Anwendungsbeispiele

Hydraulic cylinders are essential as a device for moving and positioning of cores in mould and die construction. Successful designers have been using the CyPull locking core pull cylinders for over 20 years, producing complex technical parts precisely and economically.

Common hydraulic cylinders often cannot bear up against the high internal mould pressure. Therefore they need additional locking mechanisms. The CyPull has an integrated positive locking device which enables most complex moving processes even in confined areas. The holding forces of CyPull are significantly higher than the required stroke forces so that smaller installation sizes can be used.

The design is extremely rigid and normally does not need any further maintenance. Once adjusted the cylinder achieves an ever consistent high workpiece quality, increasing the productivity.

As an option proximity switches are available for an optimal adaption of cylinder to the injection mould machine.

To meet the different applications that occur in the automotive, medical and electronic industry a wide range of different CyPull cylinder types have been developed to meet every application.

The compact alternative:
Short stroke block cylinder series HSZ/HDZ

The CyBlock block cylinder was especially developed for injection moulding cores in tool and mould manufacturing which require a safe holding with only a short mould release stroke. It is a compact alternative to the CyPull locking core pull cylinders and is functionally derived from the hydromechanical clamping element CyDim which is equipped with an integrated locking system like the CyPull cylinders.
Overview Locking Core Pull Cylinders

Series **HS/HSD** *(→ Page 18-19)*
- Series with hydraulic locking and preload which can compensate in critical axes elasticities and tolerances of the tool
  - Hydraulic locking with by-pass
  - Piston diameter 25-200 mm
  - *Series HSD is suited especially for applications in high temperature ranges (special Viton seals, hardened tie rods), up to 120°C with sensors, up to 100°C without sensors*

Series **HD/HDD** *(→ Page 20-21)*
- Series with hydraulic locking without preload
  - Hydraulic locking with by-pass
  - Piston diameter 32-200 mm
  - *Series HDD is suited especially for applications in high temperature ranges (special Viton seals, hardened tie rods), up to 120°C with sensors, up to 180°C without sensors*

Series **HX** *(→ Page 22-23)*
- Standard series for standard applications, without preload
  - Spring operated locking
  - Piston diameter 25-125 mm

Series **HSZ/HDZ** *(→ Page 34-39)*
- Special series for short stroke applications
  - Nom. size 20 - 40 mm (HSZ)
  - Nom. size 25 - 50 mm (HDZ)

### Overview

<table>
<thead>
<tr>
<th>Series</th>
<th>HS/HSD</th>
<th>HD/HDD</th>
<th>HX</th>
<th>Special designs of HSD/HDD</th>
<th>Block Cylinder HSZ/HDZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Tie rod version with round cross section</td>
<td>Tie rod version with round cross section</td>
<td></td>
<td>block housing</td>
<td></td>
</tr>
<tr>
<td>Nom size Ø</td>
<td>25-200 mm</td>
<td>32-200 mm</td>
<td>25-125 mm</td>
<td>25-200 mm</td>
<td>(20) (25) (32) (40) (50) mm</td>
</tr>
<tr>
<td>Stroke length</td>
<td>free choice</td>
<td>free choice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holding forces</td>
<td>high holding forces in locked position</td>
<td>high holding forces in locked position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>max. Pressure</td>
<td>200 bar</td>
<td>200 bar</td>
<td>160 bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locking</td>
<td>hydraulic with by-pass</td>
<td>spring operated</td>
<td>hydraulic with by-pass</td>
<td>hydraulic</td>
<td></td>
</tr>
<tr>
<td>Locking indicator</td>
<td>electronic</td>
<td>mechanical/electronic</td>
<td>electronic</td>
<td>electronic</td>
<td></td>
</tr>
<tr>
<td>Seals</td>
<td>HS: PTFE/NBR; HSD: PTFE/Viton</td>
<td>HD: PTFE/NBR; HDD: PTFE/Viton</td>
<td>PTFE/NBR</td>
<td>PTFE/Viton</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories

- Pressure screw with cone for alignment compensation
- Counterscrew to the pressure screw
- Lock nuts
- Mounting flange

### Special designs of HSD/HDD

Examples for special designs on customer demand for die casting applications, with enlarged retraction forces *(→ Page 16-17)*

### Optional accessories

- Integrated proximity switches for the sensing of the locking position *(→ Page 28 et sqq.)*
Functional process

All CyPull locking core pull cylinders work basically according to double acting cylinders whose piston rod is extended by applying hydraulic pressure. When the final position of the piston rod is reached the locking slide moves in converse direction and presses the locking segments into the annular groove of the piston rod. So the segments are fixed in radial and axial position, that means: the piston rod is positively locked. The hydraulic pressure can be switched off.

The retraction of the piston rod is operated by pressurising the rod sided piston surface. This counter pressure pushes the slide off its locking position and the segments move out of the annular groove while the piston rod retracts.

Series HD: the locking slide is operated by hydraulic pressure which is branched off with a by-pass drilling from the main hydraulic ports for extending and retracting the piston rod. This enables very fast stroke cycles.

Series HX: the slide is locked with spring operation and released hydraulically.

With the series HD and HX the piston rod always reaches one defined final position without the possibility to compensate tolerances or elasticities. The lock proceeds with positive lock without pre-load.

Characteristic functional process series HS

The locking system of series HS is operated hydraulically. In addition the locking segments can create a pre-load. The locking slide and the segments have a characteristic cone shaped contour which enables the piston rod to lock within a defined tolerance range. This tolerance range can reach up to 1 mm stroke. That means that the final extended position can vary within this range but is always locked reliably. In this range a pre-load is generated. This behaviour of the piston rod has advantages in the case of critical tool or mould situations with the danger of elasticity. These are dependant of the processed material and pressure which can lead to flash.

The significant advantage of the design of series HS is the possibility to compensate elasticity within a defined range.
Depending on the processed material different injection pressures are demanded as shown in the table on the right. This pressure can reach values far above 1000 bar which means an extreme load for tools and cores. The higher the pressure peaks are the more the danger of elasticities increases, particularly with filigree and complex shapes.

For the choice of the adequate CyPull cylinder the following factors must be regarded:

- Internal tool pressure
- Pressurised core surface, recommended cylinder size
- Type of core - is pre-load required or not?

<table>
<thead>
<tr>
<th>Material</th>
<th>Average injection pressure*</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP, PS, PE</td>
<td>600-800 bar</td>
</tr>
<tr>
<td>ABS, PPS</td>
<td>800-1000 bar</td>
</tr>
<tr>
<td>Glass fibre reinforced</td>
<td>1000-1400 bar</td>
</tr>
</tbody>
</table>

*These are only guide values which can be exceeded significantly in some cases.

