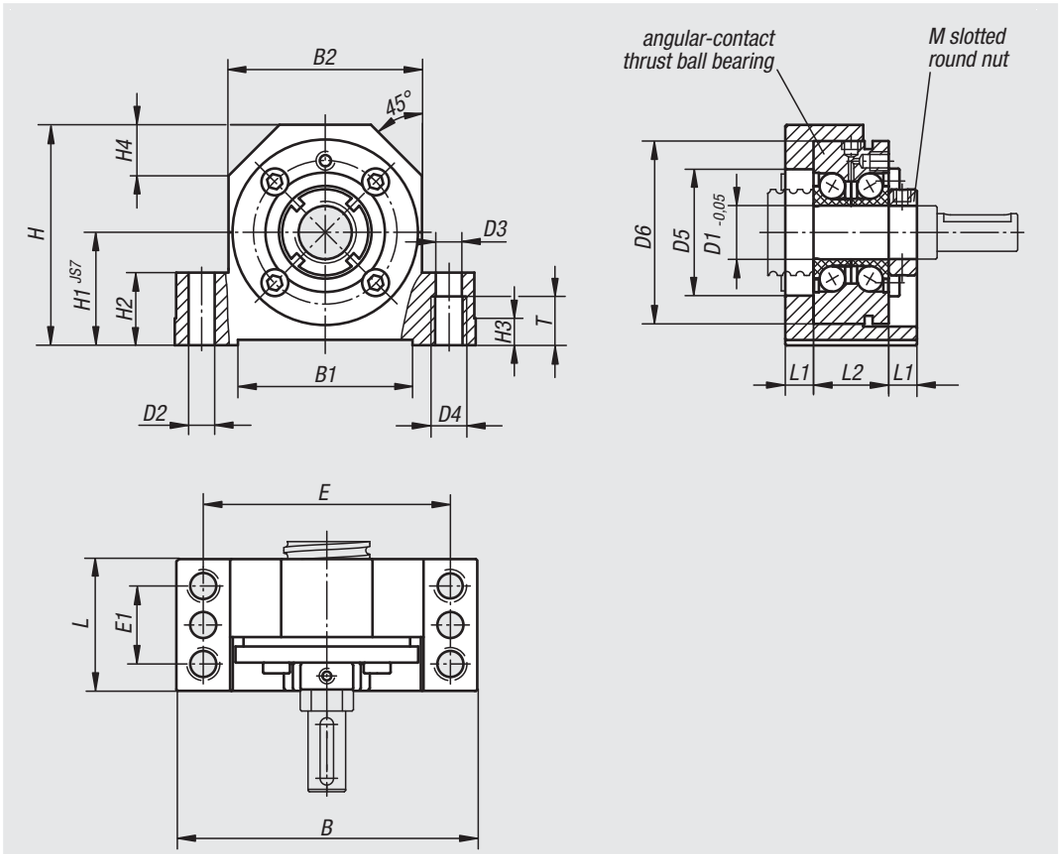
Material:
Housing steel.

Version:
Housing black oxidised.

Sample order:
nlm 24072-010

Note:
The axis height of the spindle bearings is matched to the floating bearing units 24074 and the housings for flange nuts 24070. The housings may be screwed on from above or below and pinned with two taper pins or cylindrical pins. Reference faces on both sides ease unit alignment.

Ready to install fixed bearing units with double row preloaded high-accuracy bearings and a 60° thrust angle. They accept both radial and axial forces from both directions and, due to preloading provide for highest rigidity, concentricity, precise tool positioning and repeatability.



Order No.	Suitable for spindel-Ø	B	B1	B2	D1	D2	D3	D4	D5	D6	E	E1	H	H1	H2	H3	H4	L	L1	L2	M	T
24072-010	16	86	50	52	10	7,7	8,4	M10	32	50	68	23	58	32	22	7	15	37	8,5	20	M10x1	15
24072-012	20	94	58	60	12	7,7	8,4	M10	32	55	77	25	64	34	22	7	17	42	8,5	25	M12x1	15
24072-015	20	108	63	66	15	9,7	10,5	M12	32	60	88	29	72	39	27	10	19	46	10,5	25	M15x1	18
24072-017	25	108	63	66	17	9,7	10,5	M12	36	62	88	29	72	39	27	10	19	46	10,5	25	M17x1	18
24072-020	32	112	70	72	20	9,7	10,5	M12	43	68	92	29	78	42	27	10	20	49	10,5	28	M20x1	18

Order No.	Dynamic load rating N	Static load rating N	Stiffness K (N/µm)
24072-010	13400	18800	325
24072-012	16900	24700	375
24072-015	17900	28000	400
24072-017	18800	31000	450
24072-020	26000	47000	650

Floating bearing units

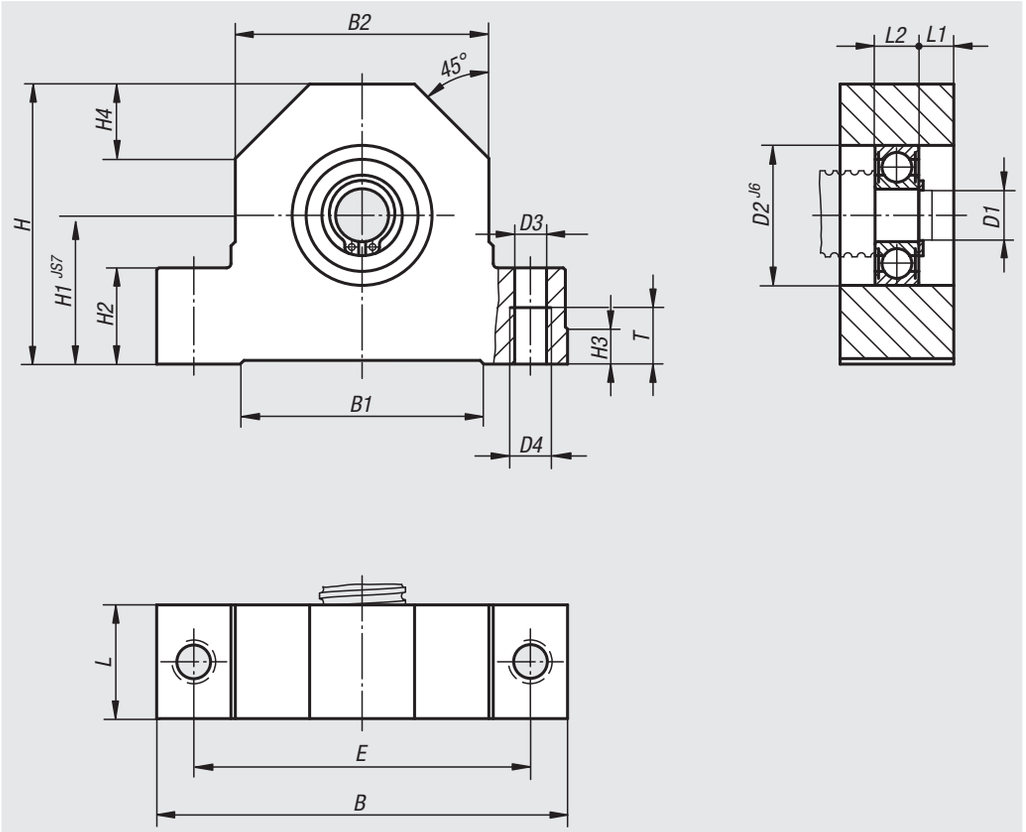
Material:
Housing steel.

Version:
Housing black oxidised.

Sample order:
nlm 24074-010

Note:
The axis height of the spindle bearings is matched to the fixed bearing units 24072 and the housings for flange nuts 24070. The housings may be screwed on from above or below. Reference faces on both sides ease unit alignment.

Ready to install floating bearing units with deep groove ball bearings.



Order No.	Suitable for spindel-Ø	B	B1	B2	D1	D2	D3	D4	E	H	H1	H2	H3	H4	L	L1	L2	T
24074-010	16	86	50	52	10	30	8,4	M10	68	58	32	22	7	15	24	7,5	9	15
24074-012	20	94	58	60	12	32	8,4	M10	77	64	34	22	7	17	26	8	10	15
24074-015	20	108	63	66	15	35	10,5	M12	88	72	39	27	10	19	28	8	12	18
24074-017	25	108	63	66	17	35	10,5	M12	88	72	39	27	10	19	28	8	12	18
24074-020	32	112	70	72	20	47	10,5	M12	92	78	42	27	10	20	34	10	14	18

Fixed bearing units

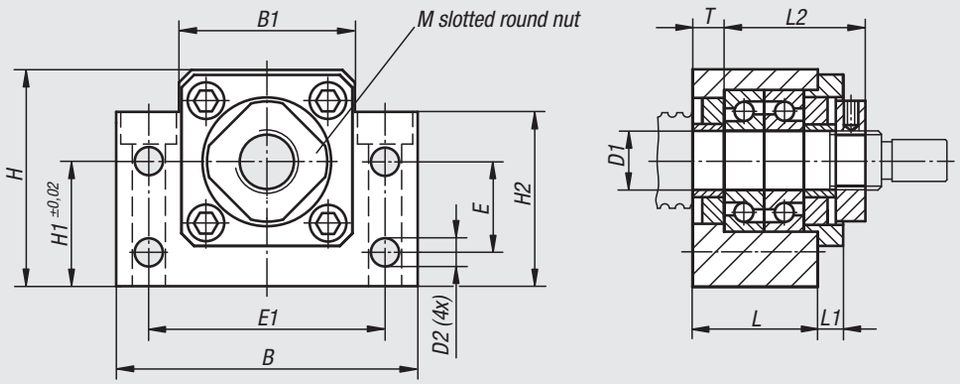
block version

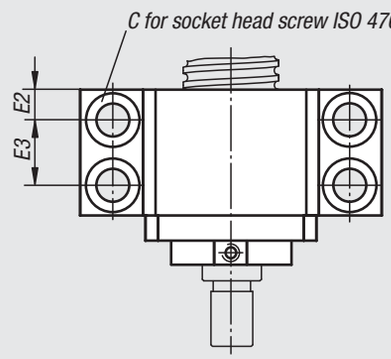
Material:
Housing steel.

Version:
Housing black oxidised.

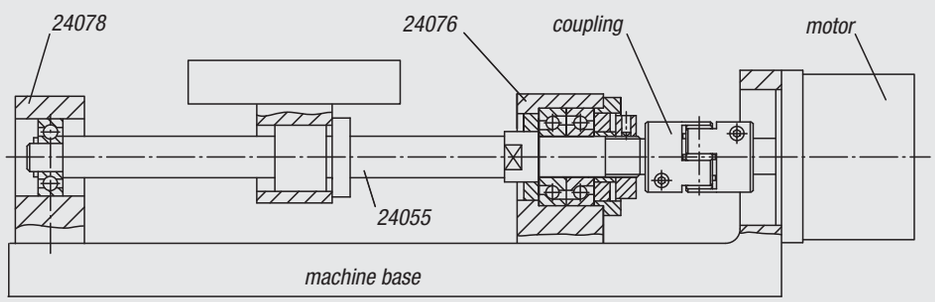
Sample order:
nlm 24076-010

Note:
The axis height of the spindle bearings is matched to the floating bearing unit 24078. The fixed bearing units are composed of a housing with 2 angular contact thrust ball bearings with seals. Preloaded by a an initial flange. With backstops and a locknut.





Assembly of a bearing unit in a module-type version



Order No.	Size	B	B1	C	D1	D2	E	E1	E2	E3	H	H1	H2	L	L1	L2	M	T
24076-010	10	60	34	M6	10	5,5	15	46	6	13	39	22	32,5	25	5	29	M10x1	5
24076-012	12	60	35	M6	12	5,5	18	46	6	13	43	25	35	25	5	29	M12x1	5
24076-015	15	70	40	M6	15	5,5	18	54	6	15	48	28	38	27	9	32	M15x1	6
24076-017	17	86	50	M8	17	6,6	28	68	8	19	64	39	55	35	8	44	M17x1	7
24076-020	20	88	52	M8	20	6,6	22	70	8	19	60	34	50	35	8	43	M20x1	8

Order No.	Dynamic load rating N	Static load rating N	Stiffness K (N/µm)
24076-010	6500	2800	95
24076-012	7000	3100	102
24076-015	7500	3500	114
24076-017	13000	5900	120
24076-020	16100	8400	145

Floating bearing units

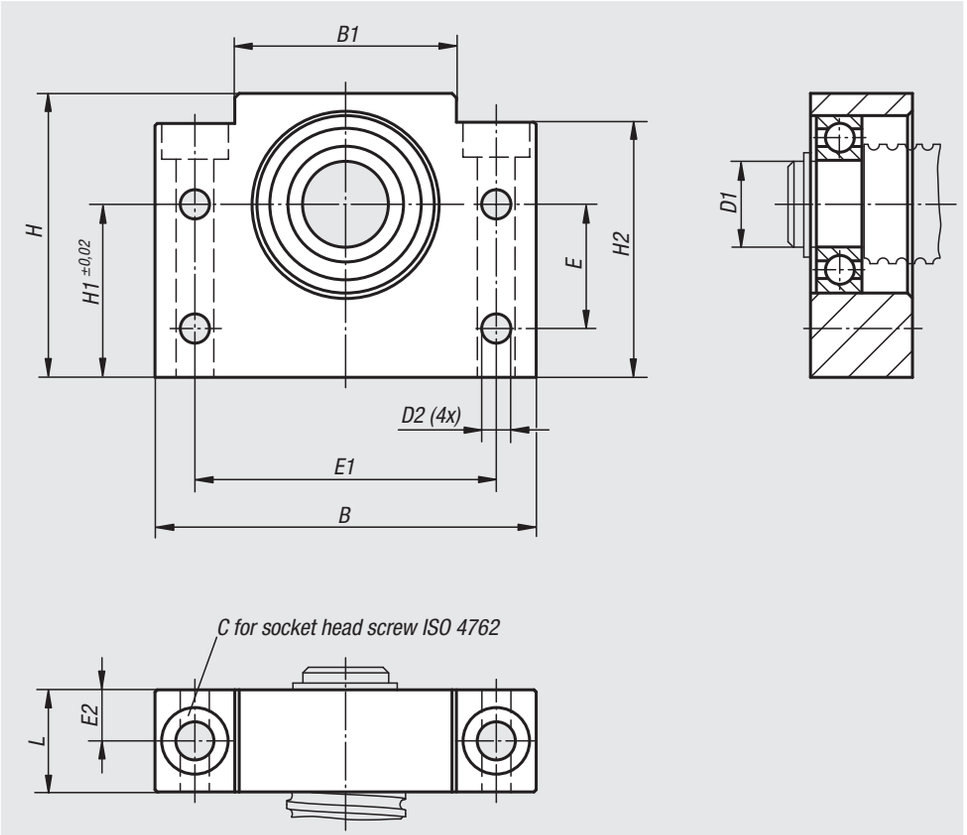
block version

Material:
Housing steel.

Version:
Housing black oxidised.

Sample order:
nlm 24078-010

Note:
The axis height of the spindle bearings is matched with the fixed bearing unit 24076. The floating bearing units consist of a housing with deep grooved ball bearing which adapts axially to the linear expansion of the spindle.



Order No.	Size	B	B1	C	D1	D2	E	E1	E2	H	H1	H2	L
24078-010	10	60	34	M6	8	5,5	15	46	10	39	22	32,5	20
24078-012	12	60	34	M6	10	5,5	18	46	10	43	25	35	20
24078-015	15	70	40	M6	15	5,5	18	54	10	48	28	38	20
24078-017	17	86	50	M8	17	6,6	28	68	11,5	64	39	55	23
24078-020	20	88	52	M8	20	6,6	22	70	13	60	34	50	26

Order No.	Dynamic load rating N	Static load rating N
24078-010	3250	1400
24078-012	4550	1960
24078-015	5600	2840
24078-017	9500	4750
24078-020	9300	5000

Fixed bearing units

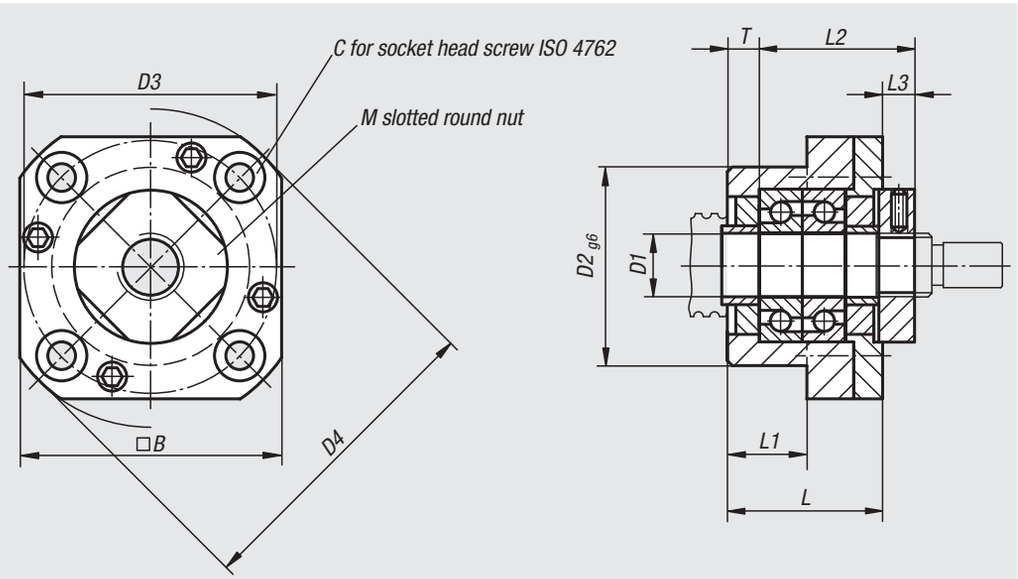
flange version

Material:
Housing steel.

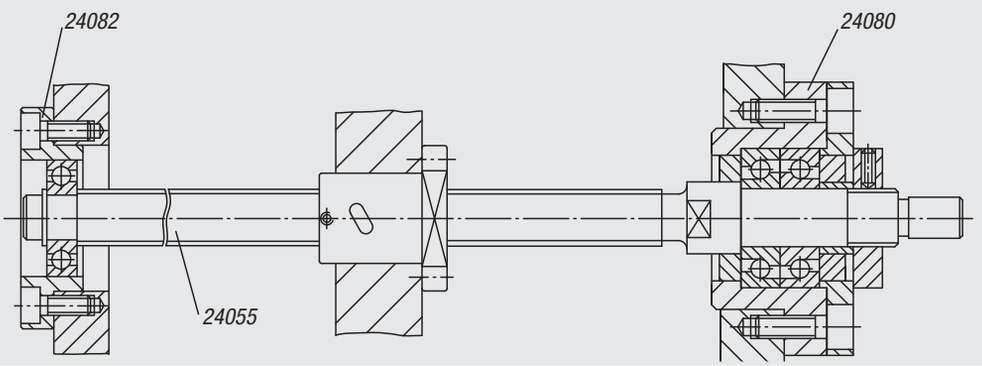
Version:
Housing black oxidised.

Sample order:
nlm 24080-010

Note:
The fixed bearing unit is matched to the floating bearing unit 24082. The fixed bearing units are composed of a housing with 2 angular contact thrust ball bearings and seals. Preloaded with an initial flange. With backstops and a locknut.



Bearing units attached externally



Order No.	Size	B	C	D1	D2	D3	D4	L	L1	L2	L3	M	T
24080-010	10	42	M4	10	34	42	52	27	17	29,5	7,5	M10x1	5
24080-012	12	44	M4	12	36	44	54	27	17	29,5	7,5	M12x1	5
24080-015	15	52	M5	15	40	50	63	32	17	36	8	M15x1	6
24080-020	20	68	M6	20	57	70	85	52	30	50	10	M20x1	10

Order No.	Dynamic load rating N	Static load rating N	Stiffness K (N/µm)
24080-010	6500	2800	95
24080-012	7000	3100	102
24080-015	7500	3500	114
24080-020	17500	8400	145

Floating bearing units

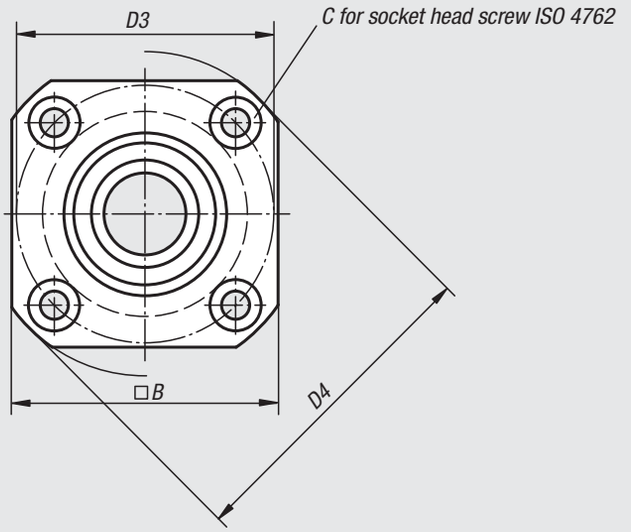
flange version

Material:
Housing steel.

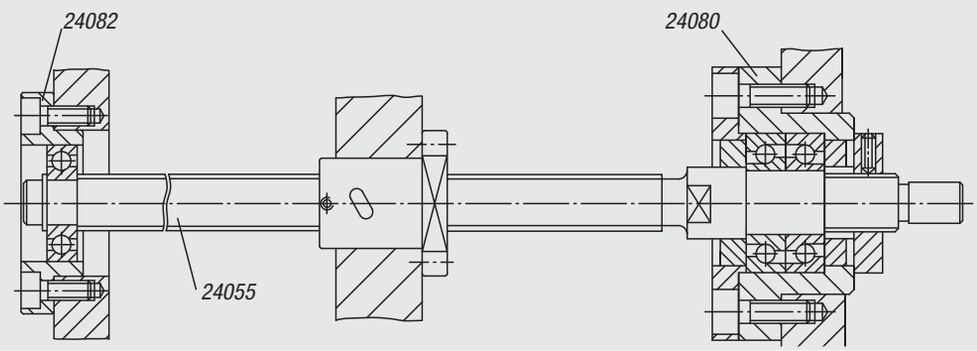
Version:
Housing black oxidised.

Sample order:
nlm 24082-010

Note:
The floating bearing unit is matched with the fixed bearing unit 24080. The floating bearing units consist of a housing with deep groove ball bearing which adapts axially to the linear expansion of the spindle.



Floating bearing attached externally, fixed bearing attached internally

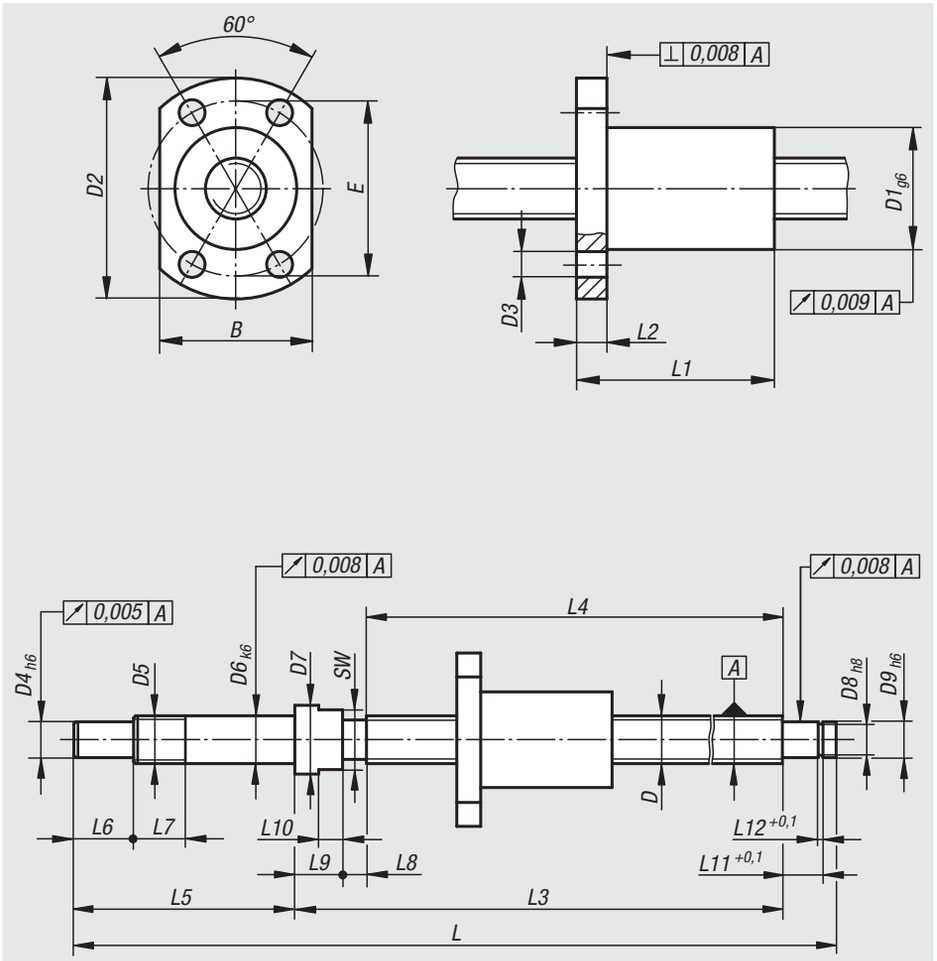


Order No.	Size	B	C	D1	D2	D3	D4	L	L1
24082-010	10	35	M3	8	28	35	43	12	5
24082-012	12	42	M4	10	34	42	52	15	8
24082-015	15	52	M5	15	40	50	63	17	8
24082-020	20	68	M6	20	57	70	85	20	9

Order No.	Dynamic load rating N	Static load rating N
24082-010	3250	1400
24082-012	4550	1960
24082-015	5600	2840
24082-020	9300	5000

Miniature ball screw linear actuators

ground, with flange nut



Material:
Spindle steel 1.1213.
Nut steel 1.3505.

Version:
Spindle and nut ground, induction hardened to 62 ±2 HRC and polished.

Sample order:
nlm 24100-0810050

Note:
Miniature ball screw linear actuators with machined shaft ends and flange nuts. Supplied with oil coating. Re-lubrication is recommended.

Produced acc. to precision class C5. Without preloading with backlash (max. 0.008 mm).

Precision spindles for use in optics, the food industry, automation, medical technology, the defence industry, aeronautics and precision tool technology.

Attention:
The flange nut must not be removed from the spindle, otherwise the balls fall out.

Miniature ball screw linear actuators

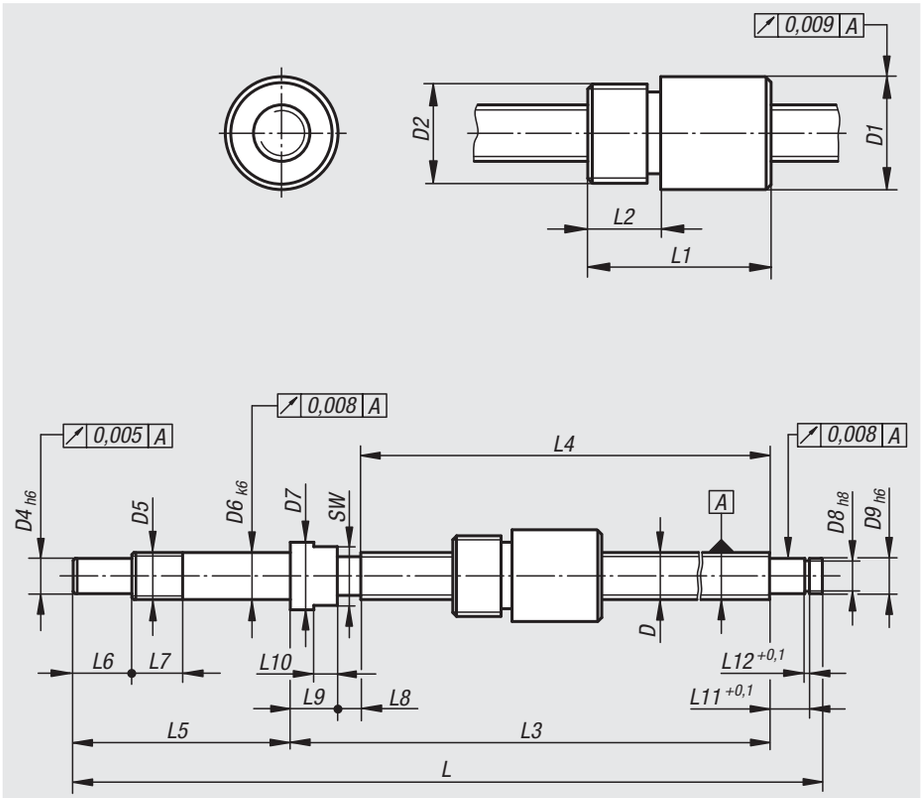
ground, with flange nut

Order No.	D	Pitch	Travel	B	D1	D2	D3	D4	D5	D6	D7	D8	D9	E	L	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12
24100-0810050	8	1	50	18	14	27	3,4	6	M8x1	8	11,5	5,7	6	21	148	16	4	102	90	37	10	9	4	8	4	6,8	0,8
24100-0810100	8	1	100	18	14	27	3,4	6	M8x1	8	11,5	5,7	6	21	198	16	4	152	140	37	10	9	4	8	4	6,8	0,8
24100-0810150	8	1	150	18	14	27	3,4	6	M8x1	8	11,5	5,7	6	21	248	16	4	202	190	37	10	9	4	8	4	6,8	0,8
24100-0820050	8	2	50	20	16	29	3,4	6	M8x1	8	11,5	5,7	6	23	148	26	4	102	90	37	10	9	4	8	4	6,8	0,8
24100-0820100	8	2	100	20	16	29	3,4	6	M8x1	8	11,5	5,7	6	23	198	26	4	152	140	37	10	9	4	8	4	6,8	0,8
24100-0820150	8	2	150	20	16	29	3,4	6	M8x1	8	11,5	5,7	6	23	248	26	4	202	190	37	10	9	4	8	4	6,8	0,8
24100-1020050	10	2	50	22	18	35	4,5	6	M8x1	8	11,5	5,7	6	27	158	28	5	112	100	37	10	9	4	8	4	6,8	0,8
24100-1020100	10	2	100	22	18	35	4,5	6	M8x1	8	11,5	5,7	6	27	208	28	5	162	150	37	10	9	4	8	4	6,8	0,8
24100-1020150	10	2	150	22	18	35	4,5	6	M8x1	8	11,5	5,7	6	27	258	28	5	212	200	37	10	9	4	8	4	6,8	0,8
24100-1020200	10	2	200	22	18	35	4,5	6	M8x1	8	11,5	5,7	6	27	308	28	5	262	250	37	10	9	4	8	4	6,8	0,8
24100-1220050	12	2	50	24	20	37	4,5	8	M10x1	10	14	7,6	8	29	180	28	5	125	110	45	15	10	5	10	5	7,9	0,9
24100-1220100	12	2	100	24	20	37	4,5	8	M10x1	10	14	7,6	8	29	230	28	5	175	160	45	15	10	5	10	5	7,9	0,9
24100-1220150	12	2	150	24	20	37	4,5	8	M10x1	10	14	7,6	8	29	280	28	5	225	210	45	15	10	5	10	5	7,9	0,9
24100-1220200	12	2	200	24	20	37	4,5	8	M10x1	10	14	7,6	8	29	330	28	5	275	260	45	15	10	5	10	5	7,9	0,9
24100-1220250	12	2	250	24	20	37	4,5	8	M10x1	10	14	7,6	8	29	380	28	5	325	310	45	15	10	5	10	5	7,9	0,9

Order No.	SW	No. of support circulations	Pitch angle	Ball-Ø	Dynamic load rating N	Static load rating N	max. speed U/min
24100-0810050	10	1 x 3	2° 13‘	0,8	700	1300	3200
24100-0810100	10	1 x 3	2° 13‘	0,8	700	1300	3200
24100-0810150	10	1 x 3	2° 13‘	0,8	700	1300	3200
24100-0820050	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24100-0820100	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24100-0820150	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24100-1020050	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24100-1020100	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24100-1020150	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24100-1020200	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24100-1220050	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24100-1220100	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24100-1220150	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24100-1220200	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24100-1220250	12	1 x 3	2° 58‘	1,6	1700	3700	3400

Miniature ball screw linear actuators

ground, with screw-in cylinder nut



Material:
Spindle steel 1.1213.
Nut steel 1.3505.

Version:
Spindle and nut ground, induction hardened to 62 ± 2 HRC and polished.

Sample order:
nlm 24105-0810050

Note:
Miniature ball screw linear actuators with machined shaft ends and screw-on barrel nut. Supplier with oil coating. Re-lubrication is recommended.

Produced acc. to precision class C5. Without preloading with backlash (max. 0.008 mm).

Precision spindles for use in optics, the food industry, automation, medical technology, the defence industry, aeronautics and precision tool technology.

Attention:
The screw-in cylinder nut must not be removed from the spindle, otherwise the balls fall out.

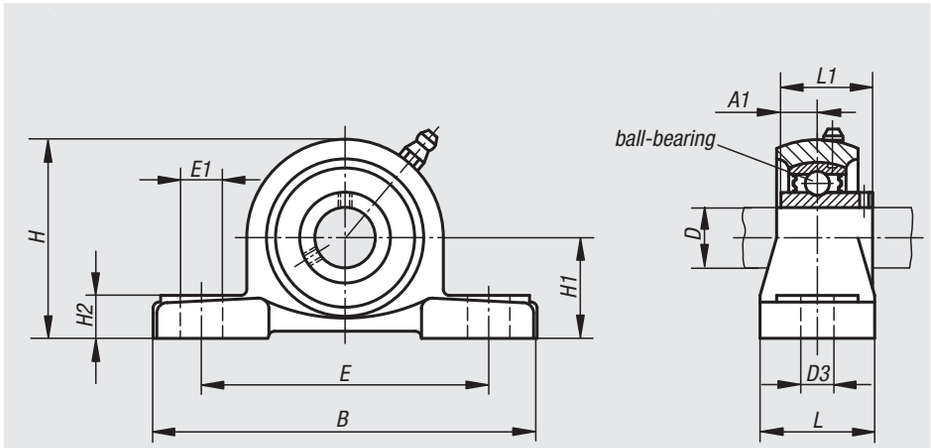
Miniature ball screw linear actuators

ground, with screw-in cylinder nut

Order No.	D	Pitch	Travel	D1	D2	D4	D5	D6	D7	D8	D9	L	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12
24105-0810050	8	1	50	16	M14x1	6	M8x1	8	11,5	5,7	6	148	22	8	102	90	37	10	9	4	8	4	6,8	0,8
24105-0810100	8	1	100	16	M14x1	6	M8x1	8	11,5	5,7	6	198	22	8	152	140	37	10	9	4	8	4	6,8	0,8
24105-0810150	8	1	150	16	M14x1	6	M8x1	8	11,5	5,7	6	248	22	8	202	190	37	10	9	4	8	4	6,8	0,8
24105-0820050	8	2	50	16	M14x1	6	M8x1	8	11,5	5,7	6	148	27	8	102	90	37	10	9	4	8	4	6,8	0,8
24105-0820100	8	2	100	16	M14x1	6	M8x1	8	11,5	5,7	6	198	27	8	152	140	37	10	9	4	8	4	6,8	0,8
24105-0820150	8	2	150	16	M14x1	6	M8x1	8	11,5	5,7	6	248	27	8	202	190	37	10	9	4	8	4	6,8	0,8
24105-1020050	10	2	50	18	M16x1	6	M8x1	8	11,5	5,7	6	158	28,5	7	112	100	37	10	9	4	8	4	6,8	0,8
24105-1020100	10	2	100	18	M16x1	6	M8x1	8	11,5	5,7	6	208	28,5	7	162	150	37	10	9	4	8	4	6,8	0,8
24105-1020150	10	2	150	18	M16x1	6	M8x1	8	11,5	5,7	6	258	28,5	7	212	200	37	10	9	4	8	4	6,8	0,8
24105-1020200	10	2	200	18	M16x1	6	M8x1	8	11,5	5,7	6	308	28,5	7	262	250	37	10	9	4	8	4	6,8	0,8
24105-1220050	12	2	50	20,5	M18x1	8	M10x1	10	14	7,6	8	180	29	10	125	110	45	15	10	5	10	5	7,9	0,9
24105-1220100	12	2	100	20,5	M18x1	8	M10x1	10	14	7,6	8	230	29	10	175	160	45	15	10	5	10	5	7,9	0,9
24105-1220150	12	2	150	20,5	M18x1	8	M10x1	10	14	7,6	8	280	29	10	225	210	45	15	10	5	10	5	7,9	0,9
24105-1220200	12	2	200	20,5	M18x1	8	M10x1	10	14	7,6	8	330	29	10	275	260	45	15	10	5	10	5	7,9	0,9
24105-1220250	12	2	250	20,5	M18x1	8	M10x1	10	14	7,6	8	380	29	10	325	310	45	15	10	5	10	5	7,9	0,9

Order No.	SW	No. of support circulations	Pitch angle	Ball-Ø	Dynamic load rating N	Static load rating N	max. speed U/min
24105-0810050	10	1 x 3	2° 13‘	0,8	700	1300	3200
24105-0810100	10	1 x 3	2° 13‘	0,8	700	1300	3200
24105-0810150	10	1 x 3	2° 13‘	0,8	700	1300	3200
24105-0820050	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24105-0820100	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24105-0820150	10	1 x 3	4° 23‘	1,6	1350	2250	4200
24105-1020050	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24105-1020100	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24105-1020150	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24105-1020200	10	1 x 3	2° 32‘	1,6	1500	2900	4000
24105-1220050	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24105-1220100	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24105-1220150	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24105-1220200	12	1 x 3	2° 58‘	1,6	1700	3700	3400
24105-1220250	12	1 x 3	2° 58‘	1,6	1700	3700	3400

Pillow block bearing pedestal type UCP



Material:
Housing, grey cast iron.
Bearing, ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Housing, painted.

Sample order:
nlm 24200-12201

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

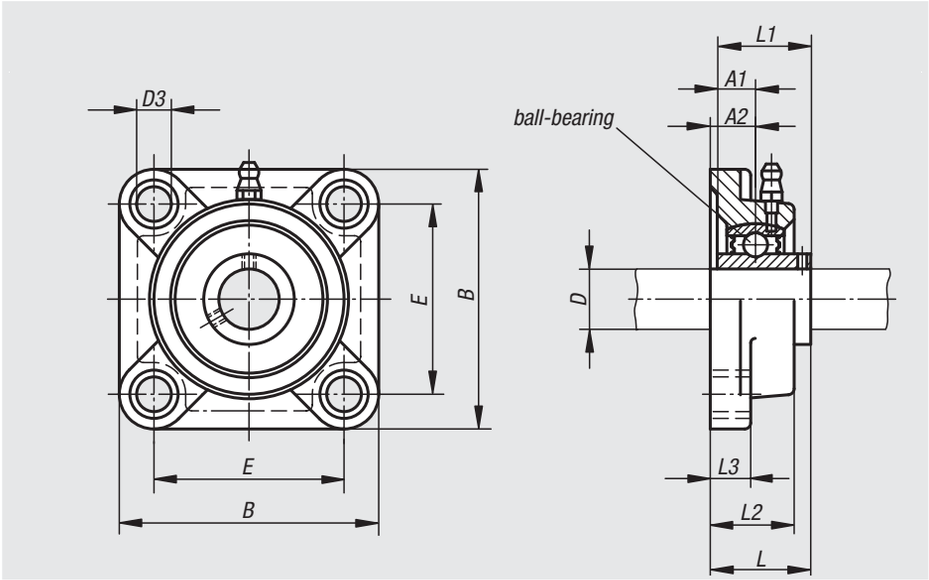
In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	B	D3	E	E1	H	H1	H2	L	L1	α	Fastening screw
24200-12201	UC 201	P 201	12	12,7	127	13	95	19	65	30,2	14	38	31	10°	M10
24200-15202	UC 202	P 202	15	12,7	127	13	95	19	65	30,2	14	38	31	10°	M10
24200-17203	UC 203	P 203	17	12,7	127	13	95	19	65	30,2	14	38	31	10°	M10
24200-20204	UC 204	P 204	20	12,7	127	13	95	19	65	33,3	14	38	31	10°	M10
24200-25205	UC 205	P 205	25	14,3	140	13	105	19	71	36,5	15	38	34	10°	M10
24200-30206	UC 206	P 206	30	15,9	165	17	121	20	84	42,9	17	44	38,1	10°	M14
24200-35207	UC 207	P 207	35	17,5	167	17	127	20	93	47,6	18	48	42,9	10°	M14
24200-40208	UC 208	P 208	40	19	184	17	137	20	100	49,2	18	54	49,2	10°	M14
24200-45209	UC 209	P 209	45	19	190	17	146	20	106	54	20	54	49,2	10°	M14
24200-50210	UC 210	P 210	50	19	206	20	159	23	113	57,2	21	60	51,6	10°	M16
24200-55211	UC 211	P 211	55	22,2	219	20	171	23	125	63,5	23	60	55,6	10°	M16
24200-60212	UC 212	P 212	60	25,4	241	20	184	23	138	69,8	25	70	65,1	10°	M16

Pillow block bearing flange type UCF



Material:
Housing, grey cast iron.
Bearing, ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Housing, painted.

Sample order:
nlm 24210-12201

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

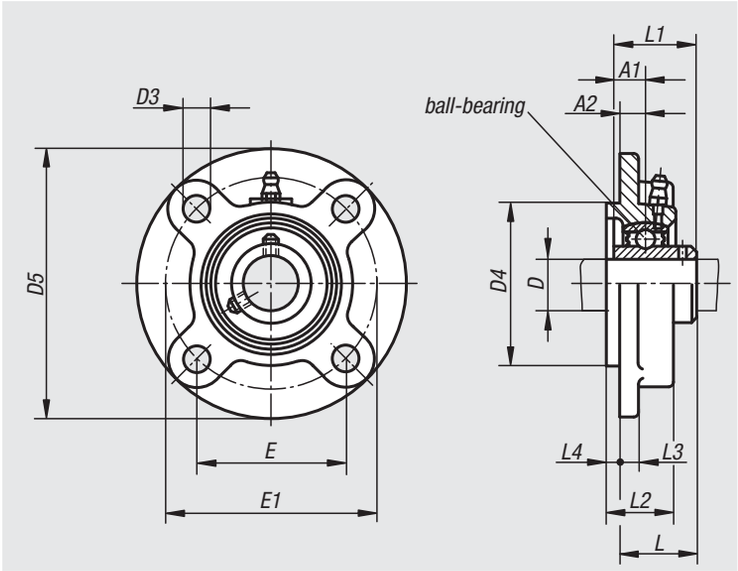
All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	A2	B	D3	E	L	L1	L2	L3	α	Fastening screw
24210-12201	UC 201	F 201	12	12,7	15	86	12	64	33,3	31	25,5	12	10°	M10
24210-15202	UC 202	F 202	15	12,7	15	86	12	64	33,3	31	25,5	12	10°	M10
24210-17203	UC 203	F 203	17	12,7	15	86	12	64	33,3	31	25,5	12	10°	M10
24210-20204	UC 204	F 204	20	12,7	15	86	12	64	33,3	31	25,5	12	10°	M10
24210-25205	UC 205	F 205	25	14,3	16	95	12	70	35,8	34	27	14	10°	M10
24210-30206	UC 206	F 206	30	15,9	18	108	12	83	40,2	38,1	31	14	10°	M10
24210-35207	UC 207	F 207	35	17,5	19	117	14	92	44,4	42,9	34	16	10°	M12
24210-40208	UC 208	F 208	40	19	21	130	16	102	51,2	49,2	36	16	10°	M14
24210-45209	UC 209	F 209	45	19	22	137	16	105	52,2	49,2	38	18	10°	M14
24210-50210	UC 210	F 210	50	19	22	143	16	111	54,6	51,6	40	18	10°	M14
24210-55211	UC 211	F 211	55	22,2	25	162	19	130	58,4	55,6	43	20	10°	M16
24210-60212	UC 212	F 212	60	25,4	29	175	19	143	68,7	65,1	48	20	10°	M16

Pillow block bearing flange type UCFC

with centring hub



Material:
Housing, grey cast iron.
Bearing, ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Housing, painted.

Sample order:
nlm 24212-20204

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

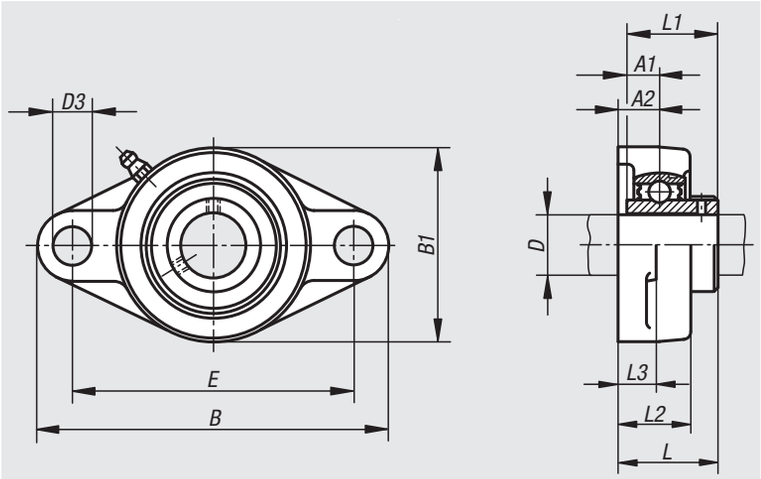
All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	A2	D3	D4	D5	E	E1	L	L1	L2	L3	L4	α	Fastening screw
24212-20204	UC 204	FC 204	20	12,7	10	12	62	100	55,1	78	28,3	31	20,5	7	5	10°	M10
24212-25205	UC 205	FC 205	25	14,3	10	12	70	115	63,6	90	29,8	34	21	7	6	10°	M10
24212-30206	UC 206	FC 206	30	15,9	10	12	80	125	70,7	100	32,2	38,1	23	8	8	10°	M10
24212-35207	UC 207	FC 207	35	17,5	11	14	90	135	77,8	110	36,4	42,9	26	9	8	10°	M12
24212-40208	UC 208	FC 208	40	19	11	14	100	145	84,8	120	41,2	49,2	26	9	10	10°	M12
24212-45209	UC 209	FC 209	45	19	10	16	105	160	93,3	132	40,2	49,2	26	14	12	10°	M14
24212-50210	UC 210	FC 210	50	19	10	16	110	165	97,6	138	42,6	51,6	28	14	12	10°	M14
24212-55211	UC 211	FC 211	55	22,2	13	19	125	185	106,1	150	46,4	55,6	31	15	12	10°	M16
24212-60212	UC 212	FC 212	60	25,4	17	19	135	195	113,1	160	56,7	65,1	36	15	12	10°	M16

Pillow block bearing flange type UCFL

2-hole



Material:
Housing, grey cast iron.
Bearing, ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Housing, painted.

Sample order:
nlm 24215-12201

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

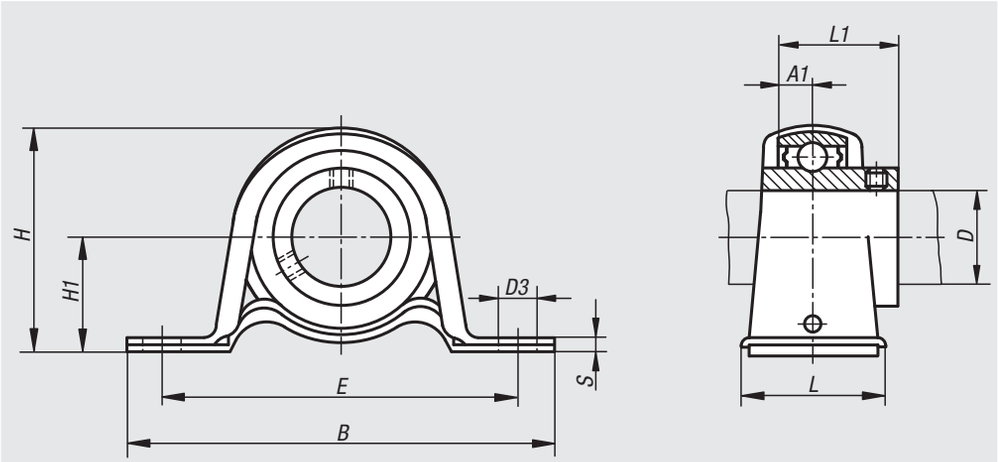
In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	A2	B	B1	D3	E	L	L1	L2	L3	α	Fastening screw
24215-12201	UC 201	FL 201	12	12,7	15	113	60	12	90	33,3	31	25,5	11	10°	M10
24215-15202	UC 202	FL 202	15	12,7	15	113	60	12	90	33,3	31	25,5	11	10°	M10
24215-17203	UC 203	FL 203	17	12,7	15	113	60	12	90	33,3	31	25,5	11	10°	M10
24215-20204	UC 204	FL 204	20	12,7	15	113	60	12	90	33,3	31	25,5	11	10°	M10
24215-25205	UC 205	FL 205	25	14,3	16	130	68	16	99	35,8	34	27	13	10°	M14
24215-30206	UC 206	FL 206	30	15,9	18	148	80	16	117	40,2	38,1	31	13	10°	M14
24215-35207	UC 207	FL 207	35	17,5	19	161	90	16	130	44,4	42,9	34	14	10°	M14
24215-40208	UC 208	FL 208	40	19	21	175	100	16	144	51,2	49,2	36	14	10°	M14
24215-45209	UC 209	FL 209	45	19	22	188	108	19	148	52,2	49,2	38	15	10°	M16
24215-50210	UC 210	FL 210	50	19	22	197	115	19	157	54,6	51,6	40	15	10°	M16
24215-55211	UC 211	FL 211	55	22,2	25	224	130	19	184	58,4	55,6	43	18	10°	M16
24215-60212	UC 212	FL 212	60	25,4	29	250	140	23	202	68,7	65,1	48	18	10°	M20

Pillow block bearing pedestal type BPP



Material:
Housing, steel
Bearing, ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Housing, galvanized.

Sample order:
nlm 24225-12201

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a sheet steel housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

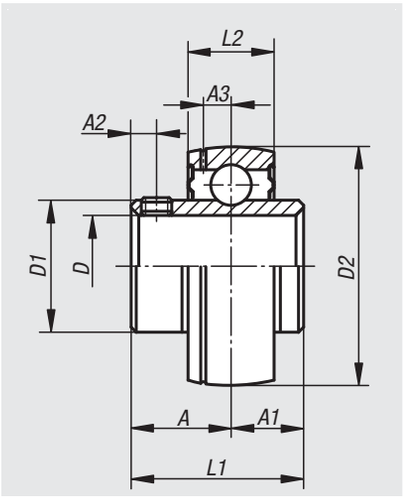
In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication.

Do not exceed the housing load. It is less than the load rating of the bearings.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	B	D3	E	H	H1	L	L1	S	α	Fastening screw	max. static load kN
24225-12201	B 201	PP 201	12	6	86	9,5	68	43,8	22,2	25	22	3,2	10°	M8	2,16
24225-15202	B 202	PP 202	15	6	86	9,5	68	43,8	22,2	25	22	3,2	10°	M8	2,16
24225-17203	B 203	PP 203	17	6	86	9,5	68	43,8	22,2	25	22	3,2	10°	M8	2,16
24225-20204	B 204	PP 204	20	7	98	9,5	76	50,5	25,4	32	25	3,2	10°	M8	2,62
24225-25205	B 205	PP 205	25	7,5	108	11,5	86	56,5	28,6	32	27	4	10°	M10	3,72
24225-30206	B 206	PP 206	30	8	117	11,5	95	66,3	33,3	38	30	4	10°	M10	4,41
24225-35207	B 207	PP 207	35	8,5	129	11,5	106	78	39,7	42	32	4,6	10°	M10	4,9

Insert bearing UC



Material:
Ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Sealed on both sides with a spherical outer ring.
Can be re-lubricated.

Sample order:
nlm 24230-20204

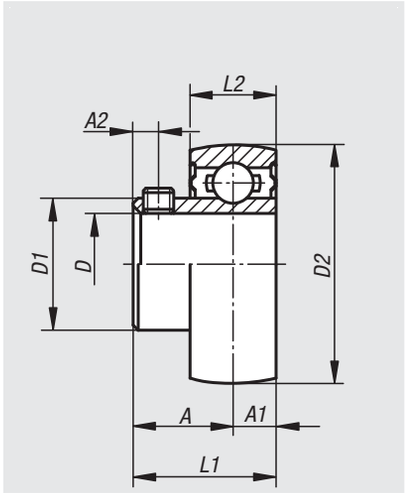
Note:
The internal construction of the insert bearings corresponds to that of standard Series 6200 and 6300 radial ball bearing. However, they have wider inner rings for easier fastening on shafts. The inner rings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by 2 grub screws positioned 120° apart on the inner ring.

The insert bearings are ready to install and are permanently lubricated with a suitable ball bearing grease. In normal applications, re-lubrication is not necessary.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	D	A	A1	A2	A3	D1	D2	L1	L2	Grub screw	Dynamic base loads kN	Static base loads kN
24230-20204	UC 204	20	18,3	12,7	4,8	3,7	29	47	31	17	M6x0,75	9,88	6,2
24230-25205	UC 205	25	19,7	14,3	5	3,9	34	52	34	17	M6x0,75	10,78	6,98
24230-30206	UC 206	30	22,2	15,9	5	5	40,5	62	38,1	19	M6x0,75	14,97	10,04
24230-35207	UC 207	35	25,4	17,5	7	5,7	48	72	42,9	20	M8x1	19,75	13,67
24230-40208	UC 208	40	30,2	19	8	6,2	53	80	49,2	21	M8x1	22,71	15,94
24230-45209	UC 209	45	30,2	19	8	6,4	57,3	85	49,2	22	M8x1	24,36	17,71
24230-50210	UC 210	50	32,6	19	10	6,5	63	90	51,6	24	M10x1,25	26,98	19,84
24230-55211	UC 211	55	33,4	22,2	10	7	70	100	55,6	25	M10x1,25	33,37	25,11
24230-60212	UC 212	60	39,7	25,4	10	7,6	77	110	65,1	27	M10x1,25	36,74	27,97

Insert bearing B



Material:
Ball-bearing steel 100Cr6.
Seal, rubber NBR.

Version:
Sealed on both sides with a spherical outer ring.

Sample order:
nlm 24235-12201

Note:
The internal construction of the insert bearings corresponds to that of standard Series 6200 and 6300 radial ball bearing. However, they have wider inner rings for easier fastening on shafts. The inner rings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by 2 grub screws positioned 120° apart on the inner ring.

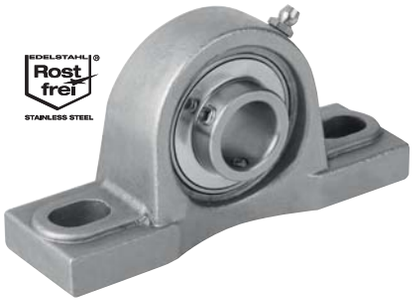
The insert bearings are ready to install and are permanently lubricated with a suitable ball bearing grease.

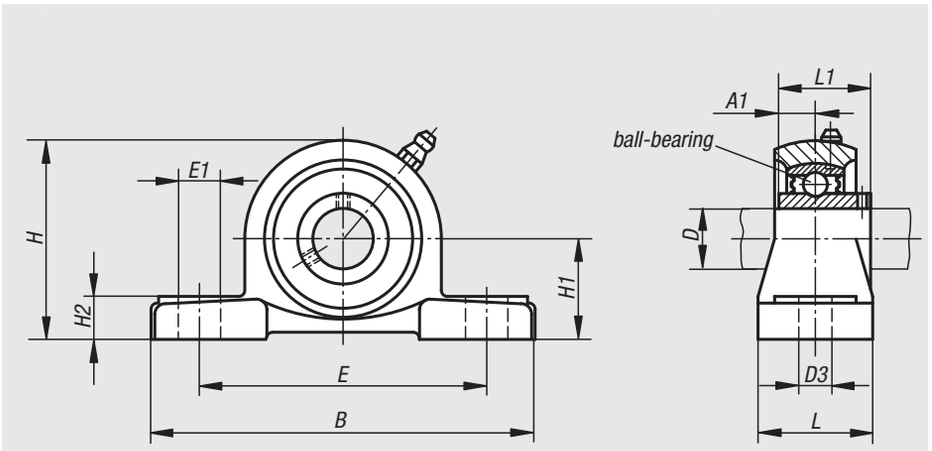
Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	D	A	A1	A2	D1	D2	L1	L2	Grub screw	Dynamic base loads kN	Static base loads kN
24235-12201	B 201	12	16	6	4,5	24,7	40	22	12	M5x0,8	7,36	4,48
24235-15202	B 202	15	16	6	4,5	24,7	40	22	12	M5x0,8	7,36	4,48
24235-17203	B 203	17	16	6	4,5	24,7	40	22	12	M5x0,8	7,36	4,48
24235-20204	B 204	20	18	7	4,5	29	47	25	14	M5x0,8	9,88	6,2
24235-25205	B 205	25	19,5	7,5	5,5	34	52	27	15	M6x0,75	10,78	6,98
24235-30206	B 206	30	22	8	6	40,5	62	30	16	M6x0,75	14,97	10,04
24235-35207	B 207	35	23,5	8,5	6,5	48	72	32	17	M8x1	19,75	13,67

Pillow block bearing pedestal type MUCP

stainless steel





Material:
Housing, stainless steel 1.4301.
Bearing, stainless steel 1.4125.
Seal, rubber NBR.

Version:
Bright.

Sample order:
nlm 24240-20204

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

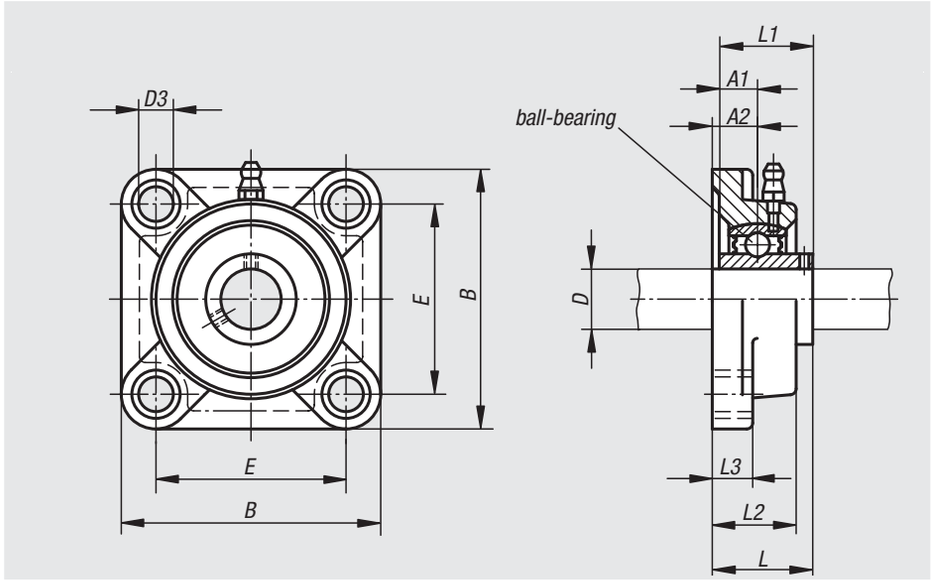
All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	B	D3	E	E1	H	H1	H2	L	L1	α	Fastening screw
24240-20204	MUC 204	P 204	20	12,7	127	13	95	19	64	33,3	15	38	31	10°	M10
24240-25205	MUC 205	P 205	25	14,3	140	13	105	19	70	36,5	16,5	38	34	10°	M10
24240-30206	MUC 206	P 206	30	15,9	165	17	121	21	82	42,9	18	48	38,1	10°	M12
24240-35207	MUC 207	P 207	35	17,5	167	17	127	21	92	47,6	19	53	42,9	10°	M12
24240-40208	MUC 208	P 208	40	19	184	17	137	22	99	49,2	19	53	49,2	10°	M12
24240-45209	MUC 209	P 209	45	19	190	17	146	22	108	54	20	53	49,2	10°	M12
24240-50210	MUC 210	P 210	50	19	206	20	159	25	112	57,2	22	60	51,6	10°	M16

Pillow block bearing flange type MUCF

stainless steel



Material:
Housing, stainless steel 1.4301.
Bearing, stainless steel 1.4125.
Seal, rubber NBR.

Version:
Bright.

Sample order:
nlm 24242-20204

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

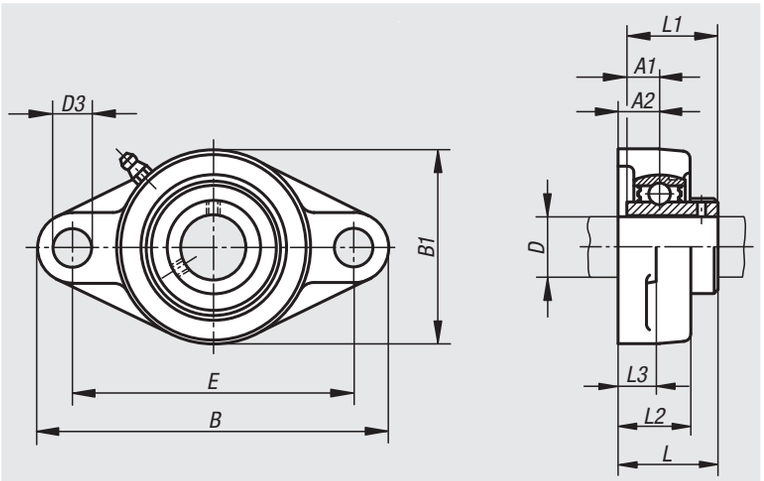
All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	A2	B	D3	E	L	L1	L2	L3	Fastening screw
24242-20204	MUC 204	F 204	20	12,7	15	86	12	64	33,3	31	25,5	12	M10
24242-25205	MUC 205	F 205	25	14,3	16	95	12	70	35,8	34	27	14,3	M10
24242-30206	MUC 206	F 206	30	15,9	18	108	12	83	40,2	38,1	31	14	M10
24242-35207	MUC 207	F 207	35	17,5	19	117	14	92	44,4	42,9	34	15,9	M14
24242-40208	MUC 208	F 208	40	19	21	130	16	102	51,2	49,2	36	15,9	M14
24242-45209	MUC 209	F 209	45	19	22	137	16	105	52,2	49,2	38	16,7	M14
24242-50210	MUC 210	F 210	50	19	22	143	16	111	54,6	51,6	40	15,9	M16

Pillow block bearing flange type MUCF

2-hole stainless steel



Material:
Housing, stainless steel 1.4301.
Bearing, stainless steel 1.4125.
Seal, rubber NBR.

Version:
Bright.

Sample order:
nlm 24244-20204

Note:
Pillow block bearings consist of a sealed single-row ball bearing with a spherical outer ring which is mounted in a housing. Because of the spherical outer surface of the bearing, shaft misalignment can be compensated for. The bearings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by grub screws on the inner ring.

In normal applications, pillow block bearings are maintenance-free due to the lifetime lubrication. In difficult environmental conditions re-lubrication can be carried out over the grease nipple.

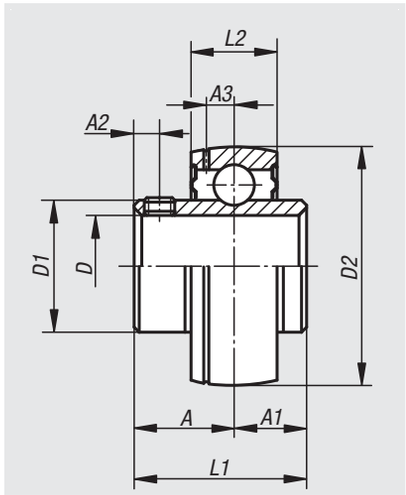
All housing dimensions are nominal dimensions for which the usual casting tolerances must be taken into consideration.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	Housing	D	A1	A2	B	B1	D3	E	L	L1	L2	L3	α	Fastening screw
24244-20204	MUC 204	FL 204	20	12,7	15	113	60	10,5	90	33,3	31	27	11,5	10°	M8
24244-25205	MUC 205	FL 205	25	14,3	16	130	68	12,5	99	35,7	34	28	13	10°	M10
24244-30206	MUC 206	FL 206	30	15,9	18	148	79	12,5	117	40,2	38,1	31	13	10°	M10
24244-35207	MUC 207	FL 207	35	17,5	19	161	90	14	130	44,4	42,9	34	14,3	10°	M12
24244-40208	MUC 208	FL 208	40	19	21	171	100	14	144	51,2	49,2	36	14,3	10°	M12
24244-45209	MUC 209	FL 209	45	19	22	179	108	16	148	52,2	49,2	38	15	10°	M14
24244-50210	MUC 210	FL 210	50	19	22	195	115	16	157	54,6	51,6	40	15	10°	M14

Insert bearing MUC

stainless steel



Material:
Stainless steel 1.4125.
Seal, rubber NBR.

Version:
Sealed on both sides with a spherical outer ring.
Can be re-lubricated.

Sample order:
nlm 24248-20204

Note:
The internal construction of the insert bearings corresponds to that of standard Series 6200 and 6300 radial ball bearing. However, they have wider inner rings for easier fastening on shafts. The inner rings are manufactured with a plus tolerance. This results in transition or press fits when using shafts with h-tolerances. The shaft is secured by 2 grub screws positioned 120° apart on the inner ring.

The insert bearings are ready to install and are permanently lubricated with a suitable ball bearing grease. In normal applications, re-lubrication is not necessary.

Temperature range:
-15 °C to +100 °C.

Order No.	Bearing	D	A	A1	A2	A3	D1	D2	L1	L2	Grub screw	Dynamic base loads kN	Static base loads kN
24248-20204	MUC 204	20	18,3	12,7	5	4,3	29	47	31	17	M6x0,75	9,88	6,2
24248-25205	MUC 205	25	19,7	14,3	5,4	4	34	52	34	17	M6x0,75	7,36	6,98
24248-30206	MUC 206	30	22,2	15,9	5,5	5,3	40,5	62	38,1	19	M6x0,75	14,97	10,04
24248-35207	MUC 207	35	25,4	17,5	6,9	5,8	48	72	42,9	20	M8x1	19,75	13,67
24248-40208	MUC 208	40	30,2	19	8	6,2	53	80	49,2	21	M8x1	22,71	15,94
24248-45209	MUC 209	45	30,2	19	8	6,5	57,3	85	49,2	22	M8x1	24,36	17,71
24248-50210	MUC 210	50	32,6	19	10	7	63	90	51,6	24	M10x1,25	26,98	19,84

26000

Rubber-metal buffers
Shock absorbers
Gas springs

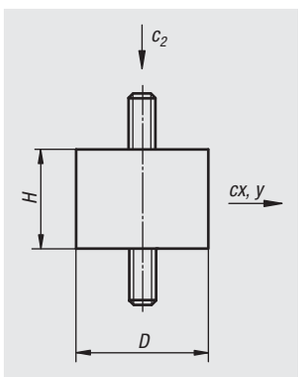
Technical information for rubber-metal buffers

Note:
Our rubber-metal buffers are simple and cost-efficient standard units for elastic mounting. They are ideally suited for compressive and axial loads of the most diverse ranges of application. With shear stress however, they are substantially less resilient than with compressive stress. The adjacent tables provide a guide to the static load values. By high dynamic alternating loads or high frequencies the loading should be reduced proportionately.

Guide values for static load (excerpt from 26100, 26102, 26104 and 26106)

Type	D	H	Compressive loads						Shear stresses					
			Spring rate c2 in N/mm			Permissible load F in N			Spring rate cx, y in N/mm			Permissible load F in N		
			hard	medium	soft	hard	medium	soft	hard	medium	soft	hard	medium	soft
A	20	15	300	190	120	500	320	200	60	40	30	190	120	70
A	30	15	670	410	250	1100	700	400	90	60	40	350	210	130
A	30	30	240	150	100	900	570	340	50	30	20	430	280	170
A	40	30	480	300	170	1800	1110	670	90	60	30	770	500	250
A	50	20	2400	1500	900	5000	3190	1870	240	160	100	1200	770	460
A	50	40	600	380	220	2800	1750	1050	120	80	50	1280	800	460
A	75	25	5000	2900	1700	8000	5000	3300	410	260	160	2800	1750	1030
A	75	55	650	400	240	4700	3000	1750	130	80	50	2100	1300	800
B	25	20	320	160	120	490	320	190	70	45	25	230	160	90
B	30	20	660	430	260	830	520	310	100	75	50	330	210	130
B	30	30	350	220	130	750	450	280	70	50	30	350	220	130
B	40	30	550	350	210	1250	750	450	110	70	40	520	330	200
B	50	40	560	370	220	2100	1270	760	120	80	45	930	580	350
B	50	50	350	220	130	1750	1100	650	80	50	30	800	510	310
B	75	50	950	630	330	4700	2910	1720	180	120	80	1900	1200	710
C	20	25	200	130	80	300	190	120	50	30	20	150	90	60
C	30	30	590	380	220	720	450	270	90	60	50	260	170	110
C	40	30	900	570	340	1080	680	410	150	90	60	380	240	140
C	50	30	1700	1090	650	2500	1750	950	210	150	70	470	290	170
C	50	50	360	220	140	1390	870	520	80	40	30	610	390	230
C	75	50	1010	630	370	3650	2050	1200	200	130	80	1560	980	580

Type	D	H	Compressive loads	
			Spring rate c2 in N/mm	Permissible load F in N
			medium	medium
D	25	20	150	260
D	30	20	330	730
D	40	30	250	950
D	50	20	660	1750
D	75	25	1430	4650



Rubber hardness:
hard = 70° Shore medium = 55° Shore soft = 45° Shore
For general guidance natural rubber is ca. 55° Shore.
static compression load: F (max.) = ca. 6.5 kg/cm² (63.77 N/cm²)
static axial load: F (max.) = ca. 1.5 kg/cm² (14.72 N/cm²)
by 10 % spring displacement, or transverse travel during axial load.
Naturally, much higher loads are possible without damage. However, these considerably effect the rubber-metal buffer in its primary purpose. Tensile loads are possible but should be avoided on account of the peak stress at the contact edges and the notch sensitivity of rubber.

Tolerances for rubber-metal buffers:
Permissible dimensional deviations per DIN 7751 Part 2. Permissible hardness deviation ±5 Shore A.

Synoptical Table - Properties of the Individual Material

Rubber material		Main Characteristics - Resistance to									
Abb.	Polymer	Temperature	Tensile strength	Fracture strain	Aging	Ozone	Petrol	Oil	Acid	Alkalis	Tensile strain
NR (NK)	Natural rubber	-30 °C – +80 °C	1	1	3	4	6	6	3	3	600%
SBR	Styrene-butadiene rubber	-30 °C – +80 °C	5	2	3	4	4	5	3	3	450%
CR	Chloroprene rubber	-20 °C – +110 °C	3	2	2	2	2	2	2	2	450%
NBR	Acrylonitrile-butadiene rubber	-30 °C – +120 °C	5	2	3	3	1	1	4	3	450%
EPDM	Ethylene propylene terpolymer	-30 °C – +130 °C	5	3	1	1	5	4	1	2	450%
SI	Silicone rubber	-60 °C – +200 °C	6	4	1	1	5	4	5	5	500%

1 = excellent 2 = very good 3 = good 4 = moderate 5 = low 6 = insufficient

Rubber-metal buffers

type A

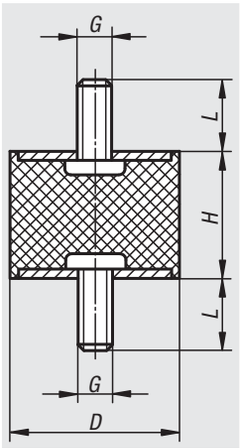
Material:
Metal parts steel grade 5.6 or stainless steel.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.
Stainless steel bright.

Sample order:
nlm 26100-00800855

Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

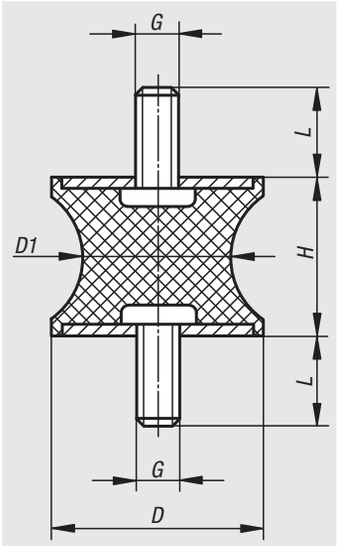
Temperature range:
-30 °C to +80 °C.



Order No.	Material	D	G	L	H	Spring stiffness N/mm	Load N
26100-00800855	Steel	8	M3	6	8	24	31
26100-01001055	Steel	10	M4	10	10	35	32
26100-01001555	Steel	10	M4	10	15	50	50
26100-01500855	Steel	15	M4	10	8	130	104
26100-01501055	Steel	15	M4	10	10	122	122
26100-01501555	Steel	15	M4	10	15	59	88
26100-02000855	Steel	20	M6	18	8	725	580
26100-02001055	Steel	20	M6	18	10	300	300
26100-02001555	Steel	20	M6	18	15	200	300
26100-02002055	Steel	20	M6	18	20	133	332
26100-02002555	Steel	20	M6	18	25	90	270
26100-02501055	Steel	25	M6	18	10	800	800
26100-02501555	Steel	25	M6	18	15	294	441
26100-02502055	Steel	25	M6	18	20	200	500
26100-02502555	Steel	25	M6	18	25	94	282
26100-02503055	Steel	25	M6	18	30	70	280
26100-03001555	Steel	30	M8	23	15	587	880
26100-03002055	Steel	30	M8	23	20	318	795
26100-03002555	Steel	30	M8	23	25	183	549
26100-03003055	Steel	30	M8	23	30	150	600
26100-03004055	Steel	30	M8	23	40	77	385
26100-04001555	Steel	40	M8	23	15	1250	1875
26100-04002055	Steel	40	M8	23	20	565	1412
26100-04003055	Steel	40	M8	23	30	300	1200
26100-04004055	Steel	40	M8	23	40	189	945
26100-05002055	Steel	50	M10	28	20	1300	3250
26100-05002555	Steel	50	M10	28	25	667	2000
26100-05003055	Steel	50	M10	28	30	500	2000
26100-05004055	Steel	50	M10	28	40	300	1500
26100-05005055	Steel	50	M10	28	50	193	1153
26100-06004055	Steel	60	M10	28	40	377	1885
26100-07004555	Steel	70	M10	28	45	410	2255
26100-07502555	Steel	75	M12	37	25	1655	4965
26100-07504055	Steel	75	M12	37	40	717	3585
26100-07505055	Steel	75	M12	37	50	470	2820
26100-07505555	Steel	75	M12	37	55	405	2835
26100-015015551	Stainless steel	15	M4	12	15	59	88
26100-020015551	Stainless steel	20	M6	18	15	200	300
26100-025020551	Stainless steel	25	M6	18	20	200	500
26100-030020551	Stainless steel	30	M8	23	20	318	795
26100-030025551	Stainless steel	30	M8	23	25	183	549
26100-040030551	Stainless steel	40	M8	23	30	300	1200

Rubber-metal buffers

type AT tapered



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 57° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26101-01001057

Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

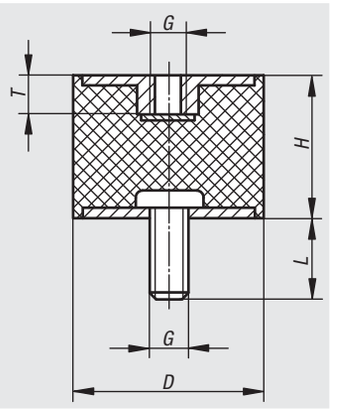
Rubber-metal buffers with tapered rubber contour reduce high edge loads of the rubber by radial deflection and so increase the components service life.

Temperature range:
-30 °C to +80 °C.

Order No.	D	D1	H	G	L	Spring stiffness N/mm	Load N
26101-01001057	10	8	10	M4	13	31	37
26101-01501557	15	12	15	M4	13	71	135
26101-02001557	20	14	15	M6	18	177	283
26101-03002057	30	22	20	M8	23	212	763
26101-04003057	40	33	30	M8	23	202	1.111
26101-04004857	40	20	48	M8	23	101	626
26101-05003057	50	40	30	M10	28	351	1.229
26101-07504057	75	50	40	M12	37	466	2.330

Rubber-metal buffers

type B



Material:
Metal parts steel grade 5.6 or stainless steel.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.
Stainless steel bright.

Sample order:
nlm 26102-00800855

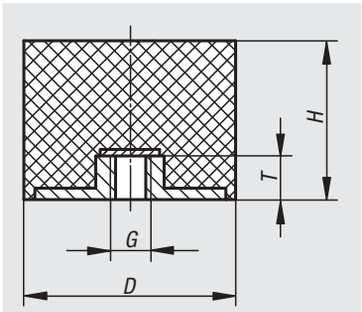
Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

Temperature range:
-30 °C to +80 °C.

Order No.	Material	D	H	G	L	T	Spring stiffness N/mm	Load N
26102-00800855	Steel	8	8	M3	6	3	35	17
26102-01001055	Steel	10	10	M4	10	4	75	75
26102-01001555	Steel	10	15	M4	10	4	50	60
26102-01500855	Steel	15	10	M4	10	4	130	130
26102-01501555	Steel	15	15	M4	10	4	100	120
26102-02001555	Steel	20	15	M6	18	6	325	390
26102-02002055	Steel	20	20	M6	18	6	130	260
26102-02002555	Steel	20	25	M6	18	6	95	210
26102-02501555	Steel	25	15	M6	18	6	333	399
26102-02502055	Steel	25	20	M6	18	6	195	410
26102-02502555	Steel	25	25	M6	18	6	117	257
26102-02503055	Steel	25	30	M6	18	6	100	300
26102-03001555	Steel	30	15	M8	23	8	590	708
26102-03002055	Steel	30	20	M8	23	8	280	560
26102-03002555	Steel	30	25	M8	23	8	180	396
26102-03003055	Steel	30	30	M8	23	8	168	504
26102-03004055	Steel	30	40	M8	23	8	88	308
26102-04002055	Steel	40	20	M8	23	8	700	840
26102-04003055	Steel	40	30	M8	23	8	273	820
26102-04004055	Steel	40	40	M8	23	8	189	660
26102-05002055	Steel	50	20	M10	28	10	1471	2500
26102-05002555	Steel	50	25	M10	28	10	630	1386
26102-05003055	Steel	50	30	M10	28	10	545	1635
26102-05004055	Steel	50	40	M10	28	10	310	1116
26102-05005055	Steel	50	50	M10	28	10	180	900
26102-06004055	Steel	60	40	M10	28	10	500	1750
26102-07004555	Steel	70	45	M10	28	10	600	2400
26102-07502555	Steel	75	25	M12	37	12	2440	3660
26102-07504055	Steel	75	40	M12	37	12	700	2450
26102-07505055	Steel	75	50	M12	37	12	520	2600
26102-07505555	Steel	75	55	M12	37	12	396	2178
26102-008008551	Stainless steel	8	8	M3	8	3	35	17
26102-010010551	Stainless steel	10	10	M4	12	4	75	75
26102-015010551	Stainless steel	15	10	M4	12	4	-	-
26102-020020551	Stainless steel	20	20	M6	18	6	130	260
26102-025020551	Stainless steel	25	20	M6	18	6	195	410
26102-030020551	Stainless steel	30	20	M8	23	8	280	560
26102-040020551	Stainless steel	40	20	M8	23	8	700	840

Rubber-metal buffers

type E



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26103-00800855

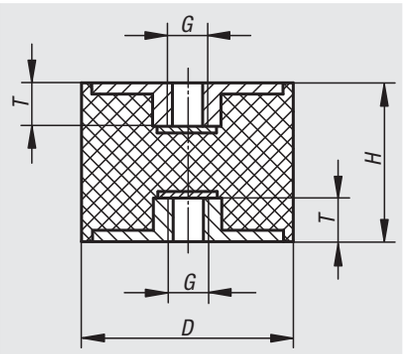
Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

Temperature range:
- 30 °C to +80 °C.

Order No.	D	H	G	T	Spring stiffness N/mm	Load N
26103-00800855	8	8	M3	3	88	44
26103-01501255	15	12	M4	4	165	182
26103-01501555	15	15	M4	4	100	130
26103-01502055	15	20	M4	4	75	113
26103-02001555	20	15	M6	6	145	246
26103-02002055	20	20	M6	6	94	216
26103-02002555	20	25	M6	6	65	169
26103-02501555	25	15	M6	6	270	540
26103-02502555	25	25	M6	6	105	315
26103-02503055	25	30	M6	6	85	281
26103-02504055	25	40	M6	6	75	300
26103-03001555	30	15	M8	8	545	491
26103-03002555	30	25	M8	8	160	416
26103-03003055	30	30	M8	8	125	425
26103-03004055	30	40	M8	8	85	315
26103-04002055	40	20	M8	8	550	660
26103-04002555	40	25	M8	8	500	1000
26103-04003055	40	30	M8	8	300	870
26103-04004055	40	40	M8	8	260	1040
26103-05002055	50	20	M10	10	860	860
26103-05002555	50	25	M10	10	700	1400
26103-05003055	50	30	M10	10	450	1575
26103-05004055	50	40	M10	10	350	1400
26103-05005055	50	50	M10	10	170	850
26103-06003055	60	30	M10	10	700	1400
26103-06004055	60	40	M10	10	400	1600
26103-06005055	60	50	M10	10	240	1200
26103-07004255	70	42	M10	10	520	2600
26103-07004555	70	45	M10	10	680	3060
26103-07502555	75	25	M12	12	1211	1816
26103-07503055	75	30	M12	12	1090	2289
26103-07504055	75	40	M12	12	500	2000
26103-07505055	75	50	M12	12	550	2750

Rubber-metal buffers

type C



Material:
Metal parts steel grade 5.6 or stainless steel.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.
Stainless steel bright.

Sample order:
nlm 26104-01001055

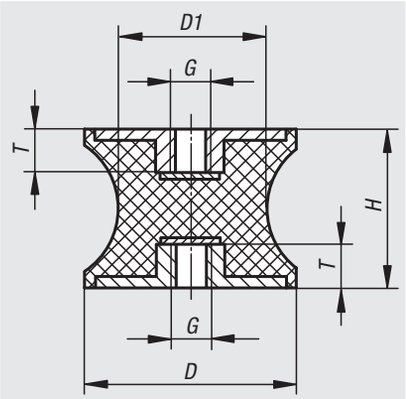
Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

Temperature range:
-30 °C to +80 °C.

Order No.	Material	D	H	G	T	Spring stiffness N/mm	Load N
26104-01001055	Steel	10	10	M4	4	100	50
26104-01001555	Steel	10	15	M4	4	50	50
26104-01501555	Steel	15	15	M4	4	100	100
26104-02002055	Steel	20	20	M6	6	230	276
26104-02002555	Steel	20	25	M6	6	120	180
26104-02502055	Steel	25	20	M6	6	230	276
26104-02502555	Steel	25	25	M6	6	110	165
26104-02503055	Steel	25	30	M6	6	80	160
26104-03002055	Steel	30	20	M8	8	425	637
26104-03003055	Steel	30	30	M8	8	175	350
26104-03004055	Steel	30	40	M8	8	133	400
26104-04003055	Steel	40	30	M8	8	530	1060
26104-04004055	Steel	40	40	M8	8	222	666
26104-05003055	Steel	50	30	M10	10	680	1360
26104-05004055	Steel	50	40	M10	10	333	1000
26104-05005055	Steel	50	50	M10	10	190	665
26104-07504055	Steel	75	40	M12	12	750	2250
26104-07505055	Steel	75	50	M12	12	636	2225
26104-010010551	Stainless steel	10	10	M4	4	100	50
26104-015015551	Stainless steel	15	15	M4	4	100	100
26104-020020551	Stainless steel	20	20	M6	6	230	276
26104-025025551	Stainless steel	25	25	M6	6	110	165
26104-030020551	Stainless steel	20	30	M8	8	425	637
26104-030030551	Stainless steel	30	30	M8	8	175	350
26104-040030551	Stainless steel	30	40	M8	8	530	1060

Rubber-metal buffers

type CT tapered



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 57° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26105-01001057

Note:
The rubber-metal buffers are widely-used construction devices for elastic mounting. They are used, among other things, as mountings for aggregates, motors, compressors, pumps and testing machinery.

Rubber-metal buffers with tapered rubber contour reduce high edge loads of the rubber by radial deflection and so increase the components service life.

Temperature range:
-30 °C to +80 °C.

Order No.	D	D1	H	G	T	Spring stiffness N/mm	Load N
26105-01501557	15	12	15	M4	4	111	122
26105-02001557	20	14	15	M6	6	227	227
26105-03002057	30	22	20	M8	8	252	504
26105-04003057	40	33	30	M8	8	199	796
26105-04004857	40	20	48	M8	8	111	555
26105-05003057	50	40	30	M10	10	499	998
26105-07504057	75	50	40	M12	12	597	2.030

Rubber-metal buffers

type D

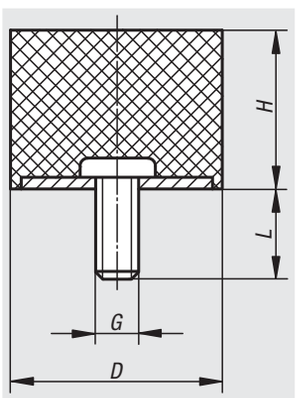
Material:
Metal parts steel grade 5.6 or stainless steel.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.
Stainless steel bright.

Sample order:
nlm 26106-00800855

Note:
Rubber-metal buffers are used among other things, for mounting aggregates and as elastic buffers to limit the travel by moving masses or as feet that are not firmly fixed in the floor and where the floor is sensitive i.e. office machinery.

Temperature range:
-30 °C to +80 °C.

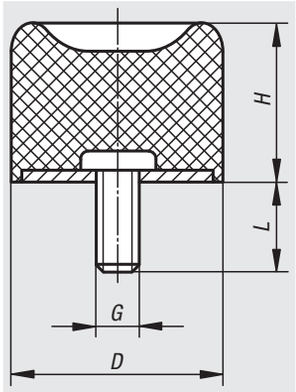


Order No.	Material	D	H	G	L	Spring stiffness N/mm	Load N
26106-00800855	Steel	8	8	M3	6	40	40
26106-01001055	Steel	10	10	M4	10	35	35
26106-01001555	Steel	10	15	M4	10	26	40
26106-01500655	Steel	15	6	M4	10	175	88
26106-01500855	Steel	15	8	M4	10	187	187
26106-01501055	Steel	15	10	M4	10	100	100
26106-01501555	Steel	15	15	M4	10	50	100
26106-02000555	Steel	20	5	M6	18	135	95
26106-02000855	Steel	20	8	M6	18	250	250
26106-02001055	Steel	20	10	M6	18	240	240
26106-02001555	Steel	20	15	M6	18	110	220
26106-02002055	Steel	20	20	M6	18	75	225
26106-02002555	Steel	20	25	M6	18	65	227,5
26106-02500855	Steel	25	8	M6	18	850	850
26106-02501055	Steel	25	10	M6	18	400	400
26106-02501555	Steel	25	15	M6	18	210	420
26106-02502055	Steel	25	20	M6	18	140	420
26106-02502555	Steel	25	25	M6	18	100	350
26106-02503055	Steel	25	30	M6	18	79	316
26106-03001555	Steel	30	15	M8	23	270	540
26106-03002055	Steel	30	20	M8	23	238	714
26106-03002555	Steel	30	25	M8	23	153	535,5
26106-03003055	Steel	30	30	M8	23	127	508
26106-03004055	Steel	30	40	M8	23	88	528
26106-04001555	Steel	40	15	M8	23	710	1420
26106-04002055	Steel	40	20	M8	23	365	1095
26106-04003055	Steel	40	30	M8	23	205	820
26106-04004055	Steel	40	40	M8	23	143	858
26106-05002055	Steel	50	20	M10	28	646	1938
26106-05003055	Steel	50	30	M10	28	354	1416
26106-05004055	Steel	50	40	M10	28	230	1380
26106-05005055	Steel	50	50	M10	28	160	1280
26106-06004055	Steel	60	40	M10	28	317	1902
26106-07002555	Steel	70	25	M10	28	980	3430
26106-07004555	Steel	70	45	M10	28	438	3066
26106-07502555	Steel	75	25	M12	37	1318	4613
26106-07504055	Steel	75	40	M12	37	643	3858
26106-07505055	Steel	75	50	M12	37	472	3776
26106-07505555	Steel	75	55	M12	37	310	3100
26106-008008551	Stainless steel	8	8	M3	8	40	40
26106-010010551	Stainless steel	10	10	M4	10	35	35
26106-015015551	Stainless steel	15	15	M4	10	50	100
26106-020015551	Stainless steel	20	15	M6	18	110	220
26106-025020551	Stainless steel	25	20	M6	18	140	420
26106-030030551	Stainless steel	30	30	M8	23	127	508
26106-040030551	Stainless steel	40	30	M8	23	205	820

26107

Rubber-metal buffers

type DS suction base



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 57° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26107-01501457

Note:
Rubber-metal buffers are used among other things, for mounting aggregates and as elastic buffers to limit the travel by moving masses.

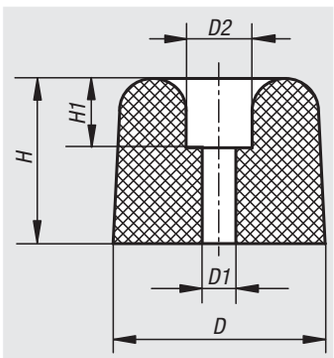
Temperature range:
-30 °C to +80 °C.

Order No.	D	H	G	L	Spring stiffness N/mm	Load N
26107-01501457	15	14	M4	13	50	100
26107-02501857	25	18,5	M6	18	95	285
26107-03002857	30	28,5	M8	23	97	340
26107-04002857	40	28	M8	23	120	480
26107-05002857	50	28	M10	28	220	990
26107-07003057	70	30	M10	28	360	2160
26107-07503757	75	37	M12	37	390	3510
26107-10005057	100	50	M16	42	540	8100

26108

Rubber impact buffers

type TP door buffer



Material:
Elastomer, natural rubber, medium hardness, 60° Shore A

Sample order:
nlm 26108-02601560

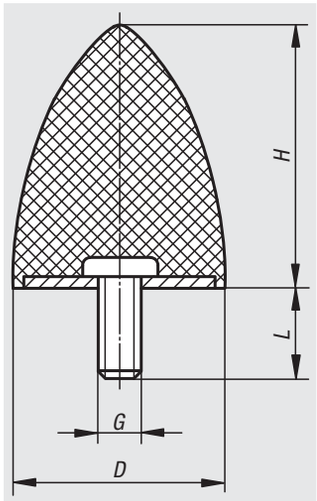
Note:
Screw on rubber impact buffers can also be used as equipment or machine feet.

Temperature range:
-30 °C to +80 °C.

Order No.	D	D1	D2	H	H1
26108-02601560	26	4	12	15	9
26108-03002260	30	7	11	21	5
26108-03503060	35	8	17	30	10
26108-04003560	40	7	20	35	8

Rubber impact buffers

parabolic



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26110-02002455

Note:
Rubber impact buffers are robust and effective elastic cushioning elements and shock absorbers. They are ideal for elastic travel limitation and cushioning knocks by mobile and immobile aggregates and machines and as use as door stops.

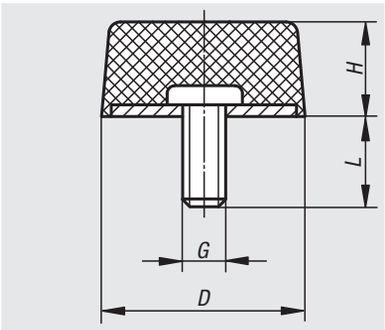
Temperature range:
-30 °C to +80 °C.

Order No.	D	H	G	L	Spring stiffness N/mm	Load N
26110-02002455	20	24	M6	18	14	500
26110-03003655	30	36	M8	20	15	750
26110-03504055	35	40	M8	20	-	-
26110-05005855	50	58	M10	28	30	3000
26110-05006755	50	67	M8	38	30	3200
26110-07508955	75	89	M12	37	50	8000

26112

Rubber impact buffers

conical



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26112-02501755

Note:
Rubber impact buffers are robust and effective elastic cushioning elements and shock absorbers. They are ideal for elastic travel limitation and cushioning knocks by mobile and immobile aggregates and machines and as use as door stops.

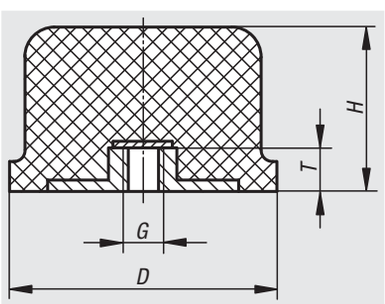
Temperature range:
-30 °C to +80 °C.

Order No.	D	H	G	L	Spring stiffness N/mm	Load N
26112-02501755	25	17	M6	18	3,7	678
26112-05001855	50	18	M10	28	4	3600

26115

Rubber impact buffers

spherical



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 55° Shore A.

Version:
Steel galvanized.

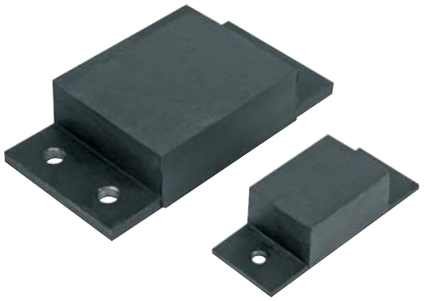
Sample order:
nlm 26115-05003555

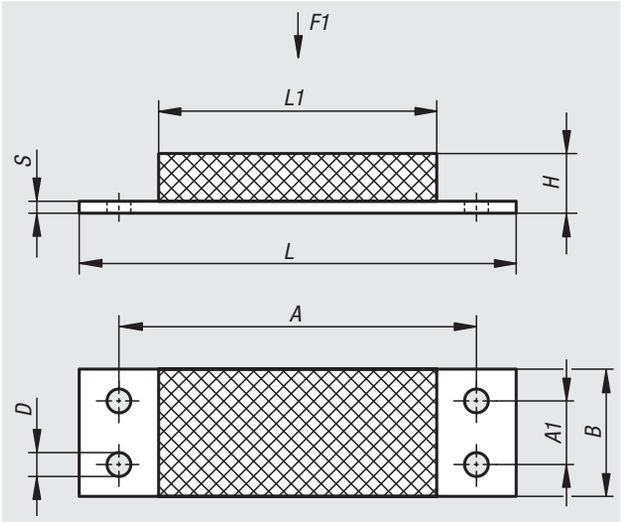
Note:
Rubber impact buffers are robust and effective elastic cushioning elements and shock absorbers. They are ideal for elastic travel limitation and cushioning knocks by mobile and immobile aggregates and machines and as use as door stops.

Temperature range:
-30 °C to +80 °C.

Order No.	D	H	G	T	Spring stiffness N/mm	Load N
26115-05003555	50	35	M10	10	15	3000
26115-08006055	80	60	M12	12	30	11000
26115-12509055	125	93	M16	16	40	20000

Rubber-metal impact buffer rails





Material:
Steel.
Elastomer, natural rubber, medium hardness, 57° Shore A.

Version:
Steel, painted black.

Sample order:
nlm 26120-02501904557

Note:
For absorbing large impact forces and supporting heavy weights.

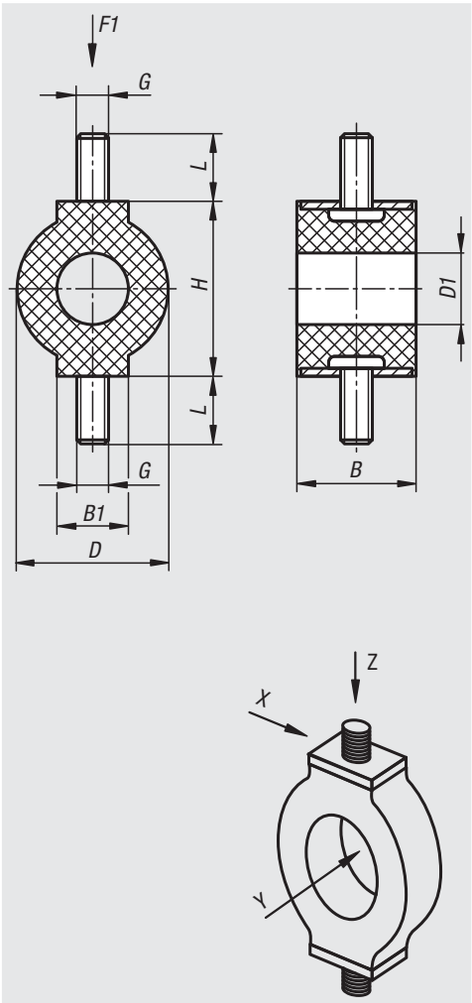
The indicated load data apply for static long-term load with a rubber hardness of 57° Shore A.

* Metal part 30 mm wide.

Temperature range:
-30 °C to +80 °C.

Order No.	A	A1	B	D	H	L	L1	S	F1 (N)
26120-02501904557	68,6	-	25*	6,5	19	84	45	3	500
26120-05003507057	100	-	50	8,5	35	130	70	5	3100
26120-05007007057	100	-	50	8,5	70	130	70	5	2500
26120-10004512057	160	50	100	13	45	200	120	10	14000
26120-10008012057	160	50	100	13	80	200	120	10	8500
26120-12004515057	200	60	120	15	45	250	150	10	18000
26120-15005020057	250	80	150	17	50	300	200	15	34000

O-shaped mounts



Material:
Metal parts, steel, strength 5.6.
Elastomer natural rubber, medium hardness, 57° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 26130-01201257

Note:
O-shapes mounts have a very soft spring characteristic, which is why they are also called low-frequency supports. They serve for low-vibration support of instruments, and electrical components, as well as for mounting light assemblies and precision mechanical equipment.

The spring characteristic of the O-shaped mounts increases in the order X, Y and Z. The main load direction is the longitudinal axis of the threaded bolts (Z direction).

Temperature range:
-30 °C to +80 °C.

Order No.	B	B1	D	D1	G	H	L	F1 (N)
26130-01201257	9,5	9,5	12,5	6	M4	12,5	10	8
26130-01401757	13	6	14	6	M4	17	10	18
26130-02503057	20	12	25	12	M5	30	10	55

Technical information for gas springs

Assembly position:
Gas pressure springs in the sizes 04/12 and 06/15 should if possible always be assembled with the piston rod extending downward. In this way, optimal lubrication of the guide and the sealing system is ensured. For gas springs sized 08/19 and up the assembly position is discretionary. Keep in mind, however, that end-of-travel damping is effective only when the piston rod extends downward. In order to prevent increased loss of gas, gas springs cannot be subject to bending loads, tensile loads or lateral forces. Whenever possible, we recommend the use of ball head connections.

The fitting and removal of gas springs may only be carried out in the no-load state.

Gas springs may be used as an end stop if the nominal force +30% is not exceeded in the process.

Gas springs must not be subjected to tensile stress.

Maintenance:
The gas springs are maintenance-free. Lubrication or service is not required.

Temperature range:
-20 °C up to +80 °C.

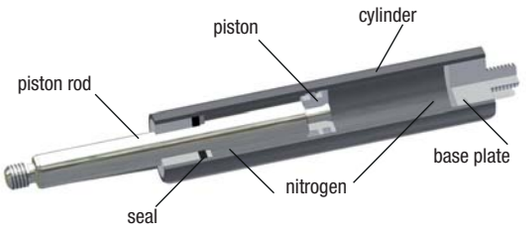
Influence of temperature:
Nominal force is measured at 20 °C. Subject to physical conditions, the gas springs' force changes every 10 °C by 3.4 %.

Transport and storage:
Gas pressure springs in the sizes 04/12 and 06/15 should be stored with the piston rod extending downward at an ambient temperature of approx. 20 °C. As of size 08/19, storage in any orientation is possible. Actuate the gas springs after 6 months' storage at the latest. Storage of gas springs for a period of over 1 year should be avoided.

Valve:
The gas springs have a check valve inside the the pressure tube thread for subsequent increase and decrease of the nitrogen pressure.

Disposal
If gas springs are no longer needed, they must be disposed of in an environmentally responsible way. For this purpose, a hole is drilled at a suitable spot in order to release the compressed nitrogen gas and drain the oil contained in them. Our opening and disposal instructions are available at our website under the menu item Download.

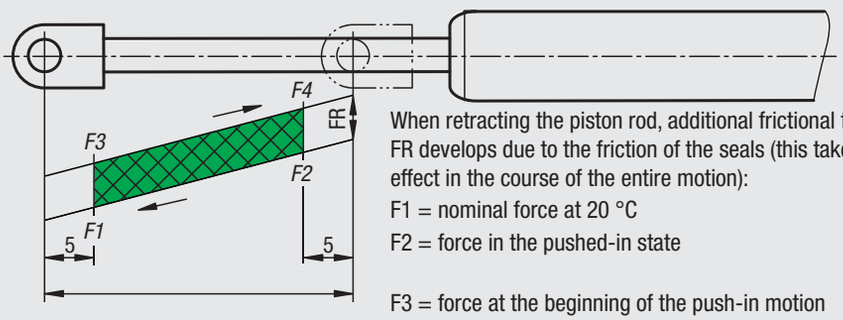
Design and function principle of norelem gas springs



norelem gas springs are hydropneumatic, self-contained and maintenance-free adjustment elements. Spring force F1 results from the internal pressure (maximum 160 bar on no-load) in the cylinder, which is produced by the nitrogen fill medium. This pressure on the gas spring acts on the cross-sectional area of the piston rod. The piston rod is always extended in the no-load state.

In the course of pushing the piston rod in, the volume in the cylinder is reduced and the gas is compressed.. By doing this, an increase in the force (progression) of the gas springs results subject to the diameter of the piston rod and the cylinder volume. Norelem gas springs contain an oil filling for lubrication and end-of-travel damping.

Gas spring characteristic in the force/distance diagram

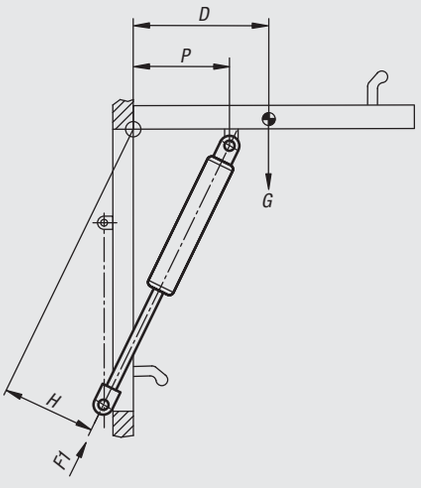


When retracting the piston rod, additional frictional force FR develops due to the friction of the seals (this takes effect in the course of the entire motion):
F1 = nominal force at 20 °C
F2 = force in the pushed-in state

F3 = force at the beginning of the push-in motion
F4 = force at the end of the push-in motion

The approximation formula and application sketch shown below assist in providing a rough estimate and in selecting the appropriate gas spring from the standard programme.

Calculating push-out force F1



Approximation formula for calculating the thrust F1 [N] at 20 °C

$$F1 = \frac{G \cdot D}{H \cdot n} \times 13 \text{ [N]}$$

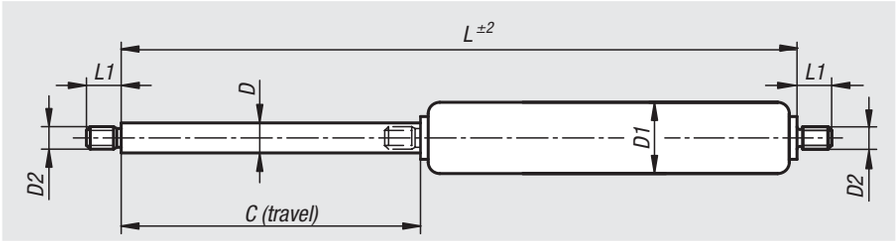
G = hatch weight in kg
H = effective lever arm of gas spring in mm, hatch open
13 = conversion factor kg → N + safety margin
P = hatch fastening ca. 2/3 D
n = No. off gas springs (standard: n = 2)
D = effective centre of gravity in mm, hatch open

Example:

G = 25 kg, D = 300 mm, H = 150 mm, n = 2

$$F1 = \frac{25 \cdot 300}{150 \cdot 2} \times 13 = 325 \text{ N}$$

Gas springs



Material:
Piston rod and pressure tube steel.
Fill medium: oil, nitrogen.

Version:
Piston rod, hard chromed.
Piston rod Ø4 is stainless steel.
Pressure tube painted black.

Sample order:
nlm 26200-0412030X20
(include extension force F1)

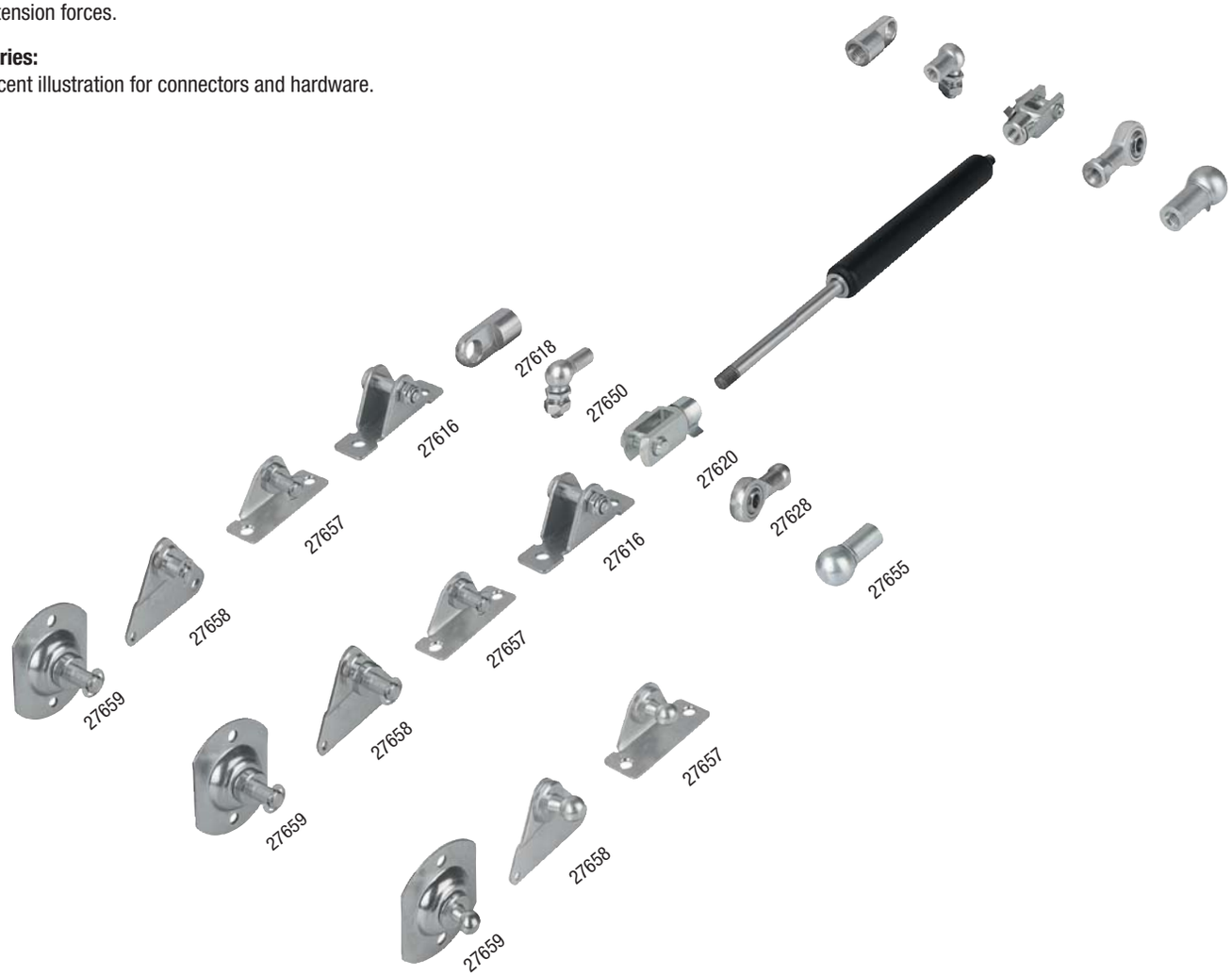
Note:
Gas springs are maintenance-free, self-contained systems that are filled with nitrogen under high pressure. For end-of-travel damping and lubrication, a defined amount of oil is also contained inside. The gas springs contain a nonreturn valve in a threaded pin on the pressurised pipe, which allows the pushing force to be lowered at a later time.

Gas pressure springs in the sizes 04/12 and 06/15 must be stored and installed with the piston rod extending downwards. As of size 08/19, storage and installation in any orientation is possible. Keep in mind, however, that end-of-travel damping is effective only when the piston rod extends downwards.
As a consequence of the physical properties when filling a gas spring, a tolerance range of ±5% results for the rated pushing force.

Gas springs are filled with nitrogen under high pressure and under no circumstances should they be opened or overloaded.

On request:
Other extension forces.

Accessories:
See adjacent illustration for connectors and hardware.

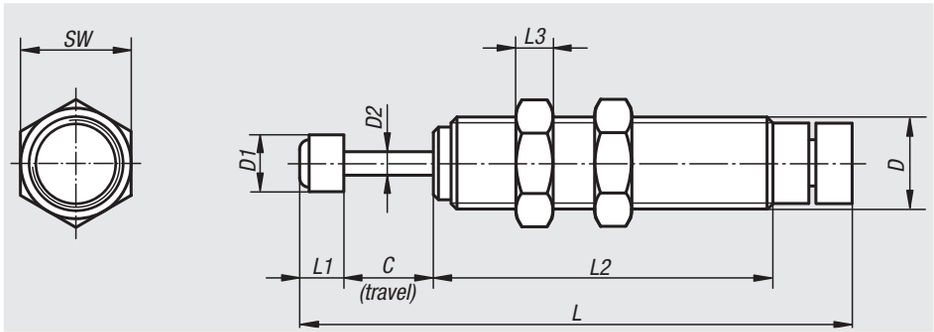


Gas springs

Order No.	Size	D	D1	D2	C (travel)	L	L1	Progression %	Extension force F1 N
26200-0412030X	04/12	4	12	M3,5	30	92	5	20	20/40/70/100/130/150/180
26200-0412040X	04/12	4	12	M3,5	40	112	5	20	20/40/70/100/130/150/180
26200-0412050X	04/12	4	12	M3,5	50	132	5	20	20/40/70/100/130/150/180
26200-0412060X	04/12	4	12	M3,5	60	152	5	20	20/40/70/100/130/150/180
26200-0412070X	04/12	4	12	M3,5	70	172	5	20	20/40/70/100/130/150/180
26200-0412080X	04/12	4	12	M3,5	80	192	5	20	20/40/70/100/130/150/180
26200-0412100X	04/12	4	12	M3,5	100	232	5	20	20/40/70/100/130/150/180
26200-0615020X	06/15	6	15,6	M5	20	95	5	22	100/150/200/250/300/350/400
26200-0615040X	06/15	6	15,6	M5	40	135	5	22	100/150/200/250/300/350/400
26200-0615060X	06/15	6	15,6	M5	60	175	5	22	100/150/200/250/300/350/400
26200-0615080X	06/15	6	15,6	M5	80	215	5	22	100/150/200/250/300/350/400
26200-0615100X	06/15	6	15,6	M5	100	255	5	22	100/150/200/250/300/350/400
26200-0615120X	06/15	6	15,6	M5	120	295	5	22	100/150/200/250/300/350/400
26200-0615150X	06/15	6	15,6	M5	150	355	5	22	100/150/200/250/300/350/400
26200-0819060X	08/19	8	19	M8	60	190	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819080X	08/19	8	19	M8	80	230	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819100X	08/19	8	19	M8	100	270	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819120X	08/19	8	19	M8	120	310	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819140X	08/19	8	19	M8	140	350	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819160X	08/19	8	19	M8	160	390	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819180X	08/19	8	19	M8	180	430	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819200X	08/19	8	19	M8	200	470	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819220X	08/19	8	19	M8	220	510	10	30	100/150/200/250/300/350/400/500/600/700
26200-0819250X	08/19	8	19	M8	250	570	10	30	100/150/200/250/300/350/400/500/600/700
26200-1023050X	10/23	10	23	M8	50	170	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023100X	10/23	10	23	M8	100	270	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023150X	10/23	10	23	M8	150	370	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023200X	10/23	10	23	M8	200	470	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023250X	10/23	10	23	M8	250	570	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023300X	10/23	10	23	M8	300	670	10	30	150/200/250/300/350/400/500/600/700/800
26200-1023350X	10/23	10	23	M8	350	770	10	30	150/200/250/300/350/400/500/600/700/800
26200-1428050X	14/28	14	28	M10	50	207	12	40	200/250/300/350/400/500/600/700/800
26200-1428100X	14/28	14	28	M10	100	307	12	40	200/250/300/350/400/500/600/700/800
26200-1428150X	14/28	14	28	M10	150	407	12	40	200/250/300/350/400/500/600/700/800
26200-1428200X	14/28	14	28	M10	200	507	12	40	200/250/300/350/400/500/600/700/800
26200-1428250X	14/28	14	28	M10	250	607	12	40	200/250/300/350/400/500/600/700/800
26200-1428300X	14/28	14	28	M10	300	707	12	40	200/250/300/350/400/500/600/700/800
26200-1428400X	14/28	14	28	M10	400	907	12	40	200/250/300/350/400/500/600/700/800

Industrial shock absorbers

adjustable



Material:
Housing, steel.
M8x0.75 housing in stainless steel.
Steel piston rod.
Steel nut.
Collision head in steel, plastic.

Version:
Housing nickel plated.
Housing M8x0.75, bright.
Housing M8x1 black oxidised.
Piston rod hard chromed.
Nut nickel plated.

Sample order:
nlm 26300-0807506

Note:
Industrial shock absorbers are maintenance-free, ready to install hydraulic components. They have an integrated fixed stop. The damping strength can be precisely set with the adjustable version. After installation, the equipment is run a few times and the adjustment screw rotated until the optimal braking is achieved. Exceeding the max. energy input per hour is possible if a pause is made every now and then or the shock absorber is air cooled. The end position is optional.

Temperature range:
-5 °C to +70 °C.

Order No.	D	D1	D2	C (travel)	L	L1	L2	L3	SW
26300-0807506	M8x0,75	6	2,5	6	58	5	41	2	11
26300-0810008	M8x1	6,4	2,5	8	61,1	5,1	43,9	3	10
26300-1010008	M10x1	6	2,4	8	65	6	41	3	13
26300-1210010	M12x1	8	3,5	10	84	8	61	4	14
26300-1415010	M14x1,5	10	3,5	10	88	8	59	6	17
26300-2015016	M20x1,5	18	6	16	127	17	76	8	24
26300-2515030	M25x1,5	22	8	30	173	18	111	10	32

Order No.	max. energy input per stroke Nm	max. energy input per hour Nm	effective mass max. kg	speed range m/s	return force N	axis deviation max. (°)
26300-0807506	1,4	2202	15	0,3 - 2	9	2,5
26300-0810008	3,5	5650	15	0,3 - 2	5,3	2
26300-1010008	1,76	3528	10	0,3 - 2	5,88	2,5
26300-1210010	4,9	5880	30	0,3 - 2	9,8	2,5
26300-1415010	5,88	8820	35	0,3 - 2	9,8	2,5
26300-2015016	29,4	20580	200	0,3 - 2	18,1	2,5
26300-2515030	49	29400	300	0,3 - 2	33,2	2,5

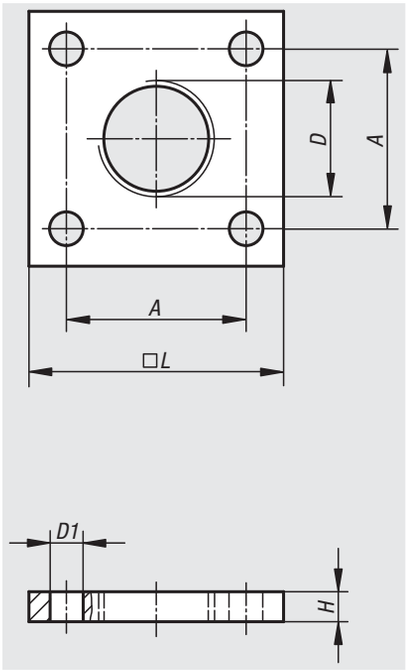
Mounting flange

Material:
Steel.

Version:
nickel-plated.

Sample order:
nlm 26320-08075

Note:
When using the mounting flange use a locknut to secure the shock absorber. The compact form allows for space saving designs.



Order No.	A	D	D1	H	L
26320-08075	18	M8x0,75	3,2	4	25
26320-10100	18	M10x1	3,2	4	25
26320-12100	18	M12x1	3,2	4	25
26320-14150	24	M14x1,5	4,5	4	34
26320-20150	28	M20x1,5	6,5	12	40
26320-25150	40	M25x1,5	9	12	54

Notes

27000

Clevis joints
Rod ends
Ball joints
Axial joints
Height adjusting elements
Swivel feet
Levelling feet
Tube-end plugs
Equipment feet
Hinges

Clevis joints for rod ends

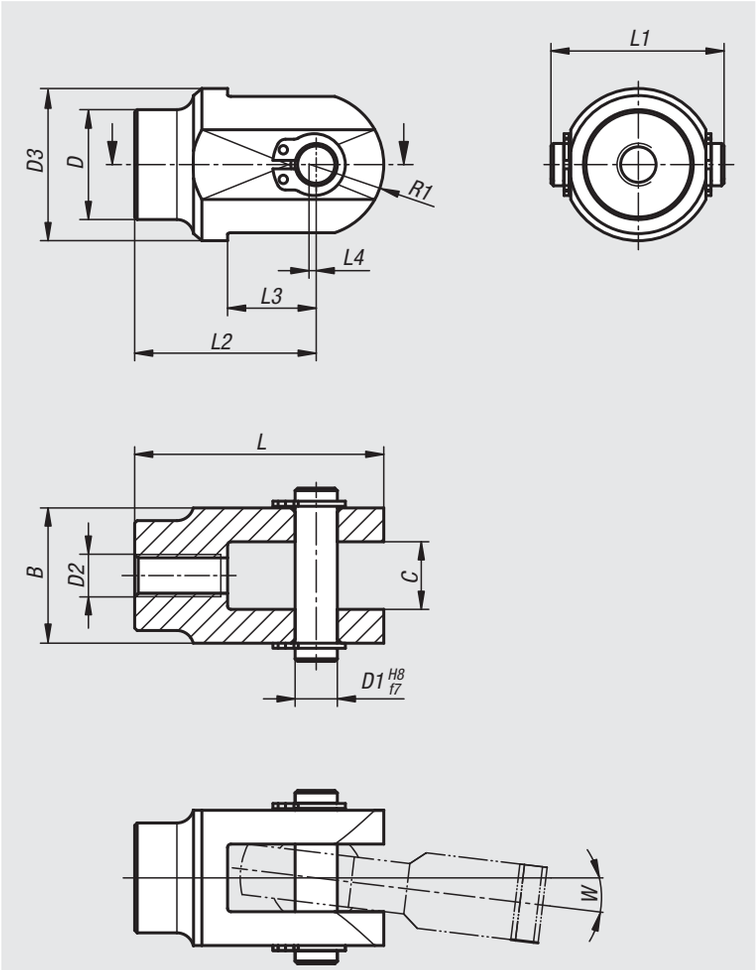
Material:
Clevis and pin, steel 1.7225

Version:
galvanized

Sample order:
nlm 27614-05080516

Note:
These clevises were developed as accessories for rod ends. The clevis opening size C was chosen to accept rod end joints.

Suitable for rod ends 27625, 27626, 27627 and 27628.



Order No.	B	C	D	D1	D2	D3	L	L1	L2	L3	L4	R1	W°	F static kN
27614-05080516	16	8	13	5	M5	18	29,5	20,5	21,5	10,5	0,5	8,5	6,5	8
27614-06090618	18	9	15	6	M6	20	33,5	22,9	25	11,5	0,5	9	7	9
27614-08120820	20	12	17	8	M8	24	41	24,9	31,5	13,5	1	10,5	8	14,5
27614-10141025	25	14	21	10	M10	28	49,5	30,3	38	16	1	12,5	8	19,5
27614-12161229	29	16	25	12	M12	32	57,5	34,3	44	18	1,5	15	8	23,5
27614-16211638	38	21	30	16	M16	42	76,5	43,3	58	23,5	1,5	20	9	32
27614-20252045	45	25	38	20	M20	50	90,5	51,9	68	29,5	-	22,5	9	43

Clevis joints for rod ends

stainless steel

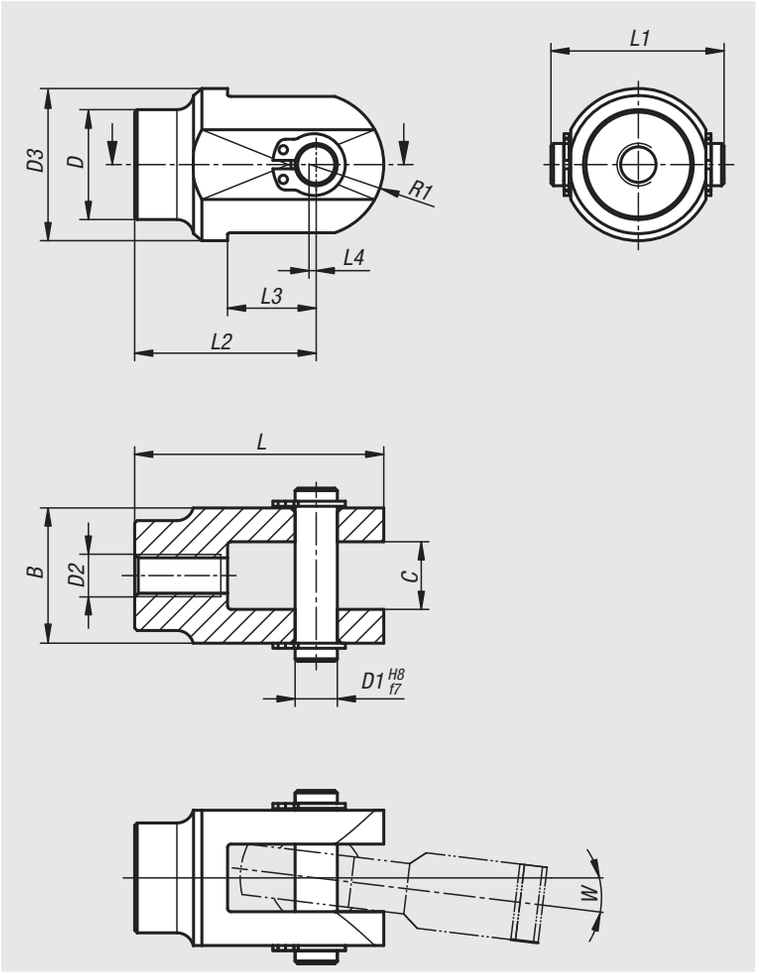
Material:
Clevis and pins stainless steel 1.4305

Version:
Bright.

Sample order:
nlm 27615-05080516

Note:
These clevises were developed as accessories for rod ends. The clevis opening size C was chosen to accept rod end joints.

Suitable for rod ends 27629 and 27630.



Order No.	B	C	D	D1	D2	D3	L	L1	L2	L3	L4	R1	W°	F static kN
27615-05080516	16	8	13	5	M5	18	29,5	20,5	21,5	10,5	0,5	8,5	6,5	8
27615-06090618	18	9	15	6	M6	20	33,5	22,9	25	11,5	0,5	9	7	9
27615-08120820	20	12	17	8	M8	24	41	24,9	31,5	13,5	1	10,5	8	14,5
27615-10141025	25	14	21	10	M10	28	49,5	30,3	38	16	1	12,5	8	19,5
27615-12161229	29	16	25	12	M12	32	57,5	34,3	44	18	1,5	15	8	23,5
27615-16211638	38	21	30	16	M16	42	76,5	43,3	58	23,5	1,5	20	9	32
27615-20252045	45	25	38	20	M20	50	90,5	51,9	68	29,5	-	22,5	9	43

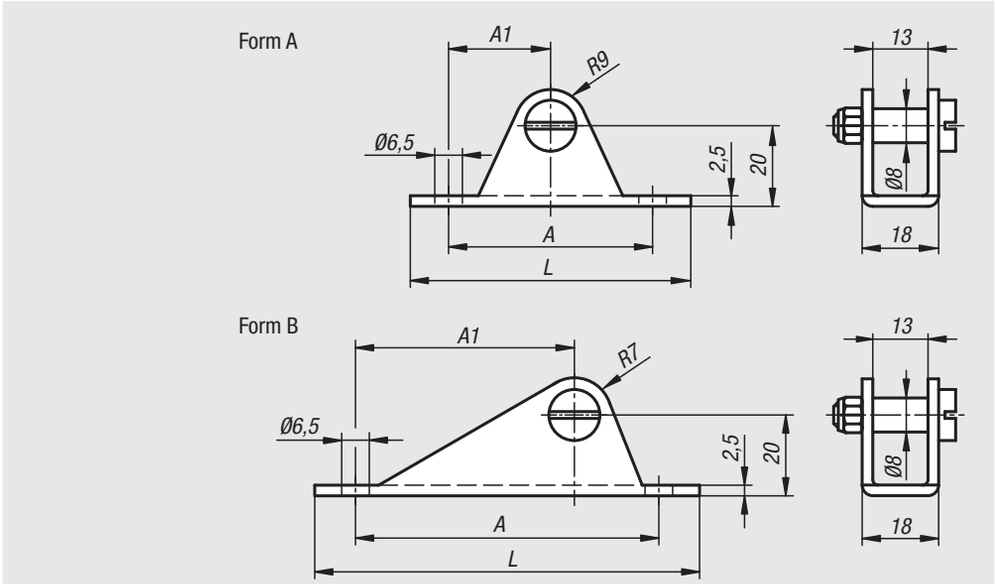
27616

Hinge plates

Material:
Steel.

