

# HOME OF CLAMPING



**2021/2022**  
HYDRAULIC CLAMPING SYSTEMS

## WE GENERATE EXCITEMENT.

Since the foundation of the company in 1890 until today the goal has remained the same: the highest quality in products and services. Nevertheless, the circumstances, tasks and challenges have changed, of course. By focussing on our core areas of expertise, we have long set new standards for innovative clamping technology - driven by our own development, the greatest possible flexibility and passion for individual solutions.

All this is only possible with committed and contented employees. Respectful interaction with others, personal development and measures for the wellbeing of each individual are therefore values that matter to us.



Company Management:  
Wolfgang Balle, Johannes Maier (CEO), Jürgen Förster

## OUR COMPANY HISTORY

- 1890 Company founded as a lock manufacturer by Andreas Maier.
- 1920 Product range extended to include spanners.
- 1928 Production line assembly of FELLBACH LOCKS.
- 1951 Introduces clamping elements and diversifies into workpiece and tool clamping technology.
- 1965 Toggle clamps extend the AMF product range, AMF catalogues are now printed in ten languages.
- 1975 Further specialisation into hydraulic clamping technology.
- 1982 Clamping and fixture systems round off AMF's clamping expertise.
- 1996 AMF team organisation in all sectors of the business, Quality management with certification to ISO 9001.
- 2001 AMF Service Guarantee for all products.
- 2004 Introduction of the ZPS zero-point clamping system.
- 2007 The magnetic clamping technology extends the AMF product range.
- 2009 Development and marketing of AMF Vacuum clamping technology.
- 2012 LOW-COST AUTOMATION gripping, clamping, marking and cleaning.
- 2014 AMF presents the most extensive product range of automation solution in zero-point clamping technology.
- 2017 Wireless sensing systems extend the expertise into Industry 4.0 and blends seamlessly into the AMF product range.

## PLEDGES THAT COUNT IN EVERYDAY LIFE

For this reason, we have a few principles that we follow by conviction and which always apply..

### INDIVIDUAL DEVELOPMENT

Even if the product you need does not even exist yet, we will find the right solution with you: from special designs to new developments, everything is possible.

### WARRANTY

If, despite our high quality standard, there is a complaint, this is dealt with quickly and unbureaucratically, even beyond the warranty period.

### HIGHEST QUALITY STANDARDS

Careful manufacturing based on tradition since 1890, and naturally with a modern quality management system according to ISO 9001 for many years.

### SHORT DELIVERY TIME

With over 5,000 articles in our warehouse, you can expect your order to be dispatched on the same day.

### COMPETENT SERVICE FROM EXPERTS

Your local retail partner or the specialists in our team will find the right solution for every task.

### MADE IN GERMANY

Our entire product range is developed and manufactured exclusively by our employees in Germany.

## PRESSURE GENERATORS



9 - 34

## HOLLOW ROD CYLINDERS BUILT-IN CYLINDERS



35 - 42

43 - 48

## THREADED CYLINDERS BLOCK CYLINDERS



49 - 56

57 - 80

## PUSH-PULL CYLINDERS SWING CLAMPS



81 - 93

94 - 132

## VERTICAL AND LINK CLAMPS TOGGLE JOINT CLAMP



133 - 166

167 - 168

## BORE CLAMPS PULL DOWN CLAMP AND SIDE CLAMPING ELEMENTS CENTRING CLAMPS

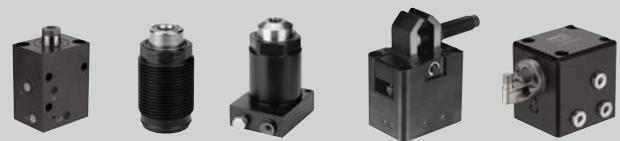


169 - 182

183 - 192

193 - 198

## SUPPORT ELEMENTS CLAMPING ELEMENTS



199 - 214

215 - 222

## LOW-PRESSURE CLAMPING TECHNOLOGY LOW-PRESSURE SUPPORT ELEMENTS



223 - 236

237 - 244

## ACCESSORIES



245 - 326

## TOOL CLAMPING FOR PRESSES



327 - 352

**FILTER PLATE**

No. 6918F, page 251

**NEW!**



**NEW!**

**VERTICAL CLAMP MINI**

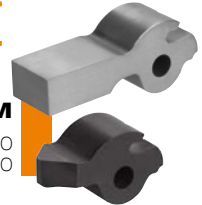
No. 6958CK, page 148



**NEW!**

**CLAMPING ARM**

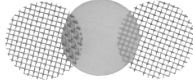
No. 6958CK-XX-04, page 150  
No. 6958CKR-XX-04, page 150



**FILTER, CARTRIDGE DESIGN**

No. 6981P-XX, page 298

**NEW!**



**SEITENSCHANNELEMENTE**

No. 6978CD, page 190  
No. 6978CDA, page 191



**NEW!**

**CLAMPING JAW, SERRATED**

No. 6978CDA-28-06, page 191



**CLAMPING JAW BLANK, SMOOTH**

No. 6970CDAR-28-06, page 191

**NEW!**



**FAILOVER WITH BALL OR ROLL**

No. 6980MK, page 323  
No. 6978FRX, page 322



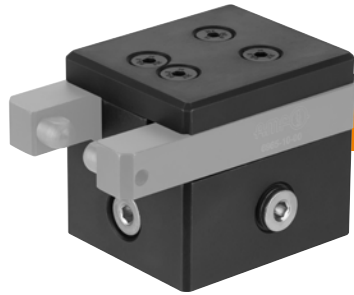
**NEW!**

**SUPPORT CONTROL, PNEUMATIC**

No. 6984-20, page 302

**NEW!**





**COMPENSATING COLLET**

No. 6965-10, page 218

**NEW!**



**CLAMPING LEVER**

No. 6965-10-00, page 219  
No. 6965-10-03, page 219  
No. 6965-10-09, page 219

**NEW!**



**PRESSURE GAUGE,  
WITH HOUSING**

No. 6983B, page 308  
No. 6983G, page 308

**NEW!**



**NEW!**

**VENT SCREW**

No. 908S-30-XXX, page 313

**SEQUENCE VALVE,  
THREADED DESIGN**

No. 6918-XX-XXX, page 252

**NEW!**



**NEW!**

**CLAMPING TONGS**

No. 6966, page 220  
No. 6966D, page 221



**NEW!**

**FILTER PLATE**

No. 6966DF, page 222

**CLAMPING LEVER BLANK**

No. 6966R, page 222

**NEW!**



## RECOMMENDATIONS AND PARAMETERS OF OIL-HYDRAULIC DEVICES AND PLANTS.

### GENERAL:

All parameters are published in accordance with the DIN regulations.

### OIL RECOMMENDATION:

| Oil temperature (°C) | designation to DIN 51 524 | viscosity to DIN 51 519 |
|----------------------|---------------------------|-------------------------|
| 0-40                 | HL, HLP 22 or HLPD 22     | ISO VG 22               |
| 10-50                | HL, HLP 32 or HLPD 32     | ISO VG 32               |

### CLAMPING ELEMENTS:

|                      |  |
|----------------------|--|
| Pressure range:      | At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.   |
| Ambient temperature: | -10°C to +60°C   |
| Thermal expansion:   | If thermal expansion is prevented in a hydraulic system, the pressure rises by about 10 bar per 1 °C temperature increase. Such conditions require overpressure protection.  |
| Seals:               | <ul style="list-style-type: none"> <li>&gt; O-rings made of NBR or PU</li> <li>&gt; Supporting rings made of PTFE</li> <li>&gt; Flange seals made of PTFE, NBR, PU or Cu</li> <li>&gt; Glydring made of PTFE or PU</li> <li>&gt; Scraper ring made of PU or NBR</li> </ul> <p>At higher ambient temperatures, clamping elements have to be equipped with heat-resistant seals (Viton® or similar). These are available upon request.</p> |
| Mounting position:   | As desired, unless otherwise specified.  |
| Piston radial force: | The piston radial force must never exceed 5% of the nominal cylinder force.  |
| Stroke speed:        | 0.01 – 0.5 m/s (for swing clamps, always observe the specifications!).   |
| Leakage rate:        | <p>Dynamic = up to 32 mm piston dia.:</p> <p>&lt; 0.3 cm<sup>3</sup> per 1000 double strokes and 10 mm stroke (HLP 22)</p> <p>from 40 mm piston dia.:</p> <p>&lt; 0.6 cm<sup>3</sup> per 1000 double strokes and 10 mm stroke (HLP 22)</p> <p>Static = no leakage rate</p>   |

### FOR YOUR SAFETY:

To avoid injuries, a maximum distance of 4 mm (in accordance with DIN 31001, part 1) between workpiece and clamping element must not be exceeded.

To ensure safe clamping, clamping elements must be positioned in such a way that a residual stroke remains in the clamping cylinder after clamping.

### HOSE CONNECTIONS:

When using high-pressure hoses, the following must be observed:

- > maximum operating pressure
- > bending radius
- > tightening torque of cap nut
- > dynamic or static use
- > environmental influences
- > the date for the permissible duration of use

### PIPES:

Seamless steel pipe, phosphatised and oiled, dia. 8x2 mm, in accordance with DIN 2391 C. Pipes must be kept as short as possible, especially when used with single-action cylinders. Pipe bends must be made to the largest possible radius.

### CONNECTING THREADS:

Whitworth pipe thread, X-type threaded bore in accordance with DIN 3852, page 2. Seal by means of sealing edge. Do not use Teflon tape or additional sealing compound.

### STATIC PRESSURE IN HYDRAULIC SYSTEM:

Cylinders, valves or lines and couplings create internal friction. An oil pressure of approx. 2 bar is required to overcome this static pressure. For single-acting cylinders with return springs, the static pressure must be reduced by keeping the supply line as short as possible and using piston rods with the smallest possible mass. Max. permissible back pressure for unclamping must not be exceeded. The counter-pressure in the return flow should not exceed 0.5 bar.

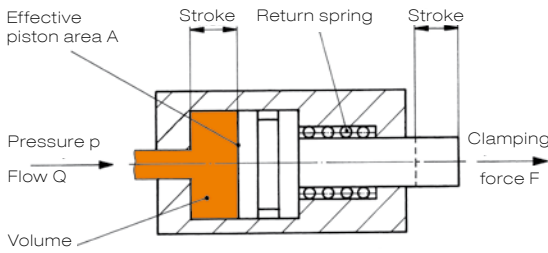
For double-acting elements, static pressures increases when load is applied to the rod side. Parts of the relatively large oil volume on the piston side cannot drain quickly enough. Static pressure does usually not affect the clamping elements.

### COMMISSIONING AND MAINTENANCE:

- > Use only clean hydraulic oil of the specified type.
- > Observe all instructions and information provided in mounting instructions before commissioning!
- > Vent the hydraulic system at low operating pressure at the highest point until the fluid is free of bubbles.

Hydraulic directional valves are very sensitive to soiling and contamination. Contamination and soiling of the pressure medium must be avoided. An oil change every six months is recommended. The oil level in the pressure generator must be checked regularly.

## HYDRAULIC PARAMETERS, UNITS AND FORMULA SYMBOLS:



The units used in this catalogue for physical quantities are in accordance with DIN 1301.

| Symbol | Unit            | Description           | Unit          | Conversion  |
|--------|-----------------|-----------------------|---------------|---|
| F      | N               | Force                 | Newton        | 1 N ≈ 0,1 kp<br>1 kN ≈ 100 kp   |
| p      | bar<br>Pa       | Pressure              | bar<br>Pascal | 1 bar = 10 N/cm <sup>2</sup><br>≈ 1 atm.<br>= 10 <sup>5</sup> N/m <sup>2</sup><br>1 Pa = 1 N/m <sup>2</sup> |
| A      | cm <sup>2</sup> | Effective piston area | -             | 1 m <sup>2</sup> = 10 <sup>4</sup> cm <sup>2</sup>  |
| V      | cm <sup>3</sup> | Volume                | -             | 1 dm <sup>3</sup> = 1000 cm <sup>3</sup><br>= 1l (Liter)  |
| t      | s               | Time                  | second        | -   |
| Q      | $\frac{l}{min}$ | Oil-flow rate         | -             | $1 \frac{l}{min} = 16,67 \frac{cm^3}{s}$  |

### TECHNICAL EQUATIONS:

Clamping force:  $F (N) = 10 \times A (cm^2) \times p (bar)$

Required operating pressure:  $p (bar) = \frac{0,1 \times F (N)}{A (cm^2)}$

Oil volume per cylinder:  $V (cm^3) = 0,1 \times A (cm^2) \times stroke (mm)$

Clamping time:  $t (s) = 1 + \frac{A (cm^2) \times stroke (mm) \times n (no's \ of \ cyl.)}{Q (l/min.) \times 167}$

### CLAMPING FORCE OF BOLTS:

For hydraulic clamping, the fatigue strength of the bolts is considered to obtain a high number of strokes. The testing force or yield strength must only be utilized for low numbers of strokes.

| Clamping bolts |               |   |  |   | Hydraulic cylinders   |   |   |    |    |    |    |    |     |  |
|----------------|---------------|---|--|---|-----------------------|---|---|----|----|----|----|----|-----|--|
| Thread         | Pitch<br>[mm] | Nominal cross-section<br>As<br>[mm <sup>2</sup> ] | Testing force for bolt grade 8.8<br>[kN] | Permissible load for continuous operation<br>[kN] | Nominal cylinder size |   |   |    |    |    |    |    |     |  |
|                |               |   |  |   | 2                     | 5 | 8 | 12 | 20 | 32 | 50 | 70 | 125 |  |
| M 6            | 1,00          | 20,1  | 11,6                                     | 4,3   |                       |   |   |    |    |    |    |    |     |  |
| M 8            | 1,25          | 36,6  | 21,2                                     | 8,0   |                       |   |   |    |    |    |    |    |     |  |
| M 10           | 1,50          | 58,0  | 33,7                                     | 12,5  |                       |   |   |    |    |    |    |    |     |  |
| M 12           | 1,75          | 84,3  | 48,9                                     | 18,3  |                       |   |   |    |    |    |    |    |     |  |
| M 14           | 2,00          | 115,0   | 66,7                                     | 25,0  |                       |   |   |    |    |    |    |    |     |  |
| M 16           | 2,00          | 157,0   | 91,0                                     | 34,0  |                       |   |   |    |    |    |    |    |     |  |
| M 18           | 2,50          | 192,0   | 115,0                                    | 43,0  |                       |   |   |    |    |    |    |    |     |  |
| M 20           | 2,50          | 245,0   | 147,0                                    | 55,0  |                       |   |   |    |    |    |    |    |     |  |
| M 24           | 3,00          | 253,0   | 212,0                                    | 79,5  |                       |   |   |    |    |    |    |    |     |  |
| M 27           | 3,00          | 459,0   | 275,0                                    | 103,0   |                       |   |   |    |    |    |    |    |     |  |
| M 30           | 3,50          | 561,0   | 337,0                                    | 126,0   |                       |   |   |    |    |    |    |    |     |  |