Recommended cylinder sizes for different injection mould materials, Series HS**

<table>
<thead>
<tr>
<th>Material</th>
<th>pressurised area (mm²)</th>
<th>300</th>
<th>500</th>
<th>1000</th>
<th>1500</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>5000</th>
<th>6000</th>
<th>7000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP, PS, PE</td>
<td>HS 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended cylinder sizes for different injection mould materials, Series HD**

<table>
<thead>
<tr>
<th>Material</th>
<th>pressurised area (mm²)</th>
<th>300</th>
<th>500</th>
<th>1000</th>
<th>1500</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>5000</th>
<th>6000</th>
<th>7000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP, PS, PE</td>
<td>HD 32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HD 125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note: This table should only be used as a guide to correct cylinder selection and assumes that the cylinders are mounted and adjusted to the tool correctly.
**Selection criteria for the series**

**Type of core - is pre-load requested or not?**

<table>
<thead>
<tr>
<th>Core situation</th>
<th>Stroke</th>
<th>Examples</th>
<th>recommended series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully exposed cores with no shut off</td>
<td>10-80 mm</td>
<td>core pins</td>
<td>HX, HD</td>
</tr>
<tr>
<td>Touching, laterally injected cores</td>
<td>10-80 mm</td>
<td>simple breakups; tool-protection against flash</td>
<td>HX, HD</td>
</tr>
<tr>
<td>A pair of partially touching cores</td>
<td>10-200 mm</td>
<td>underfloor slides; main- and multiple cores; two component applications;</td>
<td>HS</td>
</tr>
<tr>
<td>Reflection cores</td>
<td>10-200 mm</td>
<td>multiple insert parts</td>
<td>HS</td>
</tr>
<tr>
<td>Cores with insert parts</td>
<td>10-200 mm</td>
<td>rough pressing of insert parts</td>
<td></td>
</tr>
<tr>
<td>Generally for strokes of more than 80 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Without pre-load: Series HX and HD

With pre-load: Series HS

**Example 1: a pair of touching cores**

Critical: the cores must contact to achieve high workpiece quality.

If two counteracting cores must build a “free of flash” aperture, it is necessary that the cores reach the absolutely defined final position.

The cores with their very complex contour travel into each other and are extremely exposed to the high internal pressure on their large surface area. Therefore we highly recommend the use of series HS in those cases.
Core situation (examples)

Example 2: Underfloor slides

For a correct workpiece shape (with undercut) the core must reach the defined end position and compensate possible tolerances from cycle to cycle. Additionally critical: the angled flanged cylinder mounting position. Here like in all other cases core must be taken for a fixture of the cylinder which is as rigid as possible to reduce any tolerance to a minimum.

Critical: workpiece with undercut

Example 3: deflected cores

Special mould designs require a deflection of the core movement, to avoid inauspicious long cores and an attenuation of the mould. In this example the core is deflected by a bevel. In such cases the cylinder series can only be defined by the injection pressure and the deflection angle. This should be discussed with the manufacturer.
A complete mounting system is available that makes it simple to adapt to existing moulds. Because the complete holding force of the piston rod is transferred through the mounting elements also, any possible elasticity must be reduced to a minimum. Therefore we categorically recommend the use of original CyTec coupling elements. They are characterised by high rigidity and mechanical strength.

- Pressure screw with cone for alignment compensation
  (Please ensure that the pressure screw is properly secured to the piston rod. This applies also for all other coupling elements.)
- Counterpiece to pressure screw
- Lock nut
- Mounting flange

Advice
In case of any further enquiries, please hold the Comm. number at hand.
The die-casting series are designed for rough conditions (ambient temperatures up to 180°C). The mechanical parts are coated and equipped with Viton seals. Productivity can be increased significantly. As an option, integrated or externally mounted proximity switches are available.

Special features
- High retraction force by means of enlarged piston diameter (option)
- Safe function with high ambient temperature and dirty conditions
- Design to customer demands (adaptation to mould structure, special mountings and lengths)

Equipment for die-casting applications
- Hardened piston rod
  for safe operation with high ambient temperature and dirty conditions
- Metal wiper ring
  for the safe cleaning of the piston rod avoiding dirt contamination
- Special seals
  made of Viton with high durability against ambient temperatures up to 180°C
- Proximity switches (up to 120°C) as an option

Application example underfloor slide:
Underfloor slides often are in critical position to the mounting plate of the machine. In such cases it is difficult to use cylinders of the standard series. To avoid an unnecessary weakening of the mounting plate or mould half special cylinder designs are available. These individually adapted solutions are geared to the mould structure and are not restricted in their technical properties in comparison to the standard series. This application example shows a locking core pull cylinder with enlarged piston diameter, a CyPull HSD 70:
- Stroke: 18 mm
- Holding force with pre-load: 360 kN
### Technical data

#### Series HS/HSD

**Dimensions without integrated sensors**

- **Piston Ø**: Various sizes ranging from 25 to 200 mm
- **Max.preload distance Ø**: Various sizes
- **Ø SW**: Various sizes
- **I1, I2**: Various sizes
- **E**: Various sizes
- **Ø D1**: Various sizes
- **Ø D2**: Various sizes
- **LG**: Various sizes
- **L**: Various sizes
- **Pressure ports A/B**: Various sizes
- **Weight (kg)**: Various sizes
- **Stroke+**: Various sizes

**Technical data**

- **Series HS/HSD with hydraulic locking and pre-load**
- **Core in**
- **Core out**

**Holding force (kN)**

- **25 (only HS)**
  - 0.5: 4.9, 7.4, 10
  - 0.5: 4.3, 6.3, 9.8
- **32**
  - 0.5: 8.0, 12, 16
  - 1.0: 11.2, 15, 20
- **40**
  - 0.5: 15.0, 20, 25
  - 1.0: 20, 25, 30
- **50**
  - 1.0: 24.0, 30, 35
  - 1.5: 30, 40, 50
- **63**
  - 1.0: 46.0, 50, 55
  - 1.5: 55, 65, 75
- **80**
  - 1.0: 56.0, 60, 65
  - 1.5: 70, 80, 90
- **100**
  - 1.0: 70.0, 75, 80
  - 1.5: 88, 100, 110
- **125**
  - 1.0: 90.0, 95, 100
  - 1.5: 128, 140, 150
- **160**
  - 1.0: 140.0, 150, 160
  - 1.5: 212, 240, 272

**Stroke force (kN)**

- **25 (only HS)**
  - 0.5: 2.9, 4.3, 5.8
  - 0.5: 4.9, 7.4, 10
- **32**
  - 0.5: 4.9, 7.4, 10
  - 1.0: 11.2, 15, 20
- **40**
  - 0.5: 4.9, 7.4, 10
  - 1.0: 11.2, 15, 20
- **50**
  - 1.0: 11.2, 15, 20
  - 1.5: 20, 25, 30
- **63**
  - 1.0: 11.2, 15, 20
  - 1.5: 20, 25, 30
- **80**
  - 1.0: 20, 25, 30
  - 1.5: 30, 40, 50
- **100**
  - 1.0: 20, 25, 30
  - 1.5: 30, 40, 50
- **125**
  - 1.0: 20, 25, 30
  - 1.5: 30, 40, 50
- **160**
  - 1.0: 30, 40, 50
  - 1.5: 40, 50, 60
- **200**
  - 1.0: 60, 75, 90
  - 1.5: 100, 120, 140

**Retraction force (kN)**

- **25 (only HS)**
  - 0.5: 2.9, 4.3, 5.8
  - 0.5: 4.9, 7.4, 10
- **32**
  - 0.5: 2.9, 4.3, 5.8
  - 1.0: 11.2, 15, 20
- **40**
  - 0.5: 2.9, 4.3, 5.8
  - 1.0: 11.2, 15, 20
- **50**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **63**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **80**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **100**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **125**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **160**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20
- **200**
  - 1.0: 2.9, 4.3, 5.8
  - 1.5: 11.2, 15, 20

**Further sizes upon request**

**Sensor designations:** Standard B2, B3, B4, B7, B8, B9, with angled plug sensors B22, B23, B24, B27, B28, B29.

In execution with angled plug-sensors, the installation lengths R2-R4 are 32.5 mm longer in mounted position as for standard-sensors.

