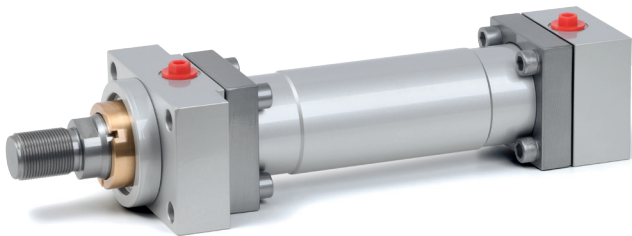




ISO 6020/2 hydraulic cylinders with counterflanges are suitable for a wide range of industrial applications, when a compact, highly reliable and easy-to-maintain product is required, thanks to the use of the best materials and technical choices based on years of experience.

The special configuration with counterflanges and high-strength screws makes them particularly suitable for applications with long strokes. In these cases, in fact, while maintaining the same overall dimensions of a cylinder with tie-rods, this configuration is more stable because it does not require the presence of excessively long tie-rods. The overall dimensions and the mounting configurations comply with ISO 6020/2, while the working pressure can rise up to 210 bar. The cylinder can be provided with reliable end-of-stroke cushioning, equipped with a quick restart system and adjustable to suit the needs and loads to be cushioned. Available in various sealing configurations to suit the desired operating conditions and performance. Before delivery, each cylinder is tested in accordance with ISO 10100 and we record these results in our systems to ensure product quality and performance. They can be equipped with various types of switches to detect the piston at the end of its stroke or with position transducers for continuous detection along the entire stroke. In addition, the cylinder can be equipped with a CETOP plate for the installation of a control valve with ISO 4401 mounting surfaces.

Spare parts are easy to find and are always available at our warehouse, with rapid support service to deal with any urgency.

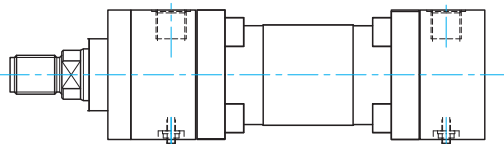


|                |                                                         |                                  |
|----------------|---------------------------------------------------------|----------------------------------|
| Standard       | ISO 6020/2 - DIN 24554 - with counterflanges            |                                  |
| Bore           | mm                                                      | from 50 to 200                   |
| Pressure       | bar                                                     | operational 210      testing 315 |
| Maximum stroke | mm                                                      | 4000                             |
| Fluid          | Mineral hydraulic oil<br>Phosphoric esters<br>HFC-fluid |                                  |

## HYDRAULIC CYLINDERS SERIES WITH COUNTERFLANGES

**HD** Bore from 50 to 100

**HK** Bore from 125 to 200



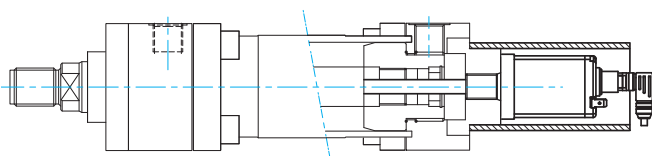
The HD and HK series hydraulic cylinders are the basic version of the ISO 6020/2 counter-flange cylinders. The technical features, dimensions, and available versions and options are detailed from page 27.

They are available in a wide variety of configurations, with rod in various materials, with CETOP plate for valve and with end-stroke sensors integrated in the cylinder heads, and many other special options.

## HYDRAULIC SERVOCYLINDERS SERIES WITH COUNTERFLANGES AND POSITION TRANSDUCER

**TH** Bore from 50 to 100

**TX** Bore from 125 to 200



The TH and TX series hydraulic servocylinders have the same technical features, dimensions and available options as the basic HD and HK series, but are equipped with a magnetostrictive linear position transducer (see page 39) for accurate and continuous detection of the piston at any point in the servocylinder stroke.

The external parts of the position transducer are protected against accidental impacts during transport, installation and operation by a removable steel cover.

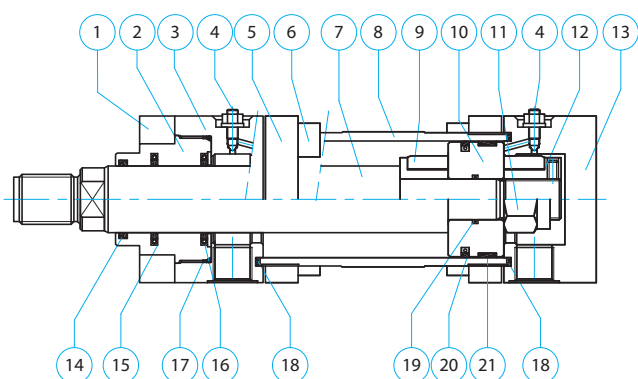


## AVAILABLE SEALS

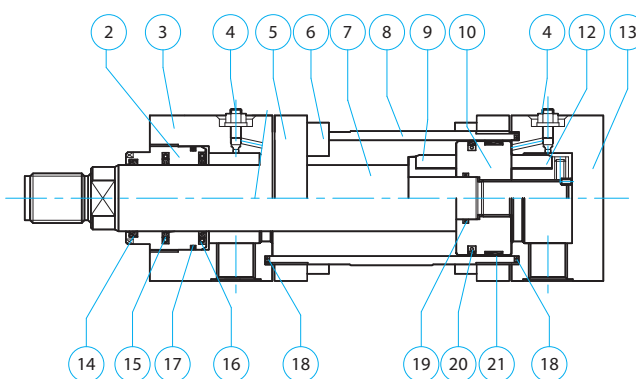
| Seals code | Performances |              |           |         |      | Fluid         |                   |           |
|------------|--------------|--------------|-----------|---------|------|---------------|-------------------|-----------|
|            | High sealing | Low friction | Max speed | Temp °C |      | Hydraulic oil | Phosphoric esters | HFC-fluid |
|            |              |              |           | Min     | Max  |               |                   |           |
| <b>S</b>   | √            |              | 0.5 m/s   | -20     | +80  | √             |                   |           |
| <b>L</b>   |              | √            | 1 m/s     | -20     | +80  | √             |                   |           |
| <b>H</b>   |              | √            | 1 m/s     | -20     | +150 | √             | √                 |           |
| <b>G</b>   |              | √            | 1 m/s     | -20     | +80  |               |                   | √         |

For speeds and temperatures exceeding the indicated limits, please contact our technical department.

## BORE 50-100



## BORE 125-200



|    | Component                        | Material           | Features                     |
|----|----------------------------------|--------------------|------------------------------|
| 1  | Closing flange                   | Steel              | Burnished                    |
| 2  | Guide bushing                    | Bronze             |                              |
| 3  | Front head                       | Steel              | Burnished                    |
| 4  | Cushioning adjusting + air bleed | Steel              |                              |
| 5  | Counterflange                    | Steel              | Burnished                    |
| 6  | Closing screw                    | Steel              | Burnished                    |
| 7  | Piston rod                       | Chromeplated steel | Cr 25 µm ISO f7 - Ra 0.20 µm |
| 8  | Cylinder body                    | Steel              | Honed H8 - Ra 0.40 µm        |
| 9  | Front cushioning                 | Hardened steel     |                              |
| 10 | Piston                           | Steel              |                              |
| 11 | Rod self-locking nut             | Steel              |                              |
| 12 | Rear cushioning                  | Hardened steel     |                              |
| 13 | Rear head                        | Steel              | Burnished                    |

The cylinders are equipped with a bronze guide bushing with wiper and double seal with high seal or low-friction.

The counterflanges are fixed to the heads by means of high-strength screws.

The original floating ring cushioning system guarantees perfect centring and performs the function of rapid opening for quick restart of the cylinder. Made of hardened steel guarantees a long service life, thanks to the steel housing of the cylinder head.