Version:
galvanized

Sample order:
nlm 27616-08070



Order No.	Form	A	A1	L	Strength N
27616-08070	A	51	25,5	70	1.800
27616-08095	B	75	54	96	1.800

27618

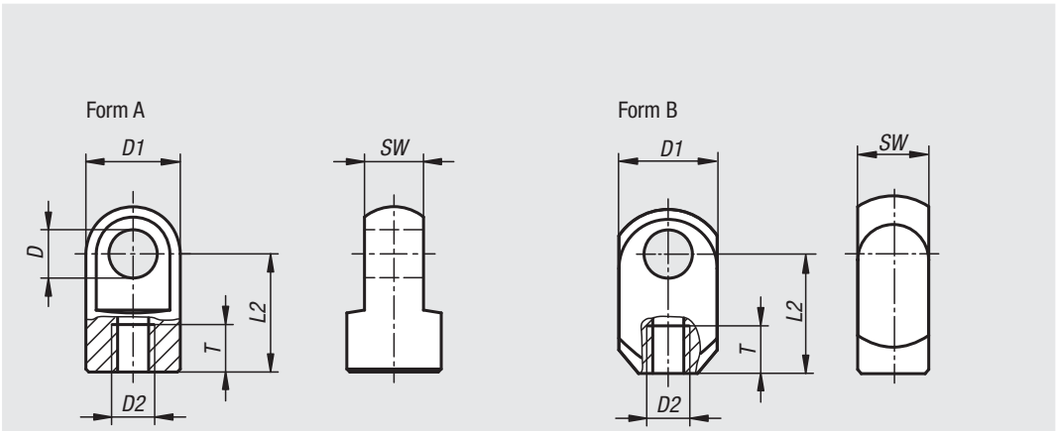
Rod-end eyes

Material:
Steel.

Version:
galvanized

Sample order:
nlm 27618-03504111

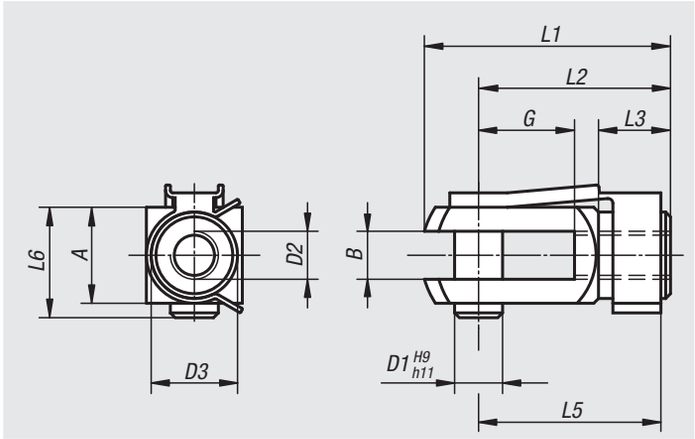
Note:
With internal thread.



Order No.	Form	D	D1	D2	L2	SW	T
27618-03504111	A	4,1	8	M3,5	11	4	6
27618-0506116	A	6,1	10	M5	16	6	8
27618-0508116	B	8,1	15	M5	16	10	8
27618-0808119	A	8,1	14	M8	19	10	11
27618-1008127	A	8,1	18	M10	27	10	12

Clevis joints with snap-in pin

DIN 71752



Material:
Clevis and pins free-cutting steel, spring, spring steel

Version:
Galvanized and chromed

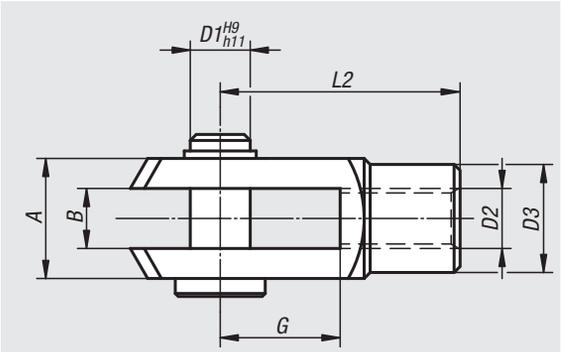
Sample order:
nlm 27620-0510

On request:
Left-handed thread.

Order No.	Version	B	G	D1	D2	D3	L1	L2	L3	~L5	~L6	A
27620-03508	RH thread	4	8	4	M3,5	8	21	16	6	15	10	8
27620-0510	RH thread	5	10	5	M5	9	26	20	7,5	19	12	10
27620-0612	RH thread	6	12	6	M6	10	31	24	9	23	14	12
27620-0816	RH thread	8	16	8	M8	14	42	32	12	31	19	16
27620-0832	RH thread	8	32	8	M8	14	58	48	12	47	19	16
27620-1020	RH thread	10	20	10	M10	18	52	40	15	39	23	20
27620-10120	RH thread	10	20	10	M10x1,25	18	52	40	15	39	23	20
27620-1040	RH thread	10	40	10	M10	18	72	60	15	59	23	20
27620-10140	RH thread	10	40	10	M10x1,25	18	72	60	15	59	23	20
27620-1224	RH thread	12	24	12	M12	20	62	48	18	47	28	24
27620-12124	RH thread	12	24	12	M12x1,25	20	62	48	18	47	28	24
27620-1248	RH thread	12	48	12	M12	20	86	72	18	69	28	24
27620-12148	RH thread	12	48	12	M12x1,25	20	86	72	18	69	28	24
27620-1428	RH thread	14	28	14	M14	24	72	56	22,5	52	31	27
27620-1632	RH thread	16	32	16	M16	26	83	64	24	62	36	32
27620-16132	RH thread	16	32	16	M16x1,5	26	83	64	24	62	36	32

Clevis joints stainless steel

DIN 71752



Material:
Stainless steel 1.4305.

Version:
Bright.

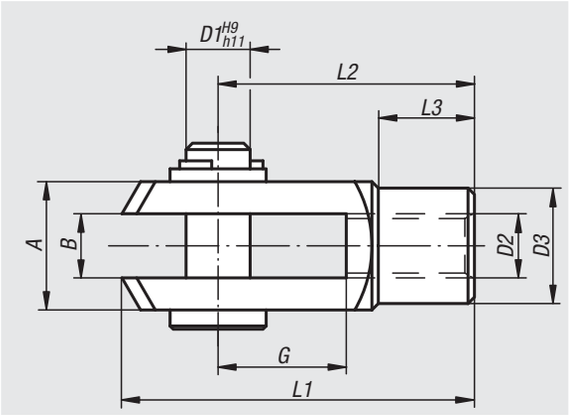
Sample order:
nlm 27622-0816

On request:
Left-handed thread.

Order No.	Version	B	G	D1	D2	D3	L2A
27622-0510	RH thread	5	10	5	M5	9	2010
27622-0612	RH thread	6	12	6	M6	10	2412
27622-0816	RH thread	8	16	8	M8	14	3216
27622-0832	RH thread	8	32	8	M8	14	4816
27622-1020	RH thread	10	20	10	M10	18	4020
27622-10120	RH thread	10	20	10	M10x1,25	18	4020
27622-1040	RH thread	10	40	10	M10	18	6020
27622-1224	RH thread	12	24	12	M12	20	4824
27622-12124	RH thread	12	24	12	M12x1,25	20	4824
27622-1248	RH thread	12	48	12	M12	20	7224
27622-12148	RH thread	12	48	12	M12x1,25	20	7224
27622-1428	RH thread	14	28	14	M14	24	5627
27622-1632	RH thread	16	32	16	M16	26	6432
27622-16132	RH thread	16	32	16	M16x1,5	26	6432

Clevis joints

DIN 71752



Material:
Free-cutting steel

Version:
galvanized

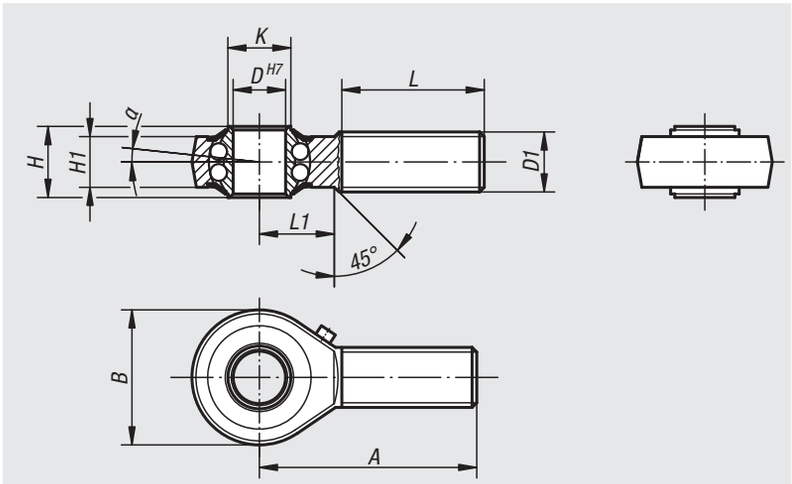
Sample order:
nlm 27624-0510

On request:
Left-handed thread.

Order No.	Version	B	G	D1	D2	D3	L1	L2	L3	A
27624-0510	RH thread	5	10	5	M5	9	26	20	7,5	10
27624-0612	RH thread	6	12	6	M6	10	31	24	9	12
27624-0816	RH thread	8	16	8	M8	14	42	32	12	16
27624-0832	RH thread	8	32	8	M8	14	58	48	12	16
27624-1020	RH thread	10	20	10	M10	18	52	40	15	20
27624-10120	RH thread	10	20	10	M10x1,25	18	52	40	15	20
27624-1040	RH thread	10	40	10	M10	18	72	60	15	20
27624-10140	RH thread	10	40	10	M10x1,25	18	72	60	15	20
27624-1224	RH thread	12	24	12	M12	20	62	48	18	24
27624-12124	RH thread	12	24	12	M12x1,25	20	62	48	18	24
27624-1248	RH thread	12	48	12	M12	20	86	72	18	24
27624-12148	RH thread	12	48	12	M12x1,25	20	86	72	18	24
27624-1428	RH thread	14	28	14	M14	24	72	56	22,5	27
27624-1632	RH thread	16	32	16	M16	26	83	64	24	32
27624-16132	RH thread	16	32	16	M16x1,5	26	83	64	24	32

Rod ends with ball bearing

external thread



Material:
Casing drop-forged steel, tempered.

Version:
Galvanized.
Internal Clearance 15 - 40 µm.

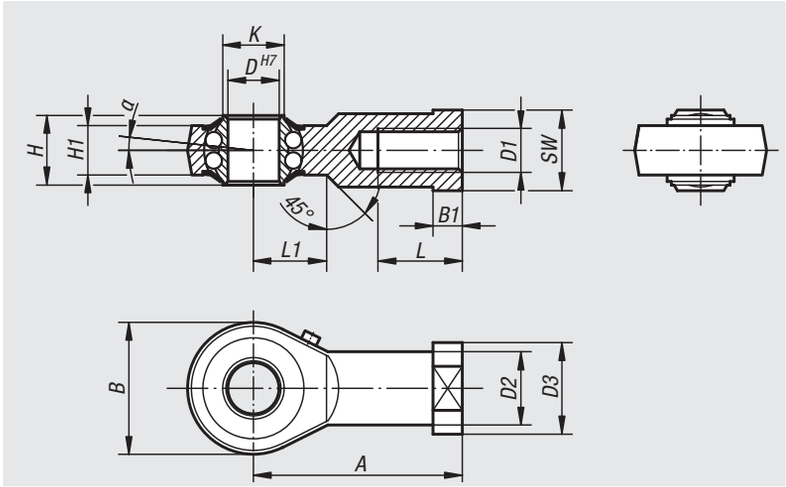
Sample order:
nlm 27625-12

Note:
The hardened ball bearing is long-term greased and sealed with cover washers. The connection dimensions comply with DIN 648 Form Series KA.
Rod ends are primarily used where movement processes are transmitted and there is no exact alignment.

Order No. right-handed thread	Order No. left-handed thread	D	D1	A	B	H	H1	K	L	L1	α	Dynamic load rating N	Static load rating N	Rev. limit n max. 1/min
27625-06	**27625-061**	6	M6	36	20	9	6,75	9	22	12	8°	2750	650	1350
27625-08	**27625-081**	8	M8	42	24	12	9	10,5	25	15	8,5°	4000	1000	1300
27625-10	**27625-101**	10	M10	48	28	14	10,5	12	29	15	8°	4450	1450	1225
27625-12	**27625-121**	12	M12	54	32	16	12	14,5	33	19	7,5°	4950	1800	1125
27625-16	**27625-161**	16	M16	66	42	21	15	19	40	22	8°	6250	2350	975
27625-20	**27625-201**	20	M20x1,5	78	50	25	18	24,5	47	28	7°	7900	3450	825
27625-22	**27625-221**	22	M22x1,5	84	54	28	20	26	51	26	8°	9300	3980	725

Rod ends with ball bearing

internal thread



Material:
Casing drop-forged steel, tempered.

Version:
Galvanized. Internal Clearance 15 - 40 µm.

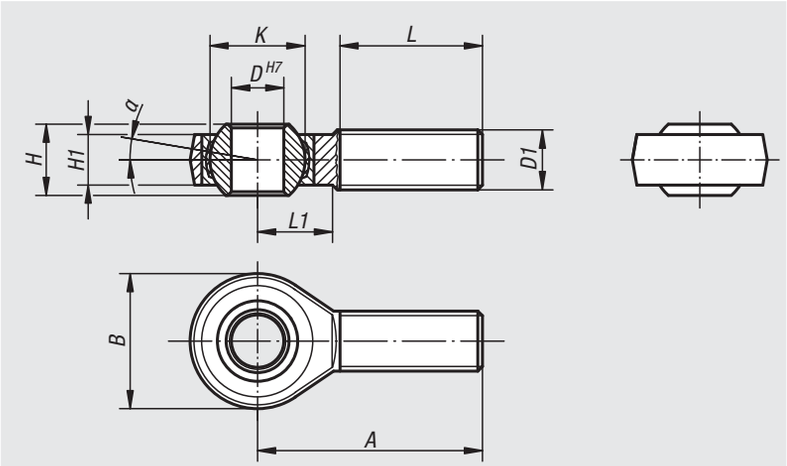
Sample order:
nlm 27626-16

Note:
The hardened ball bearing is long-term greased and sealed with cover washers. The connection dimensions comply with DIN 648 Form Series KA.

Order No. right-handed thread	Order No. left-handed thread	D	D1	D2	D3	A	B	B1	H	H1	K	L	L1	SW	α	Dynamic load rating N	Static load rating N	Rev. limit n max. 1/min
27626-06	**27626-061**	6	M6	10	13	30	20	5	9	6,75	9	12	10	11	8°	2750	650	1350
27626-08	**27626-081**	8	M8	12,5	16	36	24	5	12	9	10,5	16	12	14	8,5°	4000	1000	1300
27626-10	**27626-101**	10	M10	15	19	43	28	6,5	14	10,5	12	20	15	17	8°	4450	1450	1225
27626-12	**27626-121**	12	M12	17,5	22	50	32	6,5	16	12	14,5	22	16	19	7,5°	4950	1800	1125
27626-16	**27626-161**	16	M16	22	27	64	42	8	21	15	19	28	22	22	8°	6250	2350	975
27626-20	**27626-201**	20	M20x1,5	27,5	34	77	50	10	25	18	24,5	33	26	30	7°	7900	3450	825
27626-22	**27626-221**	22	M22x1,5	30	38	84	54	12	28	20	26	37	26	32	8°	9300	3980	725

Rod ends with plain bearing

external thread



Material:
Housing size (D) 5-12 turned steel.
From size (D) 16 forged steel.
Ball joint ball bearing steel, hardened, ground and polished.
Bearing shell steel with PTFE weave glued in.

Version:
galvanized

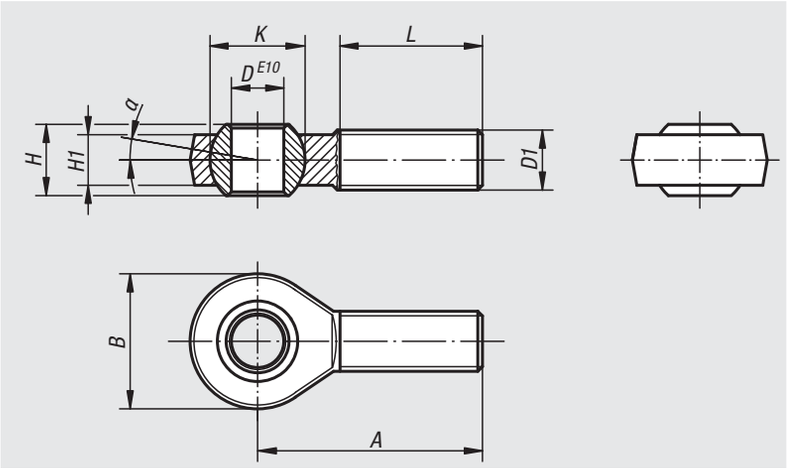
Sample order:
nlm 27627-20

Note:
The rod end bearing is maintenance-free. The connection dimensions comply with DIN 648 series KA.

Order No. right-handed thread	Order No. left-handed thread	D	D1	A	B	H	H1	K	L	L1	α	Dynamic base loads kN	Static base loads kN
27627-05	**27627-051**	5	M5	33	18	8	6	11,11	20	9	13°	7,5	4,3
27627-06	**27627-061**	6	M6	36	20	9	6,75	12,7	22	12	13°	9,3	6
27627-08	**27627-081**	8	M8	42	24	12	9	15,87	25	15	13°	16,7	11
27627-10	**27627-101**	10	M10	48	28	14	10,5	19,05	29	15	13°	23,4	17,4
27627-12	**27627-121**	12	M12	54	32	16	12	22,22	33	19	13°	32	23,5
27627-16	**27627-161**	16	M16	66	42	21	15	28,57	40	22	15°	52,7	32
27627-20	**27627-201**	20	M20x1,5	78	50	25	18	34,92	47	28	15°	78,1	43,8
27627-22	**27627-221**	22	M22x1,5	84	54	28	20	38,1	51	26	15°	97,2	52,6

Rod ends igubal® with plain bearing

external thread



Material:
Housing igumid® G.
Bearing seat iglidur® W300.

Version:
Black

Sample order:
nlm 27627-105

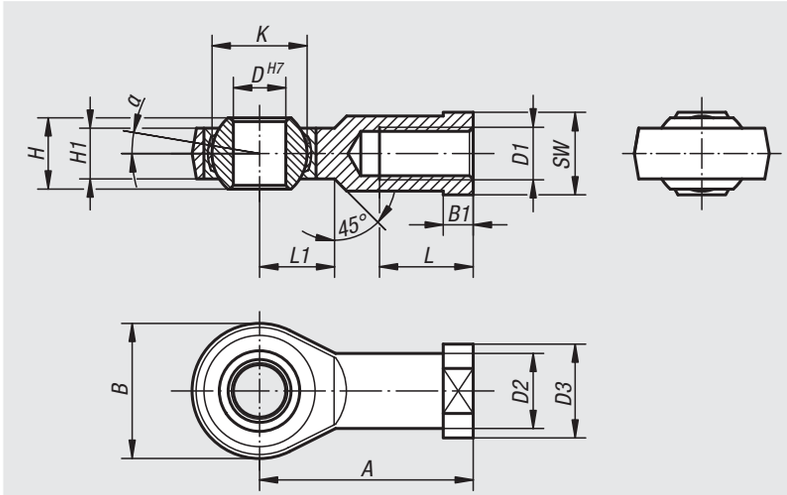
Note:
The rod end has very high rigidity under alternating stresses, it is insensitive to dirt, dust and lint, and is both corrosion and chemical resistant. It is ideal for rotary, oscillating and linear movements.
The connection dimensions comply with DIN ISO 12240 series K.

Tolerances:
The bore of the inner ring has an E10 tolerance. The shaft tolerance should be between h6 and h9.

Order No. right-handed thread	Order No. left-handed thread	D	D1	A	B	H	H1	K	L	α	Max. static tensile stress N short-term	Max. static tensile stress N long-term	Max. transverse stress N short-term	Max. transverse stress N long-term
27627-105	**27627-1051**	5	M5	33	18	8	6	11,1	19	15°	800	400	80	40
27627-106	**27627-1061**	6	M6	36	20	9	7	12,7	21	14,5°	1000	500	100	50
27627-108	**27627-1081**	8	M8	42	24	12	9	15,8	25	12,5°	1700	850	200	100
27627-110	**27627-1101**	10	M10	48	30	14	10,5	19	28	12,5°	2500	1250	300	150
27627-110125	**27627-1101251**	10	M10x1,25	48	30	14	10,5	19	28	12,5°	2500	1250	300	150
27627-112	**27627-1121**	12	M12	54	34	16	12	22,2	32	12,5°	2700	1350	400	200
27627-112125	**27627-1121251**	12	M12x1,25	54	34	16	12	22,2	32	12,5°	2700	1350	400	200
27627-114	**27627-1141**	14	M14	61	38	19	13,5	25,25	36	12,5°	3400	1700	700	350
27627-116	**27627-1161**	16	M16	66	42	21	15	28,3	37	11,5°	3900	1950	800	400
27627-116150	**27627-1161501**	16	M16x1,5	66	42	21	15	28,3	37	11,5°	3900	1950	800	400
27627-118150	**27627-1181501**	18	M18x1,5	72	46	23	16,5	31,35	41	11,5°	4200	2100	1000	500
27627-120	**27627-1201**	20	M20	78	50	25	18	34,9	45	11,5°	6000	3000	1300	650
27627-120150	**27627-1201501**	20	M20x1,5	78	50	25	18	34,9	45	11,5°	6000	3000	1300	650

Rod ends with plain bearing

internal thread



Material:
Housing size (D) 5-12 turned steel.
From size (D) 16 forged steel.
Ball joint ball bearing steel, hardened, ground and polished.
Bearing shell steel with PTFE weave glued in.

Version:
galvanized

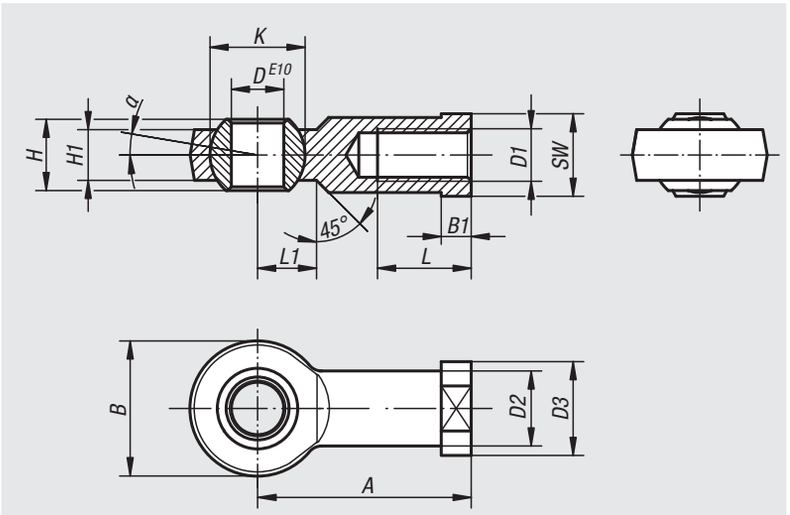
Sample order:
nlm 27628-22

Note:
The rod end bearing is maintenance-free. The connection dimensions comply with DIN 648 series KJ.

Order No. right-handed thread	Order No. left-handed thread	D	D1	D2	D3	A	B	B1	H	H1	K	L	L1	SW	α	Dynamic base loads kN	Static base loads kN
27628-05	**27628-051**	5	M5	9	11	27	18	4	8	6	11,11	10	10	9	13°	7,5	8
27628-06	**27628-061**	6	M6	10	13	30	20	5	9	6,75	12,7	12	10	11	13°	9,3	8,9
27628-08	**27628-081**	8	M8	12,5	16	36	24	5	12	9	15,87	16	12	13	13°	16,7	14,1
27628-10	**27628-101**	10	M10	15	19	43	28	6,5	14	10,5	19,05	20	15	17	13°	23,4	19,3
27628-10125	**27628-101251**	10	M10x1,25	15	19	43	28	6,5	14	10,5	19,05	20	15	17	13°	23,4	19,3
27628-12	**27628-121**	12	M12	17,5	22	50	32	6,5	16	12	22,22	22	16	19	13°	32	23,5
27628-12125	**27628-121251**	12	M12x1,25	17,5	22	50	32	6,5	16	12	22,22	22	16	19	13°	32	23,5
27628-16	**27628-161**	16	M16	22	27	64	42	8	21	15	28,57	28	22	22	15°	52,7	32
27628-1615	**27628-16151**	16	M16x1,5	22	27	64	42	8	21	15	28,57	28	22	22	15°	52,7	32
27628-20	**27628-201**	20	M20x1,5	27,5	34	77	50	10	25	18	34,92	33	26	32	15°	78,1	43,8
27628-22	**27628-221**	22	M22x1,5	30	37	84	54	12	28	20	38,1	37	26	32	15°	97,2	52,6

Rod ends igubal® with plain bearing

internal thread



Material:
Housing igumid® G.
Bearing seat iglidur® W300.

Version:
Black

Sample order:
nlm 27628-104

Note:
The rod end has very high rigidity under alternating stresses, it is insensitive to dirt, dust and lint, and is both corrosion and chemical resistant. It is ideal for rotary, oscillating and linear movements.
The connection dimensions comply DIN ISO 12240 series K.

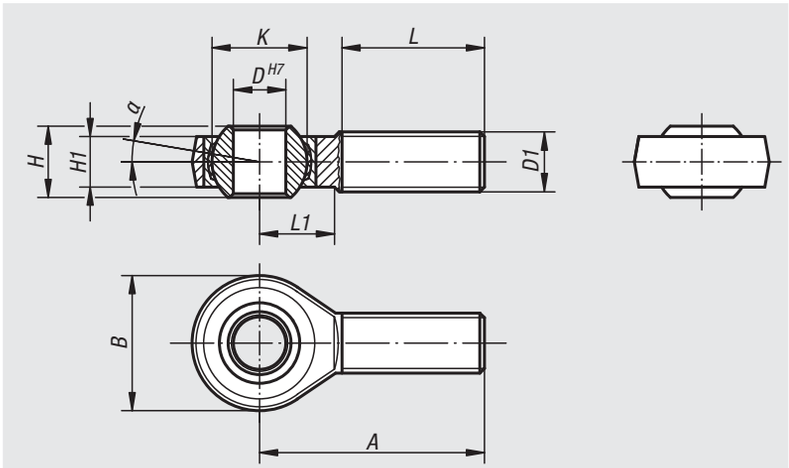
Tolerances:
The bore of the inner ring has an E10 tolerance. The shaft tolerance should be between h6 and h9.

Order No. right-handed thread	Order No. left-handed thread	D	D1	D2	D3	A	B	B1	H	H1	K	L	L1	SW	α
27628-104	**27628-1041**	5	M4	9	12	27	18	4	8	6	11,1	10	9	9	15°
27628-105	**27628-1051**	5	M5	9	12	27	18	4	8	6	11,1	10	9	9	15°
27628-106	**27628-1061**	6	M6	10	13	30	20	5	9	7	12,7	12	10	11	14,5°
27628-108	**27628-1081**	8	M8	13	16	36	24	5	12	9	15,8	16	12	14	12,5°
27628-110	**27628-1101**	10	M10	15	19	43	30	6,5	14	10,5	19	20	14	17	12,5°
27628-110125	**27628-1101251**	10	M10x1,25	15	19	43	30	6,5	14	10,5	19	20	14	17	12,5°
27628-112	**27628-1121**	12	M12	18	22	50	34	6,5	16	12	22,2	22	16	17	12,5°
27628-112125	**27628-1121251**	12	M12x1,25	18	22	50	34	6,5	16	12	22,2	22	16	19	12,5°
27628-114	**27628-1141**	14	M14	20	25	57	38	8	19	13,5	25,25	25	18	22	11,5°
27628-116	**27628-1161**	16	M16	22	27	64	42	8	21	15	28,3	28	21	22	11,5°
27628-116150	**27628-1161501**	16	M16x1,5	22	27	64	42	8	21	15	28,3	28	21	22	11,5°
27628-118150	**27628-1181501**	18	M18x1,5	25	31	71	46	10	23	16,5	31,35	32	23	27	11,5°
27628-120	**27628-1201**	20	M20	28	34	77	50	10	25	18	34,9	33	25	30	11,5°
27628-120150	**27628-1201501**	20	M20x1,5	28	34	77	50	10	25	18	34,9	33	25	30	11,5°

Order No. right-handed thread	Order No. left-handed thread	D1	Max. static tensile stress N short-term	Max. static tensile stress N long-term	Max. transverse stress N short-term	Max. transverse stress N long-term
27628-104	**27628-1041**	M4	1000	500	250	125
27628-105	**27628-1051**	M5	1000	500	250	125
27628-106	**27628-1061**	M6	1400	700	400	200
27628-108	**27628-1081**	M8	2100	1050	700	350
27628-110	**27628-1101**	M10	3100	1550	800	400
27628-110125	**27628-1101251**	M10x1,25	3100	1550	800	400
27628-112	**27628-1121**	M12	3600	1800	900	450
27628-112125	**27628-1121251**	M12x1,25	3600	1800	900	450
27628-114	**27628-1141**	M14	4000	2000	1000	500
27628-116	**27628-1161**	M16	4200	2100	1300	650
27628-116150	**27628-1161501**	M16x1,5	4200	2100	1300	650
27628-118150	**27628-1181501**	M18x1,5	4600	2300	1600	800
27628-120	**27628-1201**	M20	5400	2700	2100	1050
27628-120150	**27628-1201501**	M20x1,5	5400	2700	2100	1050

Rod ends with plain bearing

external thread, stainless steel



Material:
Housing forged special steel 1.4057.
Ball joint 1.4034 hardened and ground.
Bearing shell stainless steel 1.4571.

Version:
Polished.

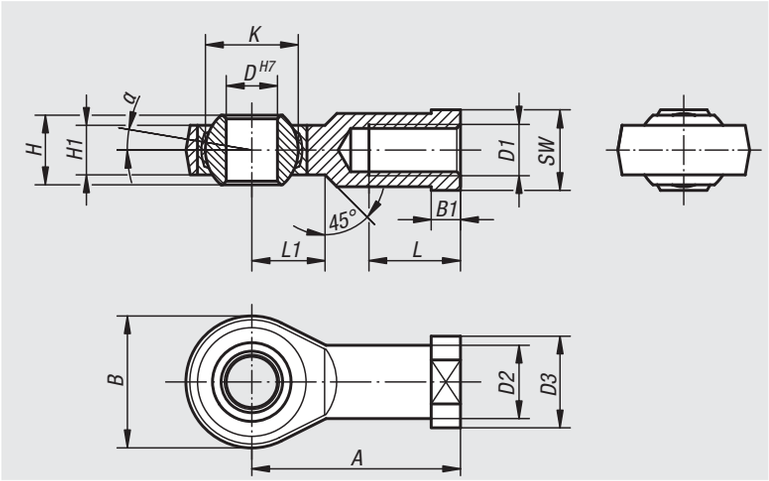
Sample order:
nlm 27629-20

Note:
The rod end bearing is maintenance-free.
The connection dimensions comply with DIN 648 Form Series KA.

Order No. right-handed thread	Order No. left-handed thread	D	D1	A	B	H	H1	K	L	L1	α	Dynamic base loads kN	Static base loads kN
27629-05	**27629-051**	5	M5	33	18	8	6	11,11	20	9	13°	7,5	6,2
27629-06	**27629-061**	6	M6	36	20	9	6,75	12,7	22	12	13°	9,3	8,8
27629-08	**27629-081**	8	M8	42	24	12	9	15,87	25	15	13°	16,7	16,1
27629-10	**27629-101**	10	M10	48	28	14	10,5	19,05	29	15	13°	23,4	25,5
27629-12	**27629-121**	12	M12	54	32	16	12	22,22	33	19	13°	32	34,5
27629-16	**27629-161**	16	M16	66	42	21	15	28,57	40	22	15°	52,7	60,6
27629-20	**27629-201**	20	M20x1,5	78	50	25	18	34,92	47	28	15°	78,1	83,1
27629-22	**27629-221**	22	M22x1,5	84	54	28	20	38,1	51	26	15°	97,2	99,7

Rod ends with plain bearing

internal thread, stainless steel



Material:
Housing forged stainless steel 1.4057.
Ball joint 1.4034 hardened and ground.
Bearing shell stainless steel 1.4571.

Version:
Polished.

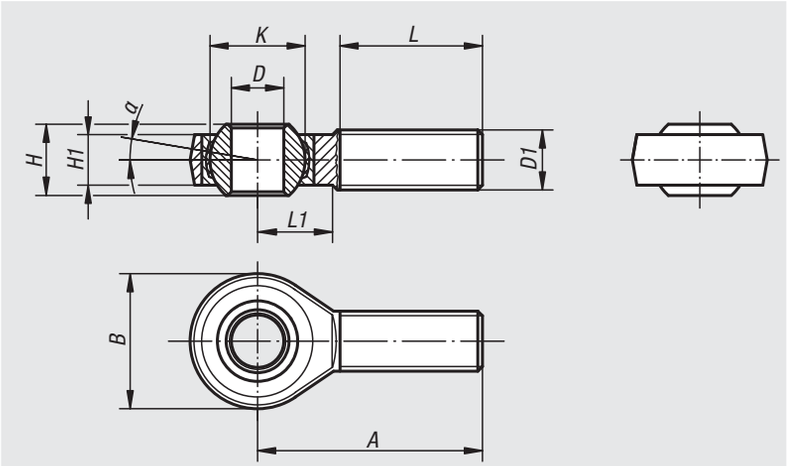
Sample order:
nlm 27630-22

Note:
The rod end bearing is maintenance-free.
The connection dimensions comply with DIN 648 Form Series KJ.

Order No. right-handed thread	Order No. left-handed thread	D	D1	D2	D3	A	B	B1	H	H1	K	L	L1	SW	α	Dynamic base loads kN	Static base loads kN
27630-05	**27630-051**	5	M5	9	11	27	18	4	8	6	11,11	10	10	9	13°	7,5	11,8
27630-06	**27630-061**	6	M6	10	13	30	20	5	9	6,75	12,7	12	10	11	13°	9,3	13,1
27630-08	**27630-081**	8	M8	12,5	16	36	24	5	12	9	15,87	16	12	13	13°	16,7	20,7
27630-10	**27630-101**	10	M10	15	19	43	28	6,5	14	10,5	19,05	20	15	17	13°	23,4	28,3
27630-10125	**27630-101251**	10	M10x1,25	15	19	43	28	6,5	14	10,5	19,05	20	15	17	13°	23,4	28,3
27630-12	**27630-121**	12	M12	17,5	22	50	32	6,5	16	12	22,22	22	16	19	13°	32	34,5
27630-12125	**27630-121251**	12	M12x1,25	17,5	22	50	32	6,5	16	12	22,22	22	16	19	13°	32	34,5
27630-16	**27630-161**	16	M16	22	27	64	42	8	21	15	28,57	28	22	22	15°	52,7	60,6
27630-1615	**27630-16151**	16	M16x1,5	22	27	64	42	8	21	15	28,57	28	22	22	15°	52,7	60,6
27630-20	**27630-201**	20	M20x1,5	27,5	34	77	50	10	25	18	34,92	33	26	32	15°	78,1	83,1
27630-22	**27630-221**	22	M22x1,5	30	37	84	54	12	28	20	38,1	37	26	32	15°	97,2	99,7

Rod ends with plain bearing

external thread, narrow version



Material:
Housing size (D) 6-10 turned steel.
From size (D) 12 forged steel.
Ball joint ball bearing steel, hardened, ground, polished and hard chromed.
Bearing shell ball bearing steel with PTFE weave glued in.

Version:
galvanized

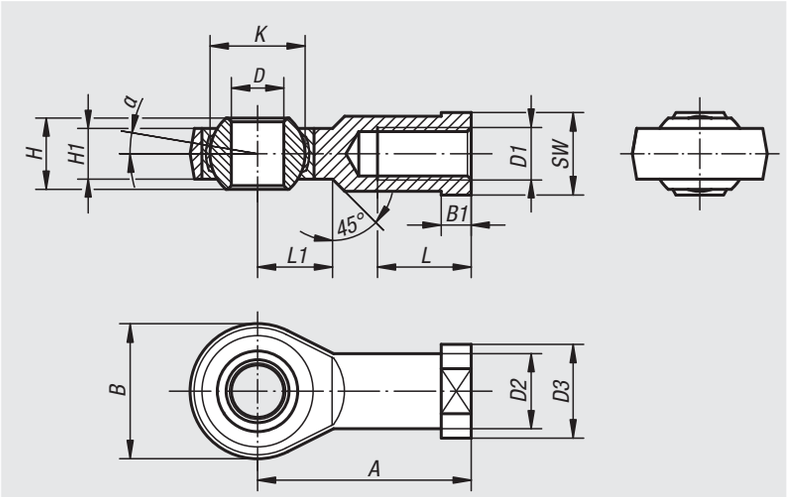
Sample order:
nlm 27631-20

Note:
The rod end bearing is maintenance-free.
The connection dimensions comply with DIN 648 Form Series E.

Order No. right-handed thread	Order No. left-handed thread	D	D1	A	B	H	H1	K	L	L1	α	Dynamic base loads kN	Static base loads kN
27631-06	**27631-061**	6 -0,008	M6	36	20	6	4,4	10	18	11	12°	3,6	8,2
27631-08	**27631-081**	8 -0,008	M8	42	24	8	6	13	22	12	12°	5,8	12,9
27631-10	**27631-101**	10 -0,008	M10	48	28	9	7	16	26	15	12°	8,6	17,6
27631-12	**27631-121**	12 -0,008	M12	54	34	10	8	18	28	15	8°	11,4	24,5
27631-16	**27631-161**	17 -0,008	M16	69	46	14	11	25	36	23	8°	22	45
27631-20	**27631-201**	20 -0,010	M20x1,5	78	53	16	13	29	43	25	8°	31,5	60

Rod ends with plain bearing

internal thread, narrow version



Material:
Housing size (D) 6-10 turned steel.
From size (D) 12 forged steel.
Ball joint ball bearing steel, hardened, ground, polished and hard chromed.
Bearing shell ball bearing steel with PTFE weave glued in.

Version:
galvanized

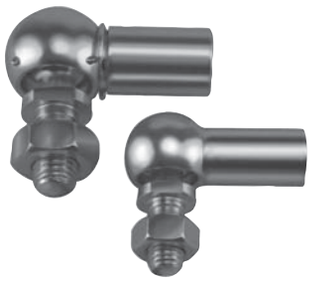
Sample order:
nlm 27632-12

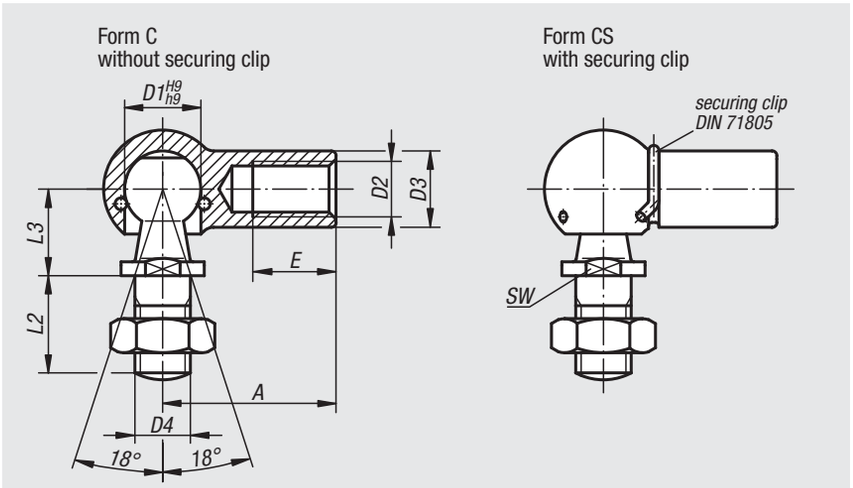
Note:
The rod end bearing is maintenance-free.
The connection dimensions comply with DIN 648 Form Series E.

Order No. right-handed thread	Order No. left-handed thread	D	D1	D2	D3	A	B	B1	H	H1	K	L	L1	SW	α	Dynamic base loads kN	Static base loads kN
27632-06	**27632-061**	6 -0,008	M6	10	13	30	20	5	6	4,4	10	12	11	11	12°	3,6	8,2
27632-08	**27632-081**	8 -0,008	M8	12,5	16	36	24	5	8	6	13	16	12	14	12°	5,8	12,9
27632-10	**27632-101**	10 -0,008	M10	15	19	43	28	6,5	9	7	16	20	13	17	12°	8,6	17,6
27632-10125	**27632-101251**	10 -0,008	M10x1,25	15	19	43	28	6,5	9	7	16	20	13	17	12°	8,6	17,6
27632-12	**27632-121**	12 -0,008	M12	17,5	22	50	34	6,5	10	8	18	22	15	19	8°	11,4	24,5
27632-12125	**27632-121251**	12 -0,008	M12x1,25	17,5	22	50	34	6,5	10	8	18	22	15	19	8°	11,4	24,5
27632-16	**27632-161**	17 -0,008	M16	24	30	67	46	10	14	11	25	33	20	27	8°	22	45
27632-20	**27632-201**	20 -0,010	M20x1,5	27,5	35	77	53	10	16	13	29	38	23	32	8°	31,5	60

Ball joints

DIN 71802





Material:
Steel or stainless steel 1.4305

Version:
Galvanized and chromed.
Stainless steel bright.

Sample order:
nlm 27650-08051

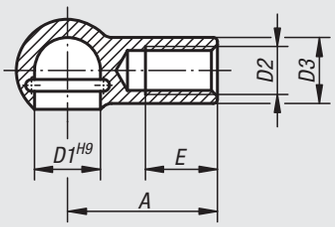
On request:
Left-handed thread.

Order No.	Form	Material	D1	D2	D3	D4	A	L2	L3	E	SW
27650-0805	C	steel	8	M5	8	M5	22	10	9	10,2	7
27650-1006	C	steel	10	M6	10	M6	25	12	11	11,5	8
27650-1308	C	steel	13	M8	13	M8	30	16	13	14	11
27650-1610	C	steel	16	M10	16	M10	35	19	16	15,5	13
27650-1612	C	steel	16	M12	16	M12	35	19	16	15,5	13
27650-1914	C	steel	19	M14x1,5	22	M14x1,5	45	27	20	21,5	16
27650-1916	C	steel	19	M16	22	M16	45	27	20	21,5	16
27650-080351	CS	Steel	8	M3,5	8	M4	18	10	9	8	7
27650-08051	CS	steel	8	M5	8	M5	22	10	9	10,2	7
27650-10061	CS	steel	10	M6	10	M6	25	12	11	11,5	8
27650-13081	CS	steel	13	M8	13	M8	30	16	13	14	11
27650-16101	CS	steel	16	M10	16	M10	35	19	16	15,5	13
27650-16121	CS	steel	16	M12	16	M12	35	19	16	15,5	13
27650-19141	CS	steel	19	M14x1,5	22	M14x1,5	45	27	20	21,5	16
27650-19161	CS	steel	19	M16	22	M16	45	27	20	21,5	16
27650-08052	CS	stainless steel	8	M5	8	M5	22	10	9	10,2	7
27650-10062	CS	stainless steel	10	M6	10	M6	25	12	11	11,5	8
27650-13082	CS	stainless steel	13	M8	13	M8	30	16	13	14	11
27650-16102	CS	stainless steel	16	M10	16	M10	35	19	16	15,5	13
27650-16122	CS	stainless steel	16	M12	16	M12	35	19	16	15,5	13

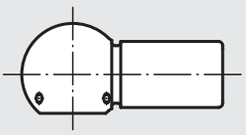
Ball seats for ball joints

DIN 71805

Form A
with snap ring



Form B
with snap ring and slot
for securing clip



Material:
Steel.

Version:
galvanized and chromed

Sample order:
nlm 27655-08051

Note:
The ball sockets are spare parts for DIN 71802 ball joints. See circlips for ball seats for suitable retaining rings for Form B.

On request:
Ball seats stainless steel

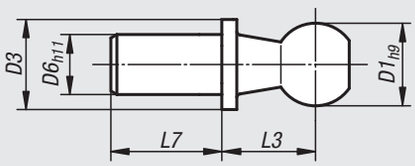
Order No.	Form	D1	D2	D3	A	E
27655-0805	A	8	M5	8	22	10,2
27655-1006	A	10	M6	10	25	11,5
27655-1308	A	13	M8	13	30	14
27655-1610	A	16	M10	16	35	15,5
27655-1612	A	16	M12	16	35	15,5
27655-1914	A	19	M14x1,5	22	45	21,5
27655-1916	A	19	M16	22	45	21,5

Order No.	Form	D1	D2	D3	A	E
27655-080351	B	8	M3,5	8	18	8
27655-08051	B	8	M5	8	22	10,2
27655-10061	B	10	M6	10	25	11,5
27655-13081	B	13	M8	13	30	14
27655-16101	B	16	M10	16	35	15,5
27655-16121	B	16	M12	16	35	15,5
27655-19141	B	19	M14x1,5	22	45	21,5
27655-19161	B	19	M16	22	45	21,5

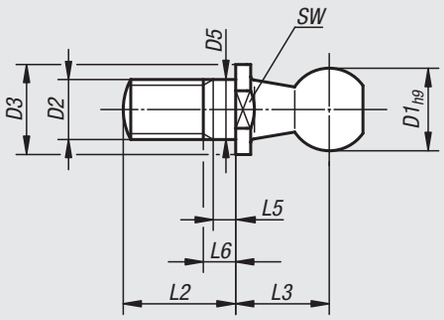
Ball studs for ball joints

DIN 71803

Form B
with rivet pin



Form C
with threaded pin and SW

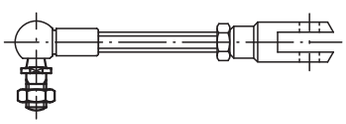


Material:
Steel.

Version:
galvanized and chromed

Sample order:
nlm 27656-1006

Note:
The ball pivots are spare parts for DIN 71802 ball joints.



Order No.	Form	Version	D1	D2	D3	D5	D6	L2	L3	L5 min.	L6 max.	L7	SW
27656-0840	B	short	8	-	8	-	5	-	9	-	-	4	-
27656-1045	B	short	10	-	10	-	6	-	11	-	-	4,5	-
27656-1305	B	short	13	-	13	-	8	-	13	-	-	5	-
27656-1606	B	short	16	-	16	-	10	-	16	-	-	6	-
27656-1912	B	short	19	-	19	-	14	-	20	-	-	12	-
27656-0875	B	long	8	-	8	-	5	-	9	-	-	7,5	-
27656-1080	B	long	10	-	10	-	6	-	11	-	-	8	-
27656-1310	B	long	13	-	13	-	8	-	13	-	-	10	-
27656-1613	B	long	16	-	16	-	10	-	16	-	-	13	-
27656-1918	B	long	19	-	19	-	14	-	20	-	-	18	-
27656-0805	C	-	8	M5	8	5	-	10,2	9	1,2	4	-	7
27656-1006	C	-	10	M6	10	6	-	12,5	11	1,2	4	-	8
27656-1308	C	-	13	M8	13	8	-	16,5	13	1,5	5,3	-	11
27656-1610	C	-	16	M10	16	10	-	20	16	2,5	7,3	-	13
27656-1612	C	-	16	M12	16	12	-	20	16	2,5	7,3	-	13
27656-1914	C	-	19	M14x1,5	19	14	-	28	20	5	10,8	-	16

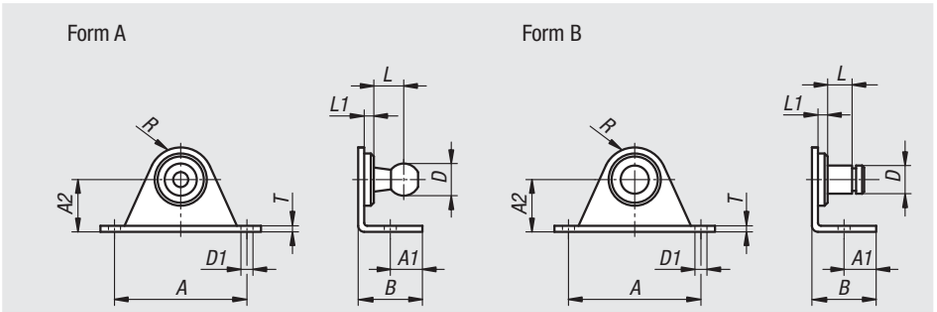
27657

Angle brackets

Material:
Steel.

Version:
galvanized

Sample order:
nlm 27657-00810



Order No.	Form	A	A1	A2	B	D	D1	L	L1	R	T	Strength N
27657-00810	A	19	4,25	10	10	8	3,4	8	3	4	1,5	180
27657-00816	A	40	10	16	20	8	4,3	8	3	10	2	500
27657-01016	A	40	10	16	20	10	4,3	9	3	10	2	800
27657-01316	A	40	10	16	20	13	4,3	9,5	3	10	2	1200
27657-10410	B	19	4,25	10	10	4	3,4	5	2	4	1,5	180
27657-10610	B	19	4,25	10	10	6	3,4	7	4	4	1,5	180
27657-10616	B	40	10	16	20	6	4,3	7	4	10	2	500
27657-10816	B	40	10	16	20	8	4,3	11	5	10	2	1200

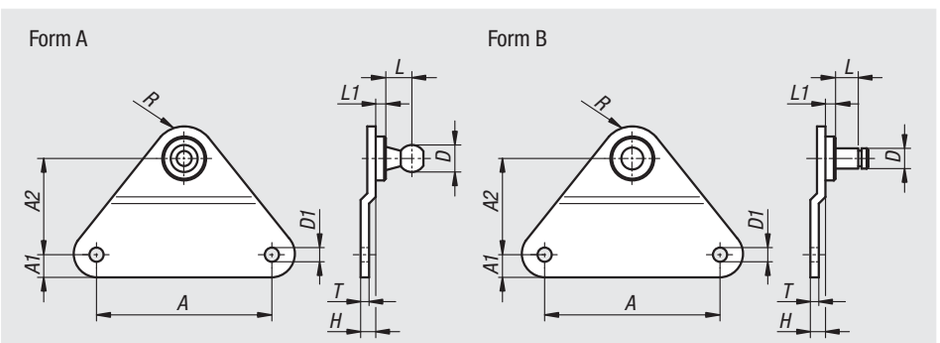
27658

Side brackets

Material:
Steel.

Version:
galvanized

Sample order:
nlm 27658-00815



Order No.	Form	A	A1	A2	D	D1	H	L	L1	R	T	Strength N
27658-00815	A	18	5	15,5	8	4,3	2,5	8	3	5	1,5	180
27658-00830	A	55	7	30	8	5,3	5	8	3	10	3	500
27658-01030	A	55	7	30	10	5,3	5	8	3	10	3	800
27658-01330	A	55	7	30	13	5,3	5	9,5	3	10	3	1200
27658-10415	B	18	5	15,5	4	4,3	2,5	4,5	2	5	1,5	180
27658-10615	B	18	5	15,5	6	4,3	2,5	6,5	4	5	1,5	180
27658-10630	B	55	7	30	6	5,3	5	7	4	10	3	500
27658-10830	B	55	7	30	8	5,3	5	11	5	10	3	1200

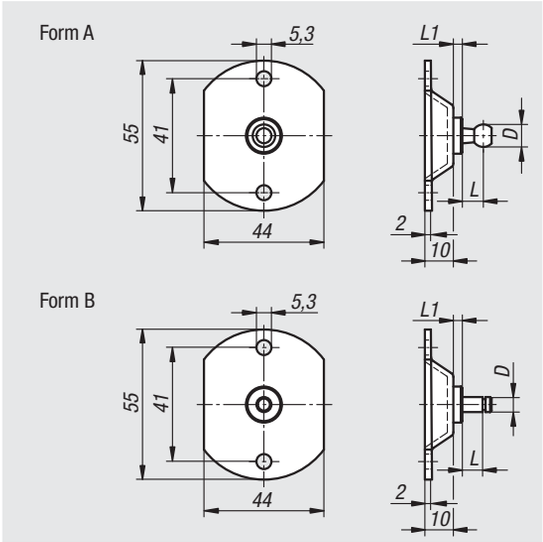
27659

Round brackets

Material:
Steel.

Version:
galvanized

Sample order:
nlm 27659-00855



Order No.	Form	D	L	L1	Strength N
27659-00855	A	8	8	3	500
27659-01055	A	10	9	3	800
27659-01355	A	13	9,5	3	1200
27659-10655	B	6	7	4	500
27659-10855	B	8	11	5	1200

27660

Circlips for ball seats

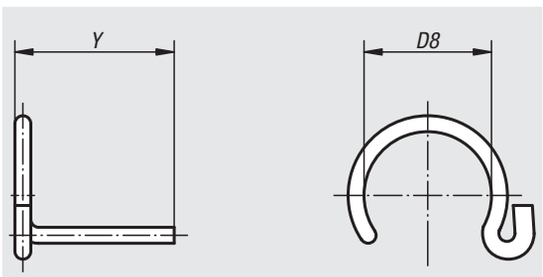
DIN 71805

Material:
Spring steel

Version:
galvanized and chromed

Sample order:
nlm 27660-08

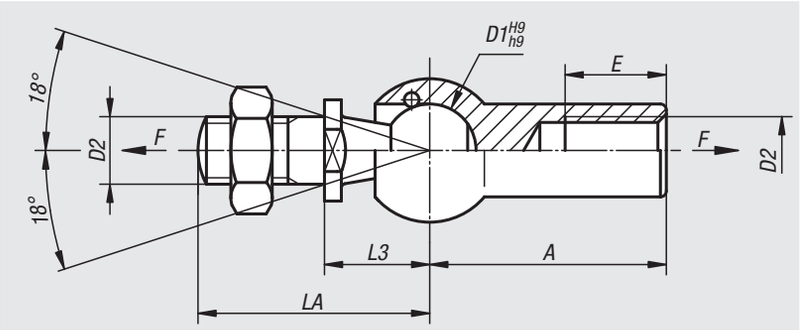
Note:
For Ball seats DIN 71805



Order No.	Type	D8	Y	Suitable for ball sockets with D1
27660-08	S 8	7	12	8
27660-10	S10	8,7	12,5	10
27660-13	S13	11	15,7	13
27660-16	S16	13	19	16
27660-19	S19	20	24	19

Axial joints

similar to DIN 71802



Material:
Steel.

Version:
galvanized and chromed

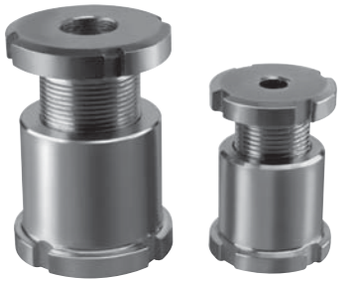
Sample order:
nlm 27665-10

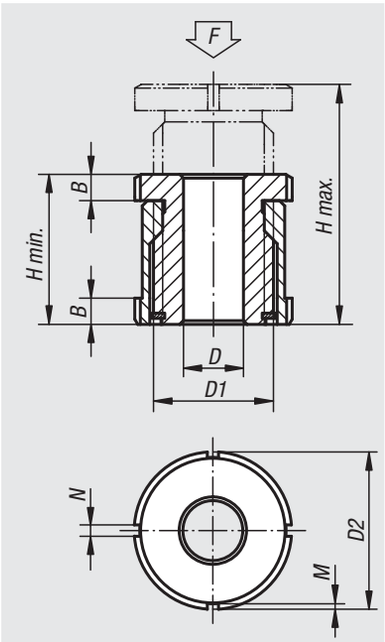
On request:
Axial joints with greater extraction force and left-hand thread available.

Order No.	D1	D2	A	LA	L3	E	Extraction force F in N
27665-08	8	M5	22	19,2	9	10,2	30
27665-10	10	M6	25	23,5	11	11,5	40
27665-13	13	M8	30	29,5	13	14	60
27665-16	16	M10	35	36	16	15,5	80
27665-19	19	M14x1,5	45	48	20	21,5	100

Levelling sets

high version





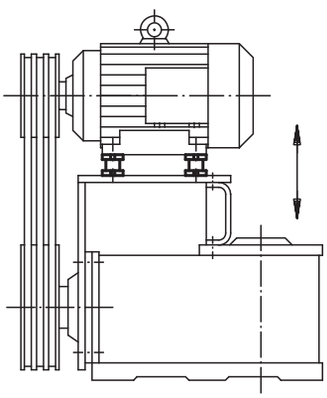
Material:
Steel 1.7225.
Stainless steel 1.4305.

Version:
Steel zinc plated, blue chromed.
Stainless steel bright.

Sample order:
nlm 27700-01505

Note:
Levelling sets are used for mounting, levelling and aligning motors, aggregates, drive units and assembly lines. They have a large adjustment range of 15 mm to 40 mm. Other sizes available on request.

Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	F kN
27700-01504	steel	4,5	M4	M15x1	25	28	43	5	4	2	40
27700-01505	steel	5,5	M5	M15x1	25	28	43	5	4	2	40
27700-01506	steel	6,6	M6	M15x1	25	28	43	5	4	2	40
27700-02006	steel	6,6	M6	M20x1	32	35	55	6	4	2	65
27700-02008	steel	9	M8	M20x1	32	35	55	6	4	2	65
27700-02010	steel	11	M10	M20x1	32	35	55	6	4	2	65
27700-02510	steel	11	M10	M30x1,5	45	42	67	7	5	2	120
27700-02512	steel	13,5	M12	M30x1,5	45	42	67	7	5	2	120
27700-02516	steel	17,5	M16	M30x1,5	45	42	67	7	5	2	120
27700-03216	steel	17,5	M16	M40x1,5	58	54	86	9	6	2,5	210
27700-03220	steel	22	M20	M40x1,5	58	54	86	9	6	2,5	210
27700-03224	steel	26	M24	M40x1,5	58	54	86	9	6	2,5	210
27700-04020	steel	22	M20	M50x1,5	70	66	106	11	6	2,5	330
27700-04024	steel	26	M24	M50x1,5	70	66	106	11	6	2,5	330
27700-04030	steel	33	M30	M50x1,5	70	66	106	11	6	2,5	330
27700-015041	stainless steel	4,5	M4	M15x1	25	28	43	5	4	2	27,1
27700-015051	stainless steel	5,5	M5	M15x1	25	28	43	5	4	2	27,1
27700-015061	stainless steel	6,6	M6	M15x1	25	28	43	5	4	2	27,1
27700-020061	stainless steel	6,6	M6	M20x1	32	35	55	6	4	2	43,4
27700-020081	stainless steel	9	M8	M20x1	32	35	55	6	4	2	43,4
27700-020101	stainless steel	11	M10	M20x1	32	35	55	6	4	2	43,4
27700-025101	stainless steel	11	M10	M30x1,5	45	42	67	7	5	2	84
27700-025121	stainless steel	13,5	M12	M30x1,5	45	42	67	7	5	2	84
27700-025161	stainless steel	17,5	M16	M30x1,5	45	42	67	7	5	2	84
27700-032161	stainless steel	17,5	M16	M40x1,5	58	54	86	9	6	2,5	148
27700-032201	stainless steel	22	M20	M40x1,5	58	54	86	9	6	2,5	148
27700-032241	stainless steel	26	M24	M40x1,5	58	54	86	9	6	2,5	148
27700-040201	stainless steel	22	M20	M50x1,5	70	66	106	11	6	2,5	225
27700-040241	stainless steel	26	M24	M50x1,5	70	66	106	11	6	2,5	225
27700-040301	stainless steel	33	M30	M50x1,5	70	66	106	11	6	2,5	225



Levelling sets

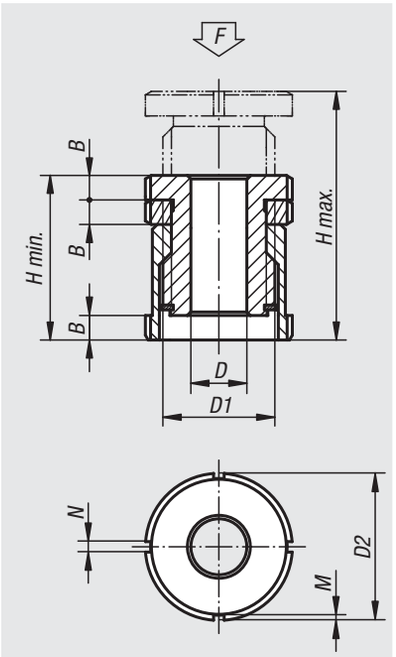
with locknut

Material:
Steel 1.7225.
Stainless steel 1.4305.

Version:
Steel zinc plated, blue chromed.
Stainless steel bright.

Sample order:
nlm 27701-01004

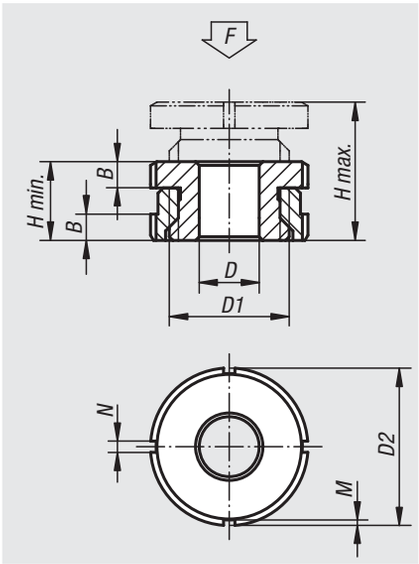
Note:
Levelling sets are used for mounting, levelling and aligning motors, aggregates, drive units and assembly lines. The locknut locks the set height. Other sizes available on request.



Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	F kN
27701-01004	steel	4,5	M4	M15x1	25	33	43	5	4	2	40
27701-01005	steel	5,5	M5	M15x1	25	33	43	5	4	2	40
27701-01006	steel	6,6	M6	M15x1	25	33	43	5	4	2	40
27701-01406	steel	6,6	M6	M20x1	32	41	55	6	4	2	65
27701-01408	steel	9	M8	M20x1	32	41	55	6	4	2	65
27701-01410	steel	11	M10	M20x1	32	41	55	6	4	2	65
27701-01810	steel	11	M10	M30x1,5	45	49	67	7	5	2	120
27701-01812	steel	13,5	M12	M30x1,5	45	49	67	7	5	2	120
27701-01816	steel	17,5	M16	M30x1,5	45	49	67	7	5	2	120
27701-02316	steel	17,5	M16	M40x1,5	58	63	86	9	6	2,5	210
27701-02320	steel	22	M20	M40x1,5	58	63	86	9	6	2,5	210
27701-02324	steel	26	M24	M40x1,5	58	63	86	9	6	2,5	210
27701-02920	steel	22	M20	M50x1,5	70	77	106	11	6	2,5	330
27701-02924	steel	26	M24	M50x1,5	70	77	106	11	6	2,5	330
27701-02930	steel	33	M30	M50x1,5	70	77	106	11	6	2,5	330
27701-010041	stainless steel	4,5	M4	M15x1	25	33	43	5	4	2	27,1
27701-010051	stainless steel	5,5	M5	M15x1	25	33	43	5	4	2	27,1
27701-010061	stainless steel	6,6	M6	M15x1	25	33	43	5	4	2	27,1
27701-014061	stainless steel	6,6	M6	M20x1	32	41	55	6	4	2	43,4
27701-014081	stainless steel	9	M8	M20x1	32	41	55	6	4	2	43,4
27701-014101	stainless steel	11	M10	M20x1	32	41	55	6	4	2	43,4
27701-018101	stainless steel	11	M10	M30x1,5	45	49	67	7	5	2	84
27701-018121	stainless steel	13,5	M12	M30x1,5	45	49	67	7	5	2	84
27701-018161	stainless steel	17,5	M16	M30x1,5	45	49	67	7	5	2	84
27701-023161	stainless steel	17,5	M16	M40x1,5	58	63	86	9	6	2,5	148
27701-023201	stainless steel	22	M20	M40x1,5	58	63	86	9	6	2,5	148
27701-023241	stainless steel	26	M24	M40x1,5	58	63	86	9	6	2,5	148
27701-029201	stainless steel	22	M20	M50x1,5	70	77	106	11	6	2,5	225
27701-029241	stainless steel	26	M24	M50x1,5	70	77	106	11	6	2,5	225
27701-029301	stainless steel	33	M30	M50x1,5	70	77	106	11	6	2,5	225

Levelling sets

low version

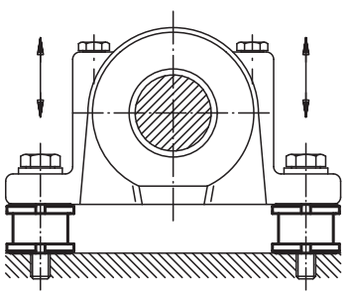


Material:
Steel 1.7225.
Stainless steel 1.4305.

Version:
Steel zinc plated, blue chromed.
Stainless steel bright.

Sample order:
nlm 27702-0404

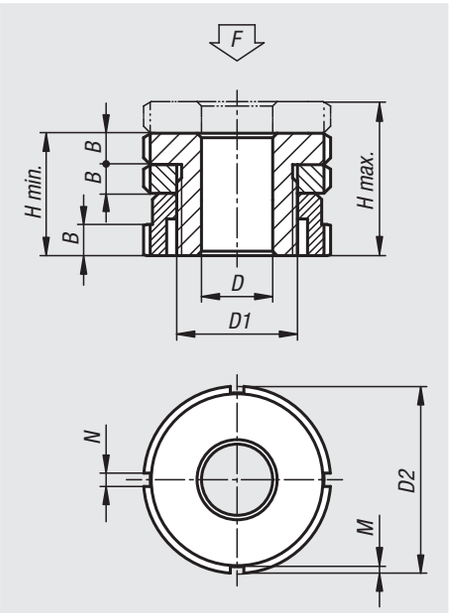
Note:
Levelling sets are used for mounting, levelling and aligning motors, aggregates, drive units and assembly lines. This levelling set has an extremely low height. Single levelling sets can be set at several mounting points to achieve a precise and torsion-free alignment.



Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	F kN
27702-0404	steel	4,5	M4	M15x1	25	15	19	5	4	2	40
27702-0405	steel	5,5	M5	M15x1	25	15	19	5	4	2	40
27702-0406	steel	6,6	M6	M15x1	25	15	19	5	4	2	40
27702-0506	steel	6,6	M6	M20x1	32	18	23	6	4	2	65
27702-0508	steel	9	M8	M20x1	32	18	23	6	4	2	65
27702-0510	steel	11	M10	M20x1	32	18	23	6	4	2	65
27702-0710	steel	11	M10	M30x1,5	45	22	29	7	5	2	120
27702-0712	steel	13,5	M12	M30x1,5	45	22	29	7	5	2	120
27702-0716	steel	17,5	M16	M30x1,5	45	22	29	7	5	2	120
27702-0916	steel	17,5	M16	M40x1,5	58	28	37	9	6	2,5	210
27702-0920	steel	22	M20	M40x1,5	58	28	37	9	6	2,5	210
27702-0924	steel	26	M24	M40x1,5	58	28	37	9	6	2,5	210
27702-1020	steel	22	M20	M50x1,5	70	33	43	11	6	2,5	330
27702-1024	steel	26	M24	M50x1,5	70	33	43	11	6	2,5	330
27702-1030	steel	33	M30	M50x1,5	70	33	43	11	6	2,5	330
27702-04041	stainless steel	4,5	M4	M15x1	25	15	19	5	4	2	27,1
27702-04051	stainless steel	5,5	M5	M15x1	25	15	19	5	4	2	27,1
27702-04061	stainless steel	6,6	M6	M15x1	25	15	19	5	4	2	27,1
27702-05061	stainless steel	6,6	M6	M20x1	32	18	23	6	4	2	43,4
27702-05081	stainless steel	9	M8	M20x1	32	18	23	6	4	2	43,4
27702-05101	stainless steel	11	M10	M20x1	32	18	23	6	4	2	43,4
27702-07101	stainless steel	11	M10	M30x1,5	45	22	29	7	5	2	84
27702-07121	stainless steel	13,5	M12	M30x1,5	45	22	29	7	5	2	84
27702-07161	stainless steel	17,5	M16	M30x1,5	45	22	29	7	5	2	84
27702-09161	stainless steel	17,5	M16	M40x1,5	58	28	37	9	6	2,5	148
27702-09201	stainless steel	22	M20	M40x1,5	58	28	37	9	6	2,5	148
27702-09241	stainless steel	26	M24	M40x1,5	58	28	37	9	6	2,5	148
27702-10201	stainless steel	22	M20	M50x1,5	70	33	43	11	6	2,5	225
27702-10241	stainless steel	26	M24	M50x1,5	70	33	43	11	6	2,5	225
27702-10301	stainless steel	33	M30	M50x1,5	70	33	43	11	6	2,5	225

Levelling sets

with locknut



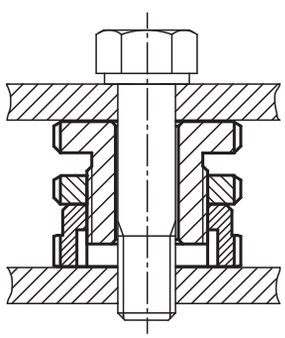
Material:
Steel 1.7225,
stainless steel 1.4305.

Version:
Standard version galvanized, blue chromed.
Stainless steel version bright.

Sample order:
nlm 27703-0404

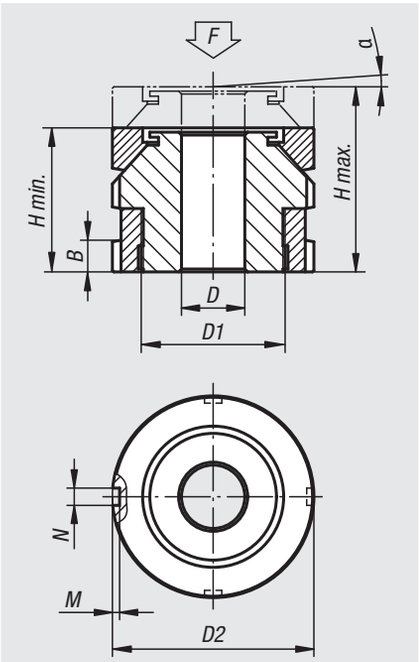
Note:
The levelling sets are used to mount and align motors, aggregates, drive units and production lines. The advantage of levelling sets are their low height. Alignments can be made quickly and easily even with several levelling points. Distortion-free mounting is guaranteed. The locknut secures a prescribed adjustment.

Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	F kN
27703-0404	steel	4,5	M4	M15x1	25	20	24	5	4	2	40
27703-0405	steel	5,5	M5	M15x1	25	20	24	5	4	2	40
27703-0406	steel	6,6	M6	M15x1	25	20	24	5	4	2	40
27703-0506	steel	6,6	M6	M20x1	32	24	29	6	4	2	65
27703-0508	steel	9	M8	M20x1	32	24	29	6	4	2	65
27703-0510	steel	11	M10	M20x1	32	24	29	6	4	2	65
27703-0710	steel	11	M10	M30x1,5	45	29	36	7	5	2	120
27703-0712	steel	13,5	M12	M30x1,5	45	29	36	7	5	2	120
27703-0716	steel	17,5	M16	M30x1,5	45	29	36	7	5	2	120
27703-0916	steel	17,5	M16	M40x1,5	58	37	46	9	6	2,5	210
27703-0920	steel	22	M20	M40x1,5	58	37	46	9	6	2,5	210
27703-0924	steel	26	M24	M40x1,5	58	37	46	9	6	2,5	210
27703-1020	steel	22	M20	M50x1,5	70	44	54	11	6	2,5	330
27703-1024	steel	26	M24	M50x1,5	70	44	54	11	6	2,5	330
27703-1030	steel	33	M30	M50x1,5	70	44	54	11	6	2,5	330
27703-04041	stainless steel	4,5	M4	M15x1	25	20	24	5	4	2	27,1
27703-04051	stainless steel	5,5	M5	M15x1	25	20	24	5	4	2	27,1
27703-04061	stainless steel	6,6	M6	M15x1	25	20	24	5	4	2	27,1
27703-05061	stainless steel	6,6	M6	M20x1	32	24	29	6	4	2	43,4
27703-05081	stainless steel	9	M8	M20x1	32	24	29	6	4	2	43,4
27703-05101	stainless steel	11	M10	M20x1	32	24	29	6	4	2	43,4
27703-07101	stainless steel	11	M10	M30x1,5	45	29	36	7	5	2	84
27703-07121	stainless steel	13,5	M12	M30x1,5	45	29	36	7	5	2	84
27703-07161	stainless steel	17,5	M16	M30x1,5	45	29	36	7	5	2	84
27703-09161	stainless steel	17,5	M16	M40x1,5	58	37	46	9	6	2,5	148
27703-09201	stainless steel	22	M20	M40x1,5	58	37	46	9	6	2,5	148
27703-09241	stainless steel	26	M24	M40x1,5	58	37	46	9	6	2,5	148
27703-10201	stainless steel	22	M20	M50x1,5	70	44	54	11	6	2,5	225
27703-10241	stainless steel	26	M24	M50x1,5	70	44	54	11	6	2,5	225
27703-10301	stainless steel	33	M30	M50x1,5	70	44	54	11	6	2,5	225



Levelling sets

spherical washer



Material:
Steel 1.7225.
Stainless steel 1.4305.

Version:
Steel zinc plated, blue chromed.
Stainless steel bright.

Sample order:
nlm 27705-0406

Note:
Levelling sets with spherical washers are used for mounting, levelling and aligning motors, aggregates, drive units and assembly lines. The spherical washer permits exact alignment when mounting sloping surfaces of up to 4°.

Accessories:
Spherical levelling washers 07460

Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	α	F kN
27705-0406	steel	6,6	M6	M15x1	25	22	26	5	4	2	4°	40
27705-0506	steel	6,6	M6	M20x1	32	26	31	6	4	2	4°	65
27705-0508	steel	9	M8	M20x1	32	26	31	6	4	2	4°	65
27705-0510	steel	11	M10	M20x1	32	26	31	6	4	2	4°	65
27705-0710	steel	11	M10	M30x1,5	45	34	41	7	5	2	4°	120
27705-0712	steel	13,5	M12	M30x1,5	45	34	41	7	5	2	4°	120
27705-0716	steel	17,5	M16	M30x1,5	45	34	41	7	5	2	4°	120
27705-0916	steel	17,5	M16	M40x1,5	58	44	53	9	6	2,5	4°	210
27705-0920	steel	22	M20	M40x1,5	58	44	53	9	6	2,5	4°	210
27705-0924	steel	26	M24	M40x1,5	58	44	53	9	6	2,5	4°	210
27705-1020	steel	22	M20	M50x1,5	70	50	60	11	6	2,5	4°	330
27705-1024	steel	26	M24	M50x1,5	70	50	60	11	6	2,5	4°	330
27705-1030	steel	33	M30	M50x1,5	70	50	60	11	6	2,5	4°	330
27705-1224	steel	26	M24	M60x2	80	56	68	11	7	3	4°	495
27705-1230	steel	33	M30	M60x2	80	56	68	11	7	3	4°	495
27705-04061	stainless steel	6,6	M6	M15x1	25	22	26	5	4	2	4°	27,1
27705-05061	stainless steel	6,6	M6	M20x1	32	26	31	6	4	2	4°	43,4
27705-05081	stainless steel	9	M8	M20x1	32	26	31	6	4	2	4°	43,4
27705-05101	stainless steel	11	M10	M20x1	32	26	31	6	4	2	4°	43,4
27705-07101	stainless steel	11	M10	M30x1,5	45	34	41	7	5	2	4°	84
27705-07121	stainless steel	13,5	M12	M30x1,5	45	34	41	7	5	2	4°	84
27705-07161	stainless steel	17,5	M16	M30x1,5	45	34	41	7	5	2	4°	84
27705-09161	stainless steel	17,5	M16	M40x1,5	58	44	53	9	6	2,5	4°	148
27705-09201	stainless steel	22	M20	M40x1,5	58	44	53	9	6	2,5	4°	148
27705-09241	stainless steel	26	M24	M40x1,5	58	44	53	9	6	2,5	4°	148
27705-10201	stainless steel	22	M20	M50x1,5	70	50	60	11	6	2,5	4°	225
27705-10241	stainless steel	26	M24	M50x1,5	70	50	60	11	6	2,5	4°	225
27705-10301	stainless steel	33	M30	M50x1,5	70	50	60	11	6	2,5	4°	225
27705-12241	stainless steel	26	M24	M60x2	80	56	68	11	7	3	4°	323
27705-12301	stainless steel	33	M30	M60x2	80	56	68	11	7	3	4°	323

Levelling sets

spherical washer with locknut

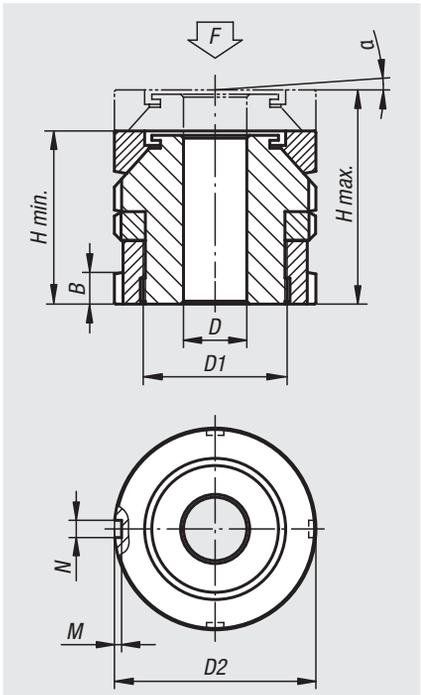
Material:
Steel 1.7225,
stainless steel 1.4305.

Version:
Standard version galvanized, blue chromed.
Stainless steel version bright.

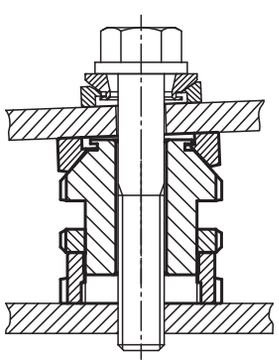
Sample order:
nlm 27706-0406

Note:
The spherical washer levelling set is used to mount and align motors, aggregates, drive units and production lines. The spherical washer gives exact alignment of sloping faces with an inclination of up to 4°. The locknut secures a prescribed adjustment.

Accessories:
Spherical levelling washers 07460

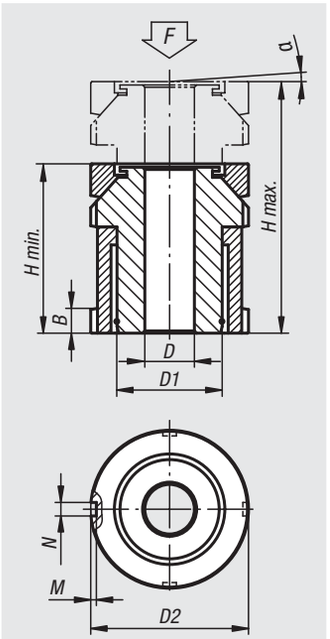


Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	α	F kN
27706-0406	steel	6,6	M6	M15x1	25	27	31	5	4	2	4°	40
27706-0506	steel	6,6	M6	M20x1	32	32	37	6	4	2	4°	65
27706-0508	steel	9	M8	M20x1	32	32	37	6	4	2	4°	65
27706-0510	steel	11	M10	M20x1	32	32	37	6	4	2	4°	65
27706-0710	steel	11	M10	M30x1,5	45	41	48	7	5	2	4°	120
27706-0712	steel	13,5	M12	M30x1,5	45	41	48	7	5	2	4°	120
27706-0716	steel	17,5	M16	M30x1,5	45	41	48	7	5	2	4°	120
27706-0916	steel	17,5	M16	M40x1,5	58	53	62	9	6	2,5	4°	210
27706-0920	steel	22	M20	M40x1,5	58	53	62	9	6	2,5	4°	210
27706-0924	steel	26	M24	M40x1,5	58	53	62	9	6	2,5	4°	210
27706-1020	steel	22	M20	M50x1,5	70	61	71	11	6	2,5	4°	330
27706-1024	steel	26	M24	M50x1,5	70	61	71	11	6	2,5	4°	330
27706-1030	steel	33	M30	M50x1,5	70	61	71	11	6	2,5	4°	330
27706-1224	steel	26	M24	M60x2	80	67	79	11	7	3	4°	495
27706-1230	steel	33	M30	M60x2	80	67	79	11	7	3	4°	495
27706-04061	stainless steel	6,6	M6	M15x1	25	27	31	5	4	2	4°	27,1
27706-05061	stainless steel	6,6	M6	M20x1	32	32	37	6	4	2	4°	43,4
27706-05081	stainless steel	9	M8	M20x1	32	32	37	6	4	2	4°	43,4
27706-05101	stainless steel	11	M10	M20x1	32	32	37	6	4	2	4°	43,4
27706-07101	stainless steel	11	M10	M30x1,5	45	41	48	7	5	2	4°	84
27706-07121	stainless steel	13,5	M12	M30x1,5	45	41	48	7	5	2	4°	84
27706-07161	stainless steel	17,5	M16	M30x1,5	45	41	48	7	5	2	4°	84
27706-09161	stainless steel	17,5	M16	M40x1,5	58	53	62	9	6	2,5	4°	148
27706-09201	stainless steel	22	M20	M40x1,5	58	53	62	9	6	2,5	4°	148
27706-09241	stainless steel	26	M24	M40x1,5	58	53	62	9	6	2,5	4°	148
27706-10201	stainless steel	22	M20	M50x1,5	70	61	71	11	6	2,5	4°	225
27706-10241	stainless steel	26	M24	M50x1,5	70	61	71	11	6	2,5	4°	225
27706-10301	stainless steel	33	M30	M50x1,5	70	61	71	11	6	2,5	4°	225
27706-12241	stainless steel	26	M24	M60x2	80	67	79	11	7	3	4°	323
27706-12301	stainless steel	33	M30	M60x2	80	67	79	11	7	3	4°	323



Levelling sets

spherical washer



Material:
Steel 1.7225,
stainless steel 1.4305.

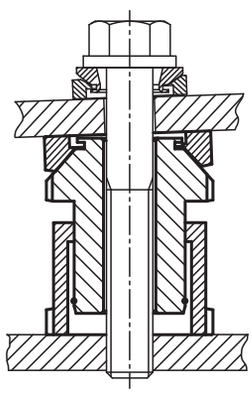
Version:
Standard version galvanized, blue chromed.
Stainless steel version bright.

Sample order:
nlm 27707-1506

Note:
The spherical washer levelling sets are used to mount and align motors, aggregates, drive units and production lines. The spherical washer permits exact alignment when mounting sloping surfaces of up to 4°. These levellers have a long travel of 15 mm to 50 mm.

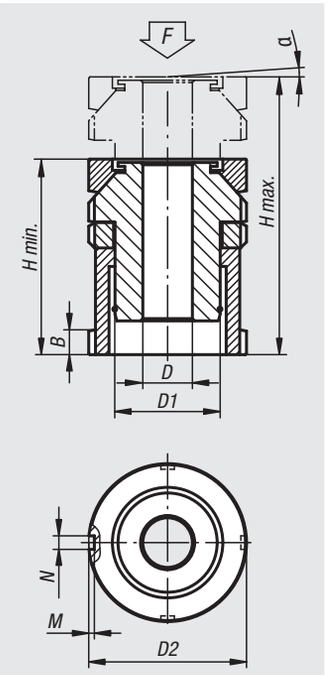
Accessories:
Spherical levelling washers 07460

Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	α	F kN
27707-1506	steel	6,6	M6	M15x1	25	35	50	5	4	2	4°	40
27707-2006	steel	6,6	M6	M20x1	32	43	63	6	4	2	4°	65
27707-2008	steel	9	M8	M20x1	32	43	63	6	4	2	4°	65
27707-2010	steel	11	M10	M20x1	32	43	63	6	4	2	4°	65
27707-2510	steel	11	M10	M30x1,5	45	54	79	7	5	2	4°	120
27707-2512	steel	13,5	M12	M30x1,5	45	54	79	7	5	2	4°	120
27707-2516	steel	17,5	M16	M30x1,5	45	54	79	7	5	2	4°	120
27707-3216	steel	17,5	M16	M40x1,5	58	70	102	9	6	2,5	4°	210
27707-3220	steel	22	M20	M40x1,5	58	70	102	9	6	2,5	4°	210
27707-3224	steel	26	M24	M40x1,5	58	70	102	9	6	2,5	4°	210
27707-4020	steel	22	M20	M50x1,5	70	83	123	11	6	2,5	4°	330
27707-4024	steel	26	M24	M50x1,5	70	83	123	11	6	2,5	4°	330
27707-4030	steel	33	M30	M50x1,5	70	83	123	11	6	2,5	4°	330
27707-5024	steel	26	M24	M60x2	80	94	144	11	7	3	4°	495
27707-5030	steel	33	M30	M60x2	80	94	144	11	7	3	4°	495
27707-15061	stainless steel	6,6	M6	M15x1	25	35	50	5	4	2	4°	27,1
27707-20061	stainless steel	6,6	M6	M20x1	32	43	63	6	4	2	4°	43,4
27707-20081	stainless steel	9	M8	M20x1	32	43	63	6	4	2	4°	43,4
27707-20101	stainless steel	11	M10	M20x1	32	43	63	6	4	2	4°	43,4
27707-25101	stainless steel	11	M10	M30x1,5	45	54	79	7	5	2	4°	84
27707-25121	stainless steel	13,5	M12	M30x1,5	45	54	79	7	5	2	4°	84
27707-25161	stainless steel	17,5	M16	M30x1,5	45	54	79	7	5	2	4°	84
27707-32161	stainless steel	17,5	M16	M40x1,5	58	70	102	9	6	2,5	4°	148
27707-32201	stainless steel	22	M20	M40x1,5	58	70	102	9	6	2,5	4°	148
27707-32241	stainless steel	26	M24	M40x1,5	58	70	102	9	6	2,5	4°	148
27707-40201	stainless steel	22	M20	M50x1,5	70	83	123	11	6	2,5	4°	225
27707-40241	stainless steel	26	M24	M50x1,5	70	83	123	11	6	2,5	4°	225
27707-40301	stainless steel	33	M30	M50x1,5	70	83	123	11	6	2,5	4°	225
27707-50241	stainless steel	26	M24	M60x2	80	94	144	11	7	3	4°	323
27707-50301	stainless steel	33	M30	M60x2	80	94	144	11	7	3	4°	323



Levelling sets

spherical washer with locknut



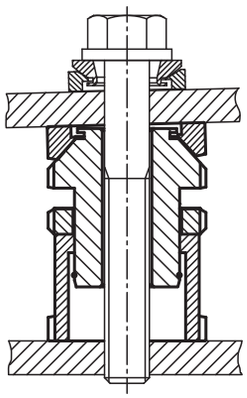
Material:
Steel 1.7225,
stainless steel 1.4305.

Version:
Standard version galvanized, blue chromed.
Stainless steel version bright.

Sample order:
nlm 27708-1006

Note:
The spherical washer levelling sets are used to mount and align motors, aggregates, drive units and production lines. The spherical washer permits exact alignment when mounting sloping surfaces of up to 4°. The locknut secures a prescribed adjustment. These levellers have a long travel of 10 mm to 39 mm.

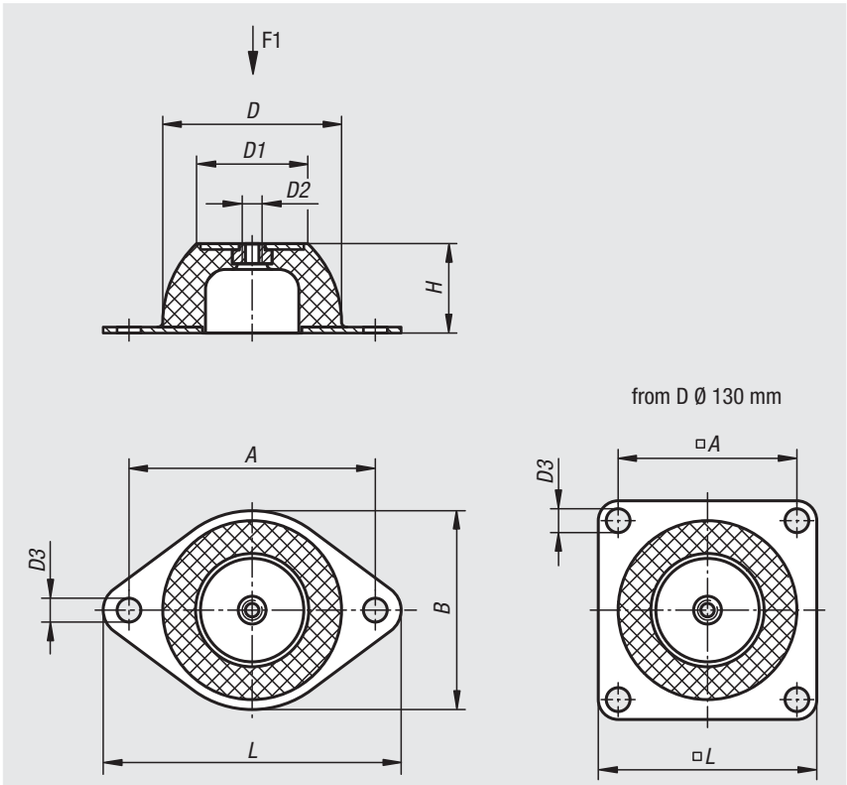
Accessories:
Spherical levelling washers 07460



Order No.	Material	D	for screw	D1	D2	H min.	H max.	B	N	M	α	F kN
27708-1006	steel	6,6	M6	M15x1	25	40	50	5	4	2	4°	40
27708-1406	steel	6,6	M6	M20x1	32	49	63	6	4	2	4°	65
27708-1408	steel	9	M8	M20x1	32	49	63	6	4	2	4°	65
27708-1410	steel	11	M10	M20x1	32	49	63	6	4	2	4°	65
27708-1810	steel	11	M10	M30x1,5	45	61	79	7	5	2	4°	120
27708-1812	steel	13,5	M12	M30x1,5	45	61	79	7	5	2	4°	120
27708-1816	steel	17,5	M16	M30x1,5	45	61	79	7	5	2	4°	120
27708-2316	steel	17,5	M16	M40x1,5	58	79	102	9	6	2,5	4°	210
27708-2320	steel	22	M20	M40x1,5	58	79	102	9	6	2,5	4°	210
27708-2324	steel	26	M24	M40x1,5	58	79	102	9	6	2,5	4°	210
27708-2920	steel	22	M20	M50x1,5	70	94	123	11	6	2,5	4°	330
27708-2924	steel	26	M24	M50x1,5	70	94	123	11	6	2,5	4°	330
27708-2930	steel	33	M30	M50x1,5	70	94	123	11	6	2,5	4°	330
27708-3924	steel	26	M24	M60x2	80	105	144	11	7	3	4°	495
27708-3930	steel	33	M30	M60x2	80	105	144	11	7	3	4°	495
27708-10061	stainless steel	6,6	M6	M15x1	25	40	50	5	4	2	4°	27,1
27708-14061	stainless steel	6,6	M6	M20x1	32	49	63	6	4	2	4°	43,4
27708-14081	stainless steel	9	M8	M20x1	32	49	63	6	4	2	4°	43,4
27708-14101	stainless steel	11	M10	M20x1	32	49	63	6	4	2	4°	43,4
27708-18101	stainless steel	11	M10	M30x1,5	45	61	79	7	5	2	4°	84
27708-18121	stainless steel	13,5	M12	M30x1,5	45	61	79	7	5	2	4°	84
27708-18161	stainless steel	17,5	M16	M30x1,5	45	61	79	7	5	2	4°	84
27708-23161	stainless steel	17,5	M16	M40x1,5	58	79	102	9	6	2,5	4°	148
27708-23201	stainless steel	22	M20	M40x1,5	58	79	102	9	6	2,5	4°	148
27708-23241	stainless steel	26	M24	M40x1,5	58	79	102	9	6	2,5	4°	148
27708-29201	stainless steel	22	M20	M50x1,5	70	94	123	11	6	2,5	4°	225
27708-29241	stainless steel	26	M24	M50x1,5	70	94	123	11	6	2,5	4°	225
27708-29301	stainless steel	33	M30	M50x1,5	70	94	123	11	6	2,5	4°	225
27708-39241	stainless steel	26	M24	M60x2	80	105	144	11	7	3	4°	323
27708-39301	stainless steel	33	M30	M60x2	80	105	144	11	7	3	4°	323

Cap elements

type H2



Material:
Metal parts, steel, grade 5.6.
Natural rubber, hardness 40° or 60° Shore A.

Version:
Steel galvanized.

Sample order:
nlm 27750-03502040

Note:
The cap elements are highly elastic both in radial and in axial direction and therefore offer an outstanding impact isolation.
The special shaping of the cap elements allows isolation of sound and vibrations of machines and assemblies with a low natural frequency. They are especially suitable for supporting sensitive instruments and small devices.

The elements must not be subjected to tensile stress.

Temperature range:
-30 °C to +80 °C.

Order No.	Version	A	B	D	D1	D2	D3	H	L	F1 (N)
27750-03502040	Hardness 40° Shore A	50	43	35	18	M6	7	20	64	34
27750-05002540	Hardness 40° Shore A	66	56	50	33	M8	8	25	85	200
27750-07003540	Hardness 40° Shore A	92	76	70	45	M10	10	35	114	390
27750-08504040	Hardness 40° Shore A	110	96	85	53	M10	11,5	40	136	680
27750-09004540	Hardness 40° Shore A	124	101	90	58	M10	11,5	45	151	1280
27750-13006340	Hardness 40° Shore A	120	-	130	78	M12	14,5	63	150	2700
27750-18008540	Hardness 40° Shore A	160	-	180	100	M16	14,5	85	200	3700
27750-03502060	Hardness 60° Shore A	50	43	35	18	M6	7	20	64	90
27750-05002560	Hardness 60° Shore A	66	56	50	33	M8	8	25	85	490
27750-07003560	Hardness 60° Shore A	92	76	70	45	M10	10	35	114	780
27750-08504060	Hardness 60° Shore A	110	96	85	53	M10	11,5	40	136	1450
27750-09004560	Hardness 60° Shore A	124	101	90	58	M10	11,5	45	151	2150
27750-13006360	Hardness 60° Shore A	120	-	130	78	M12	14,5	63	150	4900
27750-18008560	Hardness 60° Shore A	160	-	180	100	M16	14,5	85	200	7350

Machine feet

Material:
Metal parts, steel grade 5.6.
Elastomer, natural rubber,
medium hardness, 60° Shore.

Version:
Steel galvanized.

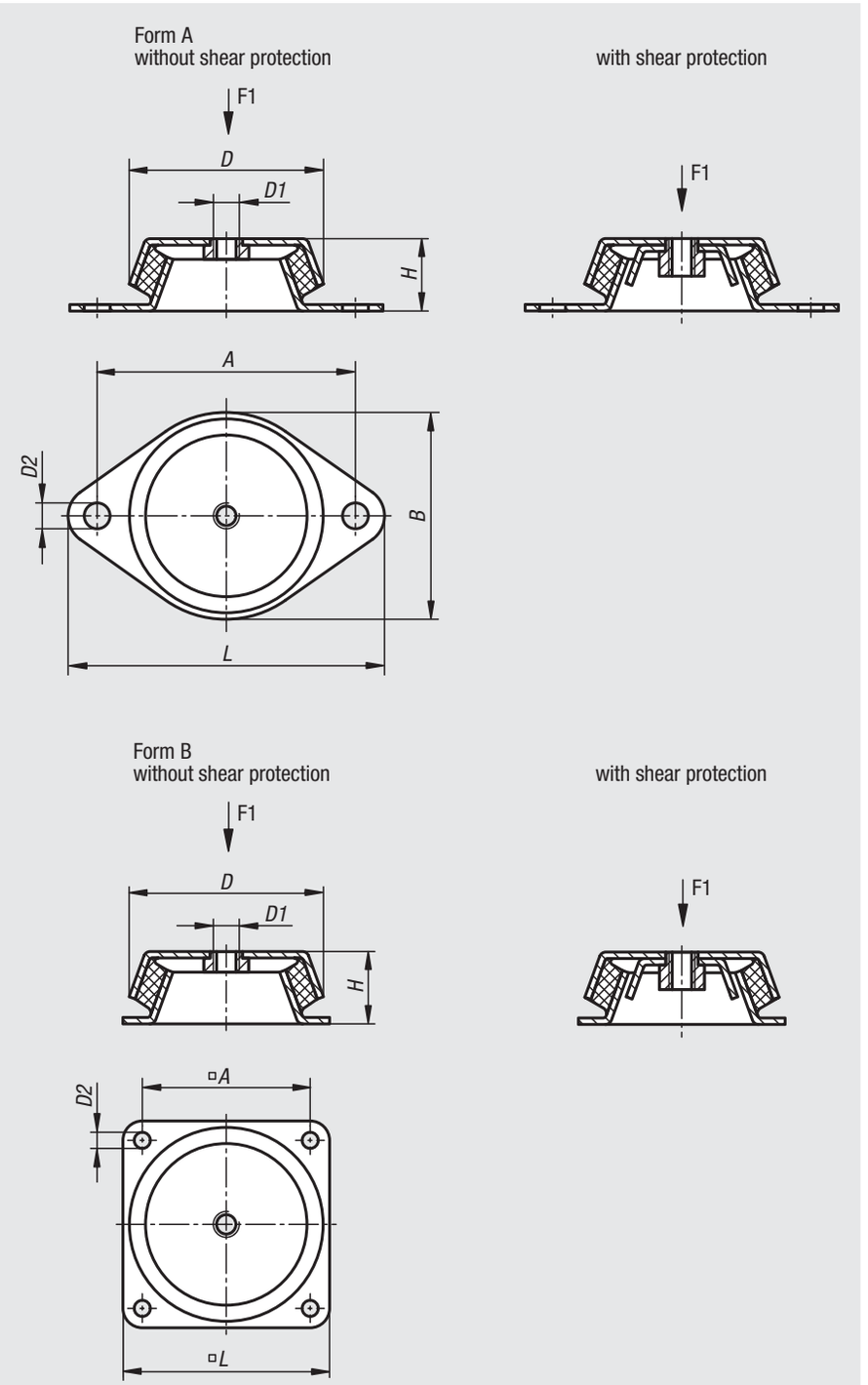
Sample order:
nlm 27760-062060

Note:
These machine feet have proven themselves to be universally applicable elements for the elastic support of all types of machine. They are commonly used wherever large horizontal movements are to be avoided. The horizontal rigidity is higher in all directions than the vertical rigidity. If used correctly they are excellent at preventing the transfer of vibration and noise.

Machine feet with shear protection are available for situations where tensile forces are to be expected (e.g. shipbuilding).

The indicated load data are reference values for static loads by rubber hardness of 60° Shore A.

On request:
Rubber hardness 40° or 70° Shore A.



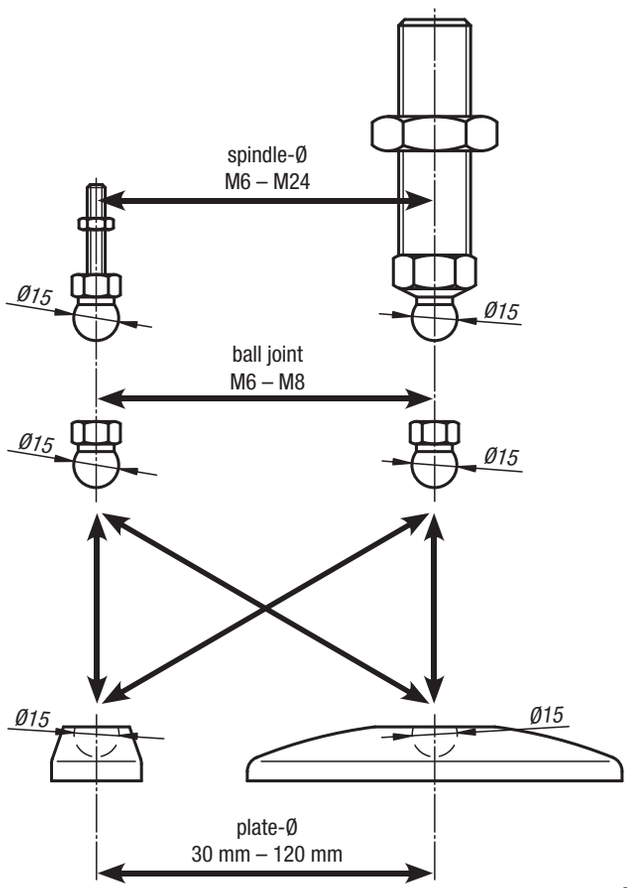
Order No. without shear protection	Order No. with shear protection	Form	A	B	D	D1	D2	H	L	F1 (N)
27760-062060	**27760-062160**	A	85	66	62	M10	8,2	30	110	1500
27760-078060	**27760-078160**	A	110	78	78	M10	9	30	128	1800
27760-092060	**27760-092160**	A	110	96	86	M12	10,2	45	140	3000
27760-106060	**27760-106160**	A	140	110	106	M12	12,4	39	170	3600
27760-150060	**27760-150160**	B	132	-	150	M16	12,5	51	168	8000

Modular structure of a swivel foot

Application:
Swivel feet are of modular design. The components can be individually combined to match the application. The swivel feet are applicable for use on machines, plants and even office furniture.

Modular design:
Swivel feet consist of two components - a plate and a threaded spindle or ball joint. **Any** plate can be combined with **any** threaded spindle or ball joint (see Figure 1).

Fig. 1



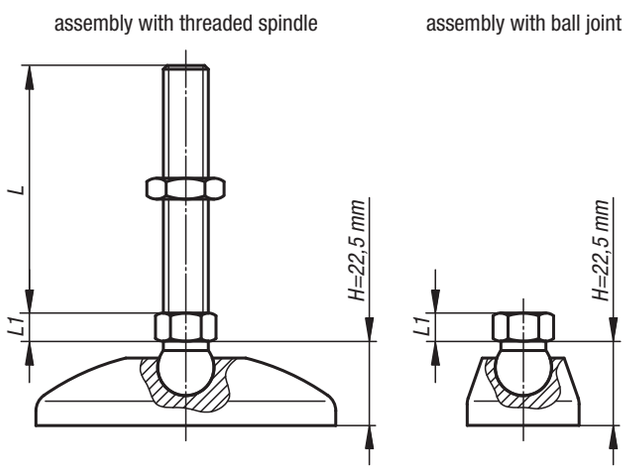
Assembly:
Using a plastic hammer, knock the ball of the threaded spindle or ball joint vertically into the swivel foot plate. If necessary, the two fastening holes (closed) in the swivel foot plate can be opened by simply punching them out to allow the swivel foot to be fastened to a base.

Height of swivel pad:
Swivel feet always have a minimum height of H = 22.5 mm independently of the plate, threaded spindle or ball joint size (see Figure 2). When assembling with threaded spindle, the height of the complete swivel foot is calculated by adding 22.5 mm to the length of the threaded spindle + the height of the hexagon. (Total height of swivel foot = L + L1 + 22.5 mm).

When assembling with ball joint, the length L is void.

Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint (see sample order on the relevant product page).

Fig. 2



Inclination angle of threaded spindle or ball joint:

Swivel feet plates

plastic

Material:
Plates, thermoplastic, glass bead reinforced.
Anti-slip plate thermoplastic elastomer.

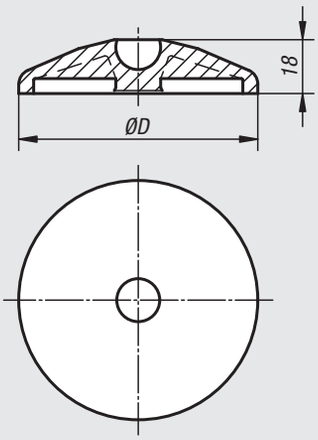
Version:
Black.

Sample order:
nlm 27800-1030
nlm 27800-1030 and 27810-060151 **assembled**

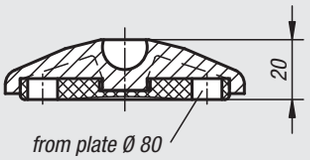
Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint. (e.g. 27800-1030 and 27810-060151 **assembled**.)

Note:
Swivel feet consist of a plate and a threaded spindle or ball joint. Any plate can be combined with any threaded spindle or ball joint. The anti-slip plate absorbs vibrations and prevents the swivel foot slipping.
For matching threaded spindles see 27810.
For matching ball joints see 27811.

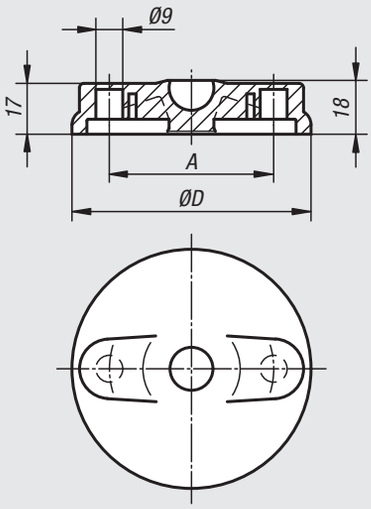
Form A
without fastening holes
without anti-slip plate



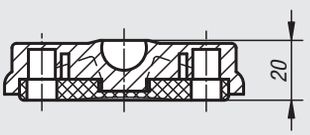
Form B
without fastening holes
with anti-slip plate



Form C
with fastening holes (closed)
without anti-slip plate



Form D
with fastening holes (closed)
with anti-slip plate



Order No. Form A	Order No. Form B	D	Load rating max. kN
27800-1030	**27800-2030**	30	5
27800-1040	**27800-2040**	40	9
27800-1045	**27800-2045**	45	9
27800-1050	**27800-2050**	50	9
27800-1060	**27800-2060**	60	9
27800-1080	**27800-2080**	80	9
27800-1100	**27800-2100**	100	9

Order No. Form C	Order No. Form D	D	A	Load rating max. kN
27800-3080	**27800-4080**	80	55	9
27800-3100	**27800-4100**	100	74	9
27800-3120	**27800-4120**	120	94	9

Swivel feet plates

die-cast zinc or stainless steel

Material:
Plate die-cast zinc or stainless steel 1.4305.
Anti-slip plate thermoplastic elastomer.

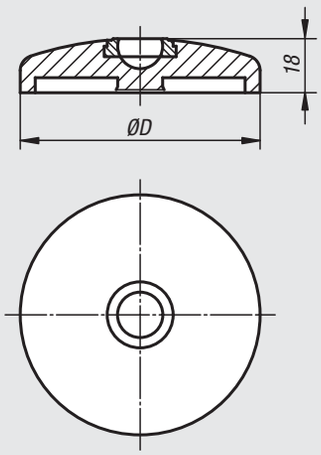
Version:
Die-cast zinc plate, black powder-coated.
Stainless steel plate, bright.

Sample order:
nlm 27801-10301
nlm 27801-10301 and 27810-060151 **assembled**

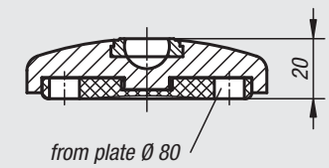
Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint. (e.g. 27801-10301 and 27810-060151 **assembled**).

Note:
Swivel feet consist of a plate and a threaded spindle or ball joint. Any plate can be combined with any threaded spindle or ball joint. The anti-slip plate absorbs vibrations and prevents the swivel foot slipping.
For matching threaded spindles see 27810.
For matching ball joints see 27811.

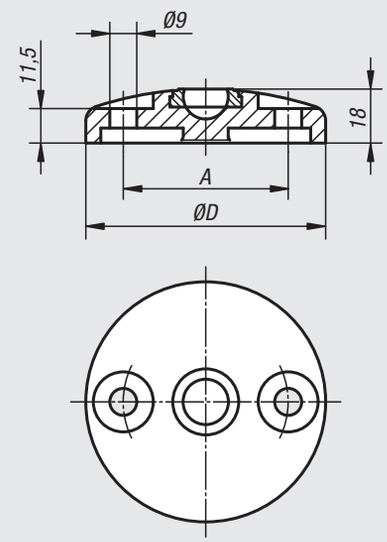
Form A
without fastening holes
without anti-slip plate



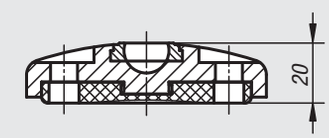
Form B
without fastening holes
with anti-slip plate



Form C
with fastening holes (open)
without anti-slip plate



Form D
with fastening holes (open)
with anti-slip plate



Swivel feet plates

die-cast zinc or stainless steel

Order No. Form A	Order No. Form B	Material	D	Load rating max. kN
27801-10301	**27801-20301**	die-cast zinc	30	20
27801-10401	**27801-20401**	die-cast zinc	40	30
27801-10451	**27801-20451**	die-cast zinc	45	30
27801-10501	**27801-20501**	die-cast zinc	50	30
27801-10601	**27801-20601**	die-cast zinc	60	30
27801-10801	**27801-20801**	die-cast zinc	80	30
27801-11001	**27801-21001**	die-cast zinc	100	35
27801-11201	**27801-21201**	die-cast zinc	120	35

Order No. Form C	Order No. Form D	Material	D	A	Load rating max. kN
27801-30801	**27801-40801**	die-cast zinc	80	55	30
27801-31001	**27801-41001**	die-cast zinc	100	74	35
27801-31201	**27801-41201**	die-cast zinc	120	94	35

Order No. Form A	Order No. Form B	Material	D	Load rating max. kN
27801-10302	**27801-20302**	stainless steel	30	20
27801-10402	**27801-20402**	stainless steel	40	30
27801-10452	**27801-20452**	stainless steel	45	30
27801-10502	**27801-20502**	stainless steel	50	35
27801-10602	**27801-20602**	stainless steel	60	35
27801-10802	**27801-20802**	stainless steel	80	35
27801-11002	**27801-21002**	stainless steel	100	40
27801-11202	**27801-21202**	stainless steel	120	40

Order No. Form C	Order No. Form D	Material	D	A	Load rating max. kN
27801-30802	**27801-40802**	stainless steel	80	55	35
27801-31002	**27801-41002**	stainless steel	100	74	40
27801-31202	**27801-41202**	stainless steel	120	94	40

Swivel feet plates extended

die-cast zinc

Material:
Plate die-cast zinc.
Anti-slip plate thermoplastic elastomer.

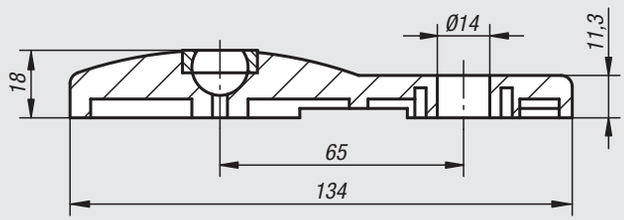
Version:
Plate black powder-coated.

Sample order:
nlm 27802-30801
nlm 27802-30801 and 27810-060151 **assembled**

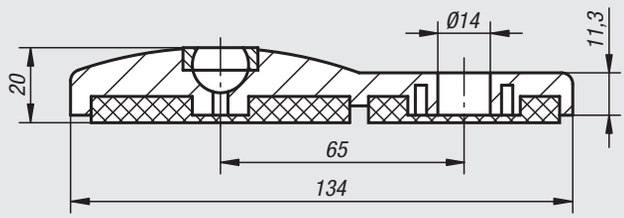
Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint. (e.g. 27802-30801 and 27810-060151 **assembled**.)

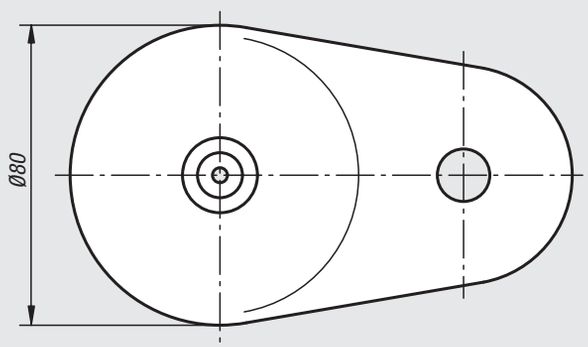
Note:
Swivel feet consist of a plate and a threaded spindle or ball joint. Any plate can be combined with any threaded spindle or ball joint. The anti-slip plate absorbs vibrations and prevents the swivel foot slipping.
For matching threaded spindles see 27810.
For matching ball joints see 27811.

Form C
with fastening hole
without anti-slip plate



Form D
with fastening hole
with anti-slip plate

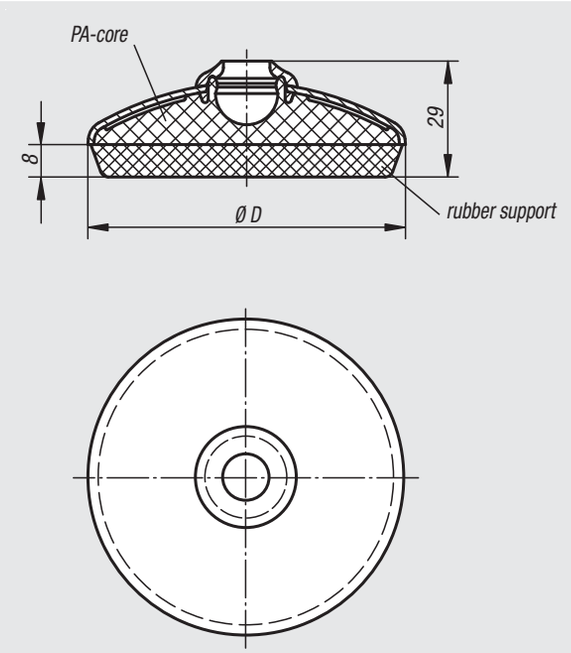




Order No.	Form	Load rating max. kN
27802-30801	C	30
27802-40801	D	30

Swivel feet plates

stainless steel



Material:
Plates, stainless steel 1.4301.
Core, thermoplastic PA.
Rubber support TPE.

Version:
Plate bright.
Rubber support light grey with sealing lip, hardness 70 Shore A.
Temp. range -20°C to +100°C.

Sample order:
nlm 27803-1060
nlm 27803-1060 and 27810-060152 **assembled**

Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint. (e.g. 27803-1060 and 27810-060152 **assembled**).

Note:
The rubber support is joined with the stainless steel plate and the PA core by injection moulding. The rubber support is resistant to oil and water (up to 60 °C). In addition, it is furnished with antibacterial and antimicrobial protection and is thus outstandingly suited for sectors in the foods industry.

Swivel feet consist of a plate and a threaded spindle or ball joint. Any plate can be combined with any threaded spindle or ball joint.
For matching threaded spindles see 27810.
For matching ball joints see 27811.

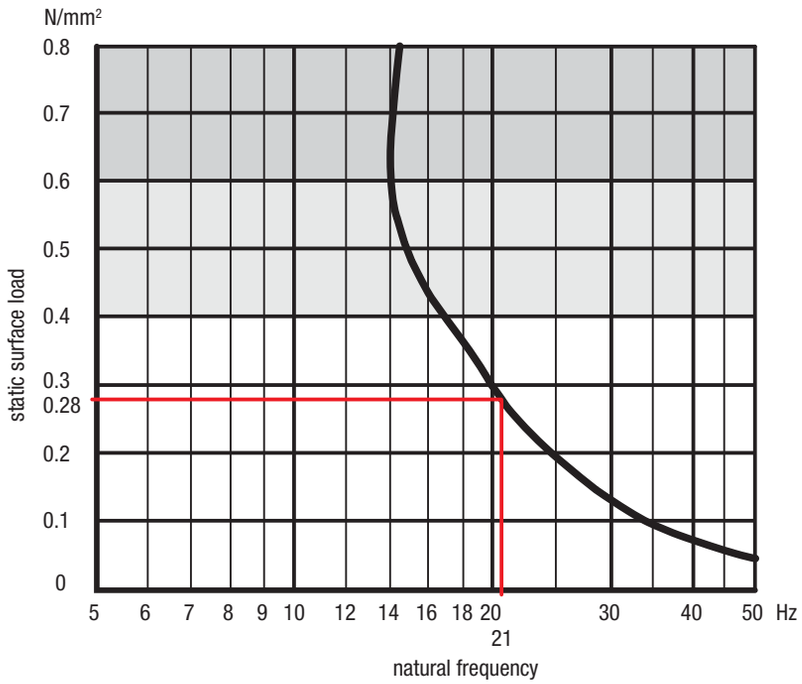
Order No.	D	Load rating max. kN
27803-1060	58,5	7
27803-1080	78,5	7
27803-1100	98,5	7

Technical information for swivel feet and plates with vibration absorption

Natural frequency:
Every sprung weight, such as a machine or piece of equipment, that is standing on swivel feet with vibration absorbers vibrates after an initial impetus at its own natural frequency (resonance frequency). In the diagram to the side (Fig. 1) the natural frequency of Sylomer V12 under pressure by various forces can be read. The optimum range of use is with a pressure of ≤ 0.4 N/mm. A maximum pressure of 0.6 N/mm should not be exceeded.

Interference frequency:
The frequency emitted by a machine or a piece of equipment is known as its interference frequency. Effective vibration absorption is dependent on the interference frequency (the frequency to be absorbed) and the natural frequecy of the absorption unit. The greater the difference in frequency between the natural frequency and the interference frequency, the better the absorption. An absorbing effect will only be achieved if the interference frequency is over $\sqrt{2}$ times the natural frequency of the absorption unit.

Fig. 1



Calculation example:

Swivel foot: M12, D1=30,5
Loading: 300N

Pressure: $\frac{F}{A} = \frac{300\ N}{529{,}5\ mm^2} = 0{,}57\ N/mm^2$

$> 0{,}4\ N/mm^2$

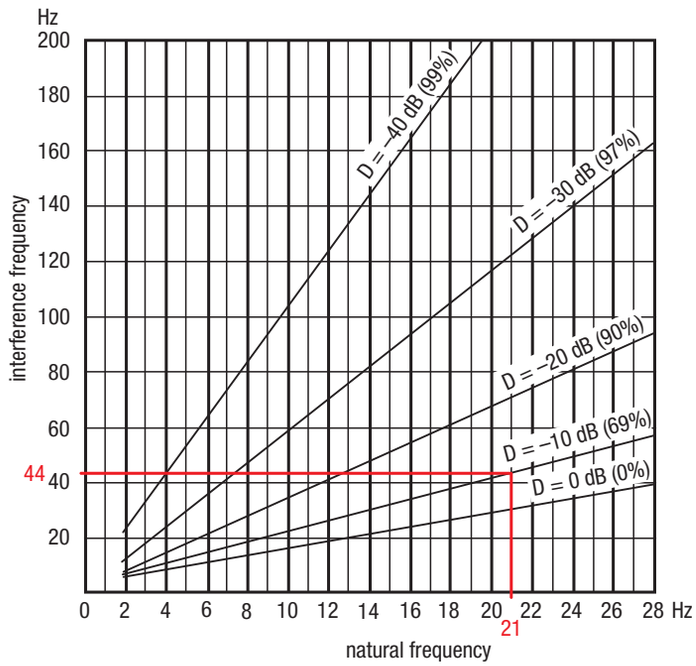
Swivel foot: M16, D1=40,5
Loading: 300N

Pressure: $\frac{F}{A} = \frac{300\ N}{1087{,}2\ mm^2} = \mathbf{0{,}28\ N/mm^2}$

$< 0{,}4\ N/mm^2$

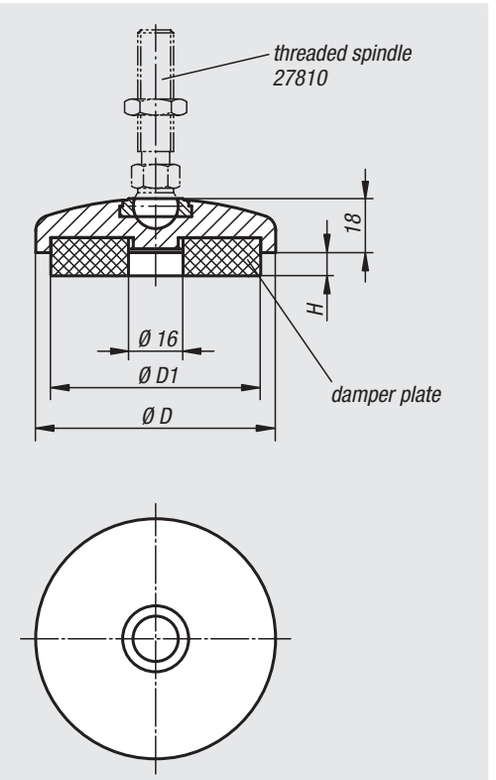
The M16 swivel foot is chosen since the pressure is ≤ 0.4 N/mm². From Fig. 1, pressure of **0.28 N/mm²** gives a natural frequency of **21 Hz**. With an interference frequency of **44 Hz** an absorption effect of 69% is achieved (Fig. 2).

Figure 2



Swivel feet plates

with vibration absorption



Material:
Plate die-cast zinc or stainless steel 1.4305.
Damper plate PUR elastomere (Sylomer V12).

Version:
Die-cast zinc plate, black powder-coated.
Stainless steel plate, bright.
Damper plate, grey, glued in, anti-slip.
Temp. range -30 °C to +70 °C.

Sample order:
nlm 27804-20601
nlm 27804-20601 and 27810-060151 **assembled**

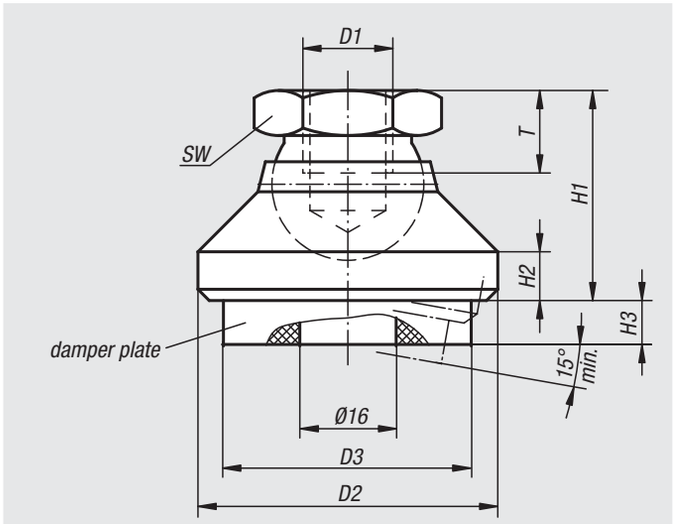
Note for ordering:
If the swivel foot plate and the threaded spindle or ball joint are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and the spindle or ball joint. (e.g. 27804-20601 and 27810-060151 **assembled**.)

Note:
The load rating given in the table is a recommendation of the **permanent static** load up to which the absorption unit should be used. This static load corresponds to a pressure per area of 0.4 N/mm², at which the material achieves its optimum absorption properties. Here it is taken into account that under dynamic demands an additional load, up to 0.6 N/mm² may occur. The damper plate absorbs vibrations and prevents the swivel foot slipping. Swivel feet consist of a plate and a threaded spindle or ball joint. Any plate can be combined with any threaded spindle or ball joint.
For matching threaded spindles see 27810.
For matching ball joints see 27811.

Order No.	Material	D	D1	H (under pressure of 0 / 0,4 / 0,6 N/mm²)	Load capacity (under pressure of 0,4 N/mm²) N
27804-20401	die-cast zinc	40	30,5	7 / 5,9 / 4,8	62
27804-20501	die-cast zinc	50	40,5	7 / 5,9 / 4,8	212
27804-20601	die-cast zinc	60	50	7 / 5,9 / 4,8	433
27804-20801	die-cast zinc	80	68	7 / 5,9 / 4,8	614
27804-20402	stainless steel	40	30,5	7 / 5,8 / 4,9	212
27804-20502	stainless steel	50	40,5	7 / 5,8 / 4,9	435
27804-20602	stainless steel	60	50	7 / 5,8 / 4,9	705
27804-20802	stainless steel	80	68	7 / 5,8 / 4,9	1372

Swivel feet

with vibration absorption



Material:
- Steel version:
  Thrust plate carbon steel.
  Ball element free-cutting steel.
- Stainless steel version:
  Thrust plate and ball element stainless steel.

Damper plate PUR elastomere (Sylomer V12).

Version:
- Steel version:
  Thrust plate black oxidised.
  Ball element case-hardened, black oxidised.

- Stainless steel version:
  bright.

Damper plate grey, glued in, anti-slip.
Temp. range -30 °C to +70 °C.

Sample order:
nlm 27806-110

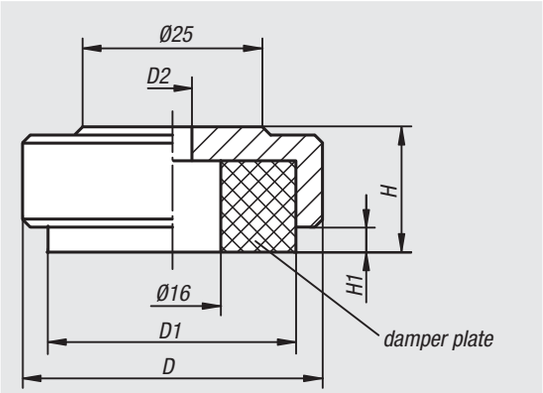
Note:
The load rating given in the table is a recommendation of the **permanent static** load to which the damping element should be used.
This static load corresponds to a surface pressure of 0.4 N/mm² at which the material achieves its optimum absorption properties. It is taken into account that under dynamic loading an additional load of up to 0.6 N/mm² may occur.
The damper plate absorbs vibrations and prevents the swivel foot slipping.

For swivel feet without vibration absorption see article No. 07144.