**Alternative and additional dimensions respectively series HS/HSD with integrated sensors**

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>LG</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>W</th>
<th>LS = Stroke+</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 (only HS)</td>
<td>9</td>
<td>80</td>
<td>19</td>
<td>50</td>
<td>20</td>
<td>67</td>
<td>54</td>
<td>60</td>
<td>159</td>
</tr>
<tr>
<td>32</td>
<td>11</td>
<td>104.5</td>
<td>19.5</td>
<td>60</td>
<td>34</td>
<td>78.5</td>
<td>67.5</td>
<td>60</td>
<td>187</td>
</tr>
<tr>
<td>40</td>
<td>14</td>
<td>112.5</td>
<td>13.5</td>
<td>70</td>
<td>29</td>
<td>87.5</td>
<td>68.5</td>
<td>60</td>
<td>199</td>
</tr>
<tr>
<td>50</td>
<td>18</td>
<td>144</td>
<td>13.5</td>
<td>80</td>
<td>29</td>
<td>91</td>
<td>71.5</td>
<td>90</td>
<td>242</td>
</tr>
<tr>
<td>63</td>
<td>23</td>
<td>133.5</td>
<td>17</td>
<td>90</td>
<td>29</td>
<td>96</td>
<td>86</td>
<td>60</td>
<td>225</td>
</tr>
<tr>
<td>80</td>
<td>30</td>
<td>157</td>
<td>17</td>
<td>100</td>
<td>26</td>
<td>106</td>
<td>84.5</td>
<td>60</td>
<td>203</td>
</tr>
<tr>
<td>100</td>
<td>35</td>
<td>187.5</td>
<td>18</td>
<td>110</td>
<td>24</td>
<td>118.5</td>
<td>92</td>
<td>60</td>
<td>290</td>
</tr>
<tr>
<td>125</td>
<td>40</td>
<td>195.5</td>
<td>21</td>
<td>120</td>
<td>24</td>
<td>126</td>
<td>106</td>
<td>60</td>
<td>318</td>
</tr>
<tr>
<td>160</td>
<td>72.5</td>
<td>237.5</td>
<td>37</td>
<td>150</td>
<td>14</td>
<td>146</td>
<td>121</td>
<td>75</td>
<td>389</td>
</tr>
<tr>
<td>200</td>
<td>90</td>
<td>268.5</td>
<td>46</td>
<td>185</td>
<td>0</td>
<td>146</td>
<td>135</td>
<td>60</td>
<td>472</td>
</tr>
</tbody>
</table>
### Series HD/HDD with hydraulic locking

#### Technical data

**Dimensions without integrated sensors**

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>SW</th>
<th>E1</th>
<th>E2</th>
<th>Ø D1</th>
<th>Ø D2</th>
<th>L= Stroke+</th>
<th>Pressure ports A/B</th>
<th>T1</th>
<th>T2</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>20</td>
<td>17</td>
<td>25</td>
<td>12</td>
<td>M10</td>
<td>75</td>
<td>G1/4</td>
<td>91.5</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
<td>23</td>
<td>25</td>
<td>15</td>
<td>M16</td>
<td>95</td>
<td>G1/4</td>
<td>86</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>36</td>
<td>20</td>
<td>30</td>
<td>21</td>
<td>M20</td>
<td>100</td>
<td>G2/0</td>
<td>110</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>63</td>
<td>45</td>
<td>36</td>
<td>25</td>
<td>M27</td>
<td>120</td>
<td>180</td>
<td>G2/0</td>
<td>114</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>80</td>
<td>54</td>
<td>46</td>
<td>45</td>
<td>M30</td>
<td>150</td>
<td>222</td>
<td>G1/2</td>
<td>145</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>60</td>
<td>45</td>
<td>M42</td>
<td>170</td>
<td>225</td>
<td>G1/2</td>
<td>146</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>125</td>
<td>90</td>
<td>70</td>
<td>M56</td>
<td>55</td>
<td>M16bS</td>
<td>200</td>
<td>G2/0</td>
<td>148</td>
<td>21</td>
<td>61</td>
</tr>
<tr>
<td>160</td>
<td>110</td>
<td>95</td>
<td>M64</td>
<td>95</td>
<td>M22S</td>
<td>250</td>
<td>G2/0</td>
<td>205</td>
<td>37</td>
<td>55</td>
</tr>
<tr>
<td>200</td>
<td>140</td>
<td>120</td>
<td>M80</td>
<td>112</td>
<td>M27S</td>
<td>310</td>
<td>G1/2</td>
<td>256</td>
<td>46</td>
<td>106</td>
</tr>
</tbody>
</table>

Further sizes upon request.

**Holding force (kN)**

- Piston Ø 32: 8.0
- Piston Ø 40: 13.0
- Piston Ø 50: 20.0
- Piston Ø 63: 22.0
- Piston Ø 80: 30.0
- Piston Ø 100: 50.0
- Piston Ø 125: 60.0
- Piston Ø 160: 80.0
- Piston Ø 200: 100.0

**Stroke force (kN)**

- Piston Ø 32: 4.9
- Piston Ø 40: 6.4
- Piston Ø 50: 9.5
- Piston Ø 63: 15.0
- Piston Ø 80: 26.0
- Piston Ø 100: 48.0
- Piston Ø 125: 59.0
- Piston Ø 160: 106.0
- Piston Ø 200: 160.0

**Retraction force (kN)**

- Piston Ø 32: 7.4
- Piston Ø 40: 10.0
- Piston Ø 50: 14.0
- Piston Ø 63: 23.0
- Piston Ø 80: 38.0
- Piston Ø 100: 60.0
- Piston Ø 125: 89.0
- Piston Ø 160: 159.0
- Piston Ø 200: 240.0

### Series HD/HDD


Alternative and additional dimensions respectively series HD/HDD with int. sensors.