The screw adjustment system allows a precise adjustment of the cushioning effect and at the same time bleeding the air (see page 29).

|    | Component              | Groove     | Material   |            |               |               |
|----|------------------------|------------|------------|------------|---------------|---------------|
|    |                        |            | S          | L          | H             | G             |
| 14 | Rod wiper              |            | NBR + PTFE | NBR + PTFE | Viton® + PTFE | NBR + PTFE CG |
| 15 | First rod seal         | ISO 7425/2 | NBR + PTFE | NBR + PTFE | Viton® + PTFE | NBR + PTFE CG |
| 16 | Second rod seal        | ISO 7425/2 | PU         | NBR + PTFE | Viton® + PTFE | NBR + PTFE CG |
| 17 | Head / bushing sealing |            | NBR + PTFE | NBR + PTFE | Viton® + PTFE | NBR + PTFE    |
| 18 | Tube seal              |            | NBR        | NBR        | Viton®        | NBR           |
| 19 | Internal piston seal   |            | NBR        | NBR        | Viton®        | NBR           |
| 20 | External piston seal   | ISO 7425/1 | NBR + PU   | NBR + PTFE | Viton® + PTFE | NBR + PTFE CG |
| 21 | Piston guide           |            | Resin      | Resin      | Resin         | Resin         |



## SIZING AND FORCES

| Dimension  |           | Piston area             |                         | Force at 100 bar |             | Force at 210 bar |             | Screws<br>tightening torque |
|------------|-----------|-------------------------|-------------------------|------------------|-------------|------------------|-------------|-----------------------------|
| Bore<br>mm | Rod<br>mm | push<br>cm <sup>2</sup> | pull<br>cm <sup>2</sup> | push<br>daN      | pull<br>daN | push<br>daN      | pull<br>daN | Nm                          |
| 50         | 22        | 19.6                    | 15.8                    | 1963             | 1583        | 4123             | 3325        | 70                          |
|            | 28        |                         | 13.5                    |                  | 1348        |                  | 2830        |                             |
|            | 36        |                         | 9.5                     |                  | 946         |                  | 1986        |                             |
| 63         | 28        | 31.2                    | 25.0                    | 3117             | 2501        | 6546             | 5253        | 70                          |
|            | 36        |                         | 21.0                    |                  | 2099        |                  | 4409        |                             |
|            | 45        |                         | 15.3                    |                  | 1527        |                  | 3206        |                             |
| 80         | 36        | 50.3                    | 40.1                    | 5027             | 4009        | 10556            | 8418        | 160                         |
|            | 45        |                         | 34.4                    |                  | 3436        |                  | 7216        |                             |
|            | 56        |                         | 25.6                    |                  | 2564        |                  | 5383        |                             |
| 100        | 45        | 78.5                    | 62.6                    | 7854             | 6264        | 16493            | 13153       | 160                         |
|            | 56        |                         | 53.9                    |                  | 5391        |                  | 11321       |                             |
|            | 70        |                         | 40.1                    |                  | 4006        |                  | 8412        |                             |
| 125        | 56        | 122.7                   | 98.1                    | 12272            | 9809        | 25771            | 20599       | 460                         |
|            | 70        |                         | 84.2                    |                  | 8423        |                  | 17689       |                             |
|            | 90        |                         | 59.1                    |                  | 5910        |                  | 12411       |                             |
| 160        | 70        | 201.1                   | 162.6                   | 20106            | 16258       | 42223            | 34141       | 820                         |
|            | 90        |                         | 137.4                   |                  | 13744       |                  | 29863       |                             |
|            | 110       |                         | 106.0                   |                  | 10603       |                  | 22266       |                             |
| 200        | 90        | 314.2                   | 250.5                   | 31416            | 25054       | 65973            | 52614       | 1150                        |
|            | 110       |                         | 219.1                   |                  | 21913       |                  | 46016       |                             |
|            | 140       |                         | 160.2                   |                  | 16022       |                  | 33646       |                             |

## STROKE

During testing, the cylinder stroke is checked, assuring compliance with the tolerance of 0/+2 mm as per ISO 8131.

For space requirements of the cylinder components or switches, the stroke cannot be less than a minimum value in some circumstances. This problem can be overcome by inserting a spacer.

|                | Bore       | 50 | 63 | 80 | 100 | 125 | 160 | 200 |
|----------------|------------|----|----|----|-----|-----|-----|-----|
| Minimum stroke | HD/HK (mm) | 75 | 75 | 90 | 115 | 120 | 190 | 200 |

## OPERATIONAL LIFE-TIME

The cylinders are manufactured from high-quality materials and according to design guidelines validated by many years of experience with these products. Under ideal conditions, the cylinders are capable of working for millions of cycles requiring only regular basic maintenance and replacement of wear parts.

The real application situations can subject cylinders to conditions that reduce their service life and would therefore be preferable to avoid.

The most frequent are:

- radial loads, generated by external forces or misalignments in fixing to machinery
- end-stroke impacts and external impulsive forces
- pressure peaks and water hammers;
- contaminated hydraulic fluid;
- over-temperatures, caused either by the environment or internal causes such as frequent cycles with short strokes, which prevent sufficient oil change.

Our technical department will be able to advise you on how best to prevent or reduce problems.



## BUCKLING VERIFICATION

When the cylinder is pushing, it can be subject to buckling instability, depending on mounting, stroke and pushing force.

The graph illustrates the boundary working conditions for each rod. Stay below for optimal operation.

The mounting of the cylinder determines the stroke factor FC. Multiplying the cylinder stroke CO by FC gives the ideal length LI.

The value of LI, read on the vertical axis, meets the line corresponding to the diameter of the rod to be checked, identifying on the horizontal axis the maximum possible push.

If the actual thrust does not exceed this limit value, the verification is passed.

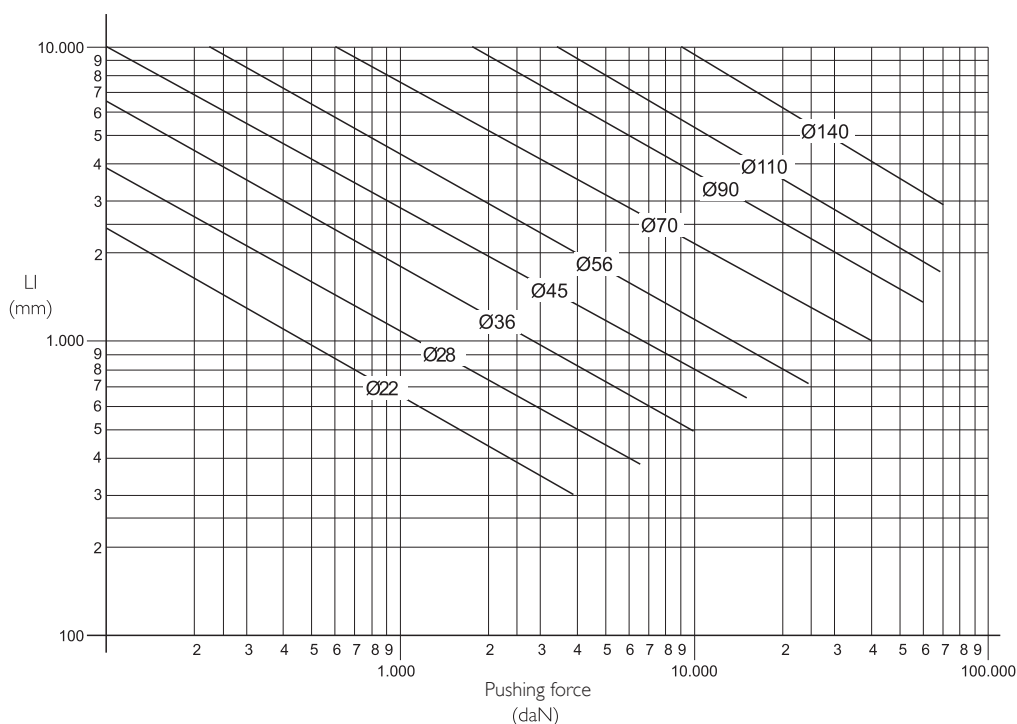
Spacers and rod extensions must be added to the stroke to obtain the CO value to be multiplied by FC.