### NOMINAL CYLINDER SIZES:

The nominal cylinder sizes are intended to facilitate cylinder selection: These sizes correspond to the clamping force in kN, related to the maximum operating pressure in each case (usually 400 bar) and the effective piston area.

| Nominal cylinder size | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Clamping force F en kN |         |         |         |         |
|-----------------------|---------------------|-----------------------------------|------------------------|---------|---------|---------|---------|
|                       |                     |                                   | 100 bar                | 250 bar | 350 bar | 400 bar | 500 bar |
| 2,0                   | 8,0                 | 0,5                               | 0,50                   | 1,25    | 1,75    | 2,0     | 2,5     |
| 2,4                   | 9,0                 | 0,7                               | 0,68                   | 1,70    | 2,40    | -       | -       |
| 4,4                   | 12,5                | 1,3                               | 1,25                   | 3,10    | 4,40    | -       | -       |
| 5,0                   | 12,0                | 1,1                               | 1,10                   | 2,80    | 3,80    | 4,4     | 5,5     |
| 5,9                   | 14,7                | 1,7                               | 1,70                   | 4,20    | 5,90    | -       | -       |
| 6,6                   | 15,5                | 1,9                               | 1,90                   | 4,70    | 6,60    | -       | -       |
| 8,0                   | 16,0                | 2,0                               | 2,00                   | 5,00    | 7,00    | 8,0     | 10,0    |
| 10,1                  | 19,0                | 2,9                               | 2,88                   | 7,20    | 10,1    | -       | -       |
| 12,0                  | 20,0                | 3,1                               | 3,00                   | 7,50    | 10,9    | 12,0    | 15,0    |
| 14,0                  | 22,0                | 4,0                               | 4,00                   | 10,0    | 14,0    | -       | -       |
| 17,5                  | 25,0                | 5,0                               | 5,00                   | 12,7    | 17,5    | -       | -       |
| 17,8                  | 25,0                | 5,1                               | 5,08                   | 12,7    | 17,8    | -       | -       |
| 20,0                  | 25,0                | 4,9                               | 5,00                   | 12,5    | 17,2    | 20,0    | 24,5    |
| 32,0                  | 32,0                | 8,0                               | 8,00                   | 20,0    | 28,0    | 32,0    | 40,0    |
| 39,9                  | 38,0                | 11,4                              | 11,4                   | 28,5    | 39,9    | -       | -       |
| 50,0                  | 40,0                | 12,5                              | 12,5                   | 31,0    | 43,8    | 50,0    | 62,5    |
| 63,0                  | 45,0                | 15,9                              | 15,9                   | 39,1    | 55,6    | 63,6    | 79,5    |
| 70,0                  | 48,0                | 18,0                              | 18,0                   | 45,0    | 63,0    | 72,0    | 90,0    |
| 78,0                  | 50,0                | 19,6                              | 19,6                   | 49,0    | 68,6    | 78,4    | 98,0    |
| 94,0                  | 55,0                | 23,7                              | 23,7                   | 59,2    | 83,0    | 94,8    | 118,5   |
| 125,0                 | 63,0                | 31,1                              | 31,1                   | 78,0    | 108,8   | 124,0   | 155,5   |

## CONVERSION FACTORS:

| Pressure: MPa | bar    | PSI    |
|---------------|--------|--------|
| 1 MPa         | 10     | 145,04 |
| 1 bar         | 1      | 14,504 |
| 1 PSI         | 0,0689 | 1      |

MPa = Megapascal    PSI = lb/sq. inch

| Temperature: K | °C               | °F                  |
|----------------|------------------|---------------------|
| 1 K            | °C x + 273,15    | (°F - 459,67) x 5/9 |
| °C             | 1                | (°F - 32) x 5/9     |
| °F             | K x 9/5 + 459,67 | °C x 9/5 + 32       |

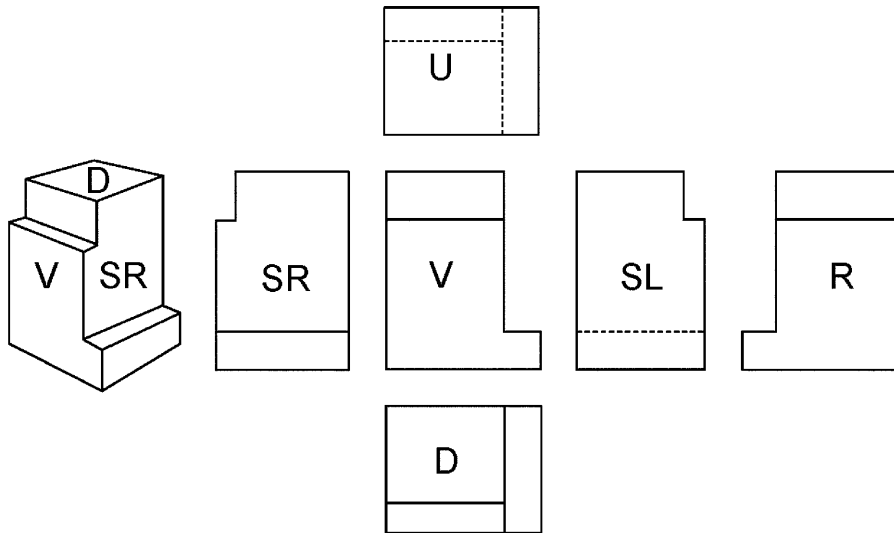
K = Kelvin    °C = degree Celsius    °F = degree Fahrenheit

| Length: mm | inch   |
|------------|--------|
| 1 inch     | 25,399 |
| 1 mm       | 0,0393 |

## IMPORTANT INFORMATION ABOUT OUR INSTALLATION DRAWINGS.

ALL INSTALLATION DRAWINGS IN THIS CATALOGUE ARE IN FIRST-ANGLE PROJECTION (DIN)!

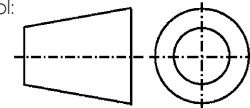
### FIRST-ANGLE PROJECTION (DIN)



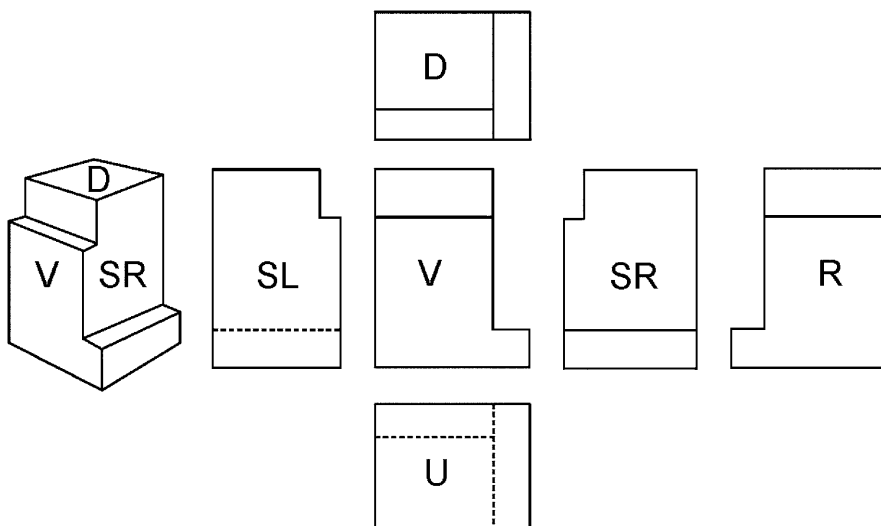
Location of other views in relation to front elevation, V:

|    |                           |                           |
|----|---------------------------|---------------------------|
| D  | Plan view                 | below V                   |
| SL | Side elevation from left  | to the right of V         |
| SR | Side elevation from right | to the left of V          |
| U  | Bottom view               | above V                   |
| R  | Rear view                 | to the left or right of V |

Symbol:



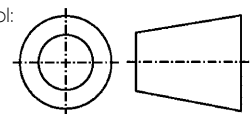
### THIRD-ANGLE PROJECTION (ANSI / USA)



Location of other views in relation to front elevation, V:

|    |                           |                           |
|----|---------------------------|---------------------------|
| D  | Plan view                 | above V                   |
| SL | Side elevation from left  | to the left of V          |
| SR | Side elevation from right | to the right of V         |
| U  | Bottom view               | below V                   |
| R  | Rear view                 | to the left or right of V |

Symbol:



Subject to technical alterations.



## PRESSURE GENERATORS: THE OPTIMAL SOLUTION FOR ANY APPLICATION!

- > easy to use
- > ready for connection
- > ready for operation
- > variety of options
- > compact design
- > single and double-acting variants
- > modular design of pump
- > various valve combinations
- > available with and without electric controller
- > external control optional
- > continuous pressure control by adjustment spindle
- > valves in the de-energised condition in locked position
- > ecological operation
- > electric motors conform to efficiency classes of 2017

### PRODUCT OVERVIEW:

| Type  | single acting | double acting | Max. operating pressure [bar] | Clamping circuits | Output flow                                     | Effective oil volume [l] |
|-------|---------------|---------------|-------------------------------|-------------------|---|--------------------------|
| 6901  | ●             | -             | 350                           | 1                 | 2,1 cm <sup>3</sup> / rotation                  | 0,026                    |
| 6902  | ●             | -             | 700                           | 1                 | 20 cm <sup>3</sup> / 1 cm <sup>3</sup> / stroke | 0,3                      |
| 6902  | ●             | -             | 700                           | 1                 | 20 cm <sup>3</sup> / 2 cm <sup>3</sup> / stroke | 1,0                      |
| 6904  | ●             | ●             | 500                           | 1                 | 0,85 l/min.                                     | 2,1                      |
| 6906  | ●             | ●             | 160                           | 1 - 5             | 2,5 l/min.                                      | 4,0                      |
| 6906  | ●             | ●             | 400                           | 1 - 5             | 2,5 l/min.                                      | 4,0                      |
| 6906N | ●             | ●             | 160                           | 1 - 4             | 2,5 l/min.                                      | 4,0                      |
| 6906N | ●             | ●             | 400                           | 1 - 4             | 2,5 l/min.                                      | 4,0                      |

### PRODUCT EXAMPLES:

NO. 6902



- > 1 clamping circuit
- > no pressure adjustment

NO. 6904-25



- > 1 clamping circuit
- > automatic pressure-adjustment

NO. 6906



- > 1 to 5 clamping circuits
- > automatic pressure-adjustment

## No. 6901

### Screw Pump

block version and built-in version,  
max. operating pressure 350 bar.

| Order no. | Article no. | max. operating pressure [bar] | stroke volume per rev. [cm <sup>3</sup> ] | stroke volume total [cm <sup>3</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|---|--|--------------|------------|
| 67819     | 6901-10     | 350                           | 2,1                                       | 26                                     | 50           | 1524       |
| 67835     | 6901-20     | 350                           | 2,1                                       | 26                                     | 50           | 689        |

#### Design:

Housing from steel, hardened and burnished. Threaded spindle hardened and burnished. Screw pump no. 6901-20 is supplied with 2 grooved nuts. Oil supply via threaded port.

#### Application:

The screw pump is particularly suitable to operate small clamping fixtures.

#### Note:

For an enclosed circuit the following has to be considered: The hydraulic clamping elements connected to the screw pump have to be hermetically tight. Due to possible leakage of the clamping cylinders during stroke movement and the compressibility of oil (1% at 140 bar), the stroke volume of the screw pump shall be used up to 70% only. The compressibility is being increased considerably by air content in the oil. Therefore the hydraulic system has to be carefully purged of air. An air bled screw at the highest position is a necessity. After returning the spindle of the pump, oil must be refilled at this spot. No air pocket should arise in the hydraulic system, which cannot be purged. A precise pressure control is possible by a manometer only. An electric pressure switch enables a pressure monitoring too. A pressure limiting valve is not suitable. Operating the threaded spindle by a torque wrench is possible. However the pressure should also be checked by a gauge. For the built-in version the mounting torque has to be observed.