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L05</th>
<th>R2 max.</th>
<th>R3 max.</th>
<th>R4 max.</th>
<th>W</th>
<th>LS = Stroke+</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>11</td>
<td>71</td>
<td>19.5</td>
<td>54</td>
<td>34</td>
<td>78.5</td>
<td>67.5</td>
<td>60</td>
<td>150</td>
</tr>
<tr>
<td>40</td>
<td>14</td>
<td>62.5</td>
<td>13.5</td>
<td>46</td>
<td>29</td>
<td>87.5</td>
<td>68.5</td>
<td>60</td>
<td>150</td>
</tr>
<tr>
<td>50</td>
<td>18</td>
<td>90.5</td>
<td>13.5</td>
<td>80</td>
<td>29</td>
<td>91</td>
<td>86.5</td>
<td>90</td>
<td>179</td>
</tr>
<tr>
<td>63</td>
<td>23</td>
<td>89.5</td>
<td>17</td>
<td>72</td>
<td>29</td>
<td>96</td>
<td>79</td>
<td>60</td>
<td>180</td>
</tr>
<tr>
<td>80</td>
<td>30</td>
<td>120</td>
<td>17</td>
<td>100</td>
<td>26</td>
<td>111</td>
<td>84.5</td>
<td>60</td>
<td>222</td>
</tr>
<tr>
<td>100</td>
<td>35</td>
<td>122</td>
<td>18</td>
<td>110</td>
<td>24</td>
<td>118.5</td>
<td>92</td>
<td>60</td>
<td>225</td>
</tr>
<tr>
<td>125</td>
<td>52.5</td>
<td>137.5</td>
<td>27.5</td>
<td>120</td>
<td>17</td>
<td>124</td>
<td>111</td>
<td>60</td>
<td>260</td>
</tr>
<tr>
<td>160</td>
<td>72.5</td>
<td>171</td>
<td>37</td>
<td>150</td>
<td>0</td>
<td>146</td>
<td>121</td>
<td>75</td>
<td>322</td>
</tr>
<tr>
<td>200</td>
<td>90</td>
<td>217</td>
<td>46</td>
<td>185</td>
<td>14</td>
<td>146</td>
<td>143.5</td>
<td>60</td>
<td>402</td>
</tr>
</tbody>
</table>
Series HX with spring operated locking

Technical data

Dimensions without integrated sensors

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>Ø A</th>
<th>SW</th>
<th>I₁</th>
<th>I₂</th>
<th>E</th>
<th>Ø D₁</th>
<th>Ø D₂</th>
<th>LG</th>
<th>L= Stroke+</th>
<th>Pressure ports A/B</th>
<th>T₁</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>16</td>
<td>13</td>
<td>M10</td>
<td>20</td>
<td>10</td>
<td>M16x2</td>
<td>60</td>
<td>50</td>
<td>140</td>
<td>6/4</td>
<td>86</td>
<td>3</td>
</tr>
<tr>
<td>32</td>
<td>20</td>
<td>17</td>
<td>M16</td>
<td>25</td>
<td>12</td>
<td>M16x2</td>
<td>70</td>
<td>60</td>
<td>150</td>
<td>6/4</td>
<td>97</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
<td>23</td>
<td>M16</td>
<td>25</td>
<td>15</td>
<td>M8x2</td>
<td>95</td>
<td>70</td>
<td>150</td>
<td>6/4</td>
<td>86</td>
<td>7</td>
</tr>
<tr>
<td>50</td>
<td>36</td>
<td>30</td>
<td>M20</td>
<td>35</td>
<td>21</td>
<td>M16x2</td>
<td>100</td>
<td>80</td>
<td>160</td>
<td>6/8</td>
<td>94</td>
<td>9</td>
</tr>
<tr>
<td>63</td>
<td>45</td>
<td>26</td>
<td>B07</td>
<td>40</td>
<td>25</td>
<td>M110x2</td>
<td>120</td>
<td>90</td>
<td>187</td>
<td>6/8</td>
<td>131</td>
<td>16</td>
</tr>
<tr>
<td>80</td>
<td>56</td>
<td>46</td>
<td>B07</td>
<td>45</td>
<td>28</td>
<td>M140x2</td>
<td>150</td>
<td>100</td>
<td>227</td>
<td>6/2</td>
<td>145</td>
<td>30</td>
</tr>
<tr>
<td>100</td>
<td>70</td>
<td>60</td>
<td>B02</td>
<td>45</td>
<td>33</td>
<td>M160x3</td>
<td>170</td>
<td>110</td>
<td>252</td>
<td>6/2</td>
<td>169</td>
<td>45</td>
</tr>
<tr>
<td>125</td>
<td>90</td>
<td>70</td>
<td>B06</td>
<td>55</td>
<td>33</td>
<td>M170x3</td>
<td>190</td>
<td>120</td>
<td>260</td>
<td>6/2</td>
<td>148,5</td>
<td>57</td>
</tr>
</tbody>
</table>

Further sizes upon request

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>Holding force (kN)</th>
<th>Stroke force (kN)</th>
<th>Retraction force (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 bar</td>
<td>150 bar</td>
<td>200 bar</td>
</tr>
<tr>
<td></td>
<td>100 bar</td>
<td>150 bar</td>
<td>200 bar</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>4,9</td>
<td>7,4</td>
</tr>
<tr>
<td>32</td>
<td>60</td>
<td>8,0</td>
<td>12</td>
</tr>
<tr>
<td>40</td>
<td>88</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>50</td>
<td>140</td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td>63</td>
<td>224</td>
<td>31</td>
<td>47</td>
</tr>
<tr>
<td>80</td>
<td>300</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>100</td>
<td>564</td>
<td>79</td>
<td>118</td>
</tr>
<tr>
<td>125</td>
<td>880</td>
<td>123</td>
<td>184</td>
</tr>
</tbody>
</table>

Sensor designations: Standard B2, B3, B4, B7, B8, B9, with angled plug B22, B23, B24, B27, B28, B29

Alternative and additional dimensions respectively Series HX with int. sensors

<table>
<thead>
<tr>
<th>Piston Ø</th>
<th>L₁</th>
<th>L₂</th>
<th>L₃</th>
<th>L₄</th>
<th>DGS</th>
<th>R₁ (inch)</th>
<th>R₁ (linked)</th>
<th>R₂ max.</th>
<th>R₃ max.</th>
<th>R₄ max.</th>
<th>T₄ (incl.)</th>
<th>W</th>
<th>LS = Stroke+</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>15</td>
<td>6</td>
<td>65</td>
<td>17</td>
<td>50</td>
<td>41,5</td>
<td>41,5</td>
<td>39</td>
<td>36</td>
<td>34</td>
<td>76</td>
<td>64,5</td>
<td>160</td>
</tr>
<tr>
<td>32</td>
<td>17</td>
<td>10</td>
<td>77,5</td>
<td>20</td>
<td>60</td>
<td>46</td>
<td>40</td>
<td>38</td>
<td>35</td>
<td>32</td>
<td>78,5</td>
<td>66,5</td>
<td>150</td>
</tr>
<tr>
<td>40</td>
<td>25,5</td>
<td>14</td>
<td>65</td>
<td>17</td>
<td>48</td>
<td>47</td>
<td>41</td>
<td>39</td>
<td>37</td>
<td>35</td>
<td>87,5</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>50</td>
<td>29</td>
<td>18</td>
<td>71,5</td>
<td>13,5</td>
<td>58</td>
<td>53</td>
<td>45</td>
<td>43</td>
<td>41</td>
<td>40</td>
<td>91</td>
<td>71,5</td>
<td>120</td>
</tr>
<tr>
<td>63</td>
<td>34</td>
<td>14</td>
<td>97</td>
<td>17</td>
<td>78</td>
<td>52</td>
<td>41,5</td>
<td>41,5</td>
<td>39</td>
<td>37</td>
<td>96</td>
<td>79</td>
<td>100</td>
</tr>
<tr>
<td>80</td>
<td>41</td>
<td>18</td>
<td>120,5</td>
<td>17</td>
<td>100</td>
<td>62</td>
<td>45</td>
<td>45</td>
<td>43</td>
<td>41,5</td>
<td>99</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
<td>23</td>
<td>146,5</td>
<td>26</td>
<td>110</td>
<td>29</td>
<td>5</td>
<td>25</td>
<td>23</td>
<td>21</td>
<td>111</td>
<td>84,5</td>
<td>70</td>
</tr>
<tr>
<td>125</td>
<td>59</td>
<td>29</td>
<td>137,5</td>
<td>31</td>
<td>120</td>
<td>28</td>
<td>5</td>
<td>17</td>
<td>17</td>
<td>15</td>
<td>126</td>
<td>110</td>
<td>50</td>
</tr>
</tbody>
</table>