Order No.	Material	D1	D2	D3	H1	H2	H3 (under pressure of 0 / 0,4 / 0,6 N/mm²)	T	SW	Load capacity (under pressure of 0,4 N/mm²) N
27806-110	steel	M10	32	30,5	22	5	8 / 6,8 / 5,9	10	17	212
27806-112	steel	M12	40	30,5	26	6	8 / 6,8 / 5,9	12	19	212
27806-116	steel	M16	50	40,5	32	7	8 / 6,8 / 5,9	14	24	435
27806-120	steel	M20	60	50	42	8	8 / 6,8 / 5,9	18	30	705
27806-310	stainless steel	M10	32	30,5	22	5	8 / 6,8 / 5,9	10	17	212
27806-312	stainless steel	M12	40	30,5	26	6	8 / 6,8 / 5,9	12	19	212
27806-316	stainless steel	M16	50	40,5	32	7	8 / 6,8 / 5,9	14	24	435
27806-320	stainless steel	M20	60	50	42	8	8 / 6,8 / 5,9	18	30	705

Machine feet

with vibration absorption



Material:
Plate steel.
Damper plate PUR elastomer (Sylomer V12).

Version:
Plate blue chromed.
Damper plate grey, glued in, anti-slip.
Temp. range -30 °C to +70 °C.

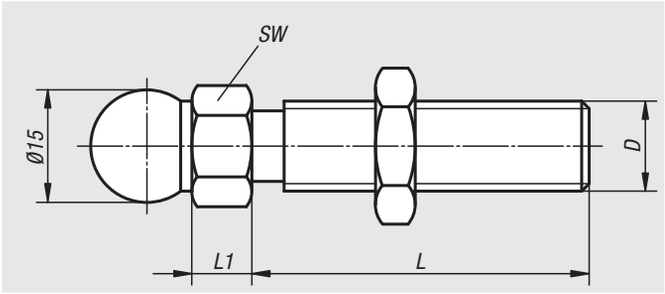
Sample order:
nlm 27808-046

Note:
The load rating given in the table is a recommendation of the **permanent static** load up to which the damper plate should be used. This static load corresponds to a surface pressure of 0.4 N/mm², at which the material reaches its optimum absorption properties. Here it is taken into account that under dynamic loading an additional load of up to 0.6 N/mm² may occur. The damper plate absorbs vibrations and prevents the machine foot slipping.

Order No.	D	D1	D2	H	H1 (under pressure of 0 / 0,4 / 0,6 N/mm²)	Load rating N (by 0.4 N/mm²)
27808-036	36	30,5	5,5	15	4 / 2,8 / 1,9	212
27808-046	46	40,5	6,6	17	4 / 2,8 / 1,9	435
27808-056	56	50	9	19	4 / 2,8 / 1,9	705
27808-074	74	68	9	21	4 / 2,8 / 1,9	1372

Swivel feet threaded spindles

steel or stainless steel



Material:
Steel or stainless steel 1.4301.

Version:
Steel blue chromed.
Stainless steel, bright.

Sample order:
nlm 27810-060151
nlm 27810-060151 and 27800-1030 **assembled**

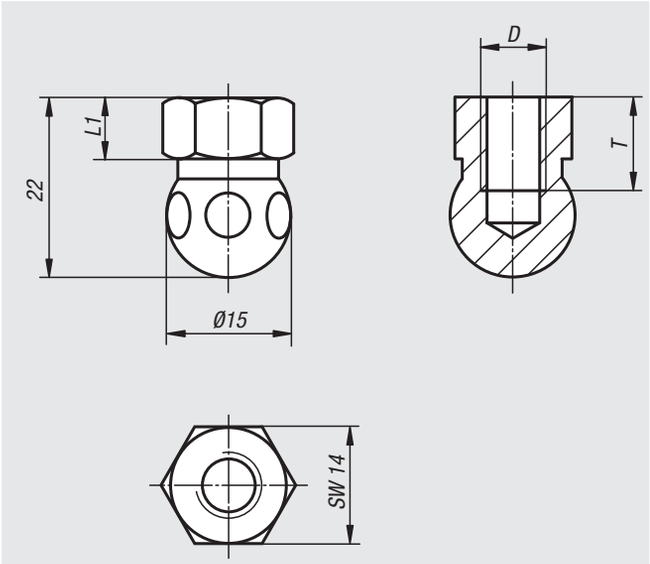
Note for ordering:
If the threaded spindle and the plate are to be supplied assembled, please add the suffix „assembled“ to the order number for the spindle and plate. (e.g. 27810-060151 and 27800-1030 assembled.)

Note:
Swivel feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle. The height of the complete swivel foot is calculated by the length of the threaded spindle + height of hexagon + 22.5 mm. (Overall height of swivel foot = L + L1 + 22.5 mm).

Order No. steel	Order No. stainless steel	D	L	L1	SW	Load rating max. kN
27810-060151	**27810-060152**	M6	15	7,5	14	2
27810-060301	**27810-060302**	M6	30	7,5	14	2
27810-080401	**27810-080402**	M8	40	7,5	14	3,5
27810-080801	**27810-080802**	M8	80	7,5	14	3,5
27810-100451	**27810-100452**	M10	45	7,5	14	4,7
27810-100701	**27810-100702**	M10	70	7,5	14	4,7
27810-100901	**27810-100902**	M10	90	7,5	14	4,7
27810-101251	**27810-101252**	M10	125	7,5	14	4,7
27810-101501	**27810-101502**	M10	150	7,5	14	4,7
27810-120451	**27810-120452**	M12	45	7,5	14	7,7
27810-120661	**27810-120662**	M12	66	7,5	14	7,7
27810-121001	**27810-121002**	M12	100	7,5	14	7,7
27810-121251	**27810-121252**	M12	125	7,5	14	7,7
27810-121501	**27810-121502**	M12	150	7,5	14	7,7
27810-140661	**27810-140662**	M14	66	7,5	14	11,1
27810-141001	**27810-141002**	M14	100	7,5	14	11,1
27810-141251	**27810-141252**	M14	125	7,5	14	11,1
27810-141501	**27810-141502**	M14	150	7,5	14	11,1
27810-160661	**27810-160662**	M16	66	7,5	17	14,5
27810-161001	**27810-161002**	M16	100	7,5	17	14,5
27810-161251	**27810-161252**	M16	125	7,5	17	14,5
27810-161501	**27810-161502**	M16	150	7,5	17	14,5
27810-162001	**27810-162002**	M16	200	7,5	17	14,5
27810-200851	**27810-200852**	M20	85	10,5	22	24,3
27810-201001	**27810-201002**	M20	100	10,5	22	24,3
27810-201251	**27810-201252**	M20	125	10,5	22	24,3
27810-201501	**27810-201502**	M20	150	10,5	22	24,3
27810-202001	**27810-202002**	M20	200	10,5	22	24,3
27810-240851	**27810-240852**	M24	85	10,5	24	36,1
27810-241001	**27810-241002**	M24	100	10,5	24	36,1
27810-241251	**27810-241252**	M24	125	10,5	24	36,1
27810-241501	**27810-241502**	M24	150	10,5	24	36,1
27810-242001	**27810-242002**	M24	200	10,5	24	36,1

Swivel feet ball joints

with internal thread



Material:
Steel or stainless steel 1.4301.

Version:
Steel blue chromed.
Stainless steel, bright.

Sample order:
nlm 27811-061
nlm 27811-061 and 27800-1030 **assembled**

Note for ordering:
If the ball joint and the plate are to be supplied assembled, please add the suffix „assembled“ to the order number for the ball joint and plate. (e.g. 27811-061 and 27800-1030 assembled.)

Note:
For fastening swivel feet with standard screws.

Swivel feet consist of a ball joint and a plate. Any ball joint can be combined with any plate.
The height of the complete swivel foot is calculated by the height of the hexagon + 22.5 mm.
(Overall height of swivel foot = L1 + 22.5 mm).

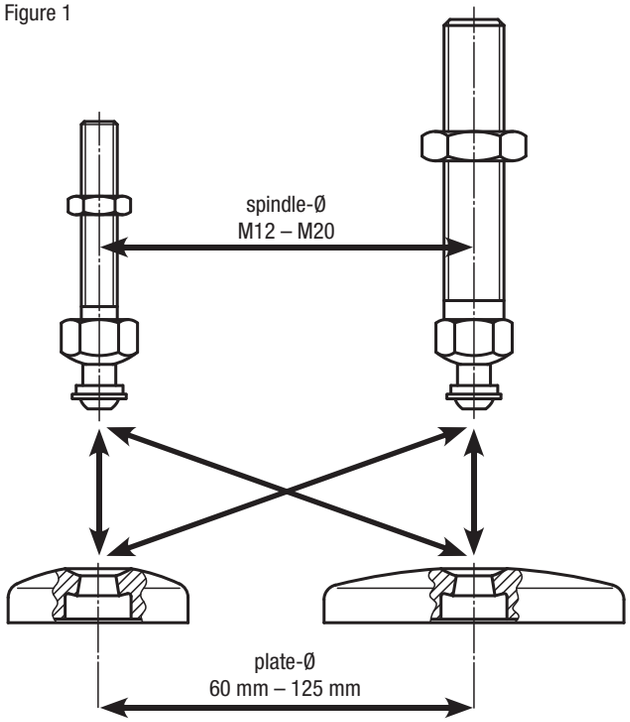
Order No. steel	Order No. stainless steel	D	L1	T
27811-061	**27811-062**	M6	7,5	10
27811-081	**27811-082**	M8	7,5	10

Modular structure of a levelling foot

Application:
Levelling feet are of modular design. The components can be individually combined to match the application. Levelling feet can be used on machines, plants and even office furniture.

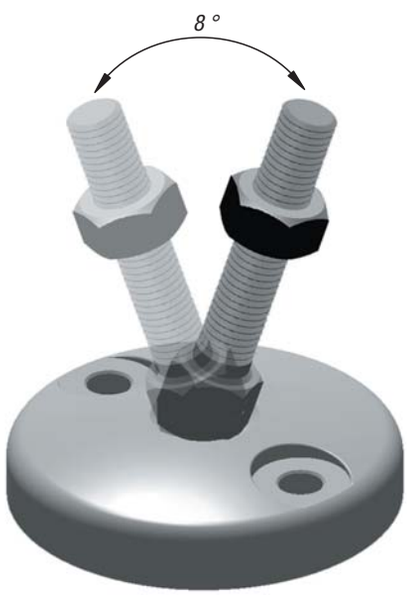
Modular design:
The levelling feet consist of two components - a plate and a threaded spindle. **Any** plate can be combined with **any** threaded spindle (see Figure 1).

Figure 1



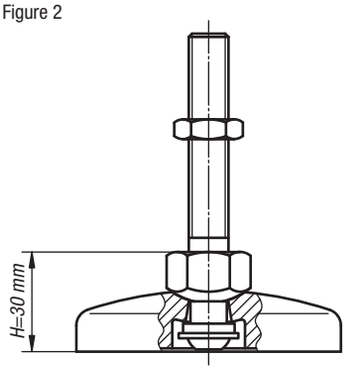
Assembly:
Insert the threaded spindle vertically into the levelling foot plate and fasten it from underneath with a spacer ring, washer and screw (no unintentional loosening of threaded spindle from the plate).
If necessary, the two fastening holes (closed) in the levelling foot plate can be opened by simply punching them out to allow the levelling foot to be bolted to the floor.

Inclination angle of threaded spindle:



Levelling feet height:
Regardless of the plate or threaded spindle size, levelling feet always have a minimum height of H = 30 mm (see Fig. 2). The height of the complete levelling foot is calculated from the length of the threaded spindle + 30 mm. (Total height of levelling foot = L + 30 mm).

Figure 2



Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and spindle (see sample order on the relevant product page).

Levelling feet plates

plastic

Material:
Plates, thermoplastic, fibreglass reinforced.
Anti-slip plate thermoplastic elastomer.

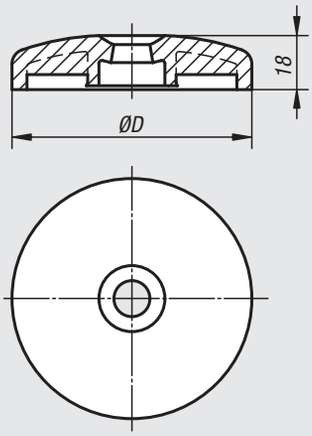
Version:
Black.

Sample order:
nlm 27815-1060
nlm 27815-1060 and 27828-120661
assembled

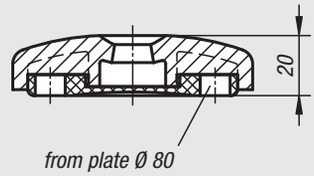
Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix „assembled“ to the order number for the plate and spindle. (e.g. 27815-1060 and 27828-120661 assembled.)

Note:
Levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle. The anti-slip plate absorbs vibrations and prevents the levelling foot slipping. For matching threaded spindles see 27828.

Form A
without fastening holes
without anti-slip plate



Form B
without fastening holes
with anti-slip plate

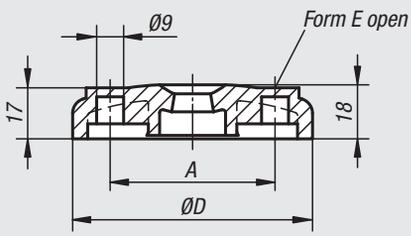


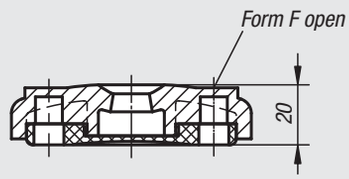
Form C
with fastening holes (closed)
without anti-slip plate

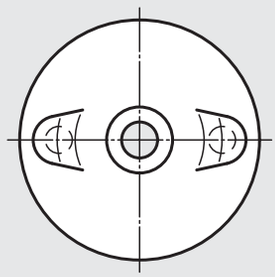
Form D
with fastening holes (closed)
with anti-slip plate

Form E
with fastening holes (open)
without anti-slip plate

Form F
with fastening holes (open)
with anti-slip plate







Order No. Form A	Order No. Form B	D	Load rating max. kN
27815-1060	**27815-2060**	60	12
27815-1080	**27815-2080**	80	12
27815-1100	**27815-2100**	100	12

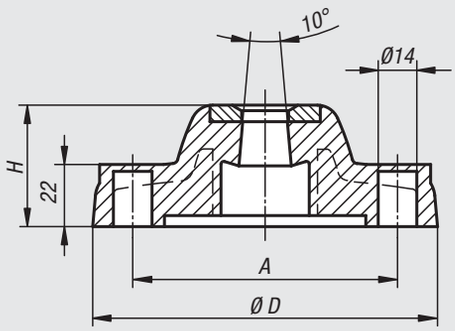
Order No. Form C	Order No. Form D	Order No. Form E	Order No. Form F	D	A	Load rating max. kN
27815-3080	**27815-4080**	**27815-5080**	**27815-6080**	80	55	12
27815-3100	**27815-4100**	**27815-5100**	**27815-6100**	100	74	12

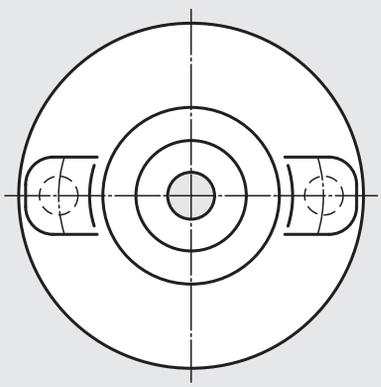
Levelling feet plates

plastic, heavy-duty version

Form C
with fastening holes (closed)
without anti-slip plate

Form D
with fastening holes (closed)
with anti-slip plate





Material:
Plates, thermoplastic, fibreglass reinforced.
Anti-slip plate thermoplastic elastomer.

Version:
Black.

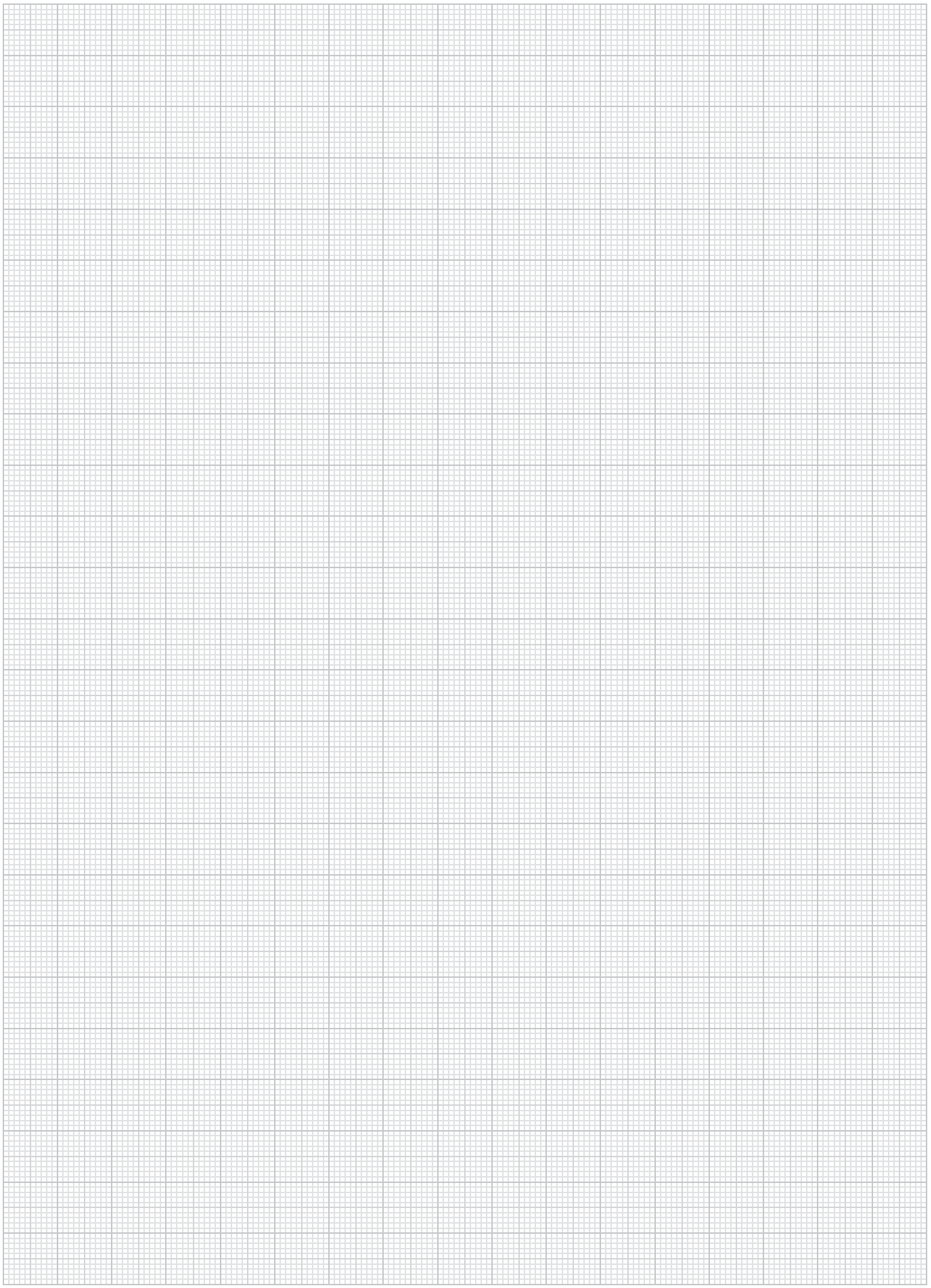
Sample order:
nlm 27816-31251
nlm 27816-31251 and 27828-120661 **assembled**

Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the plate and spindle. (e.g. 27816-31251 and 27828-120661 **assembled**.)

Note:
Levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle.
The anti-slip plate absorbs vibrations and prevents the levelling foot slipping.
For matching threaded spindles see 27828.

Order No.	Form	D	A	H	Load rating max. kN
27816-31251	C	125	96	44	18
27816-31751	C	175	135	45	25
27816-41251	D	125	96	48	18
27816-41751	D	175	135	49	25

Notes



Levelling feet plates

die-cast zinc or stainless steel

Material:
Plate die-cast zinc or stainless steel 1.4305.
Anti-slip plate thermoplastic elastomer.

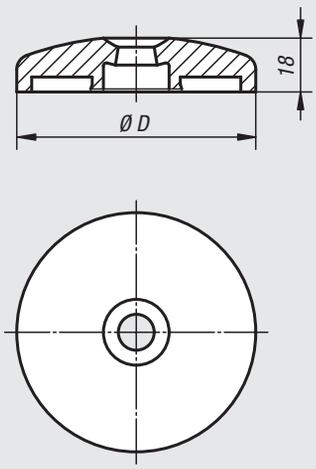
Version:
Die-cast zinc plate, black powder-coated.
Stainless steel plate, bright.

Sample order:
nlm 27817-10601
nlm 27817-10601 and 27828-120661 **assembled**

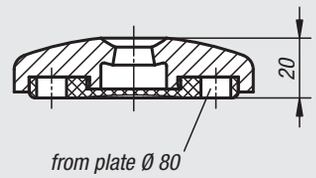
Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the plate and spindle.
(e.g. 27817-10601 and 27828-120661 **assembled**).

Note:
Levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle. The anti-slip plate absorbs vibrations and prevents the levelling foot slipping.
For matching threaded spindles see 27828.

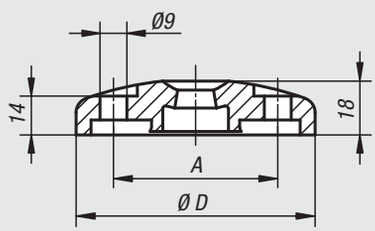
Form A
without fastening holes
without anti-slip plate



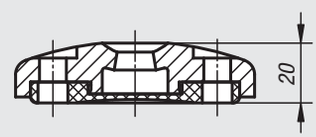
Form B
without fastening holes
with anti-slip plate



Form C
with fastening holes (open)
without anti-slip plate



Form D
with fastening holes (open)
with anti-slip plate



Levelling feet plates

die-cast zinc or stainless steel

Order No. Form A	Order No. Form B	Material	D	Load rating max. kN
27817-10401	-	die cast zinc	40	20
27817-10451	-	die cast zinc	45	25
27817-10501	-	die cast zinc	50	25
27817-10601	**27817-20601**	die cast zinc	60	35
27817-10801	**27817-20801**	die cast zinc	80	35
27817-11001	**27817-21001**	die cast zinc	100	35
27817-11201	**27817-21201**	die cast zinc	120	35

Order No. Form C	Order No. Form D	Material	D	A	Load rating max. kN
27817-30801	**27817-40801**	die cast zinc	80	55	35
27817-31001	**27817-41001**	die cast zinc	100	74	35

Order No. Form A	Order No. Form B	Material	D	Load rating max. kN
27817-10602	**27817-20602**	stainless steel	60	45
27817-10802	**27817-20802**	stainless steel	80	45
27817-11002	**27817-21002**	stainless steel	100	45

Order No. Form C	Order No. Form D	Material	D	A	Load rating max. kN
27817-30802	**27817-40802**	stainless steel	80	55	45
27817-31002	**27817-41002**	stainless steel	100	74	45

Levelling feet plates extended

die-cast zinc

Material:
Plate die-cast zinc.
Anti-slip plate thermoplastic elastomer.

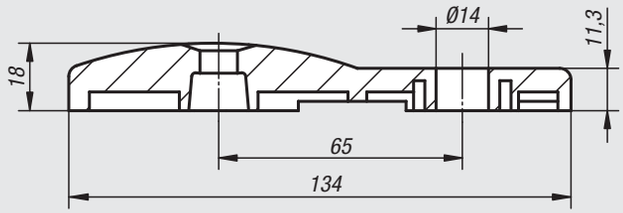
Version:
Plate black powder-coated.

Sample order:
nlm 27818-30801
nlm 27818-30801 and 27828-120661 **assembled**

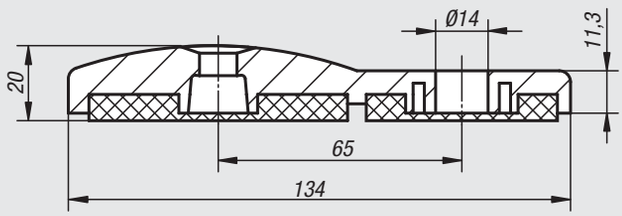
Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the plate and spindle. (e.g. 27818-30801 and 27828-120661 **assembled**.)

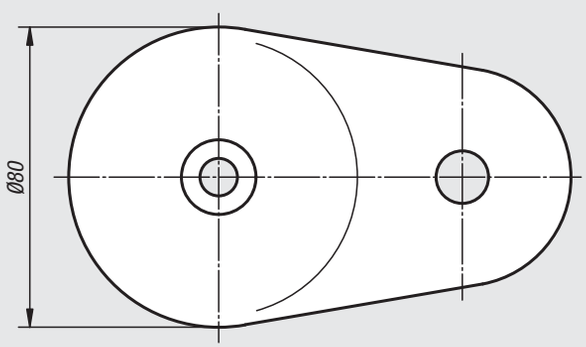
Note:
Levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle. The anti-slip plate absorbs vibrations and prevents the levelling foot slipping. For matching threaded spindles see 27828.

Form C
with fastening holes
without anti-slip plate



Form D
with fastening holes
with anti-slip plate

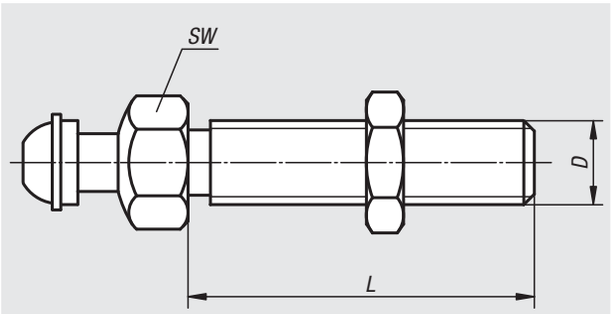




Order No.	Form	Load rating max. kN
27818-30801	C	35
27818-40801	D	35

Levelling feet threaded spindles

steel or stainless steel



Material:
Steel or stainless steel 1.4305.

Version:
Steel blue-chromed.
Stainless steel bright.

Sample order:
nlm 27828-120661
nlm 27828-120661 and 27815-1060 **assembled**

Note for ordering:
If the threaded spindle and the levelling foot plate are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the spindle and plate. (e.g. 27828-120661 and 27815-1060 **assembled**.)

Note:
Levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle. The height of the complete levelling foot is calculated from the length of the threaded spindle + 30 mm. (Total height of levelling foot = L + 30 mm)

Order No. steel	Order No. stainless steel	D	L	SW	Load rating max. kN
27828-120661	**27828-120662**	M12	66	22	7,7
27828-121001	**27828-121002**	M12	100	22	7,7
27828-121251	**27828-121252**	M12	125	22	7,7
27828-121501	**27828-121502**	M12	150	22	7,7
27828-160661	**27828-160662**	M16	66	22	14,5
27828-161001	**27828-161002**	M16	100	22	14,5
27828-161251	**27828-161252**	M16	125	22	14,5
27828-161501	**27828-161502**	M16	150	22	14,5
27828-162001	**27828-162002**	M16	200	22	14,5
27828-201001	**27828-201002**	M20	100	22	24,3
27828-201251	**27828-201252**	M20	125	22	24,3
27828-201501	**27828-201502**	M20	150	22	24,3
27828-202001	**27828-202002**	M20	200	22	24,3

Modular structure of a levelling foot ECO-Line

Application:
ECO-Line levelling feet are of modular design. The components can be individually combined to match the application. However, the threaded spindle is not screwed but pressed in permanently. The levelling feet are used for a wide range of machines, plants and even office furniture.

Modular design:
The levelling feet consist of two components - a plate and a threaded spindle. **Any** plate can be combined with **any** threaded spindle (see Figure 1).

Assembly:
Place levelling foot plate on threaded spindle and press pin in up to collar (threaded spindle cannot be inadvertently removed from plate).

Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix **„assembled“** to the order number for the plate and spindle (see sample order on the relevant product page).

Fig. 1

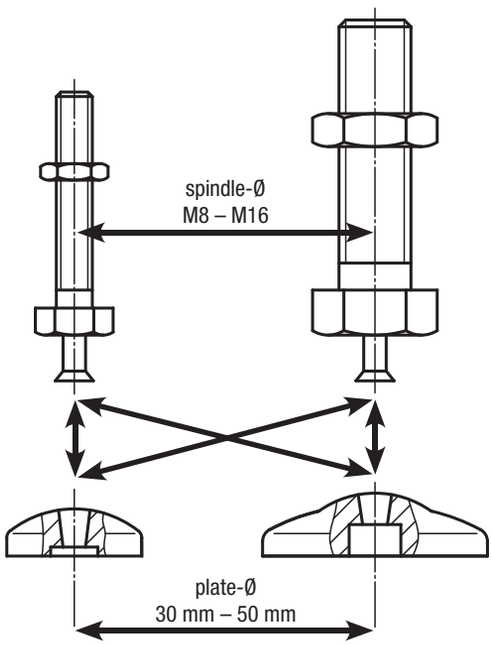
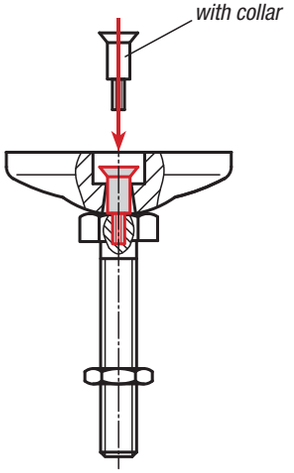
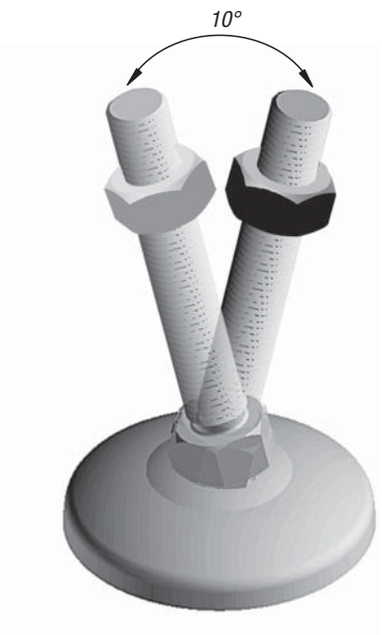


Fig. 2



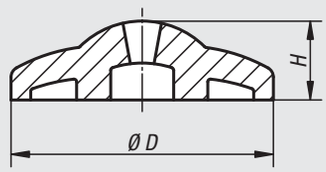
Inclination angle of threaded spindle:



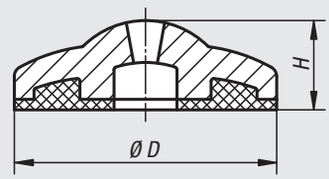
Levelling feet plates ECO-Line

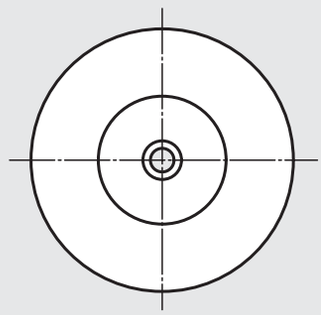
die-cast zinc, stainless steel or plastic

Form A
without anti-slip plate



Form B
with anti-slip plate





Material:
Plate thermoplastic, die-cast zinc or stainless steel 1.4305.
Anti-slip plate thermoplastic elastomer.

Version:
Thermoplastic plate black.
Die-cast zinc plate blue galvanized.
Stainless steel plate bright.

Sample order:
nlm 27830-10303
nlm 27830-10303 and 27832-080801 **assembled**

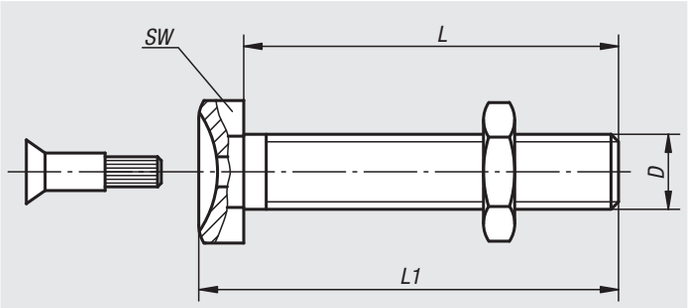
Note for ordering:
If the levelling foot plate and the threaded spindle are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the plate and spindle. (e.g. 27830-10303 and 27832-080801 **assembled**).

Note:
ECO-Line levelling feet consist of a plate and a threaded spindle. Any plate can be combined with any threaded spindle.
The anti-slip plate absorbs vibrations and prevents the levelling foot slipping.
For matching threaded spindles see 27832.

Order No.	Form	Material	D	H	Load rating max. kN
27830-10301	A	die cast zinc	30	11,5	16
27830-10401	A	die cast zinc	40	12	18
27830-10501	A	die cast zinc	50	14,5	20
27830-20301	B	die cast zinc	30	13,5	16
27830-20401	B	die cast zinc	40	14,5	18
27830-20501	B	die cast zinc	50	17,5	20
27830-10302	A	stainless steel	30	11,5	22
27830-10402	A	stainless steel	40	12	24
27830-10502	A	stainless steel	50	14,5	26
27830-20302	B	stainless steel	30	13,5	22
27830-20402	B	stainless steel	40	14,5	24
27830-20502	B	stainless steel	50	17,5	26
27830-10303	A	plastic	30	11,5	15
27830-10403	A	plastic	40	12	15
27830-10503	A	plastic	50	14,5	15
27830-20303	B	plastic	30	13,5	15
27830-20403	B	plastic	40	14,5	15
27830-20503	B	plastic	50	17,5	15

Levelling feet ECO-Line threaded spindles

steel or stainless steel



Material:
Steel or stainless steel 1.4305.

Version:
Steel blue-chromed.
Stainless steel bright.

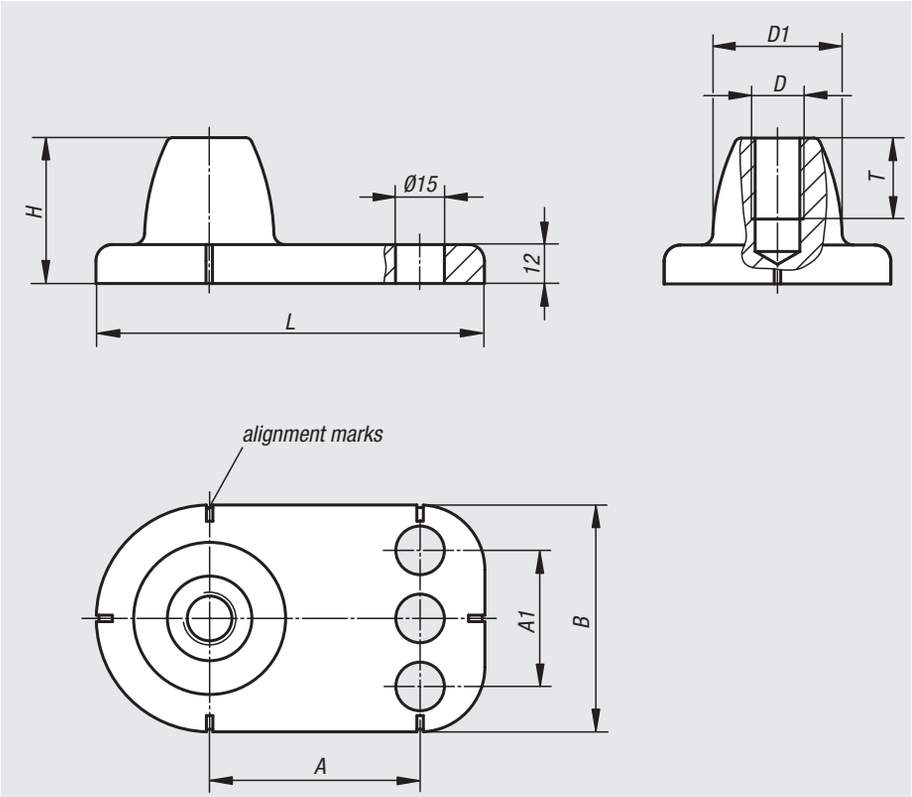
Sample order:
nlm 27832-101201
nlm 27832-101201 and 27830-10301 **assembled**

Note for ordering:
If the threaded spindle and the levelling foot plate are to be supplied assembled, please add the suffix „**assembled**“ to the order number for the spindle and plate. (e.g. 27832-080251 and 27830-10301 **assembled**.)

Note:
ECO-Line levelling feet consist of a threaded spindle and a plate. Any threaded spindle can be combined with any plate.

Order No. steel	Order No. stainless steel	D	L	L1	SW	Load rating max. kN
27832-080251	**27832-080252**	M8	25	29,5	13	3,5
27832-080401	**27832-080402**	M8	40	44,5	13	3,5
27832-080501	**27832-080502**	M8	50	54,5	13	3,5
27832-080701	**27832-080702**	M8	70	74,5	13	3,5
27832-080801	**27832-080802**	M8	80	84,5	13	3,5
27832-081001	**27832-081002**	M8	100	104,5	13	3,5
27832-081201	**27832-081202**	M8	120	124,5	13	3,5
27832-100251	**27832-100252**	M10	25	30	17	4,7
27832-100401	**27832-100402**	M10	40	45	17	4,7
27832-100501	**27832-100502**	M10	50	55	17	4,7
27832-100701	**27832-100702**	M10	70	75	17	4,7
27832-100801	**27832-100802**	M10	80	85	17	4,7
27832-101001	**27832-101002**	M10	100	105	17	4,7
27832-101201	**27832-101202**	M10	120	125	17	4,7
27832-120251	**27832-120252**	M12	25	31	19	7,7
27832-120401	**27832-120402**	M12	40	46	19	7,7
27832-120501	**27832-120502**	M12	50	56	19	7,7
27832-120701	**27832-120702**	M12	70	76	19	7,7
27832-120801	**27832-120802**	M12	80	86	19	7,7
27832-121001	**27832-121002**	M12	100	106	19	7,7
27832-121201	**27832-121202**	M12	120	126	19	7,7
27832-160501	**27832-160502**	M16	50	58,5	24	14,5
27832-161001	**27832-161002**	M16	100	108,5	24	14,5
27832-161501	**27832-161502**	M16	150	158,5	24	14,5

Ducks feet



Material:
Cast aluminium

Version:
Bright, vibratory ground.

Sample order:
nlm 27833-161

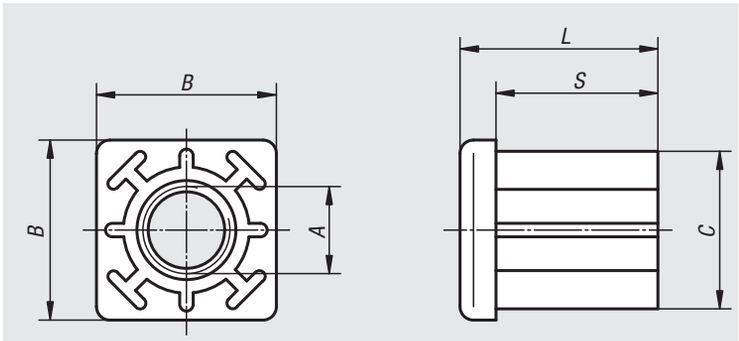
Note:
Stabile levelling foot which is ideally suited for conveyor units. With aligning markings to precisely position the ducks feet.

Accessories:
Matching threaded rods 07640.

Order No.	A	A1	B	D	D1	H	L	T	Load capacity N
27833-161	65	-	70	M16	40	45	119,5	25	4000
27833-201	75	55	90	M20	52	50	139,5	27,5	6000
27833-241	85	70	110	M24	61	55	159,5	32	10000

Tube inserts square

with tapped bush



Material:
Screw-in plugs, glass-fibre reinforced thermoplastic.
Threaded insert, brass.

Version:
Insert black.
Tapped bush nickel-plated.

Sample order:
nlm 27835-103015

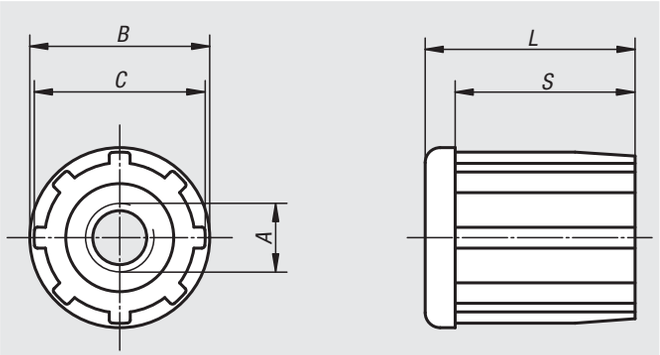
Note:
Threaded square inserts for attaching levelling feet, swivel feet and castors to square tubes.

Order No.	A	B	C	L	S	Suitable for square tubes	Load rating max. kN
27835-103015	M10	30	27,5	33	27	30 x 1,5	5
27835-123015	M12	30	27,5	33	27	30 x 1,5	5
27835-143015	M14	30	27,5	33	27	30 x 1,5	5
27835-163015	M16	30	27,5	33	27	30 x 1,5	5
27835-103020	M10	30	26,5	33	27	30 x 2	5
27835-123020	M12	30	26,5	33	27	30 x 2	5
27835-143020	M14	30	26,5	33	27	30 x 2	5
27835-163020	M16	30	26,5	33	27	30 x 2	5
27835-104015	M10	40	37,5	43	35	40 x 1,5	8
27835-124015	M12	40	37,5	43	35	40 x 1,5	8
27835-144015	M14	40	37,5	43	35	40 x 1,5	8
27835-164015	M16	40	37,5	43	35	40 x 1,5	8
27835-204015	M20	40	37,5	43	35	40 x 1,5	8
27835-104020	M10	40	36,5	43	35	40 x 2	10
27835-124020	M12	40	36,5	43	35	40 x 2	10
27835-144020	M14	40	36,5	43	35	40 x 2	10
27835-164020	M16	40	36,5	43	35	40 x 2	10
27835-204020	M20	40	36,5	43	35	40 x 2	10
27835-104025	M10	40	35,5	43	35	40 x 2,5	10
27835-124025	M12	40	35,5	43	35	40 x 2,5	10
27835-144025	M14	40	35,5	43	35	40 x 2,5	10
27835-164025	M16	40	35,5	43	35	40 x 2,5	10
27835-204025	M20	40	35,5	43	35	40 x 2,5	10
27835-104030	M10	40	34,5	43	35	40 x 3	10
27835-124030	M12	40	34,5	43	35	40 x 3	10
27835-144030	M14	40	34,5	43	35	40 x 3	10
27835-164030	M16	40	34,5	43	35	40 x 3	10
27835-204030	M20	40	34,5	43	35	40 x 3	10
27835-104040	M10	40	32,5	43	35	40 x 4	10
27835-124040	M12	40	32,5	43	35	40 x 4	10
27835-144040	M14	40	32,5	43	35	40 x 4	10

Order No.	A	B	C	L	S	Suitable for square tubes	Load rating max. kN
27835-164040	M16	40	32,5	43	35	40 x 4	10
27835-204040	M20	40	32,5	43	35	40 x 4	10
27835-125015	M12	50	47,5	55	44	50 x 1,5	8
27835-145015	M14	50	47,5	55	44	50 x 1,5	8
27835-165015	M16	50	47,5	55	44	50 x 1,5	8
27835-205015	M20	50	47,5	55	44	50 x 1,5	8
27835-125020	M12	50	46,5	55	44	50 x 2	12
27835-145020	M14	50	46,5	55	44	50 x 2	12
27835-165020	M16	50	46,5	55	44	50 x 2	12
27835-205020	M20	50	46,5	55	44	50 x 2	12
27835-125025	M12	50	45,5	55	44	50 x 2,5	12
27835-145025	M14	50	45,5	55	44	50 x 2,5	12
27835-165025	M16	50	45,5	55	44	50 x 2,5	12
27835-205025	M20	50	45,5	55	44	50 x 2,5	12
27835-125030	M12	50	44,5	55	44	50 x 3	12
27835-145030	M14	50	44,5	55	44	50 x 3	12
27835-165030	M16	50	44,5	55	44	50 x 3	12
27835-205030	M20	50	44,5	55	44	50 x 3	12
27835-125040	M12	50	42,5	55	44	50 x 4	12
27835-145040	M14	50	42,5	55	44	50 x 4	12
27835-165040	M16	50	42,5	55	44	50 x 4	12
27835-205040	M20	50	42,5	55	44	50 x 4	12
27835-146020	M14	60	56,5	55	45	60 x 2	12
27835-166020	M16	60	56,5	55	45	60 x 2	12
27835-206020	M20	60	56,5	55	45	60 x 2	12
27835-146030	M14	60	54,5	55	45	60 x 3	12
27835-166030	M16	60	54,5	55	45	60 x 3	12
27835-206030	M20	60	54,5	55	45	60 x 3	12
27835-146040	M14	60	52,5	55	45	60 x 4	12
27835-166040	M16	60	52,5	55	45	60 x 4	12
27835-206040	M20	60	52,5	55	45	60 x 4	12

Tube inserts round

with tapped bush



Material:
Screw-in plugs, glass-fibre reinforced thermoplastic.
Threaded insert, brass.

Version:
Insert black.
Tapped bush nickel-plated.

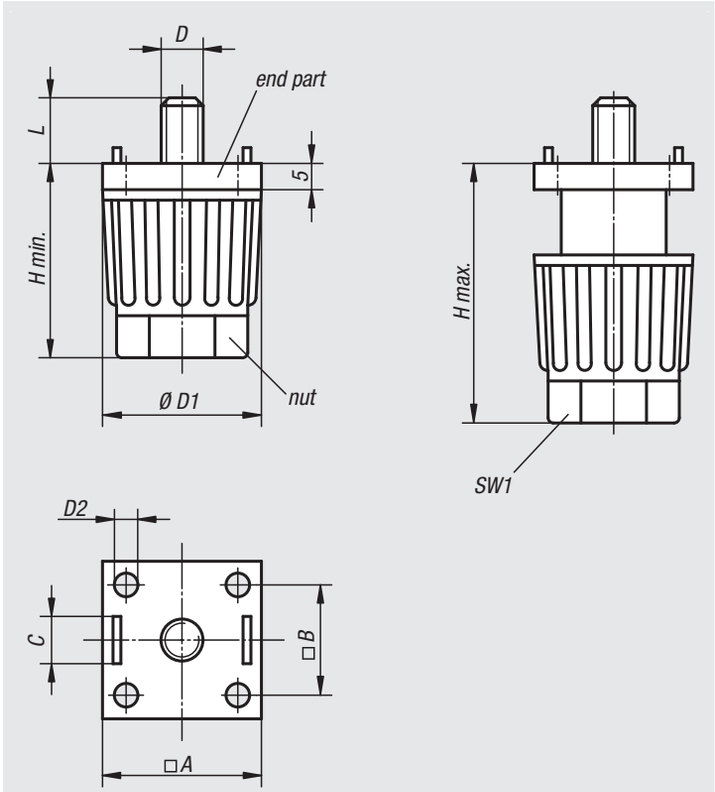
Sample order:
nlm 27836-103010

Note:
Threaded square inserts for attaching levelling feet, swivel feet and castors to round tubes.

Order No.	A	B	C	L	S	Suitable for tubes	Load rating max. kN
27836-103010	M10	30	28,4	33	27	Ø 30 x 1	5
27836-123010	M12	30	28,4	33	27	Ø 30 x 1	5
27836-143010	M14	30	28,4	33	27	Ø 30 x 1	5
27836-163010	M16	30	28,4	33	27	Ø 30 x 1	5
27836-103815	M10	38	35,5	43	35	Ø 38 x 1,5	5
27836-123815	M12	38	35,5	43	35	Ø 38 x 1,5	5
27836-143815	M14	38	35,5	43	35	Ø 38 x 1,5	5
27836-163815	M16	38	35,5	43	35	Ø 38 x 1,5	5
27836-104215	M10	42	39,9	43	35	Ø 42,4 x 1,5	6
27836-124215	M12	42	39,9	43	35	Ø 42,4 x 1,5	6
27836-144215	M14	42	39,9	43	35	Ø 42,4 x 1,5	6
27836-164215	M16	42	39,9	43	35	Ø 42,4 x 1,5	6
27836-204215	M20	42	39,9	43	35	Ø 42,4 x 1,5	6
27836-124815	M12	48	45,8	55	44	Ø 48,3 x 1,5	6
27836-144815	M14	48	45,8	55	44	Ø 48,3 x 1,5	6
27836-164815	M16	48	45,8	55	44	Ø 48,3 x 1,5	6
27836-204815	M20	48	45,8	55	44	Ø 48,3 x 1,5	6
27836-125015	M12	50	48,4	55	44	Ø 50,9 x 1,5	6
27836-145015	M14	50	48,4	55	44	Ø 50,9 x 1,5	6
27836-165015	M16	50	48,4	55	44	Ø 50,9 x 1,5	6
27836-205015	M20	50	48,4	55	44	Ø 50,9 x 1,5	6

Levelling feet

for aluminium profiles



Material:
Body fibreglass reinforced thermoplastic.
Spindle and washer steel.

Version:
Body black.
Spindle and washer galvanized.

Sample order:
nlm 27840-300806

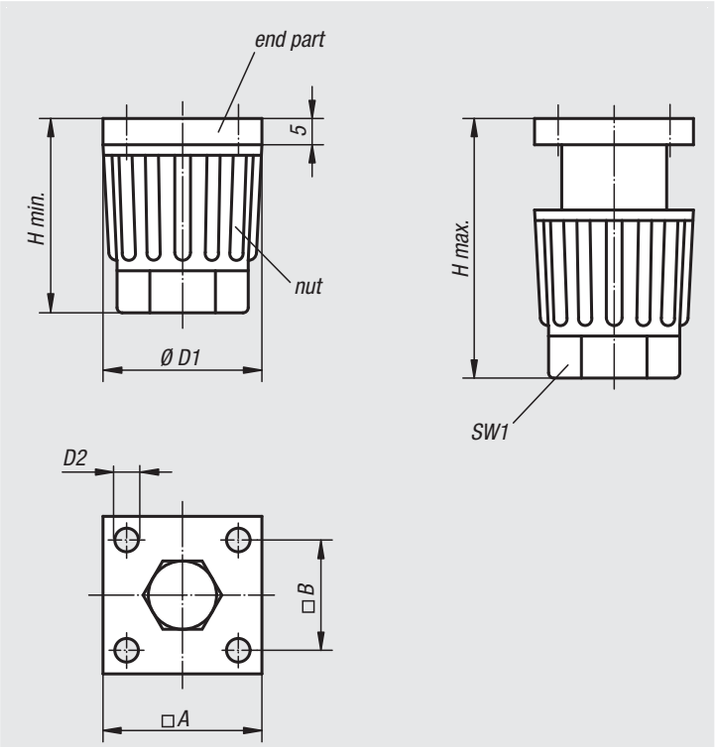
Note:
These levelling feet are suitable for tables and lighter installations. The foot height is adjusted by turning the base nut by hand or spanner. The pins on the top flange centre the foot and prevent it turning. These levelling feet can be attached to aluminium profiles using T-slot nuts, no need for drilling.

Side mounted in profile keyway
no drilling required when using a T-slot nut

Profile end mounted

Order No.	A for aluminium profile	B	C for slot	D	D1	D2 for countersunk screw	H min. - max.	L	SW1	Load rating max. kN
27840-300806	30	20,5	8	M6	30	M4	35-50	14	22	1,5
27840-300808	30	20,5	8	M8	30	M4	35-50	14	22	1,5
27840-301006	30	20,5	10	M6	30	M4	35-50	14	22	1,5
27840-301008	30	20,5	10	M8	30	M4	35-50	14	22	1,5
27840-400806	40	28	8	M6	40	M6	45-65	14	30	1,5
27840-400808	40	28	8	M8	40	M6	45-65	14	30	1,5
27840-401006	40	28	10	M6	40	M6	45-65	14	30	1,5
27840-401008	40	28	10	M8	40	M6	45-65	14	30	1,5

Levelling feet



Material:
Body fibreglass reinforced thermoplastic.
Hexagon head screw steel.

Version:
Body black.
Hexagon head screw galvanized.

Sample order:
nlm 27841-3004

Note:
The flat top flange and sunken screw head make these levelling feet ideal for mounting on smooth surfaces.
The foot height is adjusted by turning the base nut by hand or spanner.

Order No.	A	B	D1	D2 for countersunk screw	H min. - max.	SW1	Load rating max. kN
27841-3004	30	20,5	30	M4	35-50	22	1,5
27841-4006	40	28	40	M6	45-65	30	1,5

Technical information for hinges

Hinges
In the tables on the following pages are listed a large range of hinge variations. Many more variations are possible if hinges with guide tabs are required i.e. when combining aluminium profiles with different slot widths.

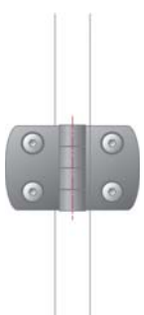
By the way,
hinges are supplied with a stainless steel axle as standard.
Hinges 27853 and 27868 are supplied with a steel axle.

Left and right hinge
Each lift-off hinge has a left and right version, before ordering it should be known on which side the door or hatch is to be mounted.

Left hinge.
The left hinge half is fixed.
The hatch or door opens from right to left.

Right hinge.
The right hinge half is fixed.
The hatch or door opens from left to right.

Fixed hinge.
The hinge is non-liftoff.
It is suitable for opening left or right.

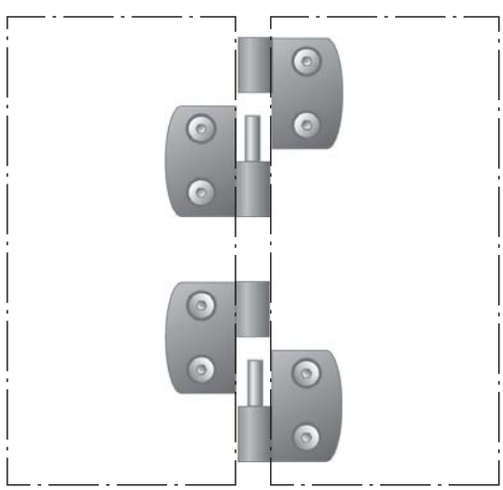


Guide tabs
Many hinges can be supplied on request with guide tabs for the slots of aluminium profiles. They secure the hinge against twisting and make it stronger. The hinges are designed in such a way that the guide tabs can simply be broken out with a screwdriver.

without
locating tabs

with
locating tabs
for aluminium
profiles with slot

Tip
If you want to fit a door or hatch so that it cannot be lifted off, you can still use a left and right lift-off hinge. The two hinges are fitted in the end position and secure each other mutually.



Hinges

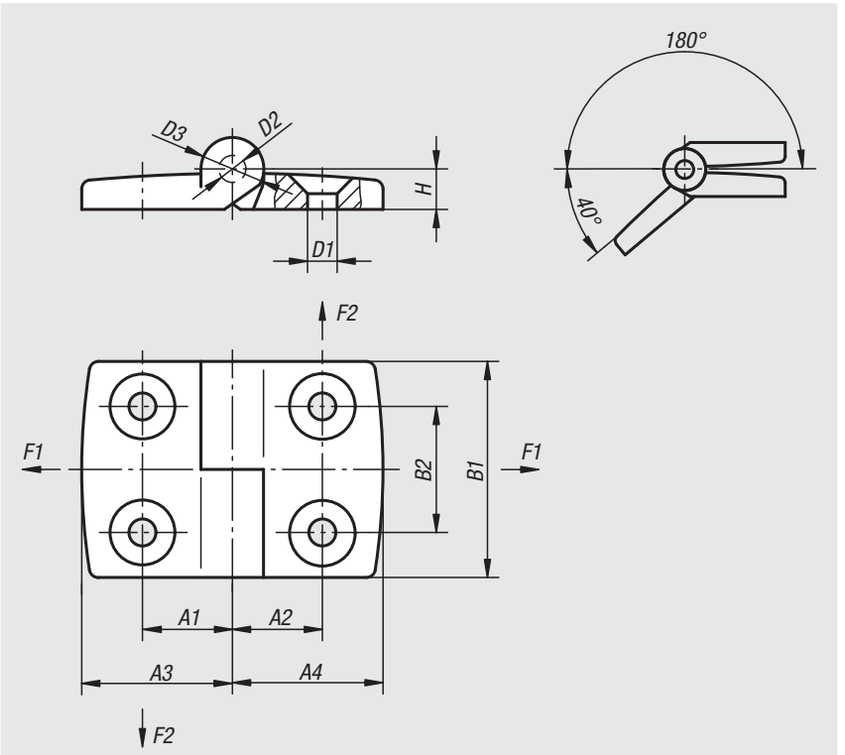
plastic, lift-off, left

Material:
Fibreglass reinforced thermoplastic.
Hinge pin stainless steel.

Version:
Hinge black. Pin bright.

Sample order:
nlm 27850-1301825

Note:
All hinges can be supplied on request with guide tabs for the slots of aluminium profiles (slots 6, 8 and 10). They facilitate mounting, secure the hinge against twisting and make it stronger.

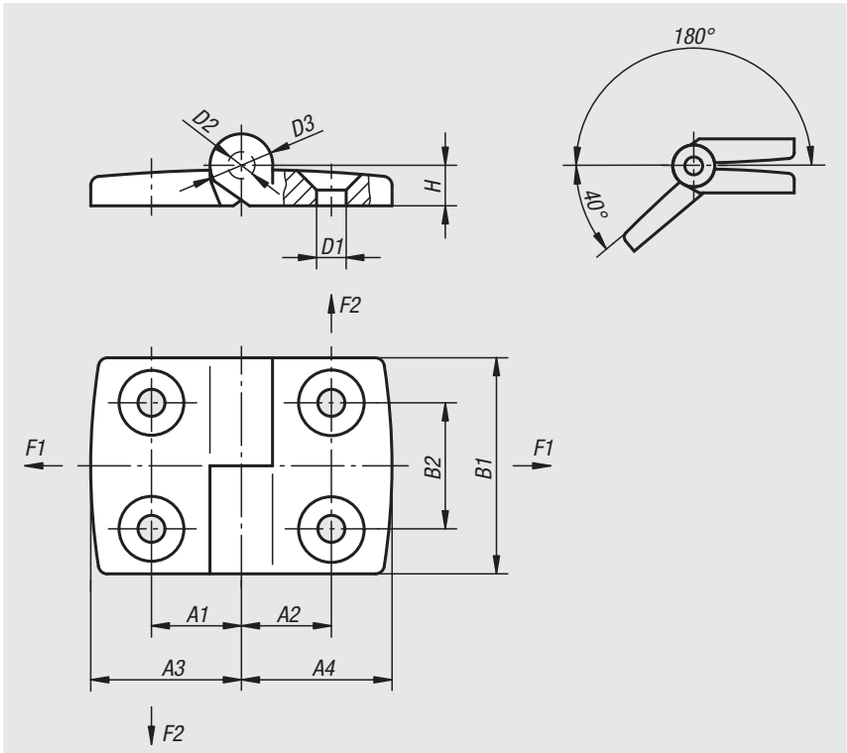


Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 max. kN	F2 max. kN
27850-1251515	15	15	26	26	48	28	6,6	6	14	9	0,625	0,425
27850-1251518	15	17,5	26	29,5	48	28	6,6	6	14	9	0,7	0,5
27850-1251520	15	20	26	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-1251523	15	22,5	26	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1251525	15	25	26	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-1251528	15	27,5	26	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-1251533	15	32,5	26	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1301815	17,5	15	29,5	26	48	28	6,6	6	14	9	0,75	0,45
27850-1301818	17,5	17,5	29,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1301820	17,5	20	29,5	35,5	48	28	6,6	6	14	9	0,75	0,4
27850-1301823	17,5	22,5	29,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1301825	17,5	25	29,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-1301828	17,5	27,5	29,5	48,5	48	28	6,6	6	14	9	0,8	0,35
27850-1301833	17,5	32,5	29,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1352015	20	15	35,5	26	48	28	6,6	6	14	9	0,75	0,4
27850-1352018	20	17,5	35,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1352020	20	20	35,5	35,5	48	28	6,6	6	14	9	0,75	0,4
27850-1352023	20	22,5	35,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1352025	20	25	35,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-1352028	20	27,5	35,5	48,5	48	28	6,6	6	14	9	0,9	0,35
27850-1352033	20	32,5	35,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1402315	22,5	15	38,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-1402318	22,5	17,5	38,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1402320	22,5	20	38,5	35,5	48	28	6,6	6	14	9	0,75	0,4
27850-1402323	22,5	22,5	38,5	38,5	48	28	6,6	6	14	9	0,8	0,4

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 max. kN	F2 max. kN
27850-1402325	22,5	25	38,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-1402328	22,5	27,5	38,5	48,5	48	28	6,6	6	14	9	0,8	0,35
27850-1402333	22,5	32,5	38,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1452515	25	15	43,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-1452518	25	17,5	43,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1452520	25	20	43,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-1452523	25	22,5	43,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1452525	25	25	43,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-1452528	25	27,5	43,5	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-1452533	25	32,5	43,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1502815	27,5	15	48,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-1502818	27,5	17,5	48,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1502820	27,5	20	48,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-1502823	27,5	22,5	48,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1502825	27,5	25	48,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-1502828	27,5	27,5	48,5	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-1502833	27,5	32,5	48,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-1603315	32,5	15	57,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-1603318	32,5	17,5	57,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-1603320	32,5	20	57,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-1603323	32,5	22,5	57,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-1603325	32,5	25	57,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-1603328	32,5	27,5	57,5	48,5	48	28	6,6	6	14	9	0,9	0,32
27850-1603333	32,5	32,5	57,5	57,5	48	28	6,6	6	14	9	0,9	0,24

Hinges

plastic, lift-off, right



Material:
Fibreglass reinforced thermoplastic.
Hinge pin stainless steel.

Version:
Hinge black. Pin bright.

Sample order:
nlm 27850-2251523

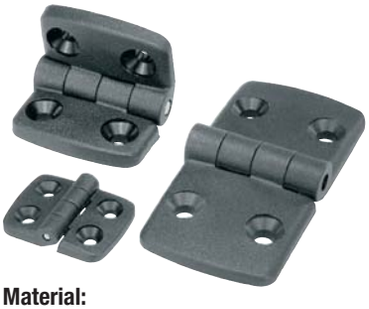
Note:
All hinges can be supplied on request with guide tabs for the slots of aluminium profiles (slots 6, 8 and 10). They facilitate mounting, secure the hinge against twisting and make it stronger.

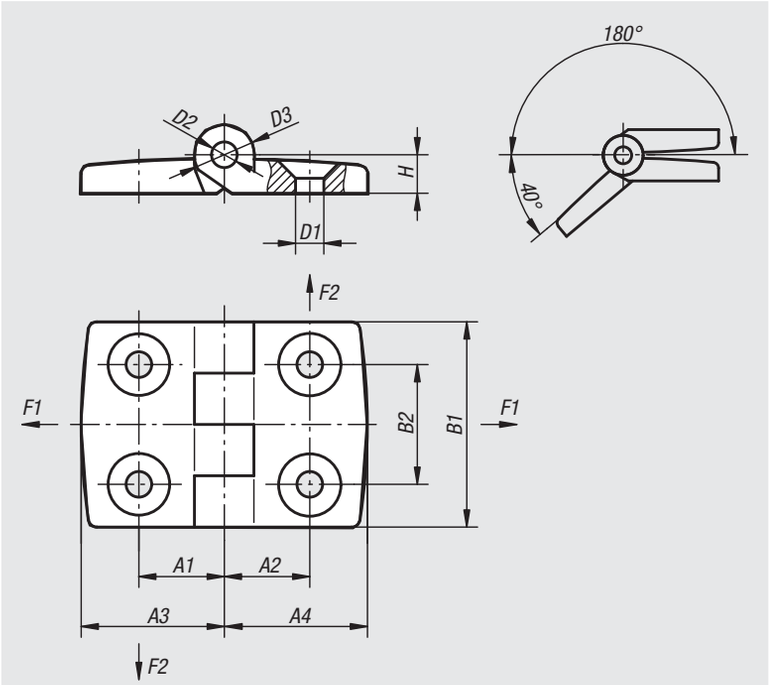
Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 max. kN	F2 max. kN
27850-2251515	15	15	26	26	48	28	6,6	6	14	9	0,625	0,425
27850-2251518	15	17,5	26	29,5	48	28	6,6	6	14	9	0,7	0,5
27850-2251520	15	20	26	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-2251523	15	22,5	26	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2251525	15	25	26	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-2251528	15	27,5	26	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-2251533	15	32,5	26	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2301815	17,5	15	29,5	26	48	28	6,6	6	14	9	0,75	0,45
27850-2301818	17,5	17,5	29,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2301820	17,5	20	29,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-2301823	17,5	22,5	29,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2301825	17,5	25	29,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-2301828	17,5	27,5	29,5	48,5	48	28	6,6	6	14	9	0,8	0,35
27850-2301833	17,5	32,5	29,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2352015	20	15	35,5	26	48	28	6,6	6	14	9	0,7	0,4
27850-2352018	20	17,5	35,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2352020	20	20	35,5	35,5	48	28	6,6	6	14	9	0,75	0,4
27850-2352023	20	22,5	35,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2352025	20	25	35,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-2352028	20	27,5	35,5	48,5	48	28	6,6	6	14	9	0,8	0,35
27850-2352033	20	32,5	35,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2402315	22,5	15	38,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-2402318	22,5	17,5	38,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2402320	22,5	20	38,5	35,5	48	28	6,6	6	14	9	0,75	0,4
27850-2402323	22,5	22,5	38,5	38,5	48	28	6,6	6	14	9	0,8	0,35

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 max. kN	F2 max. kN
27850-2402325	22,5	25	38,5	43,5	48	28	6,6	6	14	9	0,8	0,35
27850-2402328	22,5	27,5	38,5	48,5	48	28	6,6	6	14	9	0,8	0,35
27850-2402333	22,5	32,5	38,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2452515	25	15	43,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-2452518	25	17,5	43,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2452520	25	20	43,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-2452523	25	22,5	43,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2452525	25	25	43,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-2452528	25	27,5	43,5	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-2452533	25	32,5	43,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2502815	27,5	15	48,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-2502818	27,5	17,5	48,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2502820	27,5	20	48,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-2502823	27,5	22,5	48,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2502825	27,5	25	48,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-2502828	27,5	27,5	48,5	48,5	48	28	6,6	6	14	9	0,8	0,32
27850-2502833	27,5	32,5	48,5	57,5	48	28	6,6	6	14	9	0,8	0,24
27850-2603315	32,5	15	57,5	26	48	28	6,6	6	14	9	0,65	0,425
27850-2603318	32,5	17,5	57,5	29,5	48	28	6,6	6	14	9	0,75	0,5
27850-2603320	32,5	20	57,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27850-2603323	32,5	22,5	57,5	38,5	48	28	6,6	6	14	9	0,8	0,35
27850-2603325	32,5	25	57,5	43,5	48	28	6,6	6	14	9	0,8	0,325
27850-2603328	32,5	27,5	57,5	48,5	48	28	6,6	6	14	9	0,9	0,32
27850-2603333	32,5	32,5	57,5	57,5	48	28	6,6	6	14	9	0,9	0,24

Hinges

plastic





Material:
Fibreglass reinforced thermoplastic.
Hinge pin stainless steel.

Version:
Hinge black. Pin bright.

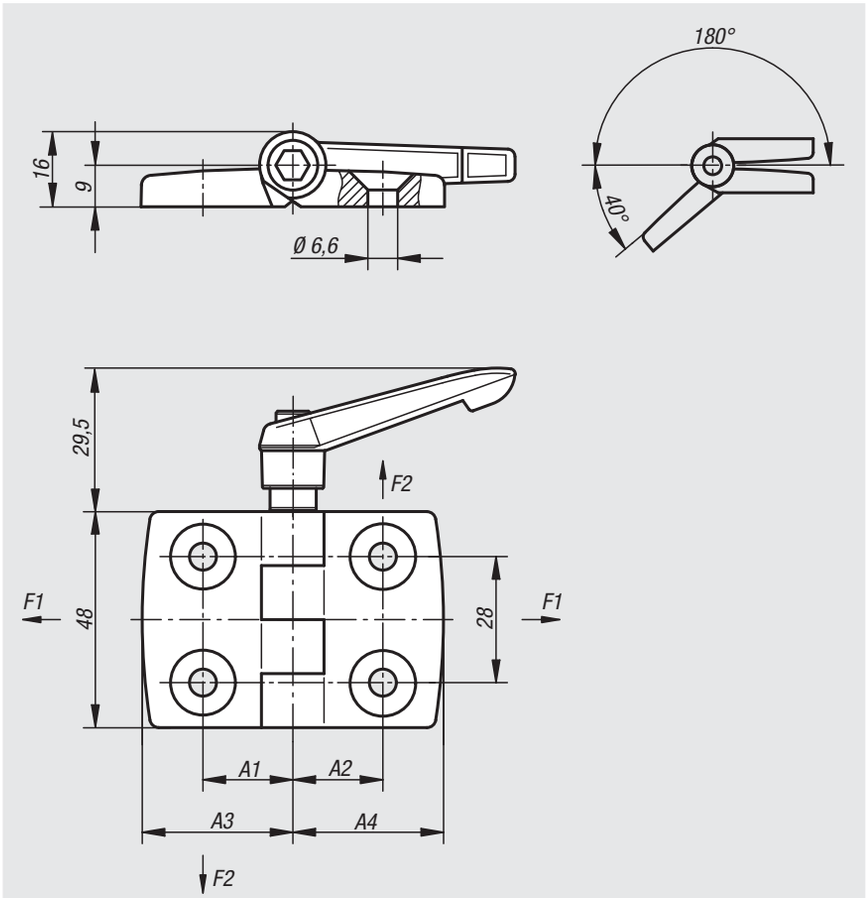
Sample order:
nlm 27852-251528

Note:
Unequal leaf hinges can be mounted left or right.
All hinges can be supplied on request with guide tabs for the slots of aluminium profiles (slots 6, 8 and 10). They facilitate mounting, secure the hinge against twisting and make it stronger.

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 max. kN	F2 max. kN
27852-201212	11,5	11,5	19,5	19,5	30	14	4,2	3	8	5,5	0,4	0,2
27852-251515	15	15	26	26	48	28	6,6	6	14	9	0,625	0,425
27852-251518	15	17,5	26	29,5	48	28	6,6	6	14	9	0,7	0,5
27852-251520	15	20	26	35,5	48	28	6,6	6	14	9	0,7	0,4
27852-251523	15	22,5	26	38,5	48	28	6,6	6	14	9	0,8	0,35
27852-251525	15	25	26	43,5	48	28	6,6	6	14	9	0,8	0,325
27852-251528	15	27,5	26	48,5	48	28	6,6	6	14	9	0,8	0,32
27852-251533	15	32,5	26	57,5	48	28	6,6	6	14	9	0,8	0,24
27852-301818	17,5	17,5	29,5	29,5	48	28	6,6	6	14	9	0,7	0,4
27852-301820	17,5	20	29,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27852-301823	17,5	22,5	29,5	38,5	48	28	6,6	6	14	9	0,75	0,45
27852-301825	17,5	25	29,5	43,5	48	28	6,6	6	14	9	0,75	0,45
27852-301828	17,5	27,5	29,5	48,5	48	28	6,6	6	14	9	0,9	0,425
27852-301833	17,5	32,5	29,5	57,5	48	28	6,6	6	14	9	0,85	0,2
27852-352020	20	20	35,5	35,5	48	28	6,6	6	14	9	0,7	0,4
27852-352023	20	22,5	35,5	38,5	48	28	6,6	6	14	9	0,75	0,45
27852-352025	20	25	35,5	43,5	48	28	6,6	6	14	9	0,75	0,45
27852-352028	20	27,5	35,5	48,5	48	28	6,6	6	14	9	0,8	0,425
27852-352033	20	32,5	35,5	57,5	48	28	6,6	6	14	9	0,8	0,175
27852-402323	22,5	22,5	38,5	38,5	48	28	6,6	6	14	9	0,75	0,45
27852-402325	22,5	25	38,5	43,5	48	28	6,6	6	14	9	0,75	0,45
27852-402328	22,5	27,5	38,5	48,5	48	28	6,6	6	14	9	0,8	0,425
27852-402333	22,5	32,5	38,5	57,5	48	28	6,6	6	14	9	0,85	0,175
27852-452525	25	25	43,5	43,5	48	28	6,6	6	14	9	0,75	0,45
27852-452528	25	27,5	43,5	48,5	48	28	6,6	6	14	9	0,8	0,425
27852-452533	25	32,5	43,5	57,5	48	28	6,6	6	14	9	0,85	0,2
27852-502828	27,5	27,5	48,5	48,5	48	28	6,6	6	14	9	0,8	0,425
27852-502833	27,5	32,5	48,5	57,5	48	28	6,6	6	14	9	0,85	0,2
27852-603333	32,5	32,5	57,5	57,5	48	28	6,6	6	14	9	0,85	0,175

Hinges

plastic, with locking lever



Material:
Hinge and lever fibreglass reinforced thermoplastic.
Hinge pin steel.
Mechanism steel.

Version:
Hinge black.
Pin galvanized.
Locking lever black.
Mechanism black galvanized.

Sample order:
nlm 27853-251515

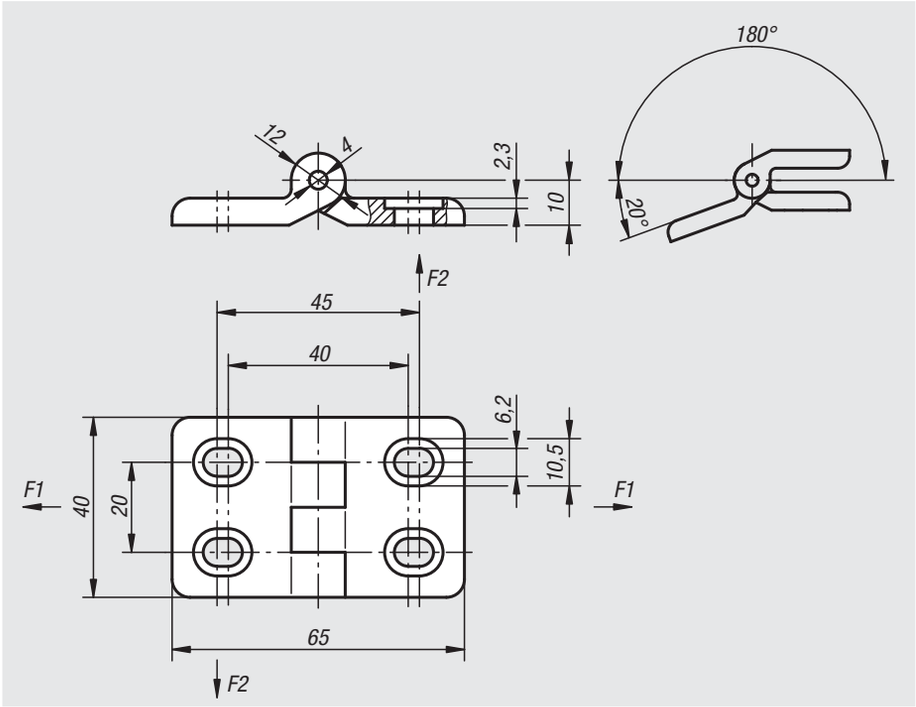
Note:
The indexable lever allows the hinge to be locked in any position.

On request:
Hinges with guide tabs (slot 6, 8 and 10) for aluminium profiles.
Unequal leaf combinations.

Order No.	A1	A2	A3	A4	F1 max. kN	F2 max. kN
27853-251515	15	15	26	26	0,5	0,38
27853-301818	17,5	17,5	29,5	29,5	0,7	0,4
27853-352020	20	20	36	36	0,7	0,4
27853-402323	22,5	22,5	38,5	38,5	0,75	0,45
27853-452525	25	25	43,5	43,5	0,75	0,45
27853-502828	27,5	27,5	48,5	48,5	0,8	0,425
27853-603333	32,5	32,5	57,5	57,5	0,85	0,175

Hinges

plastic, with elongated holes



Material:
Fibreglass reinforced thermoplastic.
Hinge pin stainless steel.

Version:
Hinge black. Pin bright.

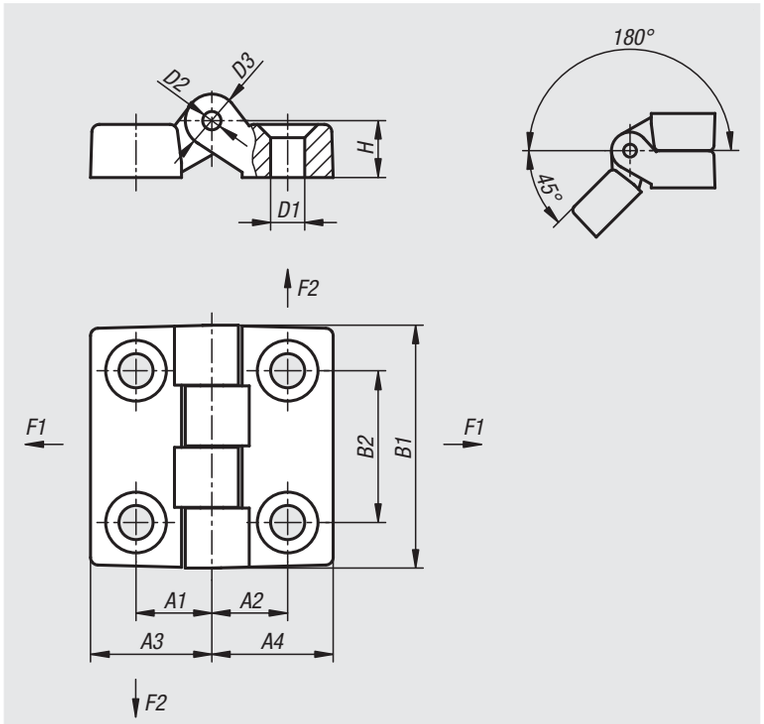
Sample order:
nlm 27854-402020

Note:
Elongated holes allow easy horizontal adjustment.

Order No.	F1 max. kN	F2 max. kN
27854-402020	0,5	0,3

Hinges plastic

with fastening holes



Material:
Fibreglass reinforced thermoplastic.
Hinge pin steel.

Version:
Hinge black.
Hinge pin galvanised.

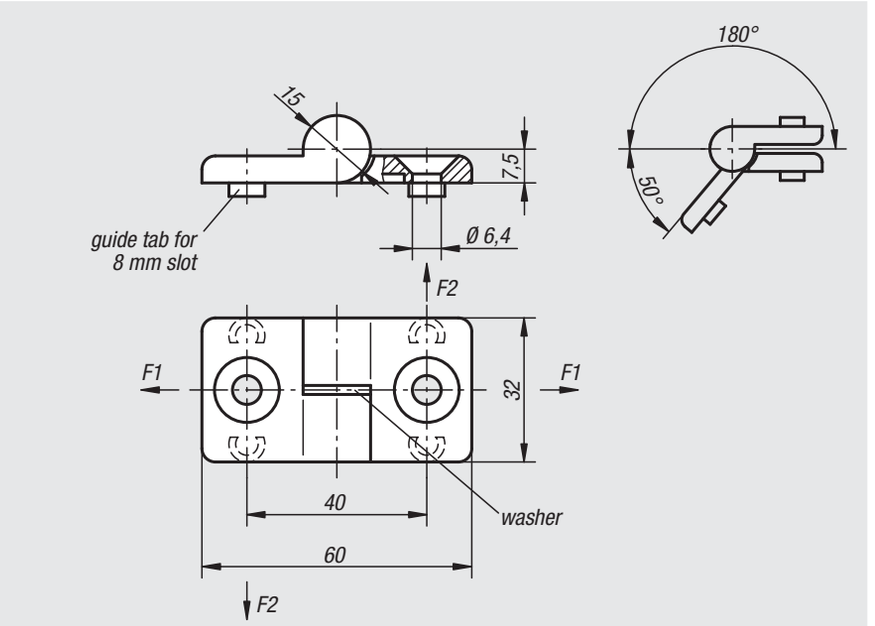
Sample order:
nlm 27855-004161010

Note:
Hinge with fastening holes
for countersunk screw DIN 7991/UNI 5933.

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	F1 (N)	F2 (N)
27855-004161010	10	10	16	16	32	20	4,5	3	7	7	1440	490
27855-006241515	15	15	24	24	48	30	6,5	5	10	10,5	1960	1470
27855-006322020	20	20	32	32	64	40	6,5	5	12	13	2850	1520
27855-008483232	31,5	31,5	48	48	96	60	8,5	8	16	16	4300	1810
27855-010483232	31,5	31,5	48	48	96	60	10,5	8	16	16	4300	1810

Hinges

plastic, lift-off, with guide tabs



Material:
Fibreglass reinforced thermoplastic.
Hinge pin stainless steel.
Washer thermoplastic.

Version:
Hinge and washer black. Pin bright.

Sample order:
nlm 27856-1322020

Note:
The guide tabs permit the hinges to be mounted in slots (8 mm).

Order No.	Version	F1 max. kN	F2 max. kN
27856-1322020	left hand	0,2	0,1
27856-2322020	right hand	0,2	0,1

Hinges

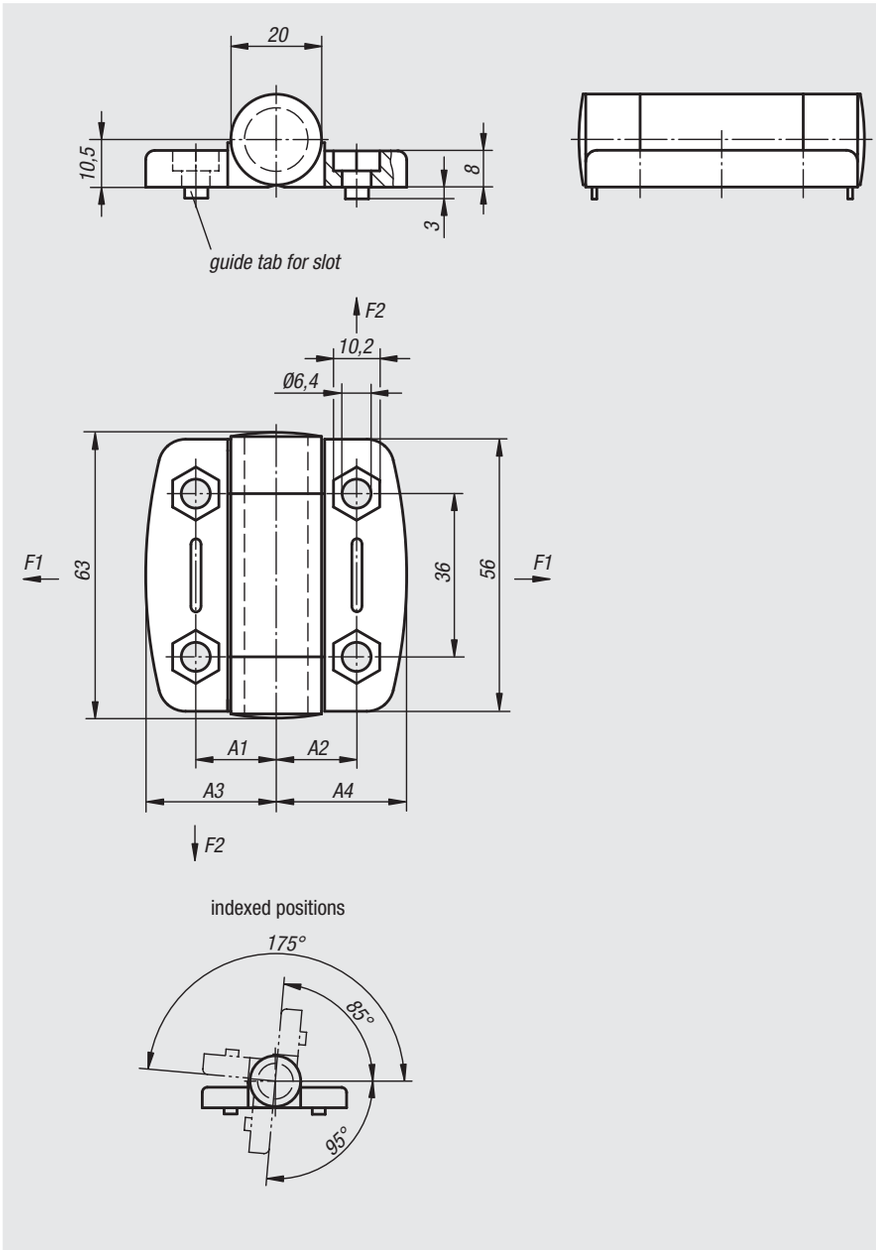
plastic, detent

Material:
Hinge and caps fibreglass reinforced PA thermoplastic.
Hinge pin stainless steel.

Version:
Hinge and caps black.
Pin bright.

Sample order:
nlm 27857-56181800

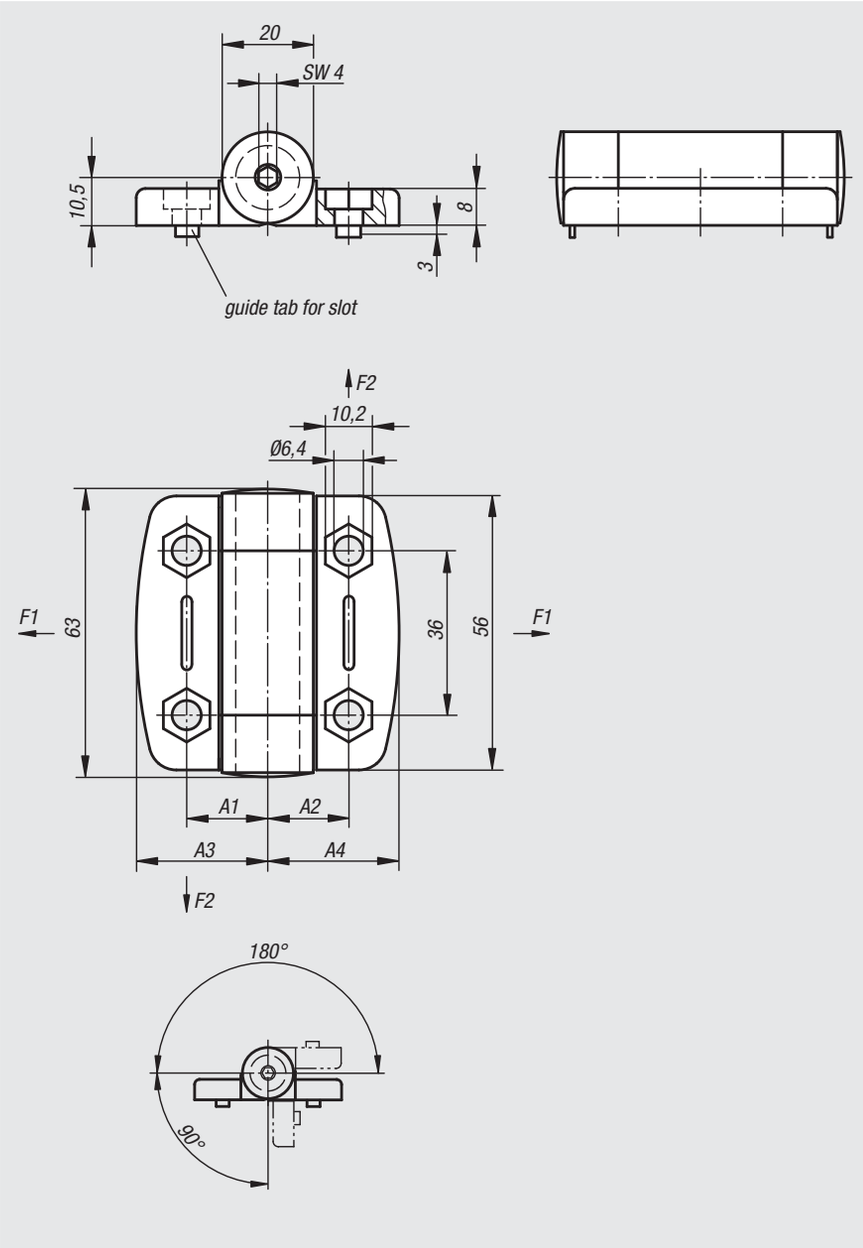
Note:
These hinges have a detent mechanism. This mechanism holds a door or lid open at three different angles or tightly closed. The hinges are available with or without guide tabs for aluminium profile slots.



Order No.	A1	A2	A3	A4	Guide tabs for slot	F1 max. kN	F2 max. kN
27857-56181800	17,75	17,75	27	27	-	0,4	0,35
27857-56181806	17,75	17,75	27	27	6	0,4	0,35
27857-56181808	17,75	17,75	27	27	8	0,4	0,35
27857-56232300	22,75	22,75	36,75	36,75	-	0,6	0,425
27857-56232308	22,75	22,75	36,75	36,75	8	0,6	0,425
27857-56232310	22,75	22,75	36,75	36,75	10	0,6	0,425

Hinges

plastic, with adjustable friction



Material:
Hinge and caps, fibreglass reinforced PA thermoplastic.
Metal parts stainless steel.

Version:
Hinge and caps black.
Metal parts bright.

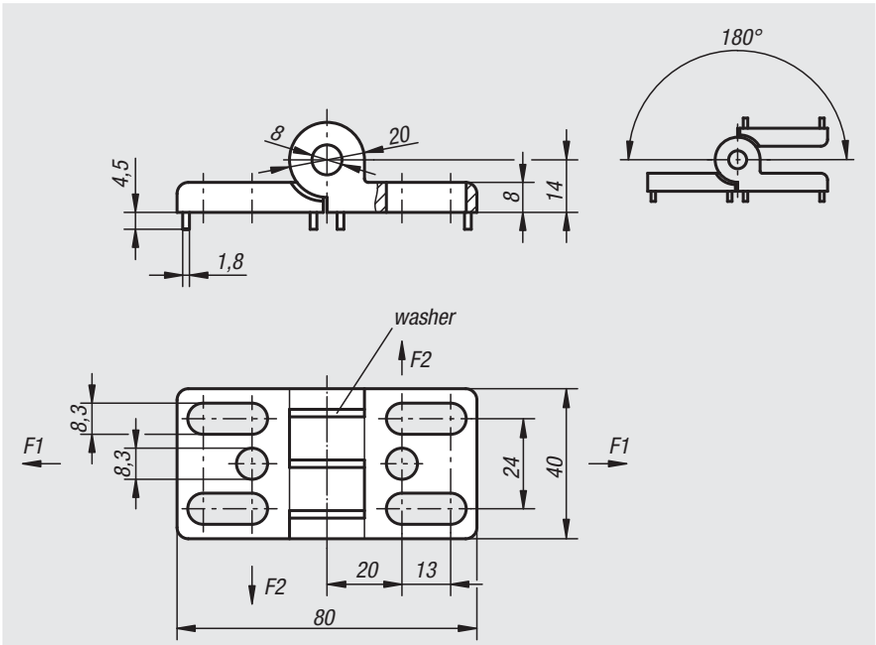
Sample order:
nlm 27858-56181800

Note:
These friction hinges allow doors or lids to remain open in any position. A set screw allows the amount of friction to be infinitely adjusted between 0-5 Nm. The hinges are available with or without guide tabs for aluminium profile slots.

Order No.	A1	A2	A3	A4	Guide tabs for slot	F1 max. kN	F2 max. kN
27858-56181800	17,75	17,75	27	27	-	0,4	0,325
27858-56181806	17,75	17,75	27	27	6	0,4	0,325
27858-56181808	17,75	17,75	27	27	8	0,4	0,325
27858-56232300	22,75	22,75	36,75	36,75	-	0,6	0,425
27858-56232308	22,75	22,75	36,75	36,75	8	0,6	0,425
27858-56232310	22,75	22,75	36,75	36,75	10	0,6	0,425

Hinges

die-cast zinc, with elongated holes



Material:
Die-cast zinc.
Hinge pin stainless steel.
Washer thermoplastic.

Version:
Hinge black powder-coated.
Pin bright.
Washer black.

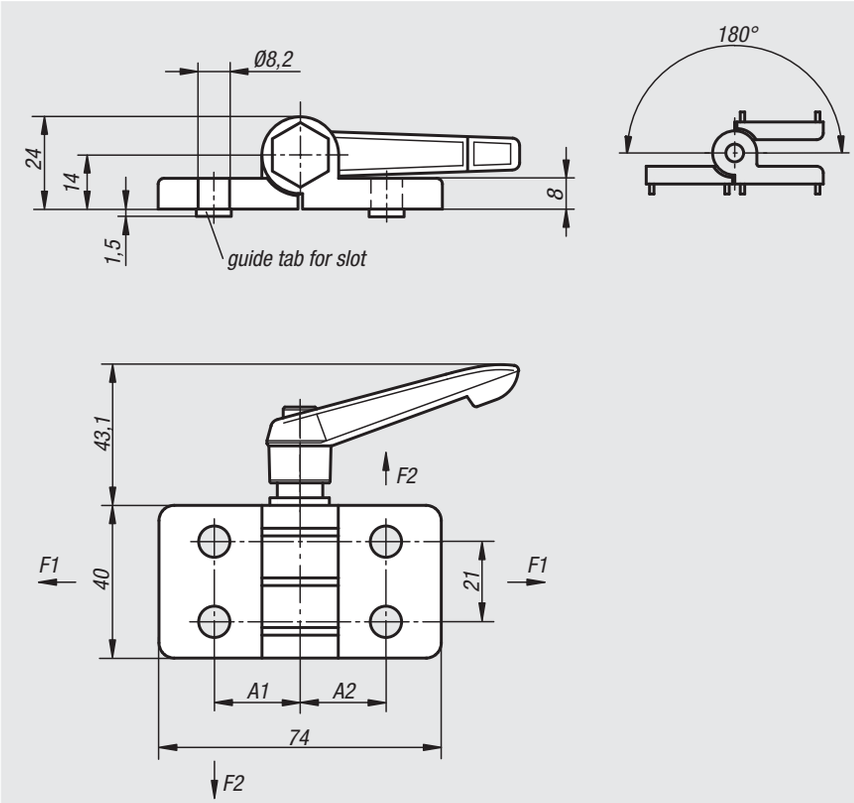
Sample order:
nlm 27865-402020

Note:
Elongated holes allow easy horizontal adjustment.

Order No.	Guide tabs for slot	F1 max. kN	F2 max. kN
27865-402020	-	1,2	0,5
27865-40202008	8	1,2	0,5
27865-40202010	10	1,2	0,5

Hinges

die-cast zinc, with locking lever



Material:
Hinge die-cast zinc.
Hinge pin steel.
Lever fibreglass reinforced thermoplastic.
Mechanism steel.

Version:
Hinge black powder-coated.
Pin galvanized.
Lever black.
Mechanism black galvanized.

Sample order:
nlm 27868-40232300

Note:
The indexable lever allows the hinge to be locked in any position.
Available with or without guide tabs for aluminium profile slots.

Order No.	A1	A2	Guide tabs for slot	F1 max. kN	F2 max. kN
27868-40232300	22,5	22,5	-	1,5	0,65
27868-40232308	22,5	22,5	8	1,5	0,65
27868-40232310	22,5	22,5	10	1,5	0,65
27868-40232500	22,5	25	-	1,5	0,65
27868-40232508	22,5	25	8	1,5	0,65
27868-40232510	22,5	25	10	1,5	0,65
27868-45252500	25	25	-	1,5	0,65
27868-45252508	25	25	8	1,5	0,65
27868-45252510	25	25	10	1,5	0,65

Hinges

aluminium, lift-off, left

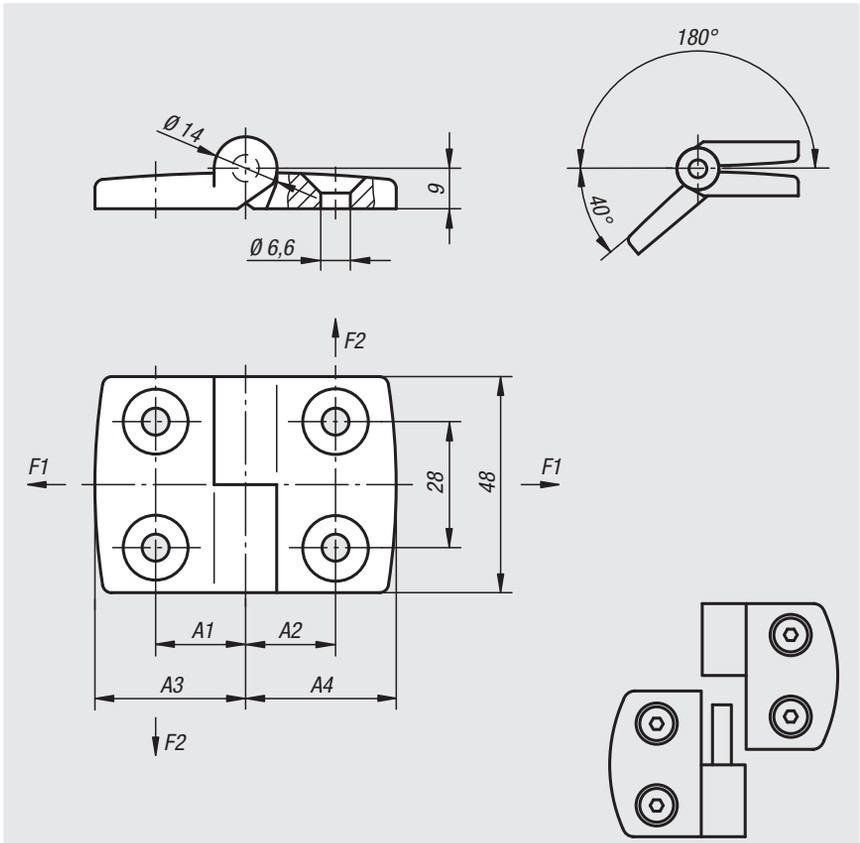
Material:
Die-cast aluminium.
Hinge pin stainless steel.

Version:
Hinge matt nickel-plated.
Pin bright.

Sample order:
nlm 27870-1251515

Note:
Hinges for panel elements and aluminium profiles.
The hinges can be fitted with plastic caps on lifting bolts.

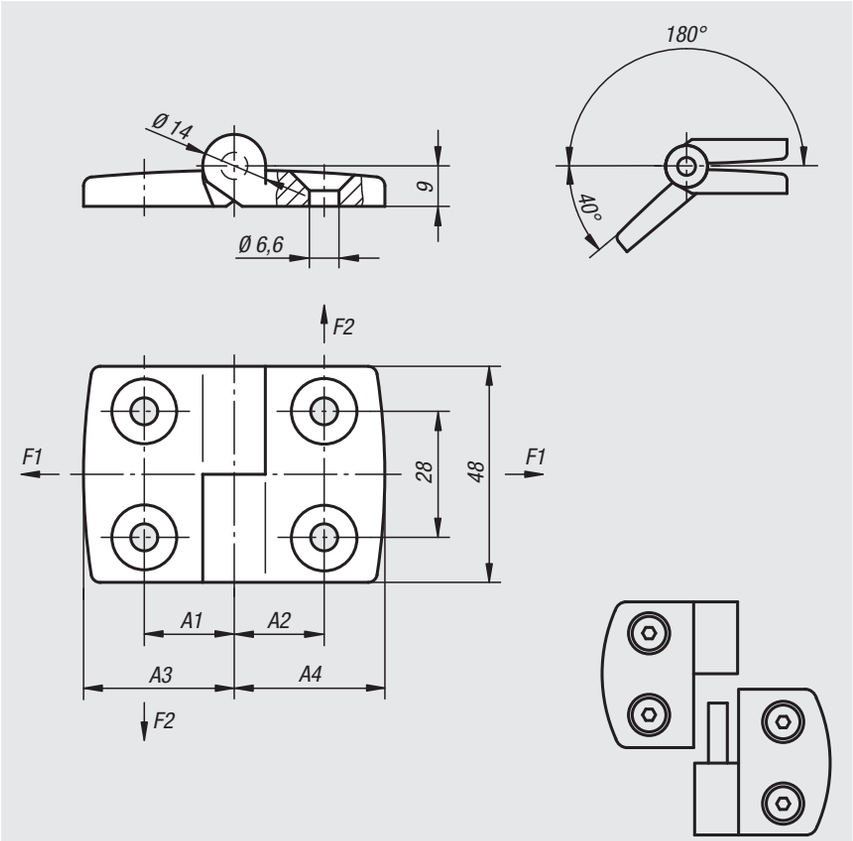
On request:
Hinges with guide tabs for aluminium profiles (slots 5, 6, 8, 10, 12 and 14).
Unequal leaf combinations.



Order No.	A1	A2	A3	A4	F1 max. kN	F2 max. kN
27870-1251515	15	15	26	26	0,41	0,25
27870-1301818	17,5	17,5	29,5	29,5	0,45	0,28
27870-1352020	20	20	36	36	0,5	0,25
27870-1402323	22,5	22,5	38,5	38,5	0,55	0,2
27870-1452525	25	25	43,5	43,5	0,55	0,2
27870-1502828	27,5	27,5	48,5	48,5	0,55	0,175
27870-1603333	32,5	32,5	57,5	57,5	0,575	0,15

Hinges

aluminium, lift-off, right



Material:
Die-cast aluminium.
Hinge pin stainless steel.

Version:
Hinge matt nickel-plated.
Pin bright.

Sample order:
nlm 27870-2251515

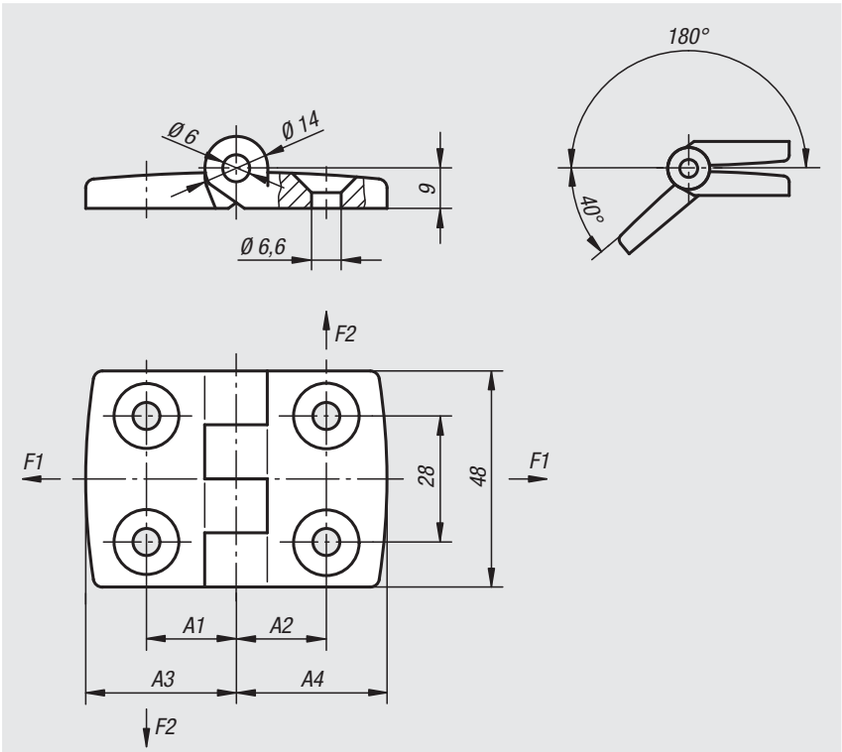
Note:
Hinges for panel elements and aluminium profiles.
The hinges can be fitted with plastic caps on lifting bolts.

On request:
Hinges with guide tabs for aluminium profiles (slots 5, 6, 8, 10, 12 and 14).
Unequal leaf combinations.

Order No.	A1	A2	A3	A4	F1 max. kN	F2 max. kN
27870-2251515	15	15	26	26	0,41	0,25
27870-2301818	17,5	17,5	29,5	29,5	0,45	0,28
27870-2352020	20	20	36	36	0,5	0,25
27870-2402323	22,5	22,5	38,5	38,5	0,55	0,2
27870-2452525	25	25	43,5	43,5	0,55	0,2
27870-2502828	27,5	27,5	48,5	48,5	0,55	0,175
27870-2603333	32,5	32,5	57,5	57,5	0,575	0,15

Hinges

aluminium



Material:
Die-cast aluminium.
Hinge pin stainless steel.

Version:
Hinge matt nickel-plated.
Pin bright.

Sample order:
nlm 27872-251515

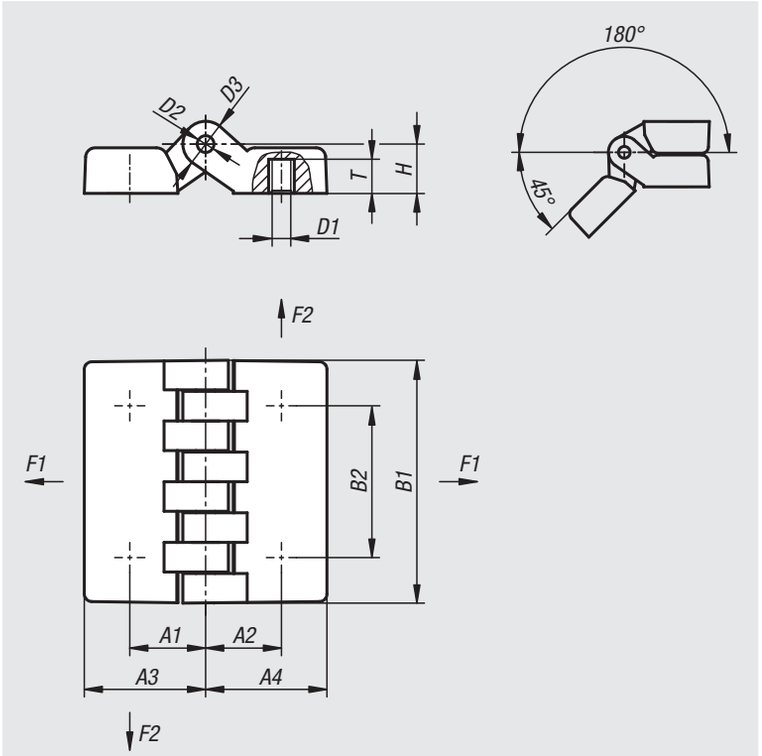
Note:
Hinges for panel elements and aluminium profiles, non lift-off.
The hinges can be fitted with plastic caps on lifting bolts.

On request:
Hinges with guide tabs for aluminium profiles (slots 5, 6, 8, 10, 12 and 14).
Unequal leaf combinations.

Order No.	A1	A2	A3	A4	F1 max. kN	F2 max. kN
27872-251515	15	15	26	26	0,275	0,215
27872-301818	17,5	17,5	29,5	29,5	0,325	0,225
27872-352020	20	20	36	36	0,325	0,225
27872-402323	22,5	22,5	38,5	38,5	0,4	0,25
27872-452525	25	25	43,5	43,5	0,4	0,25
27872-502828	27,5	27,5	48,5	48,5	0,4	0,25
27872-603333	32,5	32,5	57,5	57,5	0,4	0,1

Hinges

plastic with bushes



Material:
Fibreglass reinforced thermoplastic.
Hinge pin steel.
Bushes brass.

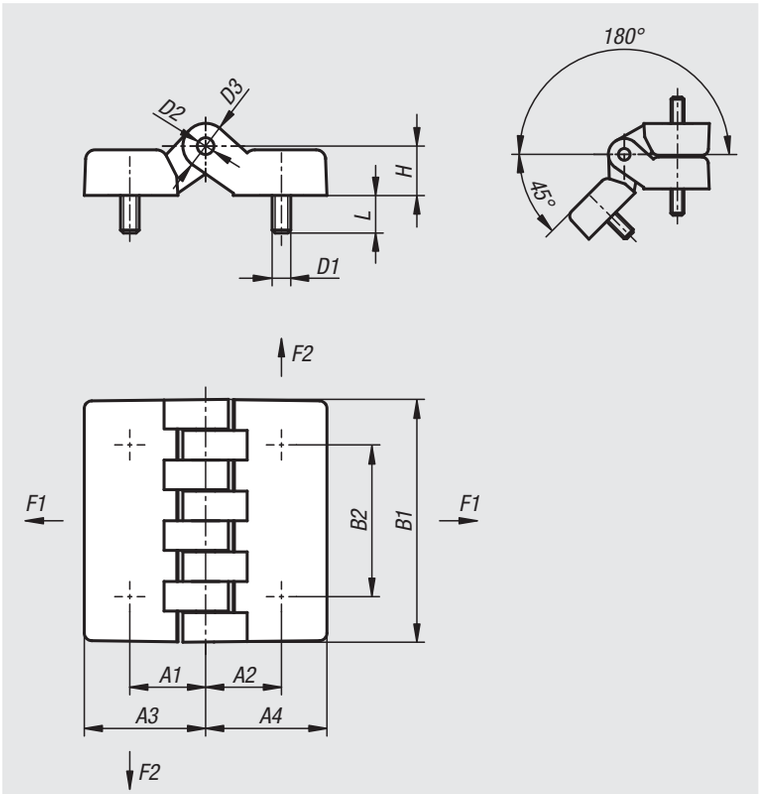
Version:
Hinge black.
Hinge pin galvanised.

Sample order:
nlm 27880-05241515

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	T	F1 (N)	F2 (N)
27880-05241515	15	15	24	24	48	30	M5	5	10	10,5	7	2000	1370
27880-06241515	15	15	24	24	48	30	M6	5	10	10,5	7	2000	1370
27880-06322020	20	20	32	32	64	40	M6	5	12	13	9	4100	1800
27880-08322020	20	20	32	32	64	40	M8	5	12	13	9	4100	1800
27880-08483232	31,5	31,5	47,5	47,5	95	60	M8	8	18	19	13	2450	2650
27880-10483232	31,5	31,5	47,5	47,5	95	60	M10	8	18	19	13	2450	2650

Hinges

plastic with fastening screws



Material:
Fibreglass reinforced thermoplastic.
Hinge pin steel.

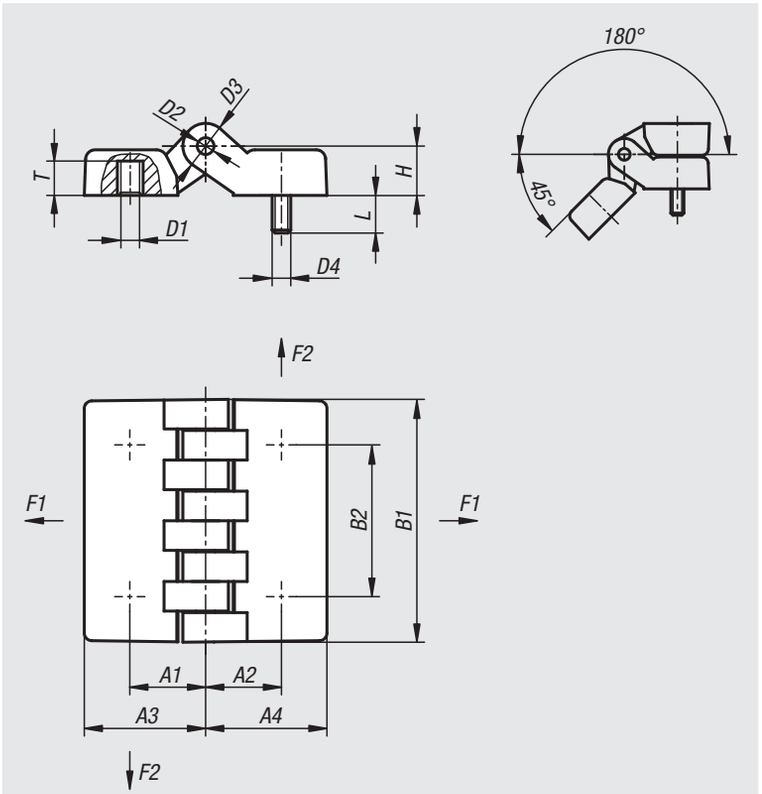
Version:
Hinge black.
Hinge pin galvanised.

Sample order:
nlm 27882-05241515

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	H	L	F1 (N)	F2 (N)
27882-05241515	15	15	24	24	48	30	M5	5	10	10,5	15	1780	1370
27882-06241515	15	15	24	24	48	30	M6	5	10	10,5	15	1780	1370
27882-06322020	20	20	32	32	64	40	M6	5	12	13	20	4120	1760
27882-08322020	20	20	32	32	64	40	M8	5	12	13	20	4120	1760
27882-08483232	31,5	31,5	47,5	47,5	95	60	M8	8	18	19	20	4900	1275
27882-10483232	31,5	31,5	47,5	47,5	95	60	M10	8	18	19	20	4900	1275

Hinges

plastic with bushes and fastening screws



Material:
Fibreglass reinforced thermoplastic.
Hinge pin steel.
Bushes brass.

Version:
Hinge black.
Hinge pin galvanised.

Sample order:
nlm 27884-05241515

Order No.	A1	A2	A3	A4	B1	B2	D1	D2	D3	D4	H	L	T	F1 (N)	F2 (N)
27884-05241515	15	15	24	24	48	30	M5	5	10	M5	10,5	15	7	1850	1350
27884-06241515	15	15	24	24	48	30	M6	5	10	M6	10,5	15	7	1850	1350
27884-06322020	20	20	32	32	64	40	M6	5	12	M6	13	20	9	4000	1600
27884-08322020	20	20	32	32	64	40	M8	5	12	M8	13	20	9	4000	1600
27884-08483232	31,5	31,5	47,5	47,5	95	60	M8	8	18	M8	19	20	13	3100	1400
27884-10483232	31,5	31,5	47,5	47,5	95	60	M10	8	18	M10	19	20	13	3100	1400

Hinges

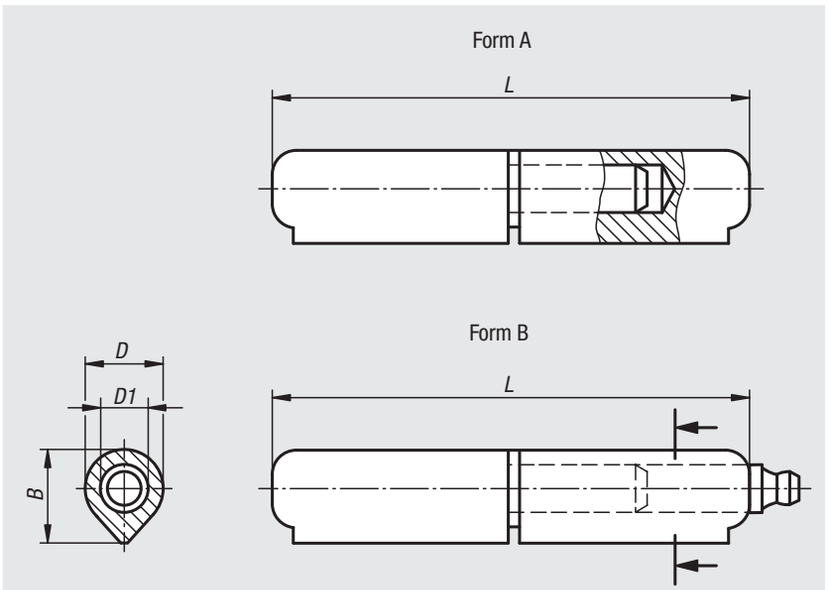
weldable

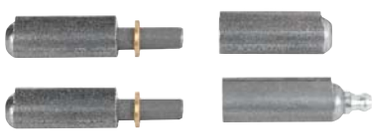
Material:
Hinge steel.
Spacer washer brass.
Hinge pin steel or brass.

Version:
Grease nipple DIN 71412-D, galvanized steel.
Steel parts, bright.

Sample order:
nlm 27885-008040012

Note:
The hinges are made of weldable profile steel.
In the lower part of the hinge, the pin is fixed in place.
The differing steel qualities of the weld and the beam onto which the hinge is welded must be at least equal to or better than:
S235 JR+AR acc. to EN 10025-2:2004-10
DIN 8563 part 3 or Fe E 235 acc. to SIA 161

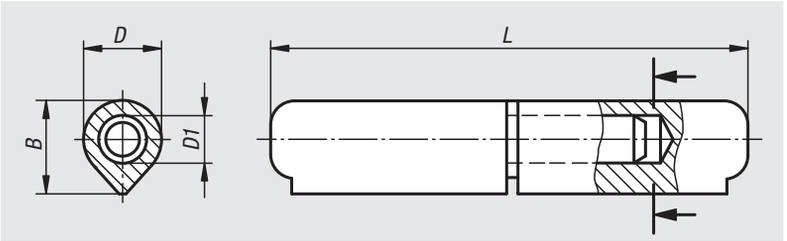




Order No.	Form	Material	D	D1	L	B
27885-008040012	A	hinge pin steel	8	5	40	9,7
27885-008050012	A	hinge pin steel	8	5	50	9,7
27885-010060012	A	hinge pin steel	10	6	60	12,7
27885-010070012	A	hinge pin steel	10	6	70	12
27885-013080012	A	hinge pin steel	13	8	80	15,5
27885-016100012	A	hinge pin steel	16	10	100	20
27885-016120012	A	hinge pin steel	16	11	120	20
27885-018135012	A	hinge pin steel	18	12	135	22
27885-020150012	A	hinge pin steel	20	13	150	25
27885-020180012	A	hinge pin steel	20	14	180	25
27885-023200012	A	hinge pin steel	23	16	200	28,5
27885-008040022	A	hinge pin brass	8	5	40	9,7
27885-008050022	A	hinge pin brass	8	5	50	9,7
27885-010060022	A	hinge pin brass	10	6	60	12,7
27885-010070022	A	hinge pin brass	10	6	70	12
27885-013080022	A	hinge pin brass	13	8	80	15,5
27885-016100022	A	hinge pin brass	16	10	100	20
27885-016120022	A	hinge pin brass	16	11	120	20
27885-018135022	A	hinge pin brass	18	12	135	22
27885-020150022	A	hinge pin brass	20	13	150	25
27885-020180022	A	hinge pin brass	20	14	180	25
27885-023200022	A	hinge pin brass	23	16	200	28,5
27885-113080012	B	hinge pin steel	13	8	80	16
27885-116100012	B	hinge pin steel	16	10	100	20
27885-116120012	B	hinge pin steel	16	10	120	20
27885-118135012	B	hinge pin steel	18	12	135	22,5
27885-120150012	B	hinge pin steel	20	13	150	25,5
27885-120180012	B	hinge pin steel	20	14	180	25
27885-123200012	B	hinge pin steel	23	16	200	29

Hinges

weldable, stainless steel



Material:
Stainless steel 1.4305.

Version:
Bright.

Sample order:
nlm 27886-010060033

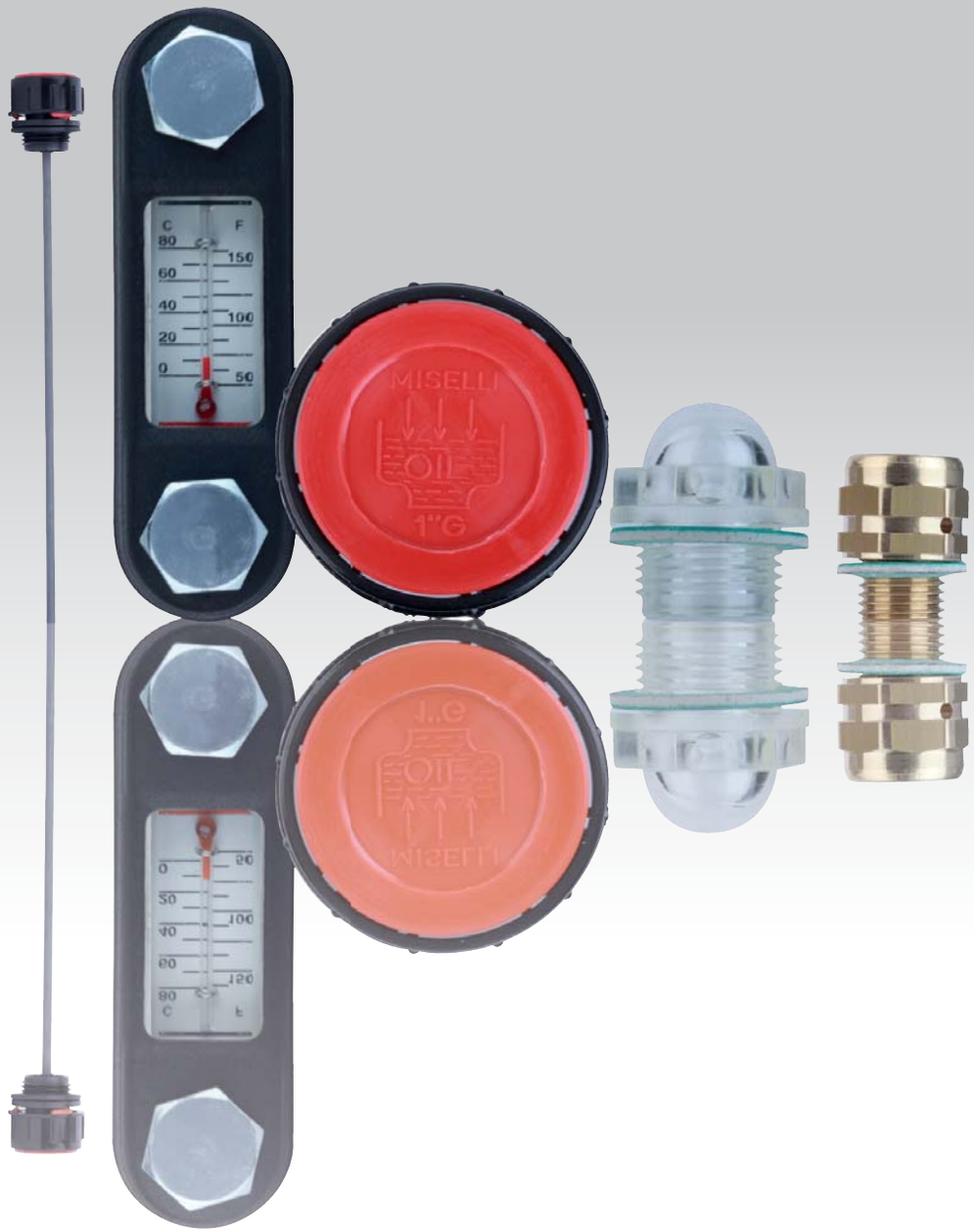
Note:
The hinges are made of weldable profile steel.
In the lower part of the hinge, the pin is fixed in place.
The differing steel qualities of the weld and the beam onto which the hinge is welded must be at least equal to or better than:
S235 JR+AR acc. to EN 10025-2:2004-10
DIN 8563 part 3 or Fe E 235 acc. to SIA 161

Order No.	D	D1	B	L
27886-010060033	10	6	12	60
27886-013080033	12	8	15,5	80
27886-016100033	16	10	20	100
27886-016120033	16	11	20	120
27886-020150033	20	12	25,5	150
27886-020180033	20	14	25,5	180

Notes

28000

Oil level gauges
Caps
Plugs
Vent screws
Dipsticks
Filler necks



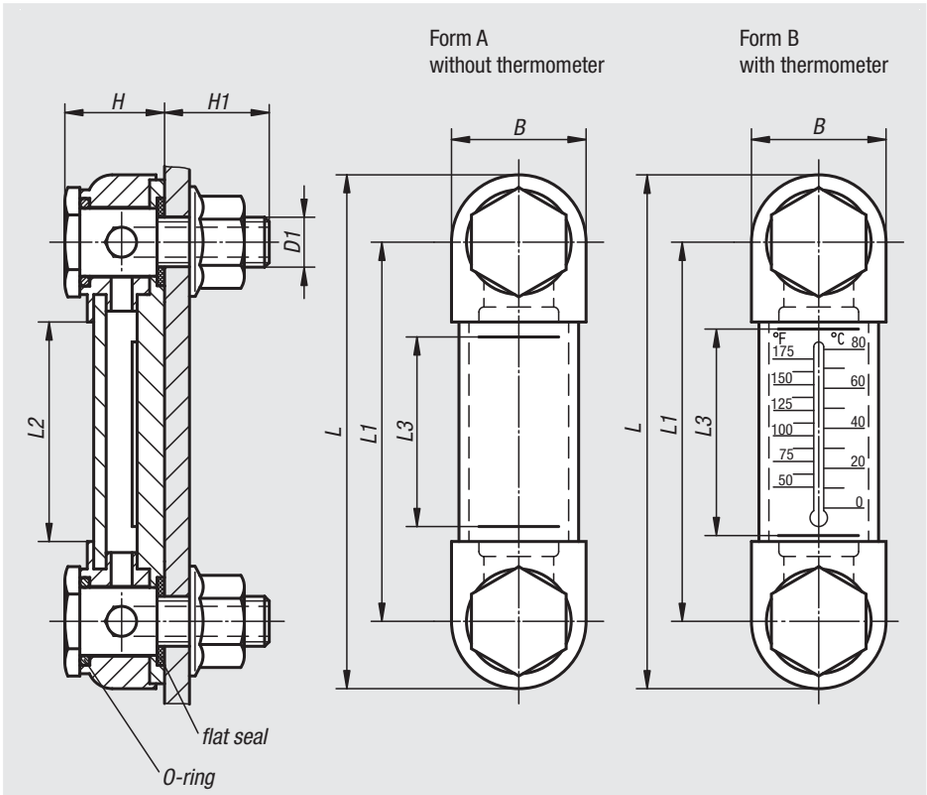
Oil level gauges

Material:
Housing thermoplastic polyamide.
O-ring and flat seal rubber (NBR).
Reflector aluminium.
Screw and hex nut steel.

Version:
Transparent housing, high mechanical stability, non-ageing, temperature resistant with oil up to 100 °C, with water up to 70 °C.
Reflector, white lacquered, line markers or black scale.
Screw and hexagon nut, galvanized.