6901-10

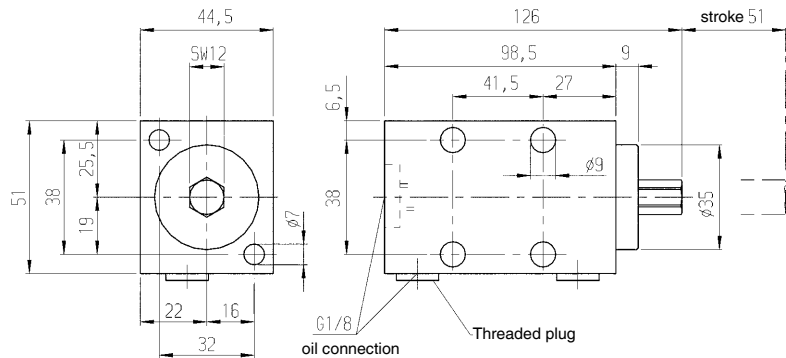


6901-20

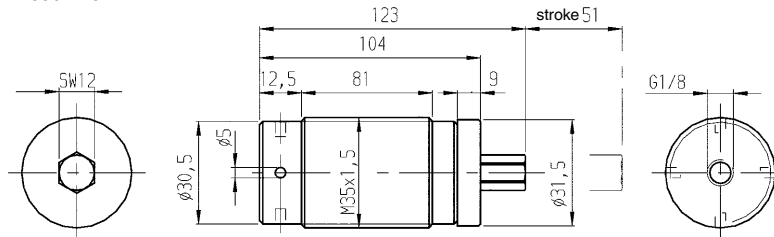
#### Clamping pressure in relation to torque:

| Torque [Nm] | Clamping pressure [bar] |
|-------------|-------------------------|
| 13,5        | 70                      |
| 27,0        | 140                     |
| 34,0        | 205                     |
| 40,5        | 275                     |
| 47,5        | 350                     |

6901-10



6901-20



CAD

## No. 6902

### Hand Pump

max. operating pressure 1st stage 50 bar,  
max. operating pressure 2nd stage 700 bar.



| Order no. | Article no. | Displacement per stroke 1st stage [cm <sup>3</sup> ] | Displacement per stroke 2nd stage [cm <sup>3</sup> ] | Q usable [cm <sup>3</sup> ] | max. hand lever force [N] | A   | B   | Weight [Kg] |
|-----------|-------------|--|--|-----------------------------|---------------------------|-----|-----|-------------|
| 61937     | 6902-7      | 20   | 1  | 300                         | 350                       | 320 | 275 | 6,0         |
| 61945     | 6902-8      | 20   | 2  | 1000                        | 320                       | 620 | 575 | 8,1         |

### Design:

Lightweight two-speed hand-pump. Low hand force required at max. operating pressure. Pump housing from malleable cast iron, oil reservoir from aluminium. With pressure relief valve, factory set at max. pressure of 700 bar. Hand pump complete with oil fill. Oil supply via threaded port.

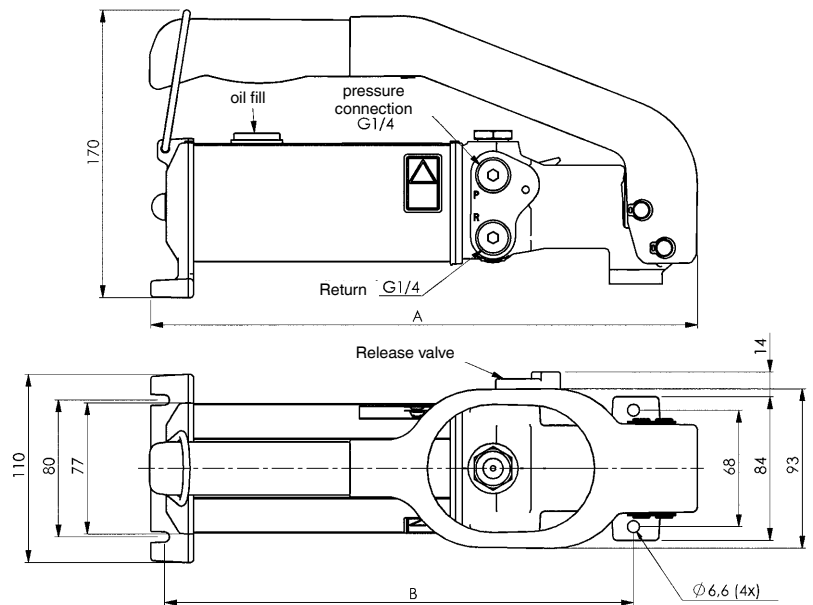
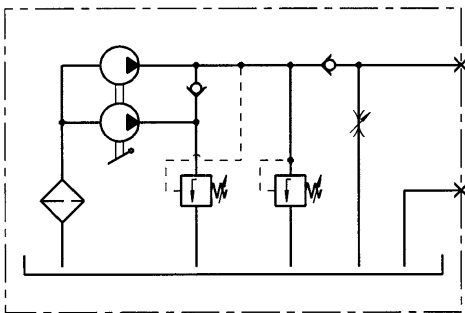
### Application:

Typical applications for the hand-pump are e.g. small clamping fixtures with irregular use, testing fixtures or for repair jobs. Please note, in case of a pressure drop the hand-pump is not capable of automatically maintaining system pressure.

### Note:

Can be operated in horizontal position or vertical position with head facing downwards. Before putting in to operation open combined reservoir vent-and-relief cap. Care for proper air bleeding of connected hydraulic components. Special pumps for different fluids and pressure ratings are available upon request.

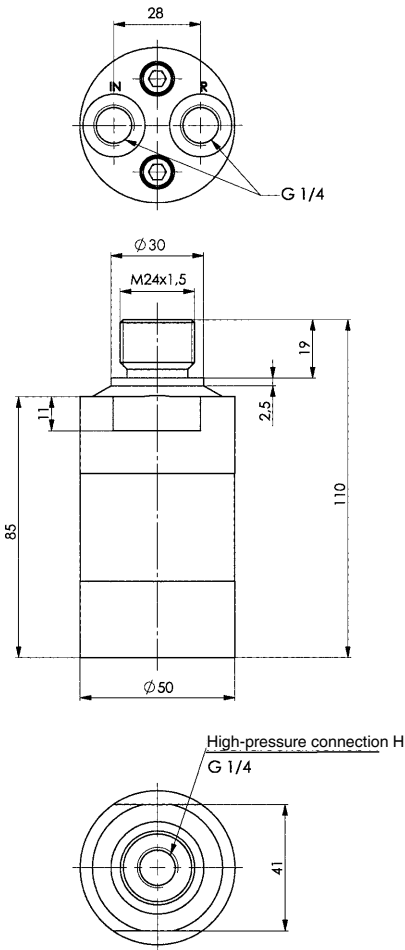
### Hydraulic diagram:



## No. 6903

### Hydraulic intensifier

Temperature -40 - +120°C



| Order no. | Article no. | Ratio i | max. operating pressure ND [bar] | max. operating pressure HD [bar] | Q max. ND [l/min] | Q max. HD [l/min] | Weight [g] |
|-----------|-------------|---------|----------------------------------|----------------------------------|-------------------|-------------------|------------|
| 452060    | 6903-20-15  | 1,5     | 200                              | 300                              | 8                 | 1,0               | 1000       |
| 320184    | 6903-20-20  | 2,0     | 200                              | 400                              | 12                | 2,0               | 1000       |
| 275198    | 6903-20-32  | 3,2     | 200                              | 640                              | 15                | 2,5               | 1000       |
| 320192    | 6903-20-40  | 4,0     | 200                              | 800                              | 14                | 2,0               | 1000       |
| 291526    | 6903-20-50  | 5,0     | 160                              | 800                              | 14                | 1,6               | 1000       |
| 320200    | 6903-20-66  | 6,6     | 120                              | 800                              | 13                | 1,3               | 1000       |

ND = low pressure side, HD = high pressure side

#### Design:

Steel housing galvanized and chrome plated, piston and valve seat from steel. Oil supply via threaded port.

#### Application:

Hydraulic intensifier are used to pressurise hydraulic clamping fixtures and assembly devices. The low pressure of the tooling machine's hydraulic system will be converted into a higher operating pressure according to the ratio. Input pressure and output pressure are proportional. The output pressure can be adjusted by the input pressure.

#### Features:

The most important functions are shown in the hydraulic circuit diagram. Oil is guided through directional valve CV to input IN and flows unimpeded through check valves KV1, KV2 and DV and into high pressure area H.

In these conditions the pressure intensifier achieves a maximum flow rate with rapid forwards motion. Once input pressure IN is achieved in high-pressure area H, valves KV1, KV2 and DV close. The output pressure is built up by oscillating pump unit OP. The unit switches itself off automatically when the output pressure is achieved in high-pressure area H. In case of pressure loss in the high-pressure area due to consumption or loss of oil, pump unit OP starts automatically in order to maintain the output pressure.

Pressure can be relieved from the high pressure area via the directly controlled valve DV.

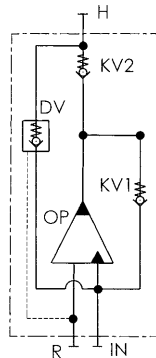
#### Note:

The hydraulic oil must be filtered with mesh size not larger than nominally 10 µm, 19/16 according ISO 4406. If the intensifier will be used for applications where the oil supply is disengaged, a leakage free pilot controlled check valve should be installed between high pressure output H and the cylinder. Please consider the min. control pressure for releasing. The design of the intensifier allows a certain leakage between the ports IN and R. This has to be considered in uncoupled operations.

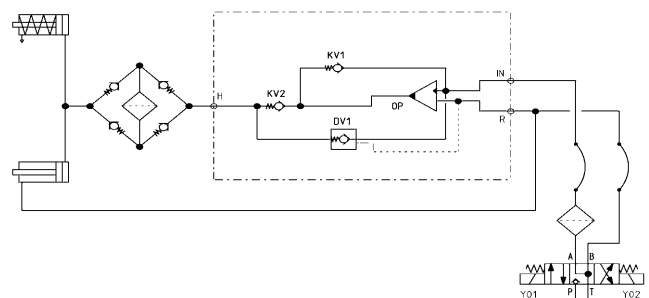
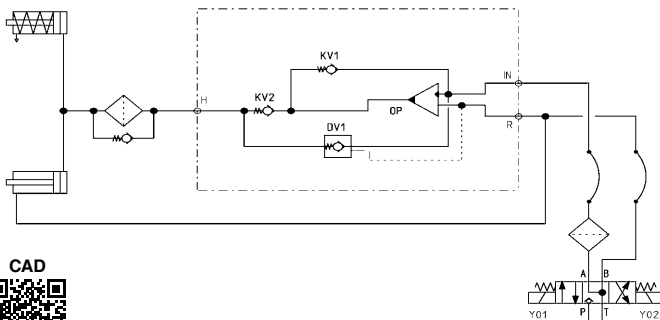
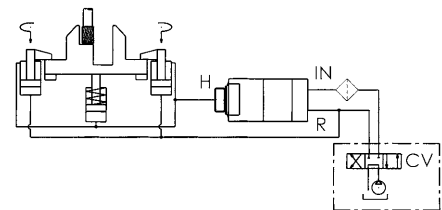
#### On request:

Manifold mounting and other sizes available on request.

#### Hydraulic diagram:



#### Application examples:



Subject to technical alterations.

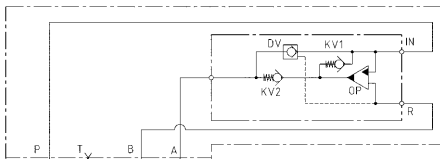
## No. 6903

### Hydraulic pressure booster

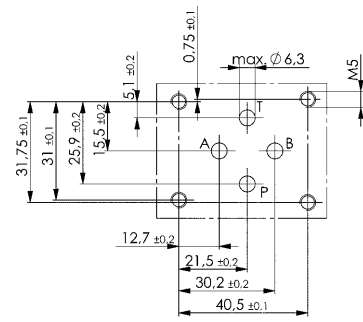
For O-ring connection,  
max. operating pressure in outlet 500 bar,  
min. operating pressure in inlet 20 bar



### Hydraulic diagram:



### Hole pattern shape A nominal size 6:



| Order no. | Article no. | NG | Rato i | max. operating pressure ND [bar] | max. operating pressure HD [bar] | Q max. ND [l/min] | Q max. HD [l/min] | Weight [g] |
|-----------|-------------|----|--------|----------------------------------|----------------------------------|-------------------|-------------------|------------|
| 328682    | 6903-30-15  | 6  | 1,5    | 200                              | 300                              | 8                 | 1,0               | 2360       |
| 328708    | 6903-30-20  | 6  | 2,0    | 200                              | 400                              | 12                | 2,0               | 2360       |
| 328807    | 6903-30-28  | 6  | 2,8    | 178                              | 500                              | 15                | 2,2               | 2360       |
| 328727    | 6903-30-32  | 6  | 3,2    | 150                              | 500                              | 15                | 2,5               | 2360       |
| 328740    | 6903-30-40  | 6  | 4,0    | 125                              | 500                              | 14                | 2,0               | 2360       |
| 328765    | 6903-30-50  | 6  | 5,0    | 100                              | 500                              | 14                | 1,6               | 2360       |
| 328781    | 6903-30-66  | 6  | 6,6    | 75                               | 500                              | 13                | 1,3               | 2360       |

### Design:

Steel housing galvanized and chrome plated, piston and valve seat from steel. Oil supply via oil channel in fixture body.

### Application:

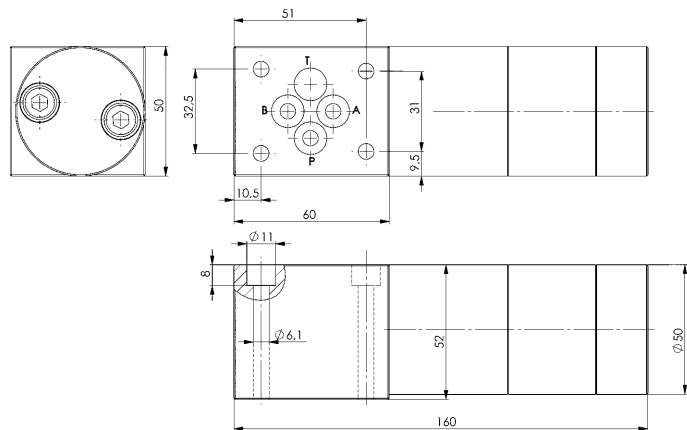
Hydraulic pressure boosters are used in clamping fixtures and assembly fixtures. The low pressure of the tooling machine's hydraulic system is converted into a higher operating pressure according to the transmission ratio. Input pressure and output pressure are proportional. The output pressure can be adjusted by the input pressure.