*Attention: provide a loop in the cable to allow for movement!

Position of pressure port "A/B" for function "extending" with sensor equipped versions up to cyl.-size 40 inclusive

Position of pressure port "A/B" for function "extending" with sensor equipped versions from cyl.-size 50

Series HX with spring operated locking
### Lock nuts M

To secure the cylinders against turning

<table>
<thead>
<tr>
<th>Cylinder-Nom. Ø</th>
<th>HS/HS 25</th>
<th>HD/HX 32</th>
<th>HS 32</th>
<th>40</th>
<th>50</th>
<th>63</th>
<th>80</th>
<th>100</th>
<th>HS 125</th>
<th>HS/HD 160</th>
<th>HS/HD 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>75</td>
<td>80</td>
<td>90</td>
<td>110</td>
<td>120</td>
<td>140</td>
<td>180</td>
<td>210</td>
<td>240</td>
<td>270</td>
<td>300</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>19</td>
<td>22</td>
<td>25</td>
<td>26</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>b</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>16</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>DG</td>
<td>M5x0.8</td>
<td>M6x1</td>
<td>M6x1</td>
<td>M8x1.25</td>
<td>M10x1.5</td>
<td>M12x1.75</td>
<td>M16x2</td>
<td>M18x2</td>
<td>M20x2</td>
<td>M24x2</td>
<td>M30x3</td>
</tr>
<tr>
<td>h</td>
<td>3</td>
<td>3</td>
<td>3.5</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

### Pressure screw F

With cone for alignment compensation

<table>
<thead>
<tr>
<th>Cylinder-Nom. Ø</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
<th>63</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>160</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>M8</td>
<td>M10</td>
<td>M12</td>
<td>M20</td>
<td>M27</td>
<td>M30</td>
<td>M42</td>
<td>M56</td>
<td>M64</td>
<td>M80</td>
</tr>
<tr>
<td>B</td>
<td>14.5</td>
<td>14.5</td>
<td>20</td>
<td>28</td>
<td>39</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>C</td>
<td>32</td>
<td>32</td>
<td>40</td>
<td>56</td>
<td>75</td>
<td>99</td>
<td>115</td>
<td>135</td>
<td>150</td>
<td>190</td>
</tr>
<tr>
<td>D</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>32</td>
<td>40</td>
<td>52</td>
<td>65</td>
<td>80</td>
<td>102</td>
<td>130</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>10</td>
<td>16</td>
<td>18</td>
<td>24</td>
<td>29.5</td>
<td>40</td>
<td>55</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>F</td>
<td>6.5</td>
<td>14</td>
<td>14</td>
<td>20</td>
<td>28</td>
<td>39</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>G</td>
<td>5.5</td>
<td>6</td>
<td>10</td>
<td>12</td>
<td>19</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>38</td>
<td>48</td>
</tr>
<tr>
<td>H</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.5</td>
<td>1.5</td>
<td>2</td>
<td>2</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>SW</td>
<td>14</td>
<td>17</td>
<td>22</td>
<td>26</td>
<td>36</td>
<td>55</td>
<td>70</td>
<td>90</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

### Counterpiece for pressure screw G

Recommended screw mountings:

- 6 x M10
- 6 x M12
- 6 x M17
- 6 x M16
- 6 x M20
- 6 x M24
- 6 x M30

*of property class 10.9 according to ISO 898-1 (not included in delivery)
For proper function and to achieve best workpiece quality, the following preconditions for mould design and installation of the cylinder must be accomplished:

Design preconditions (mould):
- Consideration of highest possible rigidity of coupling elements between cylinder and mould, like traverses, angular and adaptor flanges, screwed joints
- Avoidance of bending forces: any transmission of cross or bending moments into the piston rod is forbidden!
- Shortest distribution of forces as possible
- Regard screw recommendations for mounting the flange implicitly! (see table page 24)

Preconditions with installation (cylinder):
- The front pressure port (retract) must be depressurised and open during the locking process!
- The piston rod must have reached its extended end position and be locked!
- When using alignment screws and other coupling elements, a secure connection of the elements must be provided (Screw joints must be tightened carefully!)
- Third-party manufactured alignment screws must fulfill the following criteria:
  - the surface must have a spherical contour to be able to compensate angular and offset tolerances. Regard the detailed information about the alignment screws on page 25.
  - Especially for series HX: the piston rod must not be twisted!

Installation instructions

1. With pressurising the back port with air the piston rod is put into locked position. Only for series HX and HD: a click will be heard when the rod locks up. Caution: when the rod moves and when it reaches the locked position, small amounts of oil may be sprayed from the front port!
2. Screw lock nut to the end of the thread. The bevel must face the front end of the cylinder. Then screw the cylinder into the flange until only the half of its thread is visible.
3. Provided with an alignment screw, the rod can be connected to the core using a counterpiece. Ensure that all threads and screwed joints between piston rod, coupling elements and core are tightened and secured.
4. Now the flange is mounted to the mould carefully using the recommended socket screws.
5. With screwing in the cylinder into the mounting flange, the “core in” position and the locking up of the piston rod is put into alignment. In case of using contacting cores it is recommended that the cylinder is screwed in securely, e.g. using adequate tools.
A full resistance must be found!
When the cylinder is in its correct adjusted axial position the lock nut is tightened. The bevel of the lock nut must face the flange.

Additional advice for series HS
To achieve an optimal pre-load proceed as follows:
1. Installation and adjustment according to the table above
2. Remeasure the flash, if necessary.
3. Release the lock nut.
4. The cylinder must be re-adjusted regarding the measured flash (refer to table above).
5. Tighten lock nut.
Further adjustments can be made step by step until the proper position is reached.