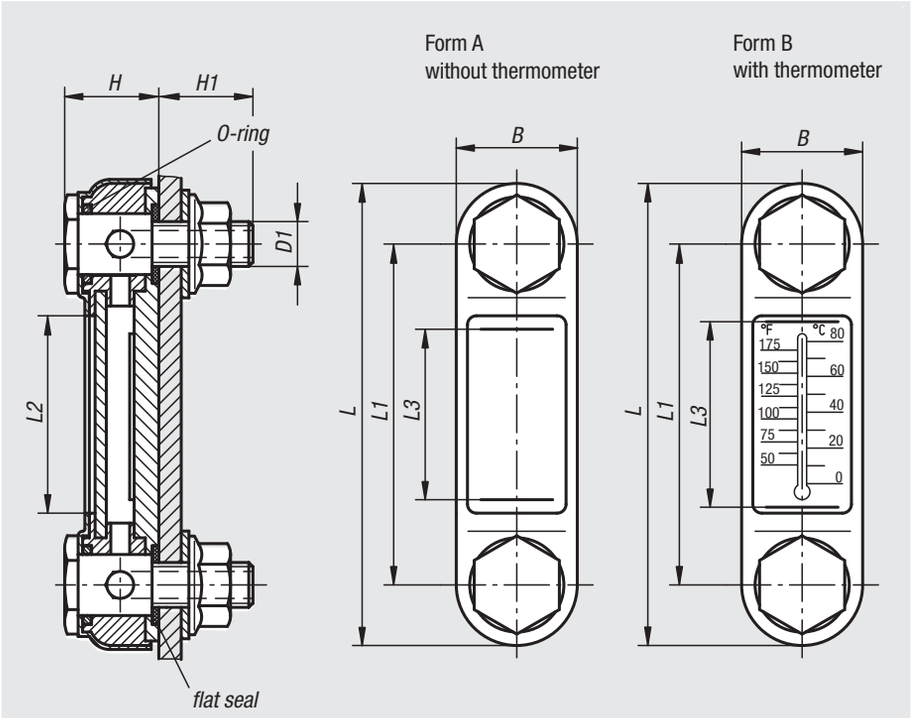
Sample order:
nlm 28000-1127

Note:
The oil level gauges can either be fastened as shown in the illustration or directly in the threaded hole.
Centre distance for the fastening holes = L1 ±0.5.



Order No.	Form	B	D1	H	H1	L	L1	L2	L3	Number of fastening screws	Thermometer scale
28000-1076	A	27	M10	20	21	103	76	44	37	2	-
28000-1127	A	27	M12	19	18	151	127	95	80	2	-
28000-2076	B	27	M10	20	21	103	76	44	37	2	0 - 80 °C / 50 - 175 °F
28000-2127	B	27	M12	19	18	151	127	95	80	2	0 - 100 °C / 50 - 200 °F

Oil level gauges



Material:
Housing steel.
Viewing glass thermoplastic polyamide.
O-ring and flat seal rubber (NBR).
Reflector aluminium.
Screw and hex nut steel.

Version:
Housing painted black.
Transparent viewing glass, high mechanical stability, non-ageing, temperature resistant with oil up to 100 °C, with water up to 70 °C.
Reflector, white lacquered, line markers or black scale.
Screw and hexagon nut, galvanized.

Sample order:
nlm 28000-107610

Note:
The oil level gauges can either be fastened as shown in the illustration or directly in the threaded hole.
Centre distance for the fastening holes = L1 ±0.5.
The oil level gauges are suitable for tanks operating without pressure.
Maximum operating temperature: 100 °C.

Order No.	Form	B	D1	H	H1	L	L1	L2	L3	Number of fastening screws	Thermometer scale
28000-107610	A	31	M10	24,5	20	107	76	39	37	2	-
28000-107612	A	31	M12	24,5	20	107	76	39	37	2	-
28000-112710	A	31	M10	24,5	20	156	127	90	80	2	-
28000-112712	A	31	M12	24,5	20	156	127	90	80	2	-
28000-125412	A	34	M12	33	17	286	254	200	178	2	-
28000-207610	B	31	M10	24,5	20	107	76	39	37	2	0 - 80 °C / 50 - 175 °F
28000-207612	B	31	M12	24,5	20	107	76	39	37	2	0 - 80 °C / 50 - 175 °F
28000-212710	B	31	M10	24,5	20	156	127	90	80	2	0 - 100 °C / 50 - 200 °F
28000-212712	B	31	M12	24,5	20	156	127	90	80	2	0 - 100 °C / 50 - 200 °F
28000-225412	B	34	M12	33	17	286	254	200	178	2	0 - 100 °C / 50 -200 °F

Oil level sight glasses

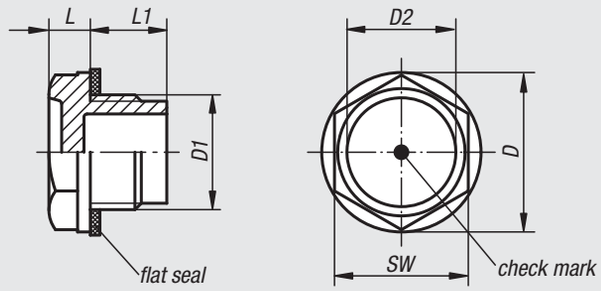
Material:
Housing in thermoplastic polyamide.
Plastic reflector.

Version:
Housing, transparent, high mechanical stability, non-ageing, temperature resistant with oil up to 100 °C, with water up to 70 °C; resistant to solvents but not to alcohol.
Flat seal, asbestos-free.
White reflector.

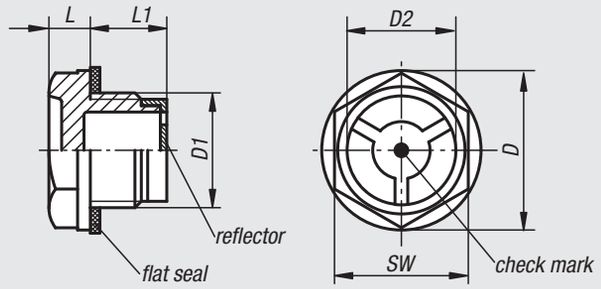
Sample order:
nlm 28004-143100

On request:
Rubber gasket (NBR).

Form A
without reflector



Form B
with reflector



Order No.	Form	D	D1	D2	L	L1	SW	Tightening torque max. Nm
28004-120014	A	20	G 1/4	15	7	8	17	6
28004-122038	A	22	G 3/8	14	6,5	10,5	18	8
28004-128012	A	28	G 1/2	16	8	11	24	12
28004-135034	A	35	G 3/4	21	8	12	30	16
28004-143100	A	43	G 1	32	11	12	36	-
28004-151114	A	51	G 1 1/4	33	10	16	42	-
28004-158112	A	58	G 1 1/2	40	12	16	50	-
28004-174200	A	74	G 2	48	12	22	64	-
28004-1201415	A	20	M14x1,5	15	7	8	17	7
28004-1221615	A	22	M16x1,5	14	6,5	10	18	8
28004-1251815	A	25	M18x1,5	16	7	10,5	21	10
28004-1282015	A	28	M20x1,5	18	7,5	11	24	16
28004-1282215	A	28	M22x1,5	16	7,5	12,5	24	12
28004-1362615	A	36	M26x1,5	21	8,5	13,5	30	21
28004-1362715	A	36	M27x1,5	21	8,5	13,5	30	21
28004-1514015	A	51	M40x1,5	32	10	17	42	-
28004-222038	B	22	G 3/8	14	6,5	10,5	18	8
28004-228012	B	28	G 1/2	16	8	11	24	12
28004-235034	B	35	G 3/4	21	8	12	30	16
28004-243100	B	43	G 1	32	11	12	36	-
28004-251114	B	51	G 1 1/4	33	10	16	42	-
28004-258112	B	58	G 1 1/2	40	12	16	50	-
28004-274200	B	74	G 2	48	12	22	64	-
28004-2221615	B	22	M16x1,5	14	6,5	10	18	8
28004-2251815	B	25	M18x1,5	16	7	10,5	21	10
28004-2282015	B	28	M20x1,5	18	7,5	11	24	16
28004-2282215	B	28	M22x1,5	16	7,5	12,5	24	12
28004-2362615	B	36	M26x1,5	21	8,5	13,5	30	21
28004-2362715	B	36	M27x1,5	21	8,5	13,5	30	21
28004-2514015	B	51	M40x1,5	32	10	17	42	-

28006

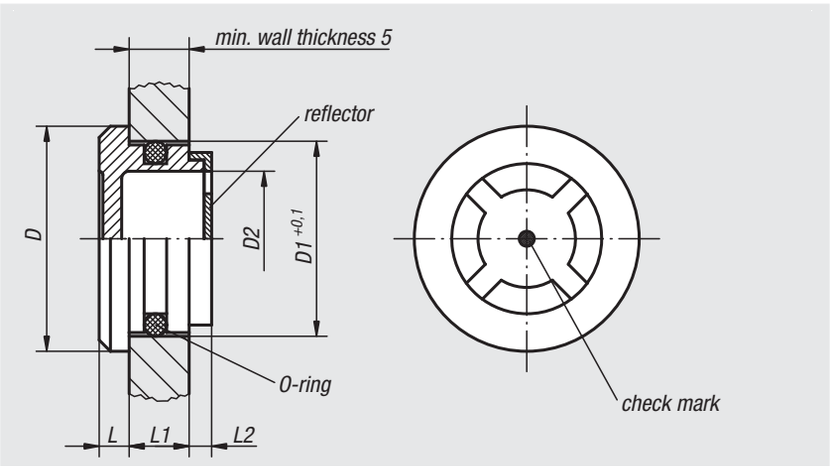
Oil level sight glasses

press-in

Material:
Housing in thermoplastic polyamide.
O-ring in rubber (NBR).
Plastic reflector.

Version:
Housing, transparent, high mechanical stability, non-ageing, temperature resistant with oil up to 100 °C, with water up to 70 °C; resistant to solvents but not to alcohol.
White reflector.

Sample order:
nlm 28006-3026



Order No.	D	drill-Ø D1	D2	L	L1	L2
28006-2420	24	20	14	4	7	3
28006-3026	30	26	20	4	8	3,5
28006-3632	36	32	24	4	9	4
28006-4238	42	38	30	4	10	4
28006-4440	44	40	32	4	10	4

28008

Oil level sight glasses

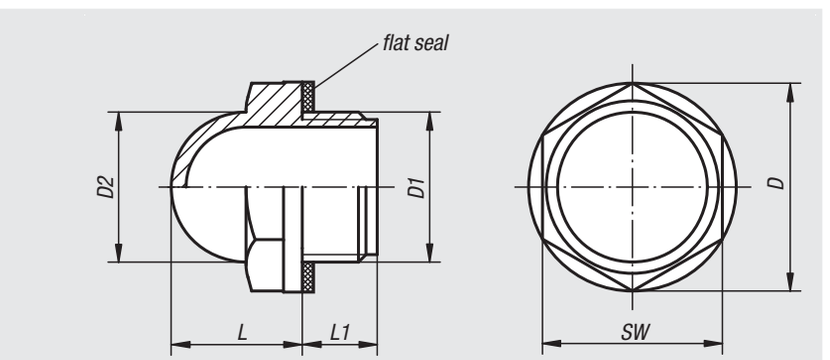
domed

Material:
Housing in thermoplastic polyamide.

Version:
Housing, transparent, high mechanical stability, non-ageing, temperature resistant with oil up to 100 °C, with water up to 70 °C; resistant to solvents but not to alcohol.
Flat seal, asbestos-free.

Sample order:
nlm 28008-28012

On request:
Rubber gasket (NBR).

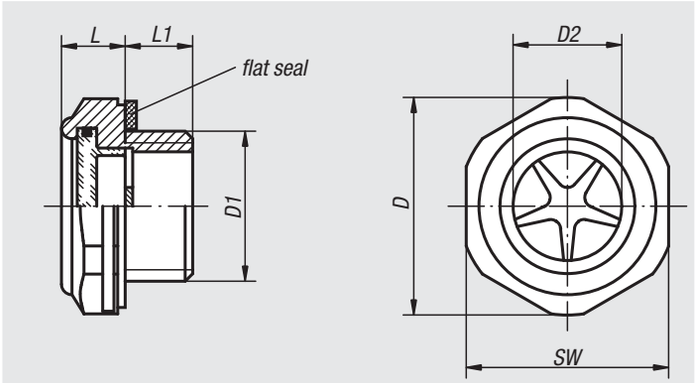


Order No.	D	D1	D2	L	L1	SW	Tightening torque max. Nm
28008-22038	22	G 3/8	15	14	10	19	8
28008-28012	28	G 1/2	20	17	10	24	12
28008-35034	35	G 3/4	25	20	10	30	16
28008-42100	42	G 1	31	24	10,5	36	20

28010

Oil level sight glasses

aluminium



Material:
Housing in aluminium.
Reflector in aluminium or white plastic.
Polyamide viewing lens.

Version:

Transparent viewing lens, temperature-resistant to oil to 100 °C, to water to 70 °C.
Flat seal, asbestos-free.

Sample order:
nlm 28010-29012

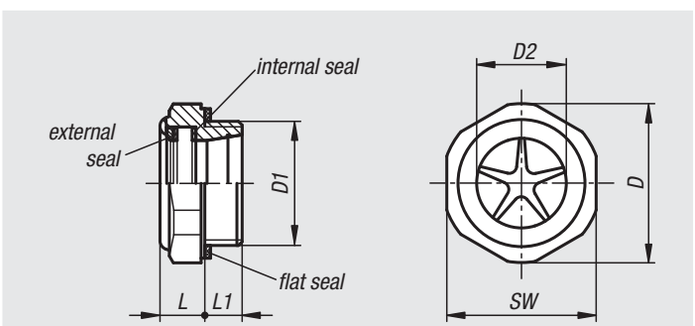
Note:
With versions G3/8 and M18x1,5 the reflector is made in white plastic.

Order No.	D	D1	D2	L	L1	SW	Tightening torque max. Nm	Pressure load max. bar
28010-20014	20	G 1/4	11	8	8	17	9	10
28010-24038	24,1	G 3/8	12,7	9,5	9	22	12	10
28010-29012	29,7	G 1/2	15	10	9	27	18	10
28010-36034	35,2	G 3/4	21,9	10	11	32	24	10
28010-42100	44,1	G 1	25,1	11	11	40	-	10
28010-52114	55	G1 1/4	34	13,5	12	50	-	10
28010-241815	24,5	M18x1,5	13	10	9	22	12	10
28010-292215	29,5	M22x1,5	16	10	9	27	18	10

28012

Oil level sight glasses

aluminium, glass window



Material:
Housing, reflector in aluminium.
Natural, clear glass viewing lens.
Internal seal, Viton®.

Version:
Viewing lens, temperature-resistant to 150 °C.
Flat seal, asbestos-free.

Sample order:
nlm 28012-29012

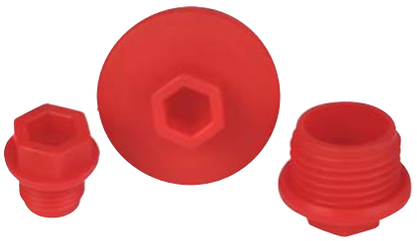
Note:
Resists high pressure and heat. Natural glass as the viewing lens ensures optimal light transmission and high surface hardness.

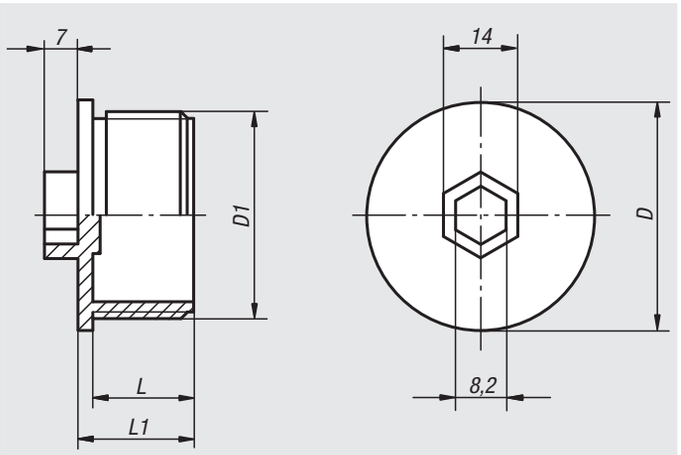
Order No.	D	D1	D2	L	L1	SW	Tightening torque max. Nm	Pressure load max. bar
28012-29012	29,5	G 1/2	12	10	9	27	18	20
28012-34034	34,5	G 3/4	16	12	10	32	24	20
28012-42100	42,5	G 1	23	12	10	40	-	20
28012-292015	29,5	M20x1,5	12	10	9	27	18	20
28012-423315	42,5	M33x1,5	23	12	10	40	-	20

28018

Plugs

screw-in





Material:
Elastomer, soft polyurethane

Version:
Red

Sample order:
nlm 28018-038

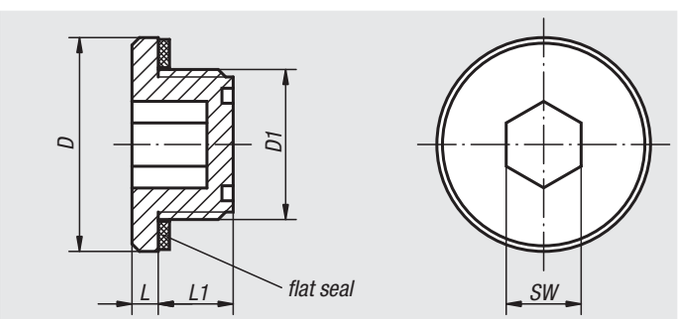
Note:
The double-lip seal guarantees a seal for pressures of 2-3 bar. It also keeps paint out during painting.

Order No.	D	D1	L	L1
28018-018	16,2	G 1/8	8	10
28018-014	18,1	G 1/4	9,9	12,5
28018-038	21	G 3/8	9	11
28018-012	25,2	G 1/2	11	14
28018-034	31,3	G 3/4	11,5	14
28018-100	36	G 1	12	15,5

28020

Plugs

screw-in



Material:
Thermoplastic polyamide 66

Version:
Black, flat seal asbestos-free

Sample order:
nlm 28020-22038

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.

On request:
O-ring or materials with higher stability and temperature resistance (150 °C).

Order No.	D	D1	L	L1	SW	Tightening torque max. Nm
28020-18014	18,2	G 1/4	2,5	8	6	3
28020-22038	22,5	G 3/8	3,5	10,5	8	6
28020-28012	28,5	G 1/2	3,5	10,5	10	8
28020-35034	35	G 3/4	4	10,5	12	10
28020-201415	20	M14x1,5	2,5	8	6	3
28020-221615	22,5	M16x1,5	3,5	11	8	6
28020-261815	26	M18x1,5	3	10	10	7
28020-282015	28,5	M20x1,5	3	11	10	7
28020-282215	28,5	M22x1,5	3,5	10,5	10	7
28020-352615	35	M26x1,5	3	12	12	10

Plugs

press-in

Material:
Housing and cap thermoplastic polyamide 66.
Air filter polyurethane (PU foam).
O-ring rubber (NBR).

Version:
Housing black.
Cap red.
Filter mesh 50 µm.

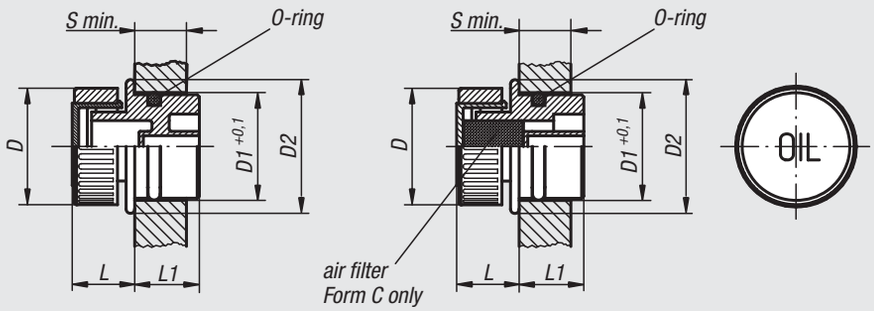
Sample order:
nlm 28022-33030

Note:
Temperature resistant:
oil up to 100 °C
water up to 70 °C

Form A
without vent

Form B
with vent

Form C
with vent and air filter



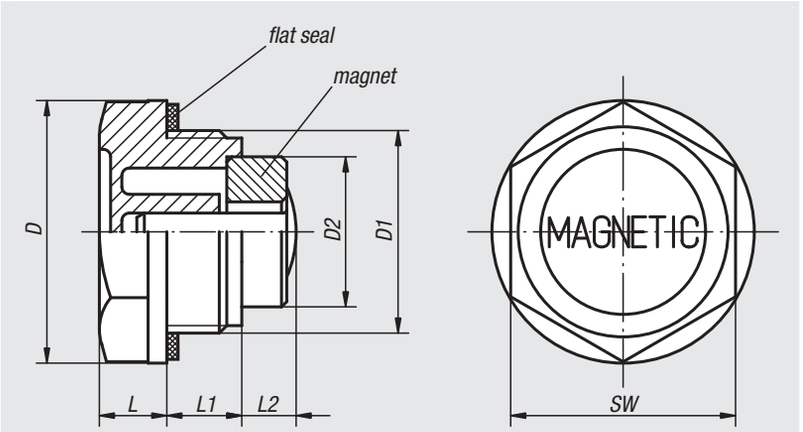
Order No. Form A	Order No. Form B	Order No. Form C	D	drill-Ø D1	D2	L	L1	S min.
28022-13018	**28022-23018**	**28022-33018**	30	18	23	14	14	8
28022-13020	**28022-23020**	**28022-33020**	30	20	24	14	15,5	8
28022-13026	**28022-23026**	**28022-33026**	30	26	30	14	16,5	9,5
28022-13030	**28022-23030**	**28022-33030**	30	30	34	14	17	9,5

Notes

28024

Plugs magnetic

plastic



Material:
Thermoplastic polyamide 66.
Ferrite permanent magnet.

Version:
Black, flat seal asbestos-free

Sample order:
nlm 28024-22038

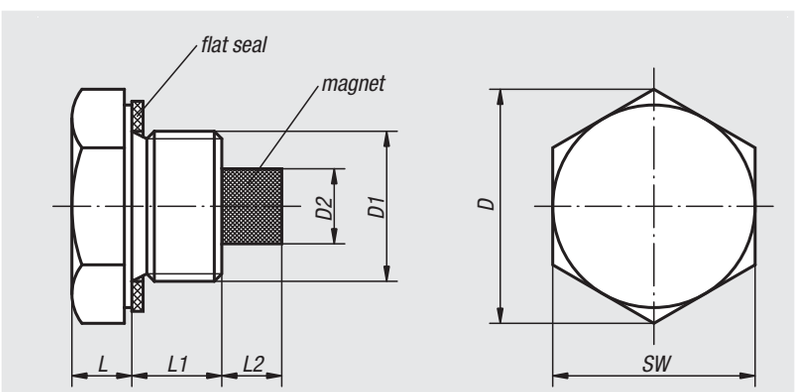
Note:
Temperature resistant by oil up to 100 °C, by water up to 70 °C.

Order No.	D	D1	D2	L	L1	L2	SW
28024-20014	20	G 1/4	8	7	9	5	17
28024-22038	22	G 3/8	13	7,5	10	10	18
28024-27012	27	G 1/2	13	8	11	9	24
28024-34034	34	G 3/4	19,6	9	11	6,5	30
28024-42100	42	G 1	19,6	10,5	12	14	35
28024-201415	20	M14x1,5	8	7	9	5	17

28026

Plugs magnetic

aluminium



Material:
Aluminium.
Ferrite permanent magnet.

Version:
Bright. Flat seal asbestos-free.

Sample order:
nlm 28026-24038

Order No.	D	D1	D2	L	L1	L2	SW
28026-21014	21	G 1/4	5	7	10	6	19
28026-24038	24,5	G 3/8	8	7	10	7	22
28026-30012	30	G 1/2	10	8	10	7	27
28026-36034	36,5	G 3/4	13	8	10	7	34
28026-42100	42,5	G 1	13	8	14	7	40

Plugs fill and drain

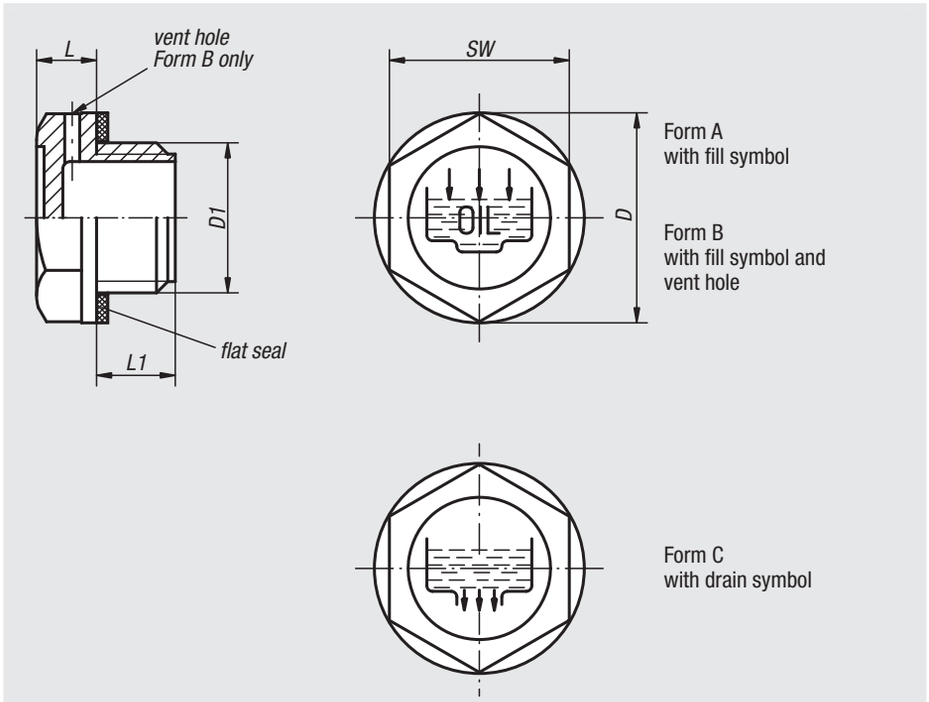
hexagon cap

Material:
Thermoplastic polyamide 66

Version:
Black, flat seal asbestos-free

Sample order:
nlm 28028-142100

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.



Order No. Form A	Order No. Form B	Order No. Form C	D	D1	L	L1	SW	Tightening torque max. Nm
28028-119014	**28028-219014**	**28028-319014**	19,5	G 1/4	7	9	17	5
28028-122038	**28028-222038**	**28028-322038**	22	G 3/8	7,5	10	18	8
28028-128012	**28028-228012**	**28028-328012**	28	G 1/2	7,5	11	24	9
28028-134034	**28028-234034**	**28028-334034**	34	G 3/4	9	11	30	11
28028-142100	**28028-242100**	**28028-342100**	42	G 1	10,5	12	35	-
28028-151114	**28028-251114**	**28028-351114**	51	G 1 1/4	12	13,5	42	-
28028-158112	**28028-258112**	**28028-358112**	58	G 1 1/2	10	14,5	50	-
28028-174200	**28028-274200**	**28028-374200**	74	G 2	13,5	16	64	-
28028-1191415	**28028-2191415**	**28028-3191415**	19,5	M14x1,5	7	9	17	5
28028-1211615	**28028-2211615**	**28028-3211615**	21	M16x1,5	7,5	10	18	6
28028-1261815	**28028-2261815**	**28028-3261815**	26	M18x1,5	7,5	10	21	7
28028-1282015	**28028-2282015**	**28028-3282015**	28	M20x1,5	8	10	24	8
28028-1282215	**28028-2282215**	**28028-3282215**	28	M22x1,5	8	11	24	10
28028-1524015	**28028-2524015**	**28028-3524015**	52	M40x1,5	10	13	42	-

Plugs fill only

knurled cap

Material:
Thermoplastic polyamide 66;
O-ring in rubber (NBR)

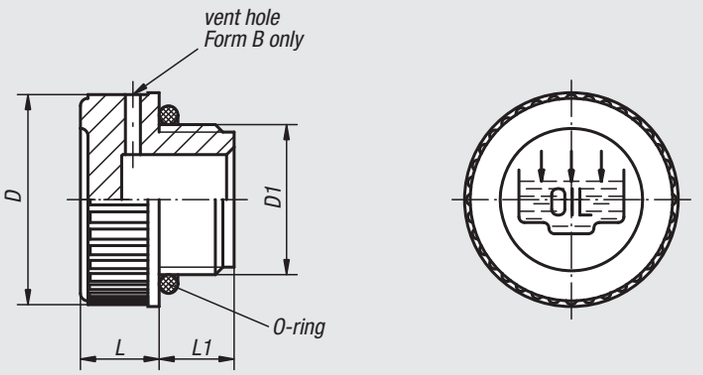
Version:
Black

Sample order:
nlm 28030-128012

Note:
Temperature resistant with oil up to 100 °C,
with water up to 70 °C.

Form A
with fill symbol

Form B
with fill symbol and
vent hole



Order No.	Form	D	D1	L	L1
28030-120014	A	20	G 1/4	9	9
28030-120038	A	20,5	G 3/8	9	10
28030-128012	A	28	G 1/2	10,5	10,5
28030-131034	A	31	G 3/4	12	11
28030-139100	A	39	G 1	12	12
28030-149114	A	49	G 1 1/4	13	13,5
28030-155112	A	55	G 1 1/2	14,7	14,5
28030-168200	A	68,5	G 2	15	16
28030-1201415	A	20	M14x1,5	9	9
28030-1201615	A	20	M16x1,5	9	10
28030-1281815	A	28	M18x1,5	10,5	10
28030-1282015	A	28	M20x1,5	10,5	10
28030-1282215	A	28	M22x1,5	10,5	10
28030-220014	B	20	G 1/4	9	9
28030-220038	B	20,5	G 3/8	9	10
28030-228012	B	28	G 1/2	10,5	10,5
28030-231034	B	31	G 3/4	12	11
28030-239100	B	39	G 1	12	12
28030-249114	B	49	G 1 1/4	13	13,5
28030-255112	B	55	G 1 1/2	14,7	14,5
28030-268200	B	68,5	G 2	15	16
28030-2201415	B	20	M14x1,5	9	9
28030-2201615	B	20	M16x1,5	9	10
28030-2281815	B	28	M18x1,5	10,5	10
28030-2282015	B	28	M20x1,5	10,5	10
28030-2282215	B	28	M22x1,5	10,5	10

28032

Caps for filler necks

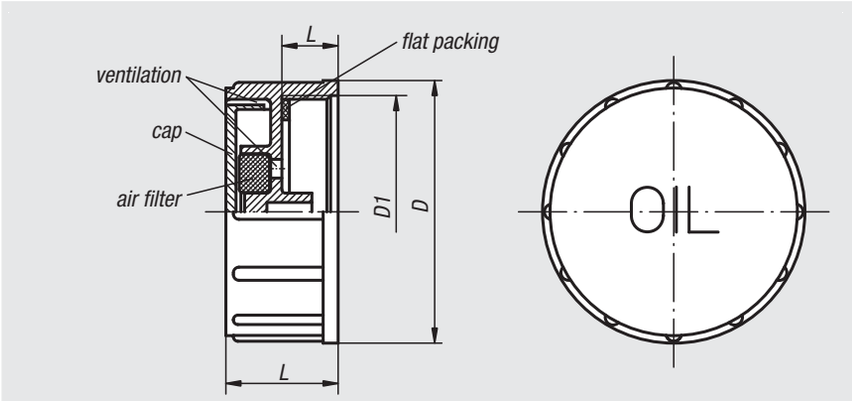
Material:
Housing, cap in thermoplastic polyamide 66.
Air filter in polyurethane (PU foam).
Rubber flat seal (NBR).

Version:
Black housing.
Red cap.
Filter mesh 50 µm.

Sample order:
nlm 28032-67200

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.

On request:
Cap in yellow for diesel oil.



Order No.	D	D1	L	L1
28032-67200	67,5	G 2	30	15
28032-676020	67,5	M60x2	30	15

28034

Vent screws

Material:
Housing, cap in thermoplastic polyamide 66.
Air filter (form B only) in polyurethane (PU foam).
O-ring in rubber (NBR).

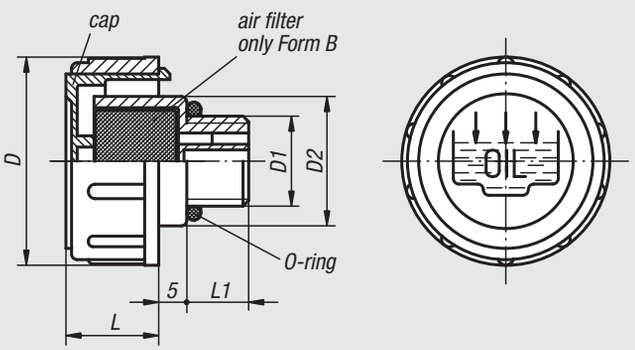
Version:
Black housing.
Red cap.
Filter mesh 60 µm.

Sample order:
nlm 28034-147034

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.
The removable cap allows easy cleaning of the air filter.

Form A
without air filter

Form B
with air filter



Order No. Form A	Order No. Form B	D	D1	D2	L	L1
28034-136038	**28034-236038**	36	G 3/8	23	17	11
28034-141012	**28034-241012**	41	G 1/2	28	18	12
28034-147034	**28034-247034**	47	G 3/4	33	17	12
28034-152100	**28034-252100**	52	G 1	38	20	12
28034-163114	**28034-263114**	63	G 1 1/4	49	23	13
28034-163112	**28034-263112**	63	G 1 1/2	55	23	13,5
28034-1361615	**28034-2361615**	36	M16x1,5	23	17	11
28034-1411815	**28034-2411815**	41	M18x1,5	28	17,5	12
28034-1412015	**28034-2412015**	41	M20x1,5	28	17,5	12
28034-1412215	**28034-2412215**	41	M22x1,5	28	17,5	12

Vent screws

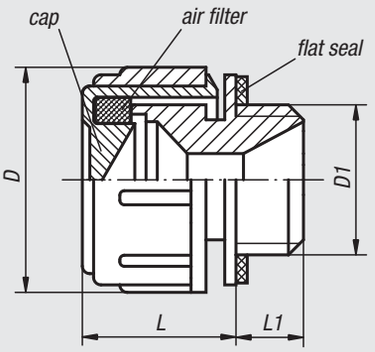
with splash guard

Material:
Housing, cap in thermoplastic polyamide 66.
Air filter in polyurethane (PU foam).
Rubber flat seal (NBR).

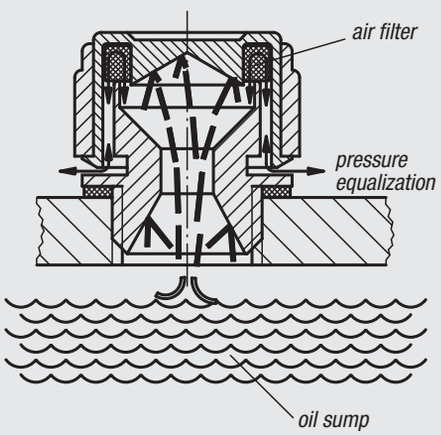
Version:
Black housing.
Red cap.
Filter mesh 50 µm.

Sample order:
nlm 28036-30038

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.



splash guard

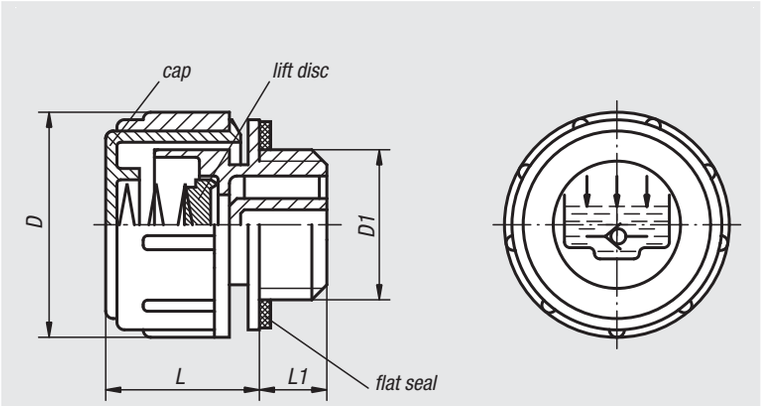


Gears partly immersed in an oil sump create an oil spray that may cause oil to leak from the vent cap. To avoid this the screw has been fitted with a splash guard. Only a small part of the oil spray can pass through the lower tapered bore. The oil that does reach the cap underside is redirected in such a way that it does not notably hinder the venting process.

Order No.	D	D1	L	L1
28036-30014	30	G 1/4	21	10
28036-30038	30	G 3/8	21	10
28036-30012	30	G 1/2	21	10

Vent screws

with check valve



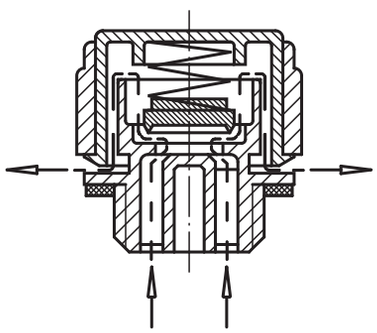
Material:
Housing and cap thermoplastic polyamide 66.
Spring stainless steel.
Lift disc and flat seal rubber (NBR).

Version:
Housing black.
Cap red.

Sample order:
nlm 28038-30014

Note:
Temperature resistant with oil up to 100 °C,
with water up to 70 °C.
Opening pressure 0.20 – 0.25 bar.

Operating principle

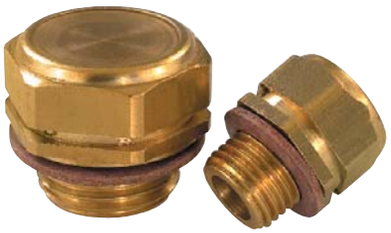


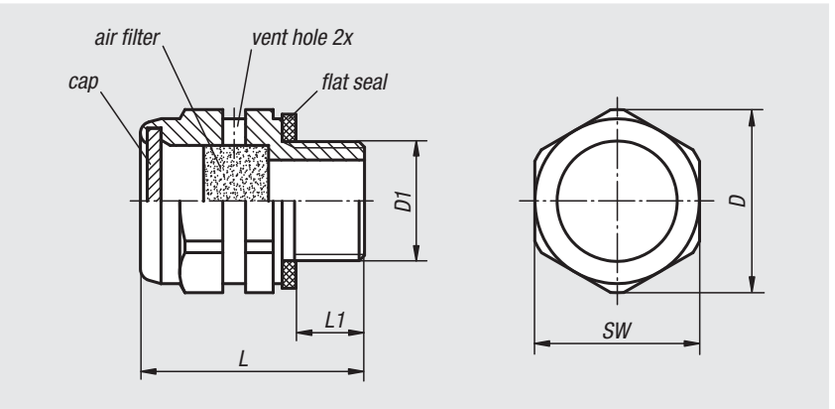
opening pressure
0.2 - 0.25 bar

Order No.	D	D1	L	L1
28038-30014	30	G 1/4	21	10
28038-30038	30	G 3/8	21	10
28038-30012	30	G 1/2	21	10

28040

Vent screws brass





Material:
Housing and cap brass.
Air filter galvanized steel wire mesh.

Version:
Air filter mesh 50 - 60 µm.
Flat seal asbestos-free.

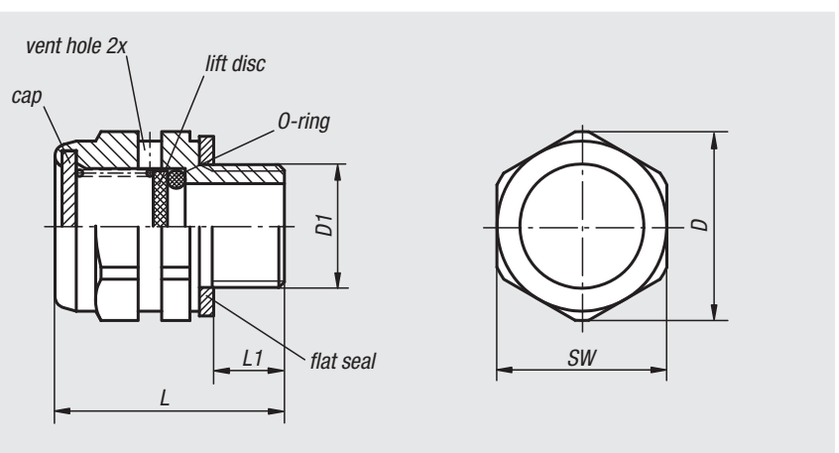
Sample order:
nlm 28040-20014

Order No.	D	D1	L	L1	SW
28040-20014	20	G 1/4	24,5	7,5	18
28040-24038	24,5	G 3/8	24,5	8,5	22
28040-30012	30	G 1/2	24,5	8,5	27

28042

Vent screws brass

with check valve



Material:
Housing and cap brass.
Spring stainless steel.
Lift disc aluminium.
O-ring rubber (NBR).

Version:
Flat seal asbestos-free.

Sample order:
nlm 28042-20014

Note:
Opening pressure 0.3 bar (±0.1).

Functional principle:
See 28038 vent screws with check valve.

Order No.	D	D1	L	L1	SW
28042-20014	20	G 1/4	24,3	7,5	18
28042-24038	24,5	G 3/8	24,5	8,5	22
28042-30012	30	G 1/2	24,5	8,5	27

Plugs to press-in

with dipstick

Material:
Housing and cap thermoplastic polyamide 66.
Air filter polyurethane (PU foam).
Dipstick zinc.
O-ring rubber (NBR).

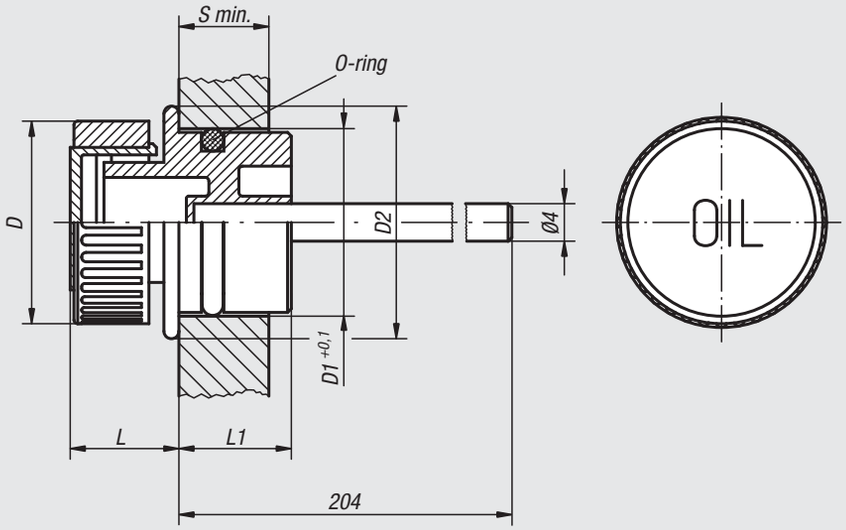
Version:
Housing black.
Cap red.
Filter mesh 50 µm.
Dipstick phosphated.

Sample order:
nlm 28048-13018

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.

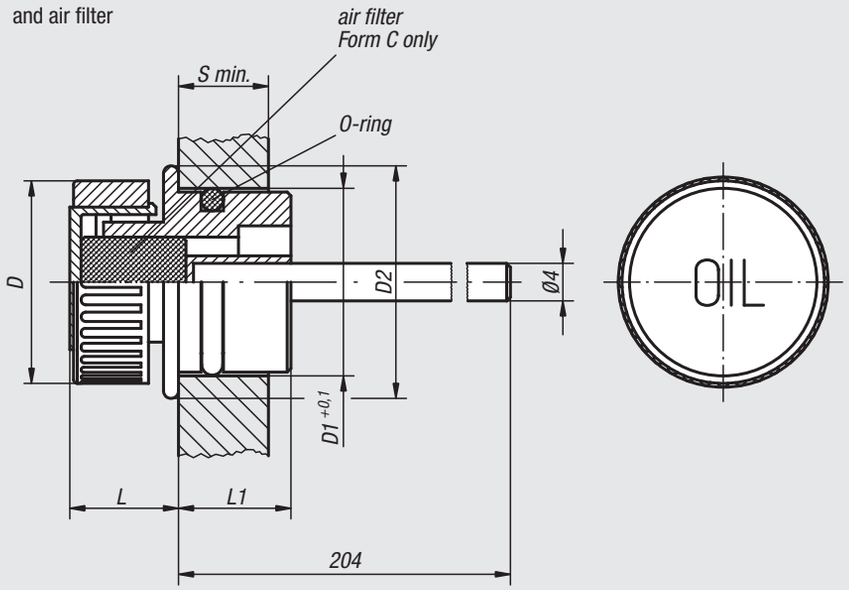
On request:
Min-Max increments.

Form A
without vent



Form B
with vent

Form C
with vent
and air filter



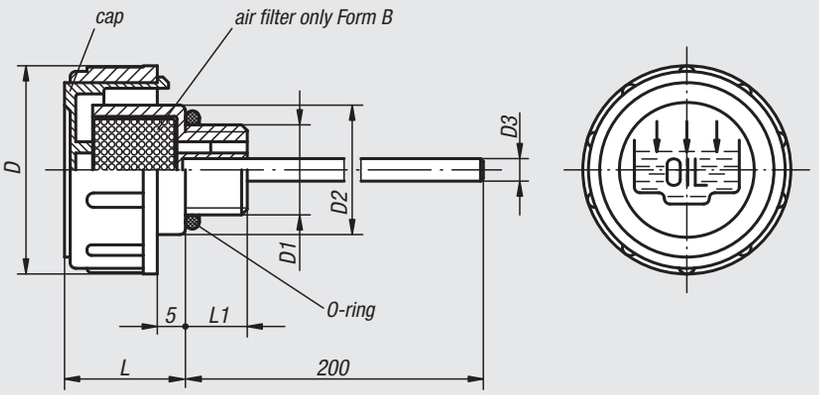
Order No. Form A	Order No. Form B	Order No. Form C	D	drill-Ø D1	D2	L	L1	S min.
28048-13018	**28048-23018**	**28048-33018**	30	18	23	14	14	8

Vent screws

with dipstick

Form A
without air filter

Form B
with air filter



Material:
Housing and cap thermoplastic polyamide 66.
Air filter polyurethane (PU foam).
Dipstick zinc.
O-ring rubber (NBR).

Version:
Housing black.
Cap red.
Filter mesh 50 µm.
Dipstick phosphated.

Sample order:
nlm 28054-141012

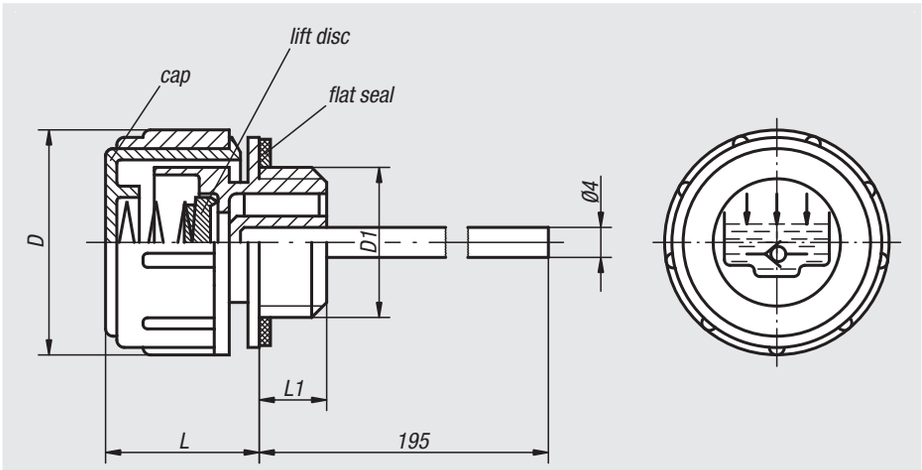
Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.
The removable cap allows easy cleaning of the air filter.

On request:
Min-Max increments.

Order No.	Form	D	D1	D2	D3	L	L1
28054-136038	A	36	G 3/8	23	4	17	11
28054-141012	A	41	G 1/2	28	4	18	12
28054-147034	A	47	G 3/4	33	5	17	12
28054-152100	A	52	G 1	38	5	20	12
28054-163114	A	63	G 1 1/4	49	5	23	13
28054-163112	A	63	G 1 1/2	55	5	23	13,5
28054-1361615	A	36	M16x1,5	23	4	17	11
28054-1411815	A	41	M18x1,5	28	4	17,5	12
28054-1412015	A	41	M20x1,5	28	4	17,5	12
28054-1412215	A	41	M22x1,5	28	4	17,5	12
28054-236038	B	36	G 3/8	23	4	17	11
28054-241012	B	41	G 1/2	28	4	18	12
28054-247034	B	47	G 3/4	33	5	17	12
28054-252100	B	52	G 1	38	5	20	12
28054-263114	B	63	G 1 1/4	49	5	23	13
28054-263112	B	63	G 1 1/2	55	5	23	13,5
28054-2361615	B	36	M16x1,5	23	4	17	11
28054-2411815	B	41	M18x1,5	28	4	17,5	12
28054-2412015	B	41	M20x1,5	28	4	17,5	12
28054-2412215	B	41	M22x1,5	28	4	17,5	12

Vent screws

with check valve and dipstick



Material:
Housing and cap thermoplastic polyamide.
Spring stainless steel.
Dipstick zinc.
Lift disc and seal rubber (NBR).

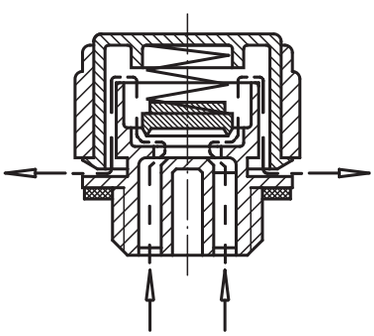
Version:
Housing black.
Cap red.
Dipstick phosphated.

Sample order:
nlm 28058-30038

Note:
Temperature resistant with oil up to 100 °C, with water up to 70 °C.
Opening pressure 0.20 – 0.25 bar.

On request:
Min-Max increments.

Operating principle



opening pressure
0.2 - 0.25 bar

Order No.	D	D1	L	L1
28058-30038	30	G 3/8	21	10
28058-30012	30	G 1/2	21	10

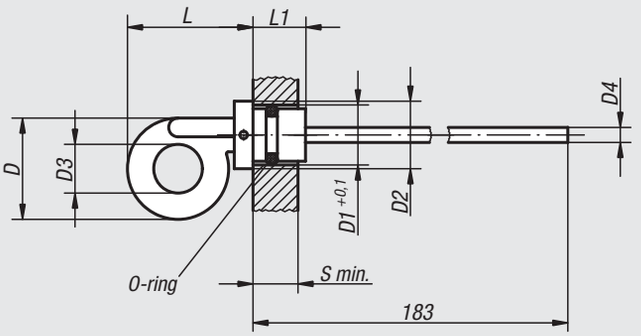
Dipsticks

Material:
Thermoplastic polyamide handle.
Zinc dipstick.
O-ring in rubber (NBR).

Version:
Black handle.
Dipstick, phosphated.

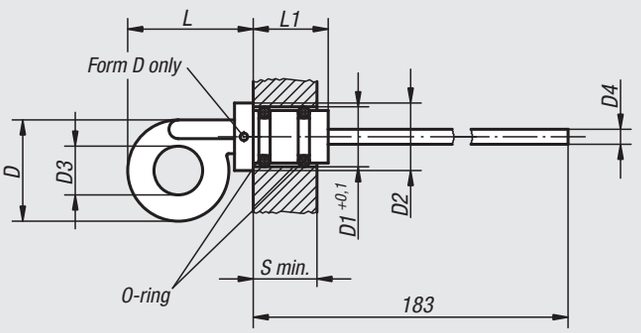
Sample order:
nlm 28060-23218

Form B
with vent hole



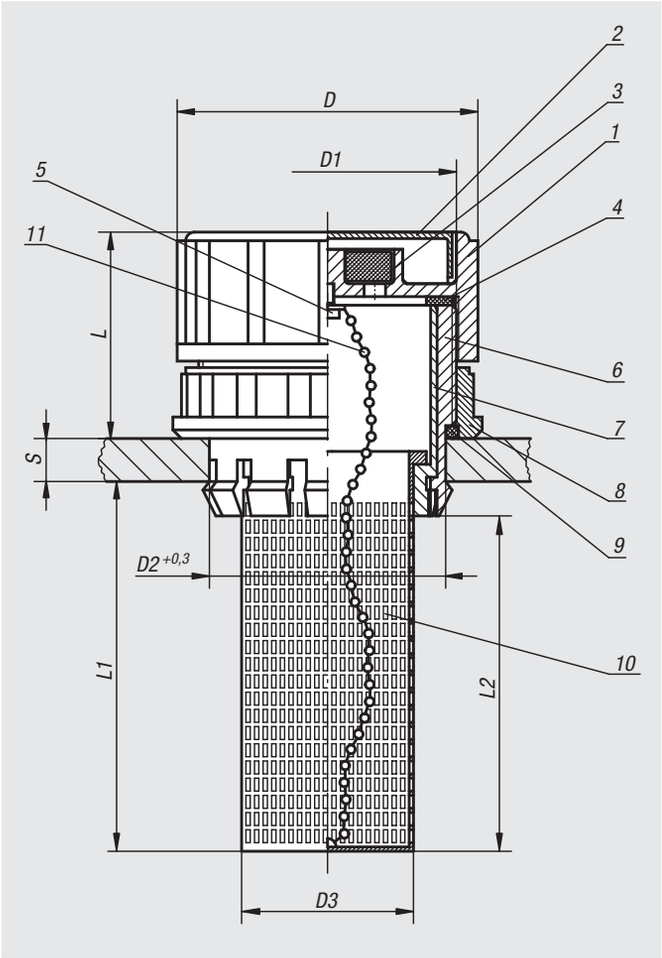
Form C
without vent hole

Form D
with vent hole



Order No.	Form	D	drill-Ø D1	D2	D3	D4 Ø	L	L1	S min.
28060-22714	B	27	14	18	13	4	34	13	10
28060-23218	B	32	18	24	14	5	45	17	9
28060-23220	B	32	20	24	14	5	44,5	18	10
28060-32714	C	27	14	18	13	4	34	20	17
28060-33012	C	27	12	18	14	4	36	20	16
28060-33318	C	33	18	24	14	5	44	21	17,5
28060-33520	C	35	20	24	16	5	46	21	17,5
28060-42714	D	27	14	18	13	4	34	20	17
28060-43318	D	33	18	24	14	5	44	21	17,5

Filler necks



Material, version:

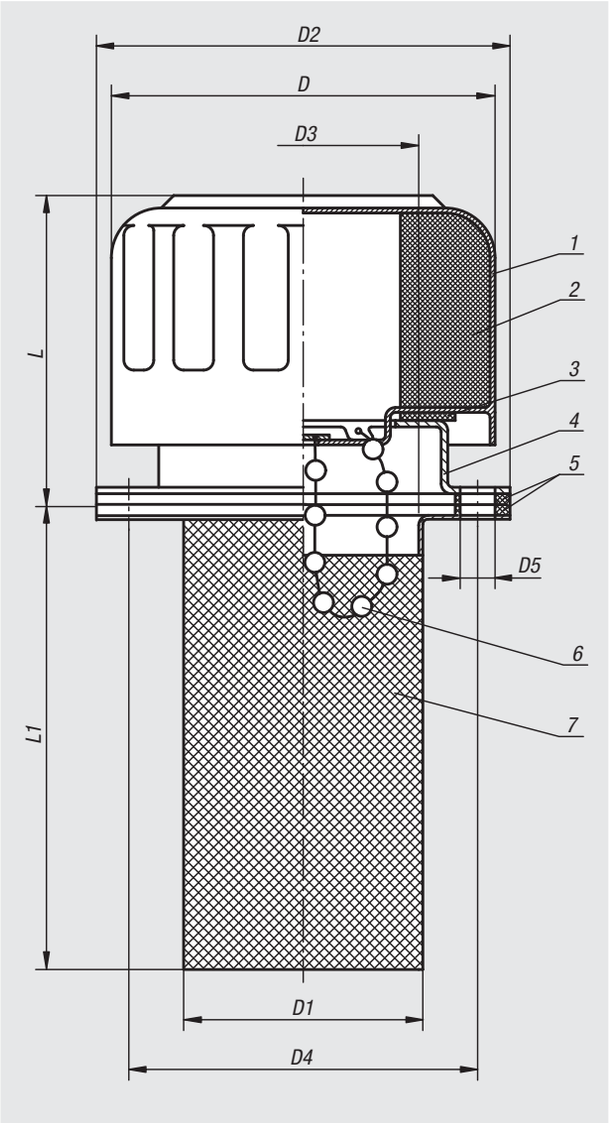
1. Filler housing black thermoplastic polyamide 66
2. Filler cap red thermoplastic polyamide 66
3. Air filter polyurethane (PU foam), filter mesh 50 µm
4. Flat seal rubber (NBR)
5. Fastening screw nickel-plated steel
6. Press-in collar black thermoplastic polyamide 66
7. Stop bush black thermoplastic polyamide 66
8. Fastening nut black thermoplastic polyamide 66
9. O-ring rubber (NBR)
10. Filler sieve black thermoplastic polypropylene
11. Chain nickel-plated brass

Sample order:
nlm 28070-706020

Note:
Temperature resistant up to 90 °C.

Order No.	D	D1	D2	D3	L	L1	L2	S
28070-706020	70	M60x2	55	38	46,5	88	80	2 - 8

Filler necks



Material, version:
1. Filler housing chrome steel

2. Air filter polyurethane (PU foam), mesh 40 µm. Flow rate up to 720 l/min

3. Flat seal cork

4. Mounting flange with fastening screws, bayonet fitting

5. Flat seal cork

6. Chain nickel-plated brass

7. Filler sieve galvanized steel

Sample order:
nlm 28071-45

Note:
The filler necks are supplied with seals and M5 fastening screws.

Not suitable for water tanks.

Order No.	Version	D	D1	D2	D3	D4	D5	L	L1
28071-45	without chain	46,5	27,5	52	25	41,3	6 (3x)	43	66
28071-77	with chain	80	49	83	44	71,5	6 (6x)	57	80

Notes

29000

Tube connectors
Tube clamps
Tube joints
Tubes
Columns

Technical information
thermoplastic tube clamping system

The tube clamping system is characterised by the attractive design and a special reducing sleeve concept.

This unique concept and the associated clamping of different diameters and tube forms permit a flexibility never before achieved.

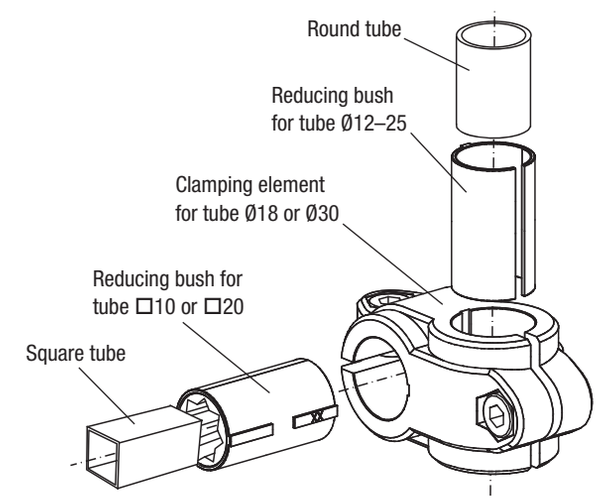
By simply exchanging a sleeve an existing tubular construction can be transformed into one with a different diameter or cross-section.

Benefits:

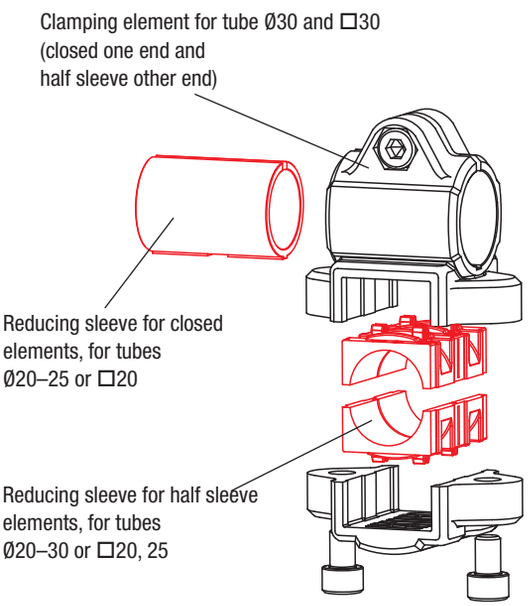
- Only one clamping element per construction type.
- Tube reduction (from Ø12–30 or 10x10–25x25) with different reducer sleeves for round or square tubes.
- Tube diameter marked on each reducer sleeve.
- Locking tab on the sleeves prevents rotation in the clamping element.

Note:
The clamping elements are supplied as standard with a DIN 7984 screw and a DIN 985 self-locking nut. Plastic clamp levers for locking available on request.

”Closed” system (one-piece basic form)



Half shell elements (two-piece basic form)



Application using tube clamps

Tube clamps

cross, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

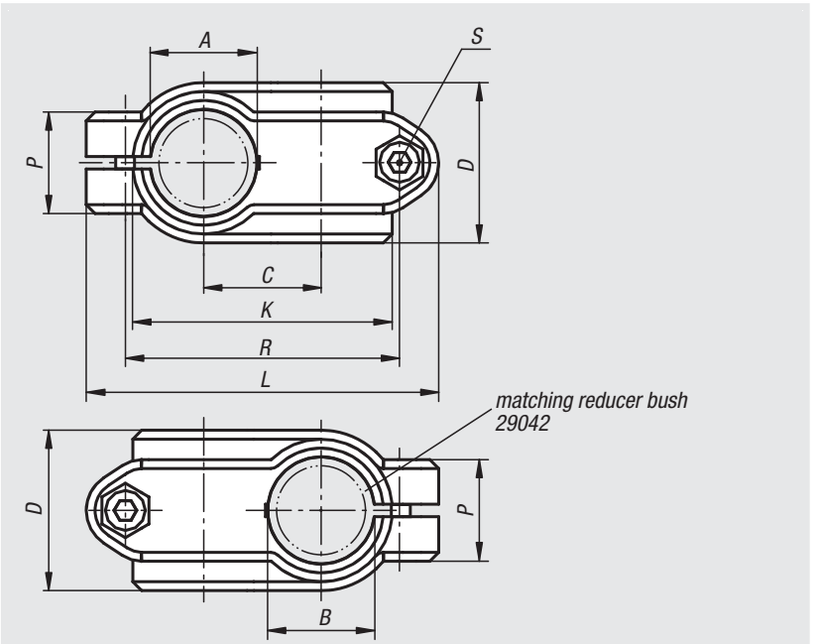
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29000-1818

Note:
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050



Order No.	A	B	C	D	K	L	P	R	S
29000-1818	18	18	20	30	48	63	21	48	M6x18
29000-3030	30	30	33	45	72	99	28,5	77	M8x25

29000

Tube clamps

cross, aluminium

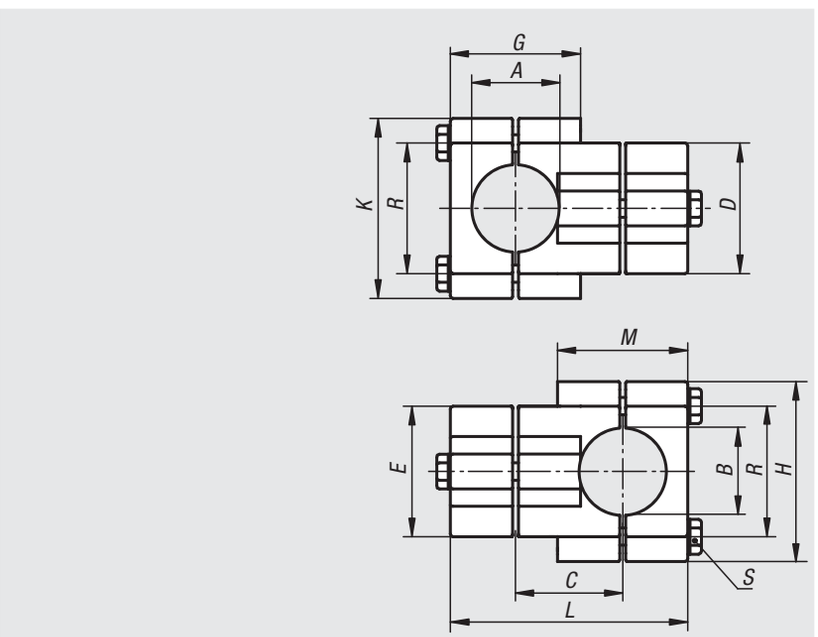
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29000-523030

On request:
Levers for locking and other diameters.

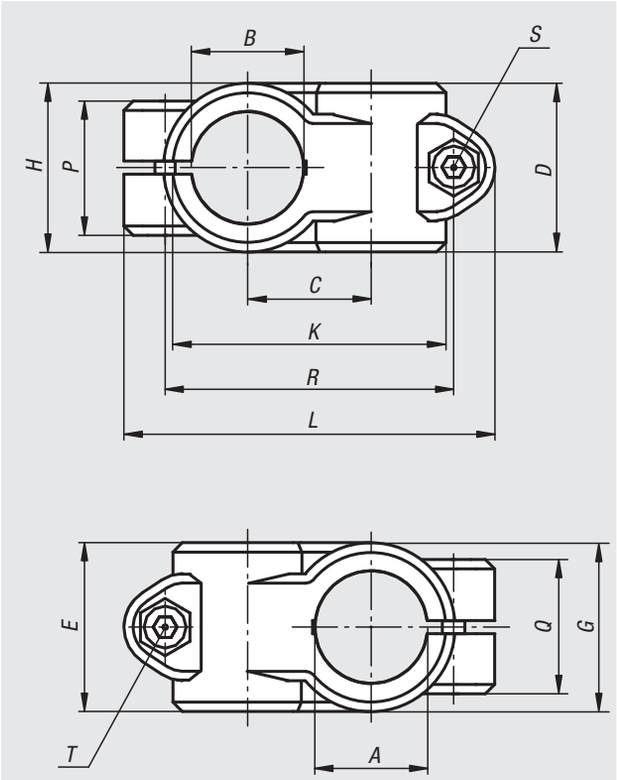
Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	K	L	M	R	S
29000-523030	30,2	30,2	38	45	45	44	62	62	83	44	46	M8x45
29000-524040	40,2	40,2	50	60	60	60	75	75	110	60	57	M8x60

Tube clamps

cross, aluminium



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29000-51818

On request:
Levers for locking.

Accessories:
- Round and square tubes 29050

Order No.	A	B	C	D	E	G	H	K	L	P	Q	R	S	T
29000-51212	12,1	12,1	20	25,5	25,5	-	-	43,5	66	23	23	51	M6x20	M6x20
29000-51414	14,1	14,1	20	25,5	25,5	-	-	43,5	66	22	22	51	M6x20	M6x18
29000-51515	15,1	15,1	20	25,5	25,5	-	-	43,5	66	22	22	51	M6x20	M6x18
29000-51616	16,1	16,1	20	25,5	25,5	-	-	43,5	66	22	22	51	M6x20	M6x18
29000-51818	18,1	18,1	20	25,5	25,5	-	-	43,5	66	23	23	51	M6x20	M6x18
29000-52014	20,1	14,1	27	40	33	40	26	60	84	21	33	65	M8x25	M6x18
29000-52020	20,1	20,1	33	40	40	-	-	73	99	33	33	78	M8x25	M8x25
29000-52514	25,1	14,1	27	40	33	40	26	60	84	21	33	65	M8x25	M6x18
29000-52525	25,1	25,1	33	40	40	-	-	73	99	33	33	78	M8x25	M8x25
29000-53014	30,1	14,1	27	40	33	40	26	60	84	21	33	65	M8x25	M6x18
29000-53030	30,1	30,1	33	40	40	-	-	73	99	33	33	78	M8x25	M8x25
29000-54020	40,2	20,2	36	50	40	55	34,5	87	109	33	40	87	M10x30	M8x25
29000-54030	40,2	30,1	45	65	65	65	49	98	137	44	44	109	M10x30	M10x30
29000-54040	40,17	40,17	45	60	60	-	-	100	137	40	40	110	M10x30	M10x30
29000-55030	50,2	30,1	45	65	65	65	49	98	137	44	44	109	M10x35	M10x35
29000-55050	50,2	50,2	54	70	70	-	-	118	154	45	45	128	M10x35	M10x35

Tube clamps

cross, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

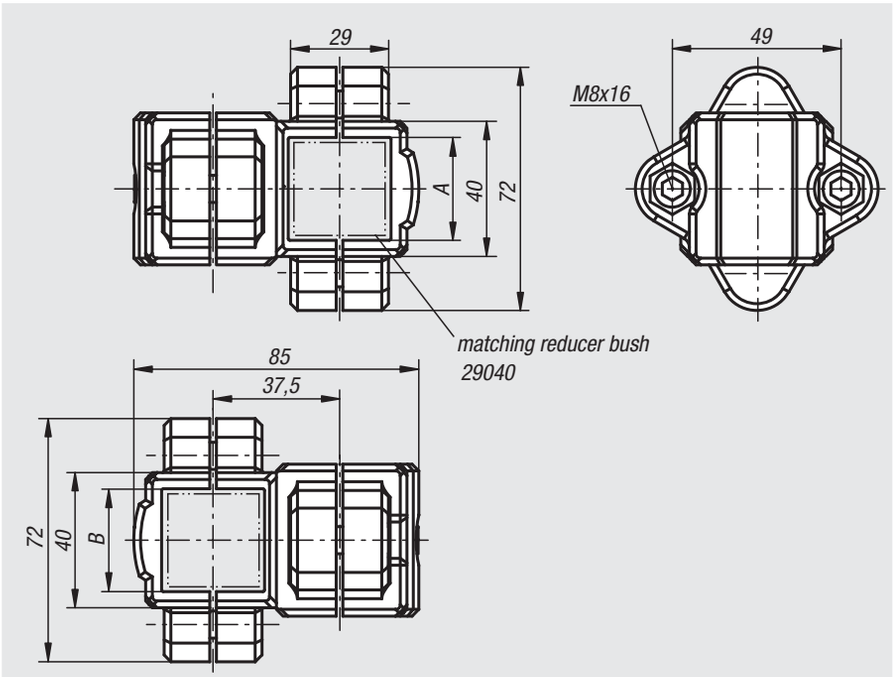
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29002-3030

Note:
These cross clamps are for 30 mm square tubes. Use reducer sleeves 29040 if smaller tubes are to be clamped or a conversion from square to round tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29040
- Round and square tubes 29050

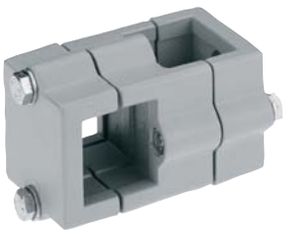


Order No.	A	B
29002-3030	30	30

29002

Tube clamps cross,

aluminium



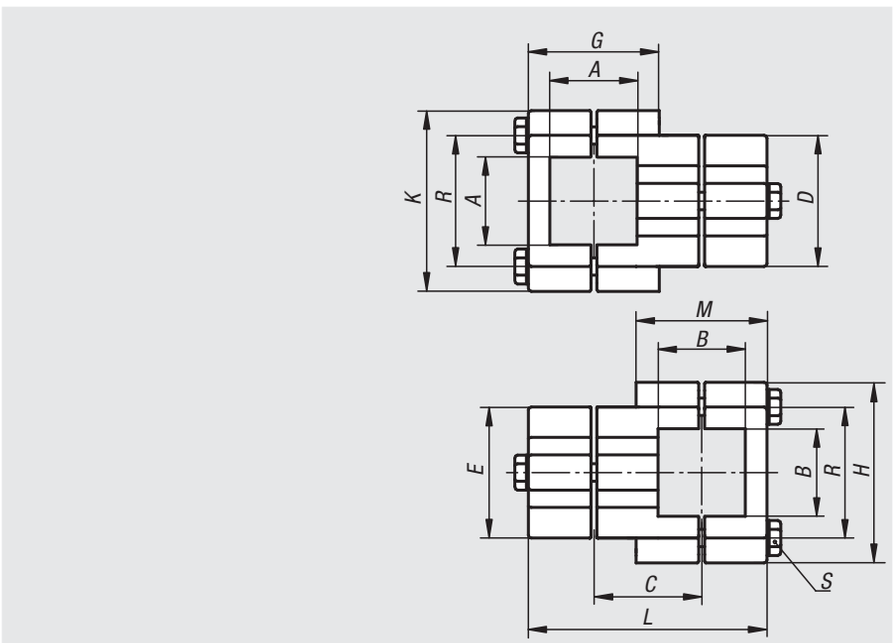
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29002-523030

On request:
Levers for locking and other sizes for square tube.

Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	K	L	M	R	S
29002-523030	30,2	30,2	38	45	45	44	62	62	83	44	46	M8x45
29002-524040	40,3	40,3	50	60	60	60	75	75	110	60	57	M8x60

Notes

Tube clamps

cross, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

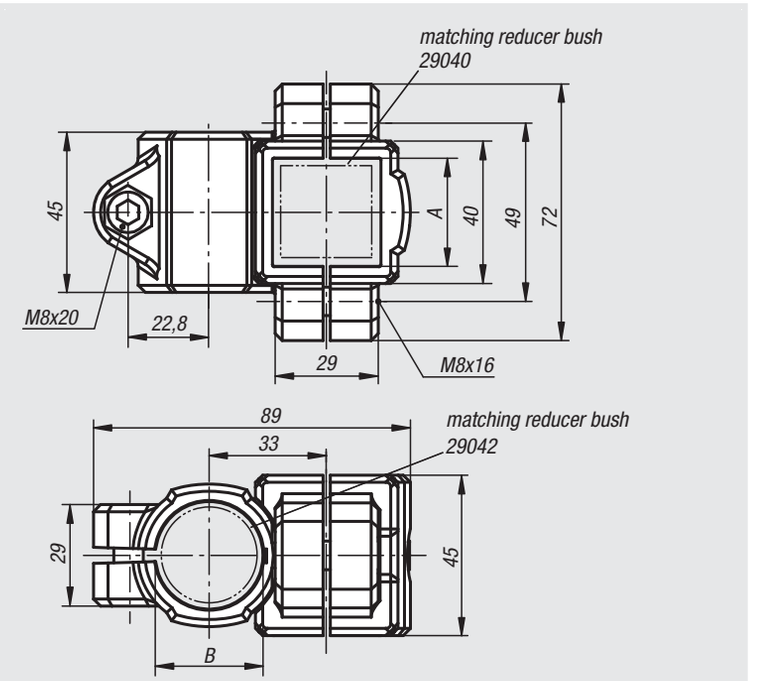
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29004-3030

Note:
These cross clamps are for 30 mm square and round tubes. Use reducer sleeves 209040 or 29042 if smaller tubes are to be clamped or a conversion from round to square tubes „or vice versa“ is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29040 and 29042
- Round and square tubes 29050



Order No.	A	B
29004-3030	30	30

29004

Tube clamps

cross, aluminium

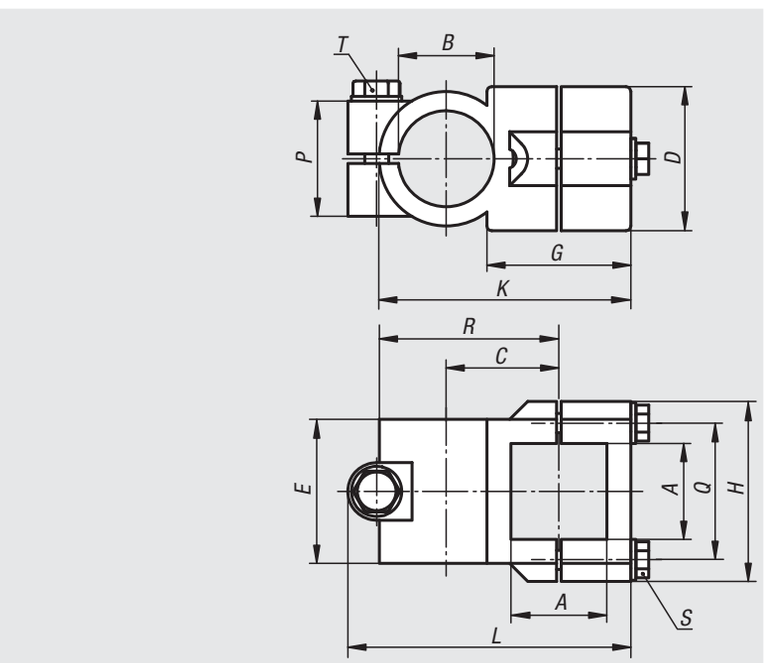
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29004-53030

On request:
Clamping levers for fastening and other diameters.

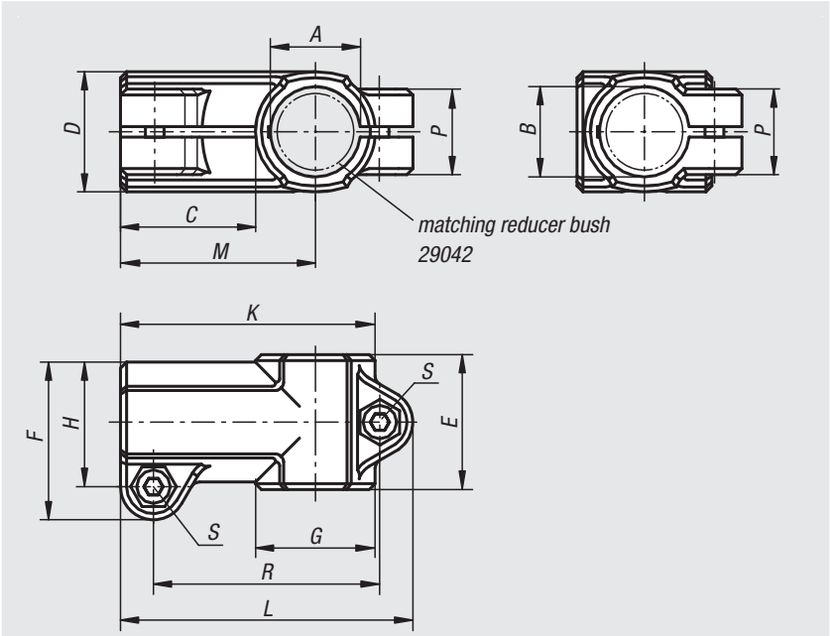
Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	K	L	P	Q	R	S	T
29004-53030	30,2	30,1	33	45	45	40	62	74,5	85	33	46	55	M8x35	M8x35
29004-54040	40,3	40,2	47	60	60	60	75	105	117	48	57	75	M8x45	M10x50

Tube clamps

T-angle, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29006-1818

Note:
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

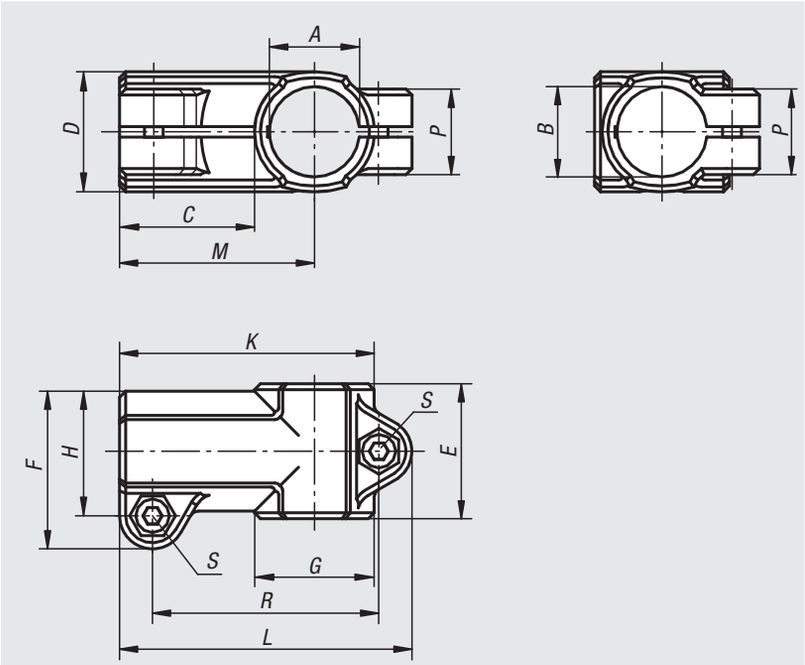
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	G	H	K	L	M	P	R	S
29006-1818	18	18	30,5	25	30	34	25	26,5	55,5	64,5	43	21	49,5	M6x18
29006-3030	30	30	45	40	45	52,5	40	41,5	85	97,5	65	28,5	75,5	M8x25

Tube clamps

T-angle, aluminium



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29006-51818

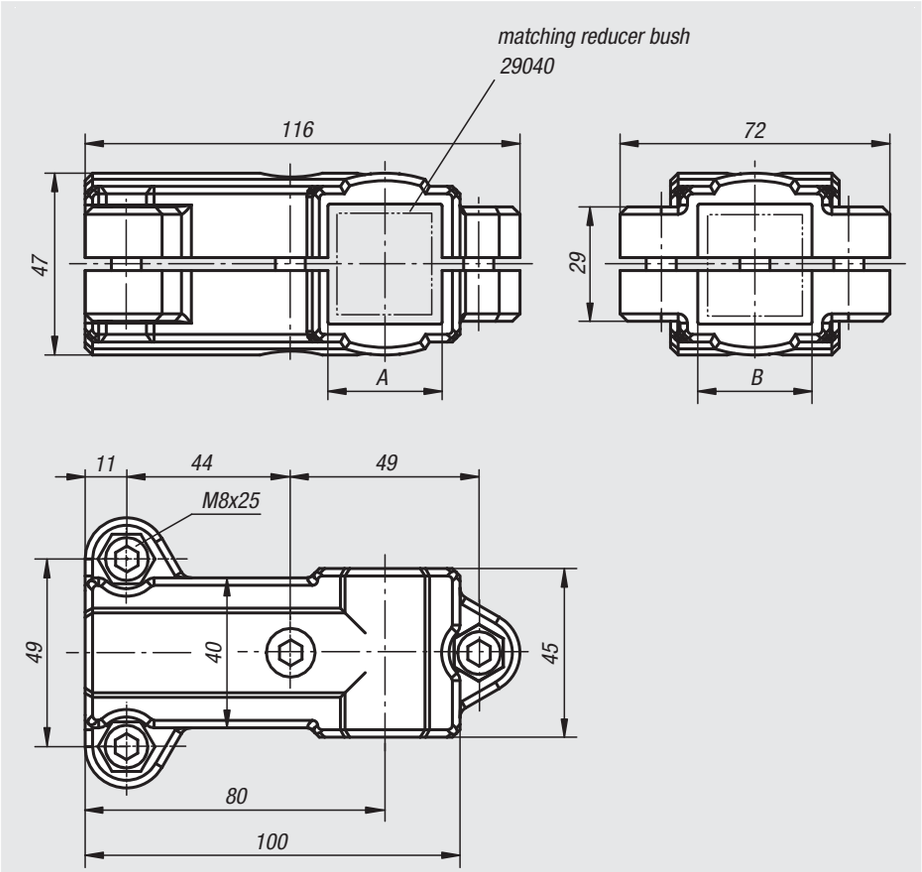
On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	G	H	K	L	M	P	R	S
29006-51212	12,1	12,1	30	26	32	37,5	26	30	56	67,5	43	21	52	M6x20
29006-51414	14,1	14,1	30	26	32	37,5	26	30	56	67,5	43	21	52	M6x20
29006-51515	15,1	15,1	30	26	32	37,5	26	30	56	67,5	43	21	52	M6x20
29006-51616	16,1	16,1	30	26	32	37,5	26	30	56	67,5	43	21	52	M6x20
29006-51818	18,1	18,1	30	26	32	37,5	26	30	56	67,5	43	21	52	M6x20
29006-52020	20,1	20,1	40	40	45	53	40	42,5	80	93	60	33	72,5	M8x25
29006-52525	25,1	25,1	40	40	45	53	40	42,5	80	93	60	33	72,5	M8x25
29006-53030	30,1	30,1	40	40	45	53	40	42,5	80	93	60	33	72,5	M8x25
29006-54040	40,2	40,2	60	56	60	74	56	60	115	133	88	40	107	M10x30
29006-55050	50,22	50,22	63	66	70	85	66	71	131	150	99	45	122	M10x35

Tube clamps

T-angle, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29008-3030

Note:
These T-clamps are for 30 mm square tubes. Use reducer sleeves 29040 if smaller tubes are to be clamped or a conversion from square to round tubes is required.

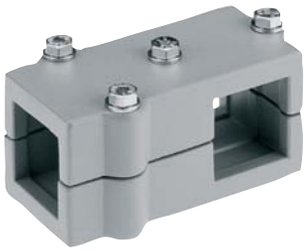
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29040
- Round and square tubes 29050

Order No.	A	B
29008-3030	30	30

Tube clamps

T-angle, aluminium



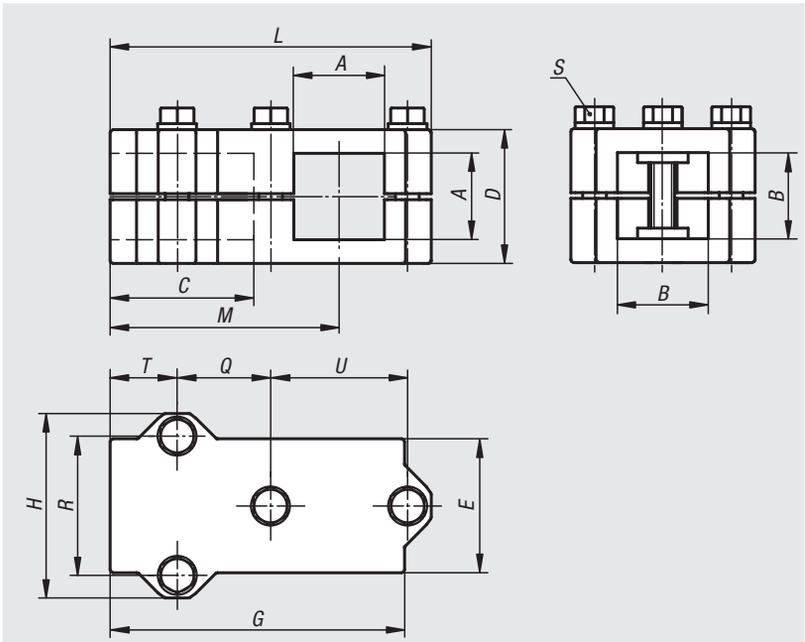
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29008-523030

On request:
Levers for locking and other sizes for square tube.

Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	L	M	Q	R	S	T	U
29008-523030	30,3	30,3	46	45	45	100	62	108	77	31,5	46	M8x45	23	46
29008-524040	40,4	40,4	60	60	60	129	75	136	99	40	57	M8x60	30	57

29008

Tube clamps

right-angle, aluminium

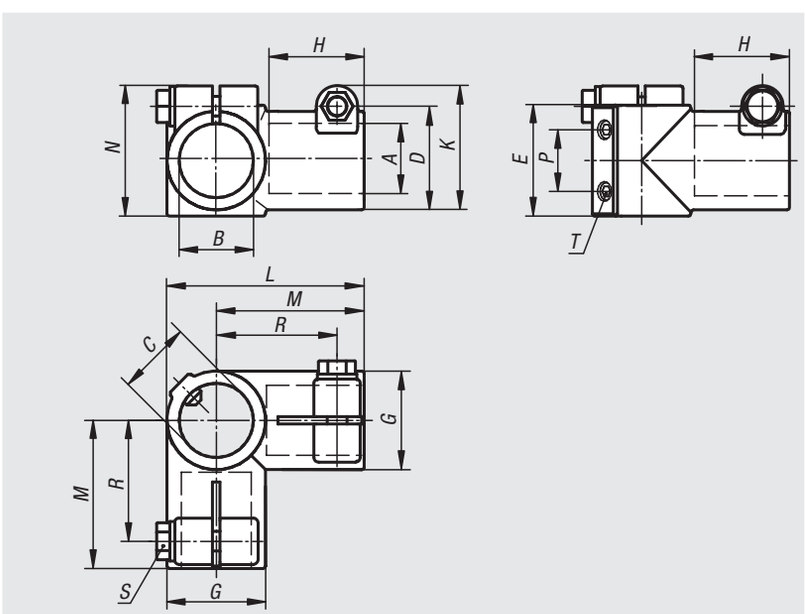
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29008-530

On request:
Levers for locking and other diameters.

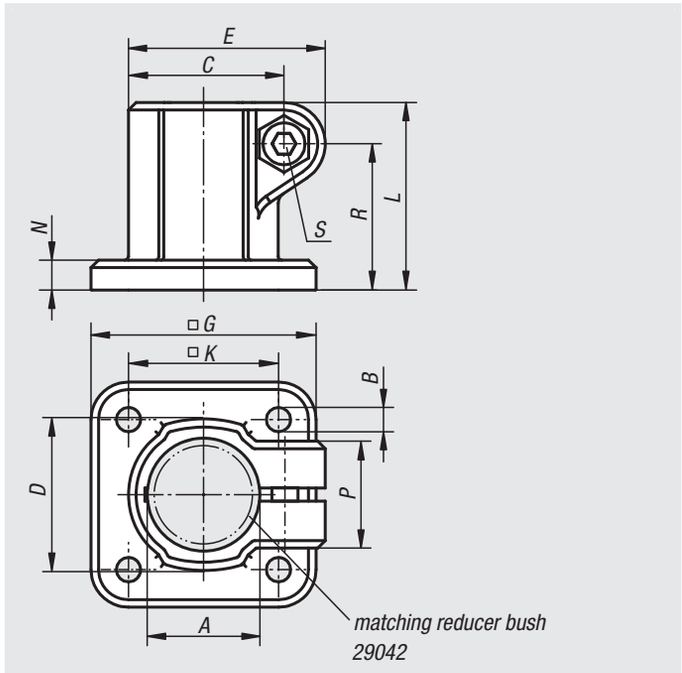
Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	K	L	M	N	P	R	S	T
29008-530	30,1	30,1	30	40	45	40	35	51	80	60	53	25	49	M8x35	M8x15
29008-540	40,2	40,2	40	56	60	56	58	71	116	88	73	35	75	M10x30	M8x10
29008-550	50,2	50,2	50,2	66	70	66	70	78	136	108	80	40	90	M10x35	M10x12

Tube clamps

base, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29010-18

Note:
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	B	C	D	E	G	K	L	N	P	R	S
29010-18	18	5,3	26,5	26	34	45	30	32	5	21	24,5	M6x18
29010-30	30	6,5	41,5	42	52,5	60	40	50	8	28,5	39	M8x25

Tube clamps

base, aluminium

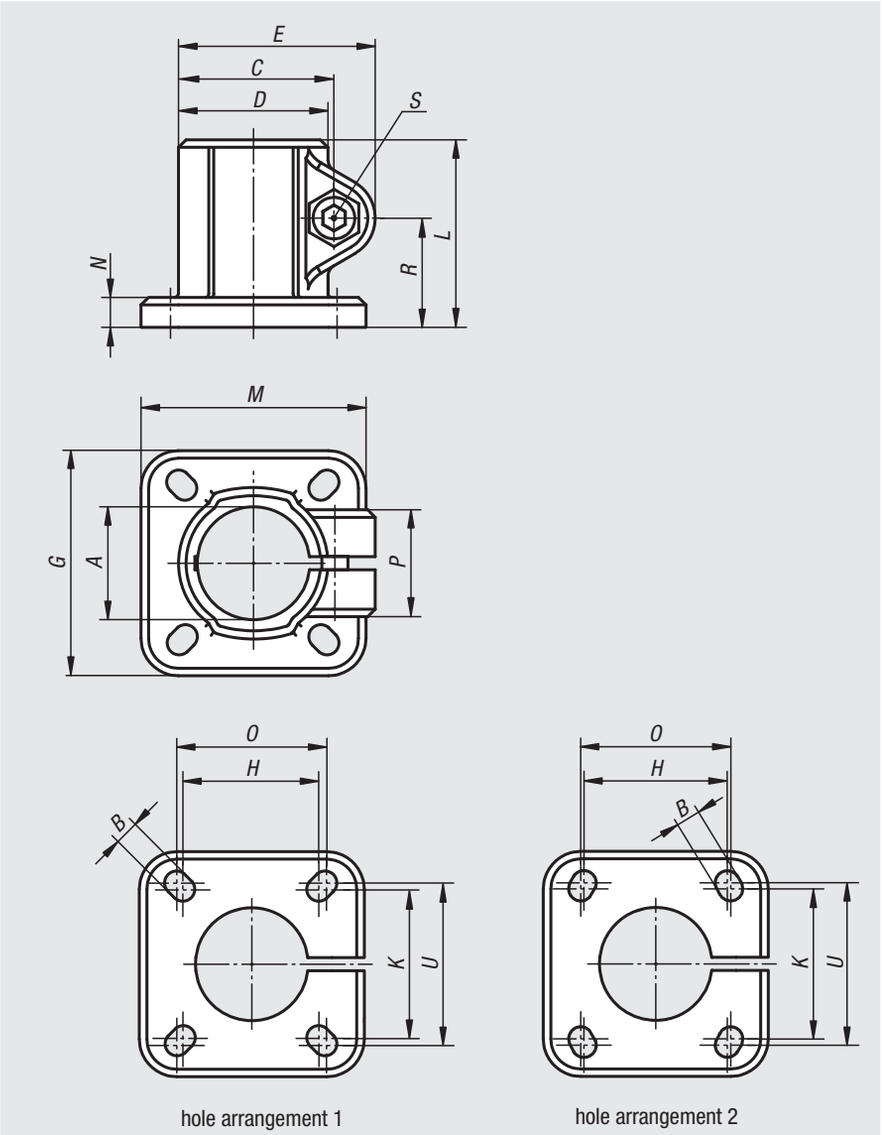
Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29010-518

On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050



hole arrangement 1 hole arrangement 2

Order No.	hole arrangement	A	B	C	D	E	G	H	K	L	M	N	O	P	R	S	U
29010-512	1	12,1	5,5	29,5	25	37,5	42	28	28	37	42	5	30	23	21	M6x20	30
29010-514	1	14,1	5,5	29,5	25	37,5	42	28	28	37	42	5	30	23	21	M6x20	30
29010-515	1	15,1	5,5	29,5	25	37,5	42	28	28	37	42	5	30	23	21	M6x20	30
29010-516	1	16,1	5,5	29,5	25	37,5	42	28	28	37	42	5	30	23	21	M6x20	30
29010-518	1	18,1	5,5	29,5	25	37,5	42	28	28	37	42	5	30	23	21	M6x20	30
29010-520	2	20,1	6,5	42,5	40	53	60	40	42	50	60	8	42	33	29	M8x25	45
29010-525	2	25,1	6,5	42,5	40	53	60	40	45	50	60	8	42	33	29	M8x25	45
29010-530	2	30,1	6,5	42,5	40	53	60	40	45	50	60	8	42	33	29	M8x25	45
29010-540	1	40,17	8,5	60	56	74	90	60	60	70	90	10	64	40	40	M10x30	64
29010-550	1	50,22	10,5	70	66	85	105	74	74	85	105	14	80	45	49,5	M10x35	80

Tube clamps

base, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

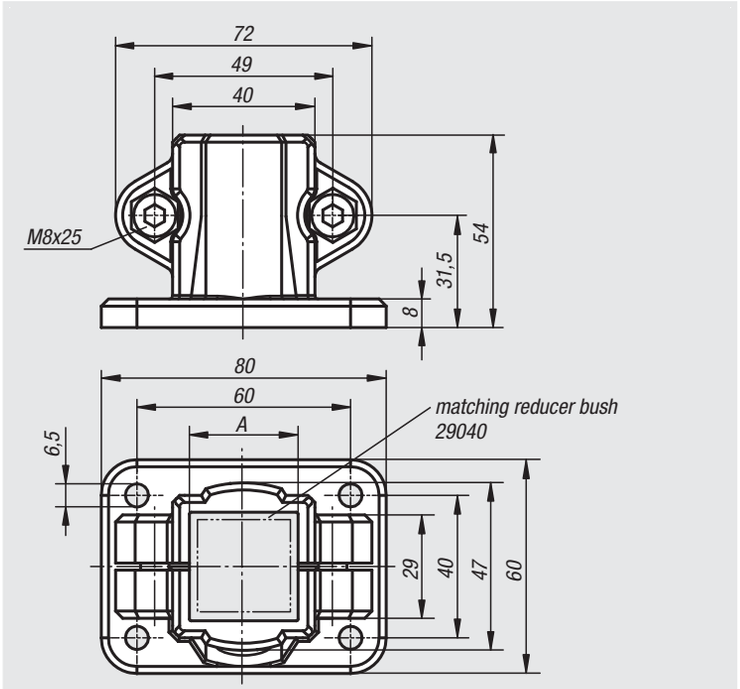
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29012-30

Note:
These base clamps are for 30 mm square tubes. Use reducer sleeves 29040 if smaller tubes are to be clamped or a conversion from square to round tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29040
- Round and square tubes 29050



Order No.	A
29012-30	30

29012

Tube clamps

base, aluminium

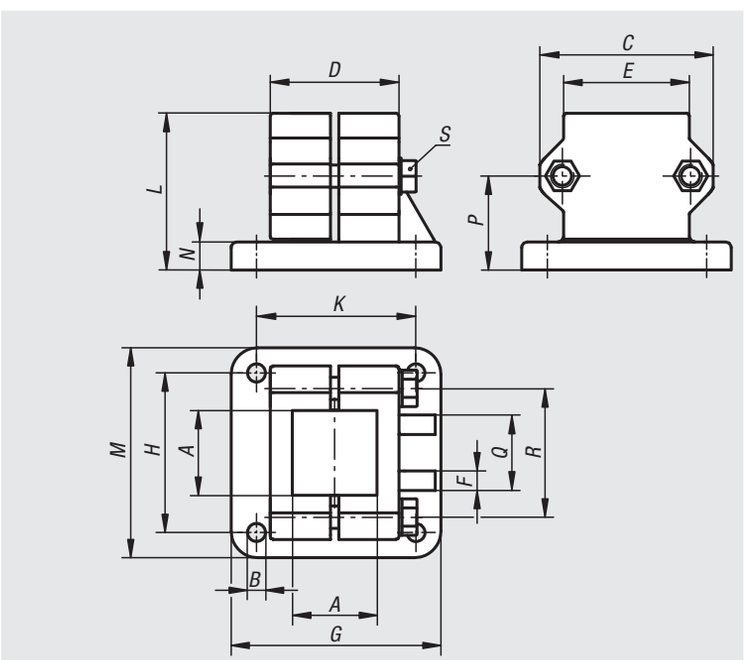
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29012-5230

On request:
Levers for locking and other sizes for square tube.

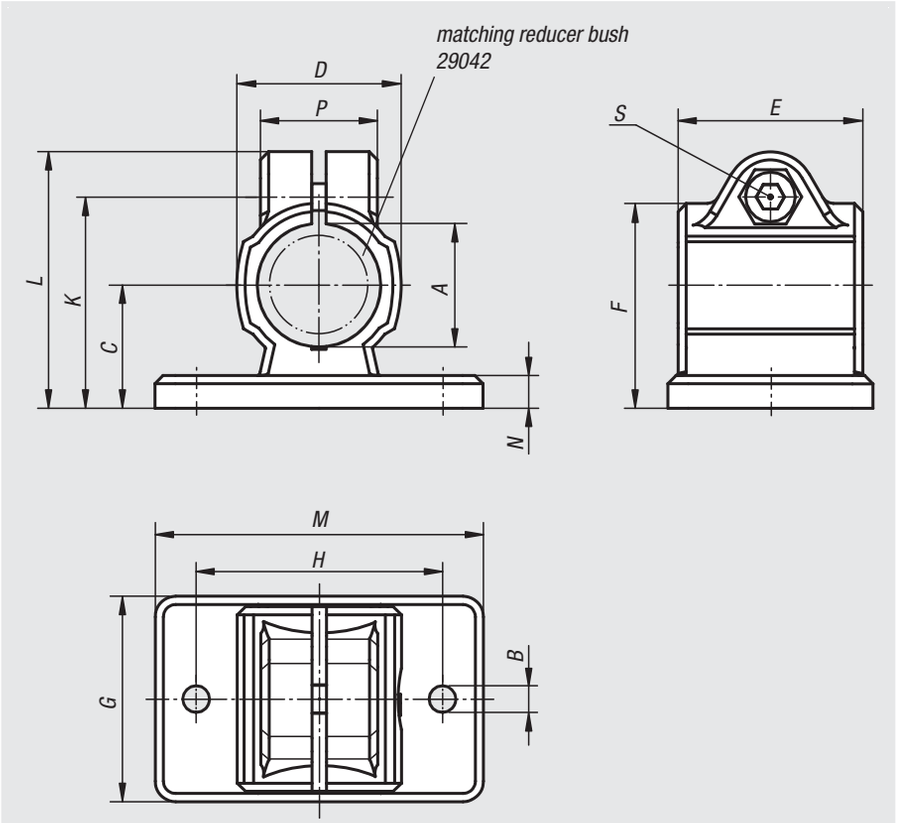
Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	F	G	H	K	L	M	N	P	Q	R	S
29012-5230	30,3	6,5	62	45	45	5	75	57	57	56	75	10	33,5	25	46	M8x45
29012-5240	40,4	8,5	75	60	60	5	100	76	76	71	100	10	43	25	57	M8x60

Tube clamps

flange, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29014-18

Note:
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	G	H	K	L	M	N	P	S
29014-18	18	5,3	18	25	30	30,5	35	40	32	39,5	50	5	21	M6x18
29014-30	30	6,5	30	40	45	50	50	60	51,5	62,5	80	8	28,5	M8x25

Tube clamps

flange, aluminium

Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

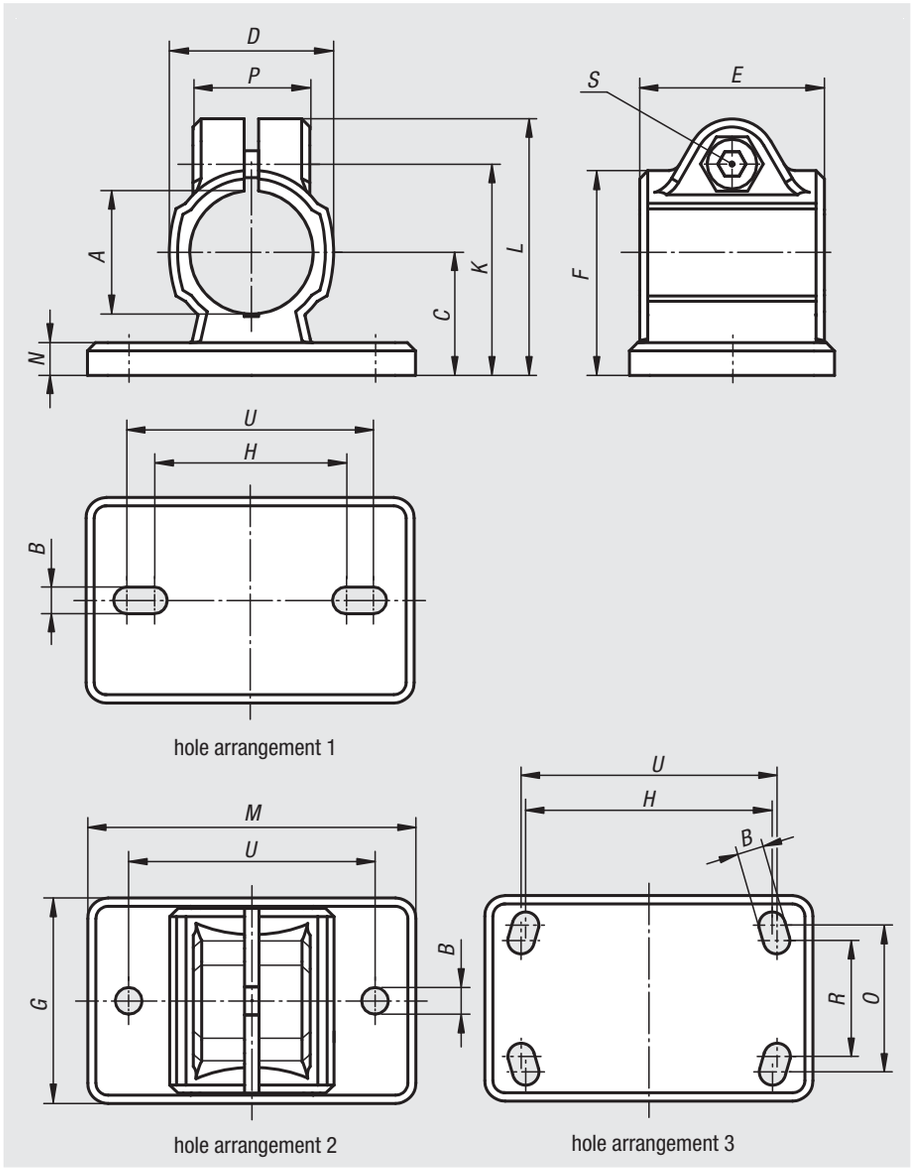
Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29014-518

Note:
* Elongated hole

On request:
Levers for locking and other diameters.

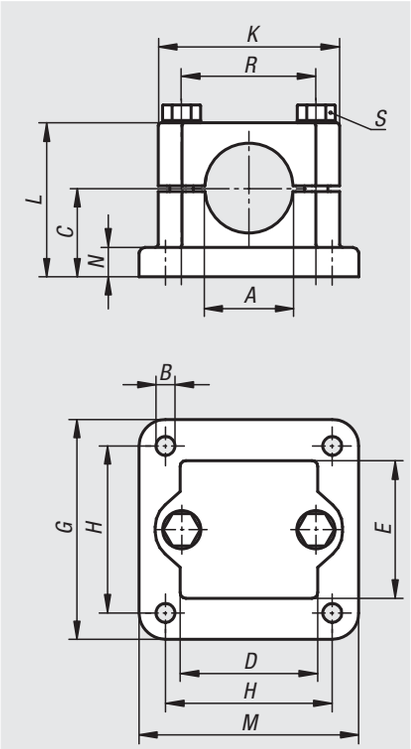
Accessories:
- Round and square tubes 29050



Order No.	hole arrangement	A	B	C	D	E	F	G	H	K	L	M	N	O	P	R	S	U
29014-512	1	12,1	5,5* (2x)	18	26	32	31	35	38	32,5	41	50	5	-	23	-	M6x20	40
29014-514	2	14,1	5,5 (2x)	18	26	32	31	35	-	32,5	41	50	5	-	23	-	M6x20	40
29014-515	2	15,1	5,5 (2x)	18	26	32	31	35	-	32,5	41	50	5	-	23	-	M6x20	40
29014-516	1	16,1	5,5* (2x)	18	26	32	31	35	38	32,5	41	50	5	-	23	-	M6x20	40
29014-518	2	18,1	5,5 (2x)	18	26	32	31	35	-	32,5	41	50	5	-	23	-	M6x20	40
29014-520	1	20,1	6,5* (2x)	30	40	40	50	55	53	53	63	78	7	-	33	-	M8x25	60
29014-525	1	25,1	6,5* (2x)	30	40	40	50	55	53	53	63	78	7	-	33	-	M8x25	60
29014-530	1	30,1	6,5* (2x)	30	40	40	50	55	53	53	63	78	7	-	33	-	M8x25	60
29014-540	3	40,17	8,5* (4x)	42	56	60	70	80	80	74	87	105	10	60	40	52	M10x30	82
29014-550	3	50,17	10,5* (4x)	50	66	65	83	90	98	85	98	128	14	62	45	60	M10x35	100

Tube clamps

flange, aluminium



Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29014-5230

On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050

Order No.	A	B	C	D	E	G	H	K	L	M	N	R	S
29014-5220	20,2	6,5	30	45	45	75	57	62	52,5	75	10	46	M8x50
29014-5225	25,2	6,5	30	45	45	75	57	62	52,5	75	10	46	M8x50
29014-5230	30,2	6,5	30	45	45	75	57	62	52,5	75	10	46	M8x50
29014-5240	40,2	8,5	40	60	60	100	76	75	70	100	10	57	M8x70

Tube clamps

flange, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

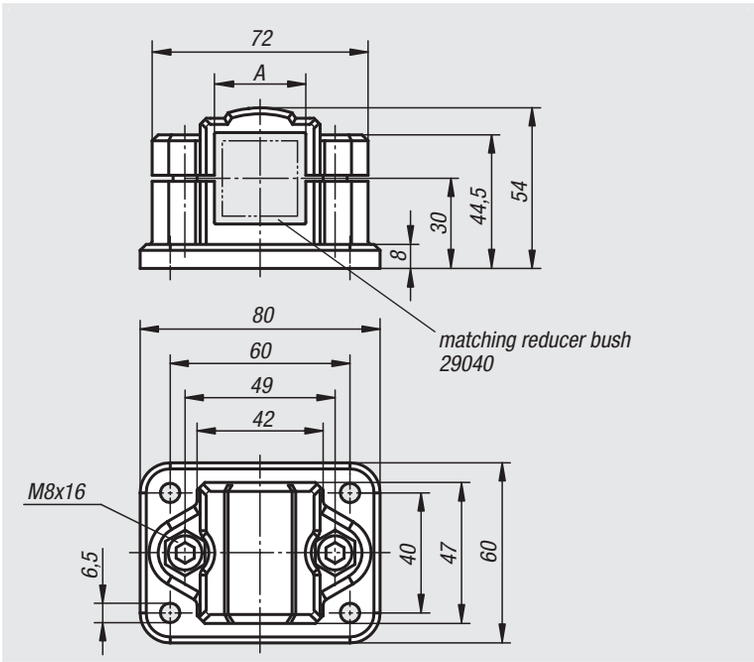
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29016-30

Note:
These flange clamps are for 30 mm square tubes. Use reducer sleeves 2940 if smaller tubes are to be clamped or a conversion from square to round tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29040
- Round and square tubes 29050



Order No.	A
29016-30	30

29016

Tube clamps

flange, aluminium

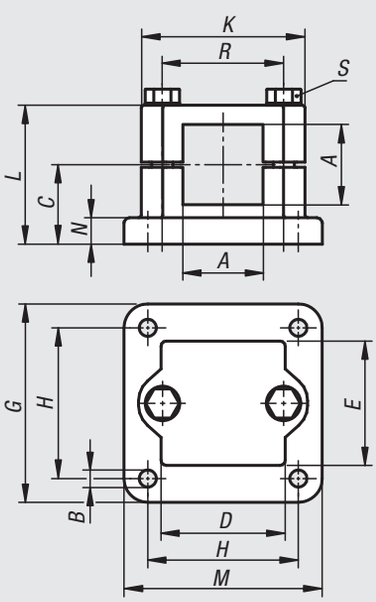
Material:
Cast aluminium.
Screws and nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29016-5230

On request:
Levers for locking and other sizes for square tube.

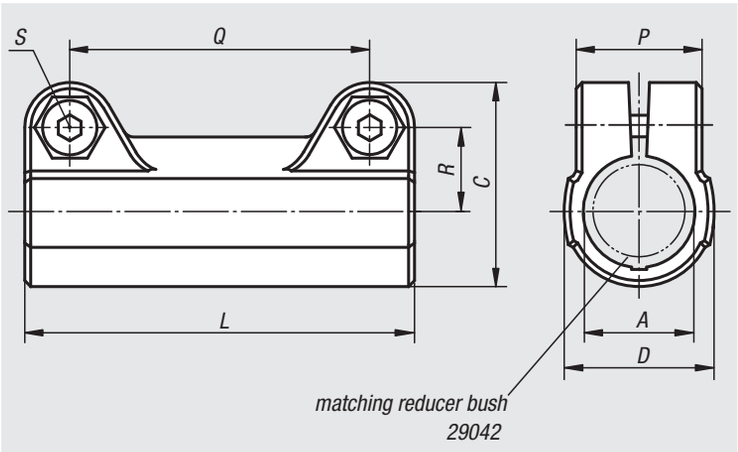
Accessories:
- Round and square tubes 29050



Order No.	A	B	C	D	E	G	H	K	L	M	N	R	S
29016-5225	25,3	6,5	30	45	45	75	57	62	52,5	75	10	46	M8x50
29016-5230	30,3	6,5	30	45	45	75	57	62	52,5	75	10	46	M8x50
29016-5240	40,4	8,5	40	60	60	100	76	75	70	100	10	57	M8x70

Tube clamps

straight, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29022-18

Note:
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

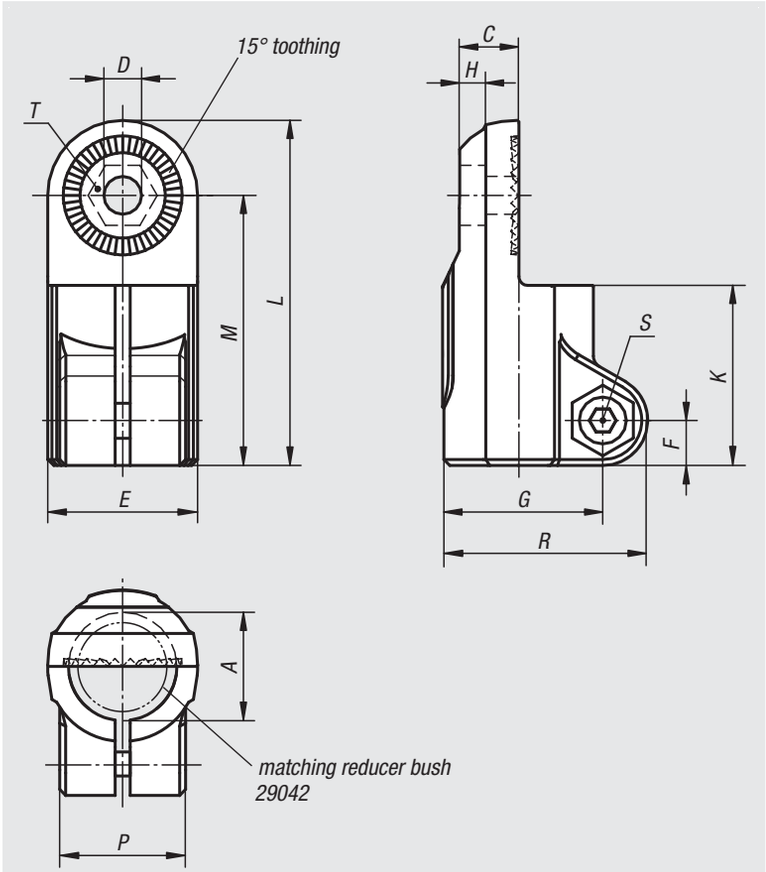
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	C	D	L	P	Q	R	S
29022-18	18	34	25	65	21	50	14	M6x18
29022-30	30	52,5	40	95	28,5	73	22,8	M8x25

Tube clamps

swivel half, sunken teeth, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29024-18

Note:
Swivel half clamps with sunken teeth can be combined with swivel half clamps with raised teeth (29026) to make a complete swivel clamp.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

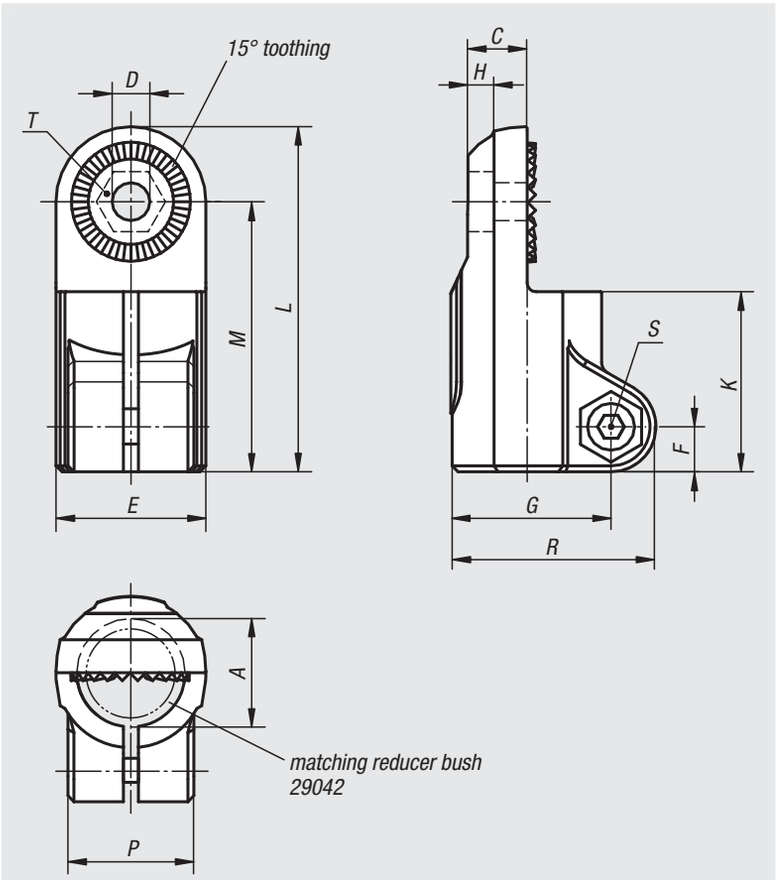
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	C	D	E	F	G	H	K	L	M	P	R	S	T
29024-18	18	9,9	6,1	25	7,5	26,5	5,9	30	57,5	45	21	34	M6x18	M6-DIN 985
29024-30	30	16,5	8,1	40	11	41,5	6,5	45	88	68	28,5	52,5	M8x25	M8-DIN 985

Tube clamps

swivel half, raised teeth, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29026-18

Note:
Swivel half clamps with raised teeth can be combined with swivel half clamps with sunken teeth (29024, 29028 or 29030) to make a complete swivel clamp.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

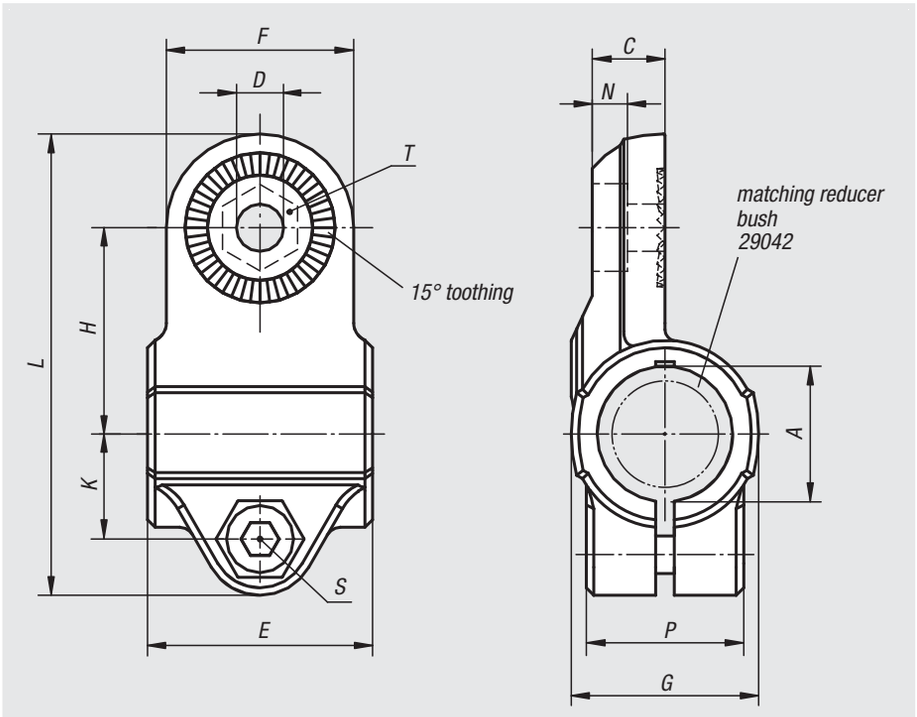
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	C	D	E	F	G	H	K	L	M	P	R	S	T
29026-18	18	9,9	6,1	25	7,5	26,5	5,9	30	57,5	45	21	34	M6x18	M6-DIN 985
29026-30	30	16,5	8,1	40	11	41,5	6,5	45	88	68	28,5	52,5	M8x25	M8-DIN 985

Tube clamps

swivel half, sunken teeth, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29028-18

Note:
Swivel half clamps with sunken teeth can be combined with swivel half clamps with raised teeth (29026) to make a complete swivel clamp.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	C	D	E	F	G	H	K	L	N	P	S	T
29028-18	18	9,7	6,1	30	25	25	27,5	14	61,5	5,7	21	M6x18	M6-DIN 985
29028-30	30	16,5	8,1	45	40	40	43	22,5	95,5	6,5	28,5	M8x25	M8-DIN 985

Tube clamps

swivel base, sunken teeth, plastic

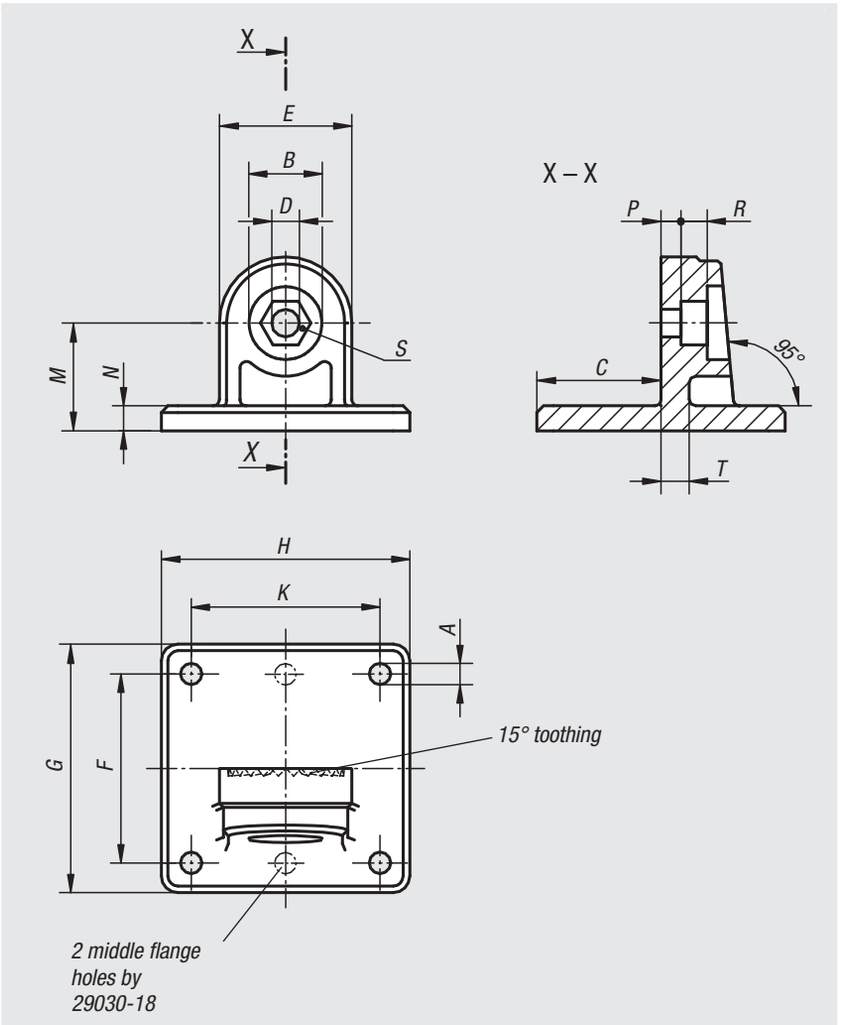
Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29030-18

Note:
Swivel clamp bases can be combined with swivel half clamps with raised teeth (29026) to make a complete swivel clamp.

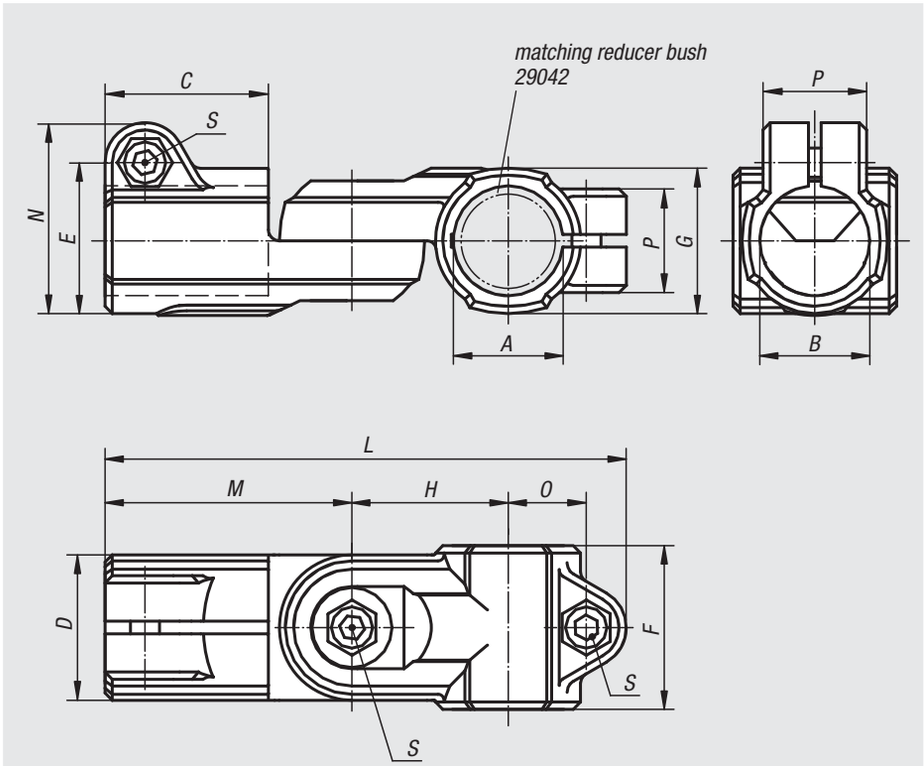
On request:
Plastic levers for locking.