### Features:

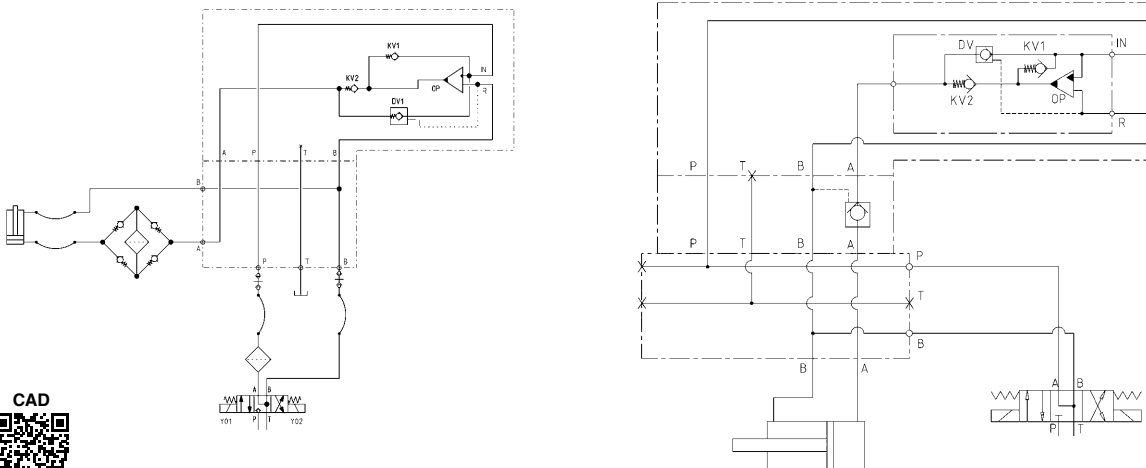
The most important functions are shown in the hydraulic circuit diagram. Oil is routed via the directional control valve to the IN connection and then flows unhindered through non-return valves KV1 and KV2, as well as through non-return valve DV in the high-pressure range A. Under these conditions, a maximum flow through the pressure booster is achieved and a fast forward movement is generated. If input pressure IN is reached in the high-pressure area, valves KV1, KV2 and PV close. The output pressure is built up by oscillating pump unit OP. The unit switches off automatically when the final pressure has been reached in the high-pressure area A. In case of a pressure drop in the high-pressure area due to oil consumption or oil loss, pump unit OP will start automatically in order to maintain the final pressure. The pressure in the high-pressure area can be relieved via the the directly actuated pressure valve.

### Note:

The hydraulic oil is to be filtered to a max. nominal filter mesh of 10 µm, max. 19/16 to ISO 4406. When installing in systems in which the supply is decoupled from the pressure booster, a leak oil-free, releasable non-return valve should be installed on the high-pressure side. It must be noted that the pilot ratio of the valve must be greater than the transmission ratio of the pressure booster. The structure of the pressure booster permits a certain leakage between the IN and R connections, which must be taken into account in decoupled installations.



### Application examples:



## No. 6904-20

### Air-Hydraulic Pump

max. operating pressure 500 bar.



| Order no. | Article no. | Pneum. pressure min. [bar] | Pneum. pressure max. [bar] | Oil capacity usable horizontal [l] | Oil capacity usable vertical [l] | Q max. [cm <sup>3</sup> /min] | Weight [Kg] |
|-----------|-------------|----------------------------|----------------------------|------------------------------------|----------------------------------|-------------------------------|-------------|
| 69435     | 6904-20     | 2,8                        | 10,0                       | 2,1                                | 1,5                              | 1400                          | 6,3         |

#### Design:

Compact compressed air operated hydraulic pump for single acting circuits. Robust plastic tank. The motor is protected against contamination by an air filter at the inlet and an internal oil filter. Safety valve to prevent overpressure and sound absorbers are fitted. Oil supply via threaded port.

#### Application:

The air-hydraulic pump can be used for small hydraulic clamping and assembly equipment. The air-hydraulic pump is designed for single acting cylinders.

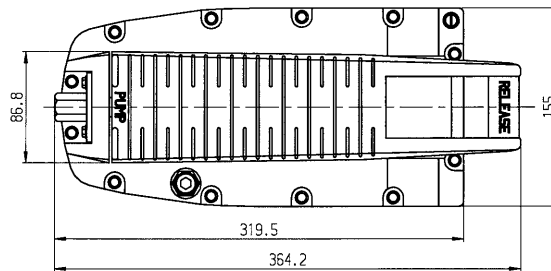
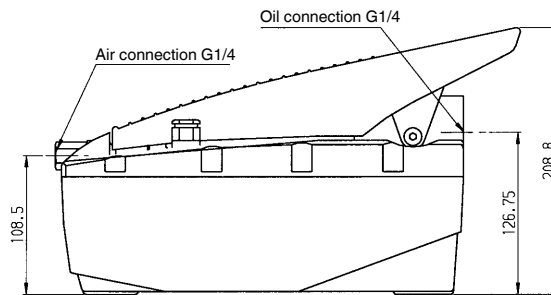
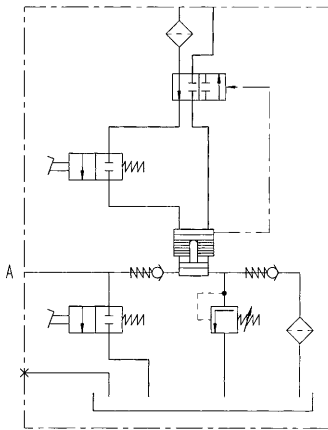
#### Features:

The large air/oil intensification ratio allows for high hydraulic pressures even with small air pressure. Low weight allows for mobile application. The pump can be mounted horizontally or vertically. Applications in hazardous environment is possible.

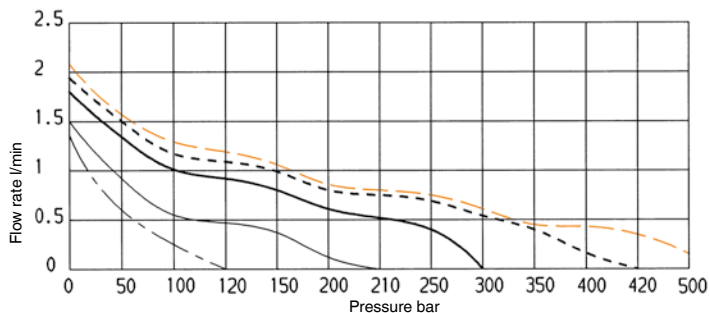
#### Note:

Optionally, pumps with other operating pressures are available upon request. Please observe proper venting of the single acting system. All tolerances other than specified refer to DINISO 2768 mittel (medium).

#### Hydraulic diagram:



#### Pressure/flow diagram:



- Air pressure:
- = 2,8 bar
  - = 4,1 bar
  - = 5,6 bar
  - = 6,9 bar
  - = 8,3 bar

No. 6904-25

## Air-Hydraulic Pump

max. operating pressure 500 bar.



| Order no. | Article no. | Pneum. pressure min. [bar] | Pneum. pressure max. [bar] | Oil capacity usable horizontal [l] | Oil capacity usable vertical [l] | Q max. [cm <sup>3</sup> /min] | Weight [Kg] |
|-----------|-------------|----------------------------|----------------------------|------------------------------------|----------------------------------|-------------------------------|-------------|
| 69450     | 6904-25     | 2,8                        | 10,0                       | 2,1                                | 1,5                              | 1400                          | 6,3         |

### Design:

Compact compressed air operated hydraulic pump for double acting circuits. Robust plastic tank. The motor is protected against contamination by an air filter at the inlet and an internal oil filter. Safety valve to prevent overpressure and sound absorbers are fitted. Oil supply via threaded port.

### Application:

The air-hydraulic pump can be used as drive element for small hydraulic and assembly equipment. Safety is guaranteed by automatic pressure compensation. The air-hydraulic pump is designed for the assembly of valves with connection diagram CETOP 03, i.e. with the option to control single or double acting cylinders. The changeover can be made manually, pneumatically or electrically.

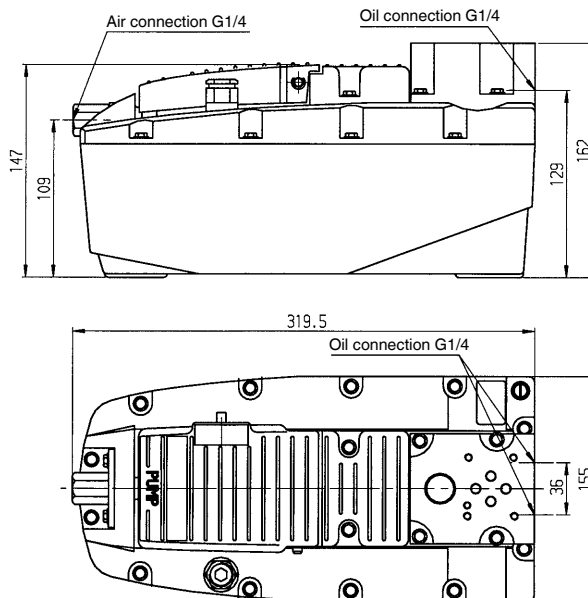
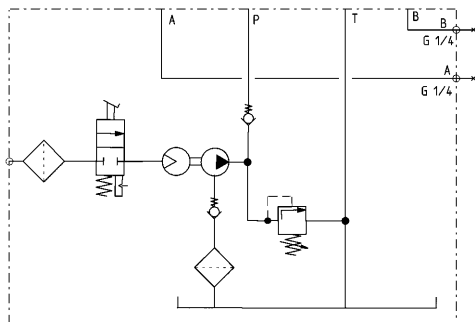
### Features:

The large air/oil intensification ratio allows for high hydraulic pressures even with small air pressure. Low weight allows for mobile application. The pump can be mounted horizontally or vertically. Applications in hazardous environment is possible.

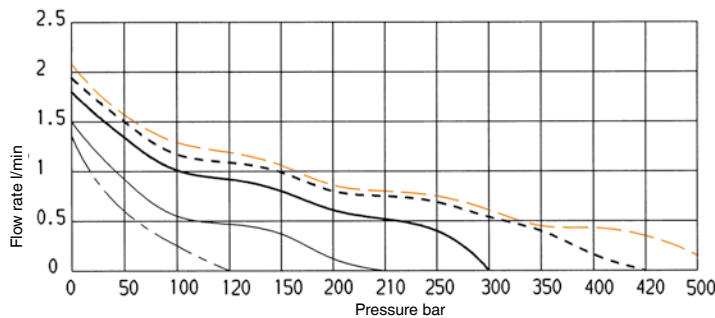
### Note:

Optionally, pumps with other operating pressures are available upon request. Please observe proper venting of the single acting system. All tolerances other than specified refer to DINISO 2768 mittel (medium).

### Hydraulic diagram:



### Pressure/flow diagram:



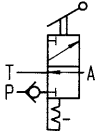
Air pressure:

- = 2,8 bar
- = 4,1 bar
- = 5,6 bar
- = 6,9 bar
- = 8,3 bar

## No. 6904-50

### Seat Valve 3/2

max. operating pressure 500 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q<br>[l/min] | Weight<br>[g] |
|-----------|-------------|----|--------------|---------------|
| 271031    | 6904-50     | 6  | 12           | 444           |

#### Design:

Design: Seat valve  
Type of actuation: manual

#### Application:

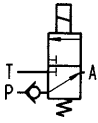
For single acting cylinders. CETOP 3 adaptation.



## No. 6904-52

### Seat Valve 3/2

max. operating pressure 500 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q<br>[l/min] | Weight<br>[g] |
|-----------|-------------|----|--------------|---------------|
| 259242    | 6904-52     | 6  | 12           | 740           |

#### Design:

Design: Seat valve  
Type of actuation: electric

#### Application:

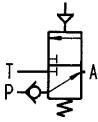
For single acting cylinders. CETOP 3 adaptation.



## No. 6904-54

### Seat Valve 3/2

max. operating pressure 500 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q<br>[l/min] | Weight<br>[g] |
|-----------|-------------|----|--------------|---------------|
| 267427    | 6904-54     | 6  | 12           | 459           |

#### Design:

Design: Seat valve  
Type of actuation: pneumatic

#### Application:

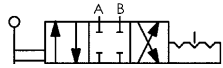
For single acting cylinders. CETOP 3 adaptation.



## No. 6904-59

### Directional valve 4/3

max. operating pressure 700 bar,  
min. operating pressure 10 bar.



**NEW!**

| Order no. | Article no. | NG | Q<br>[l/min] | Weight<br>[g] |
|-----------|-------------|----|--------------|---------------|
| 563516    | 6904-59-01  | 6  | 30           | 380           |

#### Design:

Design: Piston valve  
Type of actuation: manual

#### Application:

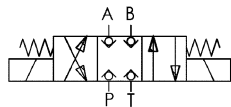
For double acting cylinders. CETOP 3 adaptation.



## No. 6911A-07-01

### Seat Valve, 4/3-Way

for O-ring joint,  
max. operating pressure 400 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q<br>[l/min] | OR-1<br>O-ring<br>Order No. | Viscosity<br>[cSt] | U<br>[V DC] | Weight<br>[g] |
|-----------|-------------|----|--------------|-----------------------------|--------------------|-------------|---------------|
| 322065    | 6911A-07-01 | 6  | 20           | 493478                      | 10-500             | 24          | 2356          |

#### Application:

For double acting cylinders. CETOP 3 adaptation.

#### Note:

Further information can be found under Accessories/Valves.



## No. 6904-90

### Air filter and pressure regulator



| Order no. | Article no. | Air connection | Weight<br>[g] |
|-----------|-------------|----------------|---------------|
| 258236    | 6904-90     | G 1/4          | 740           |

#### Application:

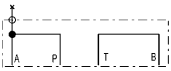
For Air-Hydraulic Pump 6904-20 or -25.

Subject to technical alterations.



No. 6906-20-33

Diverter plate



CAD

| Order no.     | Article no. | L x W x H    | Connection | O-ring Order No. | Weight [g] |
|---------------|-------------|--------------|------------|------------------|------------|
| <b>325332</b> | 6906-20-33  | 60 x 41 x 30 | 1 x G1/4   | 493478           | 525        |

**Design:**

Steel, TEM-deburred and phosphated. With O-rings. CETOP 03 hole pattern.