### MOUNTING

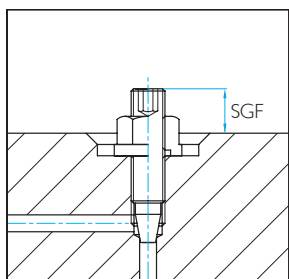
### FC

### ROD SELECTION CHART

|                                          |  |     |
|------------------------------------------|--|-----|
| X (MX5)<br>A (ME5)                       |  | 0.7 |
|                                          |  | 2   |
| B (ME6)<br>T (MX6)                       |  | 1.5 |
|                                          |  | 4   |
| E (MS2)                                  |  | 0.7 |
|                                          |  | 2   |
| G (MT1)                                  |  | 1   |
| C (MP3)<br>D (MP5)<br>L (MT2)<br>M (MP1) |  | 2   |



## CUSHIONING ADJUSTMENT AND AIR BLEEDING



All the cushioned cylinders are equipped with a screw that allows the cushioning adjustment.

Slightly loosen the Seal-Lock® sealing nut, adjust the screw and tighten carefully.

The cushioning adjustment unit can also be used as an air bleeder by loosening the nut until the air has escaped.

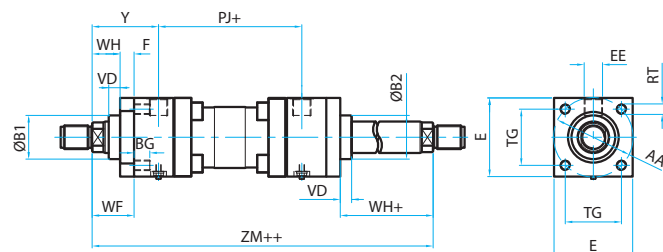
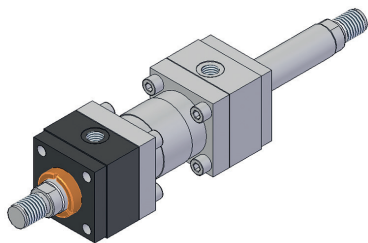
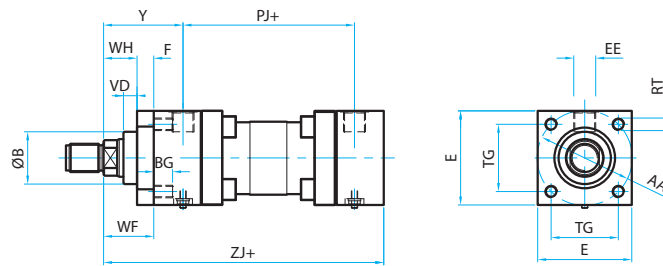
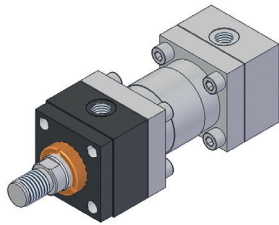
On cylinders with cushioning, if the stroke is shorter than the cushioning length, the cylinder is always cushioned.

| Bore              |                 | 50  | 63   | 80   | 100 | 125 | 160 | 200 |
|-------------------|-----------------|-----|------|------|-----|-----|-----|-----|
| Cushioning length | mm              | 21  | 21   | 28   | 28  | 26  | 30  | 44  |
| Cushioning area   | cm <sup>2</sup> | 8.3 | 13.8 | 23.8 | 38  | 56  | 99  | 151 |
| SGF               | mm              | 5   | 2    | 0    | 0   | 0   | 0   | 0   |



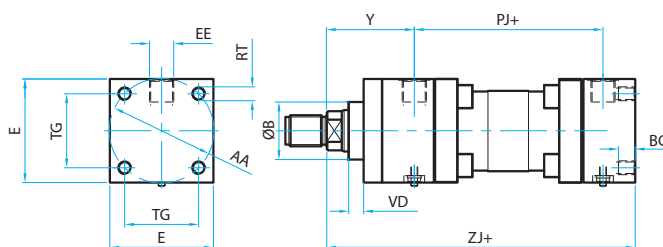
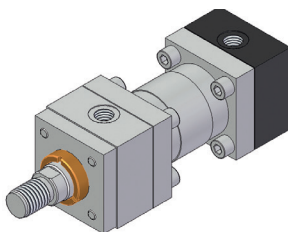
ISO MX5 - FRONT THREADED HOLES

X



ISO MX6 - REAR THREADED HOLES

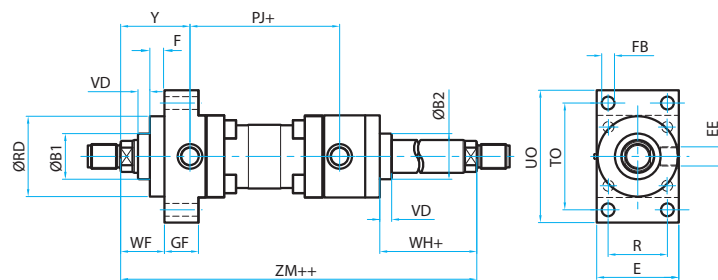
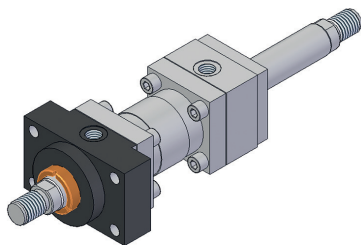
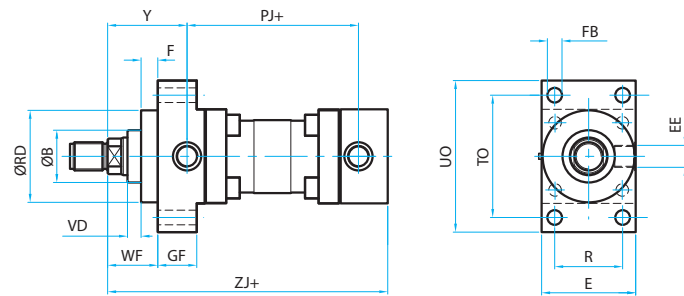
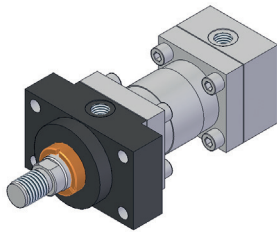
T





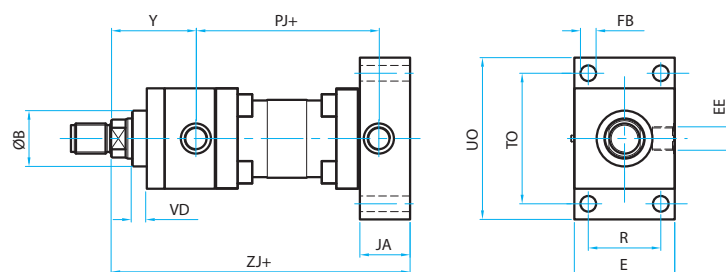
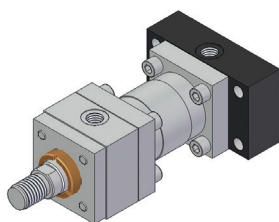
ISO ME5 - FRONT FLANGE

A



ISO ME6 - REAR FLANGE

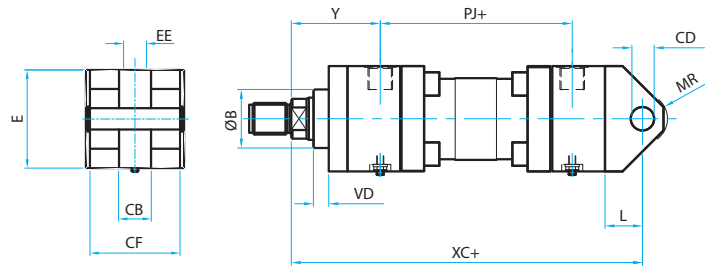
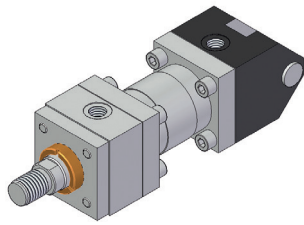
B