Order No.	A	B	C	D	E	F	G	H	K	M	N	P	R	S	T
29030-18	5,3 (2x)	15	25	6,1	25	40	50	35	-	20	5	4,5	5,5	M6-DIN 985	5
29030-30	6,5 (4x)	22	37,5	8,1	40	60	75	75	60	32,5	7,5	6,6	8,2	M8-DIN 985	7

Tube clamps

swivel, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29032-18

Note:
Tube swivel clamps can be seamlessly rotated through 180°.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

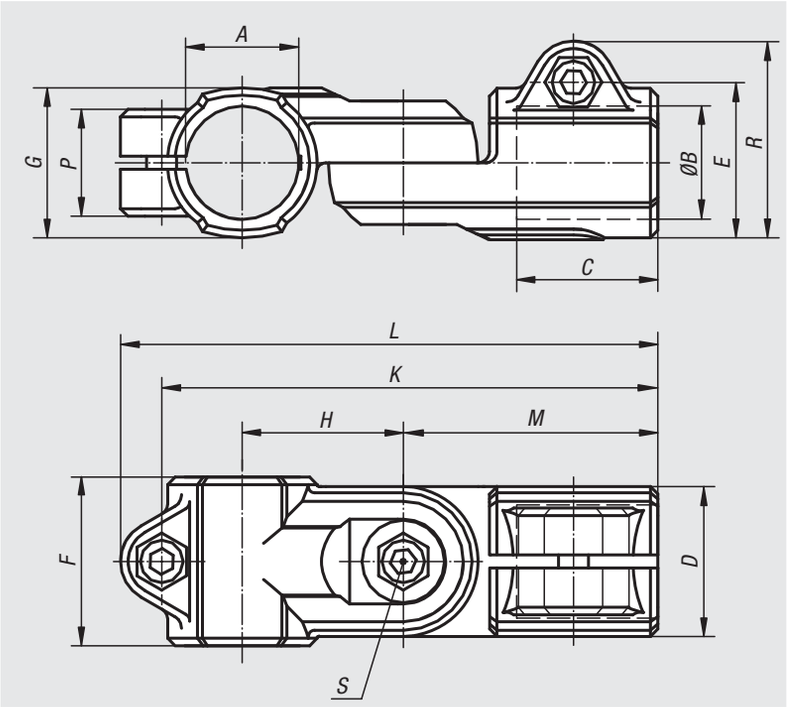
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	G	H	L	M	N	O	P	S
29032-18	18	18	30	25	26,5	30	25	27,5	94	45	34	14	21	M6x18
29032-30	30	30	45	40	41,5	45	40	43	143,5	68	52,5	22,5	28,5	M8x25

Tube clamps

swivel, aluminium



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29032-518

Note:
Tube swivel clamps can be seamlessly rotated through 180°.

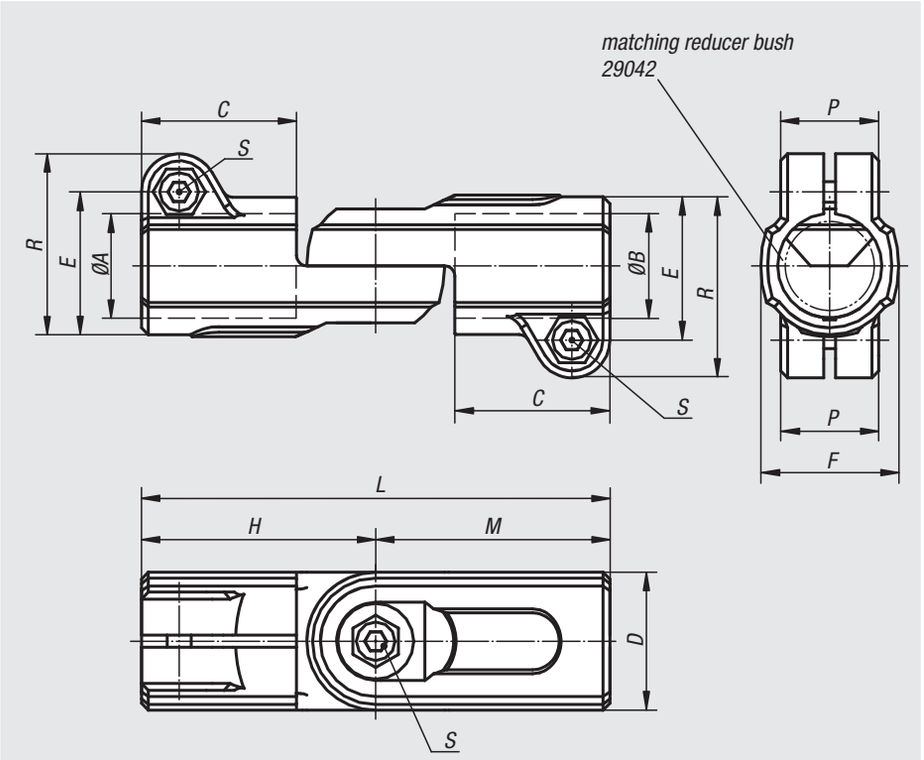
On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	G	H	K	L	M	P	R	S
29032-512	12,1	12,1	25	26	29,4	30	26	27	84	95,5	44	21	37,5	M6x16
29032-514	14,1	14,1	25	26	29,4	30	26	27	84	95,5	44	21	37,5	M6x16
29032-516	16,1	16,1	25	26	29,4	30	26	27	84	95,5	44	21	37,5	M6x16
29032-518	18,1	18,1	25	26	29,4	30	26	27	84	95,5	44	21	37,5	M6x16
29032-520	20,1	20,1	45	40	40	-	40	43	136	146	73	33	51	M8x35
29032-525	25,1	25,1	45	40	40	-	40	43	136	146	73	33	51	M8x35
29032-530	30,1	30,1	45	40	40	-	40	43	136	146	73	33	51	M8x35
29032-540	40,2	40,2	60	56	56	-	56	60	188	200	100	48	70	M10x50

Tube clamps

swivel, plastic



Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29034-18

Note:
Tube swivel clamps can be seamlessly rotated through 180°.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

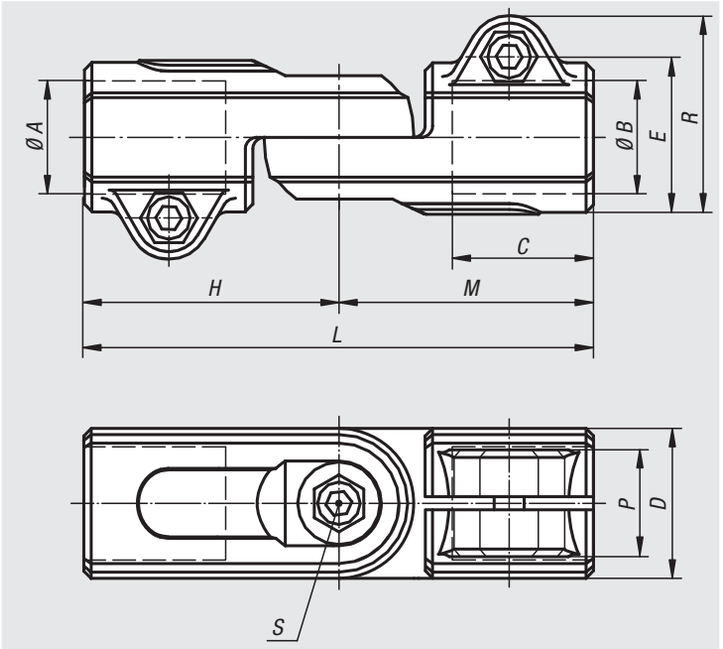
On request:
Plastic levers for locking.

Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050

Order No.	A	B	C	D	E	F	H	L	M	P	R	S
29034-18	18	18	30	25	26,5	25	45	90	45	21	34	M6x18
29034-30	30	30	45	40	41,5	40	68	136	68	28,5	52,5	M8x25

Tube clamps

swivel, aluminium



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29034-540

Note:
Tube swivel clamps can be seamlessly rotated through 180°.

On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050

Order No.	A	B	C	D	E	H	L	M	P	R	S
29034-512	12,1	12,1	25	26	29,4	44	88	44	21	37,5	M6x16
29034-514	14,1	14,1	25	26	29,4	44	88	44	21	37,5	M6x16
29034-516	16,1	16,1	25	26	29,4	44	88	44	21	37,5	M6x16
29034-518	18,1	18,1	25	26	29,4	44	88	44	21	37,5	M6x16
29034-520	20	20	45	40	40	73	146	73	33	51	M8x35
29034-525	25,1	25,1	45	40	40	73	146	73	33	51	M8x35
29034-530	30,1	30,1	43	40	40	73	146	73	33	51	M8x35
29034-540	40,15	40,15	59	56	58	100	200	100	48	70	M10x50

Tube clamps

swivel base, plastic

Material:
Thermoplastic.
DIN 7984 screws and DIN 985 nuts steel.

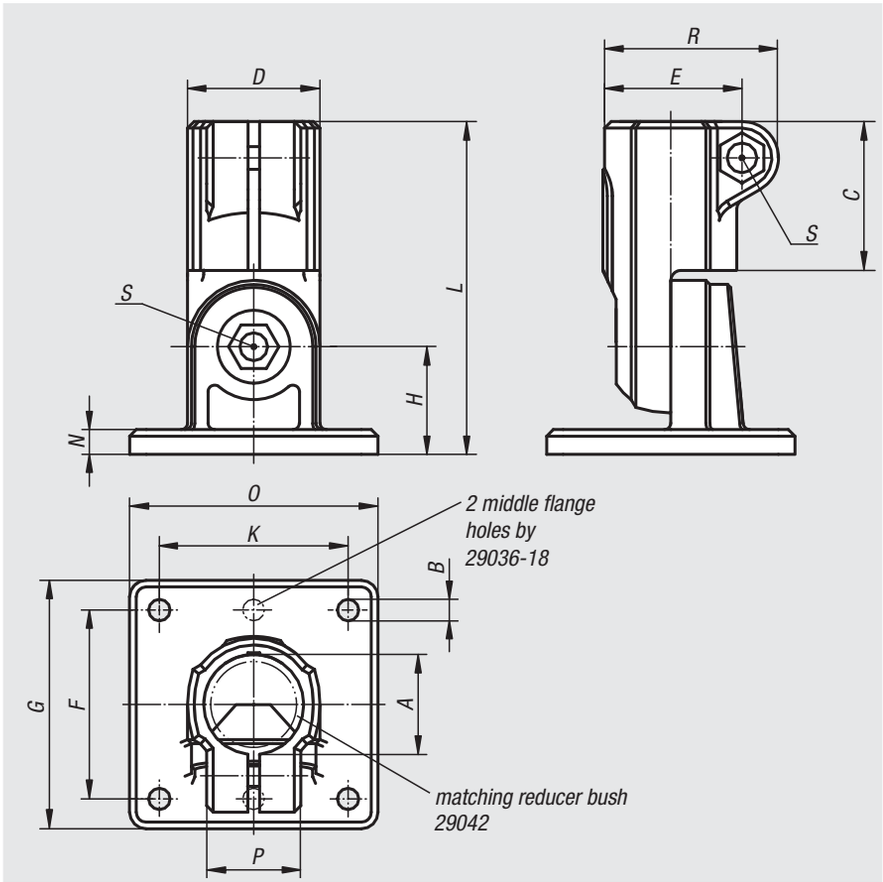
Version:
Black.
Screws and nuts galvanized.

Sample order:
nlm 29036-18

Note:
Tube swivel clamps can be seamlessly rotated through 180°.
The standard size for round tubes is Ø18 mm or Ø30 mm. Use reducer sleeves 29042 if smaller tubes are to be clamped or a conversion from round to square tubes is required.

On request:
Plastic levers for locking.

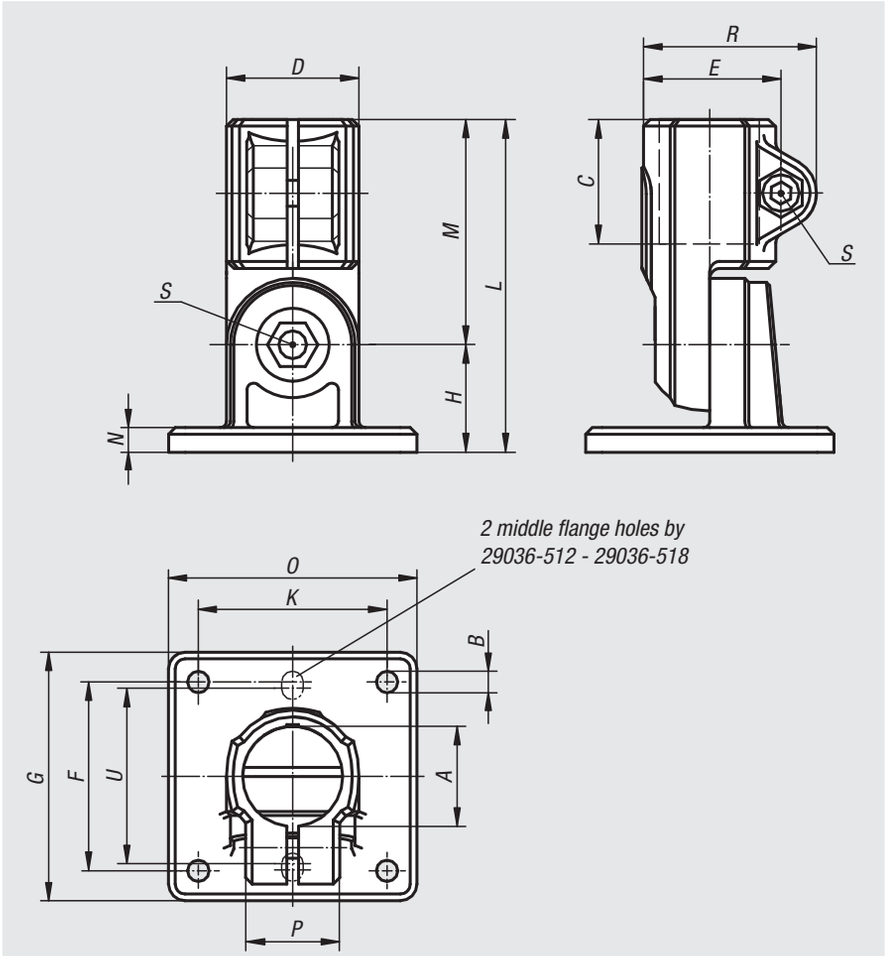
Accessories:
- Reducer sleeves 29042
- Round and square tubes 29050



Order No.	A	B	C	D	E	F	G	H	K	L	N	O	P	R	S
29036-18	18	5,3 (2x)	30	25	26,5	40	50	20	-	65	5	35	21	34	M6x18
29036-30	30	6,5 (4x)	45	40	41,5	60	75	32,5	60	100,5	7,5	75	28,5	52,5	M8x25

Tube clamps

swivel base, aluminium



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Vibratory ground.
Screws and nuts galvanized.

Sample order:
nlm 29036-518

Note:
Tube swivel clamps can be seamlessly rotated through 180°.

* Elongated hole

On request:
Levers for locking and other diameters.

Accessories:
- Round and square tubes 29050

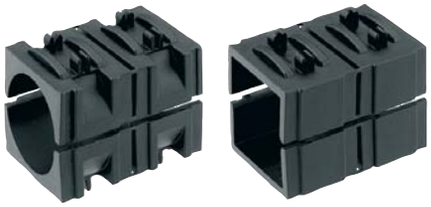
Order No.	A	B	C	D	E	F	G	H	K	L	M	N	O	P	R	S	U
29036-512	12,1	5,3* (2x)	25	26	29,4	40	50	20	-	64	44	5	35	21	37,5	M6x16	38
29036-514	14,1	5,3* (2x)	25	26	29,4	40	50	20	-	64	44	5	35	21	37,5	M6x16	38
29036-516	16,1	5,3* (2x)	25	26	29,4	40	50	20	-	64	44	5	35	21	37,5	M6x16	38
29036-518	18,1	5,3* (2x)	25	26	29,4	40	50	20	-	64	44	5	35	21	37,5	M6x16	38
29036-520	20	6,5 (4x)	45	40	40	57	75	33	57	106	73	7	75	33	51	M8x35	-
29036-525	25,1	6,5 (4x)	45	40	40	57	75	33	57	106	73	7	75	33	51	M8x35	-
29036-530	30,1	6,5 (4x)	45	40	40	57	75	33	57	106	73	7	75	33	51	M8x35	-
29036-540	40,2	8,5 (4x)	60	56	56	76	100	44	76	144	100	10	100	48	68	M10x50	-

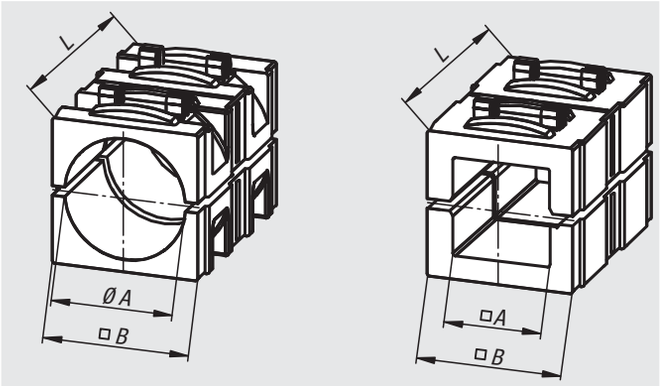
Notes

29040

Reducer sleeves

square





Material:
Thermoplastic.

Version:
Black

Sample order:
nlm 29040-03020

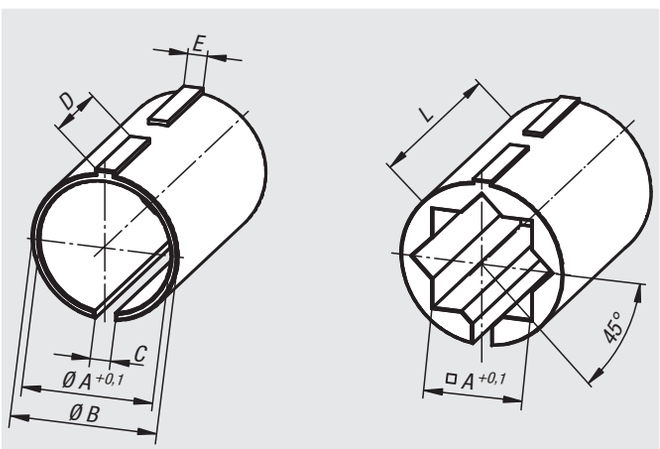
Note:
Reducer sleeves are for clamping smaller tubes or where a conversion of square to round tubes is required.

Order No.	Version	A	B	L
29040-03020	for round tubes	Ø 20,25	30,3	45
29040-03025	for round tubes	Ø 25,25	30,3	45
29040-03030	for round tubes	Ø 30,25	30,3	45
29040-13020	for square tubes	20,5	30,3	45
29040-13025	for square tubes	25,5	30,3	45

29042

Reducer sleeves

round



Material:
Thermoplastic.

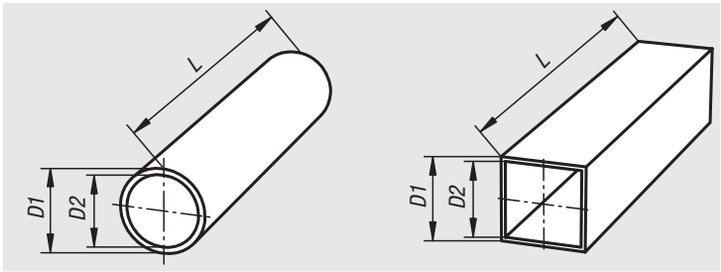
Version:
Black

Sample order:
nlm 29042-03020

Note:
Reducer sleeves are for clamping smaller tubes or where a conversion of round to square tubes is required.

Order No.	Version	A	B	C	D	E	L
29042-01812	for round tubes	12,25	18	2,5	11,9	2,4	30
29042-01814	for round tubes	14,25	18	2,5	11,9	2,4	30
29042-01815	for round tubes	15,25	18	2,5	11,9	2,4	30
29042-01816	for round tubes	16,25	18	2,5	11,9	2,4	30
29042-03020	for round tubes	20,25	30	3,5	18,9	3,4	45
29042-03025	for round tubes	25,25	30	3,5	18,9	3,4	45
29042-11810	for square tubes	10,25	18	2,5	11,9	2,4	30
29042-13020	for square tubes	20,25	30	3,5	18,9	3,4	45

Round and square tubes



Material:
Steel 1.0037.
Aluminium EN AW-6060.

Version:
Steel galvanized.
Aluminium clear anodized.

Sample order:
nlm 29050-0112X500 (include length L)

Note:
The machining tolerances of these round and square tubes are specially suited to the tube clamping system.

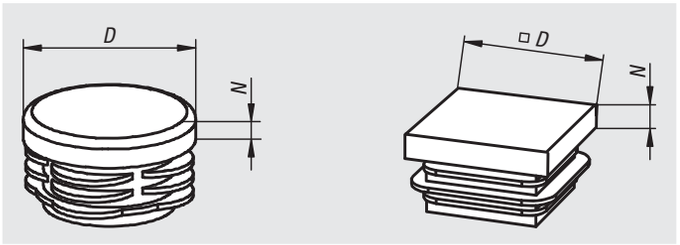
* solid bar.

On request:
- stainless steel tubes
- aluminium tubes, black anodized
- customer specific lengths

Order No.	Version	Material	Description	D1	D2	L
29050-0112X	round tubes	steel	Ø12 x 1,5	12 ±0,1	9	500/1000/2000
29050-0114X	round tubes	steel	Ø14 x 1,5	14 ±0,1	11	500/1000/2000
29050-0115X	round tubes	steel	Ø15 x 1,5	15 ±0,1	12	500/1000/2000
29050-0116X	round tubes	steel	Ø16 x 1,5	16 ±0,1	13	500/1000/2000
29050-0118X	round tubes	steel	Ø18 x 1,5	18 ±0,1	15	500/1000/2000
29050-0120X	round tubes	steel	Ø20 x 2	20 ±0,1	16	500/1000/2000
29050-0125X	round tubes	steel	Ø25 x 2	25 ±0,1	21	500/1000/2000
29050-0130X	round tubes	steel	Ø30 x 2	30 ±0,1	26	500/1000/2000
29050-0140X	round tubes	steel	Ø40 x 4	40 ±0,15	32	500/1000/2000
29050-0150X	round tubes	steel	Ø50 x 4	50 ±0,2	42	500/1000/2000
29050-0220X	round tubes	aluminium	Ø20 x 3	20	14	500/1000/2000
29050-0225X	round tubes	aluminium	Ø25 x 2	25	21	500/1000/2000
29050-0230X	round tubes	aluminium	Ø30 x 2	30 ±0,1	26	500/1000/2000
29050-0240X	round tubes	aluminium	Ø40 x 3	40 ±0,15	34	500/1000/2000
29050-0250X	round tubes	aluminium	Ø50 x 3	50 ±0,2	44	500/1000/2000

Order No.	Version	Material	Description	D1	D2	L
29050-4120X	square tubes	steel	20 x 20 x 1	20 ±0,3	18	500/1000/2000
29050-4125X	square tubes	steel	25 x 25 x 1,5	25 ±0,3	22	500/1000/2000
29050-4130X	square tubes	steel	30 x 30 x 2	30 ±0,3	26	500/1000/2000
29050-4140X	square tubes	steel	40 x 40 x 3	40 ±0,4	34	500/1000/2000
29050-4210X	square tubes	aluminium	10 x 10	10*	-	500/1000/2000
29050-4220X	square tubes	aluminium	20 x 20 x 1,5	20 ±0,2	17	500/1000/2000
29050-4230X	square tubes	aluminium	30 x 30 x 2	30 ±0,2	26	500/1000/2000
29050-4240X	square tubes	aluminium	40 x 40 x 4	40 ±0,3	32	500/1000/2000

Tube end plugs



Material:
Thermoplastic.

Version:
Black

Sample order:
nlm 29056-025200

Note:
These plugs are for corner protection and plugging the tube ends. They can be pushed in by hand or tapped in with a plastic hammer.

Order No.	Version	D	N	Suitable for
29056-018150	for round tubes	18	5	Ø18 x 1,5
29056-020200	for round tubes	20	5	Ø20 x 2
29056-025200	for round tubes	25	5	Ø25 x 2
29056-030200	for round tubes	30	5	Ø30 x 2
29056-040300	for round tubes	40	5	Ø40 x 3
29056-040400	for round tubes	40	5	Ø40 x 4
29056-050400	for round tubes	50	5	Ø50 x 3 / Ø50 x 4
29056-420100	for square tubes	20	5	20 x 20 x 1
29056-425150	for square tubes	25	5	25 x 25 x 1,5
29056-430200	for square tubes	30	5	30 x 30 x 2
29056-440300	for square tubes	40	5	40 x 40 x 3
29056-440400	for square tubes	40	5	40 x 40 x 4

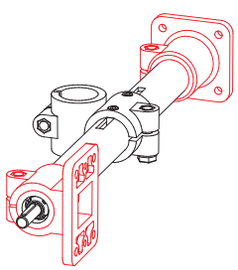
Technical information on linear actuators

These linear actuators are efficient, economical and universally applicable. They ideally combine high rigidity, low deflection, high loads and easy handling. Four sizes are available for different applications and loads (tube sizes from Ø18 mm to Ø50 mm).

Features:
– Standard travel over 2000 mm possible
– Position accuracy up to ±0.2 mm / 300 mm
– Travel speed up to 1.5 m/min
– Drive by trapezoid thread spindle
– Mounting position optional

Technical description:
In a tube, a threaded spindle mounted on bearings with guide nut converts a rotation into linear movement of a carriage. The nut has a carrier key to prevent it turning.

Mounting the linear actuator:
Depending on the mounting position and application, linear actuators can be mounted using our tube clamping elements.



Speed:

n = required spindle r.p.m.
max. spindle rpm with:
plain bearing 80 rpm.
ball bearing 250 rpm.

Type E	Pitch mm
18	2
30	3
40	4
50	4

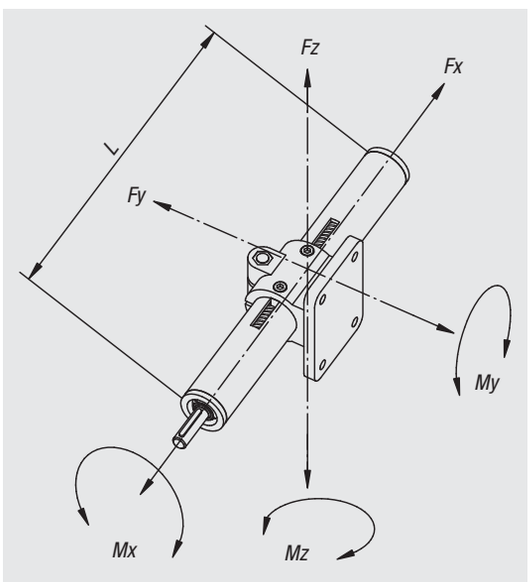
$$n\ [r.p.m.] = \frac{\text{Speed [m/min] x 1000[mm]}}{\text{Spindle pitch [mm]}}$$

No-load torques:

Type E	Spindle with plain bearing [Nm]	Spindle with ball bearings [Nm]
18	-	0,20
30	0,45	0,35
40	0,65	0,50
50	1,20	0,90

Load data*:

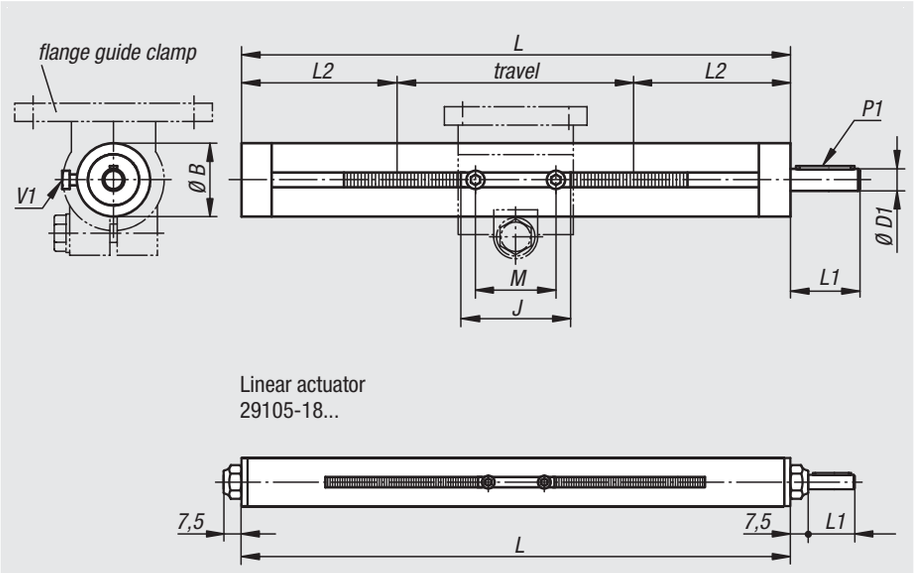
F force [N]
M moment [Nm]
I geom. moment of inertia [cm4]



Length	Fx 500	Fy 500/1000/1500	Fz 500/1000/1500
Type E 18	400	90 / 10 / -	60 / 8 / -
Type E 30	800	500 / 60 / 10	500 / 50 / 9
Type E 40	1000	2100 / 250 / 60	1900 / 140 / 50
Type E 50	1700	3000 / 600 / 140	3000 / 600 / 140

Type E	Mx	My	Mz	Iy	Iz
18	1,5	4	4	0,22	0,27
30	6	15	15	1,34	1,56
40	14	40	40	4,58	5,24
50	30	65	65	11,31	12,32

Linear actuators



Material, version:
Precision tube DIN EN 10305, stainless steel 1.4301.
For type E 18, galvanized steel.
Trapezoid thread spindle steel, RH thread, rolled.

Sample order:
nlm 29105-300001X500

Note:
Medium speed range, self-locking.

On request:
LH thread, stainless steel, 2 drive pins, other travel lengths, handwheels.

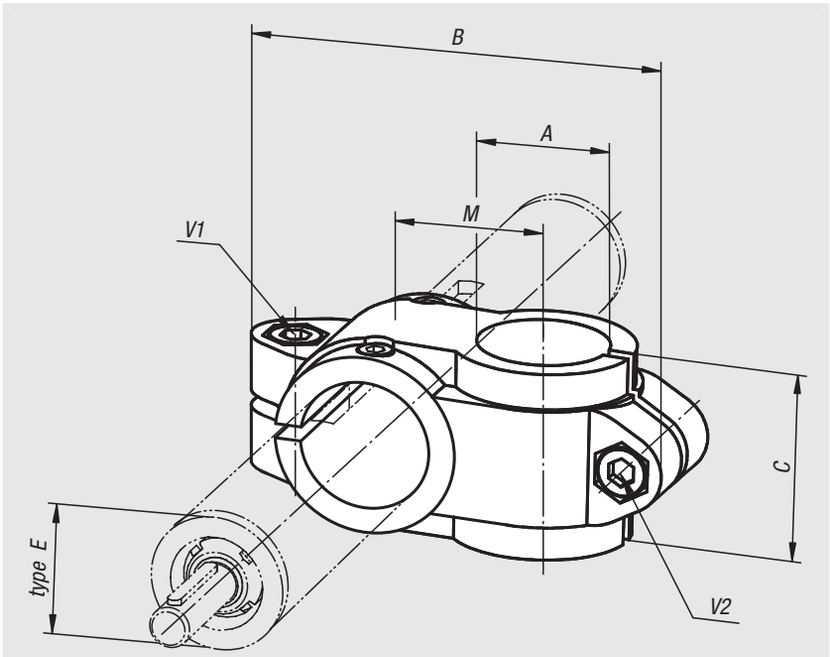
Accessories:
- Guide clamps 29120, 29125, 29130, 29135
- Tube clamps form our tube clamping system

Functional principle:
A rotating movement of the threaded spindle is converted into a linear movement of the guide carriage.

Order No.	Version	Type E	Spindle	L Standard length	Travel	B	D1	J	L1	L2	M	P1 parallel key DIN 6885	V1
29105-300001X300	plain bearing	30	Tr 14x3	300	100	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-300001X500	plain bearing	30	Tr 14x3	500	300	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-300001X800	plain bearing	30	Tr 14x3	800	600	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-400001X300	plain bearing	40	Tr 20x4	300	91	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400001X500	plain bearing	40	Tr 20x4	500	291	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400001X800	plain bearing	40	Tr 20x4	800	591	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400001X1000	plain bearing	40	Tr 20x4	1000	791	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-500001X500	plain bearing	50	Tr 20x4	500	265	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10
29105-500001X800	plain bearing	50	Tr 20x4	800	565	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10
29105-500001X1000	plain bearing	50	Tr 20x4	1000	765	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10
29105-180101X300	ball bearing	18	Tr 10x2	300	145	18	6 h9	24	17	77,5	18	2 x 2 x 12	M3x5
29105-180101X500	ball bearing	18	Tr 10x2	500	345	18	6 h9	24	17	77,5	18	2 x 2 x 12	M3x5
29105-300101X300	ball bearing	30	Tr 14x3	300	100	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-300101X500	ball bearing	30	Tr 14x3	500	300	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-300101X800	ball bearing	30	Tr 14x3	800	600	30	8 h8	38	26	100	28	2 x 2 x 20	M4x8
29105-400101X300	ball bearing	40	Tr 20x4	300	91	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400101X500	ball bearing	40	Tr 20x4	500	291	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400101X800	ball bearing	40	Tr 20x4	800	591	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-400101X1000	ball bearing	40	Tr 20x4	1000	791	40	12 h8	55	38	104,5	44	4 x 4 x 32	M6x10
29105-500101X500	ball bearing	50	Tr 20x4	500	265	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10
29105-500101X800	ball bearing	50	Tr 20x4	800	565	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10
29105-500101X1000	ball bearing	50	Tr 20x4	1000	765	50	12 h8	63	38	117,5	44	4 x 4 x 32	M6x10

Linear actuator connector clamps

cross



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black powder-coated.
Screws and nuts galvanized.

Sample order:
nlm 29120-1818

On request:
Levers for locking.

Order No.	Type E	A	B	C	M	V1	V2
29120-1818	18	18	66	25,5	20	M6x16	M6x16
29120-3020	30	20	99	40	33	M8x25	M8x25
29120-3030	30	30	99	40	33	M8x25	M8x25
29120-4020	40	20	109	40	36	M10x30	M8x25
29120-4040	40	40	137	60	45	M10x30	M10x30
29120-5040	50	40	154	70	54	M10x35	M10x35
29120-5050	50	50	154	70	54	M10x35	M10x35

Linear actuator connector clamps

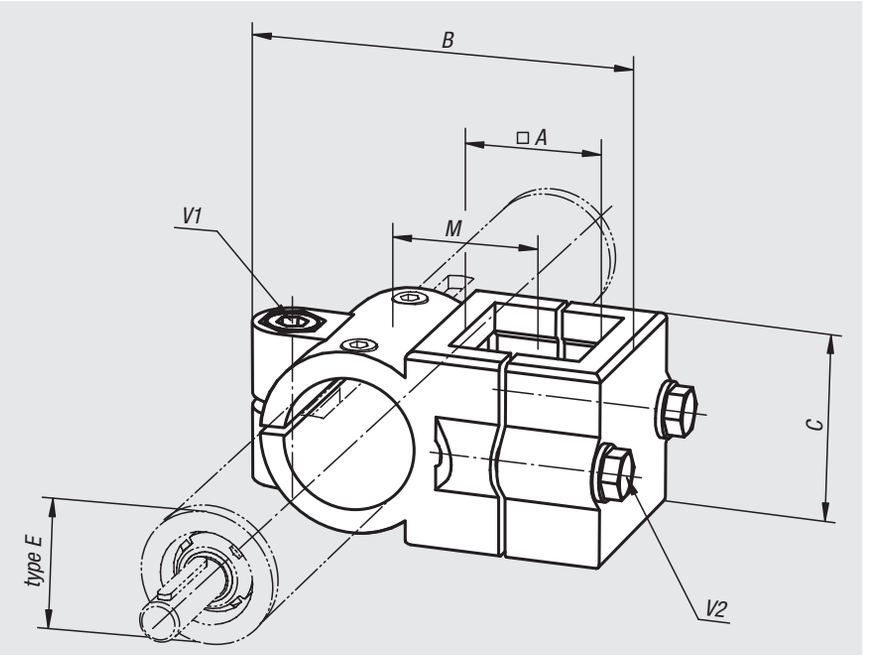
cross

Material:
Cast aluminium.
Clamping screws and nuts steel.

Version:
Black powder-coated.
Clamping screws and nuts galvanized.

Sample order:
nlm 29125-4040

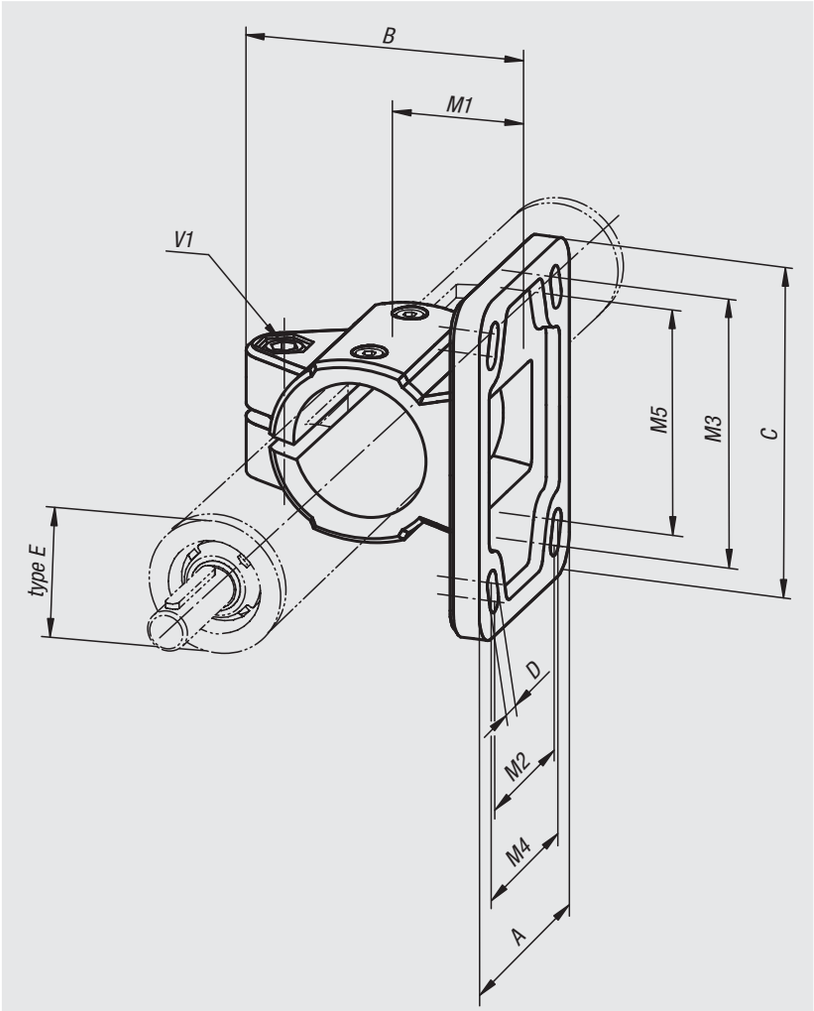
On request:
Levers for locking.



Order No.	Type E	A	B	C	M	V1	V2
29125-3030	30	30	86	45	33	M8x35	M8x35
29125-4040	40	40	117	60	47	M10x50	M8x45
29125-5050	50	50	126	86	53	M8x50	M8x50

Linear actuator connector clamps

flange



Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black powder-coated.
Screws and nuts galvanized.

Sample order:
nlm 29130-50

Note:
* Elongated hole

On request:
Levers for locking.

Order No.	Type E	A	B	C	D	M1	M2	M3	M4	M5	V1
29130-18	18	37	42,5	50	5,5 (2x)	18	-	40	-	-	M6x16
29130-30	30	55	63	78	6,5* (2x)	30	-	60	-	53	M8x25
29130-40	40	80	87	105	8,5* (4x)	42	52	82	60	80	M10x30
29130-50	50	92	100	130	10,5* (4x)	50	60	100	62	98	M10x35

Linear actuator connector clamps

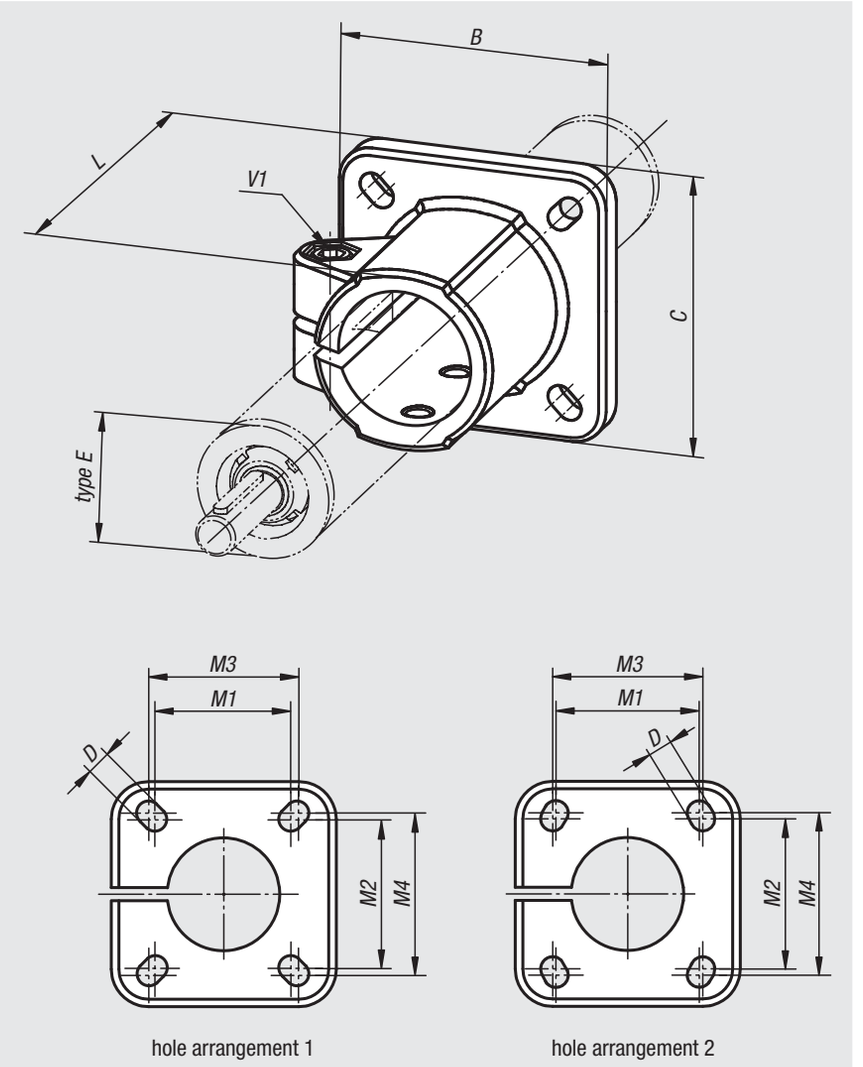
base

Material:
Cast aluminium.
DIN 7984 screws and DIN 985 nuts steel.

Version:
Black powder-coated.
Screws and nuts galvanized.

Sample order:
nlm 29135-30

On request:
Levers for locking.



hole arrangement 1 hole arrangement 2

Order No.	hole arrangement	Type E	B	C	D	L	M1	M2	M3	M4	V1
29135-18	1	18	42	42	5,5	37	28	28	30	30	M6x20
29135-30	2	30	60	60	6,5	50	40	42	42	45	M8x25
29135-40	1	40	90	90	8,5	70	60	60	64	64	M10x30
29135-50	1	50	105	105	10,5	85	74	74	80	80	M10x35

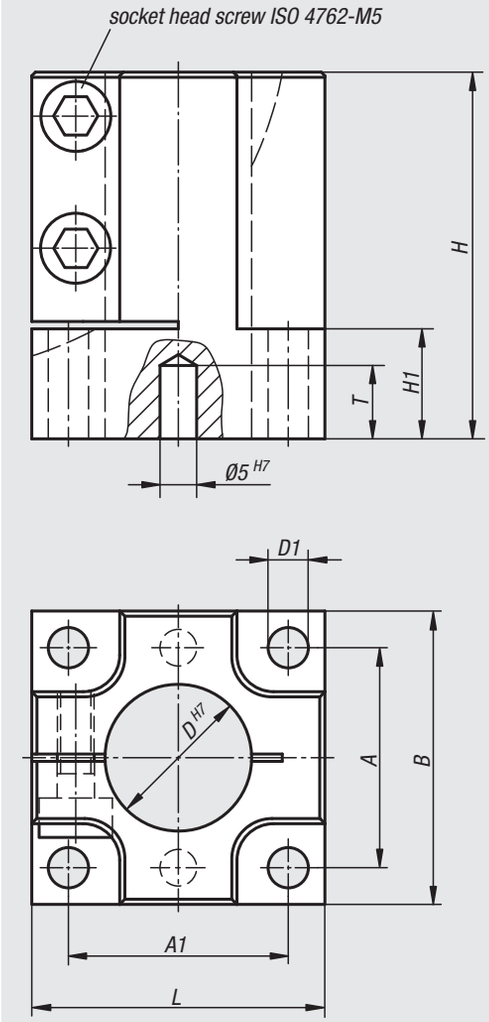
Column bases single

Material:
Aluminium EN AW-6060

Version:
Black anodized

Sample order:
nlm 29200-1122

Note:
Single base for holding columns in four different sizes. Machined contact faces with mounting and centring holes guarantee precise mounting of elements.



position tolerance of locating holes: ±0,01
position tolerance of holes: ±0,1

Order No.	Size	A	A1	B	D	D1	H	H1	L	T
29200-1122	12	22	22	30	12	5,5	35	7	30	8
29200-1202	20	30	30	40	20	5,5	50	15	40	10
29200-1302	30	40	40	50	30	6,5	50	15	50	10
29200-1402	40	48	48	60	40	8,5	50	15	60	10

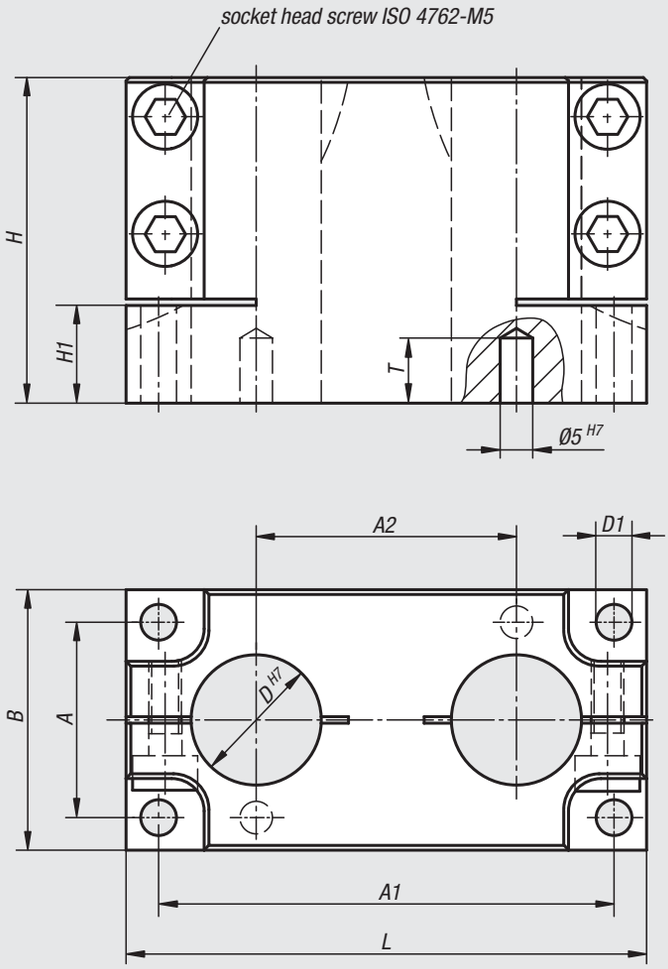
Column bases double

Material:
Aluminium EN AW-6060

Version:
Black anodized

Sample order:
nlm 29205-2122

Note:
Double base for holding columns in four different sizes. Machined contact faces with mounting and centring holes guarantee precise mounting of elements.



position tolerance of locating holes: ±0,01
position tolerance of holes: ±0,1

Order No.	Size	A	A1	A2	B	D	D1	H	H1	L	T
29205-2122	12	22	52	30	30	12	5,5	35	7	60	8
29205-2202	20	30	70	40	40	20	5,5	50	15	80	10
29205-2302	30	40	90	50	50	30	6,5	50	15	100	10
29205-2402	40	48	108	60	60	40	8,5	50	15	120	10

Column clamps double

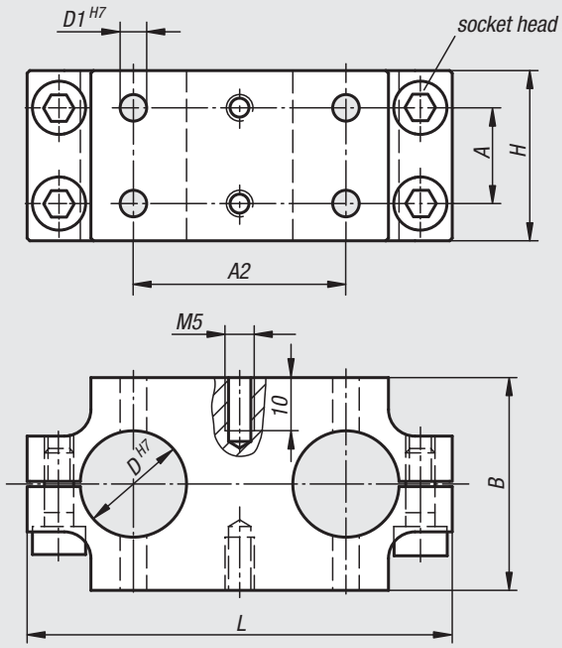
Material:
Aluminium EN AW-6060

Version:
Black anodized

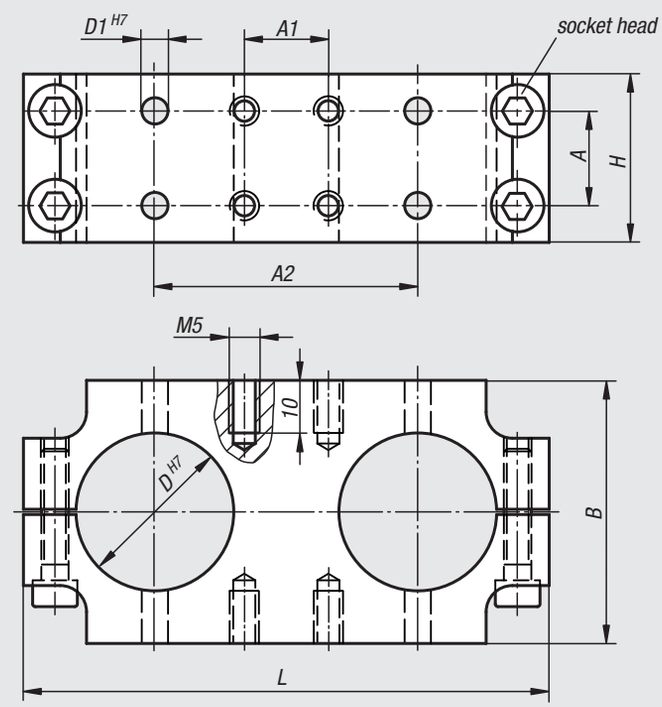
Sample order:
nlm 29207-2122

Note:
Double column clamps in four different sizes. Machined mounting faces with mounting and centring holes guarantee precise mounting of elements.

sizes 12/20



sizes 30/40



position tolerance of locating holes: ±0,01
position tolerance of holes: ±0,1

Order No.	Size	A	A1	A2	B	D	D1	H	L
29207-2122	12	12	-	30	30	12	5	26	60
29207-2202	20	18	-	40	40	20	5	32	80
29207-2302	30	18	16	50	50	30	5	32	100
29207-2402	40	18	26	60	60	40	6	32	120

Adjustment units

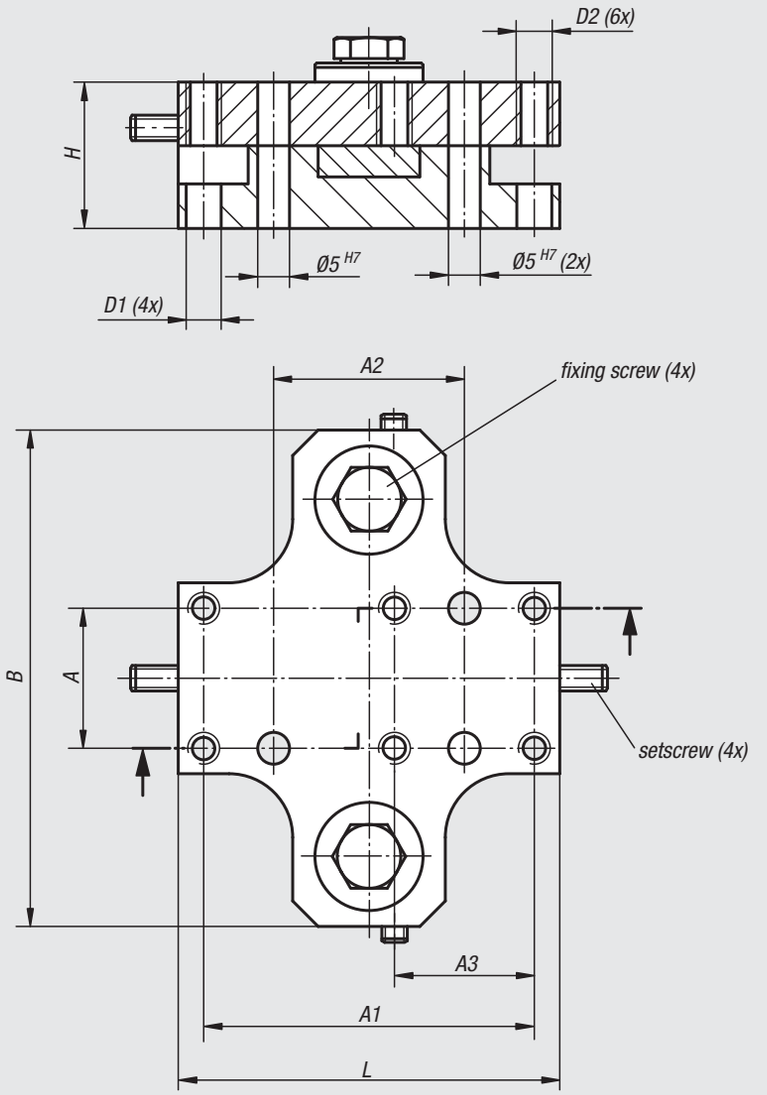
Material:
Aluminium EN AW-6060

Version:
Black anodized

Sample order:
nlm 29210-122

Note:
Units for precise adjustment of components in the X-Y axis. Allows compensation for machining tolerances in mechanical assemblies. Matches our single and double bases. The uniform hole pattern of the respective sizes allows the adjustment units to be fitted under the base at a later date.

Adjustment range: X: ±3 mm
Adjustment range: Y: ±3 mm



position tolerance of locating holes: ±0,01
position tolerance of holes: ±0,1

Order No.	Size	A	A1	A2	A3	B	D1	D2	H	L
29210-122	12	22	52	30	22	78	5,5	M5	23	60
29210-202	20	30	70	40	30	88	5,5	M5	23	80
29210-302	30	40	90	50	40	110	6,5	M6	32	100
29210-402	40	48	108	60	48	120	8,5	M8	32	120

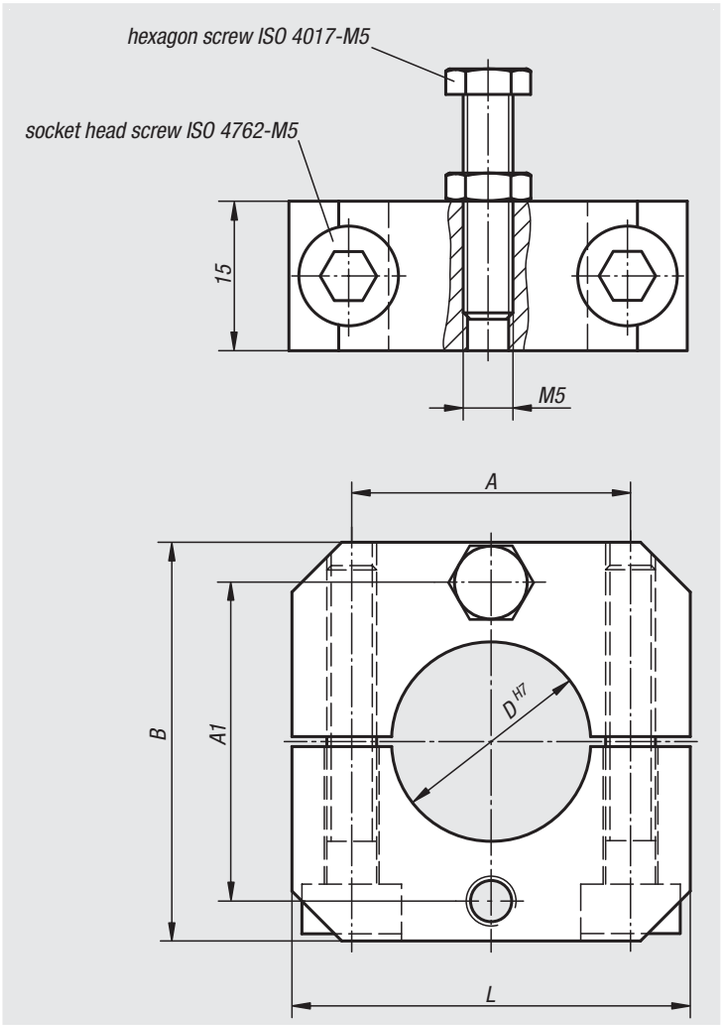
Column shaft collars

Material:
Aluminium EN AW-6060

Version:
Black anodized

Sample order:
nlm 29215-122

Note:
These shaft collars allow column bases and clamps to the precisely adjusted in the height and so guarantee the exact positioning of elements.



Order No.	Size	A	A1	B	D	L
29215-122	12	19	22	30	12	30
29215-202	20	28	32	40	20	40
29215-302	30	38	42	50	30	50
29215-402	40	48	52	60	40	60

Columns stainless steel

Material:
Stainless steel 1.4305.

Version:
Bright, ground.

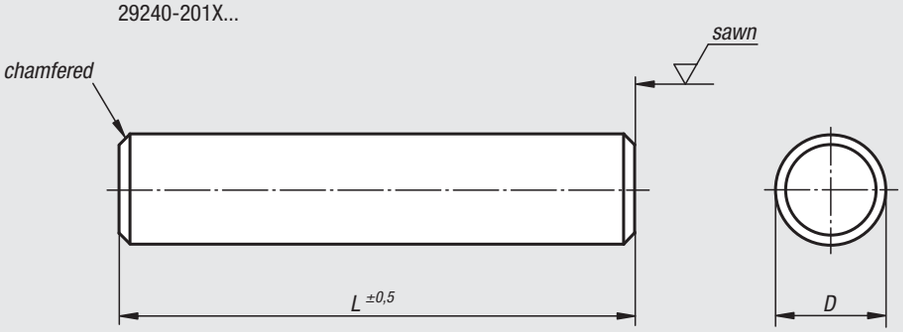
Sample order:
nlm 29240-121X0100 (include length L)

Note:
These ground stainless steel columns allow the versatile construction of many assembly configurations with only a few standard components.

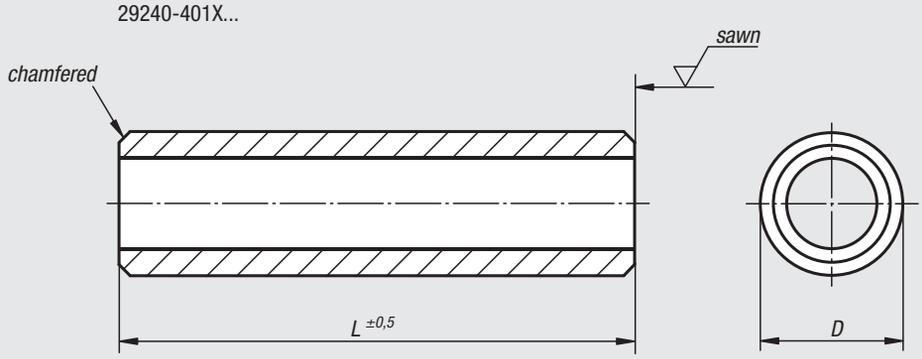
Ø12 and Ø20 = solid bar.
Ø30 and Ø40 = tubes (wall thickness 5 mm).

On request:
Other lengths.

29240-121X...
29240-201X...



29240-301X...
29240-401X...



Order No.	Size	D	L
29240-121X	12	12	100/200/300/400/500
29240-201X	20	20	100/200/300/400/500
29240-301X	30	30	100/200/300/400/500
29240-401X	40	40	100/200/300/400/500

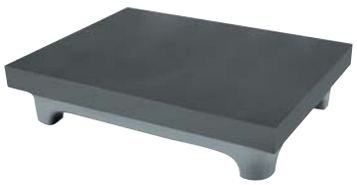
Notes

31000

Inspection tables
Gauge stands
Gauge joints

31000

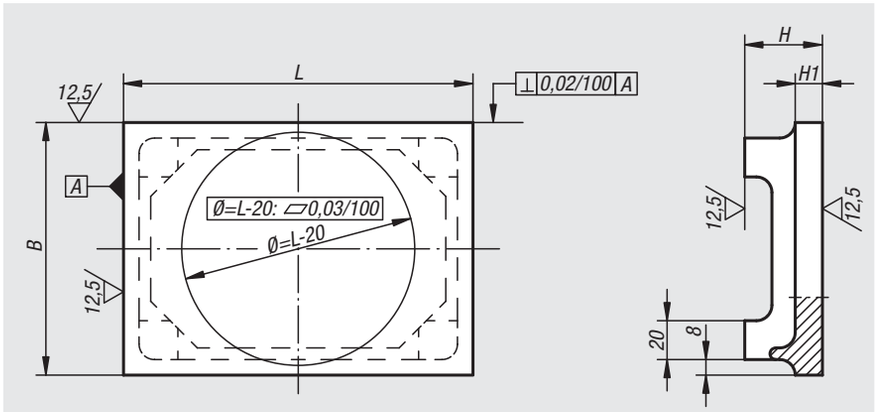
Inspection tables

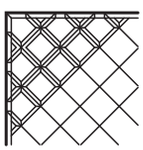


Material:
GJL 250 annealed.

Sample order:
nlm 31000-03

Note:
Plate surface with dust grooves on request.





Order No.	L	B	H	H1
31000-01	200	150	45	15
31000-02	250	200	45	15
31000-03	300	200	45	15
31000-04	350	250	45	15
31000-05	350	300	45	15
31000-06	400	350	60	20

31020

Inspection blocks

with column

Material:
Black granite (primary stone).

Version:
Block precision grade 0

Sample order:
nlm 31020-01

Note:
Primary stone has major benefits over conventional granite:
- 3 times more wear resistance.
- 20% greater density.
- 3 times less heat expansion.

Suitable dial gauge holders see 31140 and 31141.

Order No.	Base plate length x width x height	column
31020-01	200 x 150 x 40	ø25 x 260

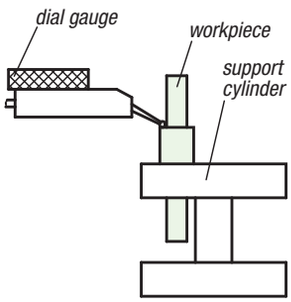
Support cylinders

for workpieces with collar

Material:
Hardened steel

Version:
Ground

Sample order:
nlm 31090-111



Order No.	Hole diameters	Diameter increments	No off holes	Parallelism of contact faces	Distance between contact faces
31090-111	1 - 11	0,5	21	< 0,01	46
31090-220	2 - 20	1	19	< 0,01	52

Gauge holders articulated arm

with central hydraulic lock

Sample order:
nlm 31100-12

Note:
The 4-part articulated arm is locked by the centre knob.
Including screw for fine adjustment.

Order No.	Total height	Effective radius	Magnetic base length	Magnetic base width	Magnetic base height	Magnetic force N
31100-01	310	260	61	50	55	600
31100-02	480	400	76	50	55	900

Order No.	Version	Connecting thread	Total height	Effective radius
31100-11	without magnetic base	M8x8	255	260
31100-12	without magnetic base	M10x11	425	400

31102

Gauge stands magnetic

Sample order:
nlm 31102-01

Note:
Base 900 N magnetic force.

Order No.	Total height	Column height	Ø column	Magnetic base length	Magnetic base width	Magnetic base height	Connecting thread	Magnetic force N
31102-01	287	232	16	76	50	55	M10	900

31120

Magnetic stands

Sample order:
nlm 31120-01

Note:
Magnetic base with On/Off switch
(see also 09210-03)

Order No.	Total height	Column height	Ø column	Magnetic base length	Magnetic base width	Magnetic base height	Connecting thread	Magnetic force N
31120-01	287	232	16	76	50	55	M10	900

Magnetic stands

Version:
Magnetic base: shielded system, surface galvanized

Sample order:
nlm 31125-01

Note:
Magnetic force 450 N. Application temperature up to 100 °C. Hairline cracks in the magnetic material are unavoidable for technical reasons. They do not impair the function of the magnets in any way. (see also 09065-10).

Order No.	Total height	Column height	Ø column	Magnetic base Ø	Magnetic base height	Magnetic stand overall height	Connecting thread
31125-01	284	250	16	80	18	34	M10

Dial gauge arm

Sample order:
nlm 31130-01

Note:
With screw for fine adjustment.

Order No.	total length	Ø of column or bar	Fixation holes, e.g. for dial gauge
31130-01	270	16	3 x Ø 8

31140

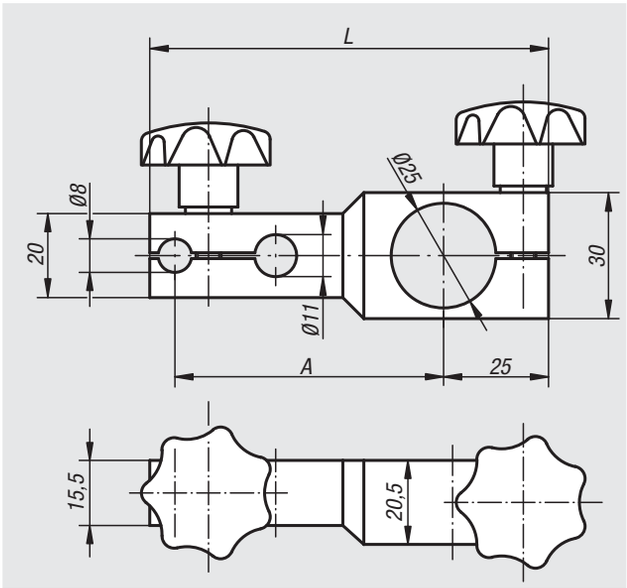
Dial gauge holders

Material:
Aluminium.

Version:
Black anodized

Sample order:
nlm 31140-065

Note:
Fits on 31020.



Order No.	A	L
31140-065	65	95
31140-100	100	130

31141

Dial gauge holders

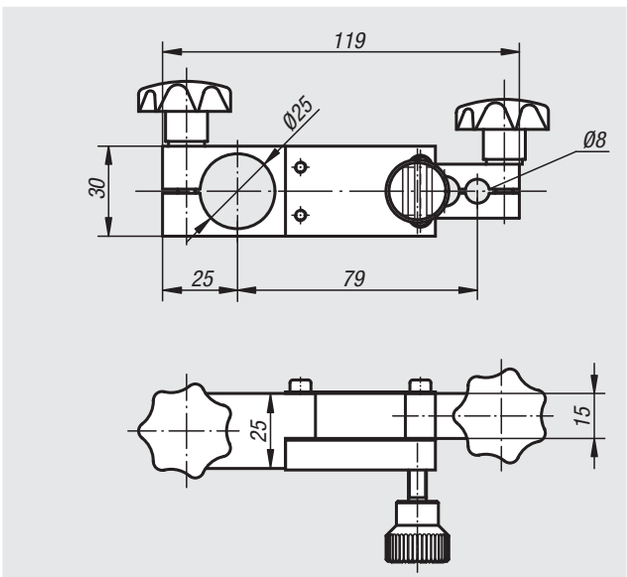
with fine adjustment

Material:
Aluminium.

Version:
Black anodized

Sample order:
nlm 31141-079

Note:
Fits on 31020.



Order No.	Dimensions
31141-079	see drawing

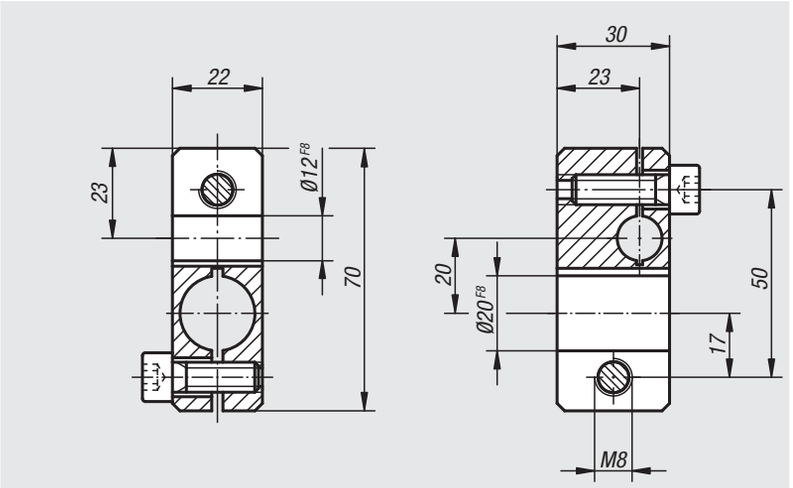
31150

Joint blocks

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 31150-1220



Order No.	Dimensions
31150-1220	see drawing

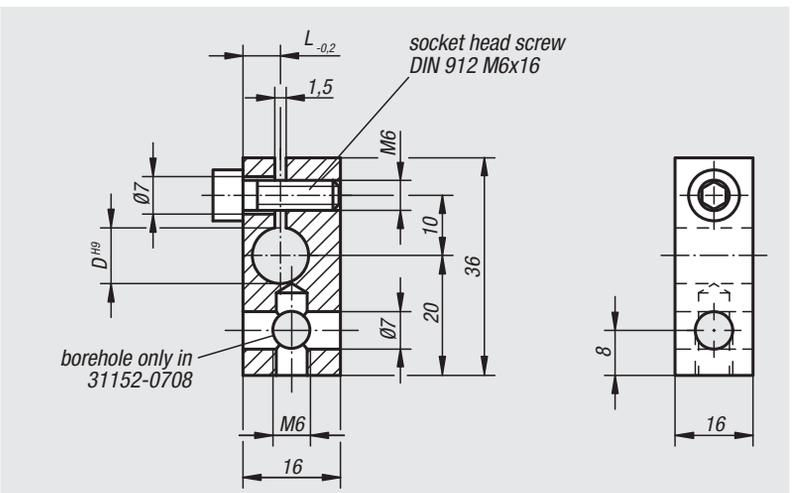
31152

Joint blocks

Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 31152-0712



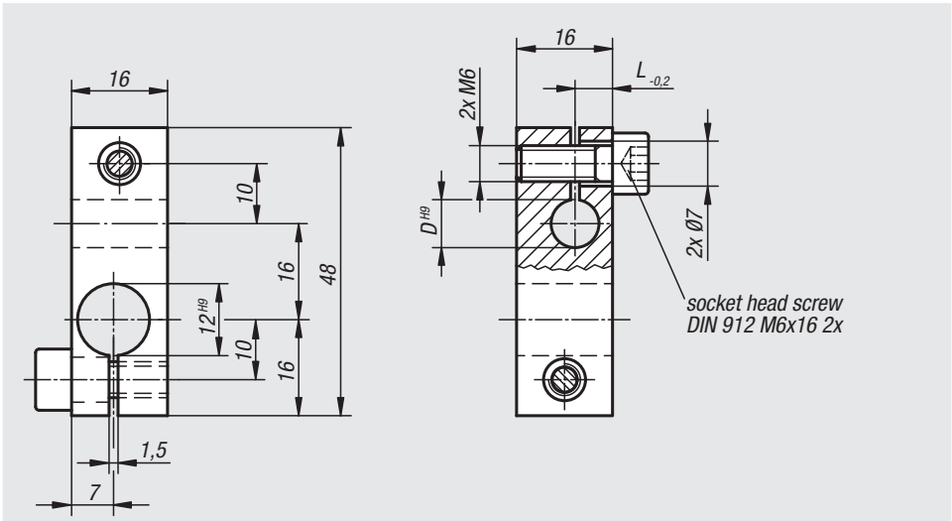
Bestellnummer	D	L
31152-0708	8	5
31152-0710	10	6
31152-0712	12	7

Joint blocks

Material:
Carbon steel.

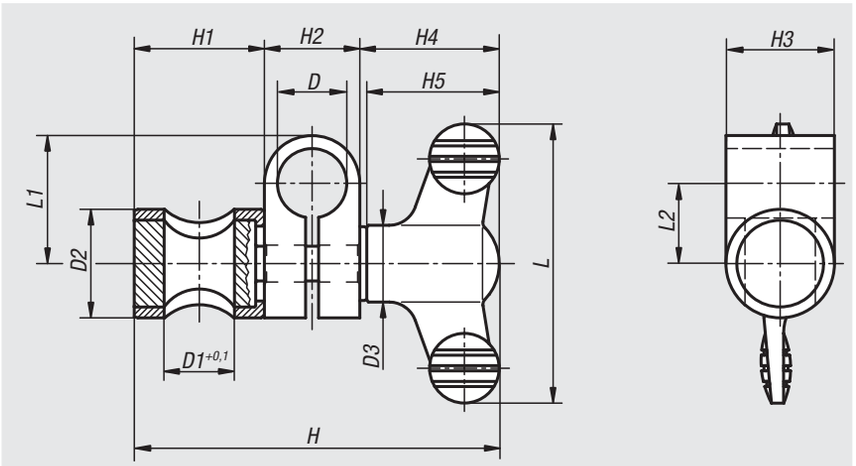
Version:
Black oxidised.

Sample order:
nlm 31154-1210



Order No.	D	L
31154-1208	8	5
31154-1210	10	6
31154-1212	12	7

Clamping joints



Material:
Sleeve and pin steel.
Clamp block high-strength aluminium.
Wing grip black grey thermoplastic.

Version:
Sleeve and pin high-gloss chromed.
Clamp block black anodized.

Sample order:
nlm 31156-1616

Note:
Infinitely adjustable.
Wing grip for rapid clamping.

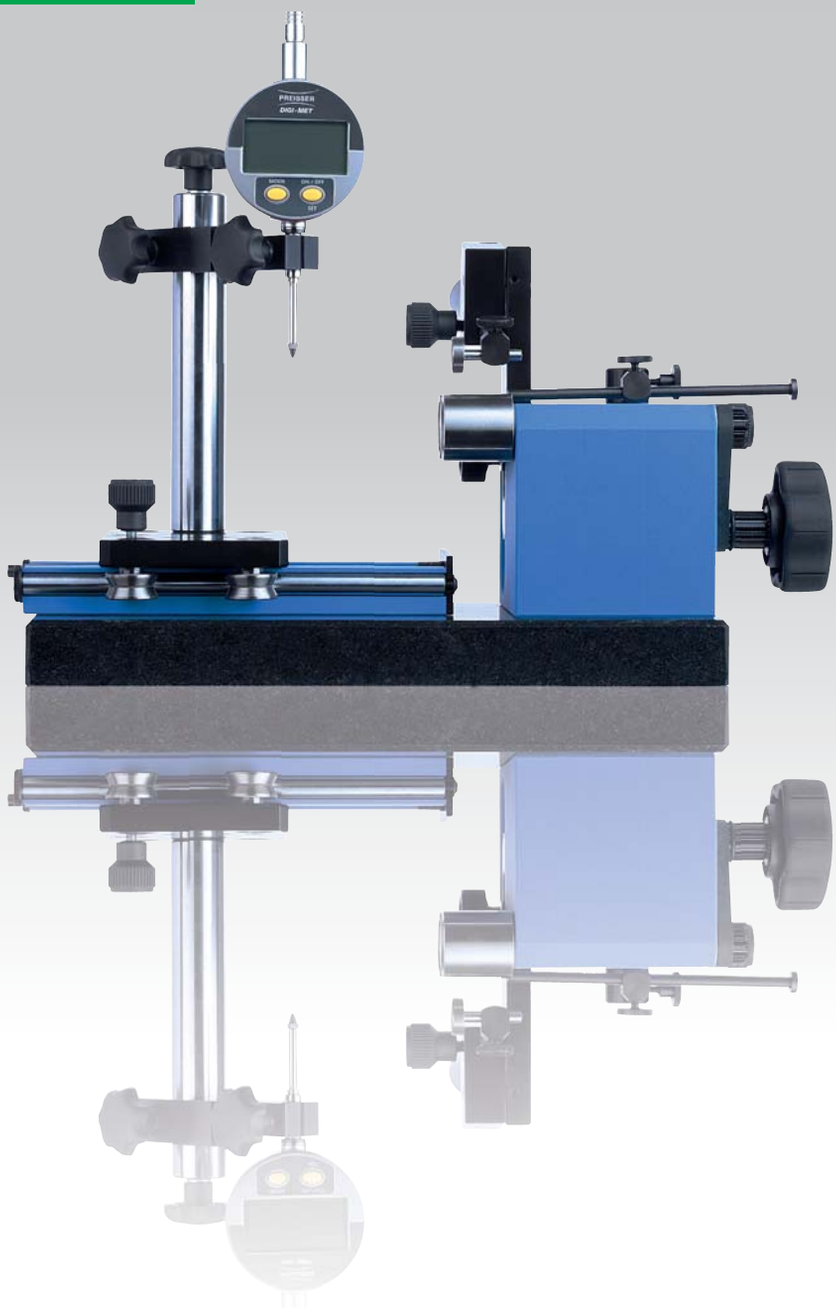
On request:
Different combinations diameters D and D1.

Order No.	Size	D	D1	D2	D3	H	H1	H2	H3	H4	H5	L	L1	L2
31156-0606	1	6	6	14	12	43,6	15	9	14	19,6	18	38	13	8,5
31156-0808	2	8	8	16	14	54,6	17	12	16	25,6	24	50	18	12
31156-1010	3	10	10	18	14	60,6	20	15	18	25,6	24	50	22	14,5
31156-1212	4	12	12	20	21	77,2	23	17	20	37,2	35,6	75	24	15,5
31156-1616	5	16	16	25	21	90,2	31	22	25	37,2	35,6	75	29,5	18,5
31156-2020	6	20	20	30	21	98,2	36	25	30	37,2	35,6	75	30	17,5

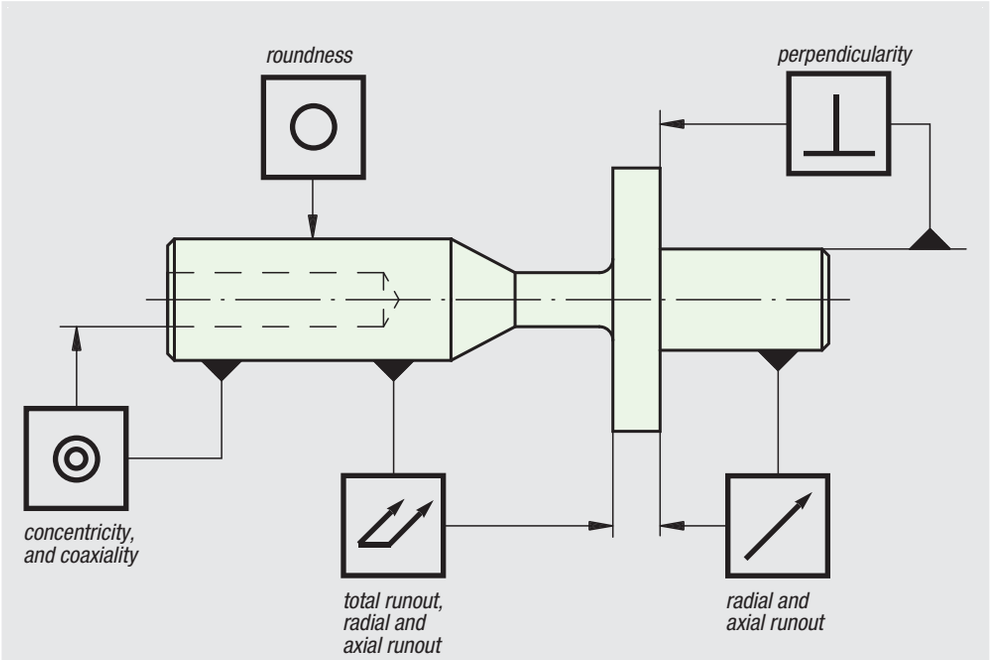
Notes

32000

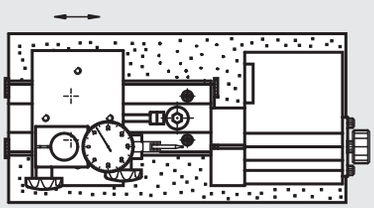
Concentricity gauges
Dial gauges

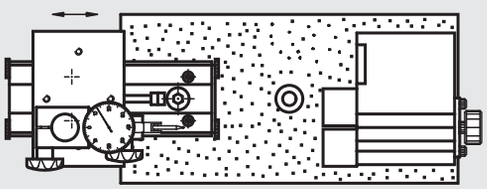


Geometric tolerances

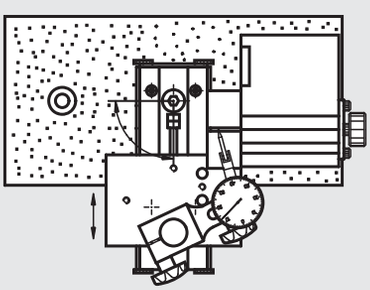


Mounting information for concentricity gauges

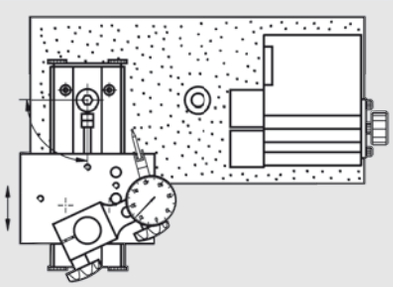




measuring internal diameters

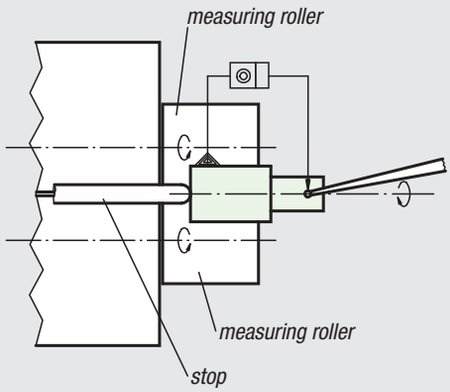


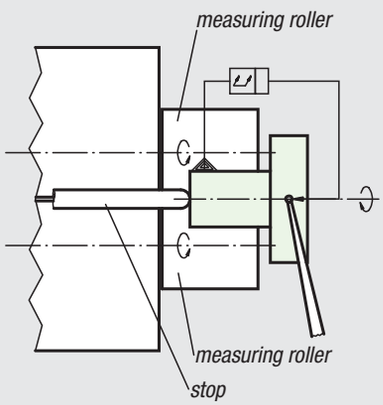
The slide can be rotated through 90° allowing rapid clearance and positioning for changing parts

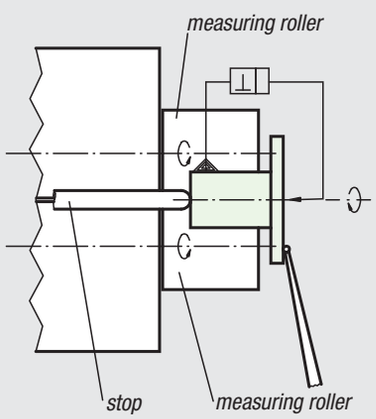


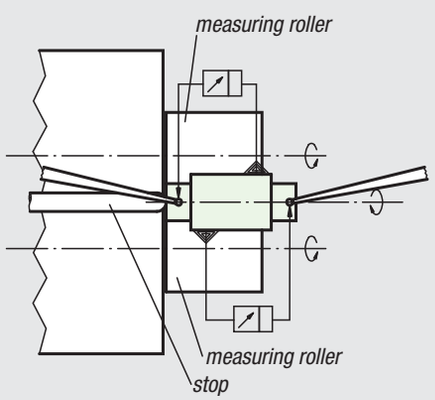
The slide is adjusted with a a screw. The two positioning holes allow for an extended working area.

Testing possibilities









Concentricity gauges

max. Ø 35 mm

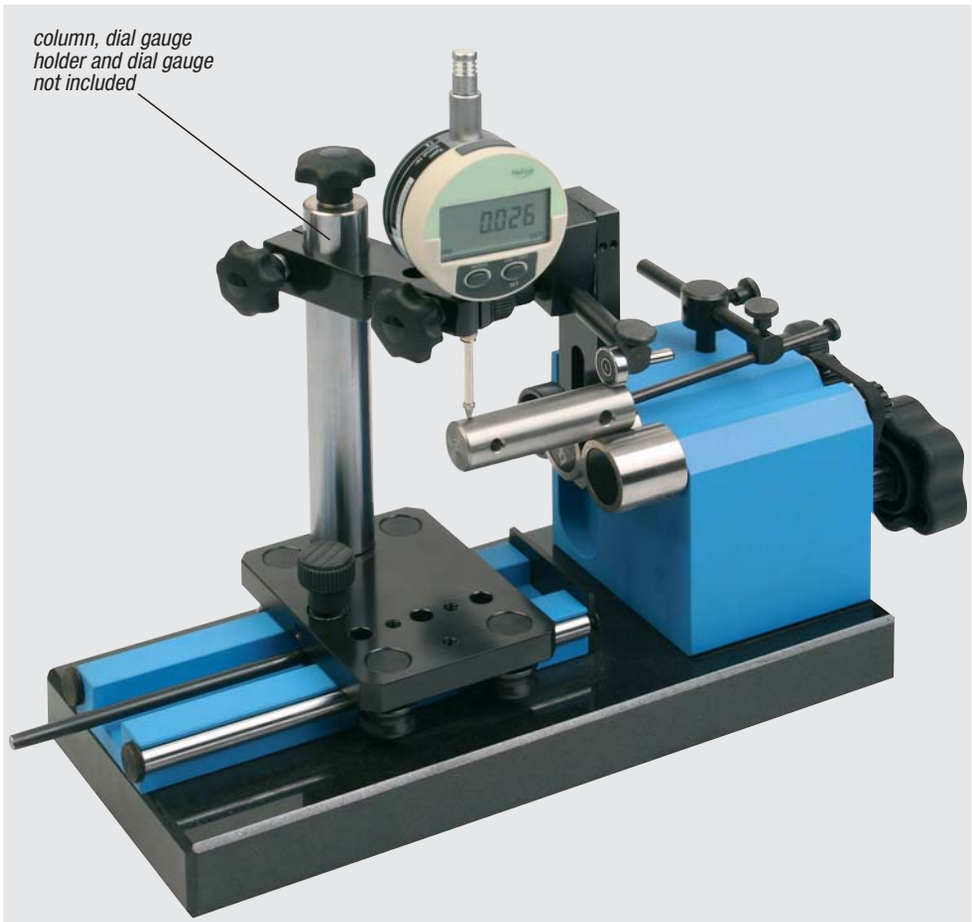
Sample order:
nlm 32501-01

Note:
Gauge unit suitable for measuring concentricity, run-out and perpendicularity.
The robust design allows the unit to be used in the workshop and inspection room. A swivel contact roller simplifies positioning of the workpiece. The light sliding guides allow the dial gauges to be placed anywhere.

Technical data:
Inspection range Ø 5 mm to Ø 35 mm
Roller spacing min. 29 mm.
Carriage travel max. 100 mm.
Contact roller thrust is adjustable.
Gear driven rollers.

Roller precision: parallelism and coaxialism of both rollers max. 2 µm.

Base plate granite: 300 mm x 130 mm x 25 mm



Order No.	Article description
32501-01	CONCENTRICITY GAUGE FOR Ø UP TO 35 MM

Accessories

for concentricity gauge max. Ø 35 mm

32501-02

32501-03

32501-04

32513-90

32501-05

Order No.	Article description
32501-02	SLIDE
32501-03	COLUMN DIAL GAUGE HOLDER
32501-04	DIAL GAUGE HOLDER WITH HYDRAULIC ARM
32513-90	SUPPORT PRISM
32501-05	TEFLON CONTACT PIN

Concentricity gauge

max. Ø 80 mm

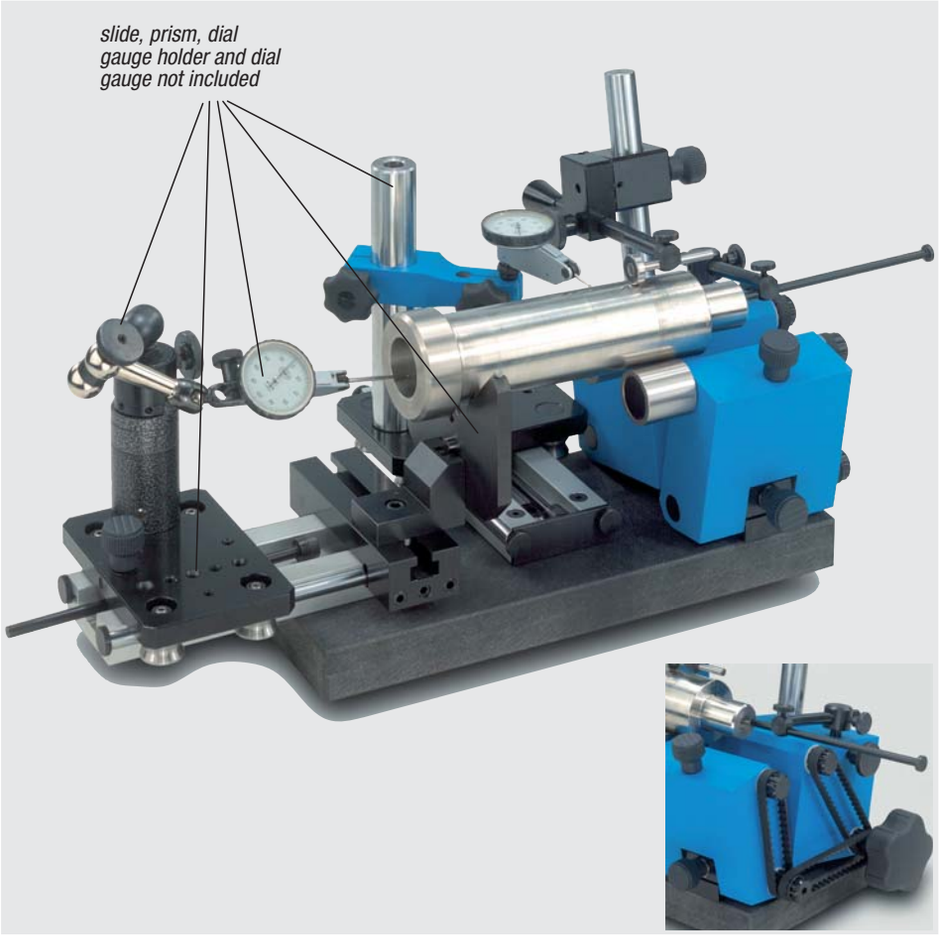
Sample order:
nlm 32506-01

Note:
Gauge unit suitable for measuring concentricity, run-out and perpendicularity.
The robust design allows the unit to be used in the workshop and inspection room. A swivel contact roller simplifies positioning of the workpiece. The light sliding guides allow the dial gauges to be placed anywhere.

Technical data:
Inspection range Ø 5 mm to Ø 80 mm
Roller spacing min. 29 mm, max. 89 mm.
Carriage travel max. 100 mm.
Contact roller thrust is adjustable.
Gear driven rollers.

Roller precision: parallelism and coaxialism of both rollers max. 2 µm.

Base plate granite: 300 mm x 130 mm x 25 mm

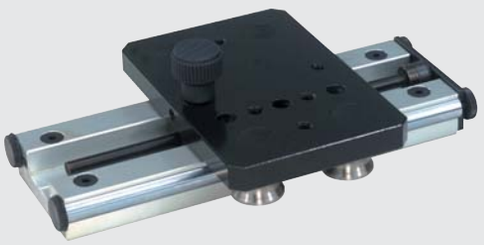


Order No.	Article description
32506-01	CONCENTRICITY GAUGE FOR Ø UP TO 80 MM

Accessories

for concentricity gauge, max. Ø 80 mm

32501-02



32501-03

32501-04

32513-98

32501-05

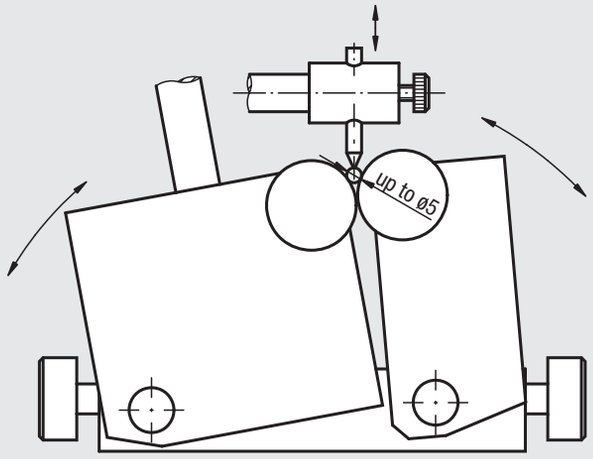
Order No.	Article description
32501-02	SLIDE
32501-03	COLUMN DIAL GAUGE HOLDER
32501-04	DIAL GAUGE HOLDER WITH HYDRAULIC ARM
32513-98	SUPPORT PRISM
32501-05	TEFLON CONTACT PIN

Positions of measuring rollers

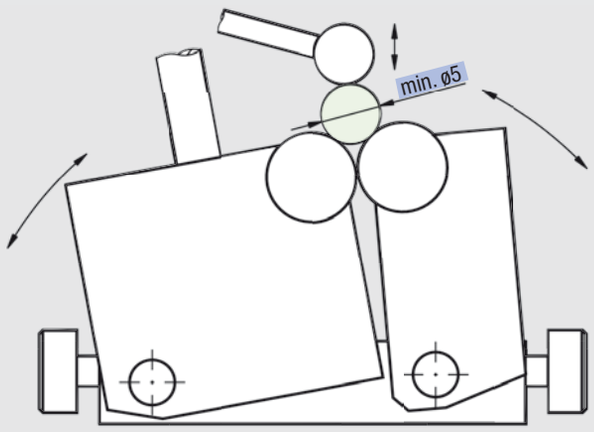
Note:
The measuring range can be extended to Ø 80 mm by the use of measuring rollers for free positioning.

The teflon contact pin extends the measuring range for parts above Ø 0.5 mm.

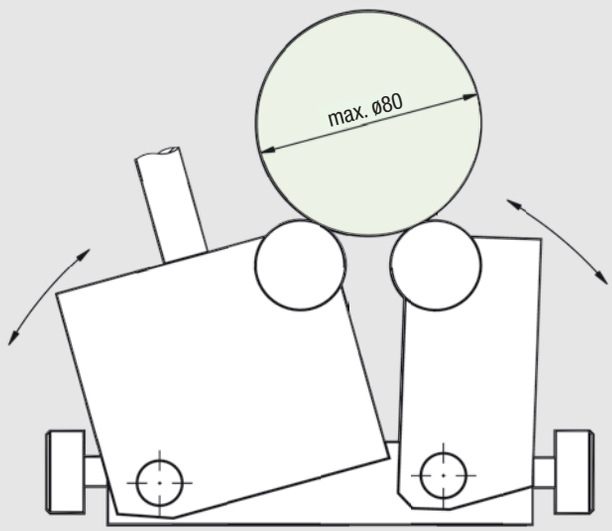
teflon contact pin
instead of contact roller



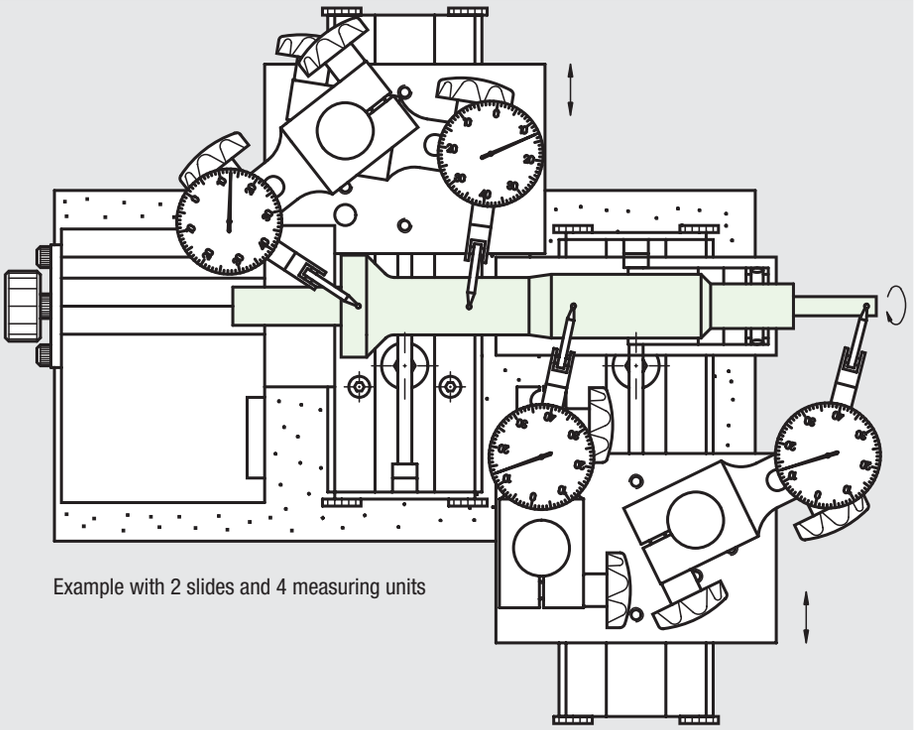
measuring rollers in closed position



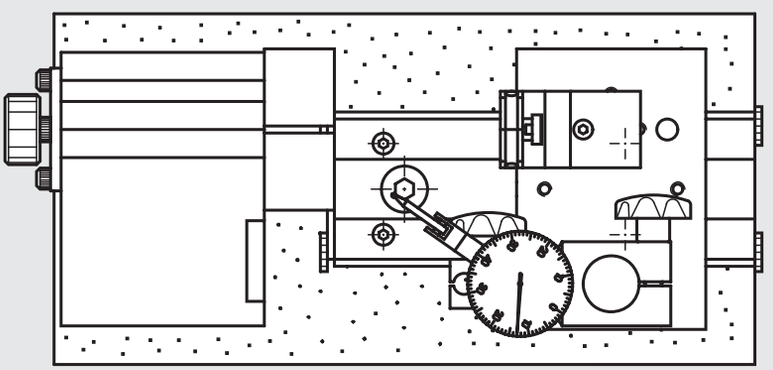
measuring rollers in opened position



Applications



Example with 2 slides and 4 measuring units



Example with support prism for long parts

Dial gauges

DIN 878

Material, version:
Robust metal housing, chromium-plated

Sample order:
nlm 32540-01

Note:
Standard holding shank Ø 8h6
Measuring range 10 mm
Scale graduation 0.01 mm
Spindle travel 1 mm per revolution of large pointer
Housing Ø 58 mm
Rotation counter
Tolerance marks
Supplied in a wooden box

Order No.	Version
32540-01	dial gauge
32540-012	dial gauge with calibration certificate

Dial gauges digital

Material:
Housing aluminium.
Measuring spindle stainless steel.

Version:
Measuring spindle hardened and ground.

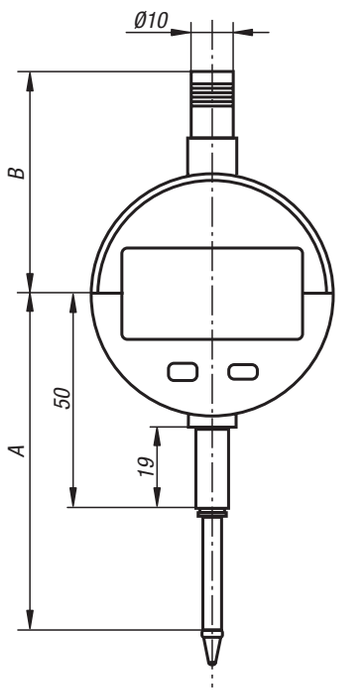
Sample order:
nlm 32542-04

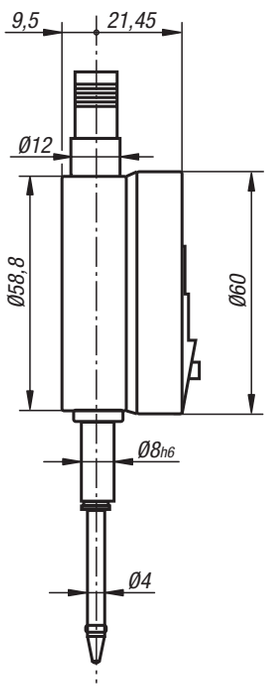
Note:
Display rotatable by 270°
Standard holding shank Ø 8h6
Exchangeable probe
Thread M2.5
Protection class IP52

Function:
– Measures in mm or inch
– Preset

Switch-off electronics.
6 digit LCD display.
Extra large digits.
Digit height 8.5 mm.
Max. transverse speed 1.5 m/s.
interface Opto RS232C.
Battery life ca. 2000 hours.
Supplied with CR2032 battery.

Accessories:
Spare CR2032 battery
order No. 32510-20.



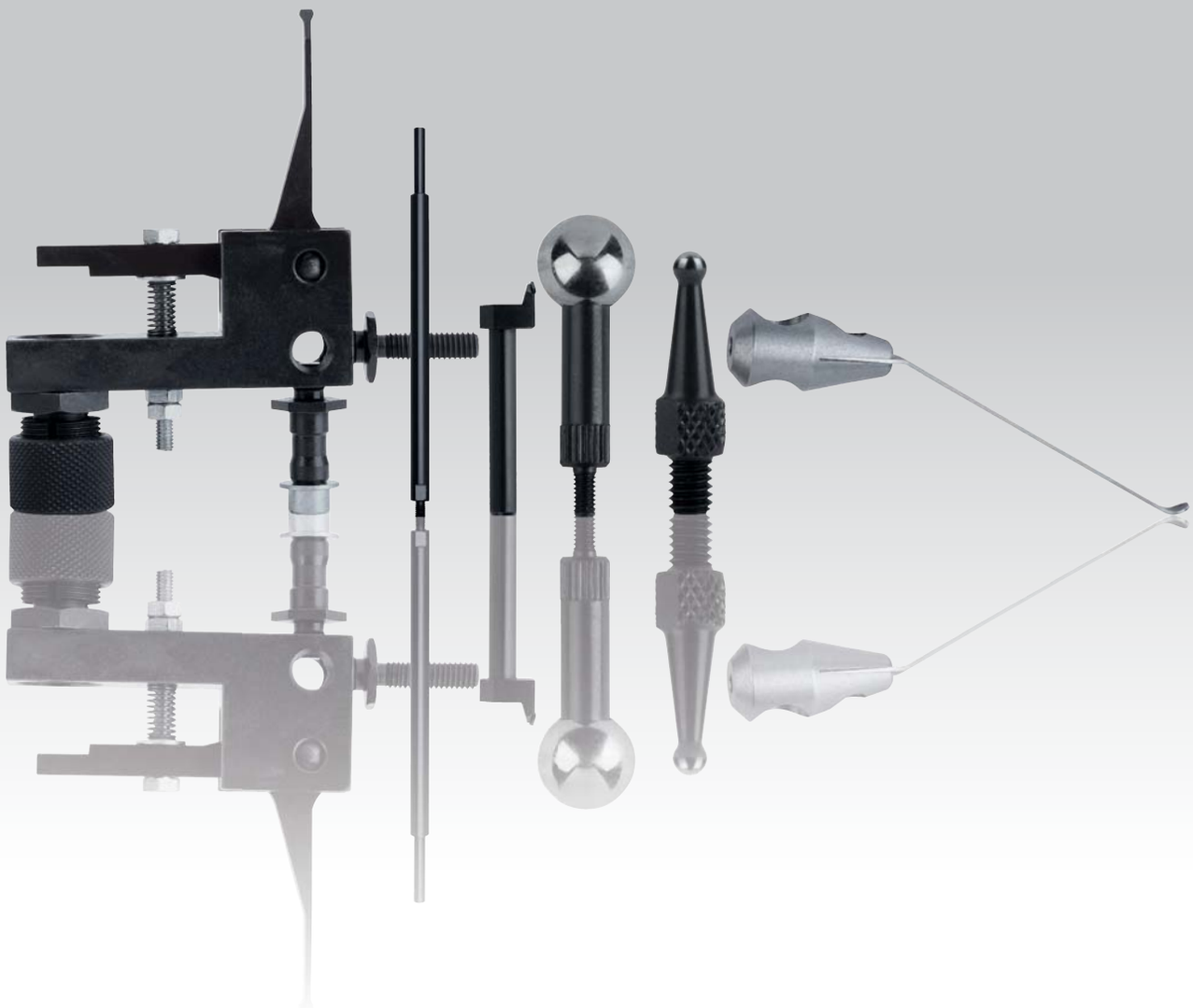


Order No.	Version	Version	A	B	Measuring range mm	Resolution mm	Precision mm	Repeat precision µm	Probe force N
32542-01	dial gauge	PRESET	78,4	53,4	25	0,001	0,005	2 (±2s)	0,6 - 1,10
32542-02	dial gauge	PRESET	78,4	53,4	25	0,01	0,010	2 (±2s)	0,6 - 1,10
32542-03	dial gauge	PRESET	65,9	53,4	12,5	0,001	0,005	2 (±2s)	0,7 - 0,95
32542-04	dial gauge	PRESET	65,9	53,4	12,5	0,01	0,010	2 (±2s)	0,7 - 0,95
32542-012	dial gauge with calibration certificate	PRESET	78,4	53,4	25	0,001	0,005	2 (±2s)	0,6 - 1,10
32542-022	dial gauge with calibration certificate	PRESET	78,4	53,4	25	0,01	0,010	2 (±2s)	0,6 - 1,10
32542-032	dial gauge with calibration certificate	PRESET	65,9	53,4	12,5	0,001	0,005	2 (±2s)	0,7 - 0,95
32542-042	dial gauge with calibration certificate	PRESET	65,9	53,4	12,5	0,01	0,010	2 (±2s)	0,7 - 0,95

Notes

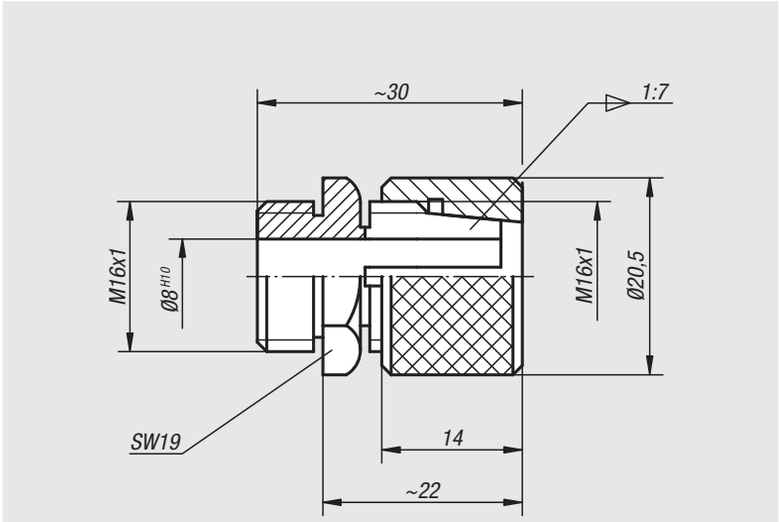
33000

Standard inspection and test fixture elements



Dial gauge collets

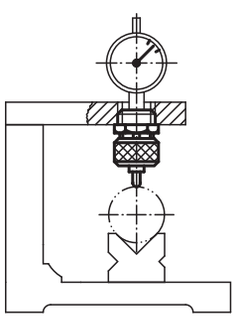
for Ø8 shafts



Material:
Carbon steel.

Version:
Black oxidised.
Collet tempered.

Sample order:
nlm 33000-08

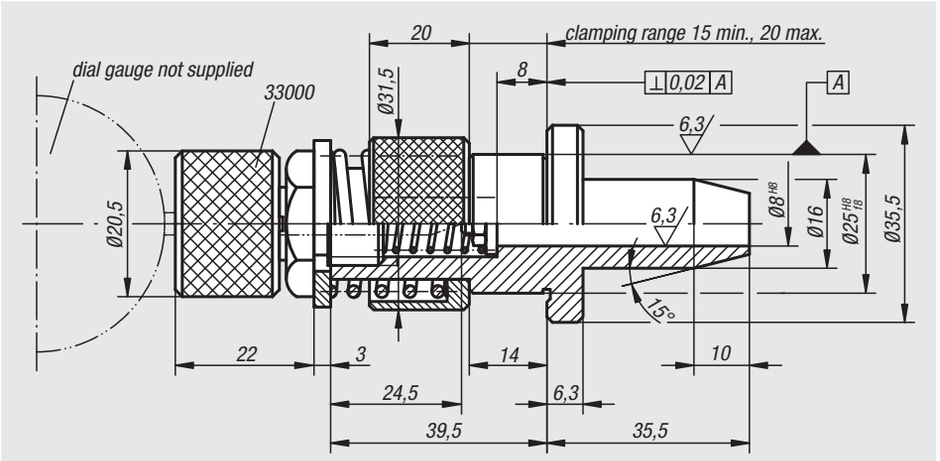


Order No.	Dimensions
33000-08	see drawing

33010

Dial gauge holders

sliding



Material:
Carbon steel.

Version:
Black oxidised.
Collet and body tempered.

Sample order:
nlm 33010-08025

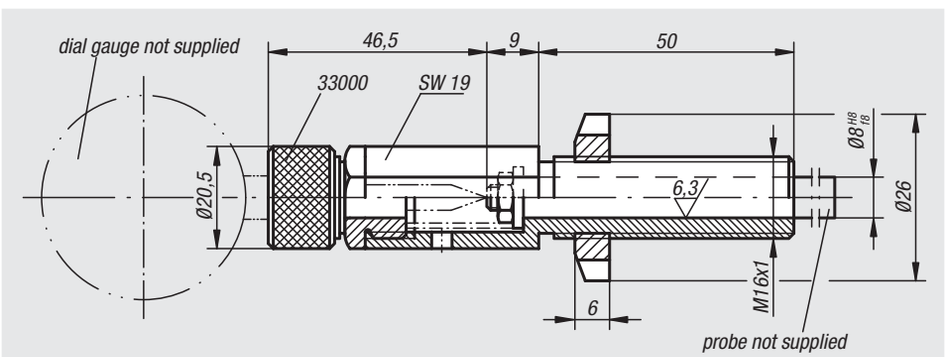
Note:
Dial gauge and probe are not included.
Dial gauges see 32540 and 32542.
Probes see 33020 up to 33026.

Order No.	Supplied for the probe pin
33010-08025	1 washer 5,3 x 14 x 1 1 hexagon nut M5 1 compression spring

33012

Dial gauge holders

short version with thread



Material:
Carbon steel.

Version:
Black oxidised.
Collet and body tempered.

Sample order:
nlm 33012-08050

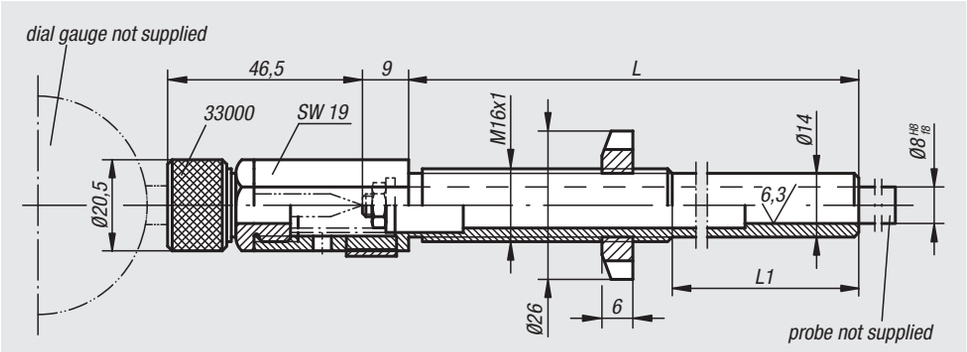
Note:
Dial gauge and probe are not included.
Dial gauges see 32540 and 32542.
Probes see 33020 up to 33026.

Order No.	Supplied for the probe pin
33012-08050	1 washer 5,3 x 14 x 1 1 hexagon nut M5 1 compression spring

33014

Dial gauge holders

long version with thread



Material:
Carbon steel.

Version:
Black oxidised.
Collet and body tempered.

Sample order:
nlm 33014-08125

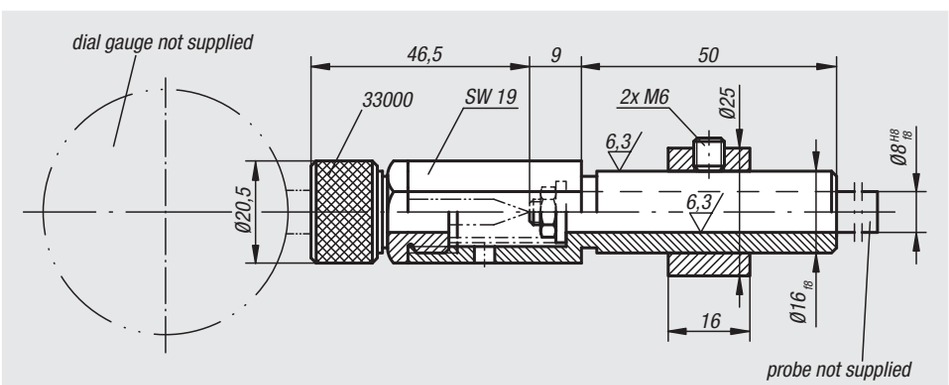
Note:
Dial gauges and probes are not included.
Dial gauges see 32540 and 32542.
Probes see 33020 up to 33026.

Order No.	L	L1	Supplied for the probe pin
33014-08125	125	75	1 washer 5,3 x 14 x 1 1 hexagon nut M5 1 compression spring
33014-08180	180	130	1 washer 5,3 x 14 x 1 1 hexagon nut M5 1 compression spring

33016

Dial gauge holders

short version with smooth shaft



Material:
Carbon steel.

Version:
Black oxidised.
Collet and body tempered.

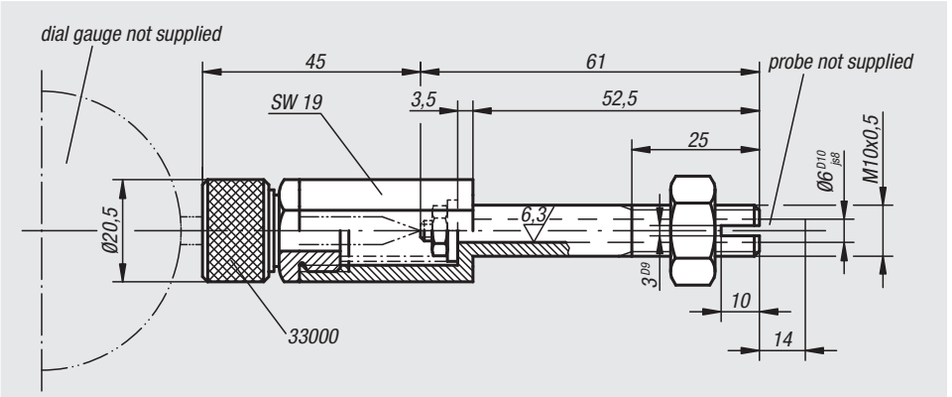
Sample order:
nlm 33016-08050

Note:
Dial gauge and probe are not included.
Dial gauges see 32540 and 32542.
Probes see 33020 up to 33026.

Order No.	Supplied for the probe pin
33016-08050	1 washer 5,3 x 14 x 1 1 hexagon nut M5 1 compression spring

Dial gauge holders

for measuring frame



Material:
Carbon steel.

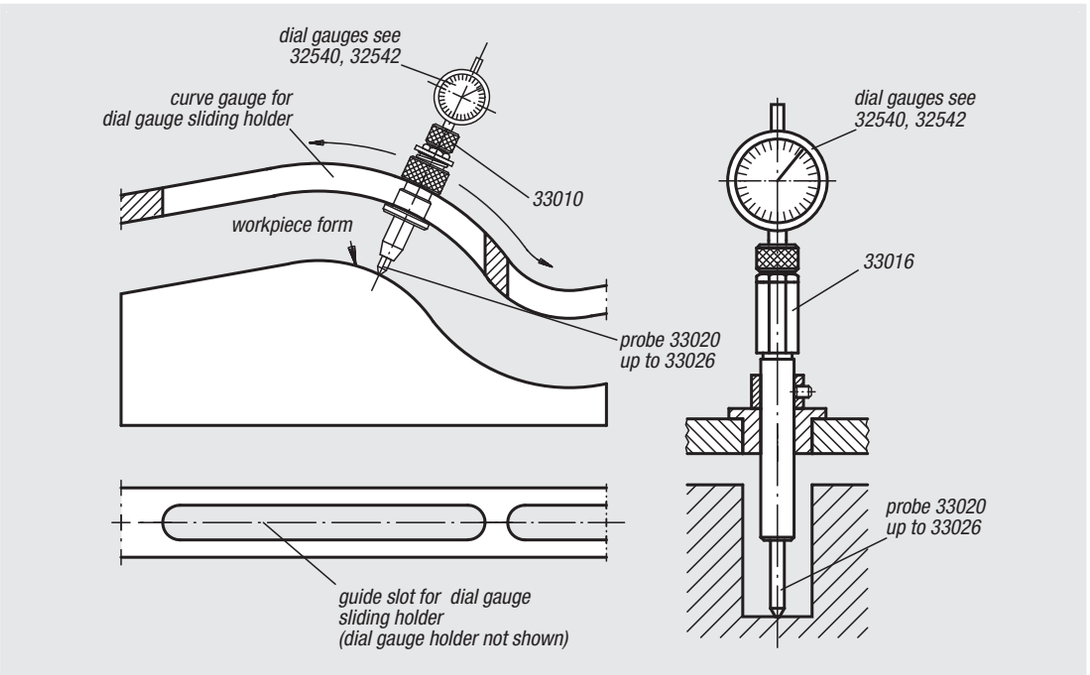
Version:
Black oxidised.
Collet and body tempered.

Sample order:
nlm 33018-06053

Note:
Dial gauges and probes are not included.
Dial gauges see 32540 and 32542.
Probes see 33028 up to 33032.

Order No.	Supplied for the probe pin
33018-06053	1 washer 4,3 x 14 x 0,9 1 hexagon nut M4 1 compression spring

Example of dial gauge holders



33020

Probe

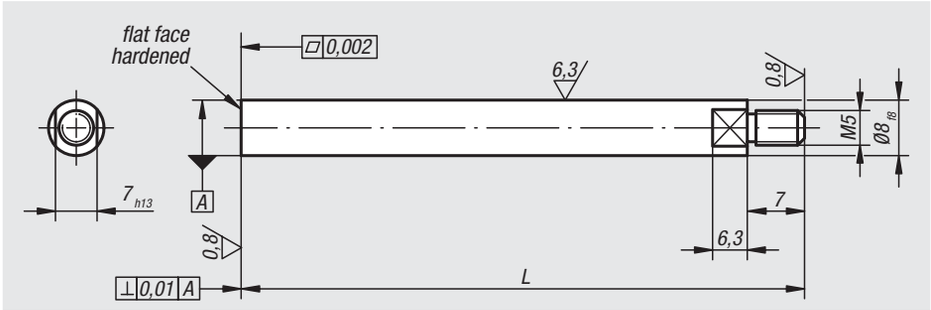
with flat face

Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33020-08100

Note:
These probes are suitable for dial gauge holders 33010 to 33016.



Order No.	L
33020-08063	63
33020-08080	80
33020-08100	100
33020-08160	160
33020-08250	250

33022

Probe

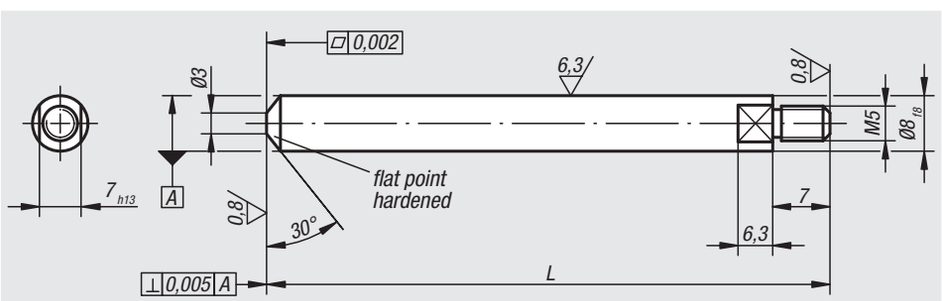
with flat point

Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33022-08063

Note:
These probes are suitable for dial gauge holders 33010 up to 33016.

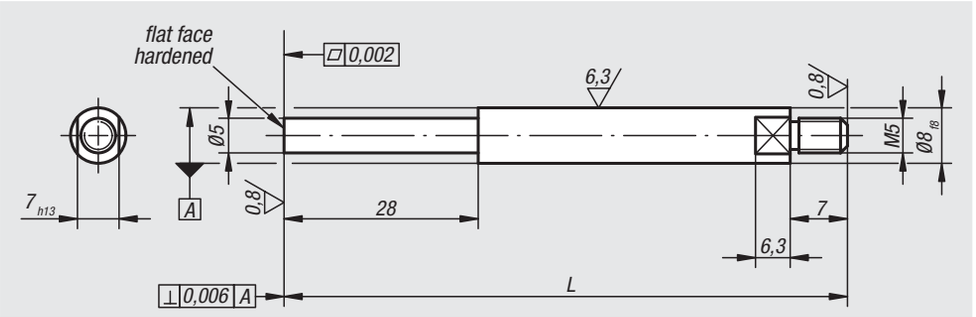


Order No.	L
33022-08063	63
33022-08080	80
33022-08100	100

33024

Probe

with reduced flat face



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33024-08160

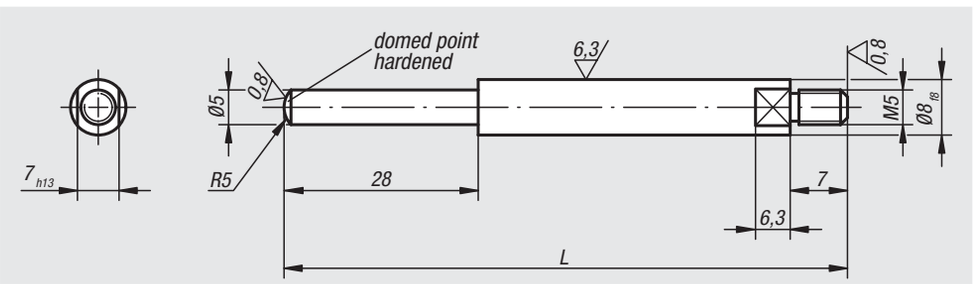
Note:
These probes are suitable for dial gauge holders 33010 up to 33016.

Order No.	L
33024-08080	80
33024-08100	100
33024-08160	160
33024-08250	250

33026

Probe

with reduced domed point



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33026-08080

Note:
These probes are suitable for dial gauge holders 33010 up to 33016.

Order No.	L
33026-08080	80
33026-08100	100
33026-08160	160

33028

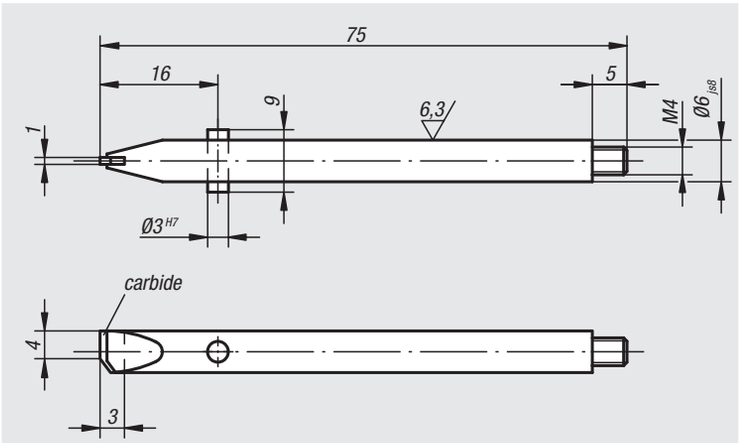
Probe knife point

Material:
Tool steel.
Contact face carbide

Version:
Black oxidised.

Sample order:
nlm 33028-06075

Note:
These probes are suitable for dial gauge holder 33018.