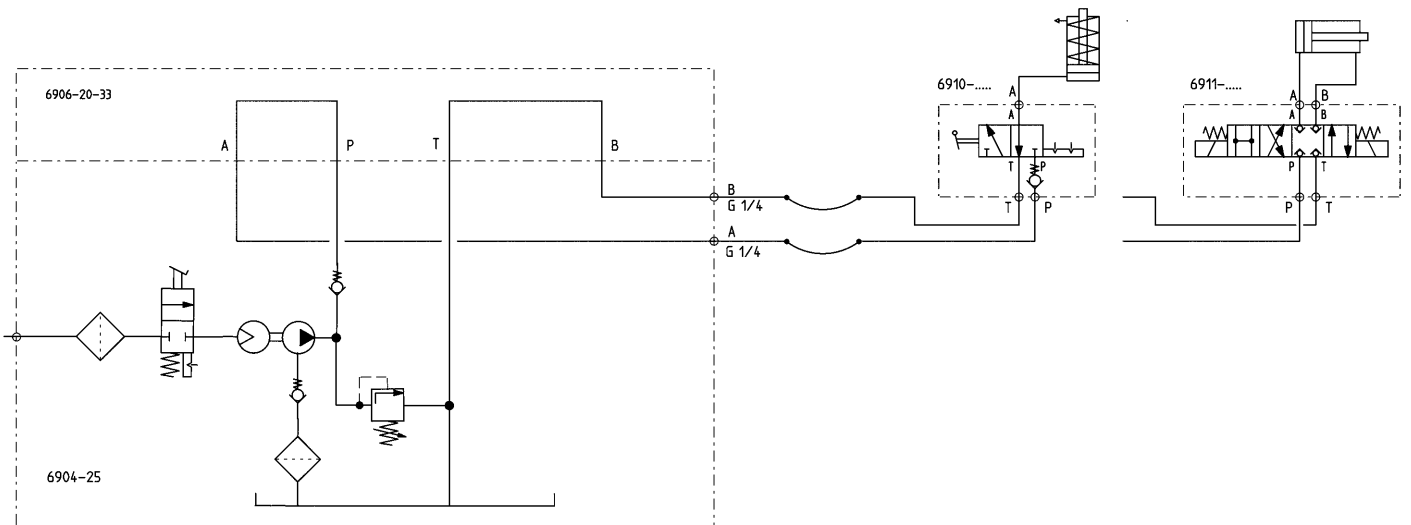
**Application:**

For air hydraulic pump 6904-25.

**Note:**

The fastening bolts ISO 4762-M5x30 order no. 338244 for fastening without a pressure regulating valve and the fastening bolts ISO 4762-M5x70 order no. 49349 for fastening with a pressure control valve are not supplied as standard.

**Application example:**



## No. 6906

### Pump unit

with pressure relief valve and electronic pressure switch, single- and double-acting, max. operating pressure 200 bar.



| Order no. | Article no.    | Clamping circuits | Q [l/min] | Valve type | Matching control unit | Electric control | Pressure switch | Weight [Kg] |
|-----------|----------------|-------------------|-----------|------------|-----------------------|------------------|-----------------|-------------|
| 327726    | 6906-61660     | 1                 | 2,5       | 4/3        | -                     | -                | -               | 53          |
| 327742    | 6906-61661     | 1                 | 2,5       | 4/3        | 6906B-2-1             | ●                | -               | 61          |
| 327635    | 6906-61661-BZH | 1                 | 2,5       | 4/3        | 6906BZH-2             | ●                | 2               | 61          |
| 327650    | 6906-62660     | 2                 | 2,5       | 4/3        | -                     | -                | -               | 56          |
| 327676    | 6906-62661     | 2                 | 2,5       | 4/3        | 6906B-3-2             | ●                | -               | 64          |

### Design:

Compact, plug-in pump unit, ready for electric and hydraulic operation. Complete with: pressure limiting valve and pressure switch, solenoid valve, pressure gauge, float switch with temperature monitoring, oil fill, electrical control with main switch, indicator lamps and flange sockets. Electrical connection, complete with CEKON connector, pressure filter with filter mesh of 25µm. Oil supply via threaded port.

### Application:

These pump units are mainly used as drive and control elements for single- and double-acting clamping devices.

### Operation type:

Control panel for one and two clamping circuits. Two-hand control panel for only one clamping circuit.

### Features:

The radial piston pump is driven via an alternating current standard motor with the energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermoelement. Pressure setting and pressure monitoring are accomplished via a pressure limiting valve (DBV) and an electronic pressure switch (EDS). The value set at the pressure limiting valve is stored with the Mode button on the pressure switch. This simultaneously sets the preprogrammed switch-off and switch-back point.

- High safety standard through the use of 4/3-way seat valves!
- No unwanted traversing movements. In the event of a loss of power or contact problems, the valve returns to the hermetically sealed centre position.
- Easy activation of external machine controllers (e.g. PLC).

The pump unit works in intermittent mode. In the event of a loss of pressure, the pump is subsequently automatically switched by the pressure switch. In the event of a lack of oil or an increase in oil temperature, the built-in floating switch with temperature monitoring switches the pump off and the fault lamp on the electrical controller lights up.

### Note:

Ensure that the ventilation is working properly when connecting the elements. In the event of a loss of pressure, subsequent pumping must not exceed a maximum of 2 times per minute. The pump unit must not be allowed to run continuously.

### Options:

Clamping circuits: For up to 5 clamping circuits, there is an electrical controller. For more than 5 clamping circuits, there is no electrical controller.

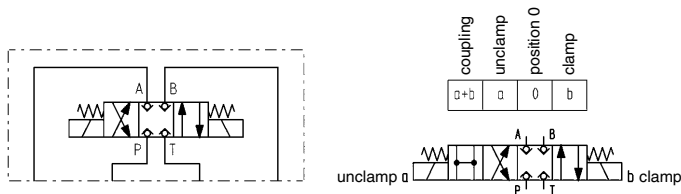
Valve combination: Pressure reduction and clamping pressure monitoring in certain clamping circuits. Pressure reduction for all subsequent clamping circuits. Pressure filter with filter mesh 10µm or 40 µm. Throttle valves for specified clamping circuits.

### On request:

Directional valves with other function diagrams on request.  
Three to five clamping circuits on request.

### Hydraulic diagrams:

Energizing both valve magnets creates a switching position that links all 4 connections to each other. A depressurised state is created that allows easy coupling.

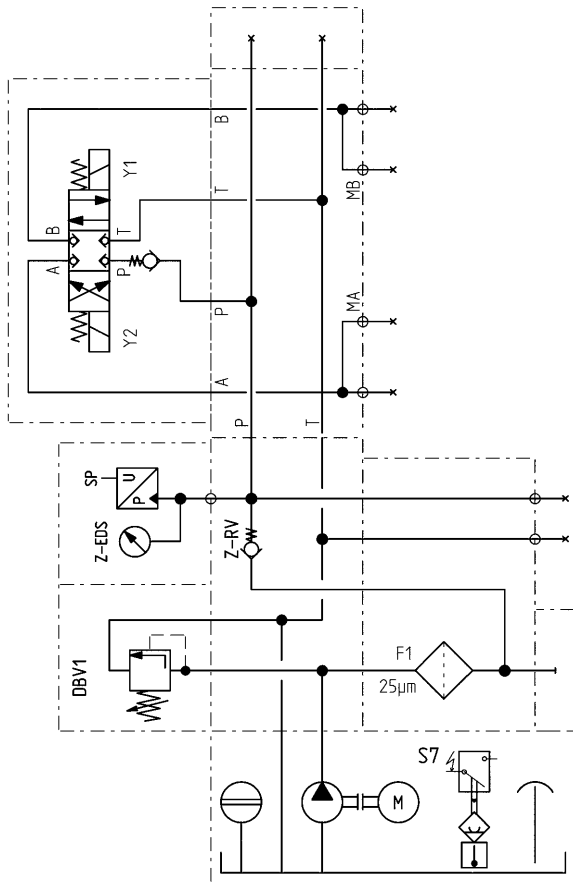


4/3-directional seat valve for single and double-acting consumers

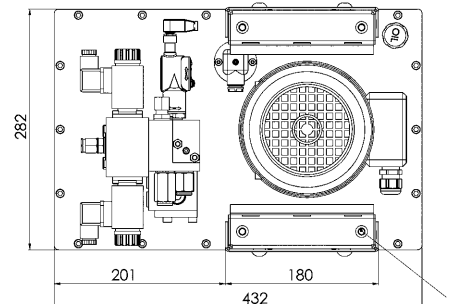
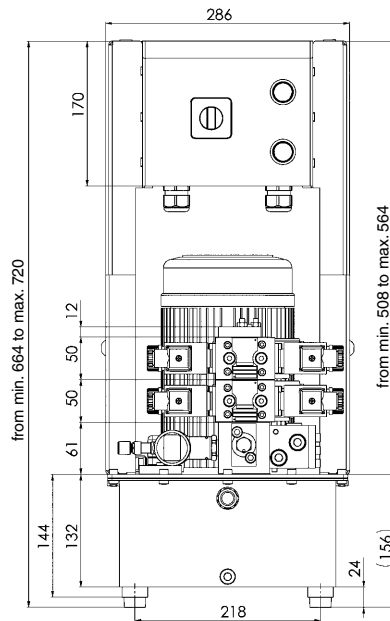
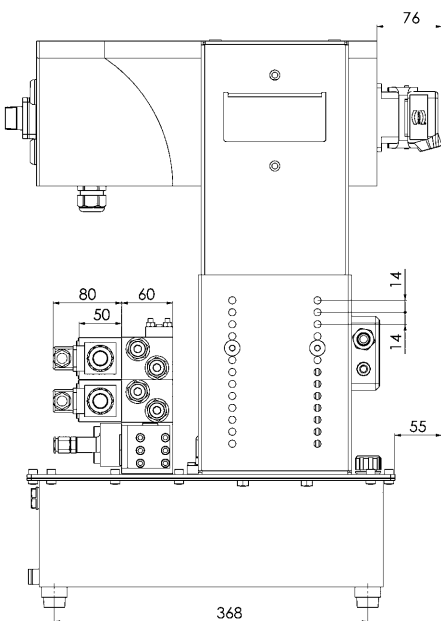
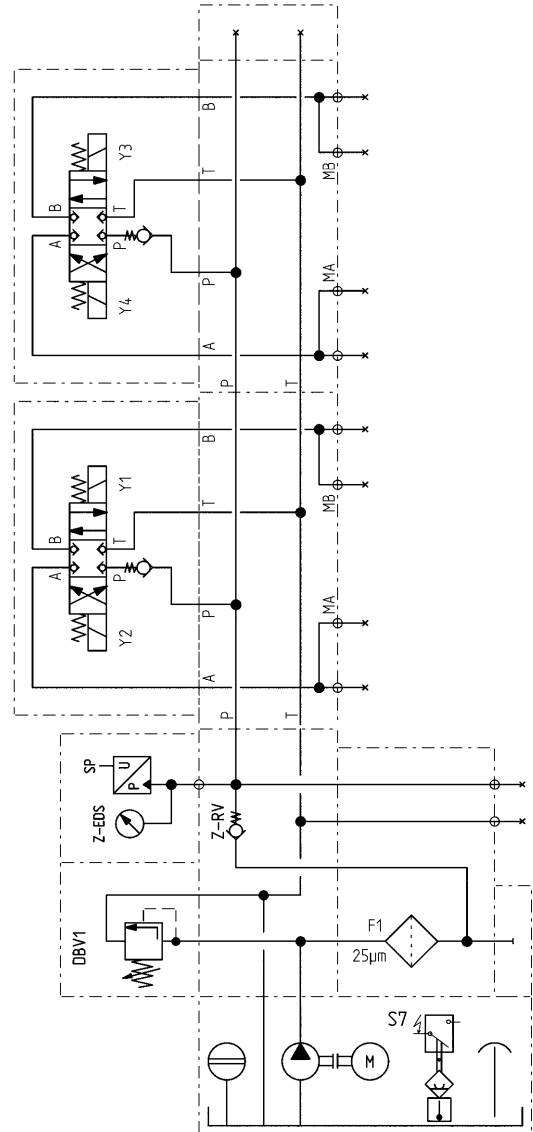


## Hydraulic diagrams with DBV and EDS:

### 1 clamping circuit, double-acting



### 2 clamping circuits, double-acting



M8 thread for lifting devices

Subject to technical alterations.

## No. 6906

### Pump unit

with pressure relief valve and electronic pressure switch, single- and double-acting, max. operating pressure 400 bar.



| Order no. | Article no.    | Clamping circuits | Q [l/min] | Valve type | Matching control unit | Electric control | Pressure switch | Weight [Kg] |
|-----------|----------------|-------------------|-----------|------------|-----------------------|------------------|-----------------|-------------|
| 322214    | 6906-61610     | 1                 | 2,5       | 4/3        | -                     | -                | -               | 53          |
| 325951    | 6906-61611     | 1                 | 2,5       | 4/3        | 6906B-2-1             | ●                | -               | 61          |
| 325969    | 6906-61611-BZH | 1                 | 2,5       | 4/3        | 6906BZH-2             | ●                | 2               | 61          |
| 322230    | 6906-62610     | 2                 | 2,5       | 4/3        | -                     | -                | -               | 56          |
| 325977    | 6906-62611     | 2                 | 2,5       | 4/3        | 6906B-3-2             | ●                | -               | 64          |

### Design:

Compact, plug-in pump unit, ready for electric and hydraulic operation. Complete with: pressure limiting valve and pressure switch, solenoid valve, pressure gauge, float switch with temperature monitoring, oil fill, electrical control with main switch, indicator lamps and flange sockets. Electrical connection, complete with CEKON connector, pressure filter with filter mesh of 25µm. Oil supply via threaded port.

### Application:

These pump units are mainly used as drive and control elements for single- and double-acting clamping devices.

### Operation type:

Control panel for one and two clamping circuits. Two-hand control panel for only one clamping circuit.

### Features:

The radial piston pump is driven via an alternating current standard motor with the energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermoelement. Pressure setting and pressure monitoring are accomplished via a pressure limiting valve (DBV) and an electronic pressure switch (EDS). The value set at the pressure limiting valve is stored with the Mode button on the pressure switch. This simultaneously sets the preprogrammed switch-off and switch-back point.