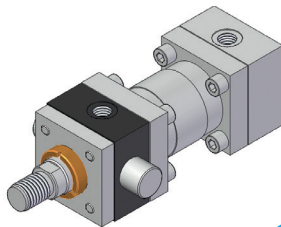
## ISO MP1 - FEMALE CLEVIS

M

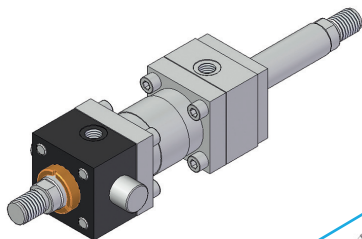
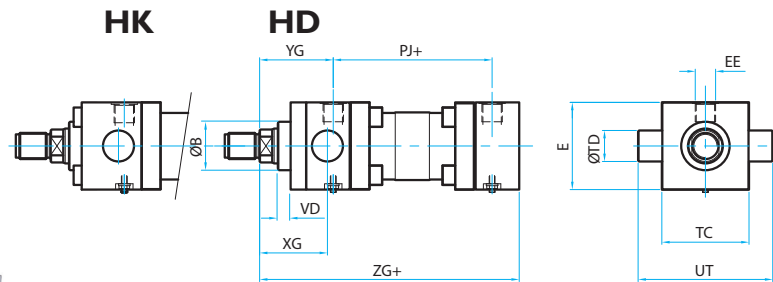


## ISO MT1 - FRONT TRUNNIONS

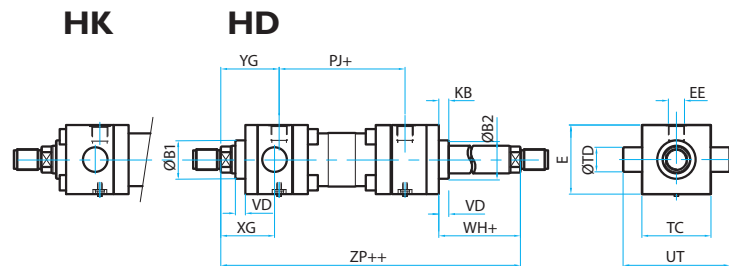
G



Accessory LK available on page 59

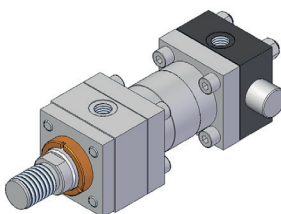


Accessory LK available on page 59

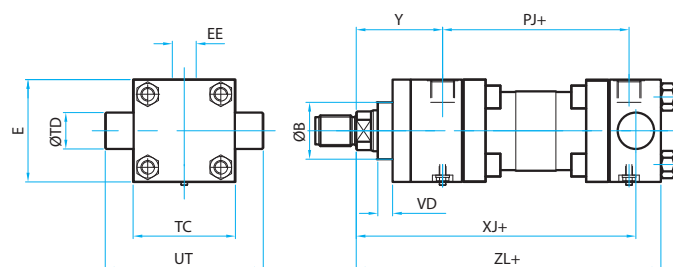


## ISO MT2 - REAR TRUNNIONS

L



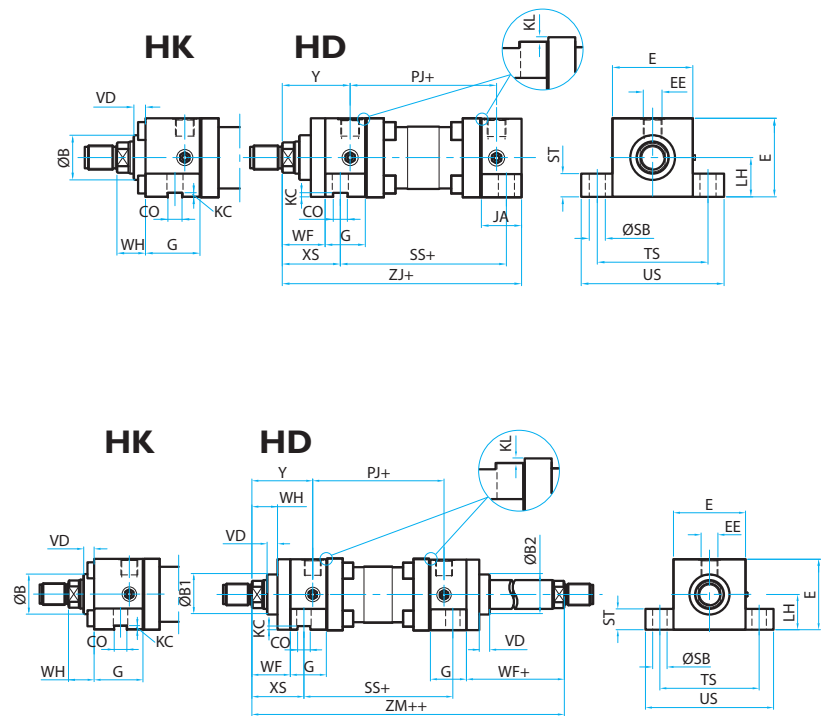
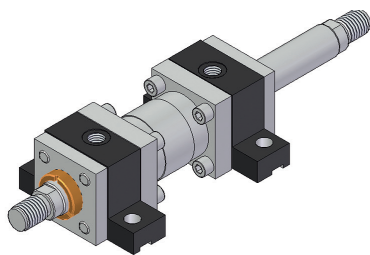
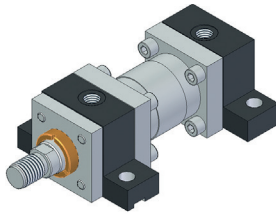
Accessory LK available on page 59





## ISO MS2 - FEET

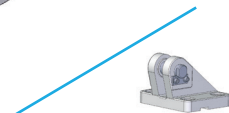
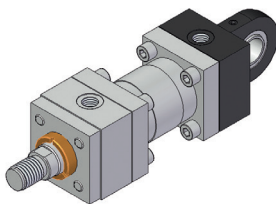
E



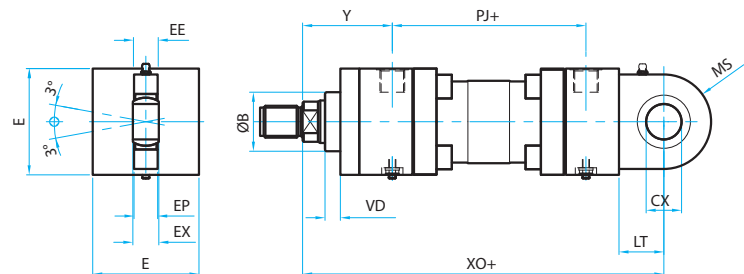
The counterflange is protruding from the base of the foot (see dimension KL)

## ISO MP5 - BALL JOINTED EYE

D

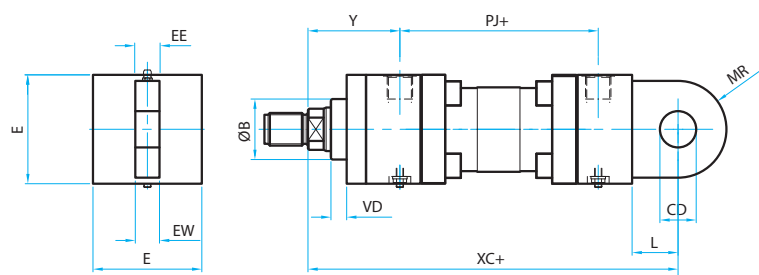
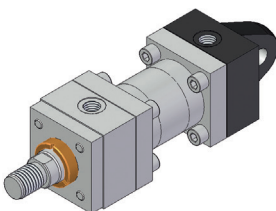