Advice for the programming of the machine control for series HS
If the core pull control of the injection moulding machine offers the possibility to hold the control valve in “Core in” position during the injection process, this position should be used. By means of this is avoided that proximity switches eventually switch too early and inhibit a complete locking or that the pre-load cannot come into effect. A creeping back of the core in case of mould deformation is also enabled.
Inductive proximity switches

Inductive proximity switches enable the electronic sensing of the locked condition and core position respectively. The cylinders can be equipped with two sensors each to detect the following positions:

- Core in - Piston rod extended and locked
- Core out - Piston rod retracted and unlocked

Two types of inductive sensors are available:
- 3-wire DC PNP, positive switching
  (on request: 3-wire DC NPN, negative switching)
- 2-wire DC NAMUR

PNP Sensor

These sensors are connected directly with the machine. A direct voltage of 10–30 V is necessary (see connection diagram page 30). Depending on their mounting position at the cylinder housing, they have different designations:

with cable: B6, B7, B8, B9
with angled plug: B27, B28, B29

Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>PNP</th>
<th>NAMUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admissible ambient temperature range</td>
<td>up to +70°C</td>
<td>up to +70°C</td>
</tr>
<tr>
<td>Function of switching element</td>
<td>PNP normally open (all series except B6)</td>
<td>signal change (with connection to amplifier)</td>
</tr>
<tr>
<td>Operational voltage range</td>
<td>10...30 VDC</td>
<td>10...30 VDC</td>
</tr>
<tr>
<td>Protection class according to DIN 40050:</td>
<td>IP 67</td>
<td>IP 67</td>
</tr>
<tr>
<td>Connection cable:</td>
<td>2m PVC, cable 3 x Ø 0,5mm²</td>
<td>2m PVC, cable 2 x Ø 0,5mm²</td>
</tr>
<tr>
<td>Smallest allowed bending radius of cable:</td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

NAMUR Sensor

The NAMUR sensor is designed to be used in hazardous areas and is “intrinsically safe”. These sensors are wired to an amplifier (included in delivery together with the sensors) which is connected to the control panel of the moulding machine (see wiring diagram on page 30). Normally the sensors are driven with 230 V AC, optional amplifiers of 110 V AC and 24 V DC are also available. In case of order, please indicate which voltage should be used for the amplifiers!

Depending on their mounting position at the cylinder housing, they have different designations:

with cable: B1, B2, B3, B4
with angled plug: B22, B23, B24

Technical data

<table>
<thead>
<tr>
<th>Specification</th>
<th>PNP</th>
<th>NAMUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admissible ambient temperature range</td>
<td>up to +70°C</td>
<td>up to +70°C</td>
</tr>
<tr>
<td>Function of switching element</td>
<td>signal change (with connection to amplifier)</td>
<td>signal change (with connection to amplifier)</td>
</tr>
<tr>
<td>Operational voltage range</td>
<td>10...30 VDC</td>
<td>10...30 VDC</td>
</tr>
<tr>
<td>Protection class according to DIN 40050:</td>
<td>IP 67</td>
<td>IP 67</td>
</tr>
<tr>
<td>Connection cable:</td>
<td>2m PVC, cable 2 x Ø 0,5mm²</td>
<td>2m PVC, cable 2 x Ø 0,5mm²</td>
</tr>
<tr>
<td>Smallest allowed bending radius of cable:</td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

Possible combinations for all series:

PNP     B8 / B28 with B9 / B29 or B7 / B27
NAMUR   B3 / B23 with B4 / B24 or B2 / B22

Possible combinations additionally only for series HX:

PNP     B6 with B9 / B29 or B7 / B27
NAMUR   B1 with B4 / B24 or B2 / B22

Advice for ordering:
- Regard before ordering whether your application needs sensors for detecting the locking condition! (A retrofit is only possible with exchange of the cylinder’s housing parts)
- Decide which position must be inquired (locked, unlocked or both positions)
- Decide on type of sensor (PNP or NAMUR)

For further information, please contact our sales engineers.
Mounting instructions for proximity switches

The integrated switches are adjusted by the manufacturer and do not require any further adjustment. In exceptional cases it can be necessary that the sensors are exchanged. Please proceed as follows:

Inquiry “piston rod locked - core in”:
This condition is detected by the front sensor (rod side). Before fitting the switch, the piston rod of the cylinder must be in the completely extended position. The locking slide is in locked position.

Now screw the switch in until you just get a signal on the switch and then, wind in another half a turn. Then tighten the sensor in its position using the lock nuts.

Inquiry “piston rod unlocked - core out”:
This condition is detected by the rear sensor (piston side). Before fitting the switch, the piston rod of the cylinder must be in the completely retracted position. Then follow the above procedure. Then tighten the sensor in its position using the lock nuts.

Provide for highest cleanliness! With screwing the sensor into the cylinder body the O-ring seal must not be damaged!

Caution: It is possible to screw the switches in too far, then, when the slide moves across, or the piston moves back, it will collide with the switch and break the ceramic front face.

A serial connection of the sensors of parallel working cylinders is forbidden because of security reasons. Possibly there can occur undefined signals for short periods, though the second (third o. s.) cylinder isn’t retracted or locked. A generated peak voltage causes a misinterpretation of the signals in the control system. That leads to faulty switching and can cause a machine crash.
Control

Control advice

Control

Compared to a conventional cylinder, the CyPull cylinder needs no additional control devices. When the piston rod reaches its end position, the lock comes into effect automatically. It generally applies that in locked position no hydraulic pressure must be "blocked up" and that the control valve is either in "Core in" or neutral position. With standard switching mode of the core pull control system, this is not always the case.

Trouble shooting

Trouble shooting

Symptom | possible Reason | Repairing
---|---|---
The cylinder is incorrectly set on the mould | • | Reset cylinder
The piston rod does not lock. | • Too high pressure on the locking side (tank port): | • Check valve position • Repeat initial adjustment
• Indesirable high back pressure in the tank pipe because of faulty valve control | • Exchange filter • Exchange valve
• Filter dirty | • Exchange valve
• Defective valve

The piston rod cannot extend completely:

• Mechanical obstruction or faulty mechanical limit stop | • Rework mould
• Filter dirty | • Exchange filter
• Defective valve | • Exchange valve

Proximity switch gives faulty signal:

• Defective sensor | • Exchange sensor
• Faulty signal processing | • Check machine control
• Faulty adjustment of switch | • Re-adjustment of switch or exchange

The cylinder leaks

Leakiness on piston rod:

• Excentric position of piston rod | • Re-adjustment or repair by manufacturer
• Damaged piston rod | • Repair by manufacturer

The piston rod does not retract after injection cycle

The core is obstructed:

• Mould is clamping the core | • Rework the mould
• Mis-alignment between cylinder and core | • Check alignment, only use original CyTec coupling elements
• Die casting applications: too high material contraction of the core | • Increase retraction pressure

The piston rod does not extend completely:

• Mechanical obstruction or faulty mechanical limit stop | • Rework mould
• Filter dirty | • Exchange filter
• Defective valve | • Exchange valve

Flash on injection moulding

Elasticity of the coupling elements between piston rod and core:

• Wrong choice of coupling elements | • Use only original CyTec coupling elements
• Faulty or damaged coupling elements (no original parts) | • Repeat initial adjustment, check pretension distance (series HS)
• Use of washers or the like (forbidden!) | • In case of doubt choose the next bigger size
• Wrong type or wrong size of cylinder | • In case of doubt choose series HS