- High safety standard through the use of 4/3-way seat valves!
  - No unwanted traversing movements. In the event of a loss of power or contact problems, the valve returns to the hermetically sealed centre position.
  - Easy activation of external machine controllers (e.g. PLC).
- The pump unit works in intermittent mode. In the event of a loss of pressure, the pump is subsequently automatically switched by the pressure switch. In the event of a lack of oil or an increase in oil temperature, the built-in floating switch with temperature monitoring switches the pump off and the fault lamp on the electrical controller lights up.

### Note:

Ensure that the ventilation is working properly when connecting the elements. In the event of a loss of pressure, subsequent pumping must not exceed a maximum of 2 times per minute. The pump unit must not be allowed to run continuously.

### Options:

Clamping circuits: For up to 5 clamping circuits, there is an electrical controller. For more than 5 clamping circuits, there is no electrical controller.

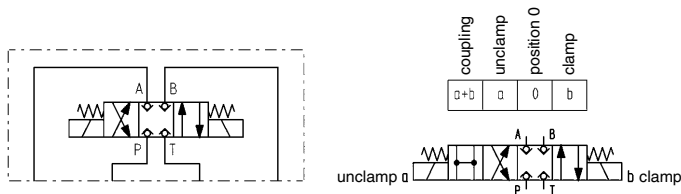
Valve combination: Pressure reduction and clamping pressure monitoring in certain clamping circuits. Pressure reduction for all subsequent clamping circuits. Pressure filter with filter mesh 10µm or 40 µm. Throttle valves for specified clamping circuits.

### On request:

Directional valves with other function diagrams on request.  
Three to five clamping circuits on request.

### Hydraulic diagrams:

Energizing both valve magnets creates a switching position that links all 4 connections to each other. A depressurised state is created that allows easy coupling.



4/3-directional seat valve for single and double-acting consumers

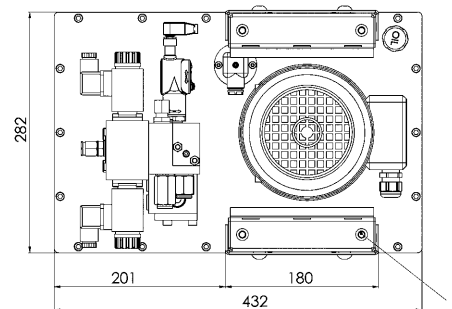
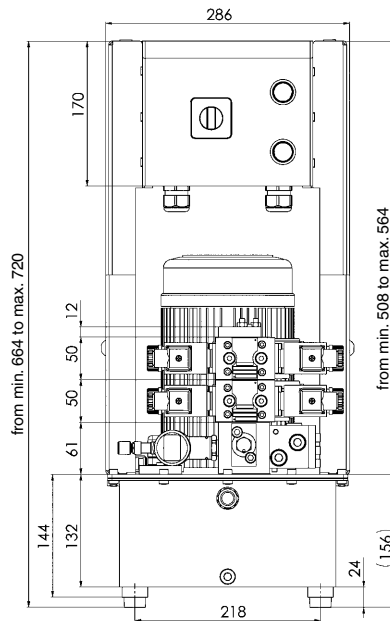
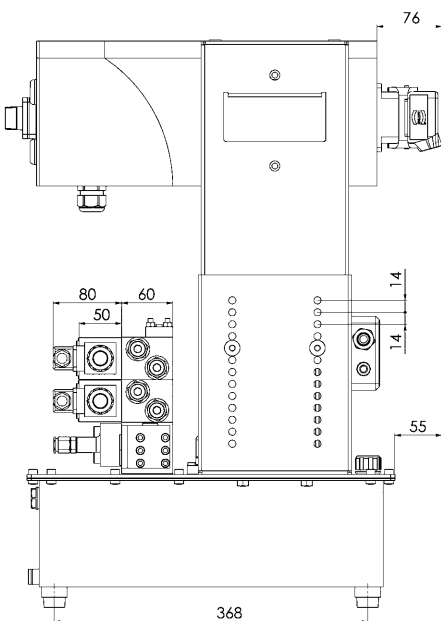
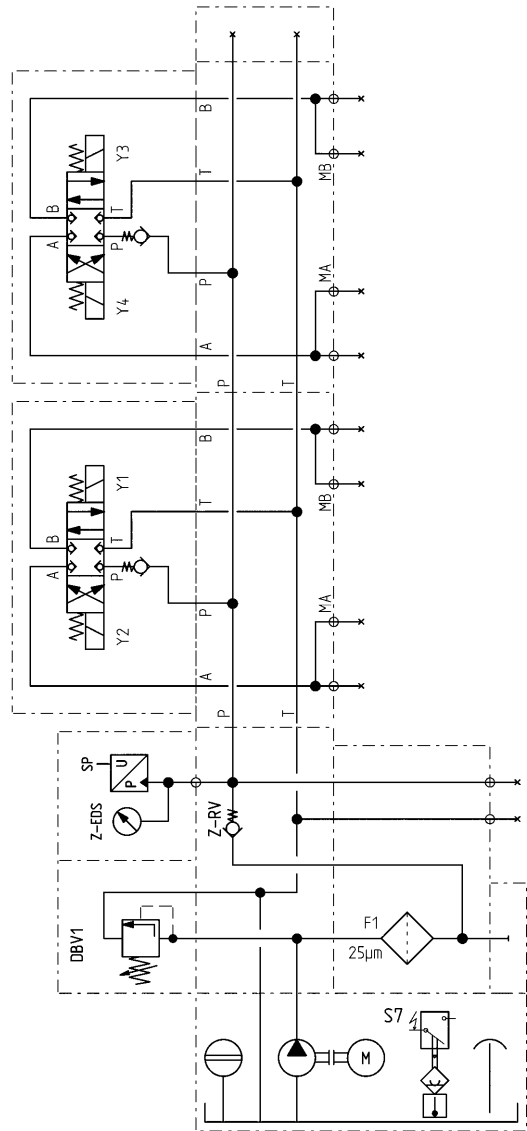
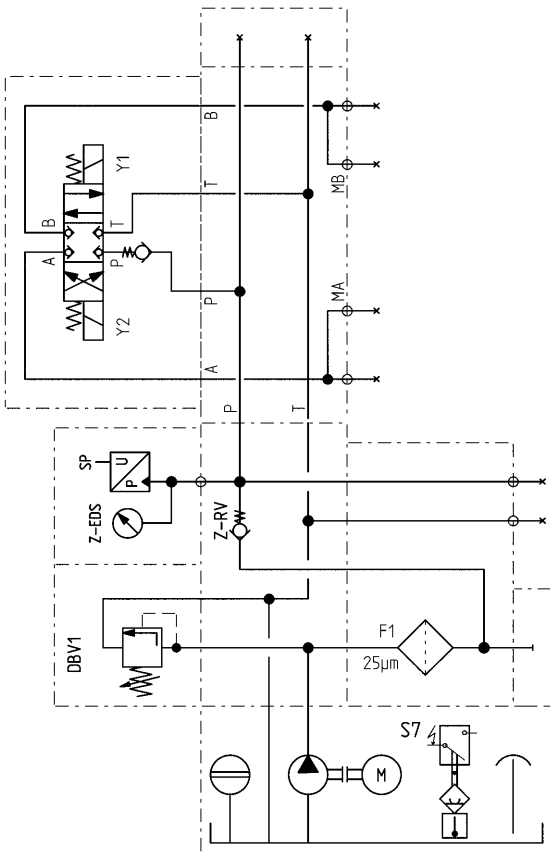


CAD

## Hydraulic diagrams with DBV and EDS:

### 1 clamping circuit, double-acting

### 2 clamping circuits, double-acting



M8 thread for lifting devices

Subject to technical alterations.

## Pump unit No. 6906, 1 and 2 clamping circuits

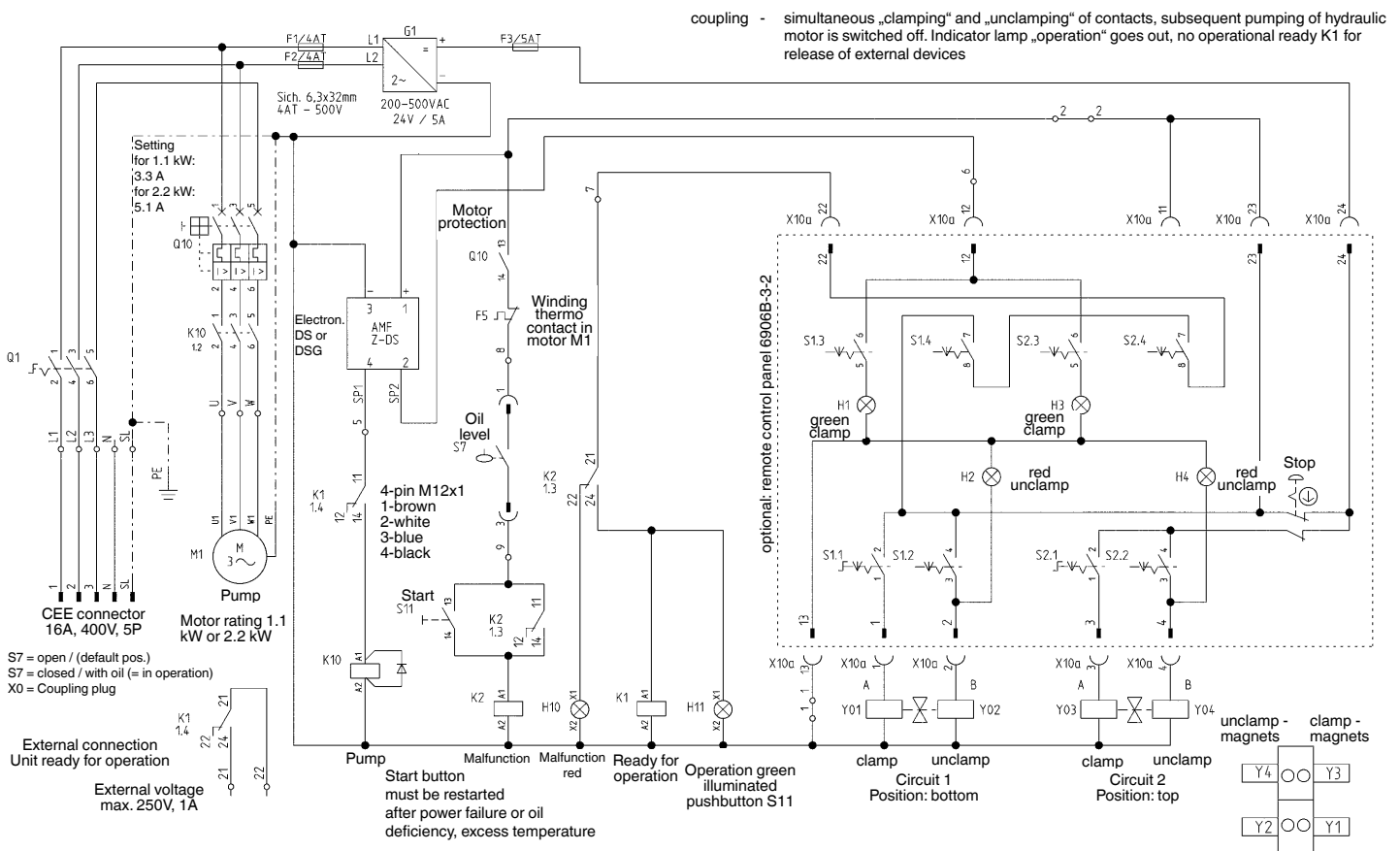
### Hydraulic specifications:

|                           |  |
|---------------------------|--|
| Max. operating pressure   | 200 bar / 400 bar  |
| Oil capacity, reservoir   | 10 litres  |
| Oil capacity, usable      | 4 litres   |
| Oil-flow rate             | 2,5 l/min.   |
| Valve types               | 4/3 seat valve   |
| No. of hydraulic circuits | 1 or 2   |
| Hydraulic connection      | pipe fitting G1/4  |
| Noise level               | max. 70 dB(A)  |
| Ambient temp. range       | -10° C to + 35° C  |
| Position of use           | upright  |
| Pump design               | radial-piston pump with 3 pistons                            |
| Load cycle                | max. 500/h   |
| Fluid                     | hydraulic oils<br>HLP and HLPD according to DIN 51524 part 2 |
| Oil recommendation        | HLP 22 and HLPD 22 or<br>HLP 32 and HLPD 32                  |
| Viscosity                 | ISO VG 22 and 32 DIN 51519                                   |