Accessory LD available on page 58



## ISO MP3 - MALE CLEVIS

C

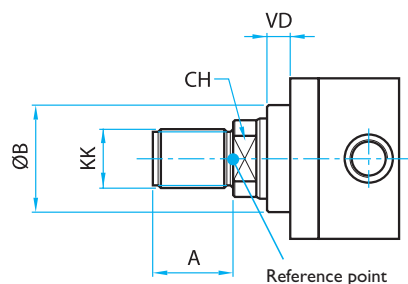
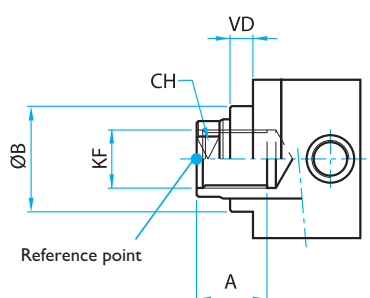
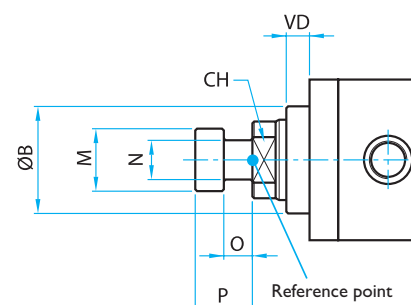




| Bore         | 50                                |    |    | 63                                |    |    | 80                                |    |    | 100                               |    |    | 125                               |    |     | 160                               |     |     | 200                                |     |     |
|--------------|-----------------------------------|----|----|-----------------------------------|----|----|-----------------------------------|----|----|-----------------------------------|----|----|-----------------------------------|----|-----|-----------------------------------|-----|-----|------------------------------------|-----|-----|
| Rod          | 22                                | 28 | 36 | 28                                | 36 | 45 | 36                                | 45 | 56 | 45                                | 56 | 70 | 56                                | 70 | 90  | 70                                | 90  | 110 | 90                                 | 110 | 140 |
| B f9         | 34                                | 42 | 50 | 42                                | 50 | 60 | 50                                | 60 | 72 | 60                                | 72 | 88 | 72                                | 88 | 108 | 88                                | 108 | 133 | 108                                | 133 | 163 |
| AA           | 74                                |    |    | 91                                |    |    | 117                               |    |    | 137                               |    |    | 178                               |    |     | 219                               |     |     | 269                                |     |     |
| BD           | 38                                |    |    | 48                                |    |    | 58                                |    |    | 68                                |    |    | 88                                |    |     | 108                               |     |     | 125                                |     |     |
| BG           | 18                                |    |    | 18                                |    |    | 24                                |    |    | 24                                |    |    | 30                                |    |     | 35                                |     |     | 40                                 |     |     |
| CB           | 30                                |    |    | 30                                |    |    | 40                                |    |    | 50                                |    |    | 64(*)                             |    |     | 80(*)                             |     |     | 80                                 |     |     |
| CD H9        | 20                                |    |    | 20                                |    |    | 28                                |    |    | 36                                |    |    | 45                                |    |     | 56                                |     |     | 70                                 |     |     |
| CF           | 74                                |    |    | 90                                |    |    | 110                               |    |    | 130                               |    |    | 164                               |    |     | 200                               |     |     | 240                                |     |     |
| CO H8        | 12                                |    |    | 16                                |    |    | 16                                |    |    | 16                                |    |    | 20                                |    |     | 30                                |     |     | 40                                 |     |     |
| CX           | 25 <sup>0</sup> <sub>-0.012</sub> |    |    | 30 <sup>0</sup> <sub>-0.012</sub> |    |    | 40 <sup>0</sup> <sub>-0.012</sub> |    |    | 50 <sup>0</sup> <sub>-0.012</sub> |    |    | 60 <sup>0</sup> <sub>-0.015</sub> |    |     | 80 <sup>0</sup> <sub>-0.015</sub> |     |     | 100 <sup>0</sup> <sub>-0.020</sub> |     |     |
| DD           | M12x1.25                          |    |    | M12x1.25                          |    |    | M16x1.5                           |    |    | M16x1.5                           |    |    | M22x1.5                           |    |     | M27x2                             |     |     | M30x2                              |     |     |
| E max        | 75                                |    |    | 90                                |    |    | 115                               |    |    | 130                               |    |    | 165                               |    |     | 200                               |     |     | 245                                |     |     |
| EE (page 36) | G 1/2"                            |    |    | G 1/2"                            |    |    | G 3/4"                            |    |    | G 3/4"                            |    |    | G 1"                              |    |     | G 1"                              |     |     | G 1 1/4"                           |     |     |
| EP           | 18                                |    |    | 20                                |    |    | 24                                |    |    | 30                                |    |    | 38                                |    |     | 47                                |     |     | 58                                 |     |     |
| EW h14       | 30                                |    |    | 30                                |    |    | 40                                |    |    | 50                                |    |    | 60                                |    |     | 70                                |     |     | 80                                 |     |     |
| EX           | 20 <sup>0</sup> <sub>-0.12</sub>  |    |    | 22 <sup>0</sup> <sub>-0.12</sub>  |    |    | 28 <sup>0</sup> <sub>-0.12</sub>  |    |    | 35 <sup>0</sup> <sub>-0.12</sub>  |    |    | 44 <sup>0</sup> <sub>-0.15</sub>  |    |     | 55 <sup>0</sup> <sub>-0.15</sub>  |     |     | 70 <sup>0</sup> <sub>-0.20</sub>   |     |     |
| F max        | 16                                |    |    | 16                                |    |    | 20                                |    |    | 22                                |    |    | 22                                |    |     | 25                                |     |     | 25                                 |     |     |
| FB H13       | 14                                |    |    | 14                                |    |    | 18                                |    |    | 18                                |    |    | 22                                |    |     | 26                                |     |     | 33                                 |     |     |
| G            | 45                                |    |    | 45                                |    |    | 52                                |    |    | 55                                |    |    | 87                                |    |     | 95                                |     |     | 117                                |     |     |
| GF           | 38                                |    |    | 38                                |    |    | 45                                |    |    | 45                                |    |    | 58                                |    |     | 58                                |     |     | 76                                 |     |     |
| JA           | 45                                |    |    | 45                                |    |    | 52                                |    |    | 55                                |    |    | 65                                |    |     | 70                                |     |     | 92                                 |     |     |
| KC           | 4.5                               |    |    | 4.5                               |    |    | 5                                 |    |    | 6                                 |    |    | 6                                 |    |     | 8                                 |     |     | 8                                  |     |     |
| KL           | 1                                 |    |    | 2                                 |    |    | 2                                 |    |    | 6                                 |    |    | 3                                 |    |     | 1                                 |     |     | 5                                  |     |     |
| L min        | 32                                |    |    | 32                                |    |    | 39                                |    |    | 54                                |    |    | 57                                |    |     | 63                                |     |     | 82                                 |     |     |
| LH h10       | 37                                |    |    | 44                                |    |    | 57                                |    |    | 63                                |    |    | 82                                |    |     | 101                               |     |     | 122                                |     |     |
| LT min       | 31                                |    |    | 38                                |    |    | 48                                |    |    | 58                                |    |    | 72                                |    |     | 92                                |     |     | 116                                |     |     |
| MR max       | 29                                |    |    | 29                                |    |    | 34                                |    |    | 50                                |    |    | 53                                |    |     | 59                                |     |     | 78                                 |     |     |
| MS max       | 33                                |    |    | 40                                |    |    | 50                                |    |    | 62                                |    |    | 80                                |    |     | 100                               |     |     | 120                                |     |     |
| PJ           | 62+ (*)                           |    |    | 64+ (*)                           |    |    | 77+ (*)                           |    |    | 78+ (*)                           |    |    | 117+                              |    |     | 130+                              |     |     | 165+                               |     |     |
| R            | 52                                |    |    | 65                                |    |    | 83                                |    |    | 97                                |    |    | 126                               |    |     | 155                               |     |     | 190                                |     |     |
| RD f8        | 74                                |    |    | 88 (**)                           |    |    | 105 (**)                          |    |    | 125 (**)                          |    |    | 150 (**)                          |    |     | 170 (**)                          |     |     | 210 (**)                           |     |     |
| RT           | M12                               |    |    | M12                               |    |    | M16                               |    |    | M16                               |    |    | M22                               |    |     | M27                               |     |     | M30                                |     |     |
| SB H13       | 14                                |    |    | 18                                |    |    | 18                                |    |    | 26                                |    |    | 26                                |    |     | 33                                |     |     | 39                                 |     |     |
| SS           | 92+                               |    |    | 86+                               |    |    | 105+                              |    |    | 102+                              |    |    | 131+                              |    |     | 130+                              |     |     | 172+                               |     |     |
| ST           | 19                                |    |    | 26                                |    |    | 26                                |    |    | 32                                |    |    | 32                                |    |     | 38                                |     |     | 44                                 |     |     |
| TC           | 76                                |    |    | 89                                |    |    | 114                               |    |    | 127                               |    |    | 165                               |    |     | 203                               |     |     | 241                                |     |     |
| TD f8        | 25                                |    |    | 32                                |    |    | 40                                |    |    | 50                                |    |    | 63                                |    |     | 80                                |     |     | 100                                |     |     |
| TG           | 52.3                              |    |    | 64.3                              |    |    | 82.7                              |    |    | 96.9                              |    |    | 125.9                             |    |     | 154.9                             |     |     | 190.2                              |     |     |
| TO           | 105                               |    |    | 117                               |    |    | 149                               |    |    | 162                               |    |    | 208                               |    |     | 253                               |     |     | 300                                |     |     |
| TS           | 102                               |    |    | 124                               |    |    | 149                               |    |    | 172                               |    |    | 210                               |    |     | 260                               |     |     | 311                                |     |     |
| UO max       | 130                               |    |    | 145                               |    |    | 180                               |    |    | 200                               |    |    | 250                               |    |     | 300                               |     |     | 360                                |     |     |
| US           | 127                               |    |    | 161                               |    |    | 186                               |    |    | 216                               |    |    | 254                               |    |     | 318                               |     |     | 381                                |     |     |
| UT           | 116                               |    |    | 139                               |    |    | 178                               |    |    | 207                               |    |    | 265                               |    |     | 329                               |     |     | 401                                |     |     |
| UW           | 90                                |    |    | 100                               |    |    | 130                               |    |    | 140                               |    |    | 180                               |    |     | 215                               |     |     | 300                                |     |     |
| VD           | 9                                 |    |    | 13                                |    |    | 9                                 |    |    | 10                                |    |    | 9                                 | 10 | 10  | 10                                | 10  | 7   | 10                                 | 7   | 7   |
| WF           | 41                                |    |    | 48                                |    |    | 51                                |    |    | 57                                |    |    | 57                                |    |     | 57                                |     |     | 57                                 |     |     |
| WH           | 25                                |    |    | 32                                |    |    | 31                                |    |    | 35                                |    |    | 35                                |    |     | 32                                |     |     | 32                                 |     |     |
| XC           | 191+                              |    |    | 200+                              |    |    | 229+                              |    |    | 257+                              |    |    | 289+                              |    |     | 308+                              |     |     | 381+                               |     |     |
| XG           | 64                                |    |    | 70                                |    |    | 76                                |    |    | 71                                |    |    | 75                                |    |     | 75                                |     |     | 85                                 |     |     |
| XJ           | 136+ (*)                          |    |    | 146+ (*)                          |    |    | 165+ (*)                          |    |    | 177+ (*)                          |    |    | 214+ (*)                          |    |     | 227+ (*)                          |     |     | 271+ (*)                           |     |     |
| XO           | 190+                              |    |    | 206+                              |    |    | 238+                              |    |    | 261+                              |    |    | 304+                              |    |     | 337+                              |     |     | 415+                               |     |     |
| XS           | 54                                |    |    | 65                                |    |    | 68                                |    |    | 79                                |    |    | 79                                |    |     | 86                                |     |     | 92                                 |     |     |
| Y            | 69 (*)                            |    |    | 76 (*)                            |    |    | 82 (*)                            |    |    | 91 (*)                            |    |    | 86                                |    |     | 86                                |     |     | 98                                 |     |     |
| YG           | 69 (*)                            |    |    | 76 (*)                            |    |    | 82 (*)                            |    |    | 79 (*)                            |    |    | 86                                |    |     | 86                                |     |     | 98                                 |     |     |
| ZG           | 159+                              |    |    | 168+                              |    |    | 190+                              |    |    | 191+                              |    |    | 232+                              |    |     | 245+                              |     |     | 299+                               |     |     |
| ZJ           | 159+                              |    |    | 168+                              |    |    | 190+                              |    |    | 203+                              |    |    | 232+                              |    |     | 245+                              |     |     | 299+                               |     |     |
| ZL           | 159+                              |    |    | 168+                              |    |    | 190+                              |    |    | 203+                              |    |    | 254+                              |    |     | 270+                              |     |     | 324+                               |     |     |
| ZM           | 200++                             |    |    | 216++                             |    |    | 241++                             |    |    | 260++                             |    |    | 289++                             |    |     | 302++                             |     |     | 356++                              |     |     |
| ZP           | 200++                             |    |    | 216++                             |    |    | 241++                             |    |    | 248++                             |    |    | 289++                             |    |     | 302++                             |     |     | 356++                              |     |     |