Service contact:
Phone: (+44) 0161/678 70 90 • Fax: (+44) 0161/620 53 92 • E-mail: sales@cytec-uk.com
CyBlock short stroke cylinder

The compact series CyBlock was especially developed for injection moulding cores in tool and mould manufacturing which require a safe holding with only a short mould release stroke. They are easy to mount and to adjust and complete the range of the locking cylinders series CyPull. Similar to series CyPull, the CyBlock cylinders are equipped with integrated positive lock for the extended stroke position of the piston rod. Two versions are available:

- **Series HSZ**
  - with positive lock and a locking tolerance range and can be adjusted to generate a preload on the core to compensate tolerances and elasticity of the tool. This type is suited for i.e. complex core forms, partially touching cores, paired touching cores, underfloor slides etc.
  - Recommended screw mountings: according ISO4762*

- **Series HDZ**
  - with positive lock without preload in the end position.
  - This type is suited for i.e. simple core pins, support cylinder for inserts, cores where the use of preload is undesirable.

Standardised stroke lengths and a new mounting system are characteristic for this new series. For axial adjustment purposes, each cylinder is supplied with 2 mounting shims (one of which is a spare). By measuring the core home position and the cylinder rod distance, the shim can be adapted to give the correct mounting position. The shims have a material thickness of 2 mm which can be reduced down to 1 mm by peeling in steps of 0.05 mm. The final stroke positions are indicated by means of inductive proximity switches (3 wire pnp normally open).

The CyBlock cylinders can be buried into the mould tools. Due to possible heat in the tool high quality Viton seals are fitted as standard.

---

### Technical data

#### Dimensions I

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>d</th>
<th>H (Stroke)</th>
<th>a</th>
<th>b</th>
<th>d1</th>
<th>d2</th>
<th>d3</th>
<th>E</th>
<th>SW</th>
<th>I1</th>
<th>L2</th>
<th>T</th>
<th>T1</th>
<th>T2</th>
<th>L1</th>
<th>L2</th>
<th>R1</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>14</td>
<td>30</td>
<td>0.4</td>
<td>27</td>
<td>55</td>
<td>132</td>
<td>11</td>
<td>35</td>
<td>9</td>
<td>10</td>
<td>86</td>
<td>12</td>
<td>61</td>
<td>20</td>
<td>35</td>
<td>12</td>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>16</td>
<td>25</td>
<td>0.5</td>
<td>85</td>
<td>63</td>
<td>157</td>
<td>11</td>
<td>63</td>
<td>10</td>
<td>13</td>
<td>88</td>
<td>17</td>
<td>94</td>
<td>11</td>
<td>80</td>
<td>12</td>
<td>9</td>
<td>63</td>
</tr>
<tr>
<td>32</td>
<td>20</td>
<td>25</td>
<td>0.5</td>
<td>100</td>
<td>75</td>
<td>170</td>
<td>13.5</td>
<td>74</td>
<td>45</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td>10</td>
<td>17</td>
<td>10</td>
<td>14</td>
<td>86</td>
<td>14</td>
</tr>
<tr>
<td>40</td>
<td>28</td>
<td>35</td>
<td>0.5</td>
<td>125</td>
<td>95</td>
<td>196</td>
<td>17.5</td>
<td>95</td>
<td>65</td>
<td>12</td>
<td>23</td>
<td>23</td>
<td>113</td>
<td>95</td>
<td>95</td>
<td>17</td>
<td>106</td>
<td>95</td>
</tr>
<tr>
<td>50</td>
<td>34</td>
<td>40</td>
<td>1.0</td>
<td>160</td>
<td>120</td>
<td>267</td>
<td>22</td>
<td>120</td>
<td>80</td>
<td>15</td>
<td>27</td>
<td>27</td>
<td>174</td>
<td>18</td>
<td>144</td>
<td>19.5</td>
<td>132</td>
<td>122</td>
</tr>
</tbody>
</table>

#### Dimensions II

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>Recommended screw mountings: according ISO4762*</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>M10x140</td>
</tr>
<tr>
<td>25</td>
<td>M10x140</td>
</tr>
<tr>
<td>32</td>
<td>M12x160</td>
</tr>
<tr>
<td>40</td>
<td>M16x200</td>
</tr>
<tr>
<td>50</td>
<td>M20x250</td>
</tr>
</tbody>
</table>

#### Forces

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>Holding force under preload (kN)</th>
<th>Stroke force (kN)</th>
<th>Retraction force (kN)</th>
<th>max. admissible operating pressure (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>30</td>
<td>3.1</td>
<td>4.7</td>
<td>1.6</td>
</tr>
<tr>
<td>25</td>
<td>35</td>
<td>4.9</td>
<td>7.4</td>
<td>2.9</td>
</tr>
<tr>
<td>32</td>
<td>50</td>
<td>8.0</td>
<td>12</td>
<td>4.9</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>150</td>
<td>19</td>
<td>6.4</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>240</td>
<td>29</td>
<td>9.5</td>
</tr>
</tbody>
</table>

*property class 10.9 according ISO 898-1 (not included in delivery!)

---
CyBlock
Series HDZ with hydraulic locking without preload

Technical data

Dimensions I

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>d</th>
<th>H (Stroke)</th>
<th>a</th>
<th>b</th>
<th>L</th>
<th>d1</th>
<th>d2</th>
<th>d3</th>
<th>E</th>
<th>SW</th>
<th>II</th>
<th>I2</th>
<th>T</th>
<th>T1</th>
<th>T2</th>
<th>L1</th>
<th>L2</th>
<th>R1</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>16</td>
<td>25</td>
<td>85</td>
<td>63</td>
<td>133</td>
<td>11</td>
<td>63</td>
<td>40</td>
<td>10</td>
<td>13</td>
<td>H6</td>
<td>17</td>
<td>G1/4</td>
<td>70</td>
<td>11</td>
<td>54</td>
<td>12</td>
<td>95</td>
<td>87</td>
</tr>
<tr>
<td>32</td>
<td>20</td>
<td>25</td>
<td>100</td>
<td>75</td>
<td>139</td>
<td>13,5</td>
<td>76</td>
<td>45</td>
<td>17</td>
<td>12</td>
<td>H10</td>
<td>17</td>
<td>G1/4</td>
<td>70</td>
<td>14</td>
<td>58</td>
<td>14,5</td>
<td>97</td>
<td>91</td>
</tr>
<tr>
<td>40</td>
<td>28</td>
<td>25</td>
<td>125</td>
<td>95</td>
<td>166</td>
<td>17,5</td>
<td>95</td>
<td>65</td>
<td>12</td>
<td>23</td>
<td>H16</td>
<td>23</td>
<td>G1/4</td>
<td>83</td>
<td>15,5</td>
<td>63,5</td>
<td>17</td>
<td>106</td>
<td>95</td>
</tr>
<tr>
<td>50</td>
<td>34</td>
<td>28</td>
<td>140</td>
<td>120</td>
<td>204</td>
<td>22</td>
<td>120</td>
<td>80</td>
<td>15</td>
<td>27</td>
<td>H20</td>
<td>35</td>
<td>G1/4</td>
<td>111</td>
<td>18</td>
<td>91</td>
<td>19,5</td>
<td>132</td>
<td>122</td>
</tr>
</tbody>
</table>