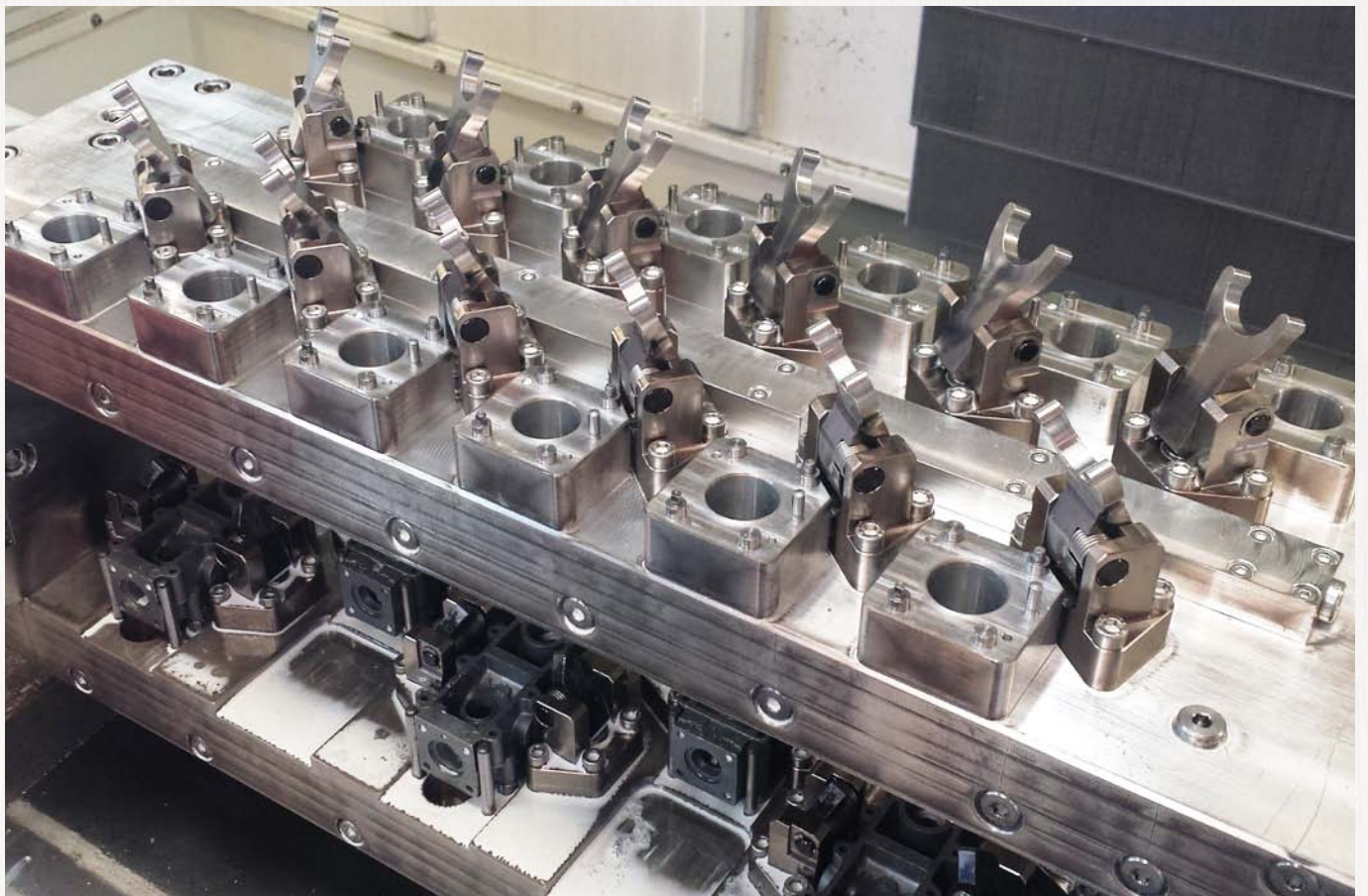
### Electrical specifications:

|                       |  |
|-----------------------|--|
| Nominal voltage       | 400 V/50 Hz three-phase  |
| Control voltage       | 24 V DC  |
| Valve voltage         | 24 V DC  |
| Motor speed           | 2900 1/min.  |
| Direction of rotation | any  |
| Motor rating          | 1,1 kW   |
| Motor type            | three-phase standard motor   |
| Nominal current       | 3 A  |
| Fuse, supply line     | 16 A slow-blow   |
| Fuse, control circuit | 2 A primary, 8 A secondary   |
| Electrical connection | Ölflex 100; 5×1,5 mm <sup>2</sup><br>3 m with CEE connector 16 A 6 h |
| Protection class      | IP 54  |
| Duty cycle            | max. 50 % intermittent operation                                     |

## Wiring circuit of pump unit with 2 clamping circuits, remote control



To increase safe handling of the clamped parts, the unit ready for operation and a clamping pressure query should be integrated with the processing machine.



Subject to technical alterations.

## No. 6906N

### Pump unit

With pressure limiting valve and electronic pressure switches, double-acting.

| Order no. | Article no. | Clamping circuits | Q [l/min] | Valve type | Matching control unit | Electric control | max. operating pressure [bar] | Weight [Kg] |
|-----------|-------------|-------------------|-----------|------------|-----------------------|------------------|-------------------------------|-------------|
| 328930    | 6906N-61666 | 1                 | 2,5       | 4/3        | 6906B-2-1             | ●                | 200                           | 61          |
| 328955    | 6906N-61616 | 1                 | 2,5       | 4/3        | 6906B-2-1             | ●                | 400                           | 61          |

### Design:

Compact, plug-in energy-saving pump unit, ready for electric and hydraulic operation. Complete with: pressure limiting valve and pressure switch, solenoid valve, pressure gauge, float switch with temperature monitoring, oil fill, electrical control with main switch, indicator lamps and flange sockets. Electrical connection, complete with CEKON connector, pressure filter with filter mesh of 25µm. Oil supply via threaded port.

### Application:

This pump unit is used predominantly as a drive and control element for single and double-acting clamping fixtures.

#### Control method:

For connection of 1-circuit control console no. 6906B-2-1 order no. 324723

### Features:

The radial piston pump is driven via an alternating current standard motor with the energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermoelement. The pressure is set via a pressure limiting valve (PLV) and centralised electronic pressure switch (EPS). The pressure is set via the electronic pressure switch (EPS) in the A and B channel. They sit directly in the directional control valve. These EPS control the directional control valve in the working or zero position and output signals for switching the pump motor on and off.

- Reduced power consumption and lower temperature rise
- No heat influence on the oil column in the distributors and loads
- No hazard to components due to excessive rise in pressure
- No risk of injury from hand contact
- No drop in magnetic force
- Prolonged service life of the magnets

The pump unit works in intermittent mode. If pressure drops in the A- or B-channel, the pump is automatically switched on afterward by the electronic pressure switch EDS. In case of low oil level or an increase in oil temperature, the built-in floating switch with temperature monitoring switches the pump off and the fault lamp on the electrical controller comes on.

### Note:

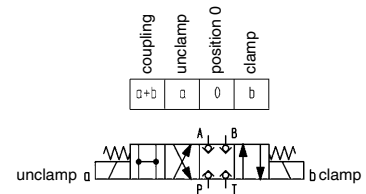
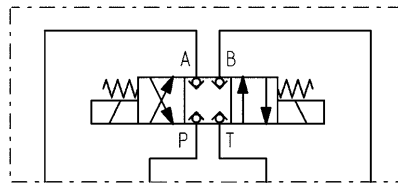
Ensure correct bleeding when connecting elements. In the event of a loss of pressure, subsequent pumping must not exceed a maximum of 2 times per minute. The pump unit must not run continuously.

### On request:

Two, three and four clamping circuits on request.

### Hydraulic diagrams:

Energizing both valve magnets creates a switching position that links all 4 connections to each other. A depressurised state is created that allows easy coupling.



4/3-directional seat valve for double-acting consumers



## Pump unit No. 6906N

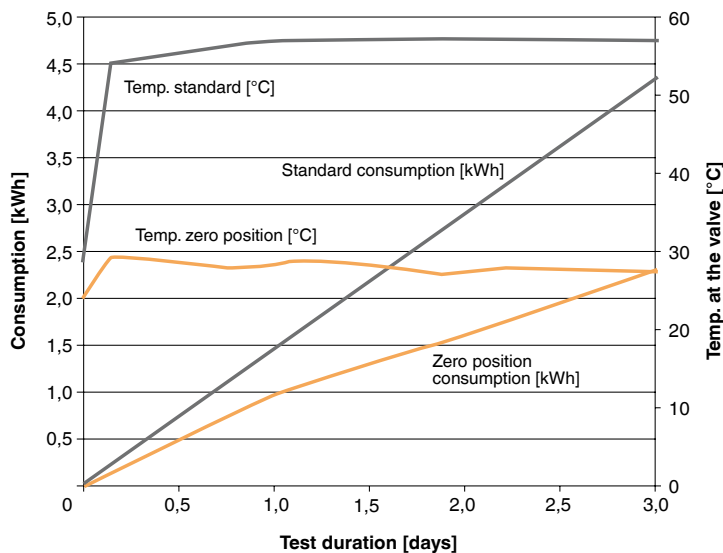
### Hydraulic specifications:

|                           |   |
|---------------------------|---|
| Max. operating pressure   | 200 bar / 400 bar   |
| Oil capacity, reservoir   | 10 litres   |
| Oil capacity, usable      | 4 litres  |
| Oil-flow rate             | 2,5 l/min.  |
| Valve types               | 4/3 seat valve  |
| No. of hydraulic circuits | 1   |
| Hydraulic connection      | pipe fitting G1/4   |
| Noise level               | max. 70 dB(A)   |
| Ambient temp. range       | -10° C to +35° C  |
| Position of use           | upright   |
| Pump design               | radial-piston pump with 3 pistons                               |
| Load cycle                | max. 500/h  |
| Fluid                     | hydraulic oils<br>HLP and HLPD according to DIN 51524<br>part 2 |
| Oil recommendation        | HLP 22 and HLPD 22 or<br>HLP 32 and HLPD 32                     |
| Viscosity                 | ISO VG 22 and 32 DIN 51519                                      |

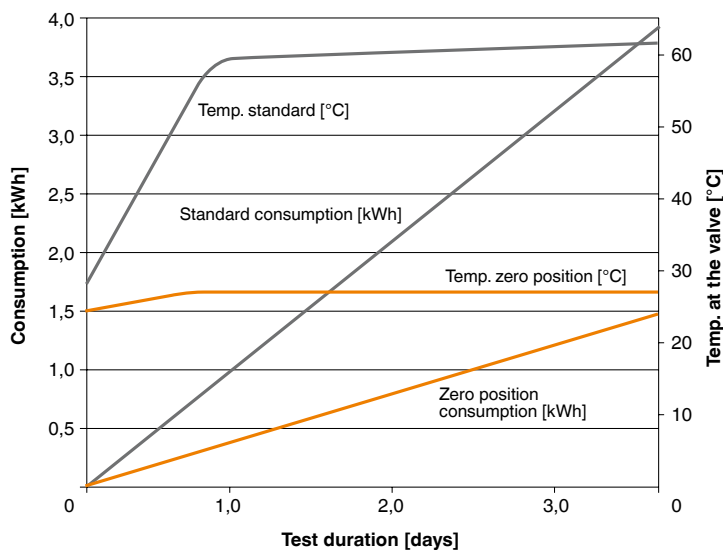
### Electrical specifications:

|                       |  |
|-----------------------|--|
| Nominal voltage       | 400 V/50 Hz three-phase  |
| Control voltage       | 24 V DC  |
| Valve voltage         | 24 V DC  |
| Motor speed           | 2900 1/min.  |
| Direction of rotation | any  |
| Motor rating          | 1,1 kW   |
| Motor type            | three-phase standard motor   |
| Nominal current       | 3 A  |
| Fuse, supply line     | 16 A slow-blow   |
| Fuse, control circuit | 2 A primary, 8 A secondary   |
| Electrical connection | Ölflex 100; 5×1,5 mm <sup>2</sup><br>3 m with CEE connector 16 A 6 |
| Protection class      | IP 54  |
| Duty cycle            | max. 50 % intermittent operation                                   |

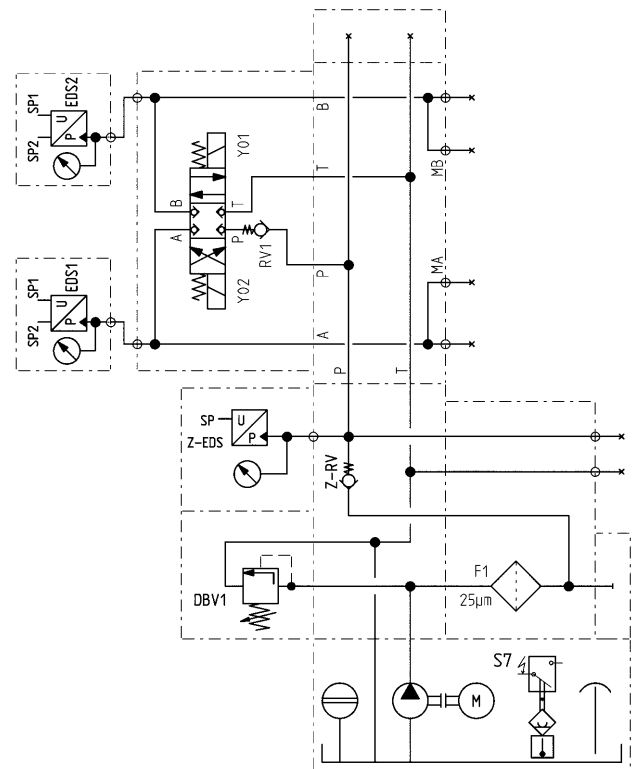
### Cycle time 3 min.:



### Cycle time 10 min.:



### Hydraulic diagram:



## No. 6906

### Pump unit

with pressure-control device (DSG),  
single- and double-acting,  
max. operating pressure 400 bar.



| Order no. | Article no.    | Clamping circuits | Q [l/min] | Valve type | Matching control unit | Electric control | Pressure switch | Weight [Kg] |
|-----------|----------------|-------------------|-----------|------------|-----------------------|------------------|-----------------|-------------|
| 324590    | 6906-61620     | 1                 | 2,5       | 4/3        | -                     | -                | -               | 53          |
| 326033    | 6906-61621     | 1                 | 2,5       | 4/3        | 6906B-2-1             | ●                | -               | 61          |
| 326041    | 6906-61621-BZH | 1                 | 2,5       | 4/3        | 6906BZH-2             | ●                | 2               | 61          |
| 324616    | 6906-62620     | 2                 | 2,5       | 4/3        | -                     | -                | -               | 56          |
| 326058    | 6906-62621     | 2                 | 2,5       | 4/3        | 6906B-3-2             | ●                | -               | 64          |

### Design:

Compact, plug-in pump unit, ready for electric and hydraulic operation. Complete with: Pressure-control device, solenoid valve, pressure gauge, floating switch with temperature monitoring, oil filling, electrical control with main switch, indicator lamps and flange sockets. Electrical connection, complete with CEKON connector, pressure filter with filter mesh of 25µm. Oil supply via threaded port.

### Application:

These pump units are mainly used as drive and control elements for single- and double-acting clamping devices.

### Operation type:

Control panel for one and two clamping circuits. Two-hand control panel for only one clamping circuit.