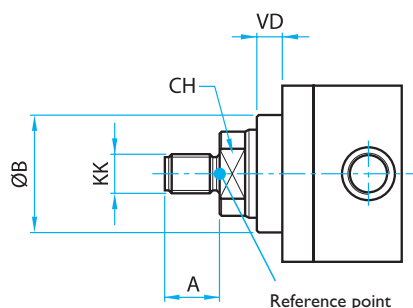
## ROD END

**-** Male thread ISO 6020/2**SF** Female thread**ST** Floating joint

| Rod  | 22      | 28      | 36    | 45    | 56    | 70    | 90    | 110   | 140    |
|------|---------|---------|-------|-------|-------|-------|-------|-------|--------|
| A    | 22      | 28      | 36    | 45    | 56    | 63    | 85    | 95    | 112    |
| B f9 | 34      | 42      | 50    | 60    | 72    | 88    | 108   | 133   | 163    |
| CH   | 19      | 22      | 30    | 36    | 46    | 60    | 75    | 95    | 120    |
| KK   | M16x1.5 | M20x1.5 | M27x2 | M33x2 | M42x2 | M48x2 | M64x3 | M80x3 | M100x3 |
| KF   | M16x1.5 | M20x1.5 | M27x2 | M33x2 | M42x2 | M48x2 | M64x3 | M80x3 | M100x3 |
| M    | 18      | 22      | 28    | 35    | 45    | 56    | 70    | 106   | 136    |
| N    | 11      | 14      | 18    | 22    | 28    | 35    | 45    | 65    | 70     |
| O    | 8       | 10      | 13    | 16    | 20    | 25    | 35    | 35    | 45     |
| P    | 16      | 20      | 25    | 32    | 40    | 50    | 70    | 70    | 90     |

For the ISO 6020/2 standard male rod end, ball-joint or clevis pin ends are available on page 56.

Different threads, lengths and rod extensions are available on request.