Order No.	Dimensions
33028-06075	see drawing

33029

Probe knife point

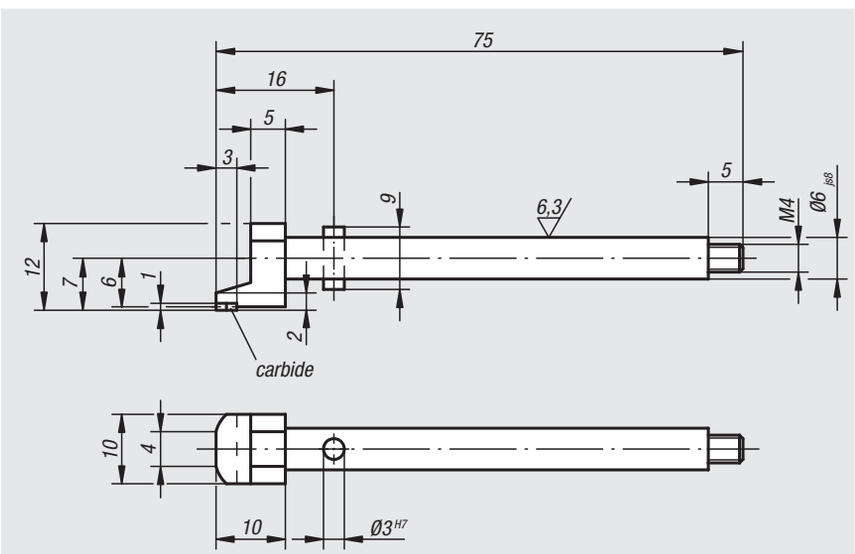
offset

Material:
Tool steel.
Contact face carbide.

Version:
Black oxidised.

Sample order:
nlm 33029-06075

Note:
This probe is suitable for holder of dial gauges 33018.



Order No.	Dimensions
33029-06075	see drawing

33032

Extension

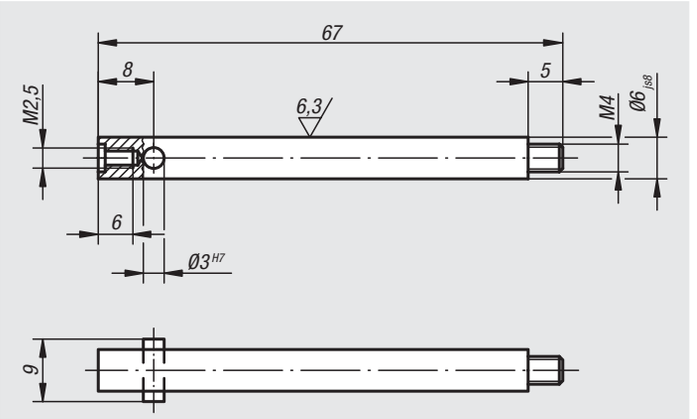
for probe inserts

Material:
Tool steel

Version:
Black oxidised.

Sample order:
nlm 33032-06067

Note:
These extension are suitable for dial gauge holder 33018.
For probe inserts see 33040 up to 33052.



Order No.	Dimensions
33032-06067	see drawing

33035

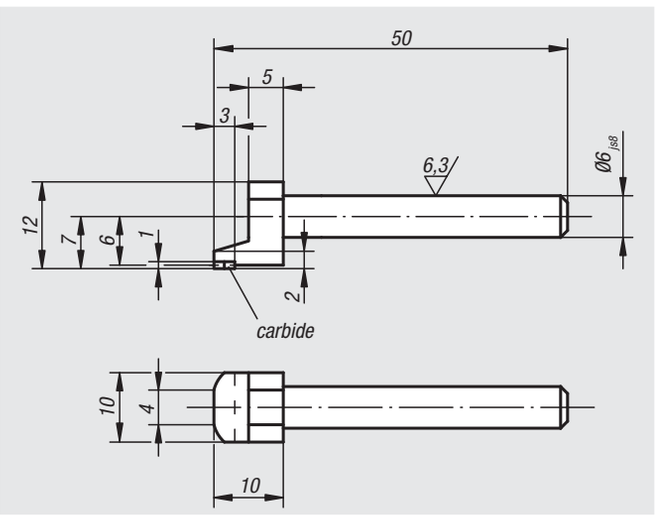
Probe knife point

offset, for fixed stop

Material:
Tool steel.
Contact face carbide

Version:
Black oxidised.

Sample order:
nlm 33035-06050

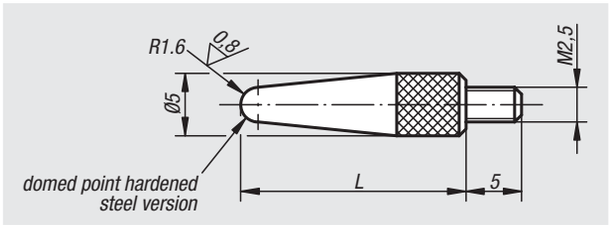


Order No.	Dimensions
33035-06050	see drawing

33040

Probe inserts

with domed point



Material:
Steel or carbide point

Version:
Black oxidised.

Sample order:
nlm 33040-1025250

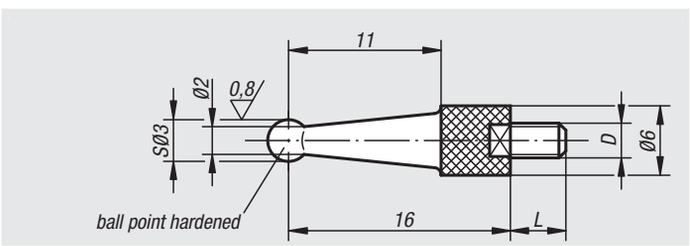
Note:
Dial gauges see 32540 and 32542.

Order No. steel point	Order No. carbide point	L
33040-1025080	33040-2025080	8
33040-1025125	33040-2025125	12,5
33040-1025160	33040-2025160	16
33040-1025200	33040-2025200	20
33040-1025250	33040-2025250	25
33040-1025280	33040-2025280	28
33040-1025355	33040-2025355	35,5

33042

Probe inserts

with ball point



Material:
Tool steel

Version:
Hardened, black oxidised.

Sample order:
nlm 33042-040016

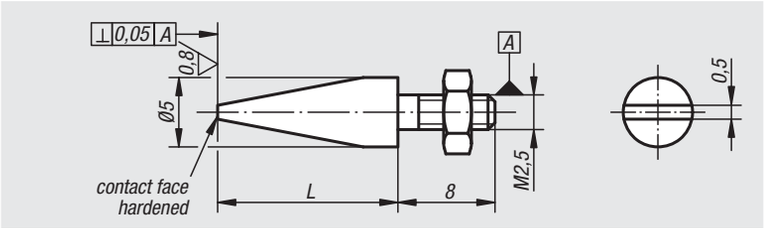
Note:
Dial gauges see 32540 and 32542.

Order No.	D	L
33042-025016	M2,5	5
33042-040016	M4	5

33044

Probe inserts

knife point



Material:
Steel.

Version:
Black oxidised.
Contact faces hardened.

Sample order:
nlm 33044-025080

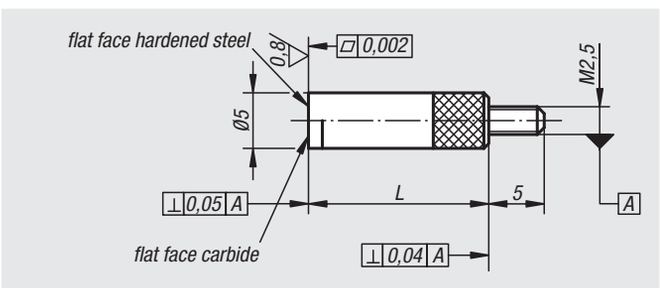
Note:
Dial gauges see 32540 and 32542.

Order No.	L
33044-025080	8
33044-025125	12,5
33044-025160	16
33044-025200	20
33044-025280	28

33046

Probe inserts

with flat face



Material:
Steel or carbide contact face

Version:
Black oxidised.

Sample order:
nlm 33046-2025160

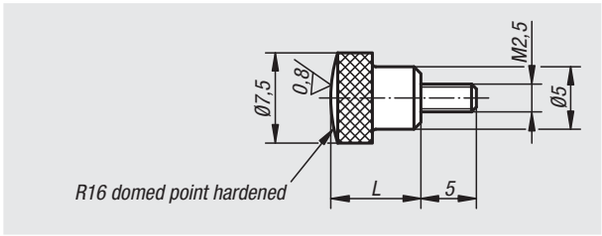
Note:
Dial gauges see 32540 and 32542.

Order No. contact face steel	Order No. contact face carbide	L
33046-1025080	**33046-2025080**	8
33046-1025125	**33046-2025125**	12,5
33046-1025160	**33046-2025160**	16

33048

Probe inserts

with domed point



Material:
Steel.

Version:
Hardened, black oxidised.

Sample order:
nlm 33048-025080

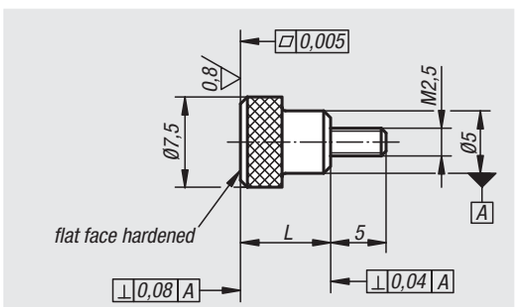
Note:
Dial gauges see 32540 and 32542.

Order No.	L
33048-025080	8

33050

Probe inserts

with enlarged flat face



Material:
Steel.

Version:
Hardened, black oxidised.

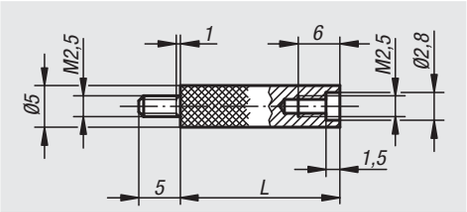
Sample order:
nlm 33050-025080

Note:
Dial gauges see 32540 and 32542.

Order No.	L
33050-025080	8

Extensions

for probe inserts



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33052-025120

Note:
Suitable for probe inserts 33040 to 33050 and probe insert set 33058.
Dial gauges see 32540 and 32542.

Order No.	L
33052-025080	8
33052-025100	10
33052-025120	12
33052-025160	16
33052-025200	20
33052-025240	24
33052-025300	30
33052-025320	32
33052-025400	40
33052-025500	50
33052-025600	60
33052-025700	70
33052-025800	80
33052-025900	90

Probe insert set

10-piece

Material:
Probe inserts hardened steel.
Box plastic.

Version:
Black oxidised.

Sample order:
nlm 33058-01

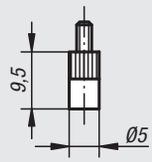
Threaded version:
Thread M2.5
Content:
9 inserts
1 extension
(length 30 mm).

Order No.	Article description
33058-01	**PROBE INSERT SET, 10-PIECE**

Probe inserts hardened steel

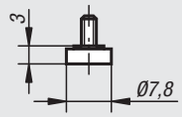
thread M2.5

Steel, hardened
flat Ø5



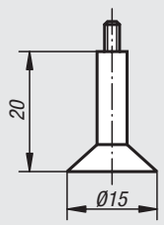
Order No.
33058-015

Steel, hardened
flat Ø7.5



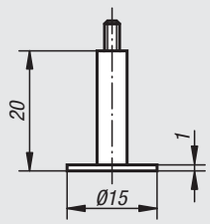
Order No.
33058-020

Steel, hardened
flat Ø15



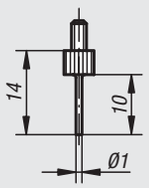
Order No.
33058-025

Steel, hardened
disc Ø15



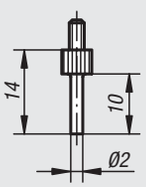
Order No.
33058-030

Steel, hardened
pin Ø1



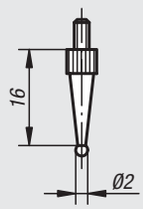
Order No.
33058-035

Steel, hardened
pin Ø2



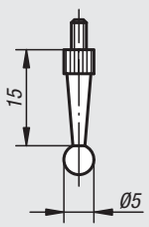
Order No.
33058-040

Steel, hardened
ball Ø2



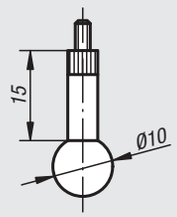
Order No.
33058-045

Steel, hardened
ball Ø5



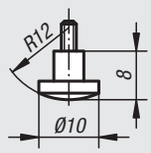
Order No.
33058-050

Steel, hardened
ball Ø10



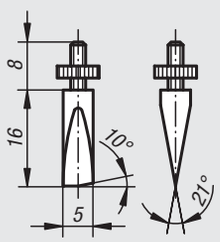
Order No.
33058-055

Steel, hardened
domed R12



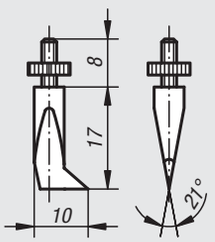
Order No.
33058-060

Steel, hardened
knife
angled 10°



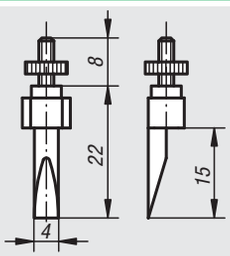
Order No.
33058-065

Steel, hardened
knife
laterally off-set



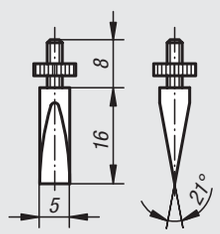
Order No.
33058-070

Steel, hardened
knife
one-sided



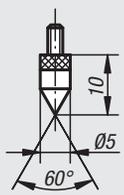
Order No.
33058-075

Steel, hardened
knife



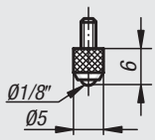
Order No.
33058-080

Steel, hardened
point 60°



Order No.
33058-085

Steel, hardened
standard inch
ball Ø 1/8“

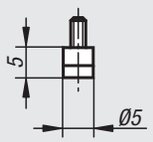


Order No.
33058-090

Probe inserts carbide

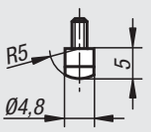
thread M2.5

Carbide
flat Ø5



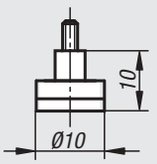
Order No.
33058-515

Carbide
domed R5



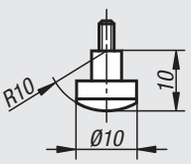
Order No.
33058-520

Carbide
flat Ø10



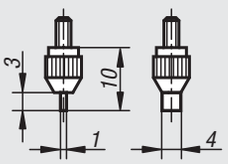
Order No.
33058-525

Carbidel
domed R10



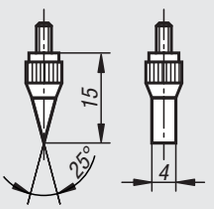
Order No.
33058-530

Carbide
blade 1x4



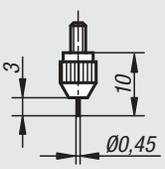
Order No.
33058-540

Carbide
knife 25°x4



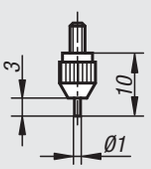
Order No.
33058-545

Carbide
pin Ø0,45



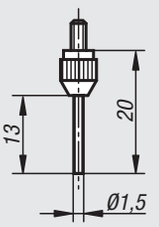
Order No.
33058-550

Carbide
pin Ø1.0



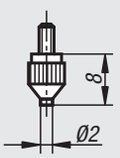
Order No.
33058-555

Carbide
pin Ø1.5



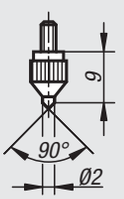
Order No.
33058-560

Carbide
flat Ø2



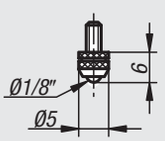
Order No.
33058-565

Carbide
point 90°x2



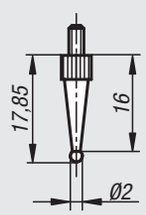
Order No.
33058-570

Carbide
standard inch
ball Ø1/8“



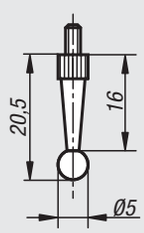
Order No.
33058-575

Carbide
ball Ø2



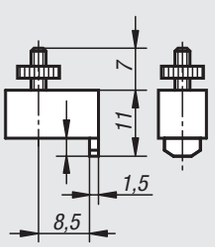
Order No.
33058-580

Carbide
ball Ø5



Order No.
33058-585

Carbide
off-set blade



Order No.
33058-590

Protection frames

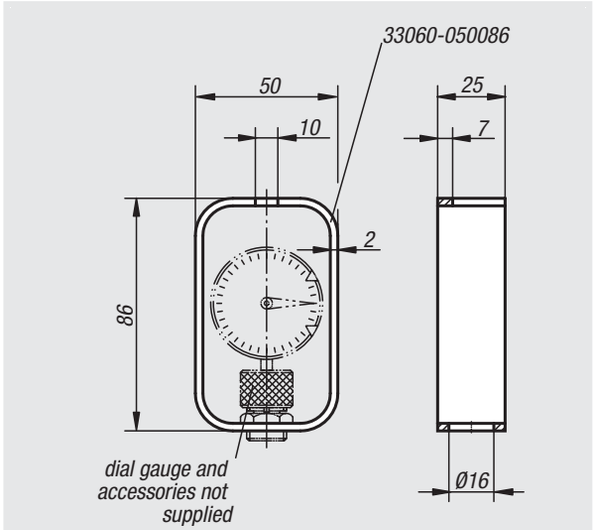
for dial gauges

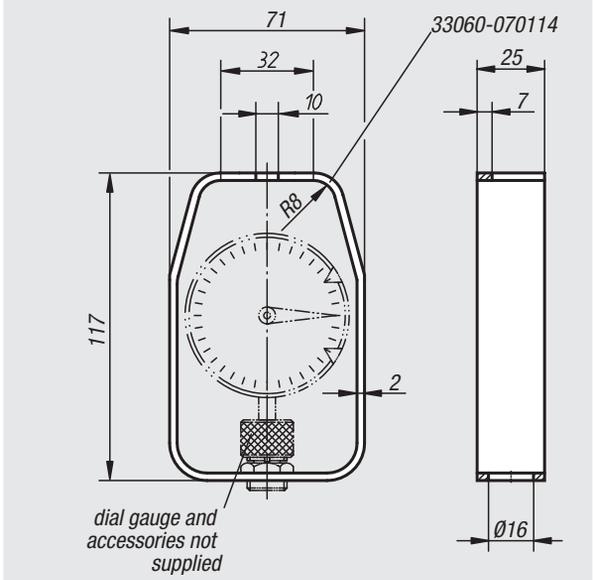
Material:
Steel.

Version:
Painted yellow

Sample order:
nlm 33060-050086

Note:
Dial gauges see 32540 and 32542.
Dial gauge collets see 33000.
Dial gauge holders see 33010 to 33018.





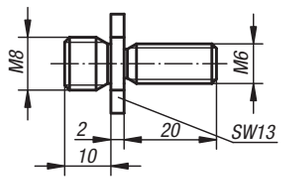
Order No.	Dimensions
33060-050086	see drawing
33060-070114	see drawing

Technical information for deflection dial gauge holders

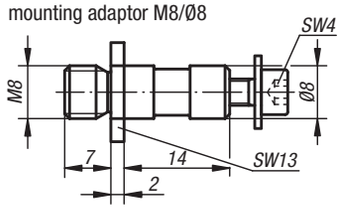
For alternative mounting for the deflection dial gauge holder:
– mounting adapter M8/M6 (double thread)
– mounting adapter M8/Ø8
(thread and smooth pin)

Both adapters are supplied with each deflection dial gauge holder.

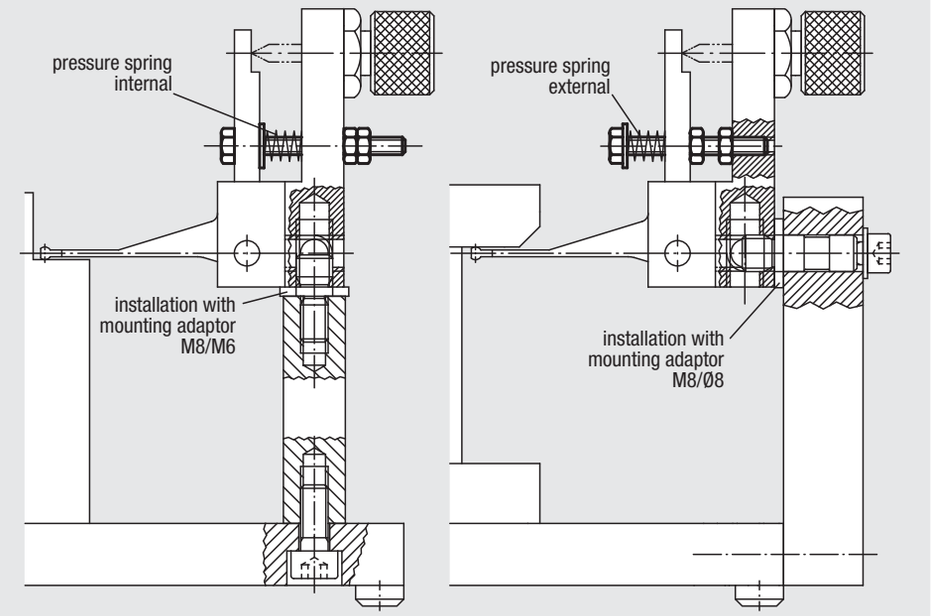
mounting adaptor M8/M6



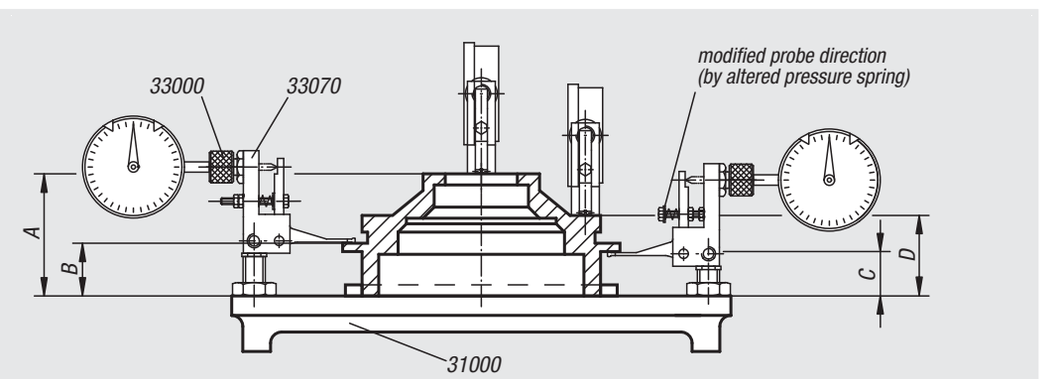
mounting adaptor M8/Ø8



Modification of the probe direction:
the probe direction can be changed by simply changing the pressure spring from internal to external



Example of simultaneous control of 4 height dimensions using deflection dial gauge holders



33070

Deflection dial gauge holders 90°

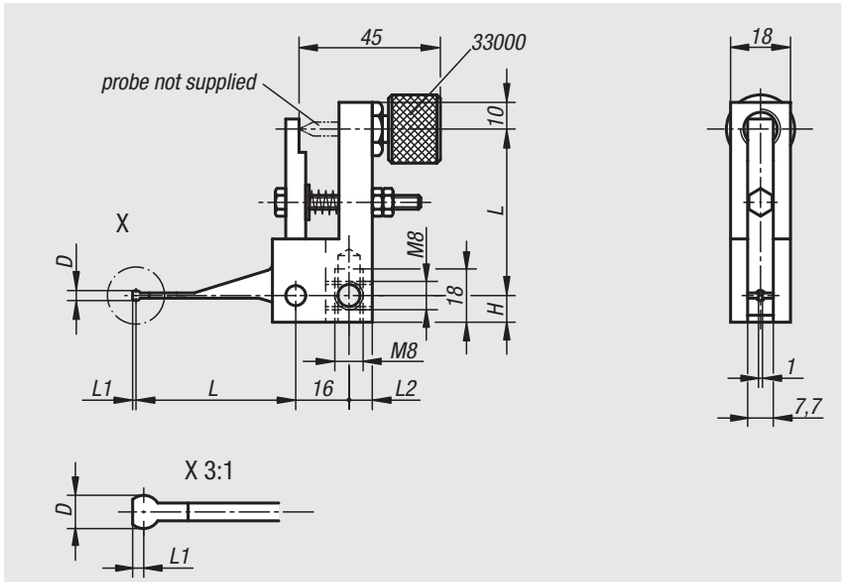
Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33070-04803

Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

Accessories:
Dial gauges see 32540 and 32542.



Order No.	L	D	L1	L2	H
33070-04803	48	3	1	7	8
33070-07008	70	8	1,5	6	10

33072

Deflection dial gauge holders 90°

probe lever with thread

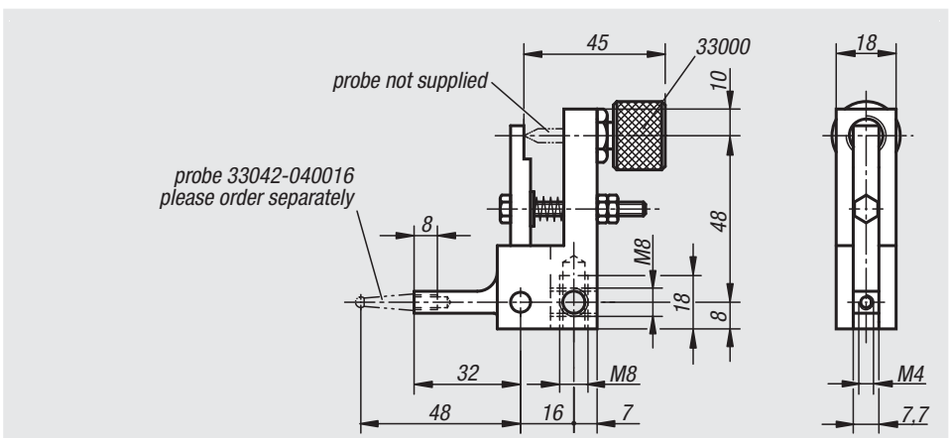
Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33072-048

Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

Accessories:
Dial gauges see 32540 and 32542.
Probe inserts see 33042-040016.

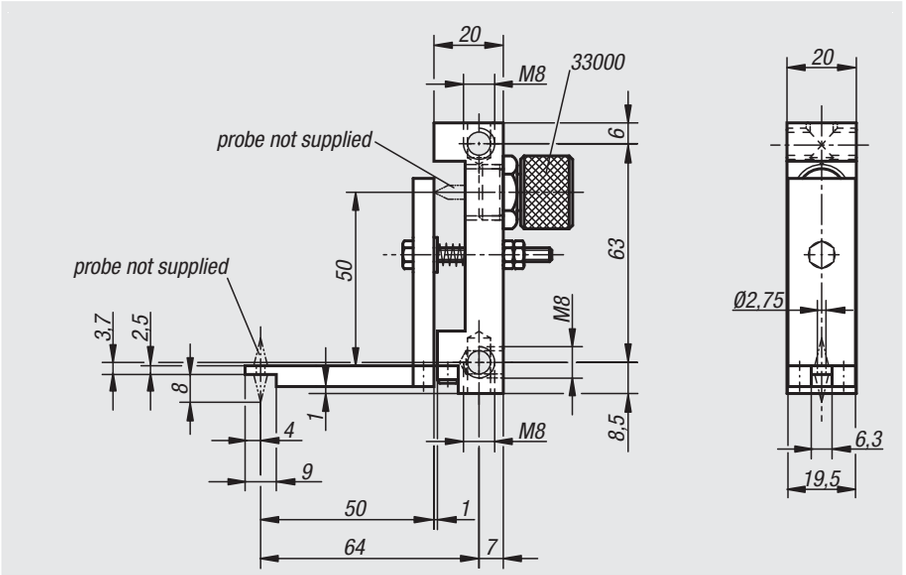


Order No.	Dimensions
33072-048	see drawing

33074

Deflection dial gauge holders 90°

probe lever with hole



Material:
Body aluminium.
Probe lever investment cast steel.

Version:
Body black anodized.
Probe lever black oxidised.

Sample order:
nlm 33074-050

Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

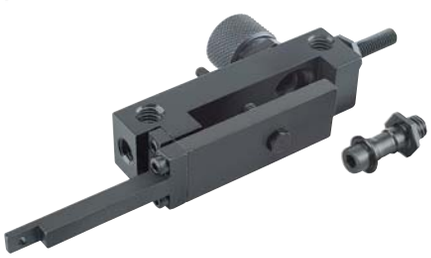
Accessories:
Dial gauges see 32540 and 32542.
Probe inserts see 33040 to 33052.

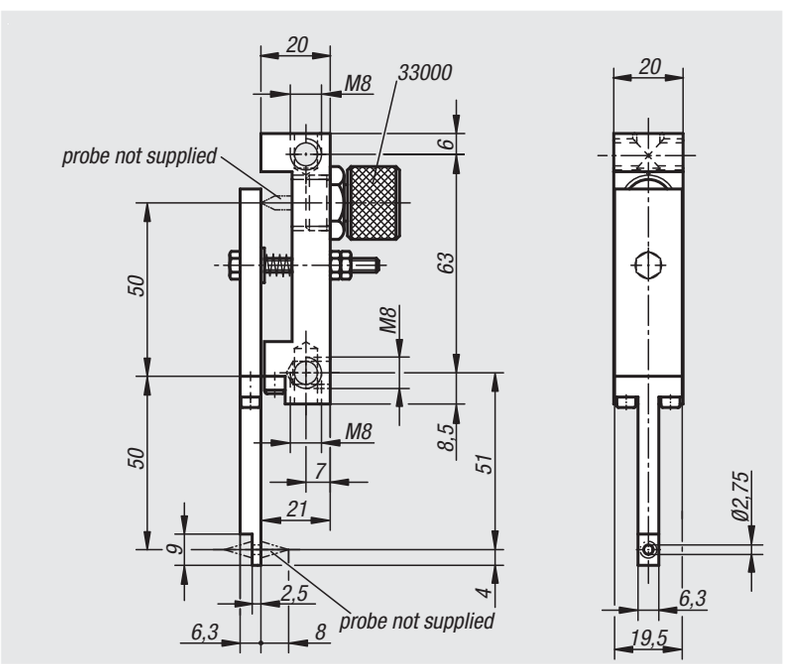
Order No.	Dimensions
33074-050	see drawing

33076

Deflection dial gauge holders 180°

probe lever with hole





Material:
Body aluminium.
Probe lever investment cast steel.

Version:
Body black anodized.
Probe lever black oxidised.

Sample order:
nlm 33076-050

Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

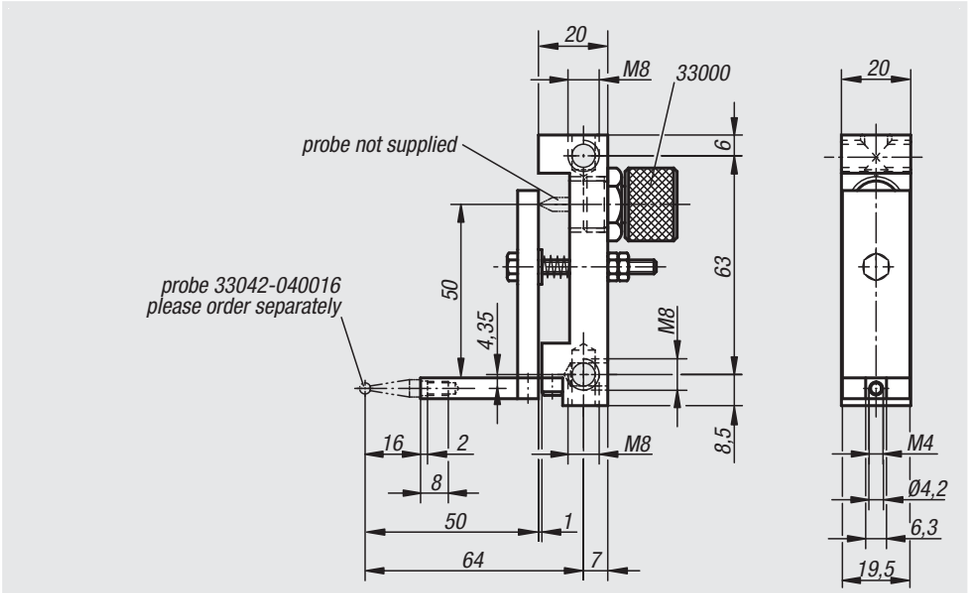
Accessories:
Dial gauges see 32540 and 32542.
Probe inserts see 33040 to 33052.

Order No.	Dimensions
33076-050	see drawing

33078

Deflection dial gauge holders 90°

probe lever with thread



Material:
Body aluminium.
Probe lever investment cast steel.

Version:
Body black anodized.
Probe lever black oxidised.

Sample order:
nlm 33078-050

Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

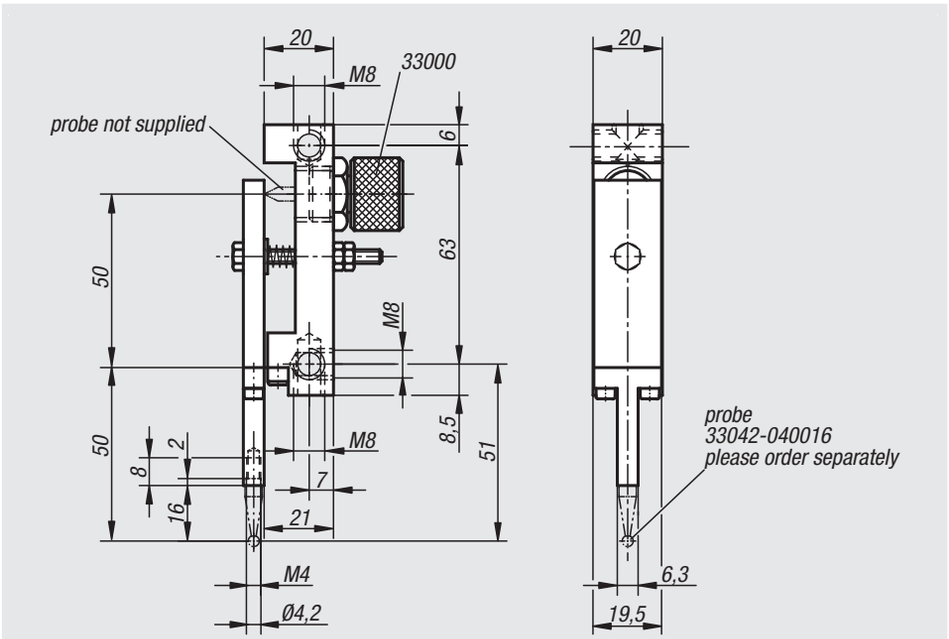
Accessories:
Dial gauges see 32540 and 32542.
Probe inserts see 33042-040016.

Order No.	Dimensions
33078-050	see drawing

33080

Deflection dial gauge holders 180°

probe lever with thread



Material:
Body aluminium.
Probe lever investment cast steel.

Version:
Body black anodized.
Probe lever black oxidised.

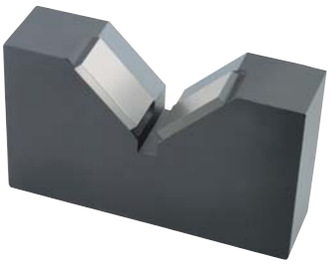
Sample order:
nlm 33080-050

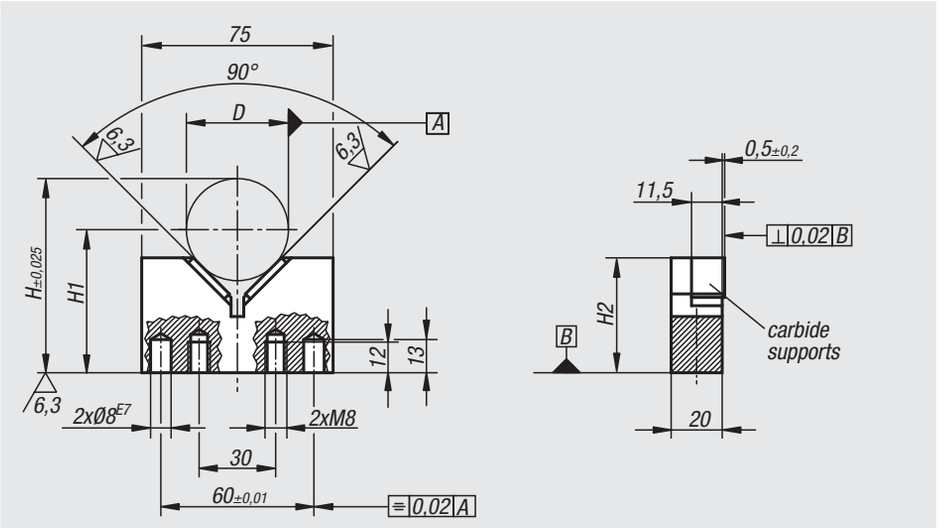
Note:
To alter the probe direction and mounting of the deflection dial gauge holder with the fastening adaptors (supplied) see technical information.

Accessories:
Dial gauges see 32540 and 32542.
Probe inserts see 33042-040016.

Order No.	Dimensions
33080-050	see drawing

Prism attachments





Material:
Carbon steel.
Contact face carbide.

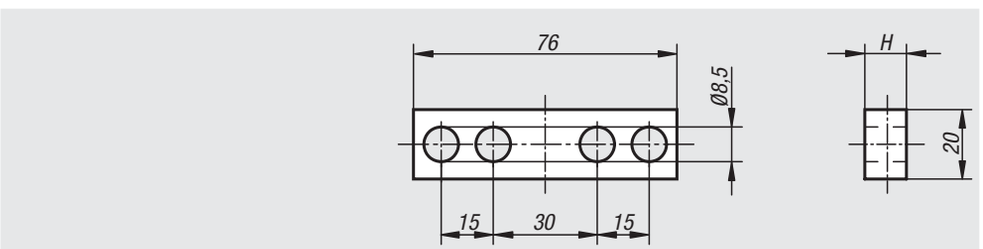
Version:
Black oxidised.
Contact faces ground, bright.

Sample order:
nlm 33090-010020

Order No.	D min.	D max.	D Test-Ø	H	H1	H2
33090-010020	10	20	20	66	D/2 x √2 + 41,857	53
33090-020040	20	40	40	76	D/2 x √2 + 27,716	45

Spacers

for prisms attachments



Material:
Carbon steel.

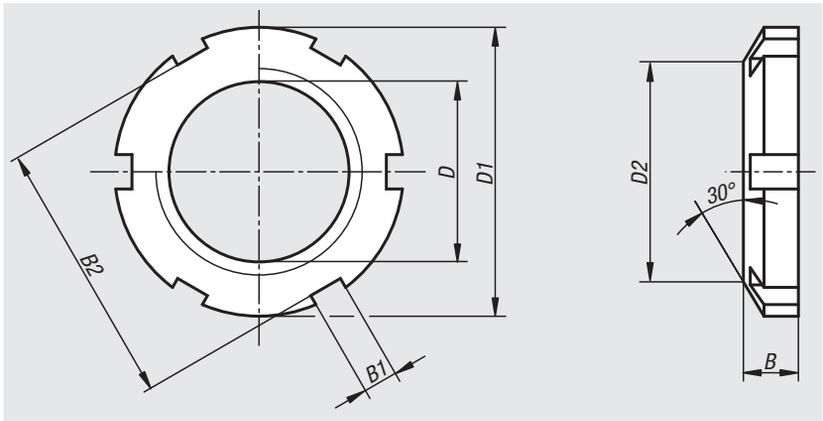
Version:
Black oxidised.

Sample order:
nlm 33092-012

Note:
These spacers are used as riser elements for prisms attachments 33090.

Order No.	H
33092-005	5
33092-008	8
33092-012	12
33092-015	15
33092-020	20

Slotted round nuts



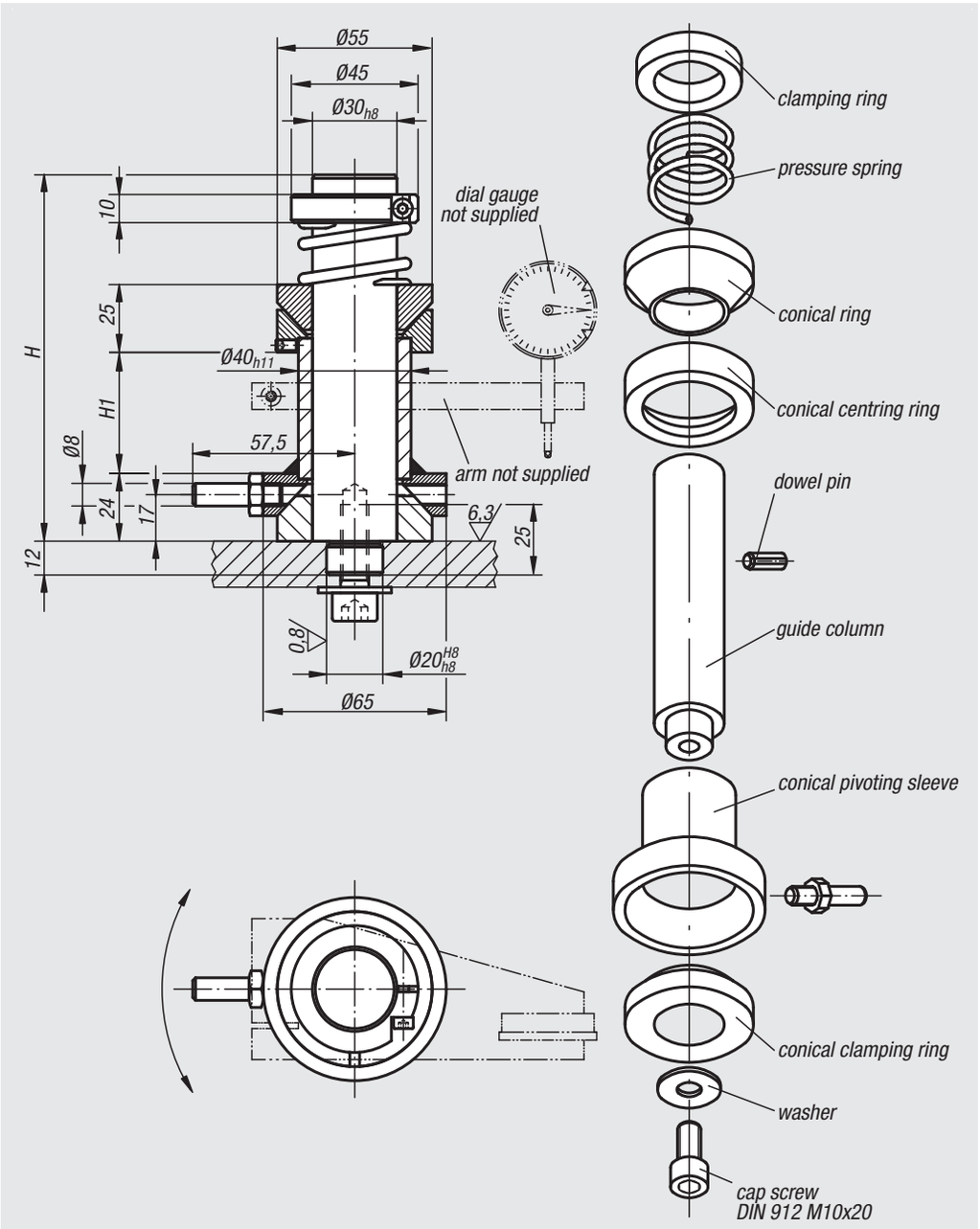
Material:
Carbon steel.

Version:
Black oxidised.

Sample order:
nlm 33105-16

Order No.	D	D1	D2	B	B1	B2	Number of slots
33105-16	M16x1	26	21	6	4	22	4
33105-36	M36x1,5	52	44	9	6	46	6

Pivoting columns



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33110-200

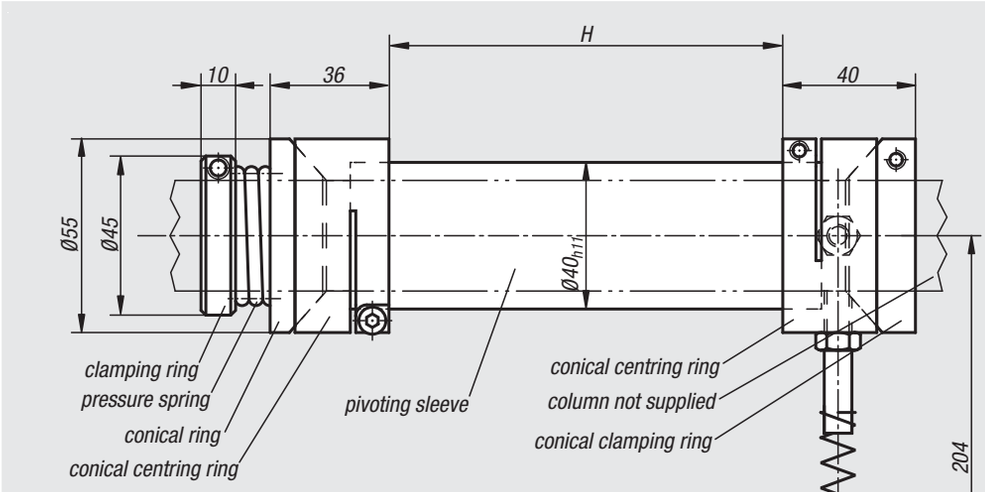
Note:
Dial gauges see 32540 and 32542.
Measuring arms see 33150.

Application:
For height measurements.

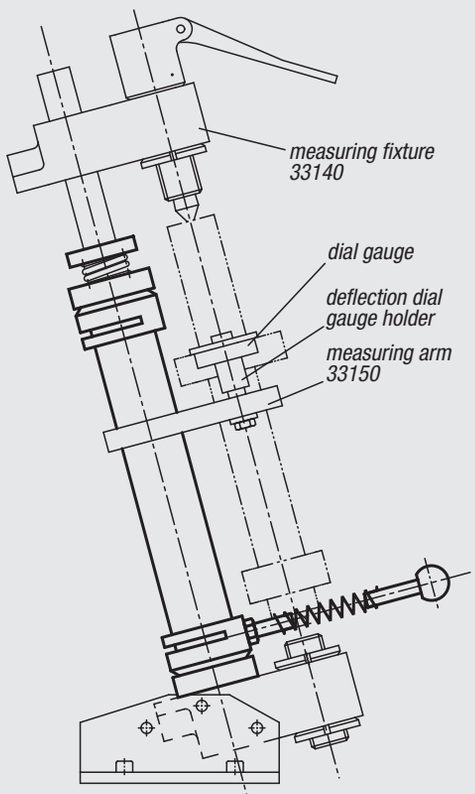
Assembly:
- Fully dismantle the pivoting column.
- Fasten guide column to the table with washer and cap screw.
- Slide the conical clamping ring on the column and press down while tightening the screw.
- Slide the conical pivoting sleeve on.
- Fasten the measuring arm onto the conical pivoting sleeve.
- Fasten the conical centring ring onto the conical pivoting sleeve with two grub screws.
- Insert the dowel pin into the guide column.
- Slide the conical ring onto the guide column so that the dowel pin engages in the slot. Ensure the conical ring has no play.
- Mount the spring on the top with the clamping ring to prevent axial play.
- Lubricate all moving parts.

Order No.	H	H1
33110-130	130	43
33110-160	160	73
33110-200	200	113
33110-250	250	163

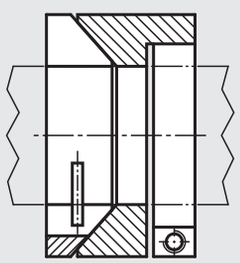
Pivoting systems



application example:



view through
conical ring and
conical centring ring



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33115-426

Note:
The pivoting systems are adapted to measuring fixtures 33140.
Measuring arms see 33150.

Assembly:
- Place the conical clamping ring on the guide column and clamp in the desired position.
- Fix the conical centring ring to the pivoting sleeve and insert it such that the conical centring ring lies on top of the conical clamping ring.
- Fix the measuring arm onto the pivoting sleeve.
- Fix the second conical centring ring onto the pivoting sleeve.
- Insert the conical ring and pressure spring.
- Mount the pressure spring on the block with the clamping ring to prevent axial play.
- Lubricate all moving parts.

Order No.	H
33115-200	200
33115-276	276
33115-426	426
33115-536	536

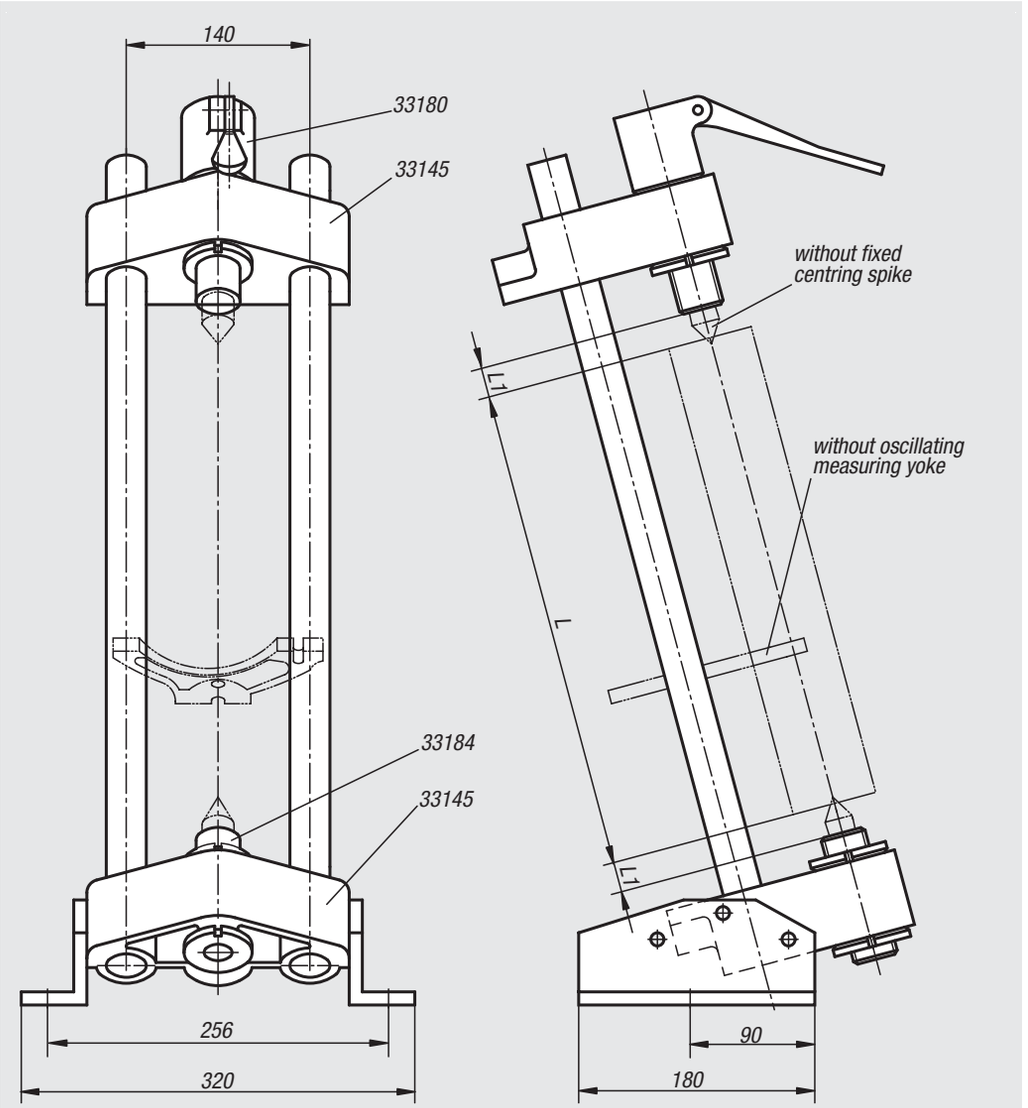
Measuring fixtures

Material:
Steel.
Shaft bearing GJL 200

Version:
Steel parts black oxidised.
Shaft bearing painted.

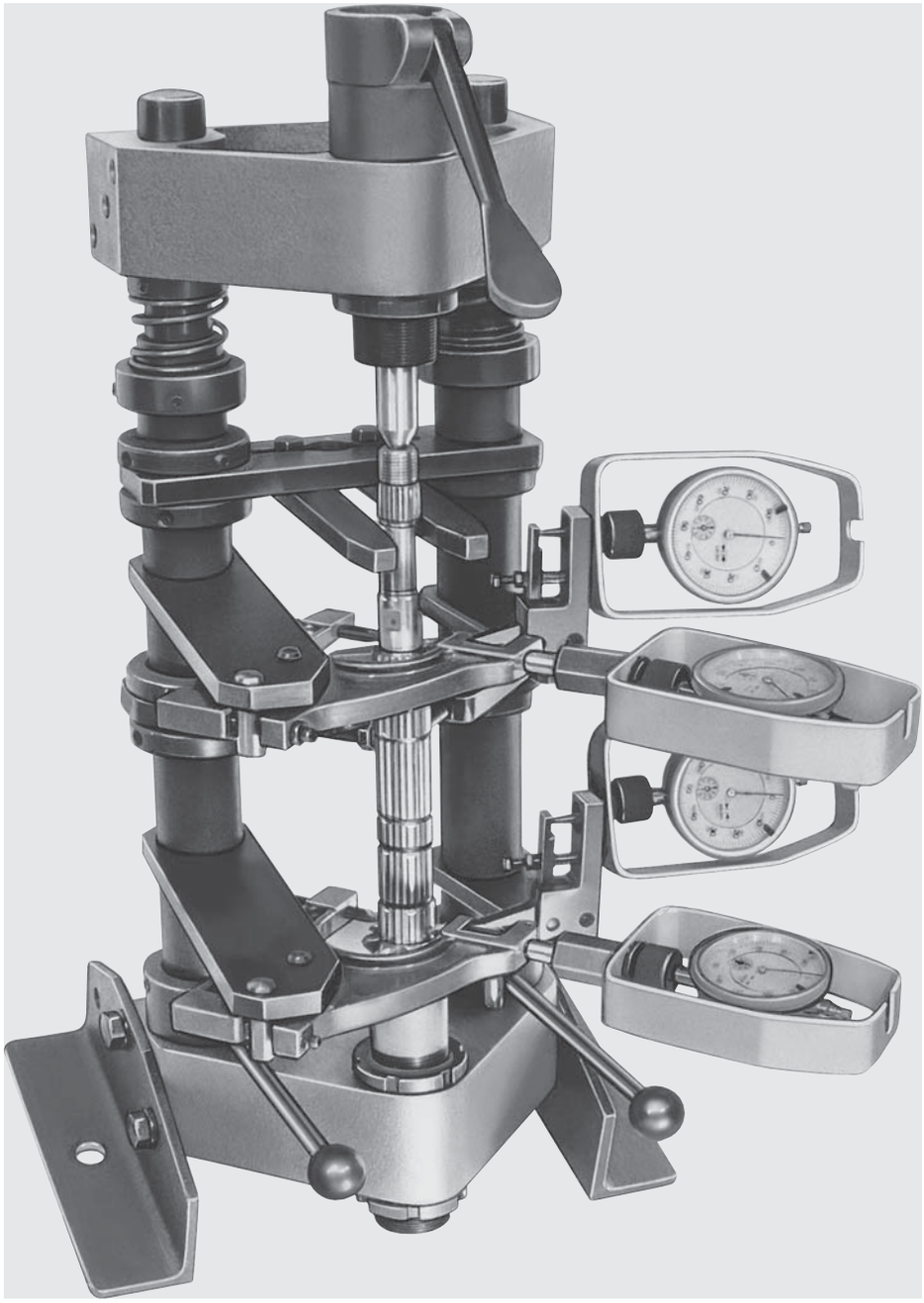
Sample order:
nlm 33140-240444

Note:
See example of a measuring fixture.

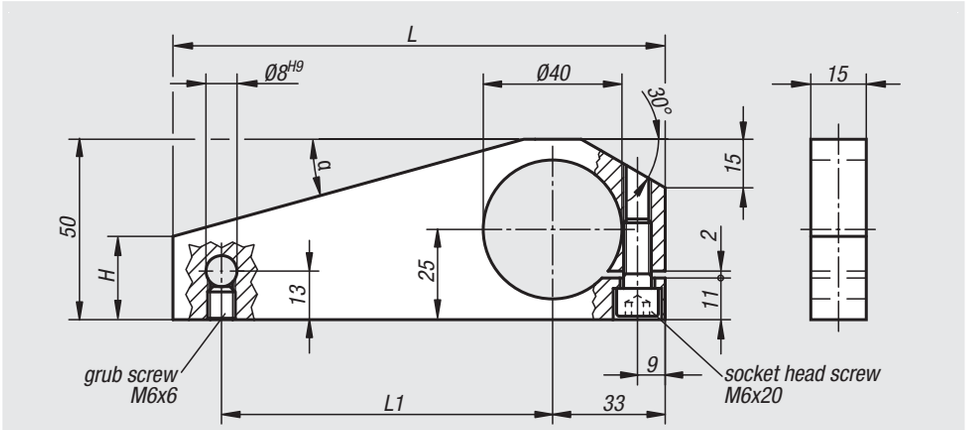


Order No.	L when L1 = 32 with fixed centre 33190-02096	L when L1 = 49 with fixed centre 33190-02113
33140-240444	274 to 444	240 to 410
33140-410524	444 to 524	410 to 490

Example of a measuring fixture



Measuring arms



Material:
Steel.

Version:
Black oxidised.

Sample order:
nlm 33150-095

Note:
The measuring arms are suitable for pivoting columns 33110 and pivoting systems 33115.

Order No.	L	L1	H	α
33150-095	95	50	18	30°
33150-140	140	95	23	15°

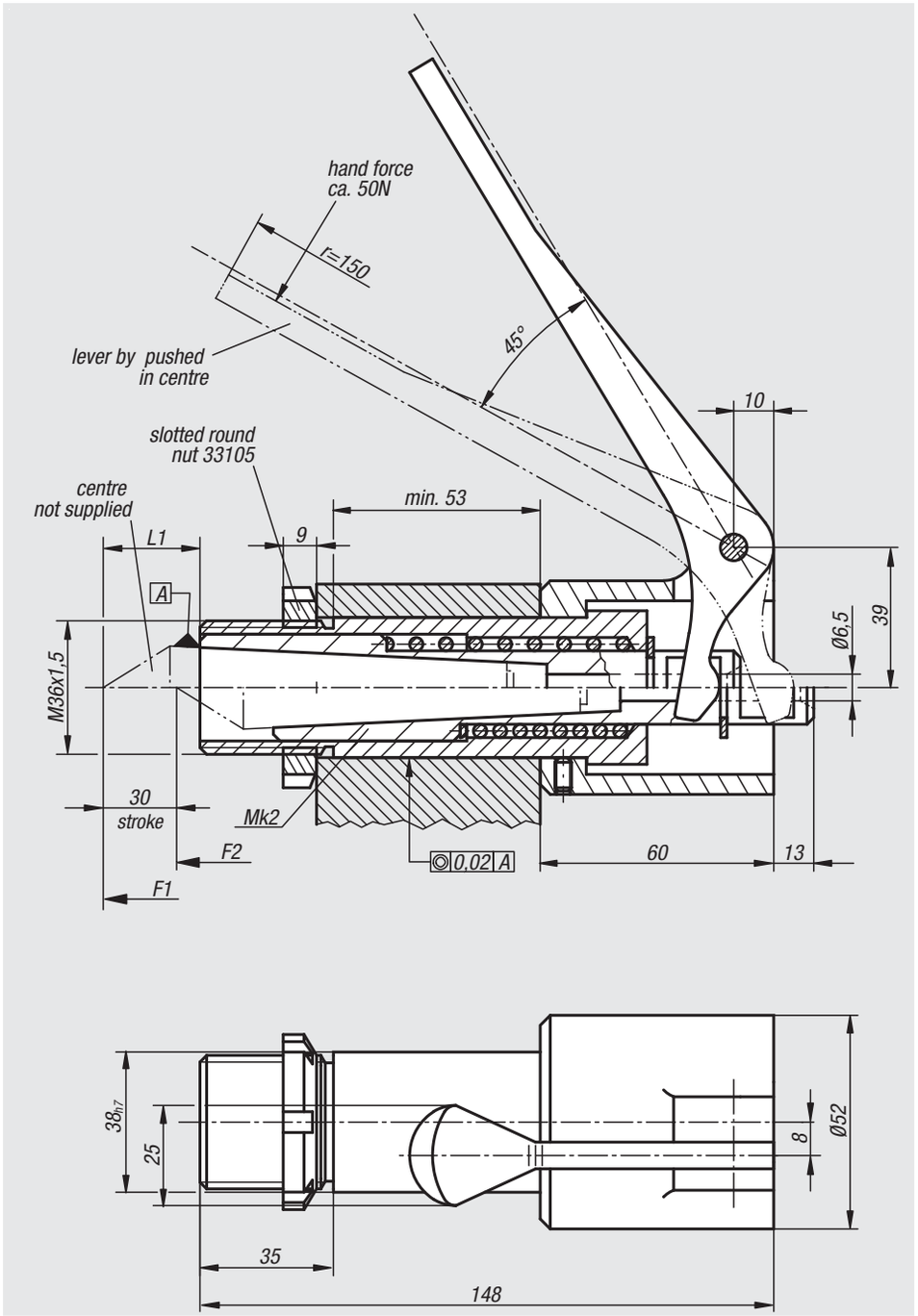
Spring mounted centre sleeves

with tension lever

Material:
Steel.

Version:
Black oxidised.

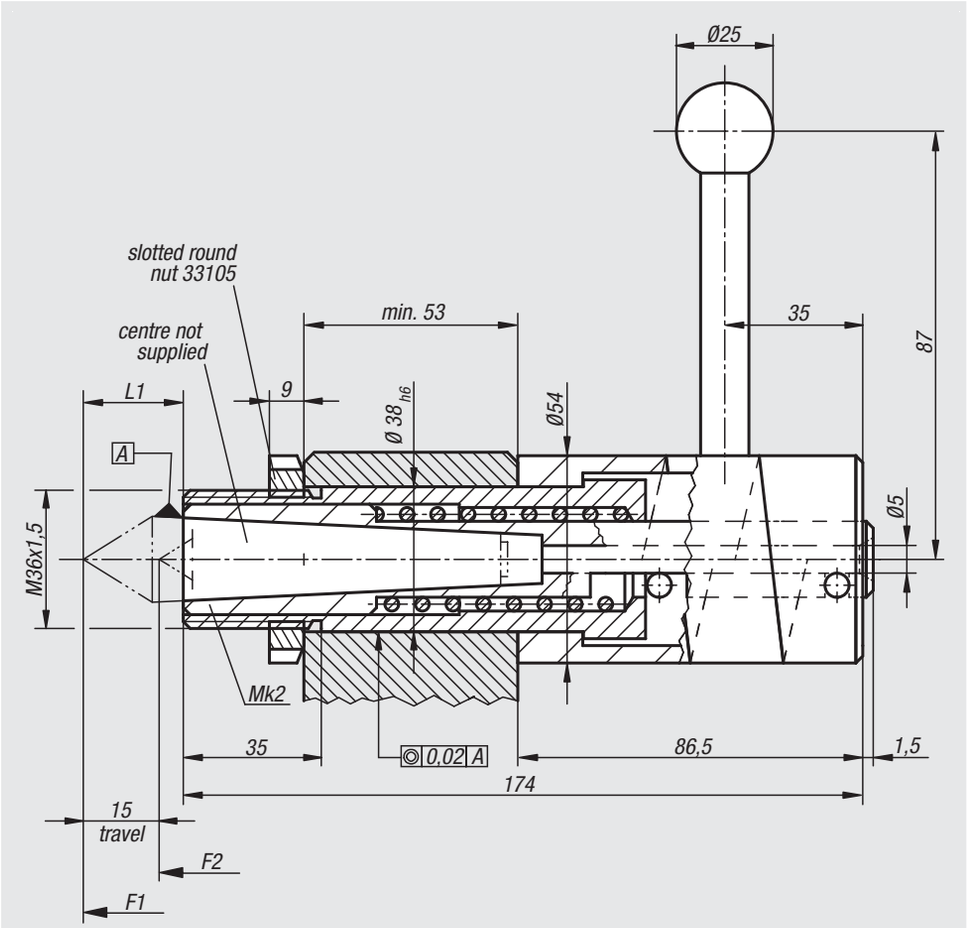
Sample order:
nlm 33180-02



Order No.	L1	suitable centre	Spring force initial pressure F1 approx. N	Final pressure F2 approx. N
33180-02	32	33190-02096	100	150
	41	33190-02105		
	49	33190-02113		

Spring mounted centre sleeves

with lifting cam



Material:
Steel.
Ball on lever black Duroplast PF 31

Version:
Black oxidised.

Sample order:
nlm 33182-02

Note:
The max. travel of 15 mm is achieved rotating the lifting cam 180°.

Order No.	L1	suitable centre	Spring force initial pressure F1 approx. N	Final pressure F2 approx. N
33182-02	32	33190-02096	100	137
	41	33190-02105		
	49	33190-02113		

33184

Adjustable holder

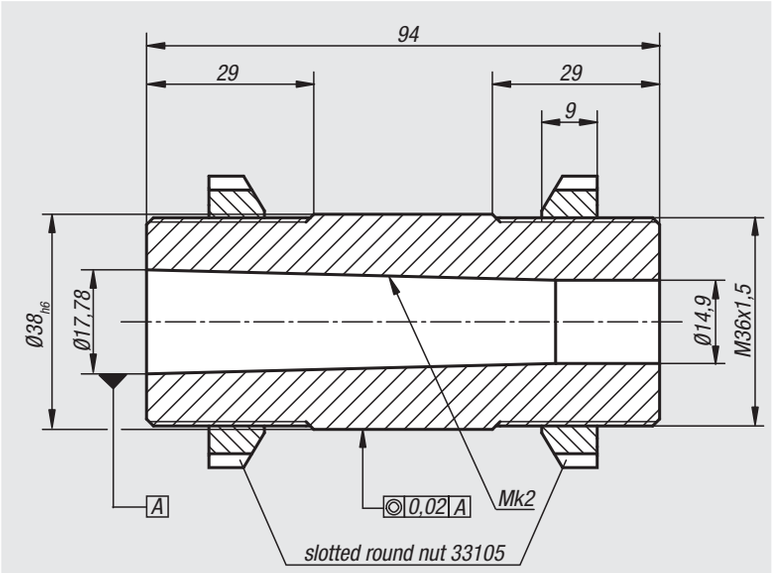
for fixed centres

Material:
Body 1.7220

Version:
Black oxidised.

Sample order:
nlm 33184-02

Note:
Matching fixed centre 33190.



Order No.	Dimensions
33184-02	see drawing

33190

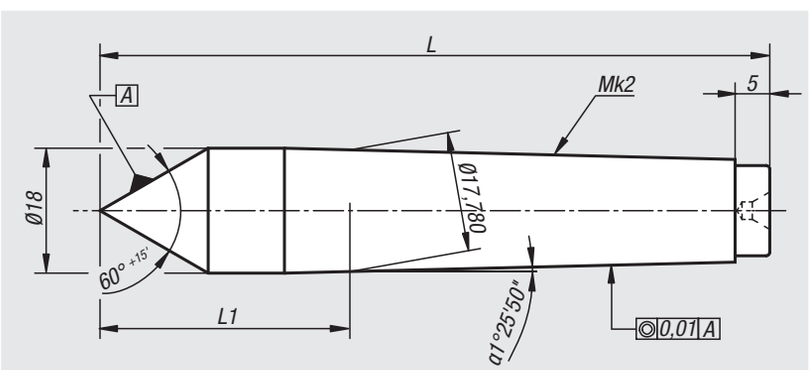
Fixed centres

Material:
1.2067

Version:
Hardened and ground, bright.

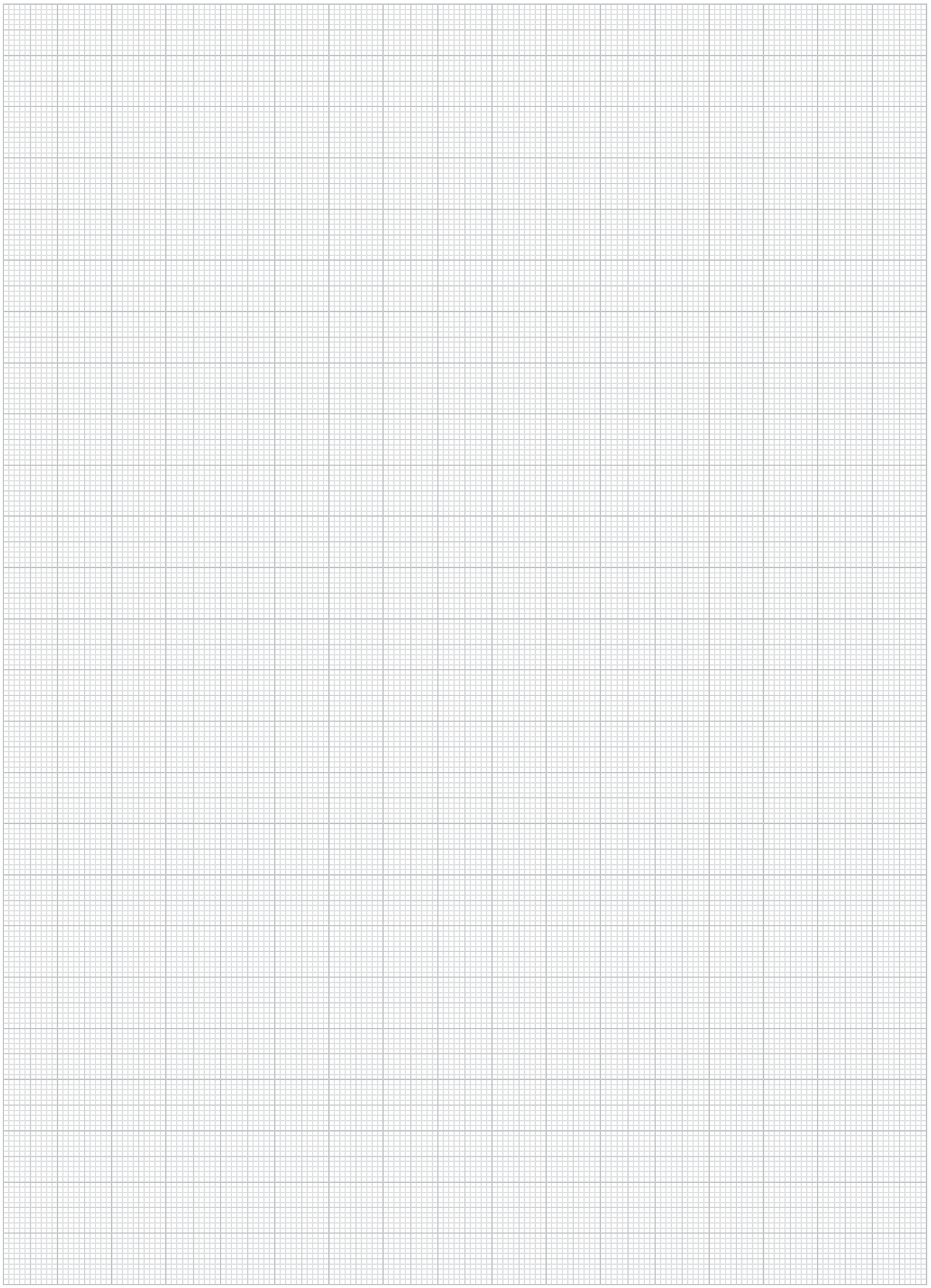
Sample order:
nlm 33190-02105

Note:
These fixed centres fit in 33180, 33182 and 33184.



Order No.	L	L1
33190-02096	96	32
33190-02105	105	41
33190-02113	113	49

Notes



Measuring element

for gear wheels

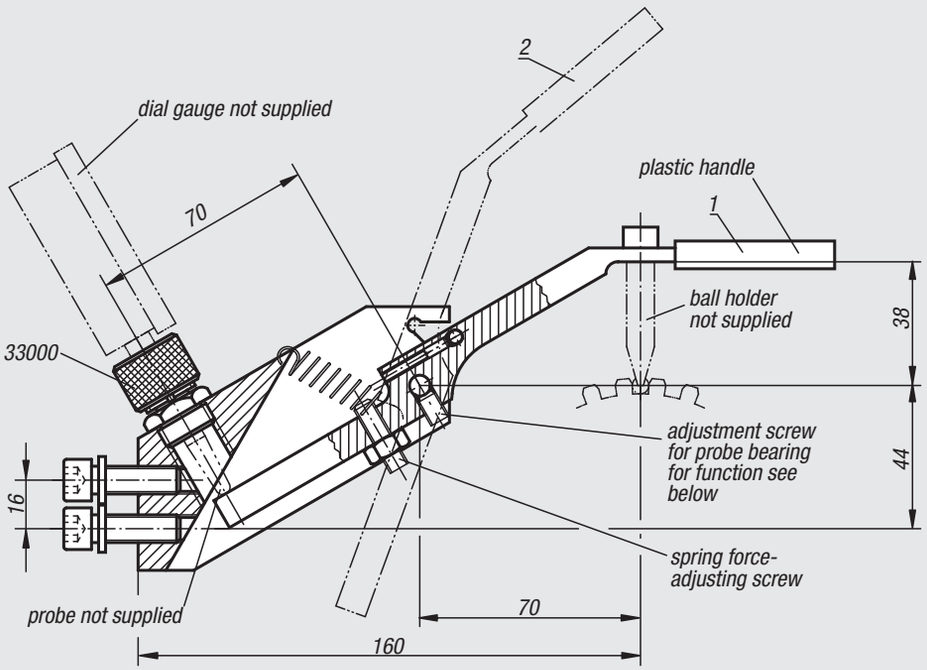
Material:
Steel.

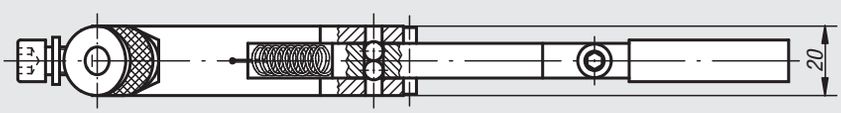
Version:
Black oxidised.

Sample order:
nlm 33202-070

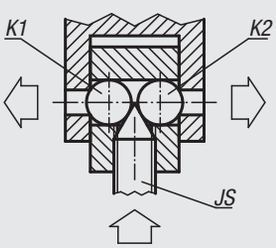
Note:
1 = Probe lever in test position
2 = Probe lever at rest, engaged.

Suitable ball holder see 32205.
Dial gauges see 32540 and 32542.
Probe inserts see 33040 up to 33052.

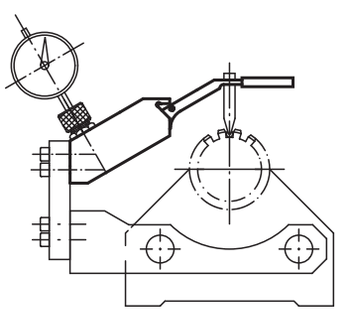




Function of probe bearing

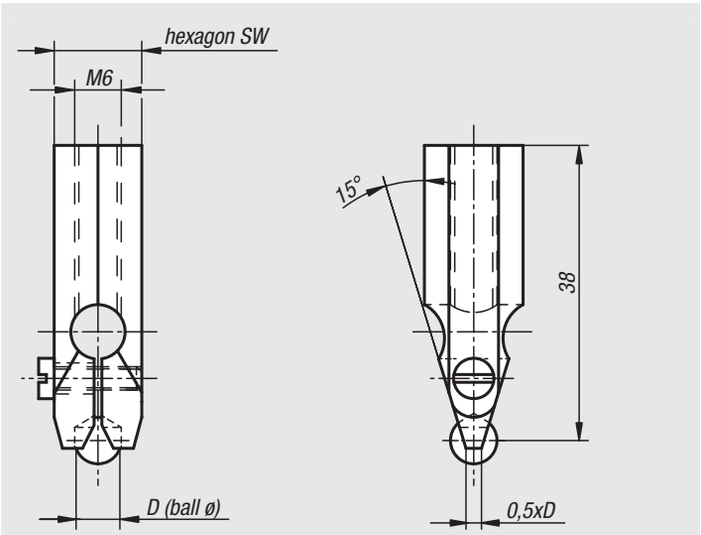


Both balls K1 and K2 are moved apart and pressed against the wall by turning the adjustment screw (JS). This allows for play-free adjustment.



Order No.	Dimensions
33202-070	see drawing

Ball holders



Material:
Spring steel

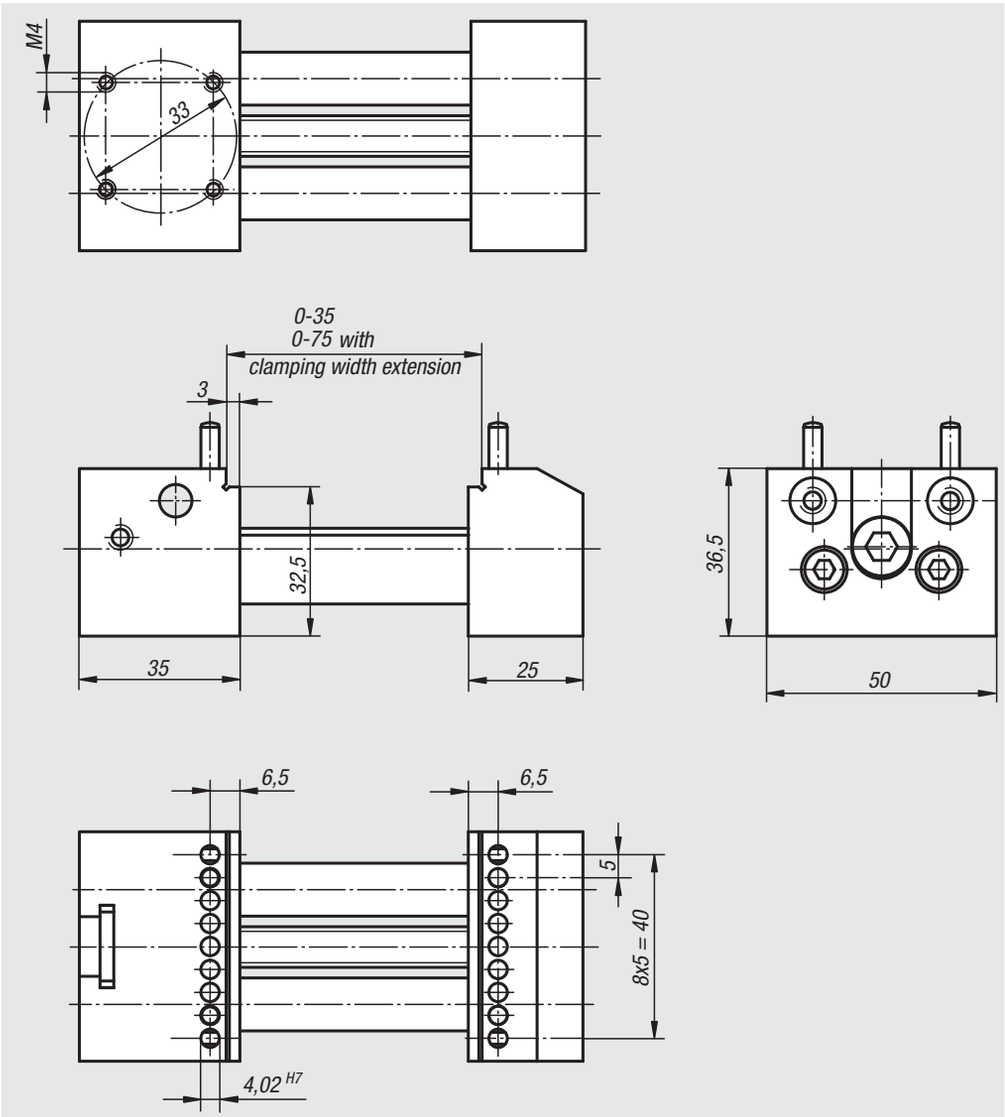
Version:
Black oxidised.

Sample order:
nlm 33205-03500

Note:
Carbide balls available on request.
The ball holders fit in the measuring element for gear wheels 33202.

Order No.	D	SW
33205-02000	2	10
33205-02380	2,38	10
33205-02500	2,5	10
33205-03000	3	10
33205-03500	3,5	10
33205-03960	3,96	10
33205-04000	4	10
33205-04500	4,5	10
33205-04760	4,76	10
33205-05000	5	10
33205-05560	5,56	10
33205-06000	6	10
33205-06500	6,5	13
33205-07000	7	13
33205-07540	7,54	13
33205-07938	7,938	13
33205-08500	8,5	13
33205-09520	9,52	13
33205-10000	10	13

Precision vice



Material:
Steel.

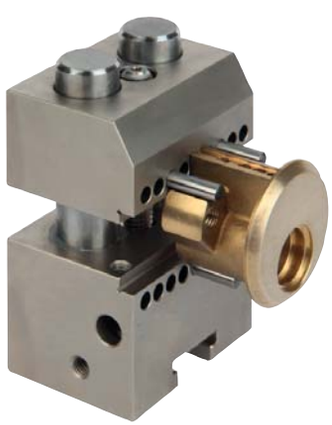
Version:
surface-hardened and precision-ground.

Sample order:
nlm 33225-500351

Note:
The precision vice is a flexible solution for positioning and securing workpieces quickly and easily for measuring on test machines. Parts are held in the offset jaws or pins that can be inserted into the jaws. The pins allow workpieces to be held in bores. The interchangeable guide columns allow the clamping width to be increased from 35 mm to up to 75 mm. The vice can be placed on the measuring table in 4 positions at right angles to each other.

The vice is supplied with an adjustable stop, a set of columns for extending the clamping width
up to 75 mm, a spindle extension, 4 pins and operating tool.

On request:
Set of columns for extending the clamping width 100 mm or 150 mm.



Order No.	Dimensions
33225-500351	see drawing

Accessories for precision vice

33225-01
Offset cylindrical pins
for clamping tall parts

33225-03
Offset cylindrical pins
for clamping tall parts
with 120° vee block

33225-05
Jaws for narrow parts

33225-06
Prism jaws

33225-07
Prism jaws
with two-point contact

33225-08
Prism jaws
with three-point contact

Order No.	Article description	Material	Clamp range	Supplied with
33225-01	CYLINDRICAL PIN OFFSET FOR PRECISION VICE	Steel	-	4-piece set
33225-03	CYLINDRICAL PIN OFFSET FOR PRECISION VICE	Steel	-	4-piece set
33225-05	JAW FOR PRECISION VICE	Stainless steel	<3	Single with fastening screws
33225-06	PRISM JAW FOR PRECISION VICE	Aluminium	Ø2 - Ø10	Pair with fastening screws
33225-07	PRISM JAW FOR PRECISION VICE	Aluminium	Ø5 - Ø20	Pair with fastening screws
33225-08	PRISM JAW FOR PRECISION VICE	Aluminium	bis Ø30	Pair with fastening screws

Clamping component set

Sample order:
nlm 33250-12

Note:
Clamping component set for microscopes and optical measurement devices to quickly and flexibly clamp small parts. A wide variety of workpieces such as plastic, punched or turned parts can be precisely positioned and securely held. Holding parts, a frequent problem in measuring, is largely solved.

The basis of the clamping system is a high-quality clamping joint that is fixed to the measuring table. A quick-change interface allows elements such as chucks or clamps to be easily mounted on the clamping joint.

Supplied in a wooden case.

Application:
– chuck and V-block for holding rotationally symmetric parts
– stop angle, clamping clip and small parts clamps for clamping e.g. plate or sheet metal and bent parts.

small parts clamp "screw clamping"

precision chuck

spring clamp for horizontal clamping right/left

small parts clamp

clamping clip

spring clamp 34/50 mm

rotational unit 90° pitch

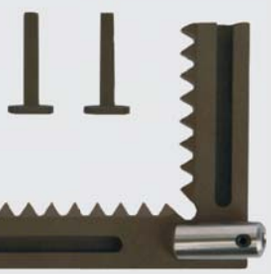
clamping joint

vee-block with spring clamp

spring clamp 34/50 for vertical clamping

clamping joint holder, vertical

column



universal hex socket key

stop angle

Clamping joint with precision small chuck

Clamping joint with small parts clamp

Clamping joint with vee-block and spring clamp

Order No.	Version	Content
33250-12	12 parts	clamping joint, stop angle, rotational unit 90° pitch, spring clamp for horizontal clamping right, spring clamp for horizontal clamping left, spring clamp 34 mm, spring clamp 50 mm, small parts clamp, vee-block with spring clamp, column, clamping clip, universal hex socket key
33250-18	18 parts	clamping joint, clamping joint holder - horizontal, stop angle, rotational unit 90° pitch, spring clamp for horizontal clamping right, spring clamp for horizontal clamping left, spring clamp 34 mm, spring clamp 50 mm, spring clamp 34 mm for vertical clamping, spring clamp 50 mm for vertical clamping, small parts clamp, small parts clamp „screw clamping“, vee-block with spring clamp, precision chuck, 2 columns, clamping clip, universal hex socket key

Spring fingers

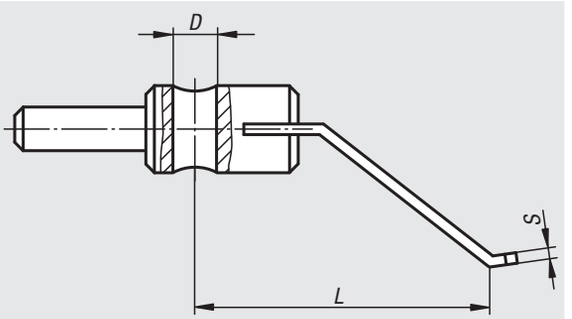
Material:
Stainless steel

Version:
Bright.

Sample order:
nlm 33260-10605010

Note:
For holding small parts on measurement and control plates.

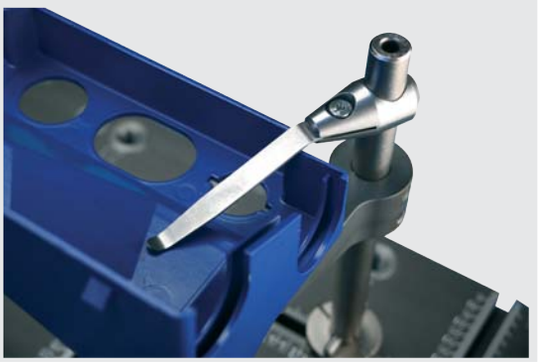
Accessories:
Columns for spring fingers 33262.



Spring finger, flat

Spring finger with fork

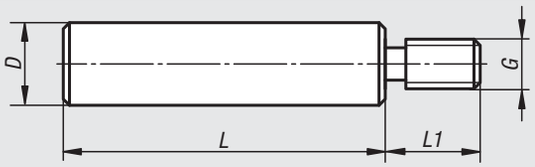
Spring finger, round



Order No.	Version	D	L	S
33260-10403004	flat	4	30	0,4
33260-10403008	flat	4	30	0,8
33260-10605010	flat	6	50	1
33260-10607510	flat	6	75	1
33260-11207510	flat	12	75	1
33260-11209510	flat	12	95	1
33260-21207515	fork	12	75	1,5
33260-21209515	fork	12	95	1,5
33260-30404011	round	4	40	1,1
33260-30406011	round	4	60	1,1
33260-31208025	round	12	80	2,5
33260-31208030	round	12	80	3

Columns

for spring fingers



Material:
Stainless steel 1.4301.

Version:
Bright.

Sample order:
nlm 33262-0606X030 (include length L)

Note:
Columns for holding our spring fingers.

Accessories:
Spring clamp 33260.

Order No.	D	G	L	L1
33262-0404X	4	M4	30/50	5
33262-0606X	6	M6	30/50	8
33262-0608X	6	M8	30/50	10
33262-1206X	12	M6	50/100	8
33262-1208X	12	M8	50/100	11,5
33262-1210X	12	M10	50/100/150	11,5

95000

Material handling and transport

Swivel and fixed castors

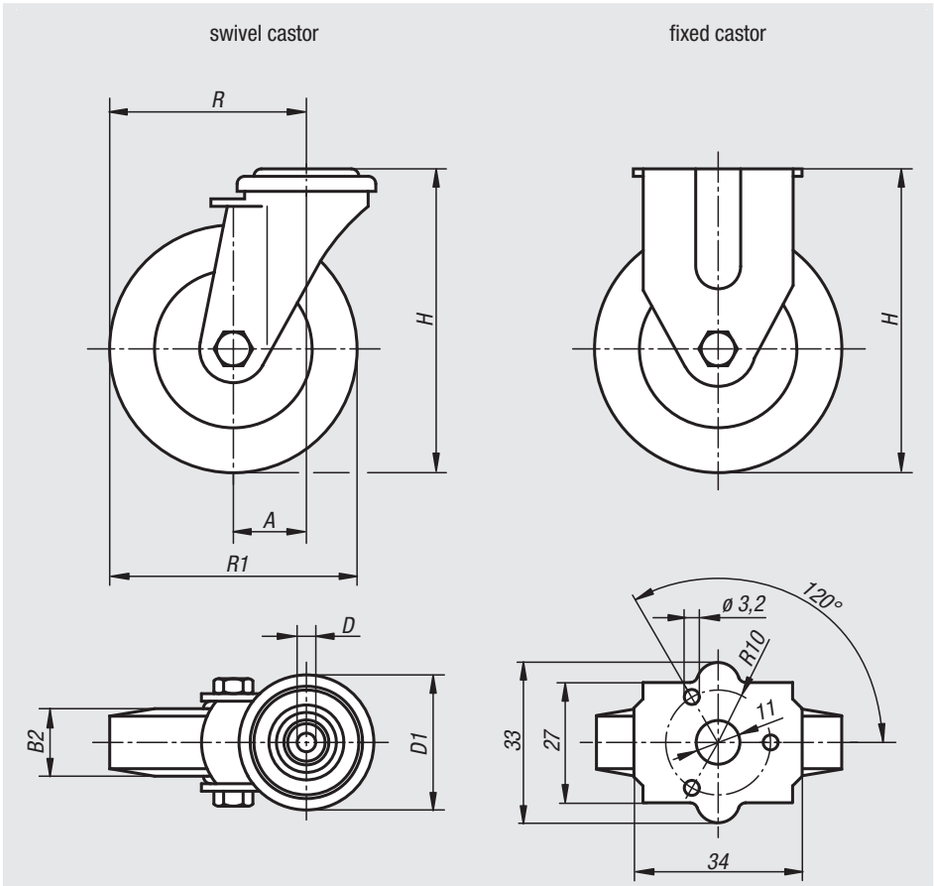
appliance, standard version

Material:
Housing steel plate.
Wheel treads solid rubber.
Wheel rims polyamide.

Version:
Housing press formed.
Double ball bearing in the castor head.
Plain bearing in wheels.

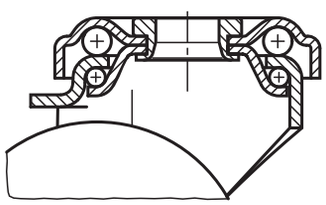
Sample order:
nlm 95010-07525

Note:
Wheel axle bolted.
Swivel and fixed castors with bolt hole.
Wheels grey, non-marking.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B2	D	D1	H	R	R1	Permissible load kg
95010-05018	**95010-050181**	**95010-050182**	plain bearing	25/-	18	11/-	43/-	69	50/-	50	40
95010-07525	**95010-075251**	**95010-075252**	plain bearing	28/-	25	11/-	43/-	98	65,5/-	75	60
95010-10025	**-**	**95010-100252**	plain bearing	33	25	11	43	121	83	100	70

Swivel and fixed castors

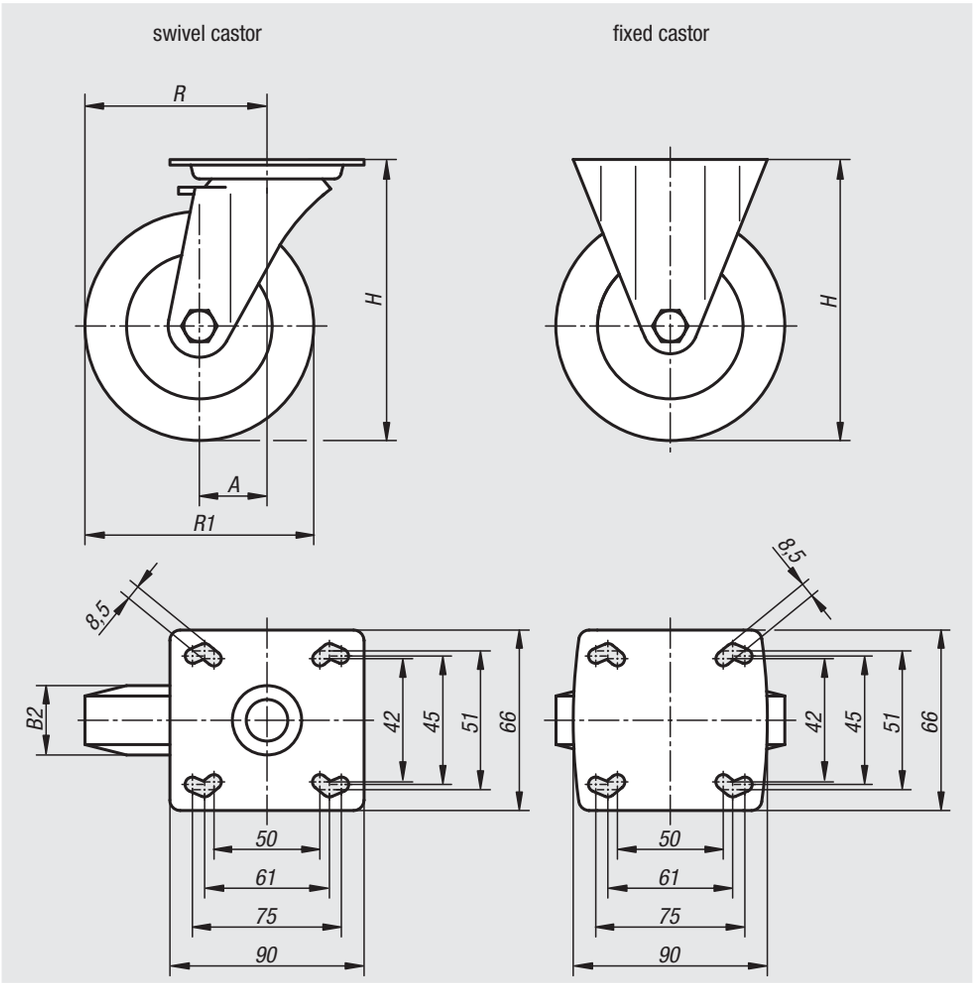
heavy-duty version

Material:
Housing steel plate.
Wheel treads solid rubber.
Wheel rims polyamide.

Version:
Housing press formed.
Double ball bearing in the castor head.
Plain bearing in wheels.

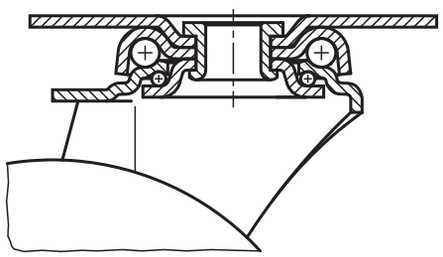
Sample order:
nlm 95012-10032

Note:
Wheel axle bolted.
Solid rubber tyres are shock and impact proof and non-corroding.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B2	H	R	R1	Permissible load kg
95012-08025	**95012-080251**	**95012-080252**	plain bearing	40/-	25	111	80/-	80	60
95012-10032	**95012-100321**	**95012-100322**	plain bearing	40/-	32	136	90/-	100	90
95012-12525	**95012-125251**	**95012-125252**	plain bearing	40/-	25	161	102,5/-	125	80
95012-12532	**95012-125321**	**95012-125322**	plain bearing	40/-	32	161	102,5/-	125	100

Swivel and fixed castors

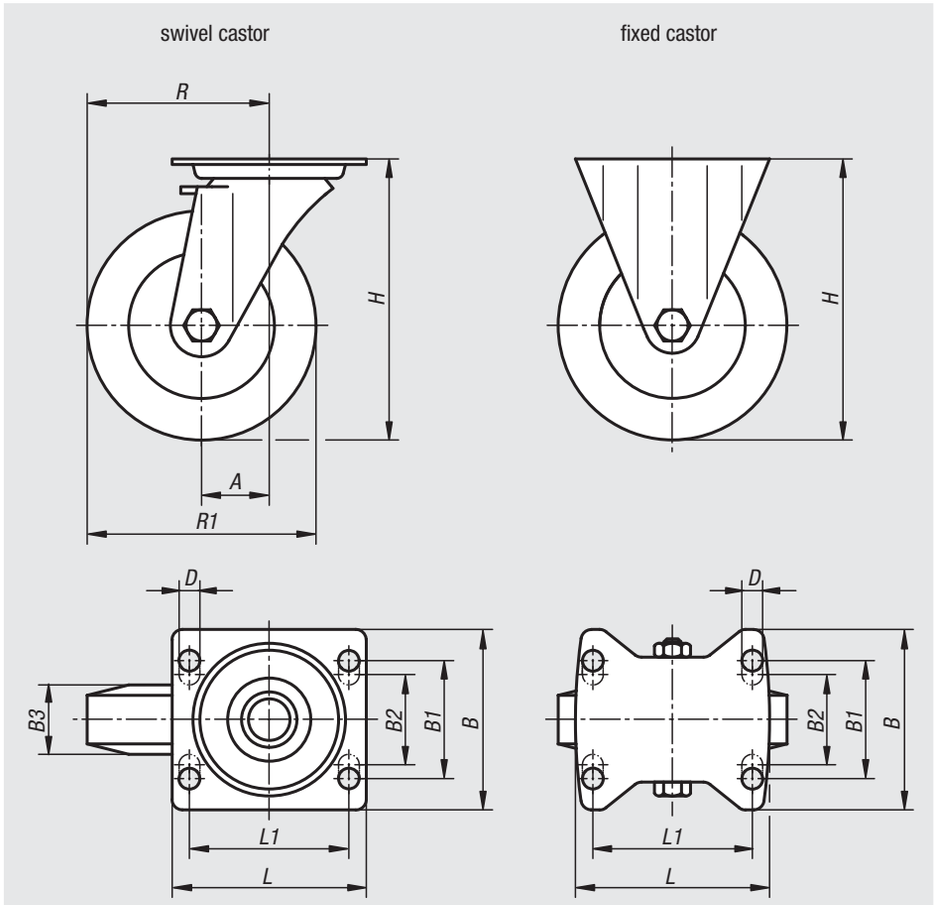
standard version

Material:
Housing and wheel rim steel plate.
Tyres solid rubber.
Wheel hub steel tube.

Version:
Housing and rim press formed.
Double ball bearing with ball shield in castor head.
Roller bearings in the wheels.

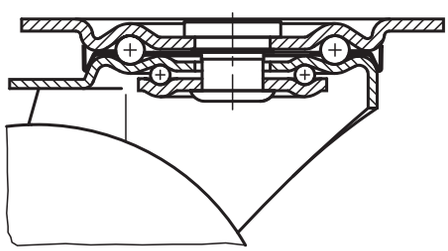
Sample order:
nlm 95016-10030

Note:
Wheel axle bolted.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95016-08025	**95016-080251**	**95016-080252**	roller bearing	38/-	85	60	-	25	100	80	102	9	78/-	80	50
95016-10030	**95016-100301**	**95016-100302**	roller bearing	36/-	85	60	-	30	100	80	125	9	86/-	100	70
95016-12538	**95016-125381**	**95016-125382**	roller bearing	40/-	85	60	-	37,5	100	80	150	9	102,5/-	125	100
95016-16040	**95016-160401**	**95016-160402**	roller bearing	60/-	110	80	75	40	140	105	195	11	140/-	160	135
95016-20050	**95016-200501**	**95016-200502**	roller bearing	65/-	110	80	75	50	140	105	235	11	165/-	200	205

Swivel and fixed castors

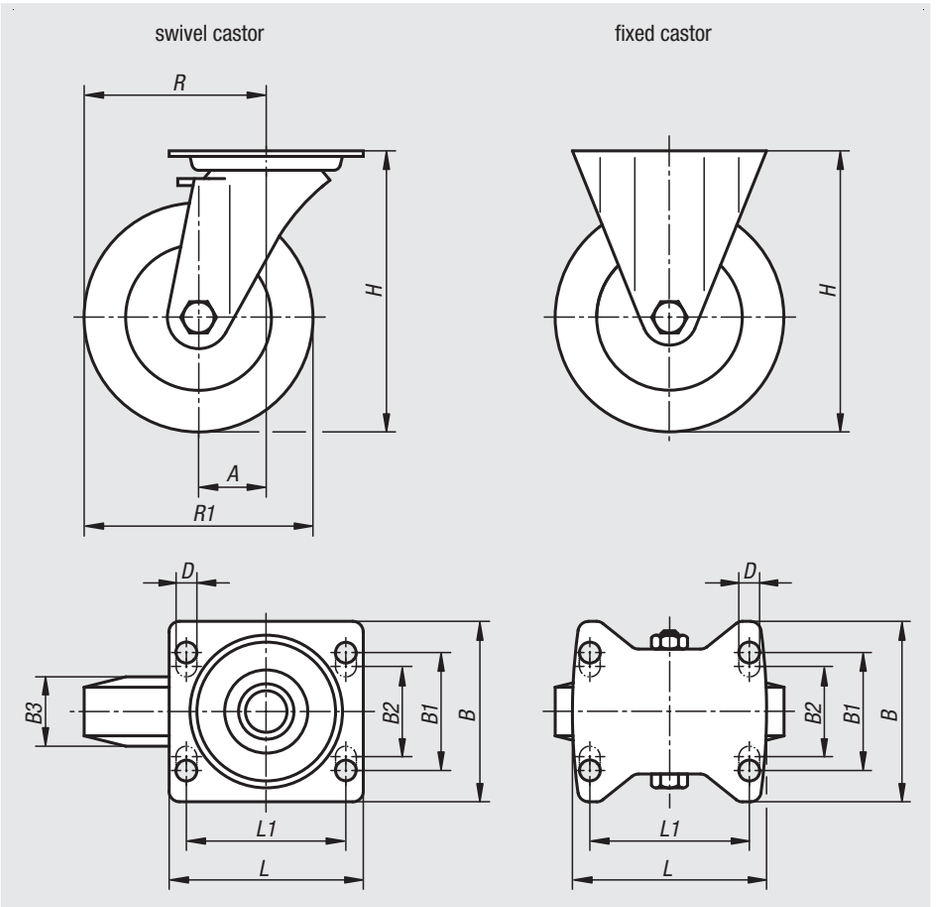
standard version

Material:
Housing steel plate.
Wheel body PA 6 with vulcanised elastic solid rubber tyre.

Version:
Housing press formed.
Double ball bearing with ball shield in castor head.
Roller bearings in the wheels.

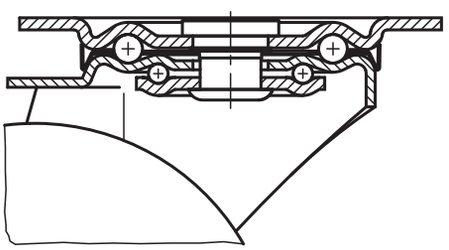
Sample order:
nlm 95018-12537

Note:
Wheel axle bolted.
Wheels are shock and impact proof.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95018-10037	**95018-100371**	**95018-100372**	roller bearing	36/-	85	60	-	38	100	80	125	9	86/-	100	170
95018-12537	**95018-125371**	**95018-125372**	roller bearing	40/-	85	60	-	40	100	80	150	9	102,5/-	125	200
95018-16050	**95018-160501**	**95018-160502**	roller bearing	60/-	110	80	75	50	140	105	195	11	140/-	160	350
95018-20050	**95018-200501**	**95018-200502**	roller bearing	65/-	110	80	75	50	140	105	235	11	165/-	200	400

Swivel and fixed castors

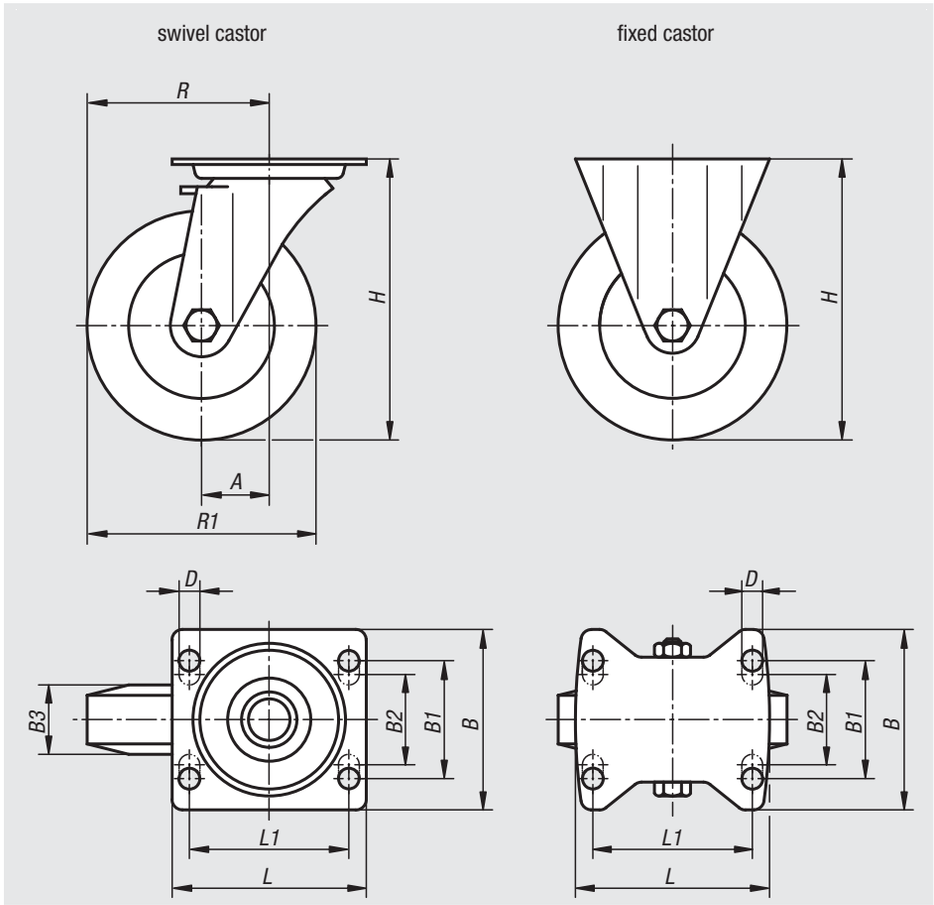
heavy-duty version

Material:
Housing thick steel plate.
Tyres steel-wire reinforced elastic solid rubber.
Wheel body welded steel.

Version:
Housing press formed.
Reinforced fork, base plate and centre pin.
Double ball bearing with hardened shells in the castor head.
Precision ball bearings in the wheels.

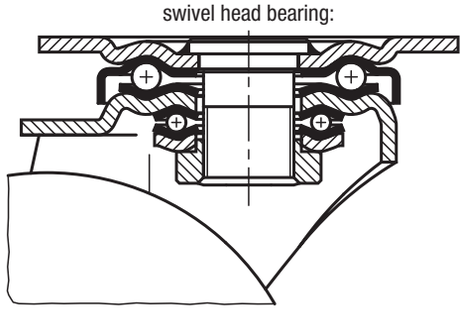
Sample order:
nlm 95020-12550

Note:
These castors are particularly impact and shock proof and assure a high service life.
Wheel axle bolted.



wheel and swivel head brake „stop-top“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95020-10040	**95020-100401**	**95020-100402**	ball bearing	45/-	85	60	-	40	100	80	140	9	95/-	100	180
95020-12550	**95020-125501**	**95020-125502**	ball bearing	55/-	110	80	75	50	140	105	170	11	117,5/-	125	280
95020-16050	**95020-160501**	**95020-160502**	ball bearing	65/-	110	80	75	50	140	105	202	11	145/-	160	400
95020-20050	**95020-200501**	**95020-200502**	ball bearing	70/-	110	80	75	50	140	105	245	11	170/-	200	500
95020-25060	**95020-250601**	**95020-250602**	ball bearing	82/-	110	80	75	60	140	105	295	11	207/-	250	700

Swivel and fixed castors

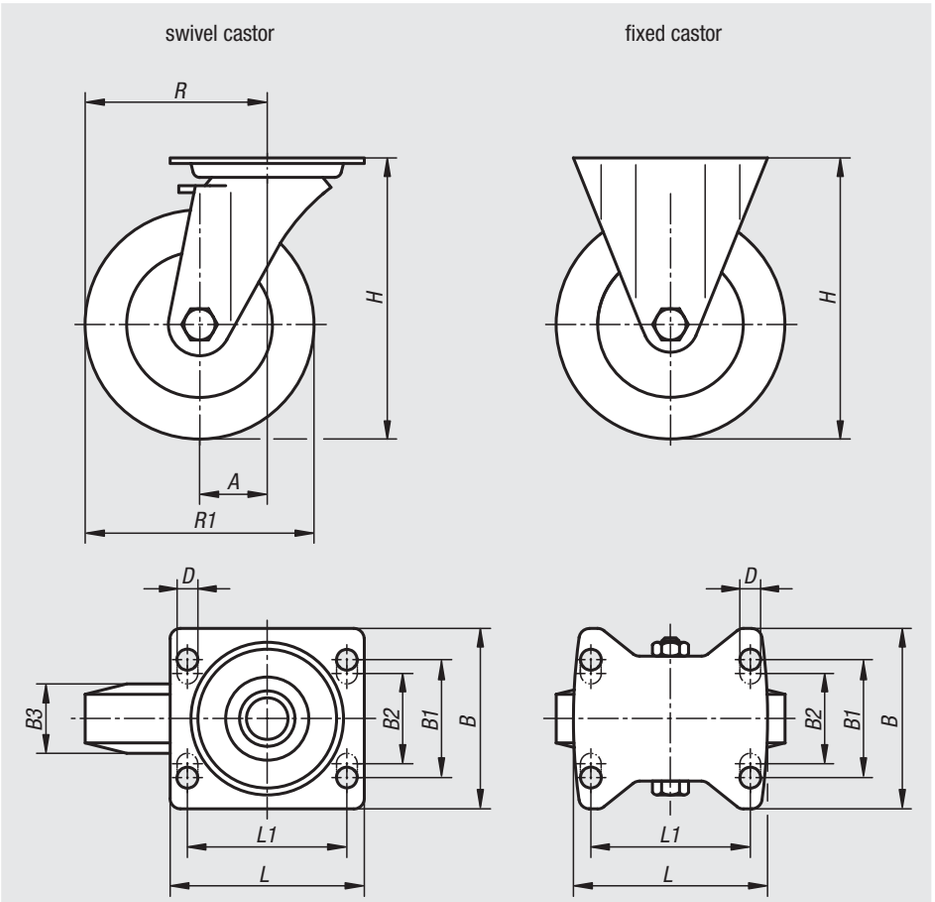
standard version

Material:
Housing steel plate.
Wheel body PA 6 with abrasion-resistant polyurethane tread.

Version:
Housing press formed.
Double ball bearing with ball shield in the castor head.
Plain bearing in the wheels.

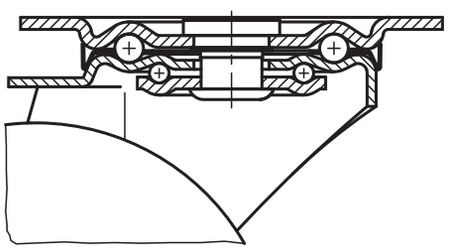
Sample order:
nlm 95024-12535

Note:
The wheels are unbreakable, maintenance-free and non-corroding. Wheel axle bolted. Tread non-marking.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95024-10035	**95024-100351**	**95024-100352**	plain bearing	36/-	85	60	-	35	100	80	125	9	86/-	100	200
95024-12535	**95024-125351**	**95024-125352**	plain bearing	40/-	85	60	-	40	100	80	150	9	102,5/-	125	200
95024-15040	**95024-150401**	**95024-150402**	plain bearing	60/-	110	80	75	45	140	105	190	11	135/-	150	400
95024-20050	**95024-200501**	**95024-200502**	plain bearing	65/-	110	80	75	50	140	105	235	11	165/-	200	400

Swivel and fixed castors

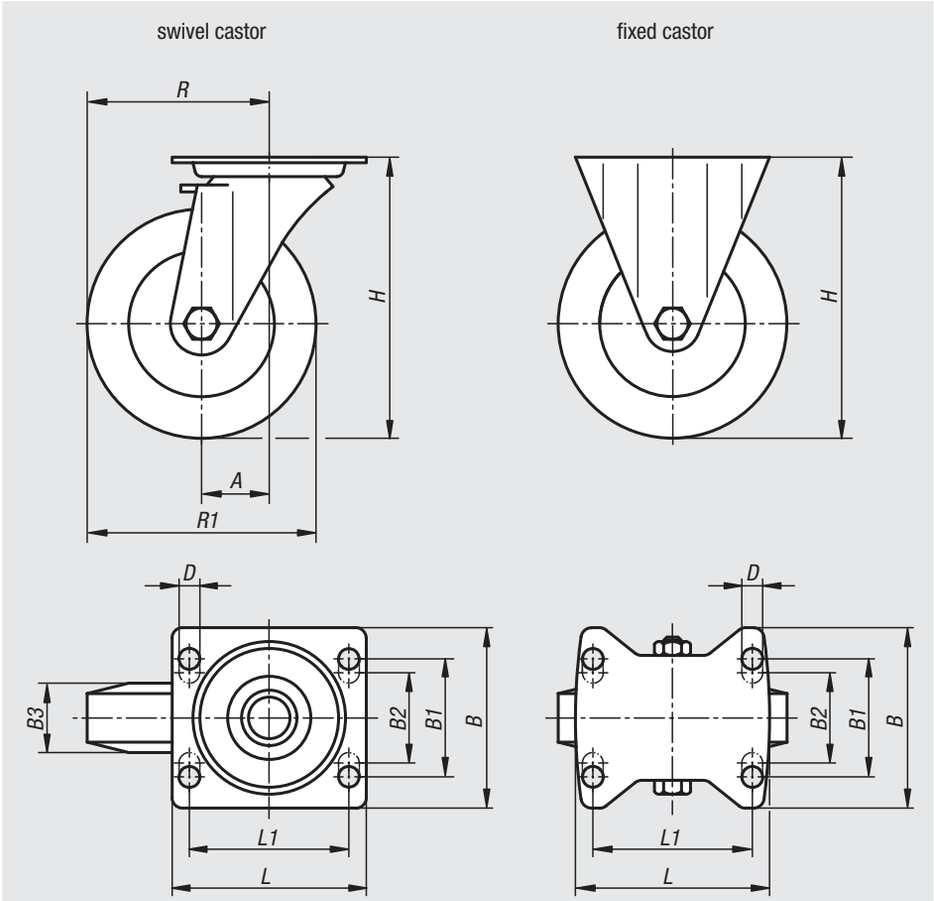
medium-duty version

Material:
Housing steel plate.
Wheel body die-cast aluminium with Extrathane® tread.

Version:
Housing press formed.
Double ball bearing with ball shield in the castor head.
Precision ball bearings in the wheels.

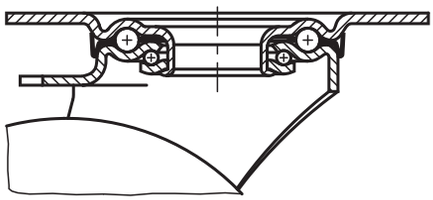
Sample order:
nlm 95028-12540

Note:
The wheels are non-corroding and have a low rolling resistance. Wheel axle bolted.

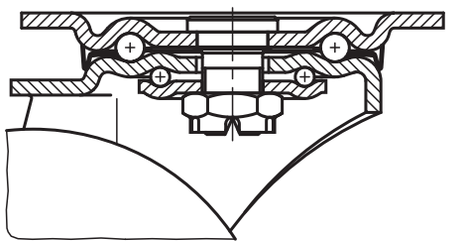


wheel and swivel head brake "stop-top"

swivel head bearing up to R1 = 125



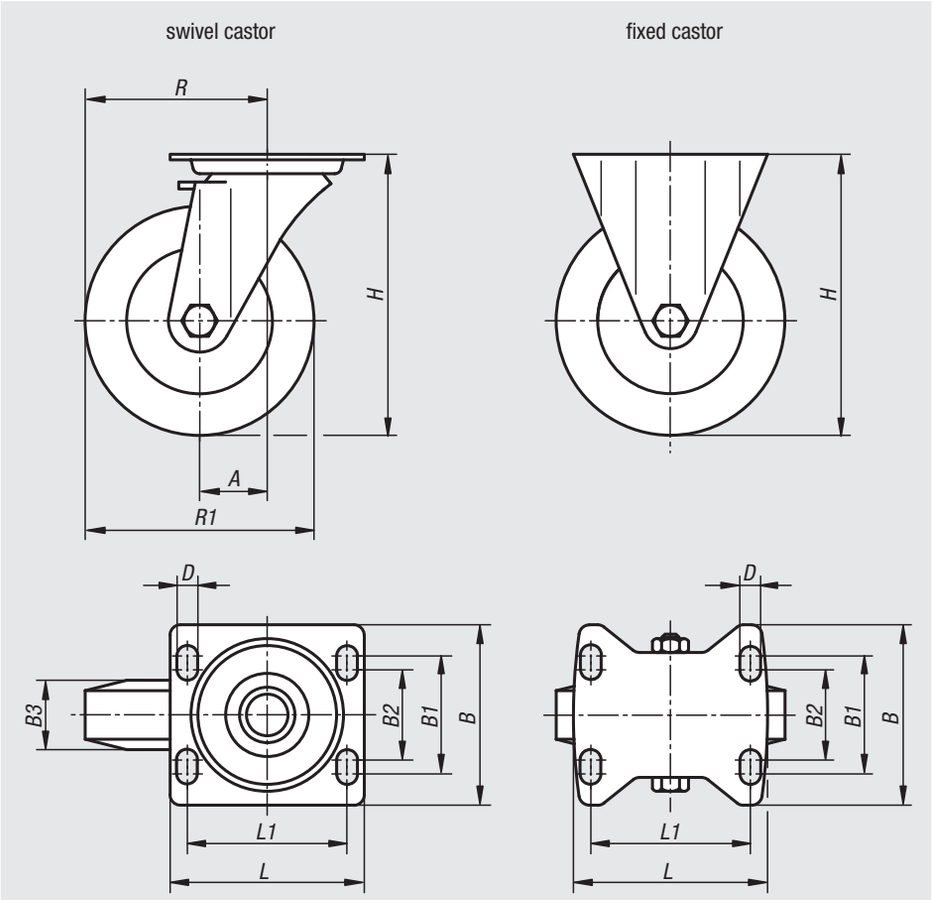
swivel head bearing from R1 = 160



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95028-10040	**95028-100401**	**95028-100402**	ball bearing	45/-	85	60	-	40	100	80	130	9	95/-	100	250
95028-12540	**95028-125401**	**95028-125402**	ball bearing	48/-	85	60	-	40	100	80	155	9	110,5/-	125	250
95028-16050	**95028-160501**	**95028-160502**	ball bearing	63/-	110	80	75	50	140	105	202	11	143/-	160	550
95028-20050	**95028-200501**	**95028-200502**	ball bearing	70/-	110	80	75	50	140	105	245	11	170/-	200	800

Swivel and fixed castors

heavy-duty version



Material:
Housing thick steel plate.
Wheels welded steel body and Extrathane® tread.

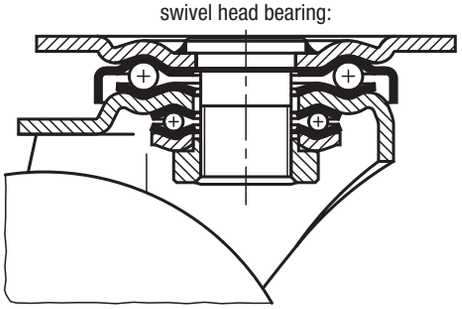
Version:
Housing press formed.
Swivel castor housing with strong fork and base plate, very robust centre pin bolted and secured. The swivel head is additionally reinforced with specially formed and hardened bearing shells.

Sample order:
nlm 95030-16050

Note:
These castors are particularly shock and impact proof. The treads resist abrasion and are elastic and low-noise. Wheel axle bolted.

wheel and swivel head brake „stop-top“

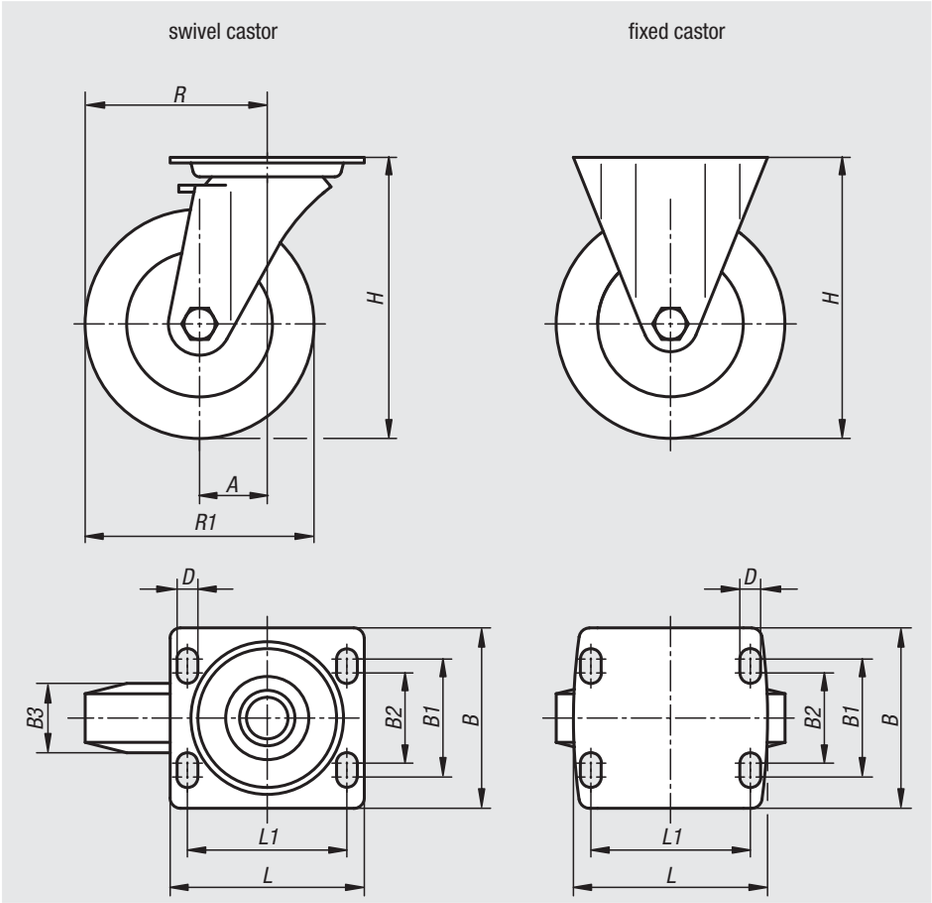
swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95030-12550	**95030-125501**	**95030-125502**	ball bearing	55/-	110	80	75	50	140	105	170	11	117,5/-	125	500
95030-16050	**95030-160501**	**95030-160502**	ball bearing	65/-	110	80	75	50	140	105	202	11	145/-	160	700
95030-20050	**95030-200501**	**95030-200502**	ball bearing	70/-	110	80	75	50	140	105	245	11	170/-	200	900

Swivel and fixed castors

welded steel heavy-duty version



Material:
Housing solid welded steel construction.
Wheels with welded steel body and Extrathane® tread.

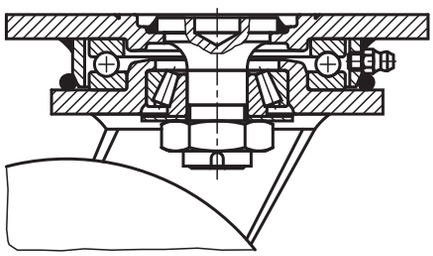
Version:
The housing is a rugged welded steel construction.
Swivel castor housing with DIN 711 axial groove ball bearing and DIN 720 tapered roller bearing in the swivel head. Dust and splash-proof, with grease nipple. Precision ball bearings in the wheels.

Sample order:
nlm 95032-20050

Note:
Centre pin welded in, bolted and secured.
Wheel axle bolted.

wheel and swivel head brake „stop-top“

Swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95032-16050	**95032-160501**	**95032-160502**	ball bearing	55/-	110	80	75	50	140	105	205	11	135/-	160	700
95032-20050	**95032-200501**	**95032-200502**	ball bearing	60/-	110	80	75	50	140	105	245	11	160/-	200	1000
95032-25060	**95032-250601**	**95032-250602**	ball bearing	75/-	140	105	-	60	175	140	305	14	200/-	250	1350

Swivel and fixed castors

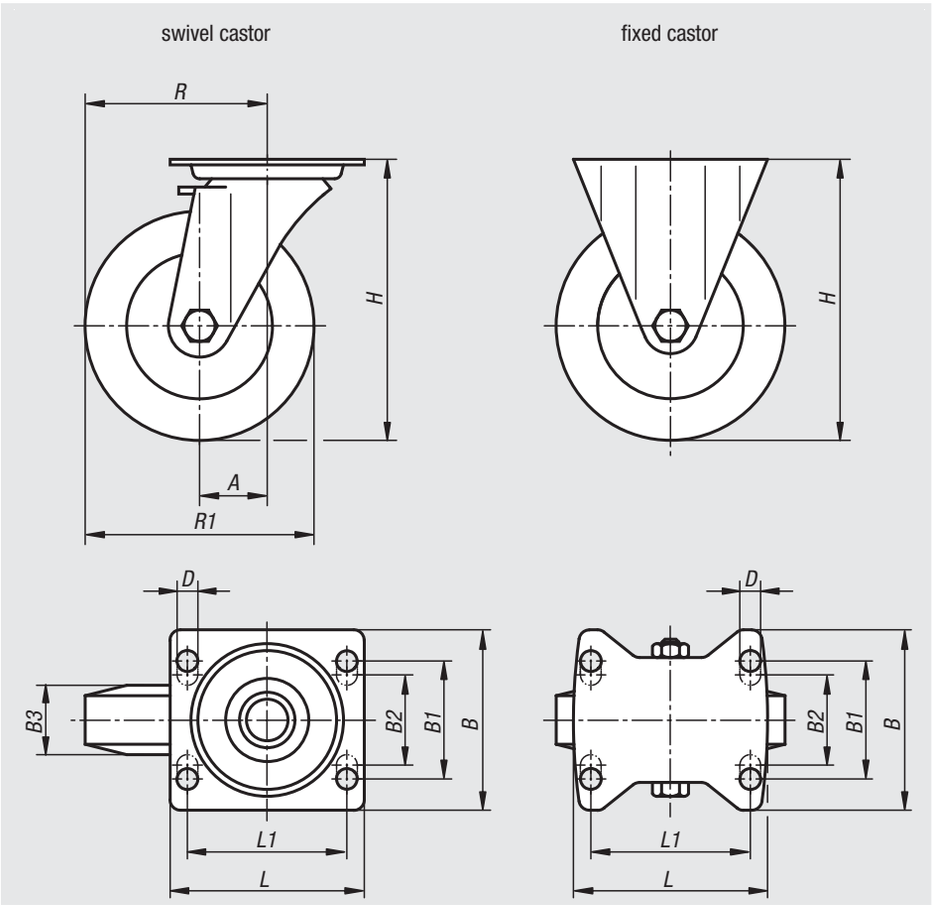
standard version

Material:
Housing steel plate.
Wheels PA 6.