Dimensions II

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>Recommended screw mountings according ISO 4762*</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>M10x135</td>
</tr>
<tr>
<td>32</td>
<td>M12x150</td>
</tr>
<tr>
<td>40</td>
<td>M16x170</td>
</tr>
<tr>
<td>50</td>
<td>M20x220</td>
</tr>
</tbody>
</table>

Forces

<table>
<thead>
<tr>
<th>D (Piston Ø)</th>
<th>Holding force under preload (kN)</th>
<th>Stroke force (kN)</th>
<th>Retraction force (kN)</th>
<th>max. admissible operating pressure (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>25</td>
<td>2,9</td>
<td>4,3</td>
<td>160</td>
</tr>
<tr>
<td>32</td>
<td>32</td>
<td>4,9</td>
<td>7,4</td>
<td>160</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>8,0</td>
<td>12</td>
<td>160</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
<td>13</td>
<td>19</td>
<td>160</td>
</tr>
</tbody>
</table>

Holding force under preload: 40 bar

In case of unneeded proximity switches, the according tap holes are covered with plugs by the manufacturer. Proximity switches can be retrofitted at any time.

Order code for spare shims for: HSZ 020 HSZ/HDZ 025 HSZ/HDZ 032 HSZ/HDZ 040 HSZ/HDZ 050

091- 0088 0080 0081 0082 0085

Example:

HSZ 025 / 016 - 0025 - 01 - I - F - G - VI - B28-B29

Order code for: 020 025 032 040 050

091- 0088 0080 0081 0082 0085

How to order

Description | Order code | Example:
---|---|---
Series | Block cylinder | HSZ ........................ HDZ ........................
Piston Ø | | |
20 | 25 | 32 | 40 | 50 mm (HSZ) |
--- | --- | --- | --- | --- |
25 | 32 | 40 | 50 mm (HDZ) |
Rod Ø | | |
14 | 16 | 20 | 28 | 36 mm (HSZ) |
--- | --- | --- | --- | --- |
16 | 20 | 28 | 36 mm (HDZ) |
Stroke length | | |
20 | 25 | 25 | 35 | 40 mm (HSZ) |
--- | --- | --- | --- | --- |
25 | 35 | 40 | 50 mm (HDZ) |
Locking | | |
rod sided with extended piston rod | 01 |
Rod thread | Standard: internal-thread | I |
Accessories | Alignment screw | F |
| Counterpiece to alignment screw | G |
Seals | Viton seals | VI |
Options | 3-wire sensors PNP pos. switching for inquiry of locking and final position | B28, B29 (up to + 70°C) |
| | | B48, B49 (up to + 120°C) |
External accessory | Tester for function control of proximity switches | ST 20-122 |

-36-
For proper function and to achieve best workpiece quality, the same preconditions for mould design and installation must be regarded as apply for CyPull series. The details on page 26 are essential!

Installation instructions

1. With pressurising the back port with air the piston rod is put into locked position. Only for series HDZ: a click will be heard when the rod locks up. Caution: when the rod moves and when it reaches the locked position, small amounts of oil may be sprayed from the front port!

2. Provided with an alignment screw, the rod can be connected to the core using a counterpiece. Ensure that all threads and screwed joints between piston rod, coupling elements and core are tightened and secured. The same applies of course for direct mountings to other coupling elements.

3. Now the flange is mounted to the mould carefully using 4 socket screws according property class 10.9 according ISO 969-1.

Using the shipped shim, the core position and the rod lock are brought into correlation. For this purpose the thickness of the shim (2 mm) can be reduced down to 1 mm by peeling off the foils in steps of 0.05 mm.

Adjustment of the locking up point

Adjustment of the optional proximity switches

To achieve an optimal pre-load proceed as follows:

1. Installation and adjustment regarding the screw recommendations and the preload distances according to the table above.
2. Remeasure the flash, if necessary.
3. Release the mounting screws.
4. The cylinder must be re-adjusted regarding the measured flash, when the piston rod is retracted. For this reduce the foil layers of the shim as described under chapter “Adjustment of the locking up point”.
5. Install the cylinder again. Further adjustments can be made step by step until the proper position is reached.

Adjustment of the locking up point

Advice for the programming of the machine control for series **HSZ**

If the core pull control of the injection moulding machine offers the possibility to hold the control valve in “Core in”-position during the injection process, this position should be used. By means of this it is avoided that proximity switches eventually switch too early and inhibit a complete locking or that the pre-load cannot come into effect. A creeping back of the core in case of mould deformation is also enabled.

### Technical data

<table>
<thead>
<tr>
<th>Function of switching element:</th>
<th>3-wire PNP, open, pos. switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational voltage range:</td>
<td>10 ... 30 VDC</td>
</tr>
<tr>
<td>Protection class sensor (DIN 40050):</td>
<td>IP 67</td>
</tr>
<tr>
<td>Protection class plug (DIN 40050):</td>
<td>IP 67</td>
</tr>
<tr>
<td>Cable with angular plug:</td>
<td>2m PVC cable 3 x Ø 0.35mm²</td>
</tr>
<tr>
<td>Smallest allowed bending radius of cable:</td>
<td>50 mm</td>
</tr>
</tbody>
</table>

Additional installation advice for series **HSZ**

<table>
<thead>
<tr>
<th>Series</th>
<th>Piston Ø</th>
<th>max. preload distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSZ</td>
<td>20</td>
<td>0.4 mm</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>0.5 mm</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>0.5 mm</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>0.5 mm</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>1.0 mm</td>
</tr>
</tbody>
</table>

### Wiring diagram 3-wire-PNP -Sensors

B28(B48) B29(B49)

Input Core in +

brown

black

blue

PNP Normally open (+) switching
Your competent partners for innovative technical solutions

CyTec Zylindertechnik GmbH • Steffensrott 1 • D-52428 Jülich • Tel.: (+49) 2461/6808-0 • Fax.: (+49) 2461/6808758 • E-mail: info@cytec.de

CyTec Systems SARL
Parc des Évolés
64 route de Sartrouville F-78230 Le Pecq
Tel.: (+33) 01 30 87 12 50
Fax.: (+33) 01 30 87 12 31

CyTwist
Motor spindle

CyLock
Cylinder with integrated locking device

CyPull
Locking core-pull cylinder

CyDock
Docking system with self-locking

CyDim
Hydromechanical clamping system

CyTrac
Collet clamp lock

CyStop
Pneumatic cylinder with internal braking device

CyLift
Multifunctional lifting column

CyTab
Pallet clamping system

CyCon
Tool/spindle controlling system

CyCool
Tool cooling/lubricating system

CyMill
2-Axis-NC-Milling heads

CyTorque
Torque motors

CyPull_english • Edition 04/2013          All data for information purpose only • Errors excepted • Technical data subject to change in terms of technical development