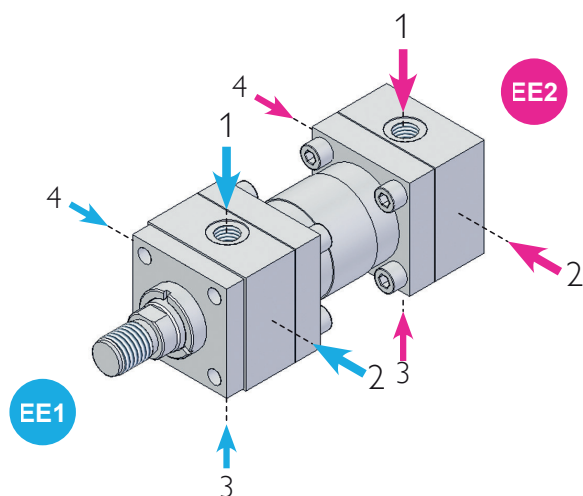
**SL** Male thread DIN 24554

| Bore | 50      |    |    | 63      |    |    | 80    |    |    | 100   |    |    | 125   |    |     | 160   |     |     | 200   |     |     |
|------|---------|----|----|---------|----|----|-------|----|----|-------|----|----|-------|----|-----|-------|-----|-----|-------|-----|-----|
| Rod  | 22      | 28 | 36 | 28      | 36 | 45 | 36    | 45 | 56 | 45    | 56 | 70 | 56    | 70 | 90  | 70    | 90  | 110 | 90    | 110 | 140 |
| A    | 22      |    |    | 28      |    |    | 36    |    |    | 45    |    |    | 56    |    |     | 63    |     |     | 85    |     |     |
| B f9 | 34      | 42 | 50 | 42      | 50 | 60 | 50    | 60 | 72 | 60    | 72 | 88 | 72    | 88 | 108 | 88    | 108 | 133 | 108   | 133 | 163 |
| CH   | 19      | 22 | 30 | 22      | 30 | 36 | 30    | 36 | 46 | 36    | 46 | 60 | 46    | 60 | 75  | 60    | 75  | 95  | 75    | 95  | 120 |
| KK   | M16x1.5 |    |    | M20x1.5 |    |    | M27x2 |    |    | M33x2 |    |    | M42x2 |    |     | M48x2 |     |     | M64x3 |     |     |
| VD   | 9       |    |    | 13      |    |    | 9     |    |    | 10    |    |    | 9     | 10 | 10  | 10    | 10  | 7   | 10    | 7   | 7   |

For the SL rod end with male thread DIN 24554, ball-joint or clevis pin ends are available on page 56.



## OIL PORTS



| Bore | Side  | ISO 1179-1 (GAS) |          | SAE 3000 |         |
|------|-------|------------------|----------|----------|---------|
|      |       | Standard         | Overize  | Standard | Overize |
| 50   | Front | G 1/2"           | -        | -        | -       |
|      | Rear  | G 1/2"           | G 3/4"   | -        | -       |
| 63   | Front | G 1/2"           | -        | -        | -       |
|      | Rear  | G 1/2"           | G 3/4"   | -        | -       |
| 80   | Front | G 3/4"           | -        | 3/4"     | 1"      |
|      | Rear  | G 3/4"           | G 1"     | 3/4"     | 1"      |
| 100  | Front | G 3/4"           | -        | 3/4"     | 1"      |
|      | Rear  | G 3/4"           | G 1"     | 3/4"     | 1"      |
| 125  | Front | G 1"             | G 1 1/4" | 1"       | 1 1/4"  |
|      | Rear  | G 1"             | G 1 1/4" | 1"       | 1 1/4"  |
| 160  | Front | G 1"             | G 1 1/4" | 1"       | 1 1/4"  |
|      | Rear  | G 1"             | G 1 1/4" | 1"       | 1 1/4"  |
| 200  | Front | G 1 1/4"         | G 1 1/2" | 1 1/4"   | 1 1/2"  |
|      | Rear  | G 1 1/4"         | G 1 1/2" | 1 1/4"   | 1 1/2"  |

The standard configuration has the oil port in position 1 and the cushioning adjustment or air bleed on position 3, except for the mounting type E where they are in position 2.

## ROD MATERIAL

|     |                                          |
|-----|------------------------------------------|
| -   | CK45 chromeplated steel                  |
| RRX | Chromeplated Stainless steel             |
| RRB | Hardened and tempered chromeplated steel |
| RRK | Nikrom steel                             |
| RRH | Hardened chromeplated steel              |

The cylinder rod is made of high-quality chrome-plated ground steel to reduce seal wear and achieve the best sealing performance over time.

The standard version is made of CK45 steel.

For special requirements regarding resistance to corrosion, mechanical stress and wear, stainless steel, Nikrom-coated, hardened and tempered steel or hardened steel rods are available.

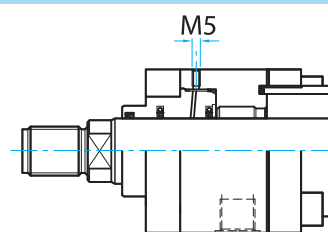
## BUSHING DRAIN

## SD

Stroke longer than 2000 mm and high-speed movement can generate a build-up of fluid between the wiper and the rod guide bushing seal.

The cylinder can be equipped with a bushing drain port to allow excess fluid to be removed and returned to the tank.

The drain port is normally located on the side opposite the oil port and must be connected to an atmospheric pressure tank.



## METAL WIPER

## RM

The metal wiper is particularly suitable for keeping extraneous particles, even small ones, outside the cylinder in the surrounding operating environment, thanks to the perfect adhesion between the scraper and the cylinder rod.

Recommended in environments with a high quantity of small dust particles.

## HIGH SEALING AND LOW FRICTION PISTON FOR HEAD BALANCING CYLINDERS

## BL

A special version of the piston is available for applications where high sealing and high free-flowing performance are required at the same time: e.g. load balancing cylinders, applications with closed circuits or with different fluids (oil/air), etc. Please consult our technical department to verify the applicability of this solution.

## PISTON FOR HEAVY DUTY APPLICATIONS

## PQ

A special version of the piston is available for heavy duty applications, where shocks and impulsive forces cannot be avoided in any way and their damaging effects on cylinder life must be limited.

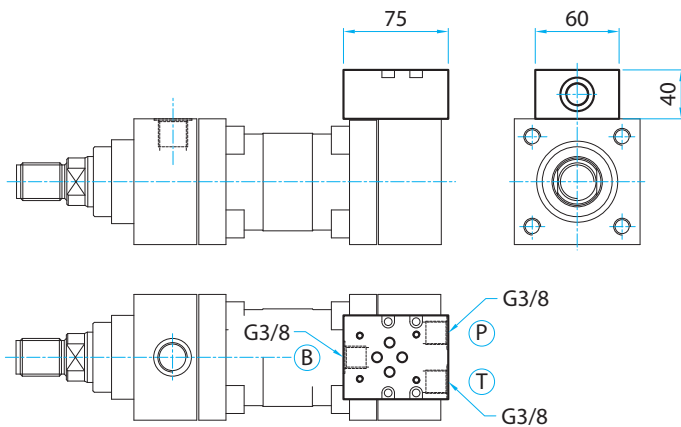
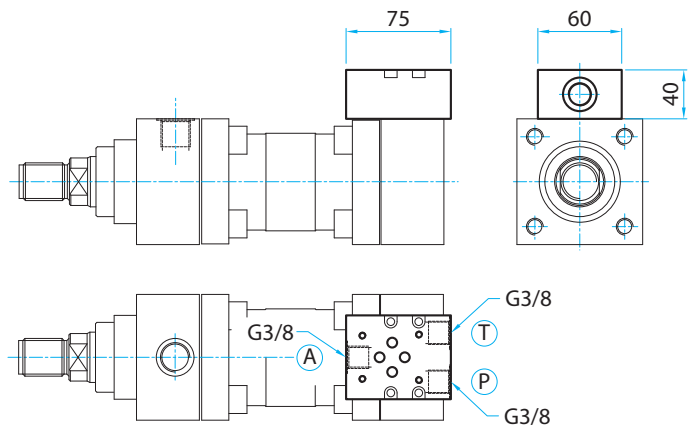
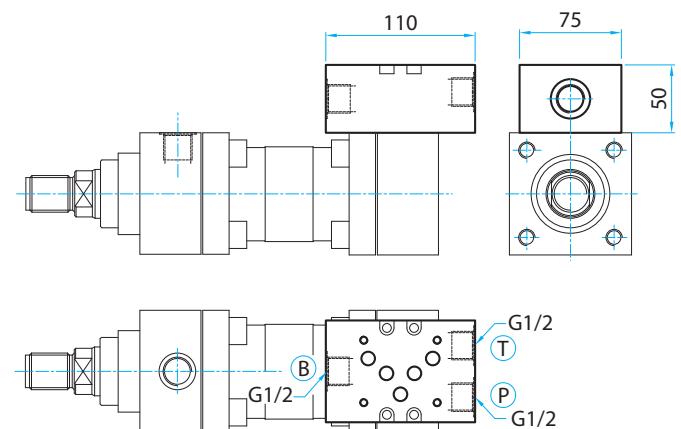
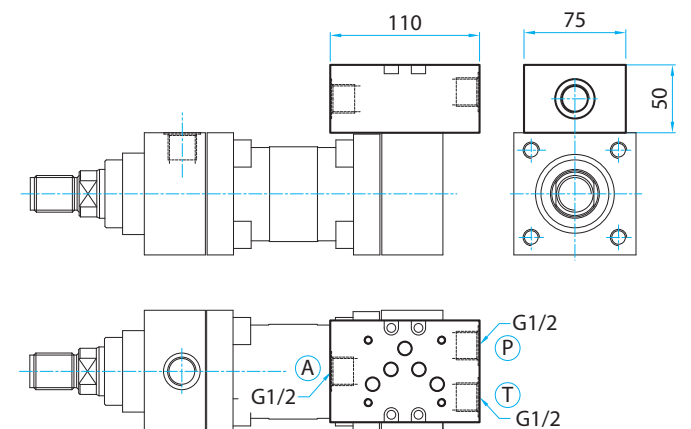
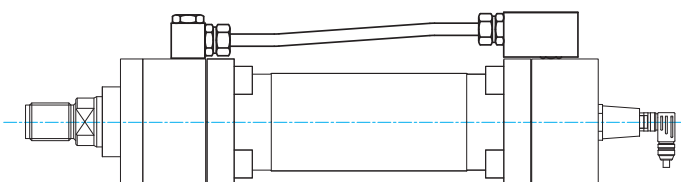
In these cases, we recommend the use of this piston in combination with a hardened and tempered steel piston rod.