Version:
Housing press formed.
Double ball bearing with ball shield in the castor head.
Plain bearings in the wheels.

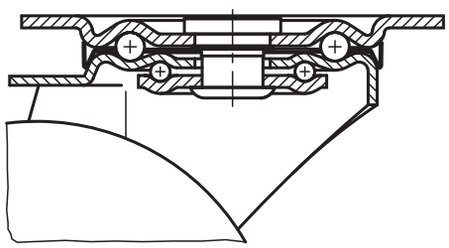
Sample order:
nlm 95034-10037

Note:
The PA 6 wheels have a low rolling resistance, are non-corroding, resist abrasion and are particularly shock and impact proof.



wheel and swivel head brake „stop-fix“

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-fix“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95034-07532	**95034-075321**	**95034-075322**	plain bearing	35/-	85	60	-	32	100	80	98	9	72,5/-	75	200
95034-10037	**95034-100371**	**95034-100372**	plain bearing	35/-	85	60	-	37	100	80	125	9	85/-	100	200
95034-12540	**95034-125401**	**95034-125402**	plain bearing	40/-	85	60	-	40	100	80	150	9	102,5/-	125	200
95034-15050	**95034-150501**	**95034-150502**	plain bearing	60/-	110	80	75	50	140	105	190	11	135/-	150	400

Swivel and fixed castors

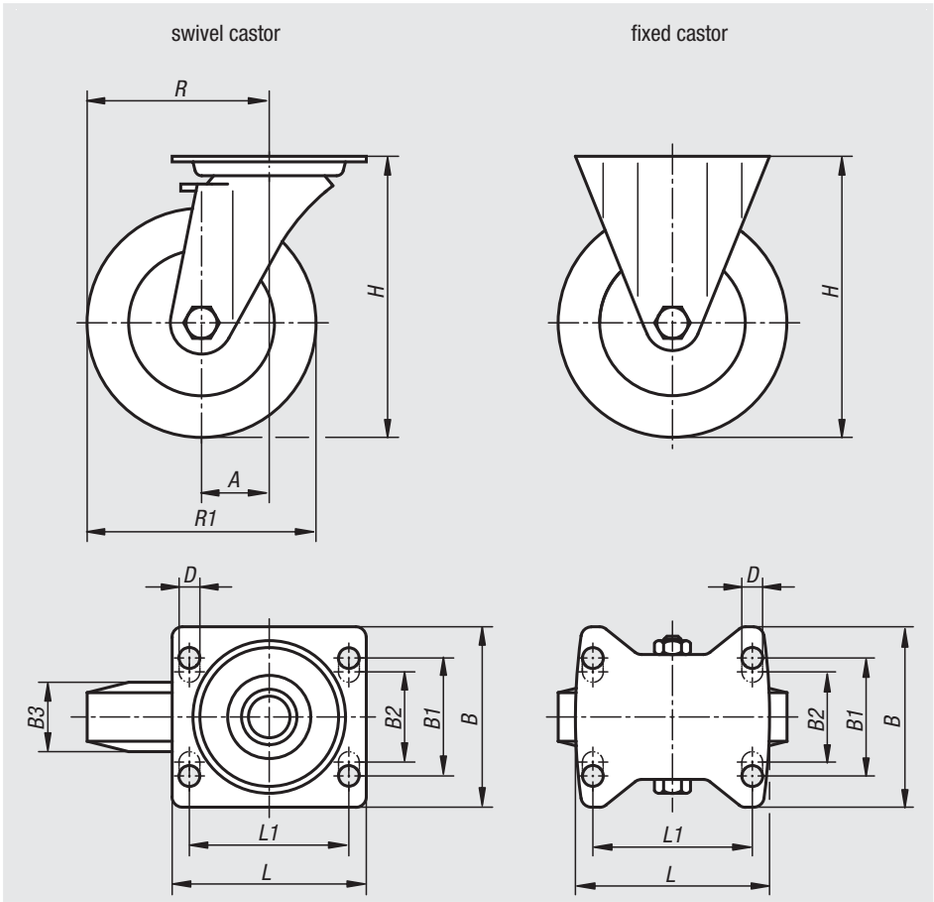
heavy-duty version

Material:
Housing thick steel plate.
Wheels PA 6.

Version:
Housing press formed.
Swivel castor housing with strong fork and base plate, very robust centre pin bolted and secured. The swivel head is additionally reinforced with specially formed and hardened bearing shells. Plain bearings in the wheels.

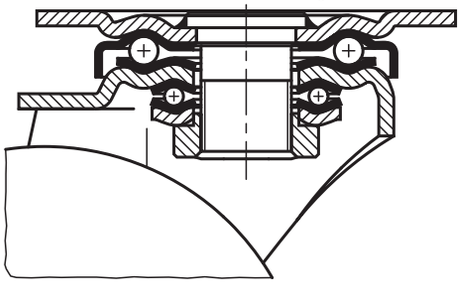
Sample order:
nlm 95036-12540

Note:
Wheel axle bolted. The wheels are particularly shock and impact proof and have high abrasion resistance.



wheel and swivel head brake "stop-top"

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95036-10037	**95036-100371**	**95036-100372**	plain bearing	45/-	85	60	-	37	100	80	140	9	95/-	100	280
95036-12540	**95036-125401**	**95036-125402**	plain bearing	45/-	85	60	-	40	100	80	165	9	107,5/-	125	300
95036-15050	**95036-150501**	**95036-150502**	plain bearing	65/-	110	80	75	50	140	105	197	11	140/-	150	400
95036-20050	**95036-200501**	**95036-200502**	plain bearing	70/-	110	80	75	50	140	105	245	11	170/-	200	600

Swivel and fixed castors

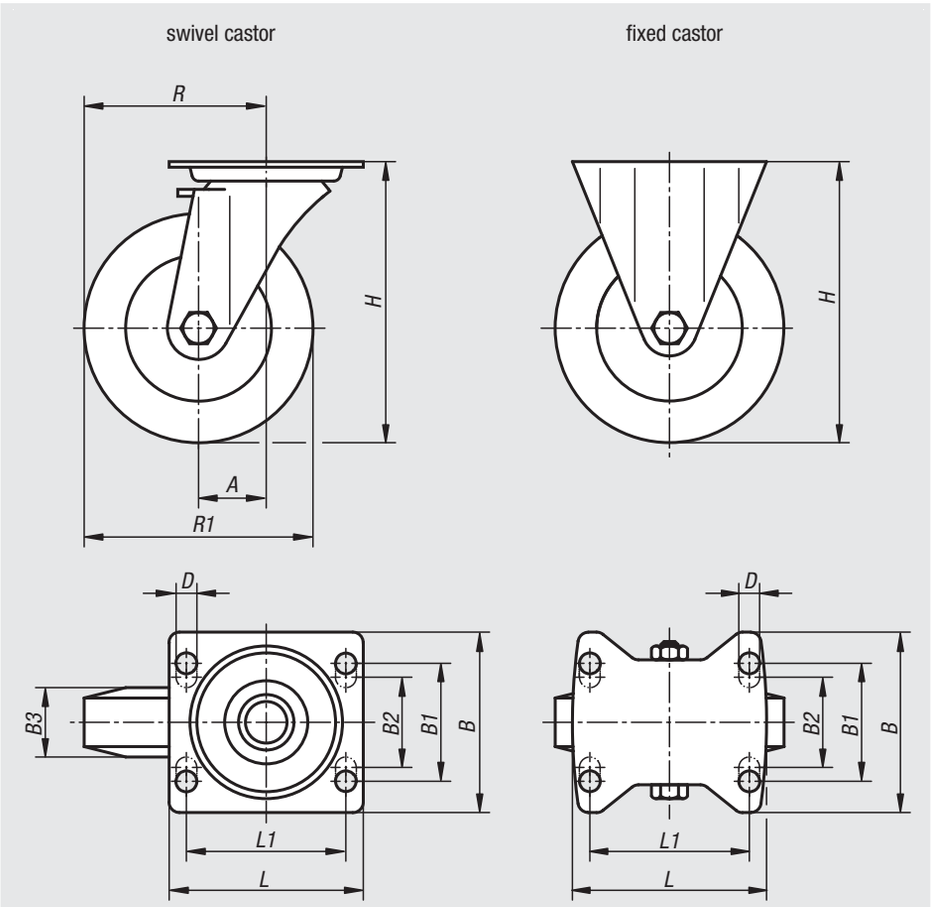
heavy-duty version

Material:
Housing thick steel plate.
Wheels high-quality PA 6.

Version:
Housing press formed.
Swivel castor housing with strong fork and base plate, very robust centre pin bolted and secured. The swivel head is additionally reinforced with specially formed and hardened bearing shells.

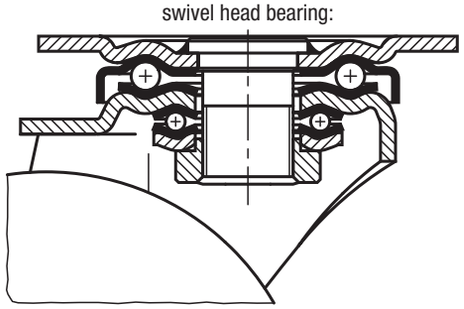
Sample order:
nlm 95040-10037

Note:
The hardened bearing shells make these castors particularly shock and impact proof. The wheels have high abrasion resistance. Wheel axle bolted.



wheel and swivel head brake "stop-top"

swivel head bearing:



Order No. swivel castor	Order No. fixed castor	Order No. swivel castor with „stop-top“	Wheel bearing	A	B	B1	B2	B3	L	L1	H	D	R	R1	Permissible load kg
95040-07532	**95040-075321**	**95040-075322**	plain bearing	45/-	85	60	-	32	100	80	118	9	82,5/-	75	300
95040-075323	**95040-075324**	**95040-075325**	ball bearing	45/-	85	60	-	32	100	80	118	9	82,5/-	75	300
95040-10037	**95040-100371**	**95040-100372**	plain bearing	45/-	85	60	-	37	100	80	140	9	95/-	100	500
95040-100373	**95040-100374**	**95040-100375**	ball bearing	45/-	85	60	-	37	100	80	140	9	95/-	100	500
95040-12540	**95040-125401**	**95040-125402**	plain bearing	45/-	85	60	-	40	100	80	165	9	107,5/-	125	700
95040-125403	**95040-125404**	**95040-125405**	ball bearing	45/-	85	60	-	40	100	80	165	9	107,5/-	125	700
95040-15050	**95040-150501**	**95040-150502**	plain bearing	65/-	110	80	75	50	140	105	197	11	140/-	150	800
95040-150503	**95040-150504**	**95040-150505**	ball bearing	65/-	110	80	75	50	140	105	197	11	140/-	150	800

Swivel castors

compact version

Material:
Housing steel plate, galvanized and blue passivated .
Roller light brown polyurethane, Shore 92° A
or white polyamide, Shore 80° D.

Version:
Housing press formed.
Swivel castor housing with 2x ball bearing in the swivel head and ball shield.
Roller with two pressed-in ball bearings.

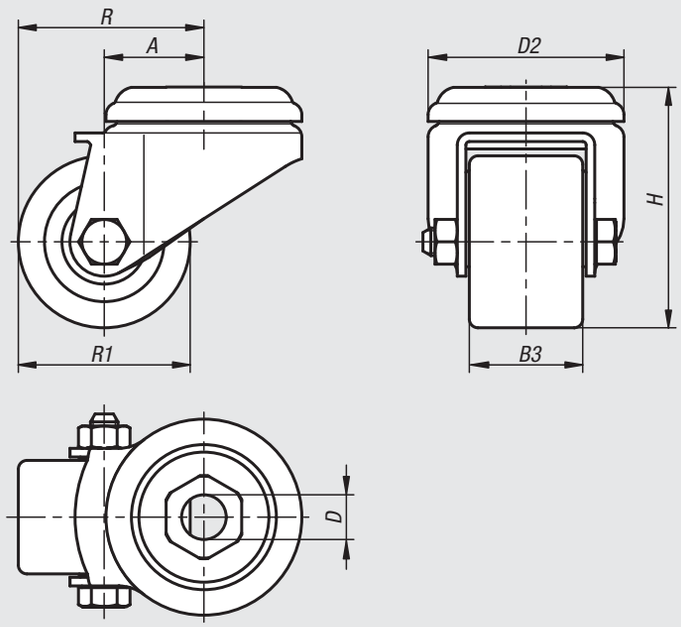
Sample order:
nlm 95045-0352701

Note:
Wheel axle bolted.

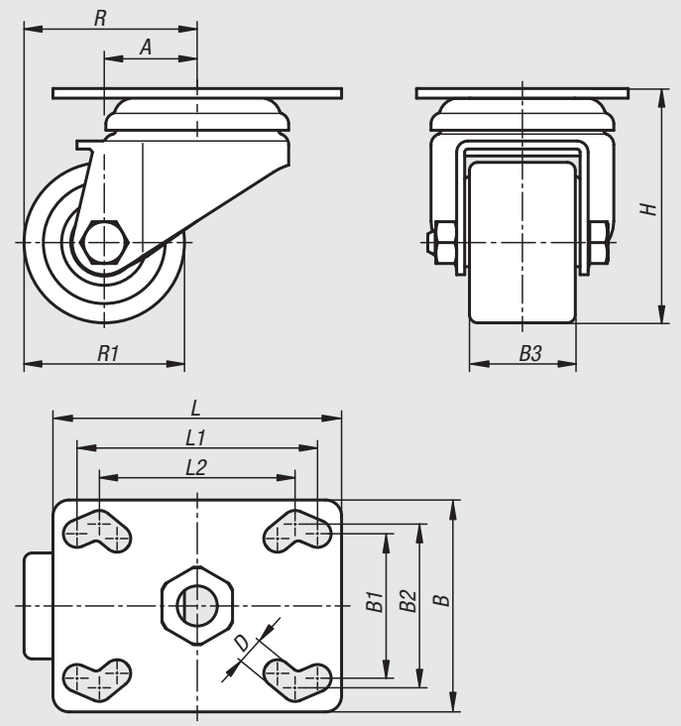
Polyurethane roller: low-noise, low rolling resistance, elastic, floor-protecting, very wear resistant , non-staining.

Polyamide roller: very low roll and pivot resistance, smooth running on smooth floors, very wear resistant.

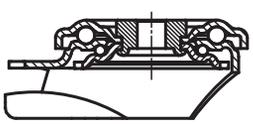
bolt hole



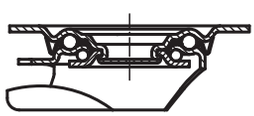
mounting plate



Swivel head bearing:
bolt hole



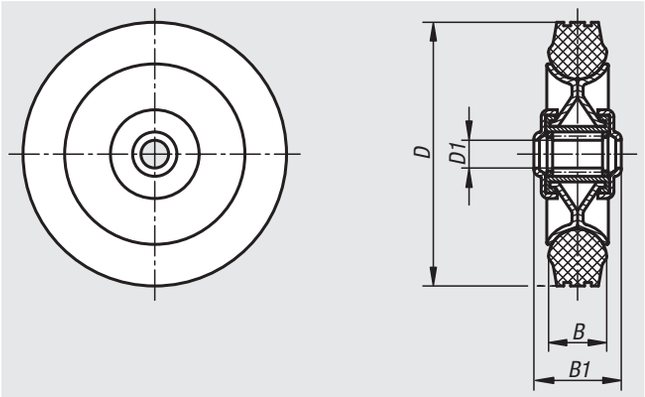
Swivel head bearing:
mounting plate



Order No.	Version	Material roller	Wheel bearing	D	D2	A	B	B1	B2	B3	H	L	L1	L2	R	R1	Permissible load kg
95045-0352701	bolt hole	polyurethane	ball bearing	11	43	15	-	-	-	27	50	-	-	-	32,5	35	100
95045-0352802	bolt hole	Polyamide	ball bearing	11	43	15	-	-	-	28	50	-	-	-	32,5	35	100
95045-0503301	bolt hole	polyurethane	ball bearing	13	57	29	-	-	-	33	70	-	-	-	54	50	150
95045-0503202	bolt hole	Polyamide	ball bearing	13	57	29	-	-	-	32	70	-	-	-	54	50	150
95045-0352711	mounting plate	polyurethane	ball bearing	6,2	-	15	60	38	48	27	52	60	48	38	32,5	35	100
95045-0352812	mounting plate	Polyamide	ball bearing	6,2	-	15	60	38	48	28	52	60	48	38	32,5	35	100
95045-0503311	mounting plate	polyurethane	ball bearing	8,5	-	29	66	45	51	33	73	90	75	61	54	50	150
95045-0503212	mounting plate	Polyamide	ball bearing	8,5	-	29	66	45	51	32	73	90	75	61	54	50	150

Wheels

rubber tyres on steel plate rims



Material:
Rim steel plate.
Tyre solid rubber.

Version:
Rims galvanized and chromed.
Tyres black.

Sample order:
nlm 95050-14038

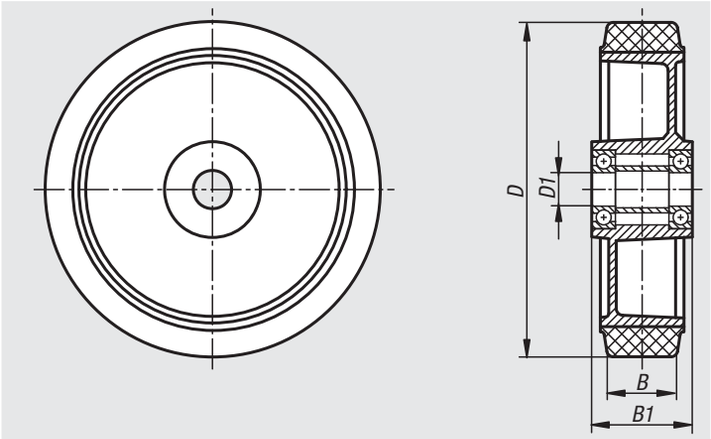
Note:
This special rim design is exceptionally ridged even with extreme shocks and impacts. Low rolling resistance.
Temperature resistant from -30 °C to +80 °C.
Suitable for 95016.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95050-08025	roller bearing	80	12	25	35	50
95050-10030	roller bearing	100	15	30	45	70
95050-12538	roller bearing	125	15	37,5	45	100
95050-14038	roller bearing	140	15	37,5	45	115
95050-16040	roller bearing	160	20	40	60	135
95050-18050	roller bearing	180	20	50	60	170
95050-20050	roller bearing	200	20	50	60	205

95053

Wheels

rubber tyres on die-cast aluminium rims



Material:
Wheel rims die-cast aluminium.
Tyre elastic solid rubber.

Sample order:
nlm 95053-200501

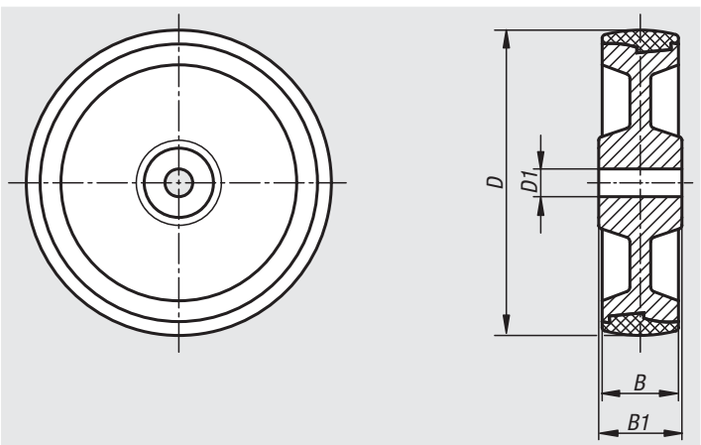
Note:
The tyre is vulcanised onto the rim. Wheels with elastic solid rubber tyres have a high wear resistance, low rolling resistance and excellent drive comfort.
Application temperature from -30 °C to +80 °C.
These wheels are used as the front wheels on fork-lift trucks.
Other sizes on request.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95053-200501	ball bearing	200	20	35	60	450

95056

Wheels

polyamide with injection-moulded tread



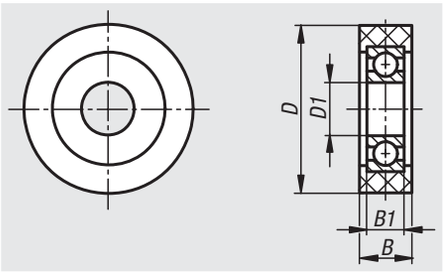
Material:
Wheel body PA.
Tread thermoplastic polyurethane elastomer.

Sample order:
nlm 95056-12535

Note:
Wheels with polyurethane tread have a high load capacity, resist abrasion, are gentle to floors, absorb shocks and vibration and are resistant to many chemicals and acids.
Temperature resistant from -30 °C to +80 °C.
Suitable for 95024.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95056-10035	plain bearing	100	15	35	45	200
95056-12535	plain bearing	125	15	35	45	250
95056-15040	plain bearing	150	20	40	60	400
95056-20050	plain bearing	200	20	50	60	700

Guide rollers



Material:
Tread light brown Extrathane® 92° Shore A or white polyamide 6 80° Shore D.

Sample order:
nlm 95057-05015

Note:
The tread is firmly bonded onto a ball bearing.

Extrathane tread: quiet running, low roll resistance, elastic, gentle on floors, very wear resistant, high cut and tear resistance, non-marking, non-staining.

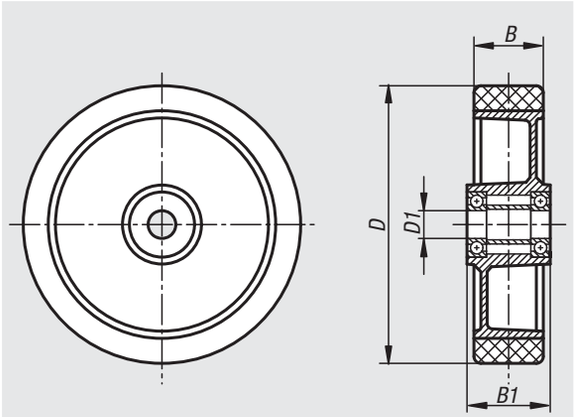
Polyamide 6 tread: unbreakable, very low roll resistance, light running on smooth floors, very wear resistant.
Uses: conveyor belts, doors, etc.
Other sizes on request.

Order No.	Material tread	Wheel bearing	D	D1	B	B1	Permissible load kg	Ball bearing
95057-03008	extrathane	ball bearing	30	6	8	6	20	626 2RS
95057-03514	extrathane	ball bearing	35	12	14	8	40	6001 2RS
95057-04020	extrathane	ball bearing	40	10	20	9	40	6000 2RS
95057-05015	extrathane	ball bearing	50	10	15	9	60	6200 2RS
95057-06020	extrathane	ball bearing	60	17	20	12	90	6203 2RS
95057-07020	extrathane	ball bearing	70	25	20	15	125	6205 2RS
95057-030081	polyamide 6	ball bearing	30	6	8	6	35	626 2RS
95057-035111	polyamide 6	ball bearing	35	8	11	7	55	608 2RS
95057-040201	polyamide 6	ball bearing	40	10	20	9	100	6200 2RS
95057-050151	polyamide 6	ball bearing	50	10	15	9	100	6200 2RS
95057-060201	polyamide 6	ball bearing	60	17	20	12	165	6203 2RS
95057-070201	polyamide 6	ball bearing	70	25	20	15	185	6205 2RS

95058

Wheels

aluminium rims with injection-moulded tread



Material:
Wheel rim die-cast aluminium.
Tread Extrathane®.

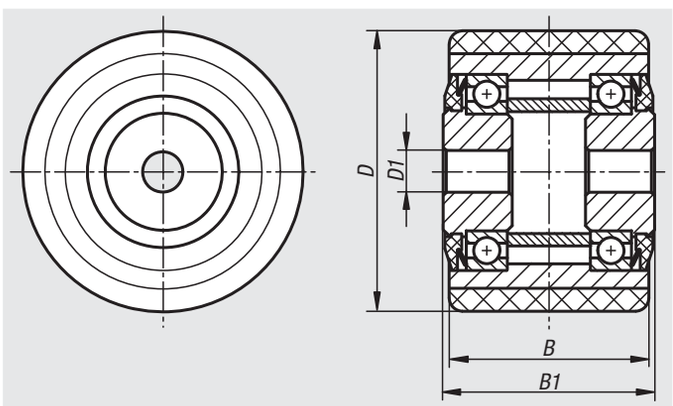
Sample order:
nlm 95058-12540

Note:
These wheels are elastic, abrasion-resistant, gentle to floors, low-noise and have low roll resistance.
Suitable for 95028.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95058-10040	ball bearing	100	15	40	45	250
95058-12540	ball bearing	125	15	40	45	350
95058-16050	ball bearing	160	20	50	60	550
95058-18050	ball bearing	180	20	50	60	600
95058-20050	ball bearing	200	20	50	60	800

95059

Rollers heavy-load



Material:
Wheel body steel tube with ball bearing.
Tread Extrathane® 92° Shore A.

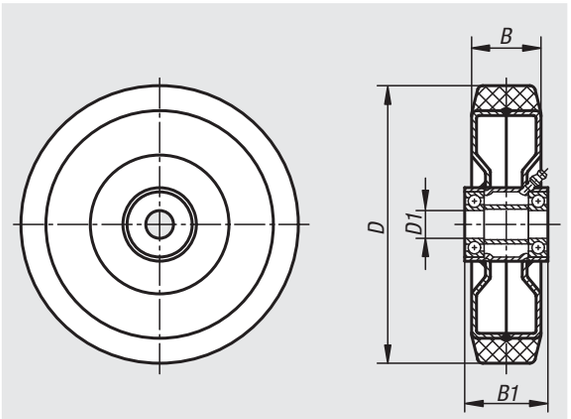
Sample order:
nlm 95059-0857520

Note:
The ball bearing is splashproof. The tread is firmly bonded. These rollers resist abrasion, are non-staining, gentle to floors, low-noise, elastic, have low roll resistance and have a particularly high elastic restoration after long standing high cut and tear resistance.
Uses: pallet trucks, forklift, etc.
Other sizes on request.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95059-0856020	ball bearing	85	20	60	65	450
95059-0856025	ball bearing	85	25	60	65	450
95059-0857520	ball bearing	85	20	75	80	570
95059-0857525	ball bearing	85	25	75	80	570
95059-0859525	ball bearing	85	25	95	100	720

Wheels heavy-load

wheel body welded



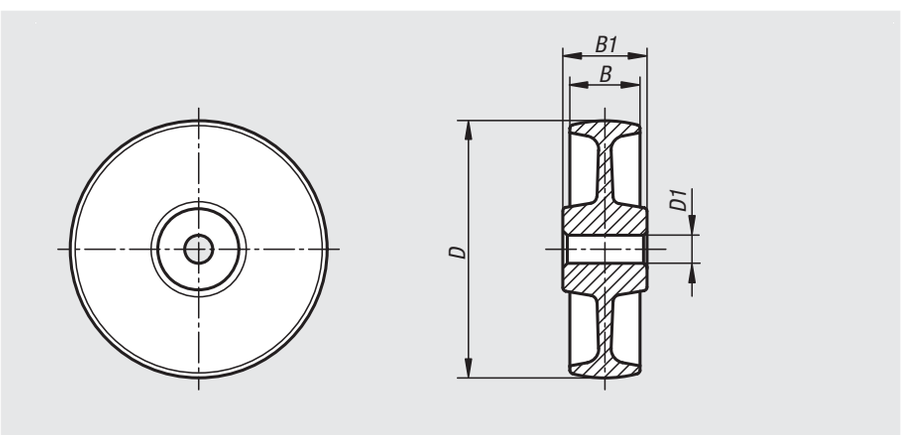
Material:
Wheel body welded steel construction.
Tread Extrathane®.

Sample order:
nlm 95060-16050

Note:
Extrathane treads are elastic, resist abrasion, gentle to floors, low-noise and have particularly high elastic restoration after long standing. The wheel is fitted with a grease nipple for bearing maintenance.
Application temperature from -40 °C to +80 °C.
Suitable for 95030 and 95032.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95060-12550	ball bearing	125	20	50	60	500
95060-16050	ball bearing	160	20	50	60	700
95060-20050	ball bearing	200	20	50	60	1000
95060-25060	ball bearing	250	25	60	70	1350

Wheels polyamide



Material:
Polyamide

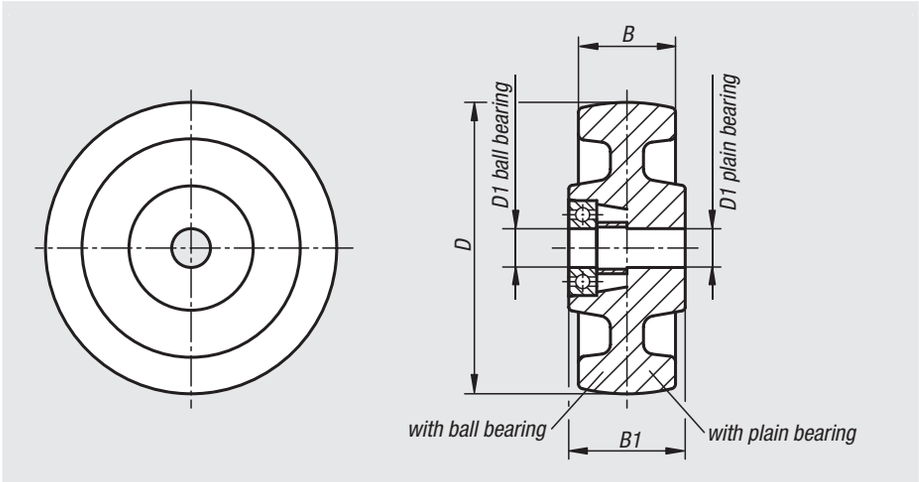
Sample order:
nlm 95062-12540

Note:
Polyamide wheels are unbreakable, non-corroding, shock and impact proof and chemical resistant. They also have high abrasion resistance and low roll resistance.
Other sizes or with ball bearing on request.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95062-07532	plain bearing	75	12	32	35	200
95062-10037	plain bearing	100	15	37	45	280
95062-12540	plain bearing	125	15	40	45	300
95062-15050	plain bearing	150	20	50	60	400
95062-20050	plain bearing	200	20	50	60	600

Wheels polyamide

heavy-duty version



Material:
Polyamide

Sample order:
nlm 95064-10037

Note:
Polyamide Wheels are unbreakable, non-corroding, shock and impact proof and chemical resistant. They also have high abrasion resistance and low roll resistance.
Suitable for 95040.

Order No.	Wheel bearing	D	D1	B	B1	Permissible load kg
95064-07532	plain bearing	75	12	32	35	300
95064-10037	plain bearing	100	15	37	45	500
95064-12540	plain bearing	125	15	40	45	700
95064-15050	plain bearing	150	20	50	60	800
95064-20050	plain bearing	200	20	50	60	1500
95064-25065	plain bearing	250	25	65	65	2000
95064-075321	ball bearing	75	15	32	35	300
95064-100371	ball bearing	100	15	37	45	500
95064-125401	ball bearing	125	20	40	45	700
95064-150501	ball bearing	150	20	50	60	800
95064-200501	ball bearing	200	25	50	60	1500
95064-250651	ball bearing	250	25	65	65	2000

Elevating castors with foot

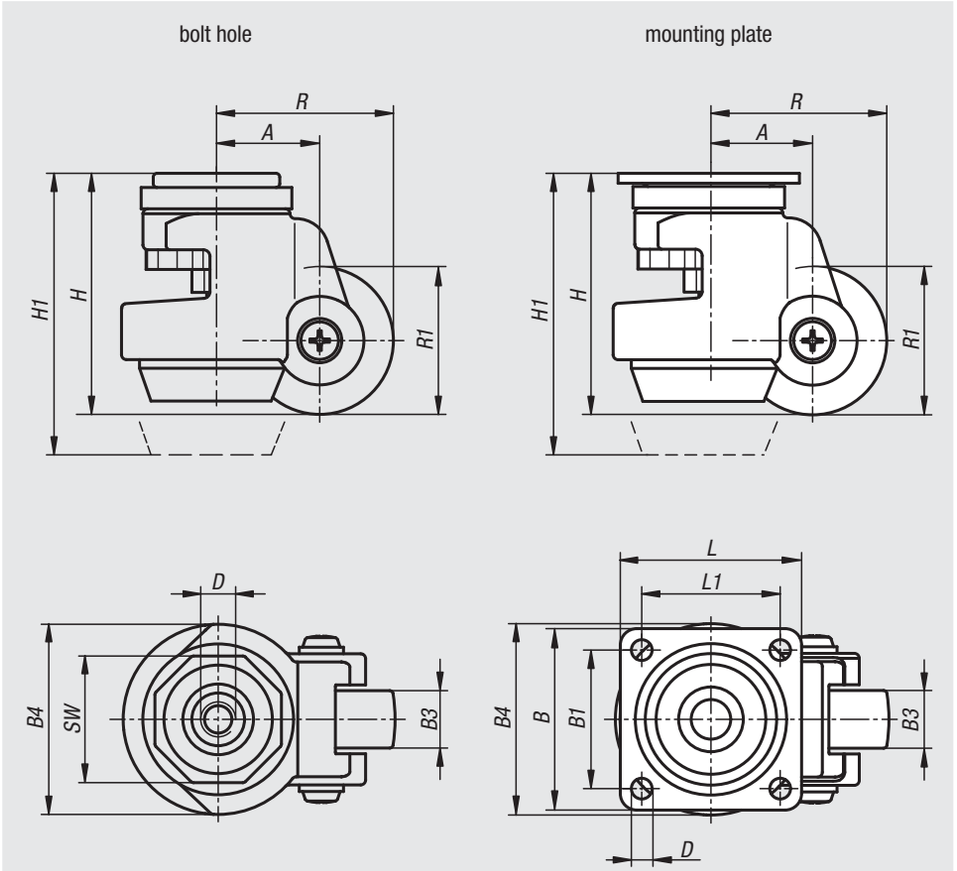
with bolt hole or mounting plate

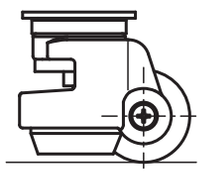
Material:
Housing die-cast aluminium.
Roller unbreakable polyamide 6, 70° Shore D.
Foot hard rubber.

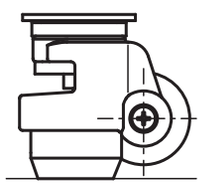
Version:
Housing, powder-coated, ivory.
Steel parts galvanized, blue-passivated.
Roller and foot black.

Sample order:
nlm 95090-045180

Note:
Elevating castor with foot. With sealed ball bearing in the swivel head. Height adjustment with a 13 mm spanner or by the integrated adjustment screw. Wheel axle bolted.



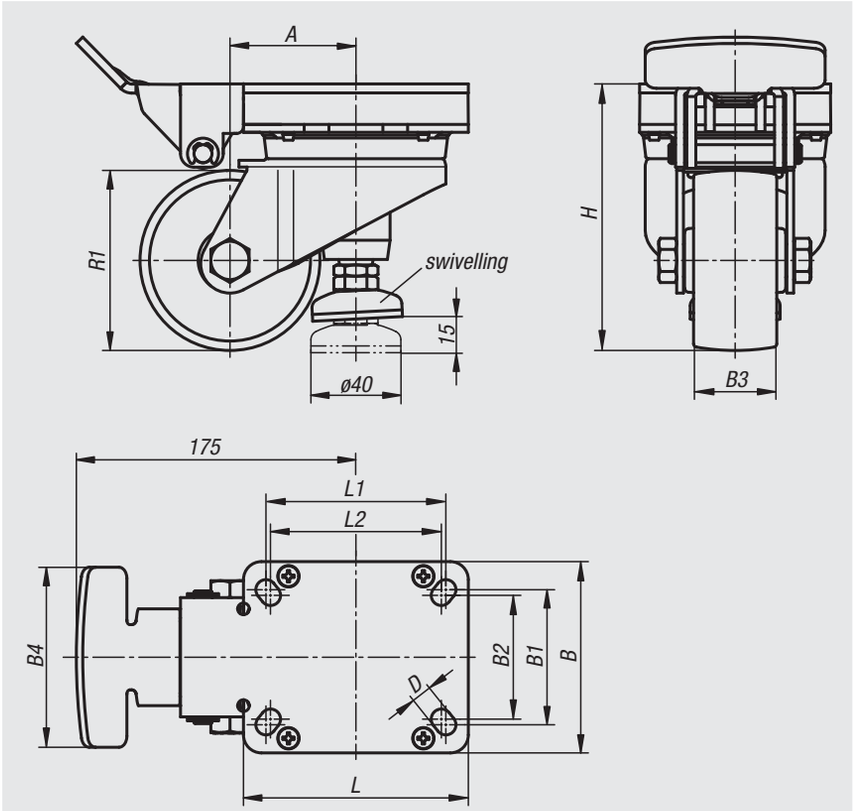




Order No.	Version	Wheel bearing	D	A	B	B1	B3	B4	H	H1	L	L1	R	R1	SW	Permissible load kg
95090-045180	bolt hole	plain bearing	M8x12	32	-	-	18	58	72	82	-	-	54,5	45	40	180
95090-050220	bolt hole	plain bearing	M12x15	38	-	-	22	72	84	94	-	-	63	50	46	250
95090-063290	bolt hole	plain bearing	M12x15	46	-	-	29	85	104	119	-	-	77,5	63	65	500
95090-045181	mounting plate	plain bearing	7	32	55	42	18	58	72	82	55	42	54,5	45	-	180
95090-050221	mounting plate	plain bearing	7	38	73	58	22	72	84	94	73	58	63	50	-	250
95090-063291	mounting plate	plain bearing	9	46	90	70	29	85	104	119	90	70	77,5	63	-	500

Elevating castors

with integrated machine foot



Material:
Housing steel plate.
roller unbreakable polyamide 6, 70° Shore D.
Machine foot steel.

Version:
Housing galvanized and blue passivated.
Roller white.
Machine foot galvanized with grey rubber pads.

Sample order:
nlm 95092-08037

Note:
Elevating castor swivel version with integrated levelling machine foot. With sealed ball bearing in the swivel head. Wheel axle bolted. The ergonomic form of the non-swivelling actuating lever allows ease of operation. The short actuation travel with simultaneous long plunger stroke and very high lifting force allows heavy weights to be easily raised and safely fixated.

Order No.	Wheel bearing	D	A	B	B1	B2	B3	B4	H	L	L1	L2	R1	Permissible load kg
95092-08037	plain bearing	9	56	85	60	55	37	80	120	100	80	76	80	230
95092-10037	plain bearing	9	65	85	60	55	37	80	142	100	80	76	100	230

Mounting instructions and specifications for ball transfer units

Ball transfer units allow bulky goods to be easily transported, rotated and directed. They have long proven their worth in conveyor systems, feeder systems, machining centres and packaging plants.

Applications:

Conveyor technology

– ball pallets, rotary tables and sorting and distribution switch points
– crossing points in permanent conveyance systems
– Airport luggage sorting plants
– Steel pipe transport
– Lifting platforms

General machine shops

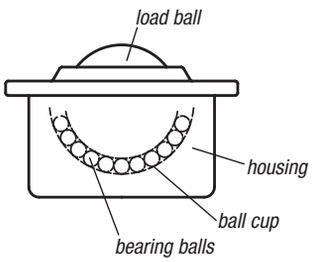
– Feed tables for sheetmetal handling machines
– Fixtures for bending machines
– Conveyors for machining centres
– Motor driven assembly aids in heavy engineering

Other applications

– Custom machine construction
– Aerospace technology
– Beverage production and stone cutting

Ball transfer units have a steel housing with a hardened ball cup. This serves as the track for a number of small bearing balls. These bearing balls roll in the cup with the rotation of the load ball.

Ball transfer units are designed so that precise rolling and load carrying is guaranteed in all positions. Ball transfer units are low maintenance and almost all types have an oil soaked felt seal to protect from dirt.



Calculating the ball transfer unit loading

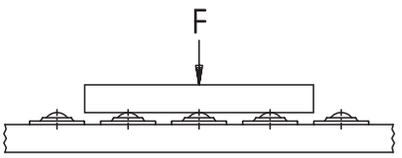
To calculate the loading for a ball transfer units divide the weight of the transported goods by 3. With good coordination of the load ball surface and, depending on the properties of the goods transported the number of load bearing ball transfer units can also be calculated.

Example:

Weight of the transported goods = 300 kg

Ball transfer unit loading:

$$F = \frac{300\ kg}{3} = 100\ kg$$



Arrangement of the ball transfer units

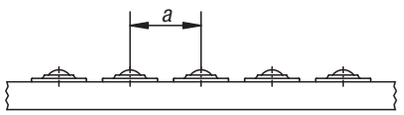
The arrangement of the ball transfer units depends on the surface area of the goods to be transported. By goods with a uniform, level surface area, such as the base of boxes, the distance between the ball transfer units is simply calculated from the length of the shortest edge divided by 2.5.

Example:

Surface area of goods = 500 x 1000 mm

Distance between ball transfer units:

$$a = \frac{500\ mm}{2,5} = 200\ mm$$



Transport speed and load capacity

The recommended conveyance speed is 1 m/sec. With polyamid load balls 0.25 m/sec. The specified load rating applies to all mounting positions and relates to 106 revolutions of the load ball. By extended use in excess of 1 m/sec and depending on the loading, the temperature can be expected to rise and the useful life reduced, particularly with balls Ø60 to Ø90.

Calculating the lifespan

$$L = \left(\frac{C}{F}\right)^3 . 10^6 \ \text{revs}$$

L = lifespan
C = load rating (N)
F = loading (N)

Attention:
Use high temperature lubricant!
Follow manufacturer's instructions!
It is possible that the existing lubrication oil may have to be washed out.

Temperature load ball		Temperature factor fT
steel °C	polyamid °C	
125	40	0,9
150	50	0,8
175	60	0,7
-	70	0,6
200	80	0,5

Temperature resistance

For ball transfer units with a felt seal the temperature resistance is 100 °C by constant temperature.

Only non-galvanised ball transfer units with a steel ball and no felt seal can be used at temperatures in excess of 100 °C. Note the load rating reduction! Multiply the load rating by the temperature factor (table).

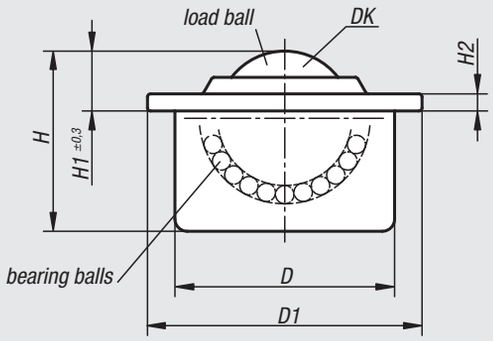
Calculating the loading by undersprung ball transfer units.

For these types the determining factor is the value given in the „Pre-tension" column of the table. The weight of the transported goods is divided by the number of supporting ball transfer units.

Ball transfer units

with steel housing

Type B: cap and housing galvanized, balls steel
Type C: cap and housing galvanized, balls stainless steel
Type D: cap, housing and balls stainless steel

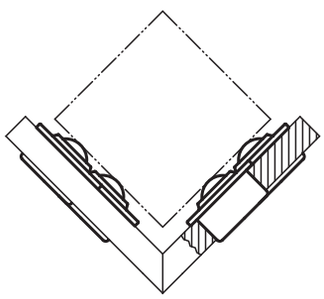


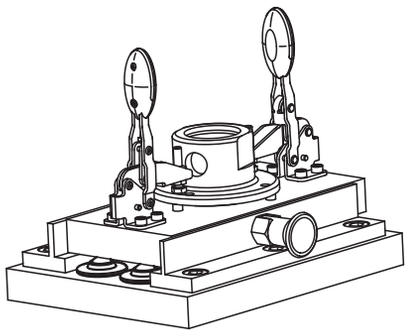
Material:
Galvanized steel or stainless steel

Sample order:
nlm 95150-122

Note:
Ball transfer units with steel housing have a felt seal to protect against dirt.

mounting option:



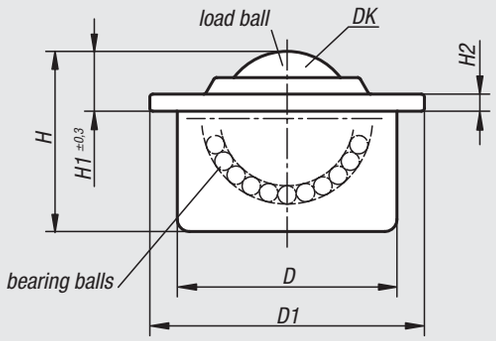


Order No.	Version	DK	D	D1	H	H1	H2	Load rating C (N)	Suitable tolerance ring
95150-115	B	15,8	24 ±0,065	31	21	9,5	2,8	600	95164-024
95150-122	B	22,2	36 ±0,080	45	30	9,8	2,8	1600	95164-036
95150-130	B	30	45 ±0,080	55	37	13,8	4	3000	95164-045
95150-145	B	44,5	62 ±0,095	75	53,5	19	4	6100	95164-062
95150-215	C	15,8	24 ±0,065	31	21	9,5	2,8	600	95164-024
95150-222	C	22,2	36 ±0,080	45	30	9,8	2,8	1600	95164-036
95150-230	C	30	45 ±0,080	55	37	13,8	4	3000	95164-045
95150-245	C	44,5	62 ±0,095	75	53,5	19	4	6100	95164-062
95150-315	D	15,8	24 ±0,065	31	21	9,5	2,8	380	95164-024
95150-322	D	22,2	36 ±0,080	45	30	9,8	2,8	1000	95164-036
95150-330	D	30	45 ±0,080	55	37	13,8	4	2000	95164-045

Ball transfer units

with steel housing and plastic ball

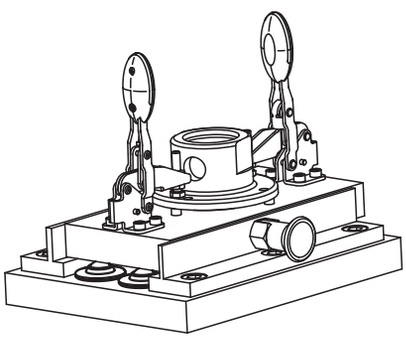
Type B: cap and housing galvanized, bearing balls steel
Type C: cap and housing galvanized, bearing balls stainless steel



Material:
Galvanized steel or stainless steel housing.
Polyamid PA 66 ball.

Sample order:
nlm 95152-122

Note:
Ball transfer units with plastic balls are particularly suitable for transporting sensitive materials such as polished aluminium, brass and steel sheets or glass. They have a felt seal to protect against dirt.

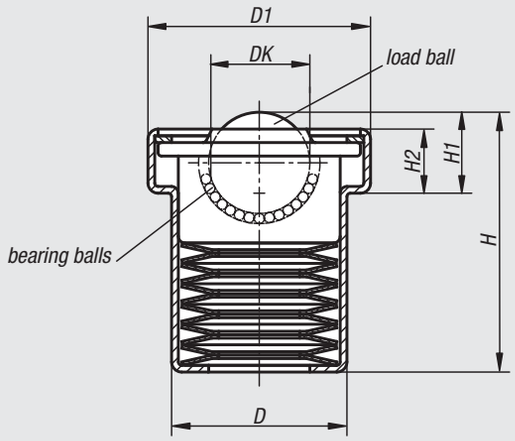


Order No.	Version	DK	D	D1	H	H1	H2	Load rating C (N)	Suitable tolerance ring
95152-115	B	15,8	24 ±0,065	31	21	9,5	2,8	100	95164-024
95152-122	B	22,2	36 ±0,080	45	30	9,6	2,8	200	95164-036
95152-130	B	30	45 ±0,080	55	37	13,6	4	250	95164-045
95152-215	C	15,8	24 ±0,065	31	21	9,5	2,8	100	95164-024
95152-222	C	22,2	36 ±0,080	45	30	9,6	2,8	200	95164-036
95152-230	C	30	45 ±0,080	55	37	13,6	4	250	95164-045

Ball transfer units

undersprung

Type B: cap and housing galvanized, balls steel
Type C: cap and housing galvanized, balls stainless steel



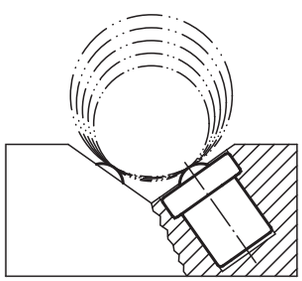
Material:
Steel galvanized.

Sample order:
nlm 95154-122

Note:
Undersprung ball transfer units allow for even distribution of loads for goods with uneven surfaces.
When used in machines such as punch presses and bend form machines the ball rollers spring back up after the forming process and the finished article can be rolled off.

By the „End tension (N)“ the ball has completely receded into the housing.

Mounting option:



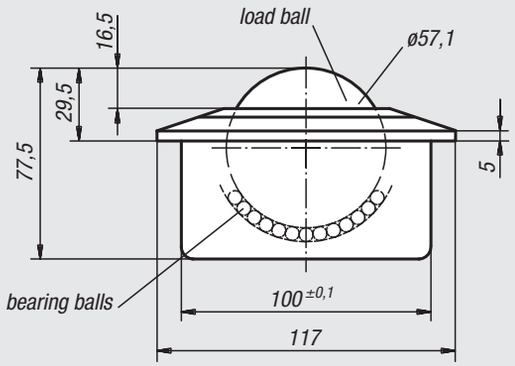
Order No.	Version	DK	D	D1	H	H1	H2	Pre-tension (N)	End tension (N)	Tol. for pre and end tension (%)
95154-122	B	22,2	39	50	51,5	18,5	14	730	860	+25 / -7,5
95154-130	B	30	48,2	62	70	24,4	17,7	1350	1600	+15 / -7,5
95154-145	B	45	66,4	85	100,5	35,6	24,2	2280	2770	+15 / -7,5
95154-222	C	22,2	39	50	51,5	18,5	14	730	860	+25 / -7,5
95154-230	C	30	48,2	62	70	24,4	17,7	1350	1600	+15 / -7,5
95154-245	C	45	66,4	85	100,5	35,6	24,2	2280	2770	+15 / -7,5

95156

Ball transfer units

with solid steel housing

Type B: cap and housing galvanized, balls steel
Type C: cap and housing galvanized, balls stainless steel



Material:
Steel galvanized.

Sample order:
nlm 95156-160

Note:
Ball transfer units with solid housings remain functional even under heavy impact loads and extreme conditions.
They have a felt seal to protect against dirt.

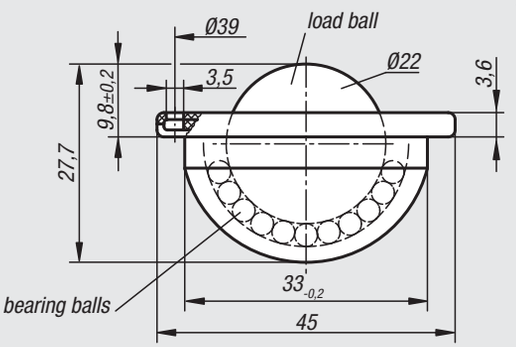
Order No.	Version	Load rating C (N)	Suitable tolerance ring
95156-160	B	15000	95164-100
95156-260	C	10000	95164-100

95158

Ball transfer units

with fastening holes, without housing

Type B: cap and housing galvanized, balls steel
Type C: cap and housing galvanized, balls stainless steel



Material:
Steel galvanized.

Sample order:
nlm 95158-122

Note:
Ball transfer units with fastening holes for easy installation and removal.

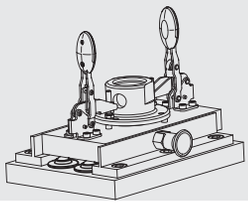
Order No.	Version	No. of fastening holes	Load rating C (N)
95158-122	B	3	1200
95158-222	C	3	900

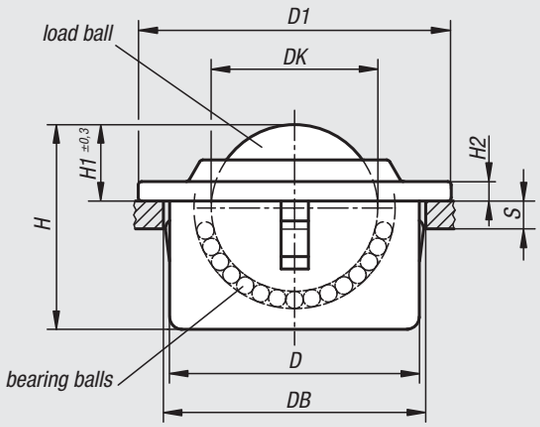
95160

Ball transfer units

with spring clips

Type B: cap and housing galvanized, balls steel
Type C: cap and housing galvanized, balls stainless steel





Material:
Steel galvanized.

Sample order:
nlm 95160-122

Note:
Ball transfer units with spring clips for easy installation and removal from the functional side. The roller is held in place with spring clips, this permits generous tolerances in the receiving hole.
They have a felt seal to protect against dirt.

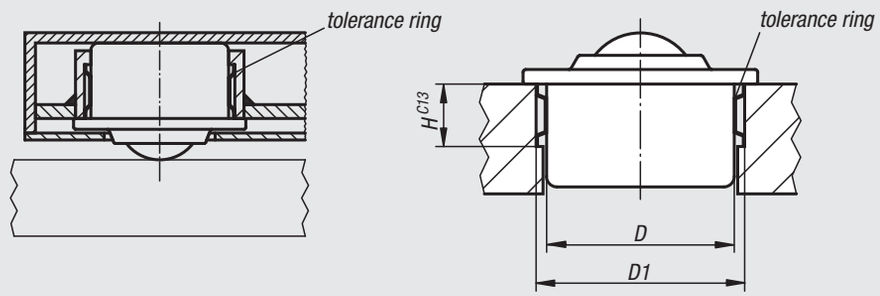
S = Minimum nominal thickness of mounting base.

Order No.	Version	DK	D	D1	Receiver-Ø DB	H	H1	H2	S	Load rating C (N)
95160-115	B	15,8	24 ±0,1	31	25 +0,5	21	9,5	2,8	2	600
95160-122	B	22,2	36 ±0,1	45	37 +0,5	30	9,8	2,8	3	1600
95160-130	B	30	45 ±0,1	55	46 +0,5	37	13,8	4	6	3000
95160-215	C	15,8	24 ±0,1	31	25 +0,5	21	9,5	2,8	2	600
95160-222	C	22,2	36 ±0,1	45	37 +0,5	30	9,8	2,8	3	1600
95160-230	C	30	45 ±0,1	55	46 +0,5	37	13,8	4	6	3000

95164

Tolerance rings

Mounting example:



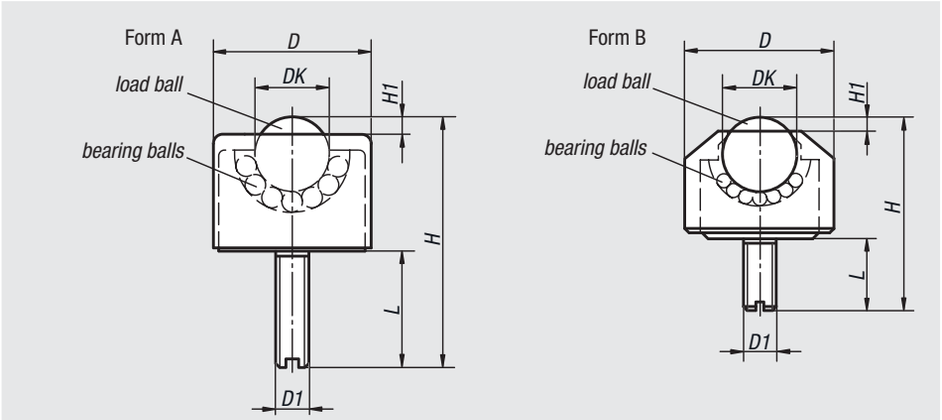
Material:
Spring band steel

Sample order:
nlm 95164-024

Note:
The use of tolerance rings allows for a greater tolerance range between the parts being assemble.
The ball transfer units can be fitted quickly and cost effectively.

Order No.	D	Assembly dimensions D1	Assembly dimensions H
95164-024	24	25,7 +0,2	7
95164-036	36	37,7 +0,2	12
95164-045	45	46,7 +0,2	12
95164-062	62	64,1 +0,3	15
95164-100	100	102,5 +0,35	19

Mini ball transfer units



Material:
Steel version:
Steel load ball.
Steel supporting ball.
Housing galvanized steel.
Cover galvanized steel.

Stainless steel version:
Stainless steel load ball.
Stainless steel supporting ball.
Stainless steel housing.
Aluminium cover.

Sample order:
nlm 95180-1105

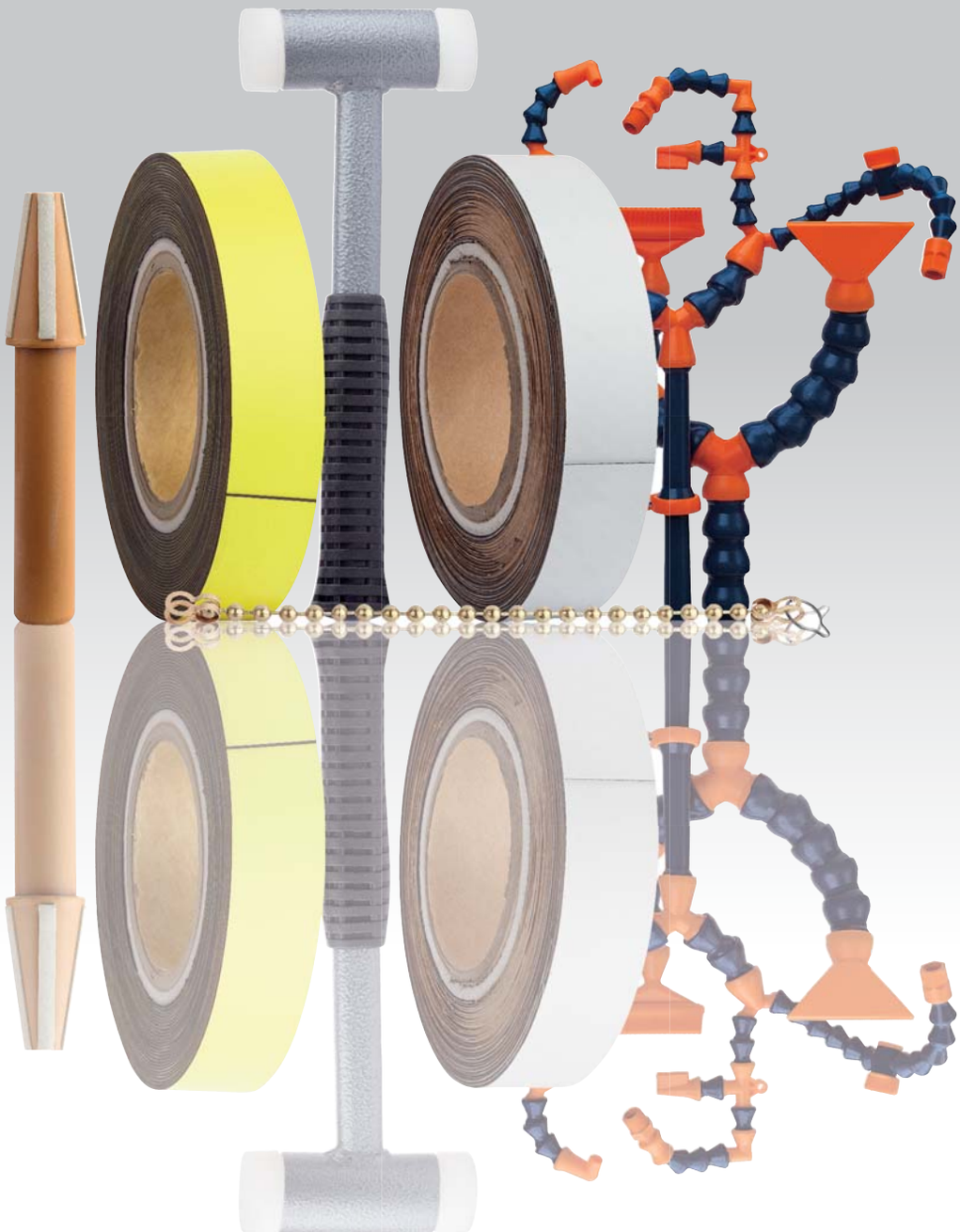
Note:
The ball transfer units comprise a housing with integrated bearing shell, a cover, a load ball and several supporting balls. For use in measuring instruments, material conveyance in clean rooms and miniature mechanisms.

Order No.	Version	Form	DK	D	D1	H	H1	L	Load rating C (N)
95180-1105	Steel	A	4,8	13	M6	24	1	15	100
95180-1106	Steel	A	6,4	17	M6	26	2	15	200
95180-1108	Steel	A	7,9	18	M8	32	2	18	300
95180-1110	Steel	A	9,6	23	M8	40	2	20	400
95180-1113	Steel	A	12,7	28	M8	48	3,5	23	500
95180-1216	Steel	B	15,8	24	M6	32,5	4	12	700
95180-2205	Stainless steel	B	4,8	8	M2	8,5	1	2,5	50
95180-2206	Stainless steel	B	6,4	13	M3	16,5	2	6	100
95180-2208	Stainless steel	B	7,9	15	M4	20,5	2	8	150

Notes

96000

Feeler gauge strips
Magnetic labels and envelopes
Protective nets
Supercraft mallets and inserts
Taper and cylinder cleaners
Coolant hoses



Coolant hose LOC-LINE® Flexi

Material:
Polyoxymethylene (POM).

Version:
Flexible hose blue or black.
Accessories orange .

Sample order:
nlm 96200-1400141

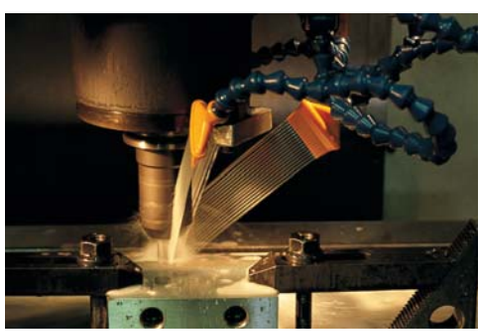
Note:
Flexible hose for supplying or extracting liquids and extracting dust, steam and smoke. It can be lengthened and shortened as desired. The material is resistant to most chemicals and solvents. It is not electrically conductive and therefore suitable for use on eroding machines.

Pinpoint accuracy, vibration stable, position retentive, pressure resistant. Can be combined with nozzles, threads, junctions, T-fittings, reducers, extensions etc.

Recommended operating pressure up to 4 bar.
Flow rate 950 l/m (1/4“) and 1800 l/m (1/2“).

Temperature range:
-20 °C to +80 °C.

90° angle nozzle ø6

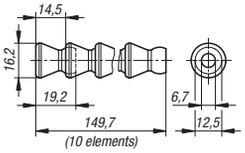


Flat nozzle with joint
16 hole ø1.5

Ring system

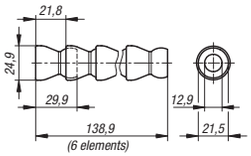
Coolant hose LOC-LINE® Flexi

1/4“

Order No.	Image	Size	Article description	Application
96200-1400141		1/4“	FLEXIBLE HOSE 140 MM, BLUE 1/4“	
96200-1400142		1/4“	FLEXIBLE HOSE 140 MM, BLACK 1/4“	
96200-1415001		1/4“	FLEXIBLE HOSE 15 METER, BLUE 1/4“	
96200-1415002		1/4“	FLEXIBLE HOSE 15 METER, BLACK 1/4“	
96200-1401		1/4“	ROUND NOZZLE Ø1.5 1/4“	The round nozzles deliver a punctiform jet.
96200-1402		1/4“	ROUND NOZZLE Ø3.0 1/4“	The round nozzles deliver a punctiform jet.
96200-1403		1/4“	ROUND NOZZLE Ø6.0 1/4“	The round nozzles deliver a punctiform jet.
96200-1404		1/4“	FLAT NOZZLE 25.0 WIDE SPRAY 1/4“	The flat nozzles deliver a flat wide jet and cover a broad area.
96200-1405		1/4“	FLAT NOZZLE 12X1.0 1/4“	The flat nozzles deliver a jet with constant profile.
96200-1406		1/4“	FLAT NOZZLE 12X1.5 1/4“	The flat nozzles deliver a jet with constant profile.
96200-1407		1/4“	FLAT NOZZLE 5 HOLE Ø1.5 1/4“	The flat nozzles deliver several parallel single jets.
96200-1408		1/4“	FLAT NOZZLE 7 HOLE Ø1.0 1/4“	The flat nozzles deliver several parallel single jets.
96200-1409		1/4“	GRINDING NOZZLE 25.0 1/4“	The grinding nozzle delivers a straight, bundled jet that does not separate.
96200-1410		1/4“	FLAT NOZZLE W. FLEX JOINT 16 HOLE Ø1.0 1/4“	The flat nozzles deliver several parallel single jets. The nozzle part can be swivelled 40°.
96200-1411		1/4“	FLAT NOZZLE W. FLEX JOINT 16 HOLE Ø1.5 1/4“	The flat nozzles deliver several parallel single jets. The nozzle part can be swivelled 40°.
96200-1412		1/4“	FLAT NOZZLE W. FLEX JOINT 20 HOLE Ø2.0 1/4“	The flat nozzles deliver several parallel single jets. The nozzle part can be swivelled 40°.
96200-1413		1/4“	90° NOZZLE Ø1.5 1/4“	The angled nozzles deliver a punctiform jet.
96200-1414		1/4“	90° NOZZLE Ø3.0 1/4“	The angled nozzles deliver a punctiform jet.
96200-1415		1/4“	90° NOZZLE Ø6.0 1/4“	The angled nozzles deliver a punctiform jet.
96200-1416		1/4“	90° SPRAY NOZZLE 6 HOLE 1/4“	The angled nozzles deliver several parallel single jets.
96200-1417		1/4“	CONNECTOR 1/8“ NPT 1/4“	Adapter with a ball one side and external thread other side.
96200-1418		1/4“	CONNECTOR 1/4“ NPT 1/4“	Adapter with a ball one side and external thread other side.
96200-1419		1/4“	Y FITTING 1/4“	Two hoses can branch from one supply line.
96200-1420		1/4“	T FITTING 1/4“	Two hoses can branch at an angle of 90° from one supply line. The eyelet permits attachment to the machine.
96200-1421		1/4“	ELBOW FITTING 1/4“	These angle pieces are used where tight bends are required.
96200-1422		1/4“	DOUBLE SOCKET 1/4“	The coupling pieces have a socket at each end. Here can e.g. a screw connection can be added.
96200-1423		1/4“	ADAPTER TO 1/8“ INTERNAL THREAD 1/4“	Adapter with socket one side and internal thread other side.
96200-1424		1/4“	EXTENSION 95MM 1/4“	The extensions are suitable for bridging long stretches, particularly horizontal stretches.
96200-1425		1/4“	HOSE BEND 90° 1/4“	These hose bends are used where bends are required.
96200-1426		1/4“	RING SYSTEM 1/4“	Ring system with lateral spray holes.
96200-1427		1/4“	LOCKING RING WITH SCREW 1/4“	With the clamping rings, bending or positional change at higher pressure can be avoided.
96200-1428		1/4“	CHECK VALVE 1/4“	Prevents dripping of the hose line.
96200-1429		1/4“	SHUT-OFF VALVE W. EXT. THREAD NPT 1/4“ 1/4“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1430		1/4“	SHUT-OFF VALVE W. INT. THREAD NPT 1/4“ 1/4“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1431		1/4“	SHUT-OFF VALVE W. SEGMENT ADAPTER 1/4“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1499		1/4“	ASSEMBLY PLIERS 1/4“	For assembling flex hose elements.

Coolant hose LOC-LINE® Flexi

1/2“

Order No.	Image	Size	Article description	Application
96200-1200141		1/2“	FLEXIBLE HOSE 140 MM, BLUE 1/2“	
96200-1200142		1/2“	FLEXIBLE HOSE 140 MM, BLACK 1/2“	
96200-1215001		1/2“	FLEXIBLE HOSE 15 METER, BLUE 1/2“	
96200-1215002		1/2“	FLEXIBLE HOSE 15 METER, BLACK 1/2“	
96200-1201		1/2“	ROUND NOZZLE Ø6.0 1/2“	The round nozzles deliver a punctiform jet.
96200-1202		1/2“	ROUND NOZZLE Ø9.0 1/2“	The round nozzles deliver a punctiform jet.
96200-1203		1/2“	ROUND NOZZLE Ø12.0 1/2“	The round nozzles deliver a punctiform jet.
96200-1204		1/2“	FLAT NOZZLE 32.0 WIDE SPRAY 1/2“	The flat nozzles deliver a flat wide jet and cover a broad area.
96200-1205		1/2“	FLAT NOZZLE 63.0 WIDE SPRAY 1/2“	The flat nozzles deliver a flat wide jet and cover a broad area.
96200-1206		1/2“	FLAT NOZZLE 18X2.0 1/2“	The flat nozzles deliver a jet with constant profile.
96200-1207		1/2“	FLAT NOZZLE 18X3.2 1/2“	The flat nozzles deliver a jet with constant profile.
96200-1208		1/2“	FLAT NOZZLE 5 HOLE Ø3.2 1/2“	The flat nozzles deliver several parallel single jets.
96200-1209		1/2“	FLAT NOZZLE 7 HOLE Ø2.0 1/2“	The flat nozzles deliver several parallel single jets.
96200-1210		1/2“	GRINDING NOZZLE 32.0 1/2“	The grinding nozzle delivers a straight, bundled jet that does not separate.
96200-1211		1/2“	GRINDING NOZZLE 42.0 1/2“	The grinding nozzle delivers a straight, bundled jet that does not separate.
96200-1212		1/2“	FLAT NOZZLE W. FLEX JOINT 20 HOLE Ø2.0 1/2“	The flat nozzles deliver several parallel single jets. The nozzle part can be swivelled 40°.
96200-1213		1/2“	90° NOZZLE Ø6.0 1/2“	The angled nozzles deliver a punctiform jet.
96200-1214		1/2“	90° NOZZLE Ø9.0 1/2“	The angled nozzles deliver a punctiform jet.
96200-1215		1/2“	90° NOZZLE Ø12.0 1/2“	The angled nozzles deliver a punctiform jet.
96200-1216		1/2“	90° SPRAY NOZZLE 8 HOLE 1/2“	The angled nozzles deliver several parallel single jets.
96200-1217		1/2“	CONNECTOR 3/8“ NPT 1/2“	Adapter with a ball one side and external thread other side.
96200-1218		1/2“	CONNECTOR 1/2“ NPT 1/2“	Adapter with a ball one side and external thread other side.
96200-1219		1/2“	Y FITTING 1/2“	Two hoses can branch from one supply line. The reducer allows a reduction from 1/2“ to 1/4“.
96200-1220		1/2“	Y FITTING REDUCED TO 1/4“ 1/2“	Two hoses can branch from one supply line. The reducer allows a reduction from 1/2“ to 1/4“.
96200-1221		1/2“	T FITTING 1/2“	Two hoses can branch at 90° from one supply line. The eyelet permits attachment to the machine.
96200-1222		1/2“	ELBOW FITTING 1/2“	These angle pieces are used where tight bends are required.
96200-1223		1/2“	DOUBLE SOCKET 1/2“	The coupling pieces have a socket at each end. Here can e.g. a screw connection can be added.
96200-1224		1/2“	REDUCER 1/2“ TO 1/4“ 1/2“	The reducer allows a reduction from 1/2“ to 1/4“.
96200-1225		1/2“	EXTENSION 95MM 1/2“	The extensions are suitable for bridging long stretches, particularly horizontal stretches.
96200-1226		1/2“	HOSE BEND 90° 1/2“	These hose bends are used where bends are required.
96200-1227		1/2“	RING SYSTEM 1/2“	Ring system with lateral spray holes.
96200-1228		1/2“	LOCKING RING WITH SCREW 1/2“	With the clamping rings, bending or positional change at higher pressure can be avoided.
96200-1229		1/2“	CHECK VALVE 1/2“	Prevents dripping of the hose line.
96200-1230		1/2“	SHUT-OFF VALVE W. EXT. THREAD NPT 1/4“ 1/2“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1231		1/2“	SHUT-OFF VALVE W. INT. THREAD NPT 1/4“ 1/2“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1232		1/2“	SHUT-OFF VALVE W. SEGMENT ADAPTER 1/2“	To regulate and stop the flow. Infinitely variable through a 90° rotation.
96200-1299		1/2“	ASSEMBLY PLIERS 1/2“	For assembling flex hose elements.

96382

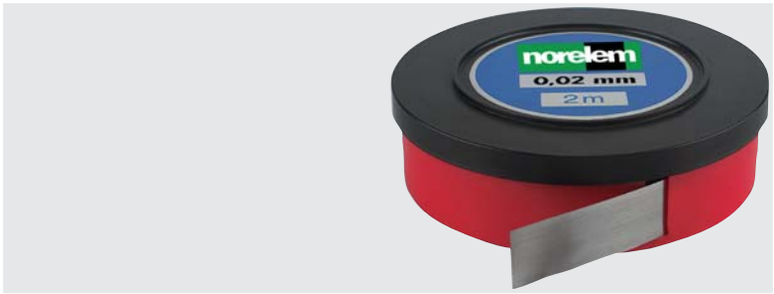
Feeler gauge strips

Material:
Stainless steel 1.4301, from 0.010 spring steel 1.1274

Version:
Spring hard, cold rolled

Sample order:
nlm 96382-0010

Note:
These feeler gauges are supplied in a practical dispenser. They are used for adjusting, aligning and as shims for tools, workpieces, forms etc, checking tolerances, controlling and adjusting guides, print rollers, profile templates and many other applications.

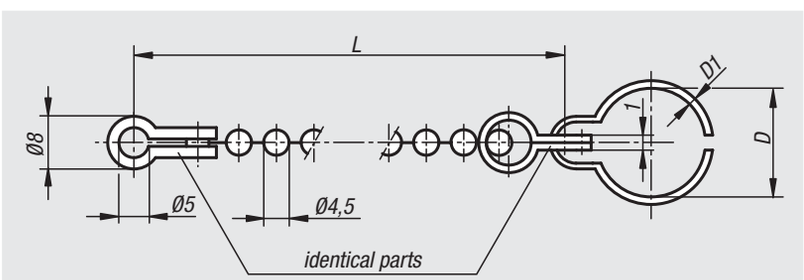


Order No.	thickness	strip width (mm)	length (m)	thickness tolerance mm
96382-0005	0,005	12,7	2	±0,001
96382-0010	0,010	12,7	2	±0,002
96382-0020	0,020	12,7	2	±0,002
96382-0030	0,030	12,7	2	±0,002
96382-0040	0,040	12,7	2	±0,003
96382-0050	0,050	12,7	2	±0,003
96382-0100	0,100	12,7	2	±0,004
96382-0200	0,200	12,7	2	±0,006
96382-0300	0,300	12,7	2	±0,007

96390

Ball chains

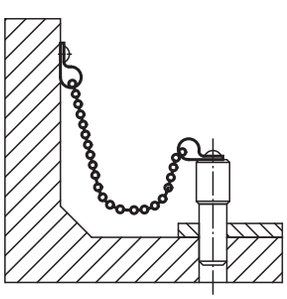
with ring clip



Material:
Chain brass.
Ring spring steel 1.5026.

Sample order:
nlm 96390-16X320 (include length L)

Note:
If no length is specified 1000 mm will be supplied.



Order No.	L	D	D1
96390-09X	160/320/500/1000	9	1
96390-12X	160/320/500/1000	12	1,2
96390-14X	160/320/500/1000	14	1,6
96390-16X	160/320/500/1000	16	1,6
96390-20X	160/320/500/1000	20	2
96390-24X	160/320/500/1000	24	2
96390-30X	160/320/500/1000	30	2,6
96390-36X	160/320/500/1000	36	2,6

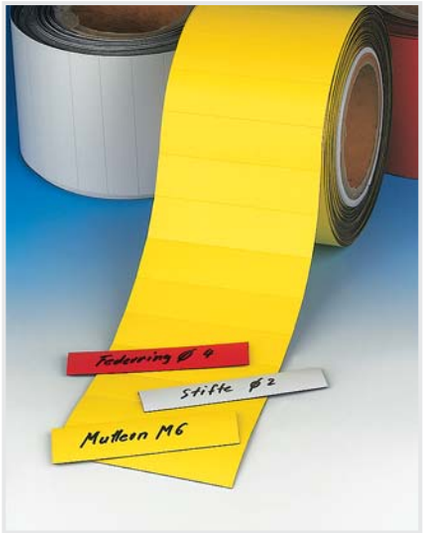
96450

Magnetic labels

on a roll, perforated

Sample order:
nlm 96450-0800201

Note:
Store shelf magnetic labels on a roll, 10 m long, perforated magnetic strips that can be separated without scissors.
Other colours and dimensions available on request.



Order No. white	Order No. yellow	length x width	Magnetic band: thickness	Labels per roll
96450-0800201	**96450-0800202**	80 x 20	0,9	500
96450-0800401	**96450-0800402**	80 x 40	0,9	250
96450-1000501	**96450-1000502**	100 x 50	0,9	200

96455

Magnetic labels

Sample order:
nlm 96455-0700202

Note:
These labels are small magnetic plaques for identifying the contents of store shelves. Product positions can be quickly and easily identified.
Other colours and dimensions available on request.

Order No. white	Order No. yellow	length x width	Magnetic band: thickness
96455-0600101	**96455-0600102**	60 x 10	0,9
96455-0700201	**96455-0700202**	70 x 20	0,9
96455-0800301	**96455-0800302**	80 x 30	0,9
96455-1000401	**96455-1000402**	100 x 40	0,9
96455-1500501	**96455-1500502**	150 x 50	0,9
96455-2000801	**96455-2000802**	200 x 80	0,9

Magnetic tape rolls

Sample order:
nlm 96460-301

Note:
Magnetic tape solves labelling problems. They adhere to any steel surface and can be repeatedly written on and wiped.
Other colours and dimensions available on request.

Order No. white	Order No. yellow	Magnetic band: width (mm)	Magnetic band: thickness	Length	Approx. weight kg
96460-301	**96460-302**	30	0,9	10 m	1,000
96460-401	**96460-402**	40	0,9	10 m	1,740

Magnetic C profiles

Sample order:
nlm 96465-100030

Note:
Magnetic C profiles are full face magnetic strips for labelling shelves or for headers or name tags on planning boards. They are supplied with card backing and a transparent cover.
Other dimensions available on request.

Order No.	length x width
96465-100030	100 x 30
96465-100040	100 x 40
96465-150050	150 x 50

96470

Magnetic envelopes

Sample order:
nlm 96470-217155

Note:
Magnetic envelopes are used to hold documents accompanying the goods during the production process.

Order No.	length x height	for sheet size
96470-217155	217 x 155	DIN A5
96470-220300	220 x 300	DIN A4

96471

Magnetic envelopes

with strong magnetics

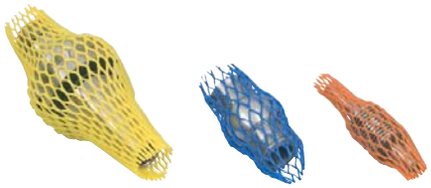
Sample order:
nlm 96471-217155

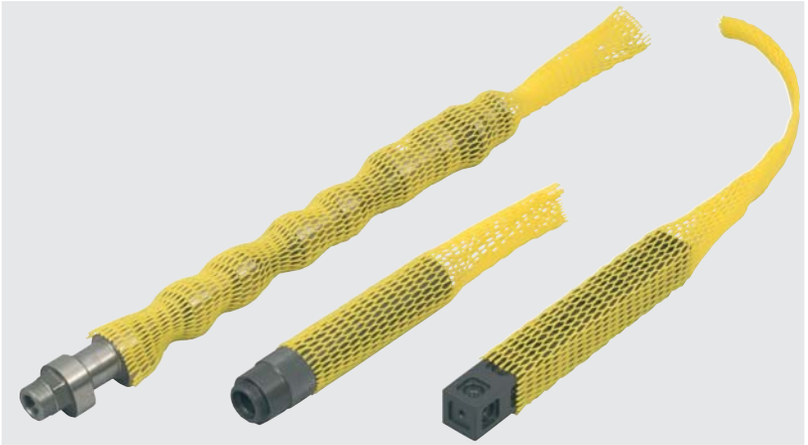
Note:
Standard magnetic envelopes do not provide sufficient hold by severe vibration or too small surface area i.e. wire crates. These magnetic envelopes have two strong neodymium magnets. They simplify handling in such a way that an envelope only has to be thrown at the wire box. The magnets sealed into the envelopes seek their own surface ensure a secure hold.

Order No.	length x height	for sheet size
96471-217155	217 x 155	DIN A5
96471-220300	220 x 300	DIN A4

96500

Net sleeves





Material:
Polyethylene

Sample order:
nlm 96500-007X25000

Note for ordering:
Release as roll ware only

Note:
Effective protection for surfaces and delicate goods. Very resistant to external influences and environmentally friendly (recyclable). Cut to length as required.
Can be reused due to good retraction effect to the original diameter.

Order No.	Recommended Ø	Colour	Length
96500-007X25000	7-15 mm	orange	250 m / on the roll
96500-015X20000	15-25 mm	blue	200 m / on the roll
96500-025X10000	25-50 mm	yellow	100 m / on the roll
96500-050X10000	50-100 mm	red	100 m / on the roll
96500-100X05000	100-200 mm	green	50 m / on the roll
96500-200X05000	200-300 mm	orange	50 m / on the roll
96500-300X05000	300-600 mm	white	50 m / on the roll

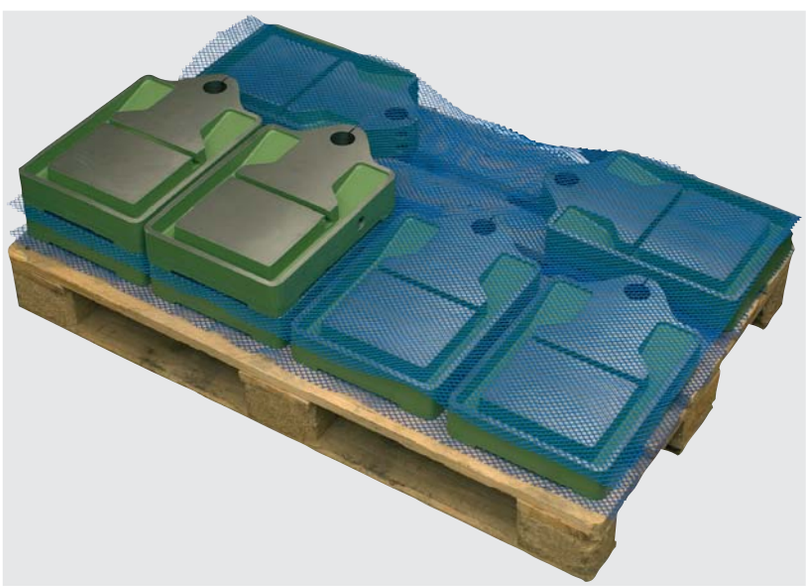
96510

Net mats

Material:
Polyethylene

Sample order:
nlm 96510-07500950

Note:
Effective protection for surfaces and delicate goods. Very resistant to external influences and environmentally friendly (recyclable). Cut to size as required.



Order No.	Dimensions	Mesh size	Mat thickness	Colour
96510-07500950	750x950 mm	11x11 mm	3,8 mm	blue
96510-078011804	780x1180 mm	4x4 mm	3,7 mm	black
96510-078011806	780x1180 mm	6x6 mm	2,8 mm	black

96610

Plastic hammer Supercraft

recoilless

Material:
Housing steel tube filled with steel balls.
Shaft steel tube with rubber grip or Hickory.
Inserts white nylon (grease and oil resistant).

Sample order:
nlm 96610-05002

Note:
Inserts to reorder 96614.

Order No.	Version	Head-Ø	Height	Length
96610-03001	Hickory shaft	30	110	330
96610-04001	Hickory shaft	40	115	360
96610-05001	Hickory shaft	50	120	370
96610-06001	Hickory shaft	60	145	370
96610-03002	steel shaft	30	110	290
96610-04002	steel shaft	40	115	300
96610-05002	steel shaft	50	120	310
96610-06002	steel shaft	60	145	325

96614

Hammer inserts

for Supercraft hammers

Material:
White nylon, grease and oil resistant.

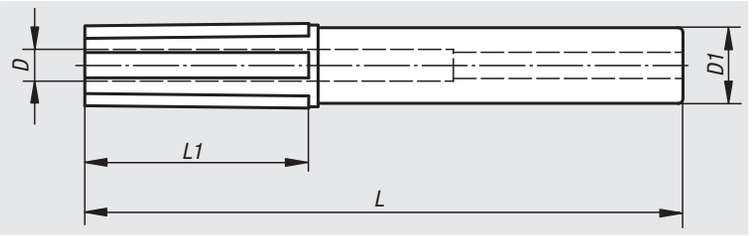
Sample order:
nlm 96614-04001

Order No.	for Head-Ø	Suitable for Supercraft soft hammers
96614-03001	30	96610-030..
96614-04001	40	96610-040..
96614-05001	50	96610-050..
96614-06001	60	96610-060..

96630

Taper cleaners

for Morse tapers



Material:
Plastic, felt facing.

Sample order:
nlm 96630-001

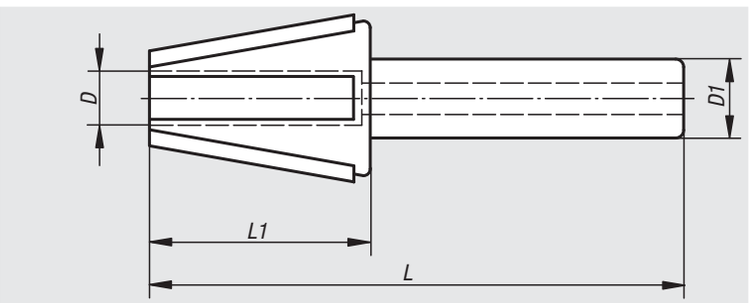
Note:
For cleaning Morse taper tool holders. The taper cleaner consists of a plastic body with form retentive felt facing. No abrasive particles remain in the non-woven material. Dirt particles collect in the large intermediate spaces.

Order No.	Size	D	D1	L	L1
96630-001	MK 1	-	22	136	59
96630-002	MK 2	10	24	190	71
96630-003	MK 3	13	24	196	87
96630-004	MK 4	17	24	222	110
96630-005	MK 5	21	30	258	136
96630-006	MK 6	29	34	315	195

96632

Taper cleaners

for short tapers



Material:
Plastic, felt facing.

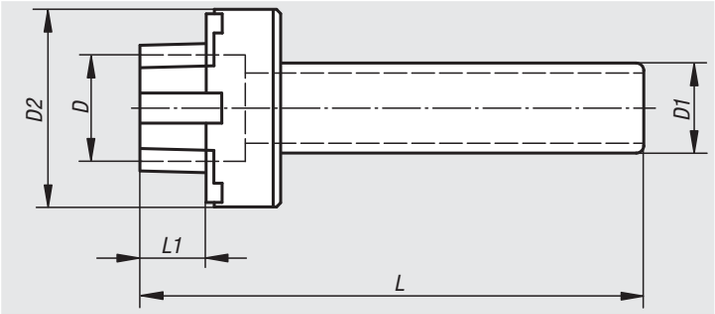
Sample order:
nlm 96632-020

Note:
For cleaning short taper tool holders. The taper cleaner consists of a plastic body with form retentive felt facing. No abrasive particles remain in the non-woven material. Dirt particles collect in the large intermediate spaces.

Order No.	Size	D	D1	L	L1
96632-020	SK 20	7,5	15	102	39
96632-030	SK 30	9,5	24	168	55
96632-040	SK 40	16	24	188	73
96632-045	SK 45	21	26	115	96
96632-050	SK 50	26	30	240	116

Taper cleaners

for hollow shank tapers



Material:
Plastic, felt facing.

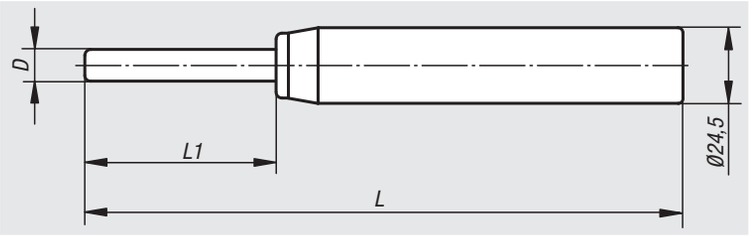
Sample order:
nlm 96634-025

Note:
For cleaning hollow shank taper tool holders. The taper cleaner consists of a plastic body with form retentive felt facing. No abrasive particles remain in the non-woven material. Dirt particles collect in the large intermediate spaces.

Order No.	Size	D	D1	D2	L	L1
96634-025	HSK 25	14	22	33	114	9
96634-032	HSK 32	17	24	35	138	10
96634-040	HSK 40	22,2	24	45	142	13
96634-050	HSK 50	27,5	24	53	152	17
96634-063	HSK 63	35	30	66	168	22
96634-080	HSK 80	44	30	83	178	27
96634-100	HSK 100	57	30	103	199	34

96636

Cylinder cleaners



Material:
Body ABS;
cleaner PA-flock,
holohedrally coated

Sample order:
nlm 96636-006

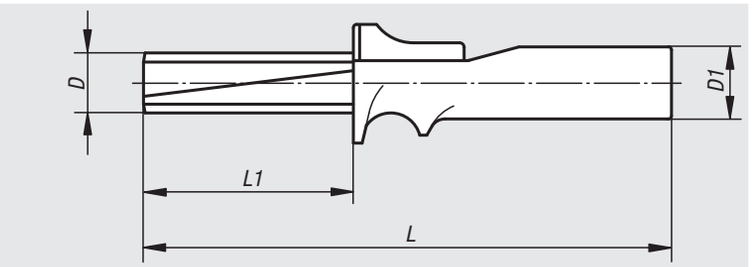
Note:
For gentle and efficient cleaning of cylindrical tool holders and bores of every kind.

Order No.	D	L	L1
96636-006	6	158	37
96636-008	8	158	37
96636-010	10	168	47
96636-012	12	168	47
96636-014	14	168	47

96638

Cylinder cleaners

two-part



Material:
Body ABS.
Cleaner felt facing.

Sample order:
nlm 96638-016

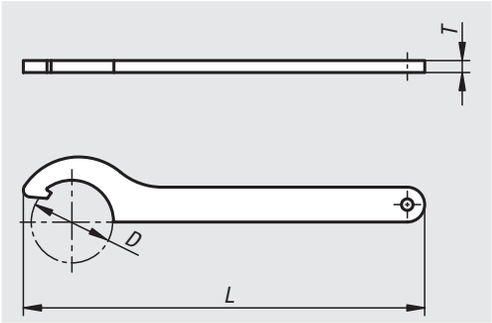
Note:
For gentle and efficient cleaning of cylindrical tool holders and bores of every kind.

Application:
1. Relax the cleaner by pushing the thumb button = reduced Ø.
2. Tense the cleaner by releasing the thumb button, rotate 360°, pull out.

Order No.	D	D1	L	L1
96638-016	16	24	176	70
96638-018	18	24	176	70
96638-020	20	24	176	70
96638-025	25	24	186	80
96638-032	32	30	221	100
96638-040	40	30	226	105
96638-042	42	30	226	105

Hook wrench with lug

DIN 1810A enhanced



Material:
Special steel.

Version:
Hardened and annealed in black oxide tone.

Sample order:
nlm 96650-012014

Note:
For DIN 1804 slotted round nuts, DIN 981 bearing nuts and for our levelling sets 27700 to 27708 (two hook wrenches will be required for the levelling sets). With rounded edges for better handling.

Order No.	D min.	D max.	L	T	for slotted nuts DIN 1804	for bearing locknuts DIN 981
96650-012014	12	14	110	3	-	-
96650-016020	16	20	110	3	M6, M8	M10
96650-025028	25	28	136	4	M10, M12	M16
96650-030032	30	32	136	4	M14, M16	M18, M20
96650-034036	34	36	170	5	M18, M20	M22
96650-038045	38	45	170	5	M26	M24 - M30
96650-040042	40	42	170	5	M22, M24	M26, M28
96650-045050	45	50	206	6	M26 - M30	M32, M35
96650-052055	52	55	206	6	M32, M35	M38
96650-058062	58	62	240	7	M38 - M42	M42 - M45
96650-065070	65	70	240	7	-	M48 - M52
96650-068075	68	75	240	7	M45 - M50	M50 - M55
96650-080090	80	90	280	8	M52 - M60	M60 - M70

97000

Lubricants
Adhesives

97900

Klüber „Quietsch-Ex“

Sample order:
nlm 97900-250

Safety:
Safety information is available on our internet site.

Description:
“Quietsch-Ex” (no squeak) the universal lubricant for industry, home, garden, automobile, motorbike, hobby and sport.

Application:
Approved for lubricating bearings, slides, chains, locks and hinges.
Cleaning and lubricating oil for the motorbike and to protect machines, equipment, tools and vehicles, etc., from corrosion, e.g. in winter.
It is particularly good for machines and equipment, which are often used outdoors in all weathers.
Rusty screws, hinges and bolts that are rusted solid can be loosened or moved again without destroying them.

Advantages:
Lubricates, repels moisture, counteracts corrosion, improves sliding, loosens rust, protects from freezing and is also good for sawing and drilling.
It penetrates into the smallest gap and reaches every accessible friction point.

Order No.	Container	Viscosity class
97900-250	250 ml spray	ISO VG 32

97901

Klüber lubricating paste

Sample order:
nlm 97901-060

Safety:
Safety information is available on our internet site.

Description:
Klüber 46 MR 401 paste is a white multi-purpose lubricating paste, which provides very high reliability against friction, wear and friction rust.

Application:
Approved as a lubricant for long-term and lifetime lubrication, as an assembly aid and a thread lubricant for CrNi fastenings. Kluber paste is an assembly aid by press fits, it also brings advantages and safety anywhere that low slide speeds, very high pressures, high wear, stick-slip, oscillating movements, vibrations and tribocorrosion occur.
Preferred uses are by low slide speeds, screw spindles, adjustment nuts, splined shafts, ball joints, pivot bearings, gear wheels, radial packing rings, O-ring seals, V-rings, elastic rubber collars and roller bearings.

Advantages:
Protects from corrosion, is water-resistant, actively adhesive and is neutral to non-ferrous metals. Due to the white colour, which after appliance forms an almost invisible highly efficient lubricating film, it is particularly suited for places in which dark pastes are undesirable for visual reasons and cleanliness is required.

Order No.	Container	Working temperature	NLGI Class
97901-060	60 g tube	-40 °C up to 150 °C	1
97901-750	750 g can	-40 °C up to 150 °C	1

97903

Klüber copper paste

lead-free

Description:
The copper paste „Wolfracoat C“ is a metallic paste for temperatures up to 1200 °C.

Application:
A proven assembly, cutting, lubricating and fastener paste for plain bearings and slide points, chains, roller bearings, in foundries for cores and ejectors, in die-casting machines, exhaust systems of internal combustion engines and furnaces.

Advantages:
The synthetic base oil evaporates at over 200 °C. A dry, metallic lubricant film gradually forms. Good lubrication of friction points with slide and rolling friction, good separation and lubrication for fastenings with static and dynamic friction, improved sliding for easy assembly of interference and transition fits, easy dismantling when loosening screw fastenings.

Sample order:
nlm 97903-400

Safety:
Safety information is available on our internet site.

Order No.	Container	Working temperature	NLGI Class
97903-060	60 g tube	-30 °C up to 1200 °C, above 200 °C exchange into dry lubrication	2
97903-400	400 ml spray	-30 °C up to 1200 °C, above 200 °C exchange into dry lubrication	2

97905

Klüber safety lubricating grease

Description:
The safety grease “Microlube GL 261” is a lubricant for high loads at low and high temperatures.

Application:
Lubricating grease for roller and plain bearings, sprockets, gear racks, small gears, adjustment gears, hoists and winches, roller guides, cams and cam plates.
Sealing and lubricating grease for oil and grease-resistant rubber seals such as radial packing rings, O-rings, cylinder and piston seals in pneumatics, rotary shaft lip seals (shaft seals), plastics, slide rails, sunroofs and seat rails.
Anticorrosive grease for bright metal parts, locks, fastening systems, ship fittings, antennas, battery poles and to counter saltwater corrosion.

Advantages:
The combination of ingredients in MICROLUBE increase the metallic surface contact area by micro-slide friction. This wear-free smoothing (friction-point tempering) counteracts corrosion and fitting rust.

Sample order:
nlm 97905-250

Safety:
Safety information is available on our internet site.

Order No.	Container	Working temperature	NLGI Class	Rev. characteristic n x dm
97905-250	250 ml spray	-30 °C up to 140 °C	1	3 x 100000
97905-400	400 g cartridge	-30 °C up to 140 °C	1	3 x 100000

97907

Klüber molybdenum disulphide lubricant

Description:
The molybdenum disulphide lubricant UNIMOLY GL 82 is a lubricating grease with MoS2 for improved fail-safe performance.

Application:
Proven use with roller and plain bearings, slide rails and guides, cams and cam plates, bolts, joints, hinges, cardan shafts, gear racks, screw spindles in all machine and plant construction.
A proven lubricant for wheel bearings and a multi-purpose lubricant for king pins, track and rod joints, cardan shafts and spline shafts.

Advantages:
Contains molybdenum disulphide (MoS2) for improved wear protection by boundary lubrication, waterproof and corrosion preventive.
Based on automobile manufacturers' requirements.

Sample order:
nlm 97907-1000

Safety:
Safety information is available on our internet site.

Order No.	Container	Working temperature	NLGI Class	Rev. characteristic n x dm
97907-0400	400 g cartridge	-20 °C up to 130 °C	2	5 x 100000
97907-1000	1 kg can	-20 °C up to 130 °C	2	5 x 100000

97909

Klüber liquid chain grease

Description:
STRUCTOVIS BHD liquid chain grease is „chain honey" for drive and control chains.

Application:
Approved for long-term lubrication for all drive and control chains. Also ideal for water damp chains or open running gear wheels and gearboxes, on forklifts, conveyors, packaging machines, textile machines, robots, paper and wood processing machines.
Ideal for long-term lubrication of motorcycle chains. Is not washed off by rain or water spray. Ideal for road racing, particularly for derailleur chains, rear derailleurs, sprockets. Protects and lubricates by sun, rain and snow.

Advantages:
Clings and sticks like honey. This „chain honey" is colourless, transparent, creeps well, is wear and corrosion preventive, noise reducing and temperature resistant.

Sample order:
nlm 97909-250

Safety:
Safety information is available on our internet site.

Order No.	Container	Working temperature	Kinematic viscosity DIN 51561 at 40 °C mm^2/s
97909-250	250 ml spray	-5 °C up to 120 °C	~4750

Klüber bonded coating

UNIMOLY C 220

Description:
Bonded coatings consist of a solid lubricant, bonding agent and solvent. After it has been applied and dried, the bonded coating forms a thin lubricating layer that reduces friction and wear. It is dry, adheres firmly to the surface and cannot drip.

Application:
For dry lubricating under high loads, oscillating movements or to counter stick-slip. For lifetime lubrication of screw spindles, hinge pins, cylinder pins and during assembly. Improves wear on gearwheels and sprockets, reduces friction on cap screws.

Advantages:
Dry lubricants cannot drip, therefore a pollution of the environment, as by oil or grease-based lubricants, can be excluded.

Sample order:
nlm 97920-400

Safety:
Safety information is available on our internet site.

Order No.	Container	Working temperature	Water Hazard Class
97920-400	400 ml aerosol	-180 °C up to 450 °C	WGK 2

Ballistol all-purpose oil

in food industry quality

Sample order:
nlm 97930-100200

Note:
Ballistol all-purpose oil is approved in the foods industry for product contact surfaces. All Ballistol components are biodegradable and harmless to the environment.
It is skin-friendly and completely harmless in case of accidental swallowing.
As spray without CFCs.

Safety:
Safety information is available on our internet site.

Description:
Ballistol as a high-quality special oil combines anti-rust, lubricating oil, maintenance and cleaning agent with high creep-ability and disinfection power all in one.

Application:
The all-purpose oil is used versatilely in machine and tool manufacturing, for the fabrication and maintenance of precision devices, scales and in light engineering.
Due to its high pharmaceutical quality, it is outstandingly suited for the foods processing sector.
It finds multiple use in industrial art, industry, agriculture, housekeeping, garden, for automobiles, fishing, hunting and shooting, in the maintenance of metal, wood, plastic, leather, rubber, skin, fur and much more.

Advantages:
Due to its low surface tension and terrific creep-ability, it penetrates into the narrowest nooks and finest cracks.
Ballistol forms an alkaline protective film on metals, neutralises hand sweat and other acidic rust promoting residues and thus protects against corrosion.
Its oil base is medicinally clean white oil. It is non-ageing and does not resinify ven after years.

Storage:
The packaging is tightly sealed, indefinitely durable.

Order No.	Container
97930-100200	200 ml aerosol
97930-100400	400 ml aerosol
97930-205000	5 litre liquid canister

LOCTITE liquid epoxy metals

Sample order:
nlm 97990-3471500

Safety:
Safety information is available on our internet site.

Repairs using epoxy liquid metal

Description:
LOCTITE metal-set liquid metals are steel or aluminium-based epoxy resins. They set new standards in repairs: great strength, very good adhesion, no shrinkage, resistant to most solvents and lubricants. After hardening they can be worked by hand or machined from chipping to thread-cutting just like metal and can be painted.
Cracks, porous spots, faulty holes or damage to pipes, tanks, chassis and machine parts can be quickly and durably repaired using LOCTITE metal-set products. They adhere well to metals, glass, ceramics and other materials.

Type S1 – 97990-3471500
The filler product. High strength and excellent adhesion to other materials. For narrow spaces.

Type S2 – 97990-3472500
The casting product. Great moulding accuracy in building moulds. High strength and excellent adhesion to other materials. Good for machining. No shrinkage.

Type M – 97990-3474500
This product contains metal particles, which produce high resistance to wear and self-lubricating characteristics. For the repair of sliding surfaces e.g. shafts and guide tracks, etc.
Other properties shared with Type S1.

Order No.	Container	Intern. Ident. No.	Product	Mixture ratio	Dexterity in min.	Tensile shear strength N/mm²	Temperature resistance
97990-3471500	tub set 500 g	3471	Metal-Set S1	1:1	180	15-22	-20 °C to +120 °C
97990-3472500	tub set 500 g	3472	Metal-Set S2	1:1	180	15-22	-20 °C to +120 °C
97990-3474500	tub set 500 g	3474	Metal-Set M	1:1	180	15-22	-20 °C to +120 °C

97990

LOCTITE liquid epoxy metals

Sample order:
nlm 97990-3450025

Safety:
Safety information is available on our internet site.

Repairs using epoxy liquid metal

Description:
LOCTITE metal-set liquid metals are steel or aluminium-based epoxy resins. They set new standards in repairs: great strength, very good adhesion, no shrinkage, resistant to most solvents and lubricants. After hardening they can be worked by hand or machined from chipping to thread-cutting just like metal and can be painted.
Cracks, porous spots, faulty holes or damage to pipes, tanks, chassis and machine parts can be quickly and durably repaired using LOCTITE metal-set products. They adhere well to metals, glass, ceramics and other materials.

Twin sprays – Liquid Epoxy Metals 97990-3450025
Automatically guarantees the correct mixing ratio. High strength and excellent adhesion to other materials. Good for machining. Does not shrink.

Order No.	Container	Intern. Ident. No.	Product	Mixture ratio	Dexterity in min.	Tensile shear strength N/mm²	Temperature resistance
97990-3450025	25ml	3450	Twin syringe	1:1	12	15-22	-55 °C up to +100 °C

LOCTITE screw lock

Sample order:
nlm 97990-2220050

Note:
LOCTITE screw lock mid-strength, 97990-243... has a KTW recommendation from the German Federal Ministry of Health in the D2 sealant joints industry based on an inspection carried out by the DVGW Research Institute: suitable for use in the foodstuffs and potable water industries.

* Values to ISO 10964.

Safety:
Safety information is available on our internet site.

Description:
For use with all screw connections. Applied as a liquid, it hardens after being screwed in, in the absence of air and on contact with the metal in the thread.

LOCTITE screw lock low-strength, 97990-222....
To secure adjustment and alignment screws up to thread size M20. Even parts with a high length to diameter ratio can be loosened again. Prevents corrosion. Good vibration resistance. Easy to remove and adjust.
Temperature-resistant from -55 °C to +150 °C.

LOCTITE screw lockmid-strength, 97990-243....
To lock and seal threaded joints, standard thread up to M20, fine thread to M36. Also hardens on lightly oiled surfaces. Resists loosening by vibration. Can be loosened again with a standard tool.
Temperature-resistant from -55 °C to +150 °C.
KTW-recommended.

LOCTITE screw lock high-temperature, 97990-2720050
To provide high-strength locking of threaded joints for thread sizes up to M36. Temperature resistant up to 200 °C. Easily applied due to its thixotropic components.
Temperature-resistant from -55 °C to +200 °C.

LOCTITE screw lock capillary, 97990-290....
Locks and seals by capillary action when applied subsequently, e.g. in already tightened threads or in porosities and cracks. Secures pre-mounted bolts from vibration and loss of tension. For connections up to M8.
Temperature-resistant from -55 °C to +155 °C.

LOCTITE screw lock high-strength, 97990-2701...
To secure and seal threaded connections up to M20, which no longer have to be loosened. Resists loosening by vibration under high dynamic load. The product is also suitable for high-strength joint connections. Can only be removed after heating to 300 °C.
Temperature-resistant from -55 °C to +150 °C

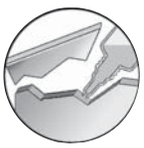
Thread lock

Order No.	Container	Intern. Ident. No.	Hardening system	Viscosity m Pa · s	Dexterity in min.	Ultimate hardness in hours	Shearing strength N/mm²	Break-away torque Nm	Thread size
97990-2220010	10 ml bottle	222	anaerobic	90-180	15	12	3-9	8-20	up to M20
97990-2220050	50 ml bottle	222	anaerobic	90-180	15	12	3-9	8-20	up o M20
97990-2430010	10 ml bottle	243	anaerobic	250-500	12	12	6-14	14-34	up to M20
97990-2430050	50 ml bottle	243	anaerobic	250-500	12	12	6-14	14-34	up to M20
97990-2720050	50 ml bottle	272	anaerobic	~2000	30	12	18-30	18-28*	up to M36
97990-2900010	10 ml bottle	290	anaerobic	10-30	20	12	6-20	15-45	up to M8
97990-2900050	50 ml bottle	290	anaerobic	10-30	20	12	6-20	15-45	up to M8
97990-2701010	10 ml bottle	2701	anaerobic	350-700	10	12	11-20	25-54	up to M20
97990-2701050	50 ml bottle	2701	anaerobic	350-700	10	12	11-20	25-54	up to M20

LOCTITE universal adhesive

Sample order:
nlm 97990-4010050

Safety:
Safety information is available on our internet site.



Bonding different materials

Description:
These adhesives bond metals, rubber, plastics and other materials with and to each other. Bonds strongly in a few seconds.

LOCTITE universal adhesive (cyanoacrylate), 97990-401....
This adhesive bonds the most varied material connections (metals, plastics, leather, rubber, wood, cardboard, ceramics, etc.) and achieves great strength in small gaps.
Temperature-resistant from -50 °C to +80 °C.

LOCTITE universal adhesive gel (cyanoacrylate), 97990-454....
This gel adhesive can be applied exactly, with no running and no drips, even on vertical surfaces. Bonds the most varied materials, even porous materials.
Good gap-filling capacity.
Temperature-resistant from -50 °C to +80 °C.

LOCTITE plastic adhesive, 97990-4060770
The combination for plastics of contact adhesive 406 (cyanoacrylate) and the primer 770 for plastics difficult to bond e.g. polyethylene (PE) and polypropylene (PP).
Temperature-resistant from -50 °C to +80 °C.

Order No.	Container	Intern. Ident. No.	Hardening system	Viscosity m Pa · s	Dexterity in sec.	Ultimate hardness in hours	Tensile strength N/mm²	Tensile shear strength N/mm²	Adhesion gap in mm
97990-4010020	20 g bottle	401	air humidity	90-140	3-30	12	12-25	18-26	0,05-0,1
97990-4010050	50 g bottle	401	air humidity	90-140	3-30	12	12-25	18-26	0,05-0,1
97990-4060770	20/10 g set	406/770	air humidity	10-30	2-50	12	12-25	18-26	0,05-0,1
97990-4540020	20 g tube	454	air humidity	gel	2-40	12	12-25	18-26	0,05-0,1

97990

LOCTITE thread sealant

Sample order:
nlm 97990-5110250

Note:
LOCTITE plastic thread sealant, 97990-5331100 has a KTW recommendation from the German Federal Ministry of Health in the D2 sealant joints industry based on an inspection carried out by the DVGW Research Institute: suitable for use in the foodstuffs and potable water industries.

Safety:
Safety information is available on our internet site.

sealing pipe threads

Description:
The liquid thread sealant replaces hemp, pastes and PTFE-tapes.
Parts can be immediately realigned after jointing.

LOCTITE-liquid pipe thread sealant, 97990-511....
For threads up to max. R2". The product has been licensed by the DVGW under No. 86.01 e 125 (pursuant to DIN 30661) for sealing threaded joints in switchboxes and gas equipment.
Temperature-resistant from -55 °C to +150 °C.

LOCTITE-liquid pipe thread sealant low-strength, 97990-577....
For threads up to max. R3". BAM-licensed for use in the oxygen industry up to 15 bar and +60 °C.
Area of use: e.g. in repairs, because it is very easy to dismantle using standard tools.
Temperature-resistant from -55 °C to +150 °C.

LOCTITE-plastic thread sealant, 97990-5331100
Permanently elastic for plastic threads, metal/metal and plastic/metal combinations. KTW-recommended.
Temperature-resistant from -60 °C to +150 °C.

Order No.	Container	Intern. Ident. No.	Hardening system	Viscosity m Pa · s	Dexterity in min.	Ultimate hardness in hours	Break-away torque Nm	Thread size
97990-5110050	50 ml bottle	511	anaerobic	3000-60000	25	12	5-15	up to R2"
97990-5110250	250 ml tube	511	anaerobic	3000-60000	25	12	5-15	up to R2"
97990-5770050	50 ml bottle	577	anaerobic	4500-9000	30	24	9-25	up to R3"
97990-5770250	250 ml tube	577	anaerobic	4500-9000	30	24	9-25	up to R3"
97990-5331100	100 ml tube	5331	air humidity	40000	immediately	12	4,5	up to R3"

LOCTITE surface sealant

Surface sealing

Description:
The adaptability of liquid or paste surface sealants solves almost every sealant problem.

LOCTITE surface sealant low strength, 97990-573…
Resistant to the majority of lubricating and hydraulic oils, petrol, diesel and water. Produces 100% surface contact, therefore it is absolutely impervious. Replaces thin paper seals in gear housings, water and fuel pumps, thermostat housings and many more.

LOCTITE surface sealant removable, 97990-5203300
Very easy to remove; can be peeled off as a film. Rapid hardening.
Temperature-resistant from -55 °C to +150 °C.

LOCTITE surface sealant permanently elastic, 97990-5910300
For non-warping flanges and plastic/plastic and metal/plastic combinations.

Sample order:
nlm 97990-5730250

Note:
* Skin formation time.

Safety:
Safety information is available on our internet site.

Order No.	Container	Intern. Ident. No.	Hardening system	Viscosity m Pa · s	Dexterity	Ultimate hardness in hours	Tensile strength N/mm²	Tensile shear strength N/mm²	Adhesion gap in mm
97990-5730050	50 ml bottle	573	anaerobic	5000-10000	9 hours	72	2-8	0,5-1,5	up to 0,1
97990-5730250	250 ml tube	573	anaerobic	5000-10000	9 hours	72	2-8	0,5-1,5	up to 0,1
97990-5731000	1000 ml tub	573	anaerobic	5000-10000	9 hours	72	2-8	0,5-1,5	up to 0,1
97990-5203300	300 ml cartridge	5203	anaerobic	10000-30000	10 min.*	72	2-6	1-4	up to 0,25
97990-5910300	300 ml cartridge	5910	air humidity	paste	20 min.*	2,5 mm / 24 hours	2-7	0,9-1,4	>0,3

97990

LOCTITE adhesive and sealant

Description:
For permanently elastic adhesive joints and a simultaneous sealant effect against water and dust, etc.

LOCTITE permanently elastic adhesive and sealant, 97990-5366310
Transparent and temperature-resistant. For bonding glass, metals, ceramics and almost all plastics.
Temperature-resistant from -65 °C to +250 °C.

LOCTITE permanently elastic black adhesive and sealant, 97990-5368310
Resistant to chemicals and oil products. Bonds the majority of materials with and to each other.
Temperature-resistant from -65 °C to +250 °C.

LOCTITE high temperature-resistant, permanently elastic adhesive and sealant, 97990-5399310
Red, resistant up to 350 °C short-term. Bonds the majority of materials with and to each other.
Temperature-resistant from -60 °C to +275 °C.

Sample order:
nlm 97990-5366310

Note:
* Skin formation time.
** 50% relative humidity at room temperature.

Safety:
Safety information is available on our internet site.

Elastic bonding and sealing

Order No.	Container	Intern. Ident. No.	Hardening system	Dexterity in min.	Ultimate hardness	Tensile strength N/mm²	Elongation %	Adhesion gap in mm	Hardness Shore A
97990-5366310	310 ml cartridge	5366	air humidity	5*	4 mm in 24 hours**	1,8	500	>0,5	20
97990-5368310	310 ml cartridge	5368	air humidity	5*	4 mm in 24 hours**	2	425	>0,5	24
97990-5399310	310 ml cartridge	5399	air humidity	5*	4 mm in 24 hours**	3,3	500	>0,5	33

LOCTITE retaining compound

Sample order:
nlm 97990-6030010

Safety:
Safety information is available on our internet site.

Bond bushes and bearings

Description:
For bonding of bushes, bearings and sleeves at push fit, interference fit and shrink fit. Full surface contact prevents play, corrosion and fitting rust.

LOCTITE jointing product, oil-tolerant, 97990-603....
Wide range of uses. Especially suited for fixing bearings. Tolerates slight oily pollutants. Temperature-resistant from -55 °C to +150 °C.

LOCTITE jointing product, special, 97990-638....
High gap-filling capacity and very quickly finger-tight. Temperature-resistant from -55 °C to +150 °C.

LOCTITE universal jointing product, 97990-648....
Good gap-filling capacity, rapidly finger-tight and it has excellent temperature resistance. Temperature-resistant from -55 °C to +175 °C

Order No.	Container	Intern. Ident. No.	Hardening system	Viscosity m Pa · s	Dexterity in min.	Ultimate hardness in hours	Shearing strength N/mm²	Break-away torque Nm	Adhesion gap in mm
97990-6030010	10 ml bottle	603	anaerobic	90-180	10	12	16-25	40-60	0,05-0,15
97990-6030050	50 ml bottle	603	anaerobic	90-180	10	12	16-25	40-60	0,05-0,15
97990-6380010	10 ml bottle	638	anaerobic	1500-3000	5	12	20-35	35-60	0,05-0,25
97990-6380050	50 ml bottle	638	anaerobic	1500-3000	5	12	20-35	35-60	0,05-0,25
97990-6480010	10 ml bottle	648	anaerobic	300-600	5	12	16-30	30-55	0,05-0,15
97990-6480050	50 ml bottle	648	anaerobic	300-600	5	12	16-30	30-55	0,05-0,15

97990

LOCTITE cleaner

Sample order:
nlm 97990-7063400

Safety:
Safety information is available on our internet site.

Surface preparation

Description:
Cleaning increases the quality of sealed and bonded joints.

LOCTITE rapid cleaner, 97990-7063…
Removes oil, grease and dirt from metal and the majority of plastic surfaces. Ideal for preparation of adhesive surfaces, rapid evaporation.

LOCTITE rapid cleaner, 97990-7070400
Very good capacity for dissolving grease and oil residues because of the combination of unripe lemons and iso-paraffin. Evaporates leaving no residue and has a pleasant citrus perfume.

LOCTITE adhesive and sealant remover, 97990-7080300
For gentle removal of adhesive and sealant residues. Replaces mechanical treatment, which often leads to damage to surfaces.

Order No.	Container	Intern. Ident. No.
97990-7063150	150 ml spray can	7063
97990-7063400	400 ml pump spray	7063
97990-7070400	400 ml pump spray	7070
97990-7080300	400 ml spray can	-

LOCTITE activators

Description:
To harden cyanoacrylate (CA) adhesives and anaerobically hardened adhesives; activators are used in passive materials for rapid and complete hardening. To that end the liquid activator is applied to one or both surfaces of the joint before the adhesive is applied.

Sample order:
nlm 97990-7113000

Note:
The activators are supplied in 500 ml sets.

Safety:
Safety information is available on our internet site.

Order No.	Activator type	Intern. Ident. No.	Open time	Carrier medium	Application
97990-7025000	CA activator (previous)	7025	24 hours	heptane	Accelerator for before application
97990-7113000	CA activator (subsequent)	7113	24 hours	heptane	Activator for after application to cure liquid cyanoacrylate adhesives
97990-7386000	Activator for 3298	7386	1 hour	heptane	Only for single side activation.
97990-7471000	Activator T for anaerobic products	7471	30 days	acetone/ isopropanol	Cure accelerator, may be applied on both sides
97990-7649000	Activator N for anaerobic products	7649	30 days	acetone	May be applied on both sides of the parts being assembled

97990

Application equipment

Description:
Suitable equipment simplifies the work and promotes correct practice in handling LOCTITE products.

LOCTITE Peristaltic Hand Pump, 97990-9700100
This hand pump is an inexpensive, accurate hand dosing pump, which screws onto the 50 ml or the 250 ml pack.
LOCTITE screw locks and LOCTITE jointing products can be dosed from 0.01 to 0.4 ml with viscosities up to 30000 m Pa · s using this manual system. The system is functional in any situation, is non-drip and optimises product consumption. It also needs no cleaning and no connection for electricity or compressed air.

Teroson cartridge press, 97990-9150310
To hold standard cartridges with a content of 150/310 ml.
Stable plastic semi-shells for a regular use. With toothed rack drive.

Sample order:
nlm 97990-9700100

Application equipment

Order No.	Article description
97990-9700100	**LOCTITE PERISTALTIC HAND PUMP**
97990-9150310	**TEROSON CARTRIDGE PRESS**

Technical data

Index and list of DIN Standards

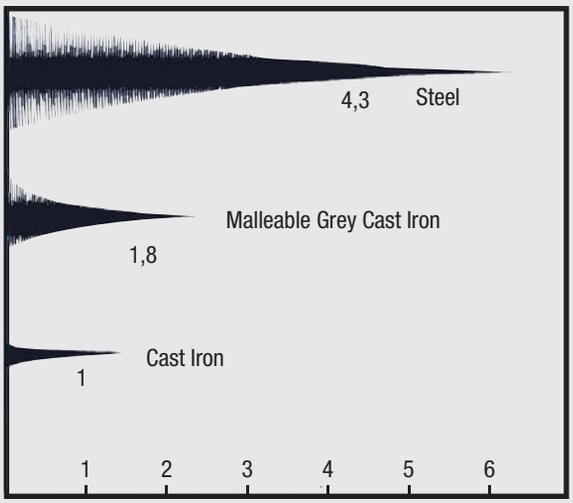
Notes

Technical Data for grey cast iron (cast iron with flake graphite)

If cast iron is for the base of drills, mills lathes etc. these fixtures may have crucial advantages over traditional steel fixtures:

– Cast iron has very good vibration damping properties (ratio of cast iron's damping effect to that of steel = 1 : 4.3.
See also the comparative diagram).
– Cast iron has good emergency
operation properties and good resistance to corrosion.
– Cast iron is easy to machine.

Comparison diagram of oscillation amplitude



Micrograph of cast iron with flake graphite

Material			GJL 250	GJL 300
Tensile strength	R_m	N/mm²	250 – 350	300 – 400
0.1 technical elastic limit	$R_{p\,0,1}$	N/mm²	–	195 – 260
Elasticity limit 0,1	R_e	N/mm²	165 – 228	195 – 260
Compressive strength	δ_{dB}	N/mm²	840	960
Shearing strength	τ_{aB}	N/mm²	290	345
Modulus of elasticity	E	(kN/mm²)	103 – 118	108 – 137
Density	e	g/cm³	7,2	7,25
Hardness	–	HB 30	180 – 250	200 – 275
Coefficient of linear expansion	α	$1 \cdot 10^{-6}$/K	10	11,7

Length tolerances for special lengths:
Grey iron and aluminium profiles and steel and plastic offcuts (Group 01000) are mostly cut to length with saw cuts and they may therefore have the following length tolerances because of their variations relative to the standard design:

Linear Dimensions	Deviations in mm
100-290	+ 10 + 3
300-590	+ 15 + 8
over 600	+ 50 + 20

All other nominal sizes are according to "DIN ISO 2768-mk".

ISO fits for standard borehole

DK 621.753.2(100) GERMAN STANDARDS August 1966

Change August 1966: dimensions harmonized with ISO recommendation ISO/R 286-1962

Previous editions: DIN 7154: 10.36
DIN 7154 sheet 1: 12.50, 9.56

Tolerance fields shown for nominal diameter of 60 mm

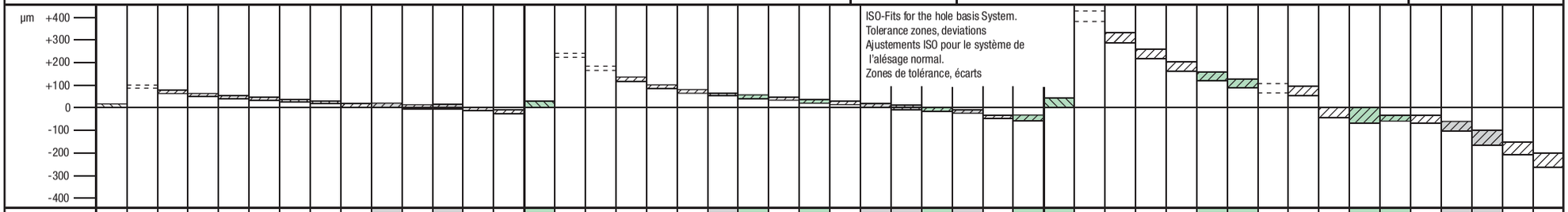
Inside dimensions (boreholes) — Outside dimensions (shafts) — Tolerance fields in dash lines are not available for 60 mm nominal diameter

Tolerance fields according to DIN 7157 [1]) — Line 1 / Line 2

ISO fits for standard borehole

Tolerance fields
dimensions in µm

DIN 7154 sheet 1



Nominal dimension range in mm	Tolerance field	H6	u5	t5	s5	r5	p5	n5	m5	k5	k6	j5	j6	h5	g5	H7	za6	z6	x6	u6	t6	s6	r6	p6	n6	m6	k6	j6	h6	g6	f6	f7	H8	zc8	zb8	za8	z8	x8	u8	t8	s8	h8	h9	f7	f8	e8	d9	c9	b9
	from 1	+ 6	+ 22	—	+ 18	+ 14	+ 10	+ 8	+ 6	+ 4	+ 6	+ 2	+ 4	0	- 2	+ 10	+ 38	+ 32	+ 26	+ 24	—	+ 20	+ 16	+ 12	+ 10	+ 8	+ 6	+ 4	0	- 2	- 6	- 6	+ 14	+ 74	+ 54	—	+ 40	+ 34	—	—	+ 28	0	0	- 6	- 6	- 14	- 20	- 60	-140
	up to 3	0	+ 18		+ 14	+ 10	+ 6	+ 4	+ 2	0	0	- 2	- 2	- 4	- 6	0	+ 32	+ 26	+ 20	+ 18		+ 14	+ 10	+ 6	+ 4	+ 2	0	- 2	- 6	- 8	- 12	- 16	0	+ 60	+ 40		+ 26	+ 20			+ 14	- 14	- 25	- 16	- 20	- 28	- 45	- 85	-165
	over 3	+ 8	+ 28	—	+ 24	+ 20	+ 17	+ 13	+ 9	+ 6	+ 9	+ 3	+ 6	0	- 4	+ 12	+ 50	+ 43	+ 36	+ 31	—	+ 27	+ 23	+ 20	+ 16	+ 12	+ 9	+ 6	0	- 4	- 10	- 10	+ 18	+ 98	+ 68	—	+ 53	+ 46	—	—	+ 37	0	0	- 10	- 10	- 20	- 30	- 70	-140
	up to 6	0	+ 23		+ 19	+ 15	+ 12	+ 8	+ 4	+ 1	+ 1	- 2	- 2	- 5	- 9	0	+ 42	+ 35	+ 28	+ 23		+ 19	+ 15	+ 12	+ 8	+ 4	+ 1	- 2	- 8	- 12	- 18	- 22	0	+ 80	+ 50		+ 35	+ 28			+ 19	- 18	- 30	- 22	- 28	- 38	- 60	-100	-170
	over 6	+ 9	+ 34	—	+ 29	+ 25	+ 21	+ 16	+ 12	+ 7	+ 10	+ 4	+ 7	0	- 5	+ 15	+ 61	+ 51	+ 43	+ 37	—	+ 32	+ 28	+ 24	+ 19	+ 15	+ 10	+ 7	0	- 5	- 13	- 13	+ 22	+119	+ 89	+ 74	+ 64	+ 56	—	—	+ 45	0	0	- 13	- 13	- 25	- 40	- 80	-150
	up to 10	0	+ 28		+ 23	+ 19	+ 15	+ 10	+ 6	+ 1	+ 1	- 2	- 2	- 6	- 11	0	+ 52	+ 42	+ 34	+ 28		+ 23	+ 19	+ 15	+ 10	+ 6	+ 1	- 2	- 9	- 14	- 22	- 28	0	+ 97	+ 67	+ 52	+ 42	+ 34			+ 23	- 22	- 36	- 28	- 35	- 47	- 76	-116	-186
	over 10 up to 14	+ 11	+ 41	—	+ 36	+ 31	+ 26	+ 20	+ 15	+ 9	+ 12	+ 5	+ 8	0	- 6	+ 18	+ 75 + 64	+ 61 + 50	+ 51 + 40	+ 44	—	+ 39	+ 34	+ 29	+ 23	+ 18	+ 12	+ 8	0	- 6	- 16	- 16	+ 27	+157 +130	+117 + 90	+ 91 + 64	+ 77 + 50	+ 67 + 40	—	—	+ 55	0	0	- 16	- 16	- 32	- 50	- 95	-150
	over 14 up to 18	0	+ 33		+ 28	+ 23	+ 18	+ 12	+ 7	+ 1	+ 1	- 3	- 3	- 8	- 14	0	+ 88 + 77	+ 71 + 60	+ 56 + 45	+ 33		+ 28	+ 23	+ 18	+ 12	+ 7	+ 1	- 3	- 11	- 17	- 27	- 34	0	+177 +150	+135 +108	+104 + 77	+ 87 + 60	+ 72 + 45			+ 28	- 27	- 43	- 34	- 43	- 59	- 93	-138	-193
	over 18 up to 24	+ 13	+ 50 + 41	—	+ 44	+ 37	+ 31	+ 24	+ 17	+ 11	+ 15	+ 5	+ 9	0	- 7	+ 21		+ 86 + 73	+ 67 + 54	+ 54 + 41	—	+ 48	+ 41	+ 35	+ 28	+ 21	+ 15	+ 9	0	- 7	- 20	- 20	+ 33	+221 +188	+169 +136	+131 + 98	+106 + 73	+ 87 + 54	—	—	+ 68	0	0	- 20	- 20	- 40	- 65	-110	-160
	over 24 up to 30	0	—	+ 50 + 41	+ 35	+ 28	+ 22	+ 15	+ 8	+ 2	+ 2	- 4	- 4	- 9	- 16	0	—	+101 + 88	+ 77 + 64	+ 61 + 48	+ 54 + 41	+ 35	+ 28	+ 22	+ 15	+ 8	+ 2	- 4	- 13	- 20	- 33	- 41	0	+251 +218	+193 +160	+151 +118	+121 + 88	+ 97 + 64	+ 81 + 48		+ 35	- 33	- 52	- 41	- 53	- 73	-117	-162	-212
	over 30 up to 40	+ 16	—	+ 59 + 48	+ 54	+ 45	+ 37	+ 28	+ 20	+ 13	+ 18	+ 6	+ 11	0	- 9	+ 25	—	+128 +112	+ 96 + 80	+ 76 + 60	+ 64 + 48	+ 59	+ 50	+ 42	+ 33	+ 25	+ 18	+ 11	0	- 9	- 25	- 25	+ 39	—	+239 +200	+187 +148	+151 +112	+119 + 80	+ 99 + 48	—	—	+ 82	0	0	- 25	- 25	- 50	- 80	-120 -182	-170 -232
	over 40 up to 50	0	—	+ 65 + 54	+ 43	+ 34	+ 26	+ 17	+ 9	+ 2	+ 2	- 5	- 5	- 11	- 20	0	—	—	+113 + 97	+ 86 + 70	+ 70 + 54	+ 43	+ 34	+ 26	+ 17	+ 9	+ 2	- 5	- 16	- 25	- 41	- 50	0	—	+281 +242	+219 +180	+175 +136	+136 + 97	+109 + 70			+ 43	- 39	- 62	- 50	- 64	- 89	-142	-130 -192	-180 -242
	over 50 up to 65	+ 19	—	+ 79 + 66	+ 66 + 53	+ 54 + 41	+ 45	+ 33	+ 24	+ 15	+ 21	+ 6	+ 12	0	- 10	+ 30	—	—	+141 +122	+106 + 87	+ 85 + 66	+ 72 + 53	+ 60 + 41	+ 51	+ 39	+ 30	+ 21	+ 12	0	- 10	- 30	- 30	+ 46	—	+346 +300	+272 +226	+218 +172	+168 +122	+133 + 87	—	—	+ 99 + 53	0	0	- 30	- 30	- 60	-100	-140 -214	-190 -264
	over 65 up to 80	0	—	—	+ 72 + 59	+ 56 + 43	+ 32	+ 20	+ 11	+ 2	+ 2	- 7	- 7	- 13	- 23	0	—	—	—	+121 +102	+ 94 + 75	+ 78 + 59	+ 62 + 43	+ 32	+ 20	+ 11	+ 2	- 7	- 19	- 29	- 49	- 60	0	—	+320 +274	+256 +210	+192 +146	+148 +102	—	—	+105 + 59	- 46	- 74	- 60	- 76	-106	-174	-150 -224	-200 -274
	over 80 up to 100	+ 22	—	—	+ 86 + 71	+ 66 + 51	+ 52	+ 38	+ 28	+ 18	+ 25	+ 6	+ 13	0	- 12	+ 35	—	—	—	+146 +124	+113 + 91	+ 93 + 71	+ 73 + 51	+ 59	+ 45	+ 35	+ 25	+ 13	0	- 12	- 36	- 36	+ 54	—	+389 +335	+312 +258	+232 +178	+178 +124	—	—	+125 + 71	0	0	- 36	- 36	- 72	-120	-170 -257	-220 -307
	over 100 up to 120	0	—	—	—	+ 69 + 54	+ 37	+ 23	+ 13	+ 3	+ 3	- 9	- 9	- 15	- 27	0	—	—	—	+166 +144	+126 +104	+101 + 79	+ 76 + 54	+ 37	+ 23	+ 13	+ 3	- 9	- 22	- 34	- 58	- 71	0	—	—	—	+364 +310	+264 +210	+198 +144	+158 +104	+133 + 79	- 54	- 87	- 71	- 90	-126	-207	-180 -267	-240 -327

Black numbers = dimensions on the good side
Green numbers = dimensions on the reject side
Fits for standard borehole, fit tolerances (clearances and interferences) see DIN 7154, sheet 2
Fits for standard shaft, see DIN 7155, sheet 1 and sheet 2

[1]) Tolerance fields according to DIN 7157 should preferably be used.
In this case, line 1 is preferable to line 2

Continuation, page 2

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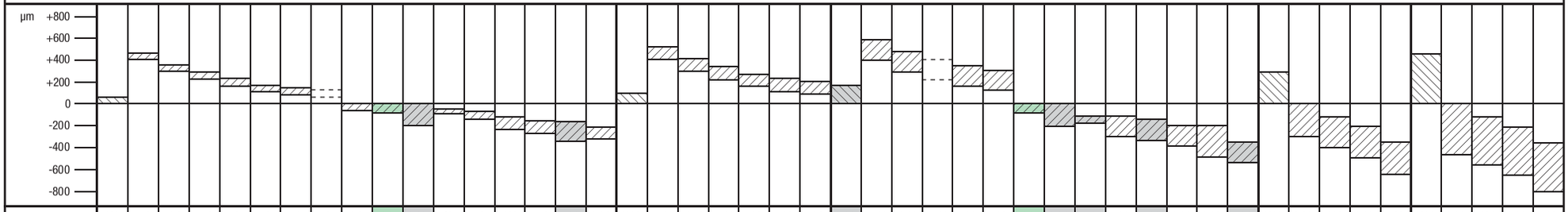
Tolerance fields shown for nominal diameter of 60 mm

Inside dimensions (boreholes) — Outside dimensions (shafts) — Tolerance fields in dash lines are not available for 60 mm nominal diameter — Tolerance fields according to DIN 7157 [1] — Line 1 / Line 2

Dimensions in µm



Nominal dimension range in mm	Tolerance field	H9	zc9	zb9	za9	z9	x9	u9	t9	h8	h9	h11	f8	e9	d10	c10	c11	b10	H10	zc10	zb10	za10	z10	x10	u10	H11	zc11	zb11	za11	z11	x11	h9	h11	d9	d11	c11	b11	b12	a11	H12	h12	d12	b12	a12	H13	h13	d13	b13	a13
from 1		+25	+85	+65	—	+51	+45	—	—	0	0	0	-6	-14	-20	-60	-60	-140	+40	+100	—	—	+66	—	—	+60	+120	—	—	—	—	0	0	-20	-20	-60	-140	-140	-270	+100	0	-20	-140	-270	+140	0	-20	-140	-270
up to 3		0	+60	+40		+26	+20			-14	-25	-60	-20	-39	-60	-100	-120	-180	0	+60			+26			0	+60					-25	-60	-45	-80	-120	-200	-240	-330	0	-100	-120	-240	-370	0	-140	-160	-280	-410
over 3		+30	+110	+80	—	+65	+58	—	—	0	0	0	-10	-20	-30	-70	-70	-140	+48	+128	—	—	+83	—	—	+75	+155	—	—	—	—	0	0	-30	-30	-70	-140	-140	-270	+120	0	-30	-140	-270	+180	0	-30	-140	-270
up to 6		0	+80	+50		+35	+28			-18	-30	-75	-28	-50	-78	-118	-145	-188	0	+80			+35			0	+80					-30	-75	-60	-105	-145	-215	-260	-345	0	-120	-150	-260	-390	0	-180	-210	-320	-450
over 6		+36	+133	+103	—	+78	+70	—	—	0	0	0	-13	-25	-40	-80	-80	-150	+58	+155	+125	—	+100	—	—	+90	+187	+157	—	—	—	0	0	-40	-40	-80	-150	-150	-280	+150	0	-40	-150	-280	+220	0	-40	-150	-280
up to 10		0	+97	+67		+42	+34			-22	-36	-90	-35	-61	-98	-138	-170	-208	0	+97	+67		+42			0	+97	+67				-36	-90	-76	-130	-170	-240	-300	-370	0	-150	-190	-300	-430	0	-220	-260	-370	-500
over 10			+173	+133	—	+93	+83													+200	+160	—	+120	—			+240	+200																					
up to 14		+43	+130	+90		+50	+40	—	—	0	0	0	-16	-32	-50	-95	-95	-150	+70	+130	+90		+42			+110	+130	+90	—	—	—	0	0	-50	-50	-95	-150	-150	-290	+180	0	-50	-150	-290	+270	0	-50	-150	-290
over 14		0	+193	+151	—	+103	+88			-27	-43	-110	-43	-75	-112	-165	-205	-220	0	+220	+178	—	+130	+115	—	0	+260	+218				-43	-110	-93	-160	-205	-260	-330	-400	0	-180	-230	-330	-470	0	-270	-320	-420	-560
up to 18			+150	+108		+60	+45													+150	+108		+60	+45			+150	+108																					
over 18			+240	+188	+150	+125	+106	—												+272	+220	—	+157	+138			+318	+266																					
up to 24		+52	+188	+136	+98	+73	+54		—	0	0	0	-20	-40	-65	-110	-110	-160	+84	+188	+136		+73	+54	—	+130	+188	+136			—	0	0	-65	-65	-110	-160	-160	-300	+210	0	-65	-160	-300	+330	0	-65	-160	-300
over 24		0	+270	+212	+170	+140	+116	+100		-33	-52	-130	-53	-92	-149	-194	-240	-244	0	+302	+244	—	+172	+148		0	+348	+290	—	+218		-52	-130	-117	-195	-240	-290	-370	-430	0	-210	-275	-370	-510	0	-330	-395	-490	-630
up to 30			+218	+160	+118	+88	+64	+48												+218	+160		+88	+64			+218	+160		+88																			
over 30			+336	+262	+210	+174	+142	+122								-120	-120	-170		+374	+300	—	+212	+180	—		+434	+360	—	+272						-120	-170	-170	-310				-170	-310				-170	-310
up to 40		+62	+274	+200	+148	+112	+80	+60	—	0	0	0	-25	-50	-80	-220	-280	-270	+100	+274	+200		+112	+80	—	+160	+274	+200	—	+112	—	0	0	-80	-80	-280	-330	-420	-470	+250	0	-80	-420	-560	+390	0	-80	-560	-700
over 40		0	+387	+304	+242	+198	+159	+132		-39	-62	-160	-64	-112	-180	-130	-130	-180	0	+425	+342	+280	+236	+197	+170	0	+485	+402	—	+296		-62	-160	-142	-240	-130	-180	-180	-320	0	-250	-330	-180	-320	0	-390	-470	-180	-320
up to 50			+325	+242	+180	+136	+97	+70								-230	-290	-280		+325	+242	+180	+136	+97	+70		+325	+242		+136						-290	-340	-430	-480				-430	-570				-570	-710
over 50			+479	+374	+300	+245	+196	+161								-140	-140	-190		+525	+420	+346	+292	+242	+207		+595	+490	—	+362	+312					-140	-190	-190	-340				-190	-340				-190	-340
up to 65		+74	+405	+300	+226	+172	+122	+87	—	0	0	0	-30	-60	-100	-260	-330	-310	+120	+405	+300	+226	+172	+122	+87	+190	+405	+300		+172	+122	0	0	-100	-100	-330	-380	-490	-530	+300	0	-100	-490	-640	+460	0	-100	-650	-800
over 65		0	—	+434	+348	+284	+220	+176		-46	-74	-190	-76	-134	-220	-150	-150	-200	0	+600	+480	+394	+330	+266	+222	0	+670	+550	—	+400	+336	-74	-190	-174	-290	-150	-200	-200	-360	0	-300	-400	-200	-360	0	-460	-560	-200	-360
up to 80				+360	+274	+210	+146	+102								-270	-340	-320		+480	+360	+274	+210	+146	+102		+480	+360		+210	+146					-340	-390	-500	-550				-500	-660				-660	-820
over 80				+532	+422	+345	+265	+211								-170	-170	-220		+725	+585	+475	+398	+318	+264		+805	+665	—	+478	+398					-170	-220	-220	-380				-220	-380				-220	-380
up to 100		+87	—	+445	+335	+258	+178	+124	—	0	0	0	-36	-72	-120	-310	-390	-360	+140	+585	+445	+335	+258	+178	+124	+220	+585	+445		+258	+178	0	0	-120	-120	-390	-440	-570	-600	+350	0	-120	-500	-730	+540	0	-120	-760	-920
over 100		0		—	+487	+397	+297	+231		-54	-87	-220	-90	-159	-260	-180	-180	-240	0	+830	+665	+540	+450	+350	+284	0	+910	+745	+620	+530	+430	-87	-220	-207	-340	-180	-240	-240	-410	0	-350	-470	-240	-410	0	-540	-660	-240	-410
up to 120					+400	+310	+210	+144								-320	-400	-380		+690	+525	+400	+310	+210	+144		+690	+525	+400	+310	+210					-400	-460	-590	-630				-590	-760				-780	-950

Black numbers = dimensions on the good side
Green numbers = dimensions on the reject side

[1]) Tolerance fields according to DIN 7157 should preferably be used. In this case, line 1 is preferable to line 2

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ISO fits for standard shaft

DK 621.753.2(100) GERMAN STANDARDS August 1966

Tolerance fields shown for nominal diameter of 60 mm

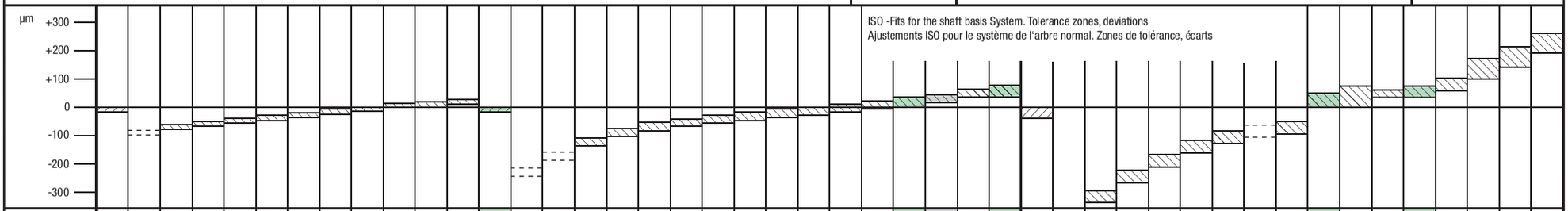
Inside dimensions (boreholes) — Outside dimensions (shafts) — Tolerance fields in dash lines are not available for 60 mm nominal diameter — Tolerance fields according to DIN 7157 [1]) — Line 1 / Line 2

ISO fits for standard shaft

Tolerance fields
dimensions in µm

DIN 7155 sheet 1

ISO -Fits for the shaft basis System. Tolerance zones, deviations
Ajustements ISO pour le système de l'arbre normal. Zones de tolérance, écarts



Nominal dimension range in mm	Tolerance field	h5	U6	T6	S6	R6	P6	N6	M6	K6	J6	H6	G6	h6	ZA7	Z7	X7	U7	T7	S7	R7	P7	N7	M7	K7	J7	H7	G7	F7	F8	h8	ZC8	ZB8	ZA8	Z8	X8	U8	T8	S8	H8	H9	F7	F8	E8	D9	C9	B9
from 1		0	-18	—	-14	-10	-6	-4	-2	0	+2	+6	+8	0	-32	-26	-20	-18	—	-14	-10	-6	-4	-2	0	+4	+10	+12	+16	+20	0	-60	-40	—	-26	-20	—	—	-14	+14	+25	+16	+20	+28	+45	+85	+165
up to 3		-4	-24		-20	-16	-12	-10	-8	-6	-4	0	+2	-6	-42	-36	-30	-28		-24	-20	-16	-14	-12	-10	-6	0	+2	+6	+6	-14	-74	-54		-40	-34			-28	0	0	+6	+6	+14	+20	+60	+140
over 3		0	-20	—	-16	-12	-9	-5	-1	+2	+5	+8	+12	0	-38	-31	-24	-19	—	-15	-11	-8	-4	0	+3	+6	+12	+16	+22	+28	0	-80	-50	—	-35	-28	—	—	-19	+18	+30	+22	+28	+38	+60	+100	+170
up to 6		-5	-28		-24	-20	-17	-13	-9	-6	-3	0	+4	-8	-50	-43	-36	-31		-27	-23	-20	-16	-12	-9	-6	0	+4	+10	+10	-18	-98	-68		-53	-46			-37	0	0	+10	+10	+20	+30	+70	+140
over 6		0	-25	—	-20	-16	-12	-7	-3	+2	+5	+9	+14	0	-46	-36	-28	-22	—	-17	-13	-9	-4	0	+5	+8	+15	+20	+28	+35	0	-97	-67	-52	-42	-34	—	—	-23	+22	+36	+28	+35	+47	+76	+116	+186
up to 10		-6	-34		-29	-25	-21	-16	-12	-7	-4	0	+5	-9	-61	-51	-43	-37		-32	-28	-24	-19	-15	-10	-7	0	+5	+13	+13	-22	-119	-89	-74	-64	-56			-45	0	0	+13	+13	+25	+40	+80	+150
over 10															-57	-43	-33														-130	-90	-64	-50	-40											
up to 14		0	-30	—	-25	-20	-15	-9	-4	+2	+6	+11	+17	0	-75	-61	-51	-26	—	-21	-16	-11	-5	0	+6	+10	+18	+24	+34	+43	0	-157	-117	-91	-77	-67	—	—	-28	+27	+43	+34	+43	+59	+93	+138	+193
over 14		-8	-41		-36	-31	-26	-20	-15	-9	-5	0	+6	-11	-70	-53	-38	-44		-39	-34	-29	-23	-18	-12	-8	0	+6	+16	+16	-27	-150	-108	-77	-60	-45			-55	0	0	+16	+16	+32	+50	+95	+150
up to 18															-88	-71	-56														-177	-135	-104	-87	-72											
over 18			-37	—												-65	-46	-33	—												-188	-136	-98	-73	-54	—										
up to 24		0	-50		-31	-24	-18	-11	-4	+2	+8	+13	+20	0	—	-86	-67	-54		-27	-20	-14	-7	0	+6	+12	+21	+28	+41	+53	0	-221	-169	-131	-106	-87		—	-35	+33	+52	+41	+53	+73	+117	+162	+212
over 24		-9	—	-37	-44	-37	-31	-24	-17	-11	-5	0	+7	-13		-80	-56	-40	-33	-48	-41	-35	-28	-21	-15	-9	0	+7	+20	+20	-33	-218	-160	-118	-88	-64	-48		-68	0	0	+20	+20	+40	+65	+110	+160
up to 30				-50												-101	-77	-61	-54												-251	-193	-151	-121	-97	-81										
over 30				-43												-103	-71	-51	-39												-200	-148	-112	-80	-60										+182	+232
up to 40		0	—	-59	-38	-29	-21	-12	-4	+3	+10	+16	+25	0	—	-128	-96	-76	-64	-34	-25	-17	-8	0	+7	+14	+25	+34	+50	+64	0	—	-239	-187	-151	-119	-99	—	—	-43	+39	+62	+50	+64	+89	+142	+120	+170
over 40		-11	—	-49	-54	-45	-37	-28	-20	-13	-6	0	+9	-16	—	—	-88	-61	-45	-59	-50	-42	-33	-25	-18	-11	0	+9	+25	+25	-39	—	-242	-180	-136	-97	-70			-82	0	0	+25	+25	+50	+80	+192	+242
up to 50				-65													-113	-86	-70												-281	-219	-175	-136	-109										+130	+180
over 50				-60	-47	-35											-111	-76	-55	-42	-30										-300	-226	-172	-122	-87	—	-53								+214	+264
up to 65		0	—	-79	-66	-54	-26	-14	-5	+4	+13	+19	+29	0	—	—	-141	-106	-85	-72	-60	-21	-9	0	+9	+18	+30	+40	+60	+76	0	—	-346	-272	-218	-168	-133		—	-99	+46	+74	+60	+76	+106	+174	+140	+190
over 65		-13		—	-53	-37	-45	-33	-24	-15	-6	0	+10	-19			—	-91	-64	-48	-32	-51	-39	-30	-21	-12	0	+30	+30	+46		—	-274	-210	-146	-102		—	-59	0	0	+30	+30	+60	+100	+224	+274
up to 80					-72	-56												-121	-94	-78	-62											-320	-256	-192	-148			-105								+150	+200
over 80					-64	-44												-111	-78	-58	-38											-335	-285	-178	-124	—	-71									+257	+307
up to 100		0	—	—	-86	-66	-30	-16	-6	+4	+16	+22	+34	0	—	—	—	-146	-113	-93	-73	-24	-10	0	+10	+22	+35	+47	+71	+90	0	—	—	-389	-312	-232	-178		—	-125	+54	+87	+71	+90	+126	+207	+170	+220
over 100		-15			—	-47	-52	-38	-28	-18	-6	0	+12	-22				-131	-91	-66	-41	-59	-45	-35	-25	-13	0	+12	+36	+36	-54			—	-310	-210	-144	-104	-79	0	0	+36	+36	+72	+120	+267	+327
up to 120						-69												-166	-126	-101	-76												-364	-264	-198	-158	-133								+180	+240

Black numbers = dimensions on the good side
Green numbers = dimensions on the reject side
Fits for standard shaft, fit tolerances (clearances and interferences) see DIN 7155, sheet 2
Fits for standard borehole, see DIN 7154, sheet 1 and sheet 2

[1]) Tolerance fields according to DIN 7157 should preferably be used. In this case, line 1 is preferable to line 2

Continuation, page 2

Change August 1966: dimensions harmonized with ISO recommendation ISO/R 286-1962

Previous editions: DIN 7155: 10.36
DIN 7155 sheet 1: 12.50, 9.56

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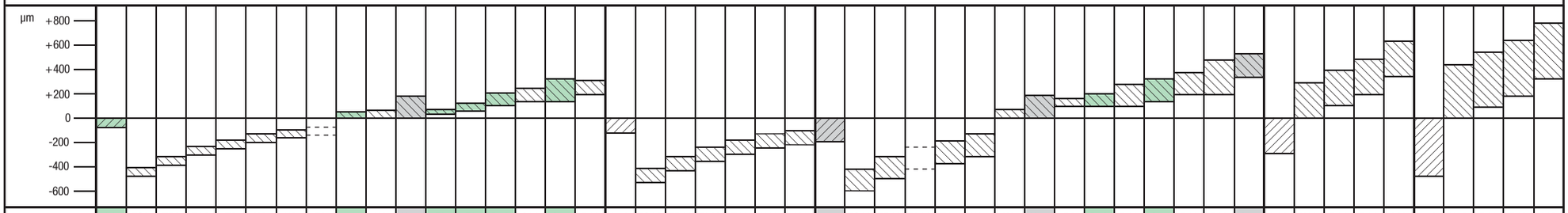
Tolerance fields shown for nominal diameter of 60 mm

Inside dimensions (boreholes) — Outside dimensions (shafts) — Tolerance fields in dash lines are not available for 60 mm nominal diameter — Tolerance fields according to DIN 7157 [1] — Line 1 — Line 2

Dimensions in µm



Nominal dimension range in mm	Tolerance field	h9	ZC9	ZB9	ZA9	Z9	X9	U9	T9	H8	H9	H11	F8	E9	D10	C10	C11	B10	h10	ZC10	ZB10	ZA10	Z10	X10	U10	h11	ZC11	ZB11	ZA11	Z11	X11	H9	H11	D9	D10	D11	C11	B11	B12	A11	h12	H12	D12	B12	A12	h13	H13	D13	B13	A13
from 1		0	-60	-40	—	-26	-20	—	—	+14	+25	+60	+20	+39	+60	+100	+120	+180	0	-60	—	—	-26	—	—	0	-60	—	—	—	—	+25	+60	+45	+60	+80	+120	+200	+240	+330	0	+100	+120	+240	+370	0	+140	+160	+280	+410
up to 3		-25	-85	-65		-51	-45			0	0	0	+6	+14	+20	+60	+60	+140	-40	-100			-66			-60	-120					0	0	+20	+20	+20	+60	+140	+140	+270	-100	0	+20	+140	+270	-140	0	+20	+140	+270
over 3		0	-80	-50	—	-35	-28	—	—	+18	+30	+75	+28	+50	+78	+118	+145	+188	0	-80	—	—	-35	—	—	0	-80	—	—	—	—	+30	+75	+60	+78	+105	+145	+215	+260	+345	0	+120	+150	+260	+390	0	+180	+210	+320	+450
up to 6		-30	-110	-80		-65	-58			0	0	0	+10	+20	+30	+70	+70	+140	-48	-128			-83			-75	-155					0	0	+30	+30	+30	+70	+140	+140	+270	-120	0	+30	+140	+270	-180	0	+30	+140	+270
over 6		0	-97	-67	—	-42	-34	—	—	+22	+36	+90	+35	+61	+98	+138	+170	+208	0	-97	-67	—	-42	—	—	0	-97	-67	—	—	—	+36	+90	+76	+98	+130	+170	+240	+300	+370	0	+150	+190	+300	+430	0	+220	+260	+370	+500
up to 10		-36	-133	-103		-78	-70			0	0	0	+13	+25	+40	+80	+80	+150	-58	-155	-125		-100			-90	-187	-157				0	0	+40	+40	+40	+80	+150	+150	+280	-150	0	40	+150	+280	-220	0	+40	+150	+280
over 10			-130	-90	—	-50	-40									+165	+205	+220		-130	-90	—	-50	—			-130	-90																						
up to 14		0	-173	-133		-93	-83	—	—	+27	+43	+110	+43	+75	+120	+95	+95	+150	0	-200	-160		-120			0	-240	-200	—	—	—	+43	+110	+93	+120	+160	+205	+260	+330	+400	0	+180	+230	+330	+470	0	+270	+320	+420	+560
over 14		-43	-150	-108	—	-60	-45			0	0	0	+16	+32	+50				-70	-150	-108	—	-60	-45		-110	-150	-108				0	0	+50	+50	+50	+95	+150	+150	+290	-180	0	+50	+150	+290	-270	0	+50	+150	+290
up to 18			-193	-151		-103	-88													-220	-178		-130	-115			-260	-218																						
over 18			-188	-136	-98	-73	-54	—												-188	-136	—	-73	-54			-188	-136	—	—																					
up to 24		0	-240	-188	-150	-125	-106		—	+33	+52	+130	+53	+92	+149	+194	+240	+244	0	-272	-220		-157	-138	—	0	-318	-266			—	+52	+130	+117	+149	+195	+240	+290	+370	+430	0	+210	+275	+370	+510	0	+330	+395	+490	+630
over 24		-52	-218	-160	-118	-88	-64	-48												-218	-160	—	-88	-64			-218	-160	—	-88																					
up to 30			-270	-212	-170	-140	-116	-100		0	0	0	+20	+40	+65	+110	+110	+160	-84	-302	-244		-172	-148		-130	-348	-290	—	-218		0	0	+65	+65	+65	+110	+160	+160	+300	-210	0	+65	+160	+300	-330	0	65	+160	+300
over 30			-274	-200	-148	-112	-80	-60								+220	+280	+270		-274	-200	—	-112	-80	—		-274	-200	—	-112							+280	+330	+420	+470				+420	+560				+560	+700
up to 40		0	-336	-262	-210	-174	-142	-122	—	+39	+62	+160	+64	+112	+180	+120	+120	+170	0	-374	-300		-212	-180	—	0	-434	-360	—	-272	—	+62	+160	+142	+180	+240	+120	+170	+170	+310	0	+250	+330	+170	+310	0	+390	+470	+170	+310
over 40		-62	-325	-242	-180	-136	-97	-70								+230	+290	+280	-100	-325	-242	-180	-136	-97	-70	-160	-325	-242	—	-136							+290	+340	+430	+480	-250	0	+80	+430	+570	-390	0	+80	+570	+710
up to 50			-387	-304	-242	-198	-159	-132		0	0	0	+25	+50	+80	+130	+130	+180		-425	-342	-280	-236	-197	-170		-485	-402		-296		0	0	+80	+80	+80	+130	+180	+180	+320				+180	+320				+180	+320
over 50			-405	-300	-226	-172	-122	-87								+260	+330	+310		-405	-300	-226	-172	-122	-87		-405	-300	—	-172	-122						+330	+380	+490	+530				+490	+640				+650	+800
up to 65		0	-479	-374	-300	-246	-196	-161	—	+46	+74	+190	+76	+134	+220	+140	+140	+190	0	-525	-420	-346	-292	-242	-207	0	-595	-490		-362	-312	+74	+190	+174	+220	+290	+140	+190	+190	+340	0	+300	+400	+190	+340	0	+460	+560	+190	+340
over 65		-74	—	-360	-274	-210	-146	-102								+270	+340	+320	-120	-480	-360	-274	-210	-146	-102	-190	-480	-360	—	-210	-146	0	0	+100	+100	+100	+340	+390	+500	+550	-300	0	+100	+500	+660	-460	0	+100	+660	+820
up to 80				-434	-348	-284	-220	-179		0	0	0	+30	+60	+100	+150	+150	+200		-600	-480	-394	-330	-266	-222		-670	-550		-400	-336						+150	+200	+200	+360				+200	+360				+200	+360
over 80			-445	-335	-258	-178	-124									+310	+390	+360		-585	-445	-335	-258	-178	-124		-585	-445	—	-258	-178						+390	+440	+570	+600				+570	+730				+760	+920
up to 100		0	—	-532	-422	-345	-265	-211	—	+54	+87	+220	+90	+159	+260	+170	+170	+220	0	-725	-585	-475	-398	-318	-264	0	-805	-665		-478	-398	+87	+220	+207	+260	+340	+170	+220	+220	+380	0	+350	+470	+220	+380	0	+540	+660	+220	+380
over 100		-87		—	-400	-310	-210	-144								+320	+400	+380	-140	-690	-525	-400	-310	-210	-144	-220	-690	-525	-400	-310	-210	0	0	+120	+120	+120	+400	+460	+590	+630	-350	0	+120	+590	+760	-540	0	+120	+780	+950
up to 120					-487	-397	-297	-231		0	0	0	+36	+72	+120	+180	+180	+240		-830	-665	-540	-450	-350	-284		-910	-745	-620	-530	-430						+180	+240	+240	+410				+240	+410				+240	+410

Black numbers = dimensions on the good side
Green numbers = dimensions on the reject side

[1] Tolerance fields according to DIN 7157 should preferably be used. In this case, line 1 is preferable to line 2

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Technical Notes
General Tolerances, Method of Indicating Surface Finish

- norelem products are adapted and manufactured in such a way that they are suitable for their general purpose with reference to material and surface finish. As such, they meet all normal tolerance requirements.
– All dimensions are indicated in mm.
– All weights are approx. data.
– The latest DIN standard sheet version applies to all parts made to DIN standards.
– Variations on dimensions without tolerance values are according to „DIN ISO 2768-mk“ (except linear dimensions of grey cast iron- and Al-profiles).

General Tolerances DIN ISO 2768 T1 and T2

General Tolerances for Linear and Angular Dimensions — DIN ISO 2768 T1

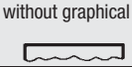
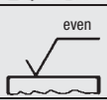
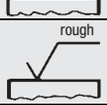
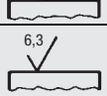
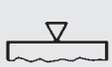
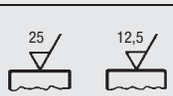
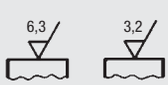
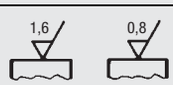
Tolerance class		Linear Dimensions							
		Permissible deviations in mm for ranges of nominal sizes							
designation	description	0,5 to 3	over 3 to 6	over 6 to 30	over 30 to 120	over 120 to 400	over 400 to 1000	over 1000 to 2000	over 2000 to 4000
f	fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	–
m	medium	± 0,10	± 0,10	± 0,2	± 0,30	± 0,5	± 0,8	± 1,2	± 2
c	coarse	± 0,20	± 0,30	± 0,5	± 0,80	± 1,2	± 2,0	± 3,0	± 4
v	very coarse	–	± 0,50	± 1,0	± 1,50	± 2,5	± 4,0	± 6,0	± 8

Tolerance class		External Radii and Chamfer Heights			Angular Dimensions				
		Permissible deviations in mm for ranges of nominal sizes			Permissible deviations in degrees or minutes for ranges of nominal sizes (shorten leg)				
designation	description	0,5 to 3	over 3 to 6	over 6	to 10	over 10 to 50	over 50 to 120	over 120 to 400	over 400
f	fine	± 0,2	± 0,5	± 1	± 1°	± 0°30‘	± 0°20‘	± 0°10‘	± 0° 5‘
m	medium								
c	coarse	± 0,4	± 1,0	± 2	± 1°30‘	± 1°30‘	± 0°30‘	± 0°15‘	± 0°10‘
v	very coarse				± 3°30‘	± 2°30‘	± 1°30‘	± 0°30’	± 0°20‘

General Tolerances for Form and Position — DIN ISO 2768 T2

Tolerance class	Tolerances in mm for Straightness and Flatness						Perpendicularity				Symmetry				Run-out
	Ranges of nominal sizes in mm						Ranges of nominal sizes in mm				Ranges of nominal sizes in mm				
	to 10	over 10 to 30	over 30 to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000	to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000	to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000	
H	0,02	0,05	0,1	0,2	0,3	0,4	0,2	0,3	0,4	0,5	0,5				0,1
K	0,05	0,10	0,2	0,4	0,6	0,8	0,4	0,6	0,8	1,0	0,6		0,8	1	0,2
L	0,10	0,20	0,4	0,8	1,2	1,6	0,6	1,0	1,5	2,0	0,6	1,0	1,5	2	0,5

Method of Indicating Surface Finish to DIN ISO 1302

Graphical symbol of surface finish to DIN 3141	Surface finish values, R_a for permissible roughness height R_t assignation according to DIN 3141 line 1 / line 2	meaning according to ISO 1302
(Surface without graphical symbol) 		Surfaces which do not need to meet specific requirements
		Surfaces which only have to meet requirements of general evenness and better appearance
		Individual raw surfaces which may be remachined
		Clean raw surface with higher requirements
		Surface with a roughness value which must not exceed the highest permissible medium roughness value
		
		

Technical Information
Screws, Nuts

The values for clamping forces F_{sp} and tightening torques M_{sp} specified in the table apply to standard metric thread according to DIN 13 and head contact surfaces according to DIN 912, 931-934, 6912, 7984, 7990.

The F_{sp} clamping force values result in a 90% utilisation of yield point σ 0.2 (DIN 267 pg. 3) subject to the respective coefficient of friction in threads.

It can be inferred from the table which screw with which quality is required for a particular coefficient of friction in thread in order to apply a given F_M assembly force ($F_{sp} >= F_M$).

The M_{sp} tightening torques are calculated based on the F_{sp} clamping forces assuming $\mu_G = \mu_K = \mu_{ges}$.

Determination of the M_{sp} tightening torque at 90 % yield point utilisation for a screw specified in size and quality is made according to the table at the right subject to the underhead friction occurring (μ_K), irregardless of a coefficient of friction in thread deviating from it.

To attain the applicable rated load torque it is still necessary to reduce half the spread of the designated torque wrench by the particular tightening torque M_{sp}.

Calculation of the table values and information for applications according to VDI guideline 2230.

Clamping force and tightening torques

Standard thread	μ_{total}* = μ_G = μ_K	Set screws clamping force F_{sp} in kN by grade			tightening torque M_{sp} in Nm by grade		
		8.8	10.9	12.9	8.8	10.9	12.9
M 4	0,08	4,40	6,40	7,5	2,2	3,2	3,8
	0,10	4,20	6,20	7,3	2,5	3,7	4,3
	0,12	4,05	6,00	7,0	2,8	4,1	4,8
	0,14	3,90	5,70	6,7	3,1	4,5	5,3
M 5	0,08	7,16	10,50	12,3	4,3	6,3	7,3
	0,10	6,90	10,10	11,9	4,9	7,2	8,5
	0,12	6,63	9,74	11,4	5,5	8,1	9,5
	0,14	6,36	9,34	10,9	6,0	8,9	10,4
M 6	0,08	10,10	14,90	17,4	7,4	10,9	12,7
	0,10	9,74	14,30	16,7	8,5	12,5	14,7
	0,12	9,35	13,70	16,1	9,5	14,0	16,4
	0,14	8,97	13,20	15,4	10,4	15,3	17,9
M 8	0,08	18,50	27,20	31,9	17,9	26,2	30,7
	0,10	17,90	26,20	30,7	20,6	30,3	35,5
	0,12	17,20	25,20	29,5	23,1	34,0	39,7
	0,14	16,50	24,20	28,3	25,3	37,2	43,6
M10	0,08	29,50	43,30	50,7	36,0	53,0	61,0
	0,10	28,40	41,80	48,9	41,0	61,0	71,0
	0,12	27,30	40,20	47,0	46,0	68,0	80,0
	0,14	26,20	38,50	45,1	51,0	75,0	88,0
M12	0,08	43,00	63,10	73,9	61,0	90,0	105,0
	0,10	41,40	60,90	71,2	71,0	104,0	122,0
	0,12	39,90	58,50	68,5	80,0	117,0	137,0
	0,14	38,30	56,20	65,8	87,0	128,0	150,0

Standard thread	μ_{total}* = μ_G = μ_K	Set screws clamping force F_{sp} in kN by grade			tightening torque M_{sp} in Nm by grade		
		8.8	10.9	12.9	8.8	10.9	12.9
M14	0,08	59,0	86,7	101,0	97	143	167
	0,10	56,9	83,6	97,8	113	165	194
	0,12	54,7	80,4	94,1	127	186	218
	0,14	52,6	77,2	90,3	139	205	239
M16	0,08	81,0	119,0	139,0	147	216	253
	0,10	78,2	115,0	134,0	172	252	295
	0,12	75,3	111,0	130,0	194	285	333
	0,14	72,4	106,0	124,0	214	314	367
M20	0,08	131,0	186,0	218,0	298	424	496
	0,10	126,0	180,0	210,0	347	494	578
	0,12	121,0	173,0	202,0	392	558	653
	0,14	117,0	166,0	194,0	431	615	719
M24	0,08	188,0	268,0	313,0	512	730	854
	0,10	182,0	259,0	303,0	597	850	995
	0,12	175,0	249,0	291,0	673	959	1122
	0,14	168,0	239,0	280,0	742	1057	1237
M30	0,08	300,0	430,0	500,0	1000	1450	1700
	0,10	290,0	415,0	485,0	1190	1700	2000
	0,12	280,0	400,0	465,0	1350	1900	2250
	0,14	270,0	385,0	450,0	1500	2100	2500
M36	0,08	440,0	630,0	730,0	1750	2500	3000
	0,10	425,0	600,0	710,0	2100	3000	3500
	0,12	410,0	580,0	680,0	2350	3300	3900
	0,14	395,0	560,0	660,0	2600	3700	4300

Screw stability according to DIN ISO 20898 T 1 (4.92)

Grades	5.8	6.8	8.8	10.9	12.9
Minimum tensile strength R_m N/mm²	500	600	800	1000	1200
Minimum yield point R_e N/mm²	400	480	640	900	1080
0.2-proof stress $R_{p0,2}$ N/mm²	–	–	640	900	1080
Test stress S_p N/mm²	364	440	582	792	950
Failure strain A_5 %	10	8	12	9	8
Impact strength (ISO test piece) Nm/cm²	–	–	60	40	30

The respective grades mean (as shown with 8.8):

$$\text{First number 8.} = \frac{\text{minimum tensile strength } R_m}{100} = 800 \text{ N/mm}^2$$

$$\text{Second number .8} = \frac{\text{minimum yield point } R_e}{\text{minimum tensile strength } R_m} \cdot 10 = 640 \text{ N/mm}^2 \text{ (80\% von } R_m)$$

Nut stability according to DIN ISO 20898 T 2 (2.94)

Grade ID numbers	5	6	8	10	12
Test stress S_p N/mm²	500	600	800	1000	1200

The grades mean (as shown with 10):

$$10 = \frac{\text{test stress } S_p}{100}$$

This test stress is equal to the minimum tensile strength of a screw that can be loaded when pairing with the corresponding nut up to the minimum yield point of the screw.

Technical Information
Screws, Nuts

The coefficients of friction (see table) fluctuate over a wide range. They fluctuate even when tightening and by production run of the same screws.
Because μ_G and μ_K are generally of different sizes a wide range of tightening torques arise as a result.
Calculation is performed using various coefficients of friction in accordance with VDI guideline 2230. By contrast Illgner/Blume in their „Schrauben Vademecum“ calculate using a coefficient of friction $\mu_{ges} = \mu_G = \mu_K$.
Here it proceeds according to VDI methods. However if μ_G and/or μ_K are unknown, $\mu_G = 0{,}12$ or $\mu_K = 0{,}12$ would typically be used.

Coefficient of friction μ_G in the thread (according to Strelow or VDI 2230)

μ_G	Thread			External thread (screw)								
	Material			Steel								
	Surface			black tempered or phosphated				galvanized (Zn6)		galvanized cadmium-plated (Cd6)		adhesive
	Tapping			rolled			machine-cut	machine-cut or rolled				
Thread	Material	Surface	Tapping	lubrication	dry	lubricated	MoS_2*	lubricated	dry	lubricated	dry	lubricated	dry
Internal thread (nut)	Steel	bright	machine-cut	dry	0,12	0,10*	0,08	0,10	–	0,10	–	0,08	0,16
		galvanized cadmium-plated			0,10	–	–	–	0,12	0,10	–	–	0,14
					0,08	–	–	–	–	–	0,12	0,12	–
	GJL/GJMB	bright			–	0,10	–	0,10	–	0,10	–	0,08	–
	AlMg	bright			–	0,08	–	–	–	–	–	–	–

* Molybdenum disulfide

Coefficient of friction µK on the head or nut engaging surface (according to Strelow or VDI 2230)

μ_K	Support suface				Screw head									
	Material				Steel									
	Surface				black tempered or phosphated						galvanized (Zn6)		galvanized cadmium-plated (Cd6)	
	Manufacture				pressed			turned		smoothed	pressed			
Support suface	Material	Surface	Manufacture	lubrication	dry	lubricated	MoS_2*	lubricated	MoS_2*	lubricated	dry	lubricated	dry	lubricated
Counter support	Steel	bright	smoothed	dry	–	0,16	–	0,10	–	0,16	0,10	–	0,08	–
			machined		0,12	0,10	0,08	0,10	0,08	–	0,10		0,08	0,08
		galvanized cadmium-plated			0,10		–	0,10	–	0,10	0,16	0,10	–	–
					0,08						–	–	0,12	0,12
	GJL/GJMB	bright	smoothed		–	0,10	–	–	–	0,10 to 0,18			0,08	–
			machined		–	0,14	–	0,10	–	0,14	0,10	0,10	0,08	–
	AlMg				–	0,08				–	–	–	–	–

* Molybdenum disulfide

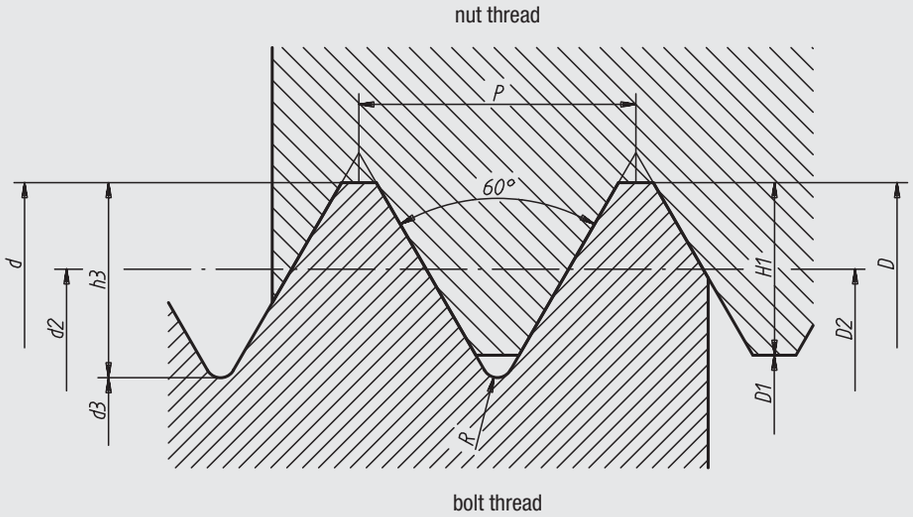
ISO Metric Screw Threads

The medium tolerance class applies to the threads listed, i.e. 6H for nut threads and 6g for bolt threads. The (metal) threads in this catalogue are manufactured according to these tolerance classes.

Technical Information about threads of aluminium grips:

Especially threads of aluminium grips cannot be true to gauge size due to final surface finish refinement and the removal of material during related pretreatment.

The majority of these threads are moulded in order to strengthen the material. As a result, the tearing resistance of aluminium for a thread with M5 x 10 is higher than 2000 N.



Coarse Screw Thread line 1

Thread description	Pitch	Thread-pitch Ø	Minor Ø		Thread depth		Radius	Core hole drill Ø
			bolt	nut	bolt	nut		
d = D	P	d2 = D2	d3	D1	h3	H1	R	Ø
M 3	0,50	2,68	2,39	2,46	0,31	0,27	0,07	2,5
M 4	0,70	3,55	3,14	3,24	0,43	0,38	0,10	3,3
M 5	0,80	4,48	4,02	4,13	0,49	0,43	0,12	4,2
M 6	1,00	5,35	4,77	4,92	0,61	0,54	0,14	5,0
M 8	1,25	7,19	6,47	6,65	0,77	0,68	0,18	6,8
M10	1,50	9,03	8,16	8,38	0,92	0,81	0,22	8,5
M12	1,75	10,86	9,85	10,11	1,07	0,95	0,25	10,2
M16	2,00	14,70	13,55	13,84	1,23	1,08	0,29	14,0
M20	2,50	18,38	16,93	17,29	1,53	1,35	0,36	17,5
M24	3,00	22,05	20,32	20,75	1,84	1,62	0,43	21,0
M30	3,50	27,73	25,71	26,21	2,15	1,89	0,51	26,5
M36	4,00	33,40	31,09	31,67	2,45	2,17	0,58	32,0

Threads
Threads are manufactured to ISO DIN 13 medium tolerance class, i.e. 6H for nut threads and 6g for bolt threads. External threads up to 60 mm are generally supplied fully threaded. Screw lengths of 70 mm and more are supplied with 60 mm long threads.

Spot facing for countersunk screws and socket head screws

Spot facing model B:
–for countersunk screws DIN 7991.
Spot facing model J:
– for socket head screws DIN 6912.
Spot facing model K:
– for socket head screws DIN 912.

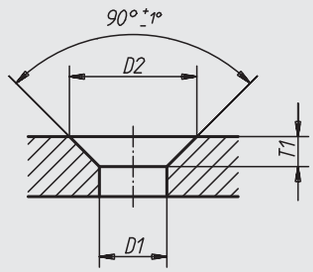
Note:

* Clearance hole medium according to DIN ISO 273.

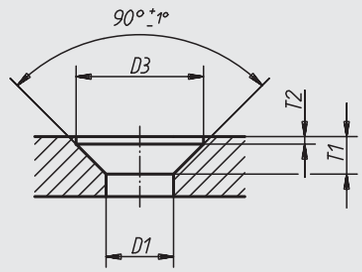
** Clearance hole fine according to DIN ISO 273.

*** 90° counterbore or rounded, under 12 mm thread diameter only deburred

Form A
Medium version (m)

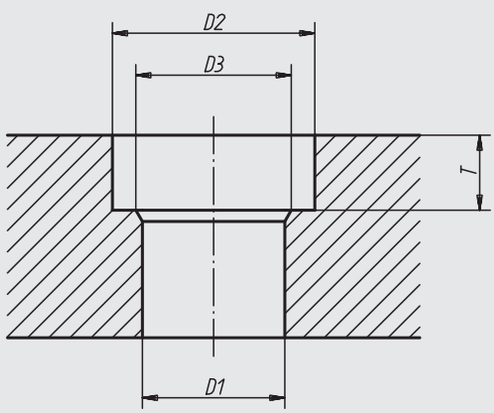


Form B
Fine version (f)



For Thread Ø	medium (m) version			fine (f) versions			
	D1 H13*	D2 H13	T1 ≈	D1 H12**	D3 H12	T1 ≈	T2 +0,1
M3	3,4	6,6	1,6	3,2	6,3	1,7	0,2
M4	4,5	9,0	2,3	4,3	8,3	2,4	0,4
M5	5,5	11,0	2,8	5,3	10,4	2,9	0,5
M6	6,6	13,0	3,2	6,4	12,4	3,3	0,5
M8	9,0	17,2	4,1	8,4	16,5	4,4	0,5
M10	11,0	21,5	5,3	10,5	20,5	5,5	0,5
M12	13,5	25,5	6,0	13,0	25,0	6,5	0,5
M16	17,5	31,5	7,0	17,0	31,0	7,5	0,5
M20	22,0	38,0	8,0	21,0	37,0	8,5	0,5

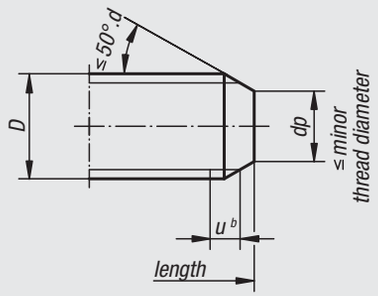
Form J, Form K



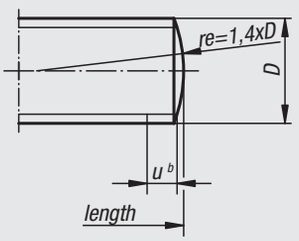
For Thread Ø	D1		D2	D3***	T		acceptable deviation
	medium (m) H13*	fine (f) H12**			model J	model K	
M3	3,4	3,2	6	–	–	3,4	+0,2 0
M4	4,5	4,3	8	–	3,4	4,6	+0,4 0
M5	5,5	5,3	10	–	4,2	5,7	+0,4 0
M6	6,6	6,4	11	–	4,8	6,8	+0,4 0
M8	9,0	8,4	15	–	6,0	9,0	+0,4 0
M10	11,0	10,5	18	–	7,5	11,0	+0,4 0
M12	13,5	13,0	20	16	8,5	13,0	+0,4 0
M16	17,5	17,0	26	20	11,5	17,5	+0,4 0
M20	22,0	21,0	33	24	13,5	21,5	+0,4 0

Thread Ends to DIN 78
Thrust Points to DIN 6332

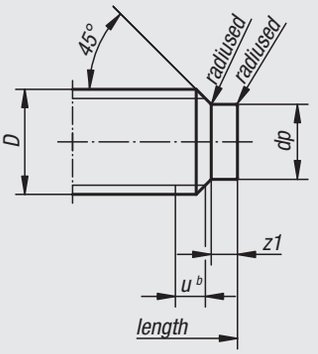
FL truncated cone



RN oval point



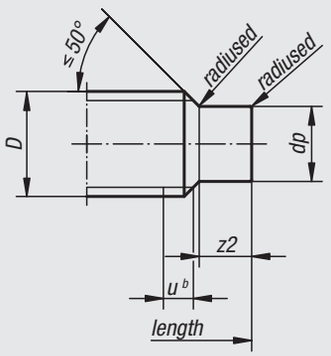
SD short stud



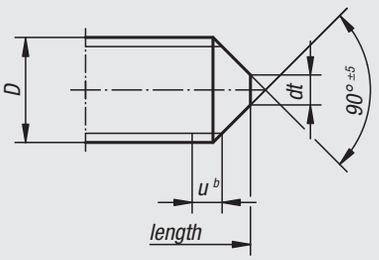
Standard form:
Flat point to DIN EN ISO 4753.
Depending on the quantity ordered, thread ends will incur extra charges.

u^b = max. 2P incomplete thread

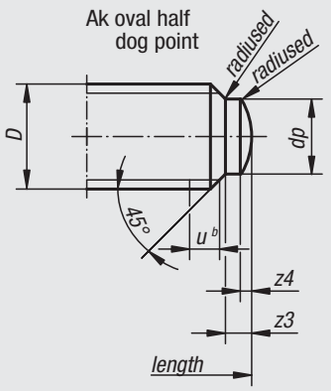
LD long dog point



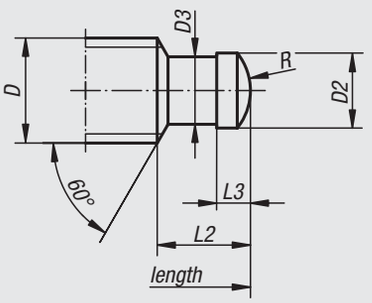
TC cone point, flattened



Ak oval half dog point



thrust point to DIN 6332



Thread- Ø	Thread ends to DIN EN ISO 4753						Thread ends with thrust points to DIN 6332				
D	dp h13	dt h16*	z1 + IT14	z2 + IT14	z3 + IT14	z4 ≈	D2 h11	D3 –0,1	L2	L3	R
M4	2,5	–	1,00	2,0	1,00	0,50	–	–	–	–	–
M5	3,5	–	1,25	2,5	1,25	0,60	–	–	–	–	–
M6	4,0	1,5	1,50	3,0	1,50	0,70	4,5	4,0	6,0	2,5	3
M8	5,5	2,0	2,00	4,0	2,00	1,00	6,0	5,4	7,5	3,0	5
M10	7,0	2,5	2,50	5,0	2,50	1,00	8,0	7,2	9,0	4,5	6
M12	8,5	3,0	3,00	6,0	3,00	1,25	8,0	7,2	10,0	4,5	6
M14	10,0	4,0	3,50	7,0	3,50	1,50	–	–	–	–	–
M16	12,0	4,0	4,00	8,0	4,00	1,75	12,0	11,0	12,0	5,0	9
M18	13,0	5,0	4,50	9,0	4,50	2,00	–	–	–	–	–
M20	15,0	5,0	5,00	10,0	5,00	2,00	15,5	14,4	14,0	5,5	13
M22	17,0	6,0	5,50	11,0	5,50	2,50	–	–	–	–	–
M24	18,0	6,0	6,00	12,0	6,00	2,50	–	–	–	–	–
M27	21,0	8,0	6,70	13,5	6,70	3,00	–	–	–	–	–

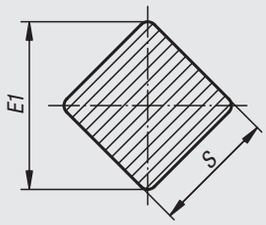
* Point up to 5 mm Ø thread end lightly flattened or lightly rounded.

Squares for Operating Spindles and Operating Parts

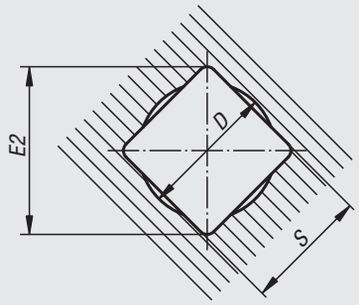
* Internal squares are allowed to be recessed in the middle third of each side. D max. defines the borehole diameter which leaves appropriate clearance when disposed concentrically to the internal square.

** External squares made on round steel bar may fall below the minimum size by the amount of tolerance on the steel bar, i.e. by h11.

A External square

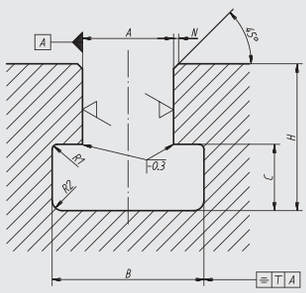


B Internal square



S H11/h11	D* max.	E1 max.	E1 min.**	E2 min.
4,0 5,0 5,5 6,0	4,2 5,3 5,8 6,3	5,0 6,5 7,0 8,0	4,8 6,0 6,6 7,2	5,3 6,6 7,2 8,1
7,0 8,0 9,0 10,0	7,3 8,4 9,5 10,5	9,0 10,0 12,0 13,0	8,4 9,6 10,8 12,0	9,1 10,1 12,1 13,1
11,0 12,0 13,0 14,0	11,6 12,6 13,7 14,7	14,0 16,0 17,0 18,0	13,2 14,4 15,6 16,8	14,1 16,1 17,1 18,1
16,0 17,0 19,0 22,0	16,8 17,9 20,0 23,1	21,0 22,0 25,0 28,0	19,2 20,4 22,8 26,4	21,2 22,2 25,2 28,2

T-Slots



6,3 (1,6 for tolerance H8 or 3,2 for tolerance H12)

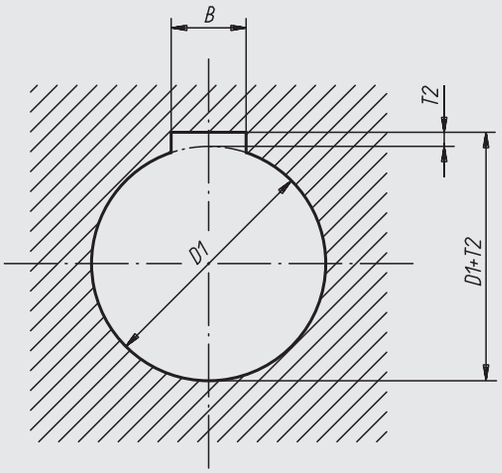
A*	B	B adm. dev.	C	C adm. dev.	H max.	H min.	N max.	R1 max.	R2 max.	T
6	11,0	+1,5 0	5	+1 0	13	11	1,0	0,6	1,0	0,5
8	14,5		7		18	15				
10	16,0	+2 0	7		21	17				
12	19,0		8		25	20				
14	23,0		9	+2 0	28	23	1,6		1,6	
18	30,0		12		36	30		1,0		
22	37,0	+3 0	16		45	38			2,5	
28	46,0	+4 0	20		56	48				
36	56,0		25	+3 0	71	61	2,5			1,0
42	68,0		32		85	74		1,6	4,0	

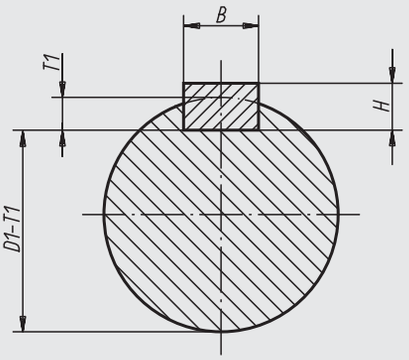
* Tolerance H8 for tenon and clamping slots, H12 for clamping slots

norelem

Keyway and parallel key

high form (sheet 1), high form for machine tools (sheet 2)





high form (sheet 1)

For shaft Ø D1	Shaft slot B* tight fit P9	Shaft slot B* sliding fit N9	Hub slot B* tight fit P9	Hub slot B* sliding fit IS9	H	T1 with top clearance	T2 by top clearance	T2 oversize
over 8 to 10	3	3	3	3	3	1,8 +0,1	1,4 +0,1	0,9 +0,1
over 10 to 12	4	4	4	4	4	2,5 +0,1	1,8 +0,1	1,2 +0,1
over 12 to 17	5	5	5	5	5	3,0 +0,1	2,3 +0,1	1,7 +0,1
over 17 to 22	6	6	6	6	6	3,5 +0,1	2,8 +0,1	2,2 +0,1
over 22 to 30	8	8	8	8	7	4,0 +0,2	3,3 +0,2	2,4 +0,2
over 30 to 38	10	10	10	10	8	5,0 +0,2	3,3 +0,2	2,4 +0,2
over 38 to 44	12	12	12	12	8	5,0 +0,2	3,3 +0,2	2,4 +0,2
over 44 to 50	14	14	14	14	9	5,5 +0,2	3,8 +0,2	2,9 +0,2
over 50 to 58	16	16	16	16	10	6,0 +0,2	4,3 +0,2	3,4 +0,2

high form for machine tools (sheet 2)

For shaft Ø D1	Shaft slot B* tight fit P9	Shaft slot B* sliding fit N9	Hub slot B* tight fit P9	Hub slot B* sliding fit IS9	H	T1	T2
over 10 to 12	4	4	4	4	4	3,0 +0,1	1,1 +0,1
over 12 to 17	5	5	5	5	5	3,8 +0,1	1,3 +0,1
over 17 to 22	6	6	6	6	6	4,4 +0,1	1,7 +0,1
over 22 to 30	8	8	8	8	7	5,4 +0,2	1,7 +0,2
over 30 to 38	10	10	10	10	8	6,0 +0,2	2,1 +0,2
over 38 to 44	12	12	12	12	8	6,0 +0,2	2,1 +0,2
over 44 to 50	14	14	14	14	9	6,0 +0,2	2,6 +0,2
over 50 to 58	16	16	16	16	10	7,5 +0,2	2,6 +0,2

* The indicated tolerances for slot widths apply, as a rule, for milled slots. ISO quality IT8 (i.e. P8 instead of P9, N8 instead of N9 and IS8 instead of IS9) are recommended for the width of broached slots. Tolerance H9 for the shaft keyway and D10 for the hub keyway are recommended for sliding fits.

Index

0-9	Page
5D workpiece stops	190

A	Page
Accessories for concentricity gauge, max. Ø 80 mm	1323
Accessories for concentricity gauge max. Ø 35 mm	1321
“Actima” clamping devices with through hole	345
Adapters for swing clamp	426
Adjustable holder for fixed centres	1358
Adjustable latches heavy-duty version	422
Adjustable mini stops	189
Adjustable stops	188
Adjusting knobs with position indicator digital display	987
Adjustment nuts	739
Adjustment units	1303
Angle bracket	432
Angle brackets	1177
Angle plates	922
Angle plates aluminium	81
Angle plates with or without T-slots cast iron	80
Angle profiles 45° grey cast iron	95
Angle profiles 60° grey cast iron	95
Angular contact ball bearing FAG single-row	1103
Application equipment	1422
“Arness” accessories	351
Assembly tools for self-tapping threaded inserts	746
Atlas jack with locknut	137
Axial ball bearing FAG single direction.	1107
Axial joints similar to DIN 71802	1179

B	Page
Ball chains with ring clip	1401
Ball-end locking screw with rotating ball	255
Ball-end thrust screws with head	670-671
Ball-end thrust screws with head stainless steel	672
Ball-end thrust screws without head short version	675
Ball-end thrust screws without head stainless steel with flattened ball	682
Ball-end thrust screws without head stainless steel with full ball	681
Ball-end thrust screws without head with flattened ball	678-679
Ball-end thrust screws without head with flattened ball and rotation lock	680
Ball-end thrust screws without head with flattened ball LONG-LOK secured	674
Ball-end thrust screws without head with full ball	676-677
Ball-end thrust screws without head with full ball, LONG-LOK secured	673
Ball grips revolving	540
Ball handles DIN 6337	557
Ball holders	1361
Ballistol all-purpose oil in food industry quality	1416
Ball joints DIN 71802	1174
Ball knobs smooth DIN 319 enhanced	494-495
Ball knobs stainless steel or aluminium DIN 319	492
Ball knobs thermoplastic DIN 319 enhanced	491
Ball lock pins self-locking	263
Ball lock pins self-locking stainless steel	264
Ball lock pins with L-grip, self-locking	268
Ball lock pins with T-grip, self-locking	267
Ball screw linear actuators rolled, with flange nut DIN 69051 Part 5	1113
Ball screw linear actuators rolled, with screw-in cylinder nut	1114
Ball seats for ball joints DIN 71805	1175
Ball studs for ball joints DIN 71803	1176
Ball transfer units undersprung	1392
Ball transfer units with fastening holes, without housing	1393
Ball transfer units with solid steel housing	1393
Ball transfer units with spring clips	1394
Ball transfer units with steel housing	1390
Ball transfer units with steel housing and plastic ball	1391
Bar knobs	590
Barrel slide bolts	238
Base plates	74, 922
Base plates DIN 6348	795
Base plates steel	73
Base plate with flanges grey cast iron	79
Base plate with T-slots grey cast iron	72
Basic elements Subplates Discs Profiles Angle plates Tombstones	71
Beam couplings with radial clamping hub, aluminium	1033
Beam couplings with radial clamping hub, stainless steel	1034
Beam couplings with removable clamping hub, aluminium	1035
Beam couplings with removable clamping hub, stainless steel	1036
Bevel gears in steel, ratio 1:1 toothing milled, straight teeth, engagement angle 20°	1024
Bevel gears in steel, ratio 1:2 toothing milled, straight teeth, engagement angle 20°	1025
Bevel gears in steel, ratio 1:3 toothing milled, straight teeth, engagement angle 20°	1026
Bevel gears in steel, ratio 1:4 toothing milled, straight teeth, engagement angle 20°	1027
Block machined all sides grey cast iron or aluminium	79
Bushes cylindrical	201, 260
Bushes tapered	203, 259
Bushing for ball lock pins	269
Bushing for ball lock pins with LONG-LOK thread lock	270

C	Page
Cam-action indexing plungers	231, 236
Cam-action indexing plungers stainless steel	232, 237
Cam clamps adjustable with riser	360
Cam clamps with end lock	325
Cam clamps with middle lock	325
Cam clamps with riser	356
Cam levers adjustable external thread, stainless steel	321
Cam levers adjustable external thread, steel or stainless steel	320
Cam levers adjustable with plastic handle external thread, steel or stainless steel	322
Cam levers double	324
Cam levers internal and external thread, stainless steel	318
Cam levers internal and external thread, steel or stainless steel	316-317
Cam levers single	324
Cam levers with plastic handle internal and external thread, steel or stainless steel	319
Cam screws with hexagon washer	354
Cam screws with hexagon washer, for T-slots	355
Cam screws with knife edge washer	354
Cap elements type H2	1188
Caps for filler necks	1250
Capstan wheel	485
Cardan shafts telescopic	1079
Carriages	946
Carriages compact	948
Carriages compact, short	949
Carriages DryLin® T	926
Carriages DryLin® W	934
Carriages with flange	947
Carrier keys DIN 2079	279
C-clamp	423
Centring bushes	249
Centring clamps	257
Centring clamps with ball or hexagon segments	253-254
Centring pins for aligning hole	242-243
Centring pins for central hole	242
Centring rings	870
Centring V	256
Centring V-plate	258
Chock clamps	359
Circlips for ball seats DIN 71805	1178
Circlips for holes DIN 472	723
Circlips for shafts DIN 471	722

Index

Circular plates grey cast iron and aluminium	88
Circular plates steel	88
Clamp grips	497
Clamp hubs	544
Clamping arm for swing clamp	426
Clamping bolts	338
Clamping bushes DIN 173-1	806
Clamping component set	1364
Clamping element „actima“	344-345
Clamping element „arness“	350-351
Clamping force intensifiers	727
Clamping grips tristar with high collar	609
Clamping jaws for floating clamps	348
Clamping joints	597, 1315
Clamping joints individually adjustable	598
Clamping levers	557
Clamping levers external thread	558, 562, 576
Clamping levers external thread, metal parts stainless steel	559, 578
Clamping levers external thread, stainless steel	563
Clamping levers external thread, steel	565
Clamping levers flat external thread	574
Clamping levers flat external thread, metal parts stainless steel	575
Clamping levers flat internal thread	566
Clamping levers flat internal thread, metal parts stainless steel	567
Clamping levers internal thread	555, 568
Clamping levers internal thread, metal parts stainless steel	556, 570
Clamping levers internal thread, stainless steel	561
Clamping levers internal thread, steel	560, 564
Clamping levers with external thread, stainless steel	580
Clamping levers with internal thread, stainless steel	572
Clamping levers with plastic handle external thread	594
Clamping levers with plastic handle external thread, metal parts stainless steel	595
Clamping levers with plastic handle internal thread	592
Clamping levers with plastic handle internal thread, metal parts stainless steel	593
Clamping levers with protective cap external thread	577
Clamping levers with protective cap external thread, metal parts stainless steel	579
Clamping levers with protective cap internal thread	569
Clamping levers with protective cap internal thread, metal parts stainless steel	571
Clamping levers with protective cap with external thread, stainless steel	581
Clamping levers with protective cap with internal thread, stainless steel	573
Clamping lever with thrust pin and external thread	596
Clamping pins	339
Clamping pins (high force)	339
Clamping screws	340
Clamping screws (high force)	340
Clamp nuts	390
Clamp nuts with star or T-grip	391
Clamp plates for toothed belts profile T and AT	1002
Clamp springs	312
Clamp strap assemblies	311
Clamp strap assemblies goose-neck	312
Clamp strap modules compact	313
Clamp straps, double-sided 90° swivelling	310
Clamp straps assorted, long slot	303
Clamp straps Clamping devices	295
Clamp straps DIN 6314 straight, steel or aluminium	299
Clamp straps double sided	309
Clamp straps gooseneck DIN 6316 wide, steel or aluminium	302
Clamp straps gooseneck narrow, steel	301
Clamp straps hinge heel	308
Clamp straps hinge heel with bolt slot	314
Clamp straps mini double sided	308
Clamp straps open U DIN 6315, steel or aluminium	304
Clamp straps open U DIN 6315 C, round pin, steel or aluminium	307
Clamp straps open U flat pin, steel or aluminium	305
Clamp straps pivot steel	314
Clamp straps pivot strap only or assembly	306
Clamp straps slotted heel	296
Clamp straps stepped-heel, steel or aluminium	298
Clamp straps swivel-heel	297
Clamp straps tapped-heel	297
Clamp straps with flattened ball	300
Clevis joints DIN 71752	1163
Clevis joints for rod ends	1158
Clevis joints for rod ends stainless steel	1159
Clevis joints Rod ends Ball joints Axial joints Height adjusting elements Swivel feet Levelling feet Tube-end plugs Equipment feet Hinges	1157
Clevis joints stainless steel DIN 71752	1162
Clevis joints with snap-in pin DIN 71752	1161
Clevis with external thread	740
Column bases double	1301
Column bases single	1300
Column clamps double	1302
Columns for spring fingers	1366
Column shaft collars	1304
Columns stainless steel	1305
Compact clamps	388
Concentricity gauge max. Ø 80 mm	1322
Concentricity gauges Dial gauges	1317
Concentricity gauges max. Ø 35 mm	1320
Conical grip revolving	529
Conical knobs	496
Conical seats Forms D and G DIN 6319, edition 10/01	729
Control handles	537
Control handles flat	538
Control knobs	460-461
Coolant hose LOC-LINE® Flexi	1398-1400
Couplings Rigid couplings Conical clamping rings Cardan joints Quick-fit couplings Bearings	1029
Crank handles aluminium	586
Crank handles balanced	590
Crank handles offset similar to DIN 468	584
Crank handles straight similar to DIN 469	585
Crank handles with fold-away grip	587
Crank handles with revolving grip	588
Crank handles with safety grip	589
Cross roller guide rails	889
C-washers captive DIN 6371	730
C-washers DIN 6372 enhanced	726
Cylinder cleaners	1409
Cylinder cleaners two-part	1409
Cylinder roller bearing FAG with cage	1105
Cylindrical drill bushes DIN 179	802
Cylindrical grips fold-down	533-534
Cylindrical grips revolving	532-533
Cylindrical grips revolving with hexagon socket	532
Cylindrical grips safety automatic return	535
Cylindrical pins DIN 6325	280
Cylindrical pins with internal thread DIN 7979	280

D	**Page**
Deep groove ball bearing FAG single row	1100-1102
Deflection dial gauge holders 180° probe lever with hole	1347
Deflection dial gauge holders 180° probe lever with thread	1348
Deflection dial gauge holders 90°	1346
Deflection dial gauge holders 90° probe lever with hole	1347
Deflection dial gauge holders 90° probe lever with thread	1346, 1348
Dial gauge arm	1311
Dial gauge collets for Ø8 shafts	1330
Dial gauge holders	1312

Index

Dial gauge holders for measuring frame	1333
Dial gauge holders long version with thread	1332
Dial gauge holders short version with smooth shaft	1332
Dial gauge holders short version with thread	1331
Dial gauge holders sliding	1331
Dial gauge holders with fine adjustment	1312
Dial gauges digital	1327
Dial gauges DIN 878	1326
Dipsticks	1257
Disc grips for hex sockets screw	464
Door latch	326
Double ball catch	186
Dovetail slides	881
Dovetail slides with end plates	882
Dovetail slides with micrometer spindle	878-879, 883
Dovetail slides with micrometer spindle and handwheel	884
Down-thrust clamps	387
Drill bushes push-in DIN 173	804
Drill bushes push-in DIN 173-1	805
Drill bushes with collar DIN 172	803
Drill bush holder plates for drilling jig for cylindrical parts	800
Drilling jigs Drill bushes Jig elements	781
Drilling jigs for cylindrical parts	798
Drilling jigs size 0 to 3 S DIN 6348 enhanced	790-791
Drilling jigs size 3 to 5 DIN 6348	792-793
Drilling plates	782
Drilling plates DIN 6348 enhanced	794
Drilling plates with long hinge block	787
Drilling plates with short hinge block	786
Drive technology	991
Ducks feet	1213

E	Page
Eccentric bushes and assembly tools for lateral spring plungers	284
Eccentric stops	187
Eccentric supports	150
Elastic slot keys Pat. No. 4200676	276
Elastomer dog couplings clamping with grub screw	1039
Elastomer dog couplings with conical hub and clamping ring (similar to DIN 69002)	1037
Elastomer dog couplings with radial clamping hub	1038
Elastomer dog couplings with radial clamping hub and intermediate tube	1040
Elevating castors with foot with bolt hole or mounting plate	1387
Elevating castors with integrated machine foot	1388
End seals double-lip sealing rings	967
Extension columns long	796
Extension columns short	796
Extension for probe inserts	1337
Extension nuts height 3xD	715
Extension pieces	124
Extensions for probe inserts	1341
Extractor	281
Eye bolts DIN 444, Form B	712

F	Page
Fasteners Ball-end thrust screws and grippers Thrust screws and thrust pads Torque bolts and threaded inserts Lifting bolts Swivel bales Ring bolts	659
Fastening screws for cross table mounting	880
Feeler gauge strips	1401
Feeler gauge strips Magnetic labels and envelopes Protective nets Supercraft mallets and inserts Taper and cylinder cleaners Coolant hoses	1397
Feet with threaded pin, DIN 6320 (Edition 1971)	124
Filler necks	1258-1259
Five lobe grips	611
Fixed bearing units	1116
Fixed bearing units block version	1118
Fixed bearing units flange version	1120
Fixed centres	1358
Fixture clamps machinable	352
Fixture clamps unequal hexagon	352
Fixture feet with external thread	128
Fixture feet with internal thread	129
Flat guides DryLin® N	933
Flip Flop hoist ring	766
Floating bearing units	1117
Floating bearing units block version	1119
Floating bearing units flange version	1121
Floating clamp	346
Floating clamp with separate workpiece clamp and interlock	347
Four-spoked nuts	484

G	Page
Gas springs	1152-1153
Gauge holders articulated arm with central hydraulic lock	1309
Gauge stands magnetic	1310
Gear racks in steel toothing milled, straight teeth, engagement angle 20°	1022-1023
Grip module parallel grippers	862-863
Gripper pads round carbide	683
Gripper pads square carbide	691
Grippers adjustable	692
Grippers and inserts, round with counterbore	688
Grippers square	690
Grub screws DIN 551	740
Grub screws with ball thrust point	696
Grub screws with flat point hexagon socket DIN 913	709
Grub screws with thrust point DIN 6332	696
Grub screw with hexagon socket and pointed end DIN 914 / DIN EN ISO 4027	710
Guide rails DryLin® T	927
Guide rails DryLin® W double	937
Guide rails DryLin® W single	936
Guide rollers	1383

H	Page
Hammer inserts for Supercraft hammers	1406
Handle for drilling jigs	787
Handles	542
Handles screw-in	541
Handles screw-in with torque limit	541
Handwheels	502-503, 610
Handwheels 2-spoke, aluminium, flat wheel rim, fixed cylinder grip	521
Handwheels 2-spoke aluminium, flat wheel rim	520-521
Handwheels 2-spoke plastic	498
Handwheels 2-spoke plastic, with folding grip	500
Handwheels 2-spoke plastic, with revolving grip	499-500
Handwheels DIN 950, aluminium	516-517
Handwheels DIN 950, aluminium, with fixed grip	517
Handwheels DIN 950, grey cast iron	514-515
Handwheels DIN 950, grey cast iron, with fixed grip	515
Handwheels disc, aluminium, with fixed cylinder grip	519
Handwheels disc aluminium	518-519
Handwheels disc similar to DIN 950, aluminium	522
Handwheels disc without grip	524
Handwheels disc with revolving grip	523
Handwheels for position indicators	989
Handwheels with fold-away grip	506-507
Handwheels with revolving grip	504-505
Handwheels with safety grip	508-509
Handwheel washers	725
HeliCoil®plus threaded inserts	743
Hexagonal grippers	689
Hexagon domed cap nuts similar to DIN 1587	719
Hexagon head bolts DIN 931/DIN EN ISO 4014/DIN EN 24014	711
Hexagon nuts DIN 934/DIN EN ISO 4032/DIN EN 24032	713
Hexagon nuts Form B height 1.5xD, DIN 6330 enhanced	718

Index

Hexagon nuts thin DIN 439	714
Hexagon nuts with collar height 1.5xD, DIN 6331 enhanced	716
Hexagon nut with no-loss washer	717
Hinge blocks, long	782
Hinge blocks, short	783
Hinged fastener DIN 6310	734
Hinge pins	323
Hinge plates	1160
Hinges aluminium	1232
Hinges aluminium, lift-off, left	1230
Hinges aluminium, lift-off, right	1231
Hinges die-cast zinc, with elongated holes	1228
Hinges die-cast zinc, with locking lever	1229
Hinges plastic	1221
Hinges plastic, detent	1226
Hinges plastic, lift-off, left	1219
Hinges plastic, lift-off, right	1220
Hinges plastic, lift-off, with guide tabs	1225
Hinges plastic, with adjustable friction	1227
Hinges plastic, with elongated holes	1223
Hinges plastic, with locking lever	1222
Hinges plastic with bushes	1233
Hinges plastic with bushes and fastening screws	1235
Hinges plastic with fastening holes	1224
Hinges plastic with fastening screws	1234
Hinges weldable	1236
Hinges weldable, stainless steel	1237
Hoist ring	762, 765
Hoist rings 360° rotation grade 10	761
Hoist ring with Envirolox® coating	763
Hook clamp holders	335
Hook clamps	330
Hook clamps ground Form A/B/C	332
Hook clamps precision	337
Hook clamps with collar	331, 333
Hook clamps with mounting bracket	334
Hook wrench with lug DIN 1810A enhanced	1410
Housings for flange nuts	1115
H-profiles grey cast iron and aluminium	91

I	Page
igubal® pillow block bearings	1087
Index drilling discs for drilling jig for cylindrical parts	799
Indexing and clamp grips	262
Indexing plungers	192-193, 206-207, 209-213
Indexing plungers for thin-walled parts	199
Indexing plungers - Precision with cylindrical pin	260
Indexing plungers - Precision with tapered pin	259
Indexing plungers - Premium with cylindrical pin	200-201
Indexing plungers - Premium with tapered pin	202-203
Indexing plungers short version	196-197
Indexing plungers stainless steel	198
Indexing plungers stainless steel without collar	218-219
Indexing plungers with extended indexing pin	194-195
Indexing plungers without collar	214-215, 220-230
Indexing plungers without collar with extended indexing pin	216-217
Inductive proximity switches rectangular housing	872
Inductive proximity switches round housing	871
Inductive proximity switches threaded housing	873
Industrial shock absorbers adjustable	1154
Insert bearing B	1132
Insert bearing MUC stainless steel	1136
Insert bearing UC	1131
Inserts	148
Inspection blocks with column	1308
Inspection tables	1308
Inspection tables Gauge stands Gauge joints	1307
Intermediate plates	985
Intermediate position for rotary module 20060-024	855
Intermediate position for rotary module 20062-016	856
Intermediate position for rotary module 20062-026	857
Intermediate position for rotary module 20064-019	858
Intermediate position for rotary module 20064-029	859

J	Page
Jack screws	134, 148
Jack screws extended	149
Joint blocks	1313-1314

K	Page
Keyless locking couplings Form A for thin walled hubs	1046-1047
Keyless locking couplings Form B	1048-1049
Keyless locking couplings Form C with axial ring	1050-1051
Keyless locking couplings Form D compact design	1052-1053
Keyless locking couplings Form E short version	1054-1055
Keyless locking couplings Form F short version with axial ring	1056-1057
Keyless locking couplings Form G increased tolerance range	1058-1059
Keyless locking couplings Form H for high torques	1060-1061
Keyless locking couplings with central nut	1062-1063
Key rings	272
Klüber „Quietsch-Ex“	1412
Klüber bonded coating UNIMOLY C 220	1415
Klüber copper paste lead-free	1413
Klüber liquid chain grease	1414
Klüber lubricating paste	1412
Klüber molybdenum disulphide lubricant	1414-1415
Klüber safety lubricating grease	1413
Knobs flat	486
Knurled heads for hexagon socket screw	463
Knurled knobs	458-459, 510-511
Knurled knobs metal parts stainless steel	512
Knurled nuts	456
Knurled nuts flat steel and stainless steel, DIN 467	462
Knurled nuts high steel and stainless steel, DIN 466	462
Knurled nuts plastic	455
Knurled nuts quick-acting	455
Knurled nuts steel and stainless steel, DIN 6303	454
Knurled screws	463
Knurled screws high steel and stainless steel DIN 464	457
Knurled thumb screws plastic	457
Knurled torque knobs	699

L	Page
Latch	784
Latches adjustable	421
Latches adjustable with swing bail	420
Latches with draw bail	418-419
Latches with spring clip	417
Lateral spring plungers	282-283, 291
Lateral spring plungers without thrust pin	285
Lateral spring plungers with seal, thrust pin and spring steel	283
Lateral spring plungers with seal, thrust pin steel or POM	287
Lateral spring plungers with threaded sleeve	286-287
Lateral spring plungers with threaded sleeve, without thrust pin	288
Ledge handles	648
Ledge handles stainless steel	647
Levelling feet	1217
Levelling feet ECO-Line threaded spindles steel or stainless steel	1212
Levelling feet for aluminium profiles	1216
Levelling feet plates die-cast zinc or stainless steel	1206-1207
Levelling feet plates ECO-Line die-cast zinc, stainless steel or plastic	1211
Levelling feet plates extended die-cast zinc	1208
Levelling feet plates plastic	1203
Levelling feet plates plastic, heavy-duty version	1204
Levelling feet threaded spindles steel or stainless steel	1209
Levelling sets high version	1180

Index

Levelling sets low version	1182
Levelling sets spherical washer	1184, 1186
Levelling sets spherical washer with locknut	1185, 1187
Levelling sets with locknut	1181, 1183
Levers 20° DIN 99	536
Lifting bolt with ring lock	772
Lifting pins, stainless steel, self-locking	770
Lifting pins self-locking	769
Lifting ring	763
Lifting units, pneumatic with rail guide	842-843
Lifting units, pneumatic with round guides	844-847
Lift tables	916
Linear actuator connector clamps base	1299
Linear actuator connector clamps cross	1296-1297
Linear actuator connector clamps flange	1298
Linear actuators	1295
Linear ball bearings self-aligning	955
Linear ball bearings self-aligning, high load rating	956
Linear ball bearings with flange	957
Linear ball bearings with flange, double bearing	958
Linear ball bearings with plastic cage	953
Linear ball bearings with steel cage	954
Linear housing units quadro, closed	965
Linear housing units quadro, open	966
Linear housing units single, closed	961
Linear housing units single, open	962
Linear housing units tandem, closed	963
Linear housing units tandem, open	964
Linear housing units with flange	959
Linear housing units with flange, tandem	960
Linear modules Lifting units Rotary modules Grip modules Inductive proximity switches Plug connectors	823
Linear modules pneumatic with rail guide	832-839
Linear modules pneumatic with three round guides	828-829
Linear scales self-adhesive, stainless steel	976
Linear scales self adhesive or with screw holes, aluminium	977
Linear scales self-adhesive or with screw holes, aluminium	978
Locating cylinders	248
Locating feet	131
Locating pins and rest pads DIN 6321 (Issue 1973)	121
Locating pins expanding	246
Locating pins removable Form A and C	239
Locating pins removeable Form B and D	239
Locating pins with ball-end Form A	240
Locating pins with ball-end Form B	241
Locating pins with flattened ball-end Form C	240
Locating pins with flattened ball-end Form D	241
Locators	181
Lock grips	539
Locking pins	265
Locking pins with axial locking	294
Locking pins with folding latch	293
Locking pins with key ring	266
Lock washer self-locking DIN 25201	720
LOCTITE activators	1422
LOCTITE adhesive and sealant	1420
LOCTITE cleaner	1421
LOCTITE liquid epoxy metals	1417
LOCTITE retaining compound	1421
LOCTITE screw lock	1418
LOCTITE surface sealant	1420
LOCTITE thread sealant	1419
LOCTITE universal adhesive	1419
Low-profile clamps	362
L-profiles grey cast iron or aluminium	89
L-profiles unequal legs grey cast iron or aluminium	90
L profile with reinforcing ribs grey cast iron	90
Lubricants Adhesives	1411

M	Page

Machine feet	1189
Machine feet with vibration absorption	1199
Machine handles fixed aluminium, DIN 39 Form E	526
Machine handles fixed steel, DIN 39 Form E	525
Machine handles fixed steel, similar to DIN 39	525
Machine handles fixed straight form, similar to DIN 39	528
Machine handles revolving	529
Machine handles revolving aluminium, DIN 98 Form E	527
Machine handles revolving steel, DIN 98 Form E	526
Machine handles revolving steel, similar to DIN 98	527
Machine handles revolving straight form, similar to DIN 98	528
Magnetic base permanent	821
Magnetic C profiles	1403
Magnetic envelopes	1404
Magnetic envelopes with strong magnetics	1404
Magnetic labels	1402
Magnetic labels on a roll, perforated	1402
Magnetic stands	1310-1311
Magnetic tape rolls	1403
Magnets	807
Magnets (button magnets)	817
Magnets (shallow pot magnets)	817
Magnets (shallow pot magnets) in hard ferrite	811
Magnets (shallow pot magnets) in NdFeB	814
Magnets (shallow pot magnets) in SmCo	812
Magnets (U-magnet)	818
Magnets permanent for workholding with fine pole division	808
Magnets pickup	821
Magnets shallow pot with internal thread NdFeB, with rubber protective jacket	819
Magnets shallow pot with tapped pin NdFeB, with rubber protective jacket	819
Magnets shallow pot with threaded pin NdFeB, with rubber protective jacket	820
Magnets shallow pot with through hole NdFeB, with rubber protective jacket	820
Magnets with counterbore (shallow pot magnets) hard ferrite	815
Magnets with countersunk hole (shallow pot magnets) hard ferrite	815
Magnets with internal thread (shallow pot magnets) in NdFeB	816
Magnets with thread (shallow pot magnets) in hard ferrite	812
Mandrel collets	251
Mandrel collets with side lock	252
Material handling and transport	1367
Measuring arms	1355
Measuring element for gear wheels	1360
Measuring fixtures	1353-1354
Metal bellows couplings clamping with grub screw	1032
Metal bellows couplings with radial clamping hub	1031
Miniature ball screw linear actuators ground, with flange nut	1122-1123
Miniature ball screw linear actuators ground, with screw-in cylinder nut	1124-1125
Miniature carriages stainless steel	951
Miniature linear guides DryLin® T	928-929
Miniature profile guide rails stainless steel	952
Miniature slide guides DryLin® N	930-932
Mini ball transfer units	1395
Mini clamps Tünkers system	428-429
Mini clamp with pneumatic end position feedback	429
Mounting brackets	233, 986
Mounting brackets aluminium	234-235
Mounting flange	1155
Mounting plates horizontal	907
Mounting plates vertical	908-909
Multiple connectors	599
Mushroom knobs external thread	488
Mushroom knobs internal thread	487
Mushroom knobs internal thread, steel or stainless steel	487

Index

N	Page
Net mats	1405
Net sleeves	1405
Nuts for T-slots blanks	668
Nuts for T-slots DIN 508 enhanced	667
Nuts for T-slots long	668
Nuts for T-slots rhombic form	669

O	Page
Oil level gauges	1240-1241
Oil level gauges Caps Plugs Vent screws Dipsticks Filler necks	1239
Oil level sight glasses	1242
Oil level sight glasses aluminium	1244
Oil level sight glasses aluminium, glass window	1244
Oil level sight glasses domed	1243
Oil level sight glasses press-in	1243
Oldham-type couplings clamping with grub screw	1042
Oldham-type couplings with radial clamping hub	1041
Operating parts	453
O-shaped mounts	1150

P	Page
Palm grips aluminium, similar to DIN 6335	467
Palm grips grey cast iron DIN 6335	469
Palm grips plastic coated grey cast iron, DIN 6335	470
Palm grips quick-acting grey cast iron	472
Palm grips similar to DIN 6335	471
Palm grips stainless steel, similar to DIN 6335	468
Palm grips with threaded spindle	470
Parallel block sets	274
Parallel blocks pair DIN 6346	273
Parallel keys DIN 6885 A	278
Pillow block bearing flange type MUCF 2-hole stainless steel	1135
Pillow block bearing flange type MUCF stainless steel	1134
Pillow block bearing flange type UCF	1127
Pillow block bearing flange type UCFC with centring hub	1128
Pillow block bearing flange type UCFL 2-hole	1129
Pillow block bearing pedestal type BPP	1130
Pillow block bearing pedestal type MUCP stainless steel	1133
Pillow block bearing pedestal type UCP	1126
Pivot heads swivel angle 30°	921
Pivoting columns	1351
Pivoting systems	1352
Plain bearing cylindrical	1092-1093
Plain bearing sintered bronze cylindrical	1096-1097
Plain bearing sintered bronze with collar	1098-1099
Plain bearings plastic	1088-1089
Plain bearing with collar	1094
Plastic grips	406
Plastic hammer Supercraft recoilless	1406
Plates grey cast iron or aluminium	75
Plug connectors self-assembly with screw fitting	875
Plug connectors with screw fitting	874
Plugs fill and drain hexagon cap	1248
Plugs fill only knurled cap	1249
Plugs magnetic aluminium	1247
Plugs magnetic plastic	1247
Plugs press-in	1246
Plugs screw-in	1245
Plugs to press-in with dipstick	1254
Pneumatic clamps	410-411
Pneumatic clamps push-rod	412
Pneumatic clamps vertical heavy-duty version	413
Pneumatic clamps vertical with vertical mounted cylinder	414
Pneumatic linear modules with two round guides	826-827
Portal modules, pneumatic with rail guides	866-867
Portal modules, pneumatic with round guides	868-869
Position indicators	979-981
Position indicators for handwheels analogue-digital display	988
Position indicators freely programmable	982
Positioning brackets	274
Positioning feet	126-127
Positioning pins cylindrical ground	244
Positioning pins cylindrical not ground	244
Positioning pins free-milled ground	245
Positioning pins free-milled not ground	245
Positioning tables long	914
Positioning tables long with coaxial electric drive	896-897
Positioning tables long with lateral electric drive	898-899
Positioning tables long with position indicator	915
Positioning tables rotary with coaxial electric drive	900-901
Positioning tables short	912
Positioning tables short with coaxial electric drive	892-893
Positioning tables short with lateral electric drive	894-895
Positioning tables short with position indicator	913
Positioning wheels	513
Precision guide shafts	975
Precision guide shafts with fastening holes	974
Precision slides roller mounted	885
Precision slides roller mounted with end plates	887
Precision slides roller mounted with micrometer spindle	888
Precision vice	1362-1363
Prism attachments	1349
Probe inserts carbide thread M2.5	1343
Probe insert set 10-piece	1341
Probe inserts hardened steel thread M2.5	1342
Probe inserts knife point	1339
Probe inserts with ball point	1338
Probe inserts with domed point	1338, 1340
Probe inserts with enlarged flat face	1340
Probe inserts with flat face	1339
Probe knife point	1336
Probe knife point offset	1336
Probe knife point offset, for fixed stop	1337
Probe with flat face	1334
Probe with flat point	1334
Probe with reduced domed point	1335
Probe with reduced flat face	1335
Profile guide rails	950
Protection frames for dial gauges	1344
Protective caps	408
Protective rubber caps for shallow pot magnets	818
Pull clamps	342
Pull clamps (high force)	343
Pull handles	613-618, 621-622, 628, 633, 636-637, 645-646
Pull handles angled	629, 638, 645, 657
Pull handles arch	618-619
Pull handles fold-down	637
Pull handles high-gloss chromed	634
Pull handles oblique	619
Pull handles open-ended screw on	651
Pull handles oval	624-625
Pull handles oval detachable	626-627
Pull handles round	623-624
Pull handles stainless steel	621, 628-629, 635
Pull handles tubular	630-631, 639-643
Pull handles tubular angled	638
Pull handles tubular oblique	632
Pull handles tubular stainless steel	644
Pull handles with soft inner face	620
Push-pull clamps heavy-duty version with handle	431
Push-Pull spring plungers	289
Push-Pull spring plunger with rotation lock	290

Index

Q	Page
Quarter-turn screws	735
Quick-fit couplings with angular and radial offset compensation	1086
Quick-fit couplings with radial offset compensation	1082-1083
Quick-fit couplings with radial offset compensation and mounting flange	1084-1085

R	Page
Ratchet levers	582-583
Ratchet levers with locating hole	583
Receiver bush, stainless steel, for lifting pins	771
Receiver bushes Form A (pressed in from rear)	250
Receiver bushes Form B (screwed down from front)	250
Recessed handles	652, 655
Recessed handles fold-down	653-654
Recessed handles fold-down stainless steel	656
Rectangular hollow profiles grey cast iron	94
Rectangular plates precision steel	74
Rectangular support elements	146
Reducer sleeves round	1291
Reducer sleeves square	1291
Reducing bushings	985
Repair kit	753
Rest pad	132
Rest pads	120, 122, 133, 785
Rest pads adjustable with locknut	132
Rest pads with positioning pin	123
Retaining cables with loop	272
Ribbed grips	612
Rigid couplings one-piece	1043
Rigid couplings two-piece	1044
Ring bolts DIN 580 / stainless steel similar to DIN 580	757
Ring bolts rotatable high-strength grade 10	758
Ring bolts swivel and 360° rotatable, grade 8	759
Ring nuts DIN 582 stainless steel similar to DIN 582	757
Riser bars	336
Riser blocks with draw bolt	389
Riser stops	361
Rod-end eyes	1160
Rod ends igubal® with plain bearing external thread	1167
Rod ends igubal® with plain bearing internal thread	1169
Rod ends with ball bearing external thread	1164
Rod ends with ball bearing internal thread	1165
Rod ends with plain bearing external thread	1166
Rod ends with plain bearing external thread, narrow version	1172
Rod ends with plain bearing external thread, stainless steel	1170
Rod ends with plain bearing internal thread	1168
Rod ends with plain bearing internal thread, narrow version	1173
Rod ends with plain bearing internal thread, stainless steel	1171
Roller cages	890
Roller carriages aluminium	941
Roller carriages compact and heavy-duty version	938
Roller carriages steel	940
Roller guide rails	939, 942
Rollers heavy-load	1384
Rotary discs	917
Rotary module, pneumatic	849-851
Rotary module, pneumatic heavy duty version	852, 854
Rotary module pneumatic	853
Rotary positioning tables	918
Rotary positioning tables with position indicators	919
Round and square tubes	1292
Round brackets	1178
Round grippers and inserts	686-687
Round magnets (deep pot magnets) in AlNiCo with fitting tolerance	810
Round magnets (deep pot magnets) in AlNiCo without fitting tolerance	810
Round magnets (deep pot magnets) in SmCo	813
Round magnets (pot magnets)	816
Round magnets with internal thread (deep pot magnets) in NdFeB	813
Round magnets with pin (deep pot magnets) in AlNiCo	811
Rubber impact buffers conical	1148
Rubber impact buffers parabolic	1147
Rubber impact buffers spherical	1148
Rubber impact buffers type TP door buffer	1146
Rubber-metal buffers Shock absorbers Gas springs	1137
Rubber-metal buffers type A	1139
Rubber-metal buffers type AT tapered	1140
Rubber-metal buffers type B	1141
Rubber-metal buffers type C	1143
Rubber-metal buffers type CT tapered	1144
Rubber-metal buffers type D	1145
Rubber-metal buffers type DS suction base	1146
Rubber-metal buffers type E	1142
Rubber-metal impact buffer rails	1149
Rubber sleeves for ball and socket or double universal joints	1080
Rubber sleeves for ball and socket or single universal joints	1080

S	Page
Safety band	271
Safety spiral cable	271
Screw rest inserts spherical, centring disc, prism, locating pin, revolving ball	138
Screw rest with flat face, aluminium	136
Screw rest with flat face, steel	136
Screw rest with flat face and magnetic foot, aluminium	137
Screws with countersunk head hexagon socket DIN 7991	711
Seating blocks adjustable	366
Self-aligning pads	100-101
Self-aligning pads adjustable	109
Self-aligning pads adjustable with O-ring	110-111
Self-aligning pads adjustable with O-ring, exchangeable inserts and hexagon socket	118-119
Self-aligning pads adjustable with O-ring and exchangeable inserts	112-115
Self-aligning pads adjustable with O-ring and hexagon socket	116-117
Self-aligning pads Fixture feet Clamp rests Support elements	99
Self-aligning pads self-righting	108
Self-aligning pads swivel 12°	130
Self-aligning pads swivel angle 14° and 20°	103
Self-aligning pads with o-ring	104-105
Self-aligning pads with O-ring and exchangeable inserts	106-107
Sensor holder	910-911
Shaft clamping units	292
Shaft collars one-piece	775
Shaft collars one-piece wide	776
Shaft collars set screw DIN 705, stainless steel	774
Shaft collars set screw DIN 705, steel	773
Shaft collars two-piece	777
Shaft collars two-piece wide	778
Shaft collars with thread	779
Shaft-hub clamping sets stainless steel	1064
Shaft supports	968, 971
Shaft supports flanged	973
Shaft supports standard	972
Shoulder screws flathead for DIN 173 drill bushes	806
Shoulder screws Form B	732
Shoulder screws similar to DIN ISO 7379	732
Shoulder screws with hexagon head, DIN 609	733
Shoulder screws with slotted domed head	734
Shoulder screws with slotted flat head DIN 923	731
Shrink discs Form A	1066-1067
Shrink discs Form B	1068-1069
Side brackets	1177
Side clamps	363, 365, 367-369, 379, 381-382, 384-385
Side clamps robust	365
Side clamps with rest pad	364

Index

Side stops 380
Slide carriages DryLin® W 935
Slides Guide rails Positioning tables Linear guide systems Position indicators 877
Slides mini roller mounted 886
Slot keys 275
Slot keys loose DIN 6323 277
Slot keys with locating pin 277
Slotted nuts with elastic lock 737
Slotted round nuts 1350
Slotted round nuts DIN 1804 736
Socket head screws DIN 912/DIN EN ISO 4762 707
Socket head screws DIN 912 / DIN EN ISO 4762, steel or stainless steel 707
Socket head screws with low head DIN 6912 708
Spacer bolts 323
Spacer rings 205
Spacers for prisms attachments 1349
Spacing washers ground 731
Spherical knobs 489
Spherical knobs revolving 490
Spherical levelling washers 730
Spherical roller bearing FAG cylindrical bore 1104
Spherical seating nuts 451
Spherical washers DIN 6319, edition 10/01 728-729
Spiral cams 326
Spiral cam screws 353
Splined shafts AT profile 1001
Splined shafts T profile 1000
Spring fingers 1365
Spring mounted centre sleeves with lifting cam 1357
Spring mounted centre sleeves with tension lever 1356
Spring plungers Indexing plungers Stops Centring and positioning components Locking pins T-slot nuts 151
Spring plungers smooth version, double-sided 185
Spring plungers smooth version, extended, stainless steel 181-182
Spring plungers smooth version, plastic 183
Spring plungers smooth version, stainless steel 182
Spring plungers smooth version without collar, stainless steel 184
Spring plungers with detent ring 180
Spring plungers with end position feedback 161
Spring plungers with head 179, 184
Spring plungers with hexagon socket and ball, LONG-LOK secured, steel 166
Spring plungers with hexagon socket and ball, LONG-LOK secured stainless steel 169
Spring plungers with hexagon socket and ball, stainless steel 168
Spring plungers with hexagon socket and ball, steel 165
Spring plungers with hexagon socket and ceramic ball 167
Spring plungers with hexagon socket and POM thrust pin, LONG-LOK secured, stainless steel 178
Spring plungers with hexagon socket and POM thrust pin, LONG-LOK secured, steel 174
Spring plungers with hexagon socket and POM thrust pin, stainless steel 177
Spring plungers with hexagon socket and POM thrust pin, steel 173
Spring plungers with hexagon socket and thrust pin, LONG-LOK secured, stainless steel 176
Spring plungers with hexagon socket and thrust pin, LONG-LOK secured, steel 172
Spring plungers with hexagon socket and thrust pin, long version 170
Spring plungers with hexagon socket and thrust pin, stainless steel 175
Spring plungers with hexagon socket and thrust pin, steel 171
Spring plungers with slot and ball, LONG-LOK secured, stainless steel 158
Spring plungers with slot and ball, LONG-LOK secured, steel 155
Spring plungers with slot and ball, stainless steel 157
Spring plungers with slot and ball, steel 154
Spring plungers with slot and ceramic ball, stainless steel 156
Spring plungers with slot and POM ball 156
Spring plungers with slot and stainless steel ball 159
Spring plungers with slot and thrust pin, LONG-LOK secured, stainless steel 164
Spring plungers with slot and thrust pin, LONG-LOK secured, steel 162
Spring plungers with slot and thrust pin, stainless steel 163
Spring plungers with slot and thrust pin, steel 160
Springs 741
Spring washers DIN 2093 724
Spur gears in steel, module 1.5 toothing milled, straight teeth, engagement angle 20° 1014-1015
Spur gears in steel, module 1 toothing milled, straight teeth, engagement angle 20° 1012-1013
Spur gears in steel, module 2.5 toothing milled, straight teeth, engagement angle 20° 1018-1019
Spur gears in steel, module 2 toothing milled, straight teeth, engagement angle 20° 1016-1017
Spur gears in steel, module 3 toothing milled, straight teeth, engagement angle 20° 1020-1021
Square hollow profiles grey cast iron 94
Standard inspection and test fixture elements 1329
Star grips aluminium, similar to DIN 6336 473
Star grips grey cast iron, DIN 6336 475
Star grips metal parts stainless steel, similar to DIN 6336 478
Star grips quick-acting 484
Star grips similar to DIN 6336 476, 480-481
Star grips stainless steel, similar to DIN 6336 474
Star grips with projecting steel bush 477
Star grips with safety band metal parts stainless steel, similar to DIN 6336 479
Star grips with safety band similar to DIN 6336 482-483
Step blocks 140
Step block sets 140
Stepper motor 903
Stepper motor with integrated positioning control 904-905
Stop, adjustable with end position feedback 135
Stop screw 189
Stop screws 830
Straps 880
Studs 661
Studs DIN 6379 662-663
Studs with screw-in stop for gluing in 755
Subplates 76-77
Subplates machined all sides grey cast iron 78
Support blocks compact 139
Support bolts 125
Support cylinders for workpieces with collar 1309
Support element 145
Support elements cylindrical 141
Swing clamps 329, 337
Swing clamps mini 328
Swing clamps mini, with cam lever 327
Swing clamps pneumatic 424-425
Swing screws 430
Swivel and fixed castors appliance, standard version 1368
Swivel and fixed castors heavy-duty version 1369, 1372, 1375, 1378-1379
Swivel and fixed castors medium-duty version 1374
Swivel and fixed castors standard version 1370-1371, 1373, 1377
Swivel and fixed castors welded steel heavy-duty version 1376
Swivel angles 920
Swivel bale 768
Swivel bale with axial ring 764
Swivel castors compact version 1380
Swivel eye bolts 767
Swivel feet 706
Swivel feet ball joints with internal thread 1201
Swivel feet plates die-cast zinc or stainless steel 1192-1193
Swivel feet plates extended die-cast zinc 1194
Swivel feet plates plastic 1191
Swivel feet plates stainless steel 1195
Swivel feet plates with vibration absorption 1197
Swivel feet threaded spindles steel or stainless steel 1200

Index

Swivel feet with vibration absorption	1198
Swivel hold-down clamps mini, with cam lever	386
Swivel pads	131
T	**Page**
Talon grips	357
Talon grips round	358
Taper cleaners for hollow shank tapers	1408
Taper cleaners for Morse tapers	1407
Taper cleaners for short tapers	1407
Tapered knobs	496
Tapered roller bearing FAG single row	1106
Taper grips	531
Taper grips revolving	530
Technical data for pot magnets	809
Technical InFormation for Adjusting Nuts	738
Telescope rails	943
Telescope rails S-form	944
Tension levers	539
Tension levers external thread	547
Tension levers external thread, stainless steel	548
Tension levers flat external thread	553
Tension levers flat external thread, stainless steel	554
Tension levers flat internal thread	551
Tension levers flat internal thread, stainless steel	552
Tension levers internal thread	545
Tension levers internal thread, stainless steel	546
Tension levers safety external thread	550
Tension levers safety internal thread	549
T-grips	600-601
Threaded inserts	748
Threaded inserts reinforced	749
Threaded inserts reinforced internal thread, self-locking	752
Threaded inserts self-tapping with cutting bores	747
Threaded inserts self-tapping with cutting slot	745
Threaded inserts solid body	750
Threaded inserts with internal thread, self-locking	751
Threaded rods steel and stainless steel DIN 976-1	741
Thrust pads	702, 704
Thrust pads DIN 6311 enhanced	703
Thrust pads with retaining pin	703
Thrust screws	693
Thrust screws LONG-LOK secured	695
Thrust screws neoprene	408
Thrust screws stainless steel	694
Thrust screws with point	697
Thrust screws with radiused half-dog point	698
Thrust screws with thrust pad	407
Thrust spindles	705
Thrust spindles spring mounted	406
Thrust washers	786, 1095
Thrust washers, plastic	1091
Tightening screws	392
Toe clamps	383
Toe clamps compact	370
Toe clamps for T-slots	356
Toggle clamps heavy duty version straight foot	416
Toggle clamps heavy duty vertical	415
Toggle clamps horizontal large version	402
Toggle clamps horizontal with flat foot and adjustable clamping spindle	434-435
Toggle clamps horizontal with flat foot and adjustable clamping spindle, stainless steel	436
Toggle clamps horizontal with horizontal foot	402
Toggle clamps horizontal with push rod	404
Toggle clamps horizontal with safety interlock with flat foot and adjustable clamping spindle	437
Toggle clamps horizontal with safety interlock with flat foot and adjustable clamping spindle, stainless steel	438
Toggle clamps horizontal with safety interlock with straight foot and adjustable clamping spindle	441
Toggle clamps horizontal with safety interlock with straight foot and adjustable clamping spindle, stainless steel	442
Toggle clamps horizontal with straight foot	403
Toggle clamps horizontal with straight foot and adjustable clamping spindle	439
Toggle clamps horizontal with straight foot and adjustable clamping spindle, stainless steel	440
Toggle clamps Pneumatic clamps Clamp accessories Latches	393
Toggle clamps vertical with angled foot	400
Toggle clamps vertical with flat foot and adjustable clamping spindle	443
Toggle clamps vertical with flat foot and adjustable clamping spindle, stainless steel	444
Toggle clamps vertical with horizontal foot	395
Toggle clamps vertical with horizontal foot, large version	397
Toggle clamps vertical with horizontal foot and full clamping lever	396
Toggle clamps vertical with safety interlock with flat foot and adjustable clamping spindle	445
Toggle clamps vertical with safety interlock with flat foot and adjustable clamping spindle, stainless steel	446
Toggle clamps vertical with safety interlock with straight foot and adjustable clamping spindle	449
Toggle clamps vertical with safety interlock with straight foot and adjustable clamping spindle, stainless steel	450
Toggle clamps vertical with straight foot	398
Toggle clamps vertical with straight foot and adjustable clamping spindle	447
Toggle clamps vertical with straight foot and adjustable clamping spindle, stainless steel	448
Toggle clamps vertical with straight foot and full clamping lever	399
Toggle clamps with push rod push-pull operation, bracket mounting	405
Toggle hook clamps and catch plate	401
Toggle mini clamps	403
Tolerance rings	1394
Tombstones cube	96-97
Tombstones cube grey cast iron	98
Tombstones double-sided	84-85
Tombstones double-sided grey cast iron	87
Tombstones single-sided	82-83
Tombstones window frame	86
Tommy bars with fixed or sliding T-bar, DIN 6305 or DIN 6307	465
Toothed belt pulleys, AT profile	998-999
Toothed belt pulleys, T profile	996-997
Toothed belt pulleys Splined shaft Timing belts	991
Toothed belts AT profile	1008-1009
Toothed belts by the meter AT profile	1010-1011
Toothed belts by the metre T profile	1006-1007
Toothed belts T profile	1003-1005
Torque grips	701
Torque screws with ball thrust points	702
Torque screws with slot coupling	700
Torque screws with support pin	701
Torque screws with thrust point	700
T-profiles machined all sides grey cast iron or aluminium	91
Trapezoidal rolled thread spindles RH thread, single-start	1110
Trapezoidal thread flange nuts RH thread, single-start	1111
Trapezoidal thread round nuts RH thread, single-start	1111
Trapezoidal thread spindles Ball screw linear actuators Pillow block bearings	1109
Traverses fixed	969
Traverses moveable	970
T-slot bolts DIN 787	664-665
T-slot bolts DIN 787, 12.9	666
T-slot clamps	362
T-slot keys	275
T-thrust screws with fixed or sliding T-bar, DIN 6304 or DIN 6306	466
Tube clamps base, aluminium	1273-1274

Index

Tube clamps base, plastic	1272, 1274
Tube clamps cross, aluminium	1263-1265, 1267
Tube clamps cross, plastic	1263, 1265, 1267
Tube clamps flange, aluminium	1276-1278
Tube clamps flange, plastic	1275, 1278
Tube clamps right-angle, aluminium	1271
Tube clamps straight, plastic	1279
Tube clamps swivel, aluminium	1285, 1287
Tube clamps swivel, plastic	1284, 1286
Tube clamps swivel base, aluminium	1289
Tube clamps swivel base, plastic	1288
Tube clamps swivel base, sunken teeth, plastic	1283
Tube clamps swivel half, raised teeth, plastic	1281
Tube clamps swivel half, sunken teeth, plastic	1280, 1282
Tube clamps T-angle, aluminium	1269, 1271
Tube clamps T-angle, plastic	1268, 1270
Tube connectors Tube clamps Tube joints Tubes Columns	1261
Tube end plugs	1293
Tube inserts round with tapped bush	1215
Tube inserts square with tapped bush	1214
Tubular handles	650
Tubular handles angled	649
U	**Page**
Universal joints double with needle bearing DIN 808	1076
Universal joints double with plain bearing DIN 808	1074
Universal joints double with plain bearing robust version DIN 808	1078
Universal joints single with needle bearing DIN 808	1075
Universal joints single with plain bearing DIN 808	1073
Universal joints single with plain bearing robust version DIN 808	1077
U-profiles machined all sides grey cast iron or aluminium	93
V	**Page**
V-block machined all sides extra wide, grey cast iron	92
V-block machined all sides grey cast iron or aluminium	92
V-blocks with stop	801
Vent screws	1250
Vent screws brass	1253
Vent screws brass with check valve	1253
Vent screws with check valve	1252
Vent screws with check valve and dipstick	1256
Vent screws with dipstick	1255
Vent screws with splash guard	1251
W	**Page**
Washers for clamps steel or aluminium DIN 6340	721
Washers medium DIN 125 Form A	719
Wedge clamps	371
Wedge clamps double jaw faces serrated	377
Wedge clamps jaw face smooth or serrated	373
Wedge clamps jaw faces serrated	375
Wedge clamps machinable	372, 374, 376
Wedge supports	141
Weld-on D-ring	760
Wheels aluminium rims with injection-moulded tread	1384
Wheels heavy-load wheel body welded	1385
Wheels polyamide	1385
Wheels polyamide heavy-duty version	1386
Wheels polyamide with injection-moulded tread	1382
Wheels rubber tyres on die-cast aluminium rims	1382
Wheels rubber tyres on steel plate rims	1381
Wing grips	603, 608
Wing grips „Miniwing“	605
Wing grips „Miniwing“ with tapped through bush	606
Wing grips for hexagon socket screws	464
Wing grips internal thread, stainless steel	602, 625
Wing grips one-sided	607
Wing grips with tapped through bush	604
Woodruff keys DIN 6888	278
Workpiece support cylinders	144
Workpiece supports	143, 146-147
Workpiece supports adjustable	142

Index

Index

DIN	Description	nlm	Page
DIN 39	Machine handles fixed steel, DIN 39 Form E	06291	525
	Machine handles fixed aluminium, DIN 39 Form E	06292	526
DIN 39 similar	Machine handles fixed steel, similar to DIN 39	06290	525
	Machine handles fixed straight form, similar to DIN 39	06311	528
DIN 98	Machine handles revolving steel, DIN 98 Form E	06308	526
	Machine handles revolving aluminium, DIN 98 Form E	06309	527
DIN 98 similar	Machine handles revolving steel, similar to DIN 98	06310	527
	Machine handles revolving straight form, similar to DIN 98	06312	528
DIN 99	Levers 20° DIN 99	06330	536
DIN 125	Washers medium DIN 125 Form A	07300	719
DIN 172	Drill bushes with collar DIN 172	08910	803
DIN 173	Drill bushes push-in DIN 173	08920	804
	Shoulder screws flathead for DIN 173 drill bushes	08927	806
DIN 173 Part 1	Drill bushes push-in DIN 173	08920	804
	Clamping bushes DIN 173-1	08926	806
DIN 179	Cylindrical drill bushes DIN 179	08900	802
DIN 319	Ball knobs stainless steel or aluminium DIN 319	06247	492
DIN 319 enhanced	Ball knobs thermoplastic DIN 319 enhanced	06247	491
	Ball knobs smooth DIN 319 enhanced	06250	494-495
DIN 439	Hexagon nuts thin DIN 439	07212	714
DIN 444	Eye bolts DIN 444, Form B	07180	712
DIN 464	Knurled screws high steel and stainless steel DIN 464	06090	457
DIN 466	Knurled nuts high steel and stainless steel, DIN 466	06110	462
DIN 467	Knurled nuts flat steel and stainless steel, DIN 467	06120	462
DIN 468	Crank handles offset similar to DIN 468	06480	584
DIN 469	Crank handles straight similar to DIN 469	06490	585
DIN 471	Circlips for shafts DIN 471	07330	722
DIN 472	Circlips for holes DIN 472	07331	723
DIN 508 enhanced	Nuts for T-slots DIN 508 enhanced	07060	667
DIN 551	Grub screws DIN 551	07630	740
DIN 580 similar	Ring bolts DIN 580 / stainless steel similar to DIN 580	07680	757
DIN 582 similar	Ring nuts DIN 582 stainless steel similar to DIN 582	07690	757
DIN 609	Shoulder screws with hexagon head DIN 609	07535	733
DIN 705	Shaft collars set screw DIN 705, steel	07800	773
	Shaft collars set screw DIN 705, stainless steel	07800	774
DIN 787	T-slot bolts DIN 787	07040	664-665
	T-slot bolts DIN 787, 12.9	07040	666
DIN 808	Universal joints single with plain bearing DIN 808	23403	1073
	Universal joints double with plain bearing DIN 808	23404	1074
	Universal joints single with needle bearing DIN 808	23406	1075
	Universal joints double with needle bearing DIN 808	23407	1076
	Universal joints single with plain bearing robust version DIN 808	23409	1077
	Universal joints double with plain bearing robust version DIN 808	23410	1078
DIN 878	Dial gauges DIN 878	32540	1326
DIN 912	Socket head screws DIN 912/DIN EN ISO 4762	07160	707
	Socket head screws DIN 912 / DIN EN ISO 4762, steel or stainless steel	07160	707
DIN 913	Grub screws with flat point hexagon socket DIN 913	07165	709
DIN 914	Grub screw with hexagon socket and pointed end DIN 914 / DIN EN ISO 4027	07166	710
DIN 923	Shoulder screws with slotted flat head DIN 923	07530	731
DIN 931	Hexagon head bolts DIN 931/DIN EN ISO 4014/DIN EN 24014	07170	711
DIN 934	Hexagon nuts DIN 934/DIN EN ISO 4032/DIN EN 24032	07210	713
DIN 950	Handwheels DIN 950, grey cast iron	06271	514-515
	Handwheels DIN 950, aluminium	06273	516-517
DIN 950 similar	Handwheels disc similar to DIN 950, aluminium	06279	522
DIN 976-1	Threaded rods steel and stainless steel DIN 976-1	07640	741
DIN 1587 similar	Hexagon domed cap nuts similar to DIN 1587	07280	719
DIN 1804	Slotted round nuts DIN 1804	07590	736
DIN 1810A enhanced	Hook wrench with lug DIN 1810A enhanced	96650	1410
DIN 2079	Carrier keys DIN 2079	03290	279
DIN 2093	Spring washers DIN 2093	07360	724

DIN	Description	nlm	Page
DIN 6303	Knurled nuts steel and stainless steel, DIN 6303	06010	454
DIN 6304, DIN 6306	T-thrust screws with fixed or sliding T-bar, DIN 6304 or DIN 6306	06150	466
DIN 6305, DIN 6307	Tommy bars with fixed or sliding T-bar, DIN 6305 or DIN 6307	06140	465
DIN 6310	Hinged fastener DIN 6310	07560	734
DIN 6311 enhanced	Thrust pads DIN 6311 enhanced	07140	703
DIN 6314	Clamp straps DIN 6314 straight, steel or aluminium	04080	299
DIN 6315	Clamp straps open U DIN 6315, steel or aluminium	04110	304
DIN 6315 C	Clamp straps open U DIN 6315 C, round pin, steel or aluminium	04150	307
DIN 6316	Clamp straps gooseneck DIN 6316 wide, steel or aluminium	04090	302
DIN 6319, edition 10/01	Spherical washers DIN 6319, edition 10/01	07420	728-729
DIN 6320 (edition 1971)	Feet with threaded pin, DIN 6320 (Edition 1971)	02030	124
DIN 6321 (edition 1973)	Locating pins and rest pads DIN 6321 (Issue 1973)	02020	121
DIN 6323	Slot keys loose DIN 6323	03260	277
DIN 6325	Cylindrical pins DIN 6325	03320	280
DIN 6330 enhanced	Hexagon nuts Form B height 1.5xD, DIN 6330 enhanced	07260	718
DIN 6331 enhanced	Hexagon nuts with collar height 1.5xD, DIN 6331 enhanced	07240	716
DIN 6332	Grub screws with thrust point DIN 6332	07120	696
DIN 6335	Palm grips grey cast iron DIN 6335	06160	469
	Palm grips plastic coated grey cast iron, DIN 6335	06161	470
DIN 6335 similar	Palm grips aluminium, similar to DIN 6335	06156	467
	Palm grips stainless steel, similar to DIN 6335	06158	468
	Palm grips similar to DIN 6335	06180	471
DIN 6336	Star grips grey cast iron, DIN 6336	06200	475
DIN 6336 similar	Star grips aluminium, similar to DIN 6336	06192	473
	Star grips stainless steel, similar to DIN 6336	06194	474
	Star grips similar to DIN 6336	06208	476
	Star grips metal parts stainless steel, similar to DIN 6336	06212	478
	Star grips similar to DIN 6336	06220	480-481
	Star grips with safety band similar to DIN 6336	06220	482-483
DIN 6337	Ball handles DIN 6337	06420	557
DIN 6340	Washers for clamps steel or aluminium DIN 6340	07320	721
DIN 6346	Parallel blocks pair DIN 6346	03200	273
DIN 6348	Drilling jigs size 3 to 5 DIN 6348	08550	792-793
	Base plates DIN 6348	08580	795
DIN 6348 enhanced	Drilling jigs size 0 to 3 S DIN 6348 enhanced	08550	790-791
	Drilling plates DIN 6348 enhanced	08570	794
DIN 6371	C-washers captive DIN 6371	07520	730
DIN 6372 enhanced	C-washers DIN 6372 enhanced	07380	726
DIN 6379	Studs DIN 6379	07030	662-663
DIN 6885 A	Parallel keys DIN 6885 A	03288	278
DIN 6888	Woodruff keys DIN 6888	03289	278
DIN 6912	Socket head screws with low head DIN 6912	07161	708
DIN 7979	Cylindrical pins with internal thread DIN 7979	03325	280
DIN 7991	Screws with countersunk head hexagon socket DIN 7991	07175	711
DIN 25201	Lock washer self-locking DIN 25201	07310	720
DIN 69002 similar	Elastomer dog couplings with conical hub and clamping ring (similar to DIN 69002)	23021	1037
DIN 69051 Part 5	Ball screw linear actuators rolled, with flange nut DIN 69051 Part 5	24055	1113
DIN 71752	Clevis joints with snap-in pin DIN 71752	27620	1161
	Clevis joints stainless steel DIN 71752	27622	1162
	Clevis joints DIN 71752	27624	1163
DIN 71802	Ball joints DIN 71802	27650	1174
DIN 71802 similar	Axial joints similar to DIN 71802	27665	1179
DIN 71803	Ball studs for ball joints DIN 71803	27656	1176
DIN 71805	Ball seats for ball joints DIN 71805	27655	1175
	Circlips for ball seats DIN 71805	27660	1178
DIN EN 24014	Hexagon head bolts DIN 931/DIN EN ISO 4014/DIN EN 24014	07170	711
DIN EN 24032	Hexagon nuts DIN 934/DIN EN ISO 4032/DIN EN 24032	07210	713
DIN EN ISO 4014	Hexagon head bolts DIN 931/DIN EN ISO 4014/DIN EN 24014	07170	711
DIN EN ISO 4027	Grub screw with hexagon socket and pointed end DIN 914 / DIN EN ISO 4027	07166	710
DIN EN ISO 4032	Hexagon nuts DIN 934/DIN EN ISO 4032/DIN EN 24032	07210	713

DIN	Description	nlm	Page
DIN EN ISO 4762	Socket head screws DIN 912/DIN EN ISO 4762	07160	707
	Socket head screws DIN 912 / DIN EN ISO 4762, steel or stainless steel	07160	707
DIN ISO 7379 similar	Shoulder screws similar to DIN ISO 7379	07534	732
ISO 10285	Linear ball bearings with plastic cage	21500	953
	Linear ball bearings with steel cage	21505	954
	Linear ball bearings self-aligning	21510	955
	Linear ball bearings self-aligning, high load rating	21515	956
	Linear ball bearings with flange	21518	957
	Linear ball bearings with flange, double bearing	21520	958

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