Please consult our technical department to verify the applicability of this solution.

**CETOP PLATES FOR ISO 4401 VALVES**

CETOP plates with ISO 4401 mounting surfaces allow fixing a four-way control valves to reduce oil volumes between the cylinder and the valve, achieving better control accuracy.

They are mounted directly on the rear head of the cylinder by means of a nipple and four screws, which ensure stable attachment even in the case of continuous vibrations. They are often chosen in combination with the use of position transducers for absolute and precise detection of the rod. On request, the cylinder can be supplied with the connection tube to the front end fitted.

**CETOP 3 PLATES FOR ISO 4401-03 NG6 VALVES (for bores from 50 to 125)****BV3-A** Rear side through port A**BV3-B** Rear side through port B**CETOP 5 PLATES FOR ISO 4401-05 NG10 VALVES (for bores from 50 to 200)****BV5-A** Rear side through port A**BV5-B** Rear side through port B**TBV** Connection pipe to front head (on request)

On request, it is possible to supply the cylinder already equipped with the connection pipe to the front head.

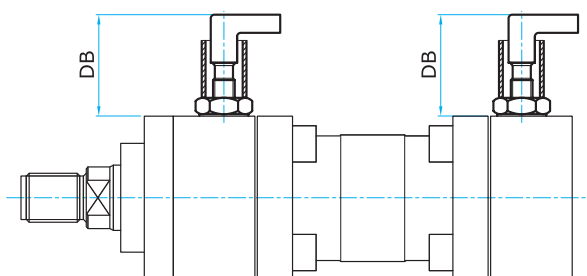


## HYDRAULIC CYLINDERS WITH COUNTERFLANGES AND PROXIMITY SWITCHES

The HD and HK series cylinders can be equipped with proximity switches integrated in the cylinder heads, for detecting the position of the piston at the end of the stroke, on one or both sides.

The switches generates a magnetic field and it is able to detect the change resulting from the approaching of the cushioning bushing.

The switches are mounted on the cylinder head, usually in position 4, and are protected from accidental impact by a solid steel cover (see page 36).



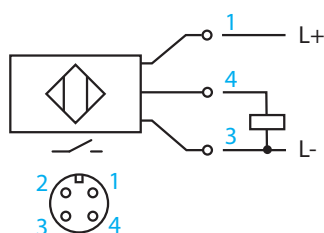
| Bore | DB max (mm) |
|------|-------------|
| 50   | 80          |
| 63   | 80          |
| 80   | 70          |
| 100  | 60          |
| 125  | 65          |
| 160  | 55          |
| 200  | 50          |

|            |                                     |
|------------|-------------------------------------|
| <b>SPV</b> | Front side switch option            |
| <b>SPZ</b> | Rear side switch option             |
| <b>SPK</b> | Front and rear side switches option |

The switches are made of stainless steel and are supplied correctly mounted in the cylinder and tested before delivery.

The switches is supplied with a 5 meter PUR cable with M12 connector.

The output signal is regulated by a "normally open" contact.



| Switch technical features |                |
|---------------------------|----------------|
| Operating temperature     | -25°C / +120°C |
| Maximum pressure          | 500 bar        |
| Protection grade          | IP69k          |
| Connector                 | S4             |
| Hysteresis                | <= 15%         |
| Repeatability             | <= 5%          |
| Wiring                    | 3 wires        |
| Switching function        | Normally open  |
| Output signal             | PNP            |
| Rated operational voltage | 24 V DC        |
| Rated operational current | 200 mA         |
| Supply voltage            | 10 / 36 V DC   |



## CODE COMPOSITION

The entry fields for the example values are mandatory

**HD** **50** / **28** / **A** **500** **S**

**Standard**

| Bore      | Type      |
|-----------|-----------|
| 50 / 100  | <b>HD</b> |
| 125 / 200 | <b>HK</b> |

**Special version <sup>(1)</sup>** **SX**

**Bore** **Rod**

| Bore      | Rod                   |
|-----------|-----------------------|
| <b>HD</b> | <b>50</b> 28 36       |
|           | <b>63</b> 28 36 45    |
|           | <b>80</b> 36 45 56    |
|           | <b>100</b> 45 56 70   |
|           | <b>125</b> 56 70 90   |
| <b>HK</b> | <b>160</b> 70 90 110  |
|           | <b>200</b> 90 110 140 |

**Options (see from page 36)**

**Air bleed**

|           |              |
|-----------|--------------|
| -         | No air bleed |
| <b>SV</b> | Front        |
| <b>SZ</b> | Rear         |
| <b>SK</b> | Front + Rear |

**Rod end (see page 35)**

|           |                       |
|-----------|-----------------------|
| -         | Male thread           |
| <b>SF</b> | Female thread         |
| <b>ST</b> | Floating joint        |
| <b>SL</b> | Male thread DIN 24554 |

**Seals (see page 27)**

|          |              |
|----------|--------------|
| <b>S</b> | High sealing |
| <b>L</b> | Low friction |
| <b>H</b> | Viton®       |
| <b>G</b> | HFC-fluid    |

**Spacer**

|               |                           |
|---------------|---------------------------|
| -             | For stroke from 0 to 1000 |
| <b>SJ 50</b>  | from 1000 to 1500         |
| <b>SJ 100</b> | from 1500 to 2000         |
| <b>SJ 150</b> | from 2000 to 3000         |
| <b>SJ 200</b> | over 3000                 |

**Stroke in mm**

**Adjustable cushioning**

|          |               |
|----------|---------------|
| -        | Not cushioned |
| <b>V</b> | Front         |
| <b>Z</b> | Rear          |
| <b>K</b> | Front + Rear  |

**Second rod**

| See mounting list from page 30 | ISO 6020/2 | DIN 24554 | Mounting |
|--------------------------------|------------|-----------|----------|
| Front threaded holes           | MX5        |           | <b>X</b> |
| Rear threaded holes            | MX6        |           | <b>T</b> |
| Feet                           | MS2        | MS2       | <b>E</b> |
| Front flange                   | ME5        | ME5       | <b>A</b> |
| Rear flange                    | ME6        | ME6       | <b>B</b> |
| Ball jointed eye               | MP5        | MP5       | <b>D</b> |
| Male clevis                    | MP3        |           | <b>C</b> |
| Female clevis                  | MP1        |           | <b>M</b> |
| Front trunnions                | MT1        |           | <b>G</b> |
| Rear trunnions                 | MT2        |           | <b>L</b> |

(1) Indicate SX whenever the cylinder has special requests or executions, by filling in the options section of the code, followed by our drawing number if applicable. (see list of available options from page 36)