### Features:

The radial piston pump is driven via an alternating current standard motor to energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermocouple. Pressure setting and pressure monitoring are made via a pressure control device. The pressure control device combines the pressure limiting valve (PLV) and the pressure switch (PS) in a single device. The pressure is continuously adjustable over the entire pressure range by means of an adjustment sleeve. The point for restarting is about 10-15% below the switch-off point.

- High safety standard through the use of 4/3-directional seat valves!
- No unwanted travel movements. In the event of a loss of power or contact problems, the valve returns to the hermetically sealed centre position.
- Easy actuation by external machine controllers (e.g. PLC).

The pump unit works intermittently. In the event of a loss of pressure, the pump is subsequently automatically switched by the pressure control device. In case of low oil level or an increase in oil temperature, the built-in floating switch with temperature monitoring switches the pump off and the fault lamp on the electrical controller comes on.

### Note:

Ensure that the ventilation is working properly when connecting the elements. In the event of a loss of pressure, subsequent pumping must not exceed a maximum of 2 times per minute. The pump unit must not be allowed to run continuously.

### Options:

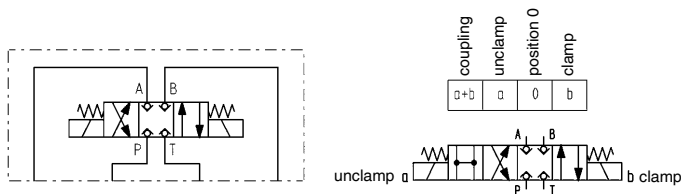
Clamping circuits: For up to 5 clamping circuits, there is an electrical controller. For more than 5 clamping circuits, there is no electrical controller.  
Valve combination: Pressure reduction and clamping pressure monitoring in certain clamping circuits. Pressure reduction for all subsequent clamping circuits. Pressure filter with filter mesh 10µm or 40 µm. Throttle valves for specified clamping circuits.

### On request:

Directional valves with other function diagrams on request.  
Three to five clamping circuits on request.

### Hydraulic diagrams:

Energizing both valve magnets creates a switching position that links all 4 connections to each other. A depressurised state is created that allows easy coupling.

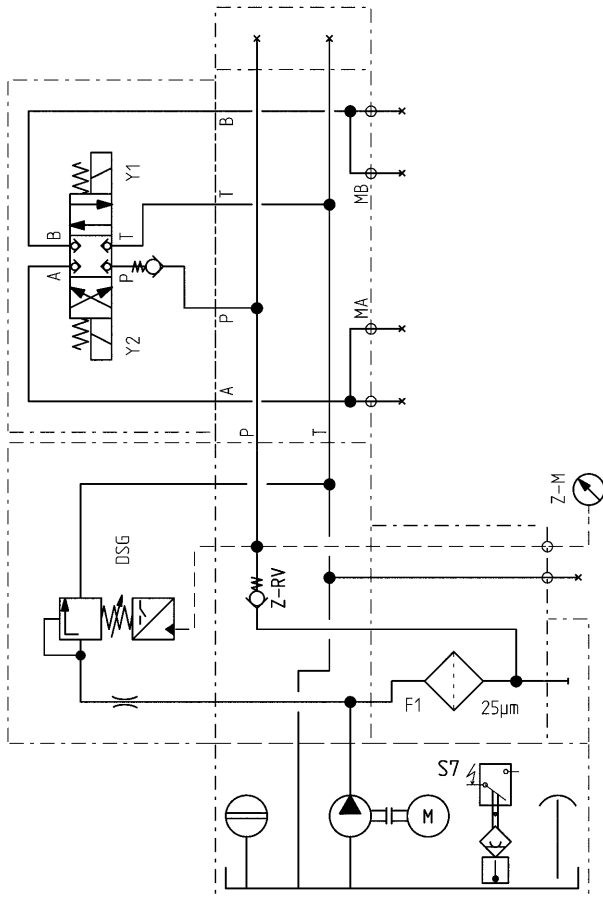


4/3-directional seat valve for single and double-acting consumers

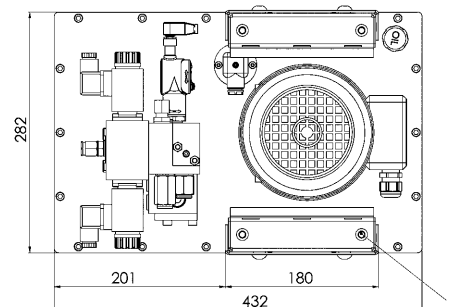
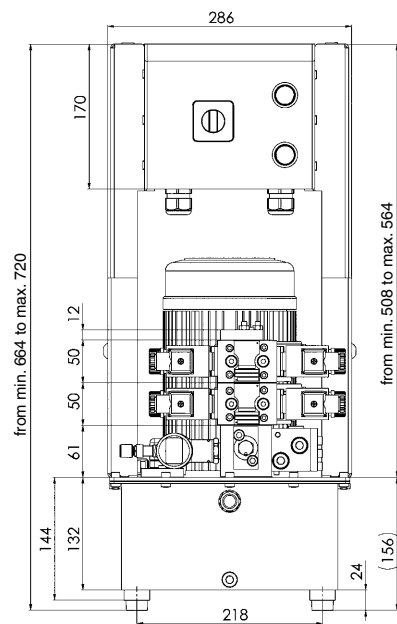
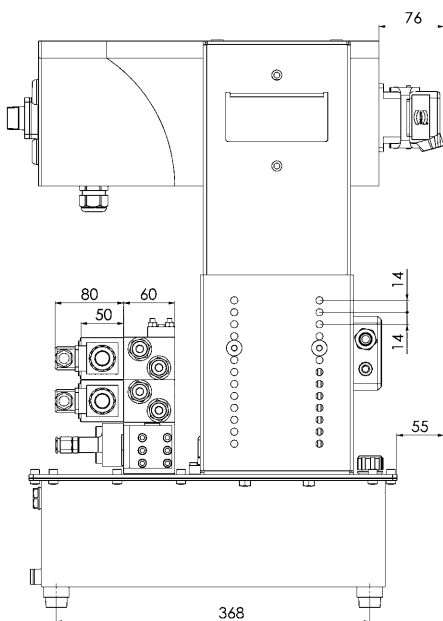
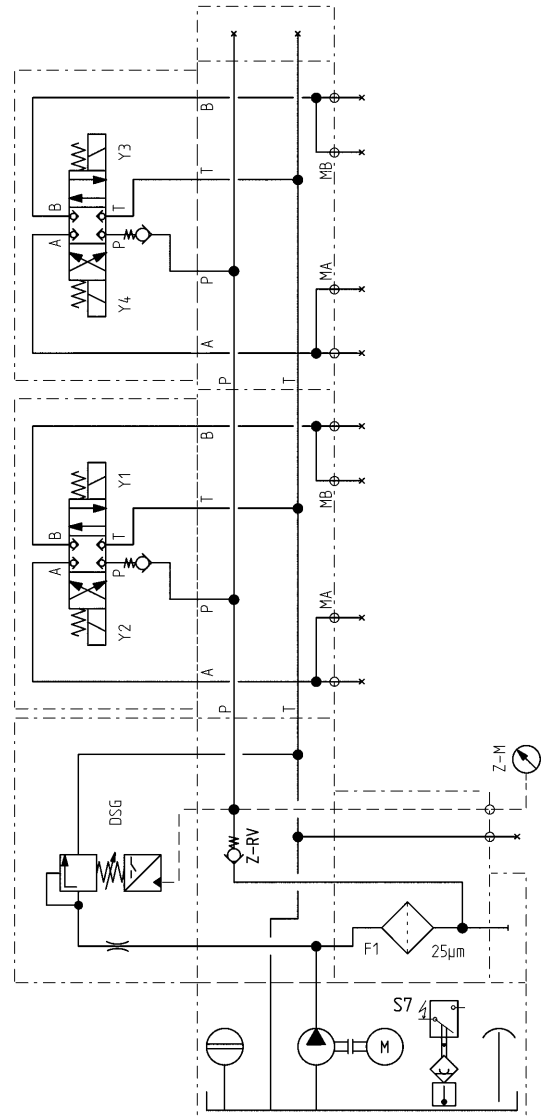


## Hydraulic diagrams with DSG:

### 1 clamping circuit, double-acting



### 2 clamping circuits, double-acting



M8 thread for lifting devices

Subject to technical alterations.

## Pump unit No. 6906, 1 and 2 clamping circuits

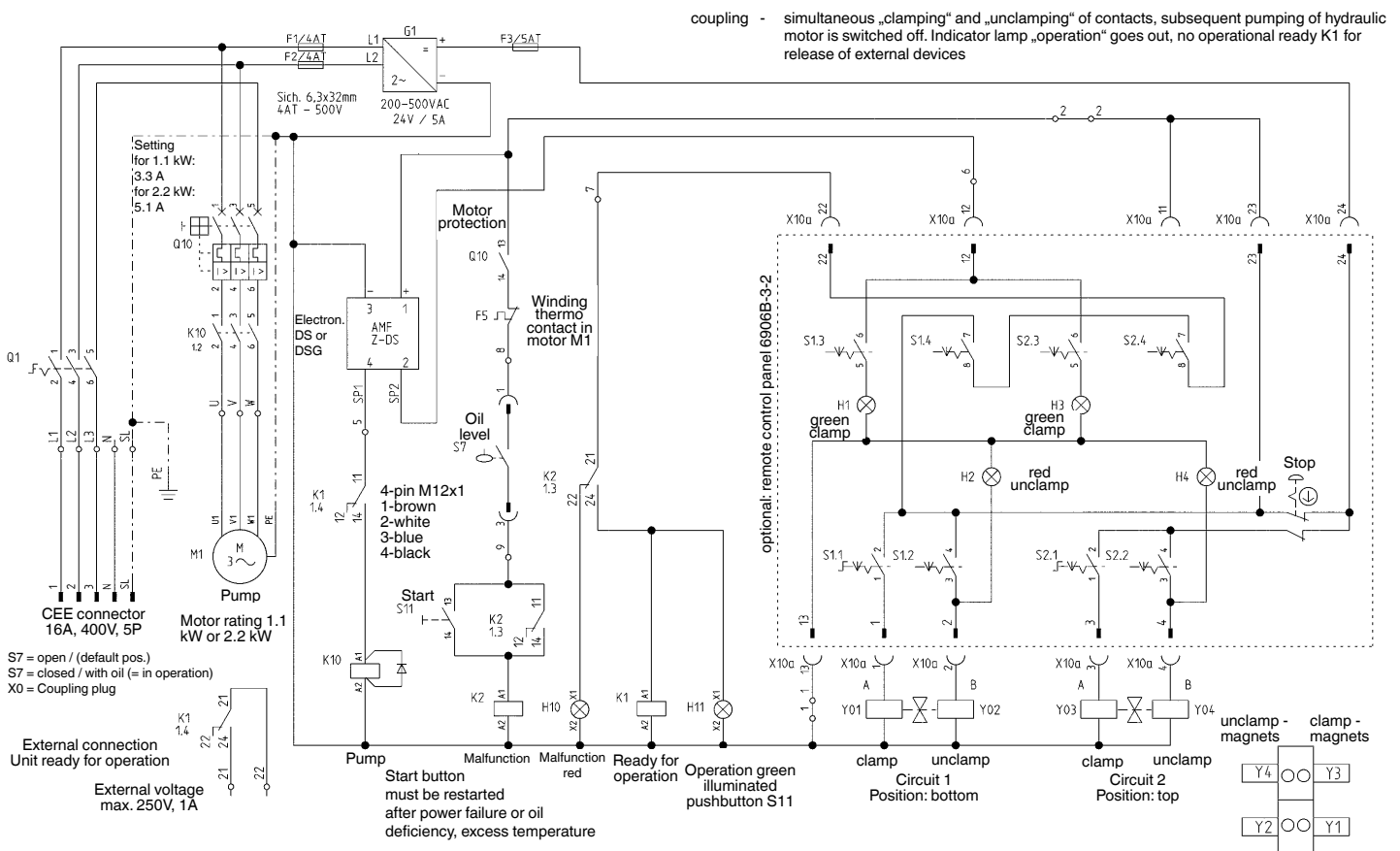
### Hydraulic specifications:

|                           |  |
|---------------------------|--|
| Max. operating pressure   | 400 bar  |
| Oil capacity, reservoir   | 10 litres  |
| Oil capacity, usable      | 4 litres   |
| Oil-flow rate             | 2,5 l/min.   |
| Valve types               | 4/3 seat valve   |
| No. of hydraulic circuits | 1 or 2   |
| Hydraulic connection      | pipe fitting G1/4  |
| Noise level               | max. 70 dB(A)  |
| Ambient temp. range       | -10° C to + 35° C  |
| Position of use           | upright  |
| Pump design               | radial-piston pump with 3 pistons                            |
| Load cycle                | max. 500/h   |
| Fluid                     | hydraulic oils<br>HLP and HLPD according to DIN 51524 part 2 |
| Oil recommendation        | HLP 22 and HLPD 22 or<br>HLP 32 and HLPD 32                  |
| Viscosity                 | ISO VG 22 and 32 DIN 51519                                   |

### Electrical specifications:

|                       |  |
|-----------------------|--|
| Nominal voltage       | 400 V/50 Hz three-phase  |
| Control voltage       | 24 V DC  |
| Valve voltage         | 24 V DC  |
| Motor speed           | 2900 1/min.  |
| Direction of rotation | any  |
| Motor rating          | 1,1 kW   |
| Motor type            | three-phase standard motor   |
| Nominal current       | 3 A  |
| Fuse, supply line     | 16 A slow-blow   |
| Fuse, control circuit | 2 A primary, 8 A secondary   |
| Electrical connection | Ölflex 100; 5×1,5 mm <sup>2</sup><br>3 m with CEE connector 16 A 6 h |
| Protection class      | IP 54  |
| Duty cycle            | max. 50 % intermittent operation                                     |

## Wiring circuit of pump unit with 2 clamping circuits, remote control



To increase safe handling of the clamped parts, the unit ready for operation and a clamping pressure query should be integrated with the processing machine.

# MODULAR PUMP UNIT NO. 6906

## POSSIBLE VERSIONS OF PUMP UNITS:

**Tank volume:** 10,0 litres

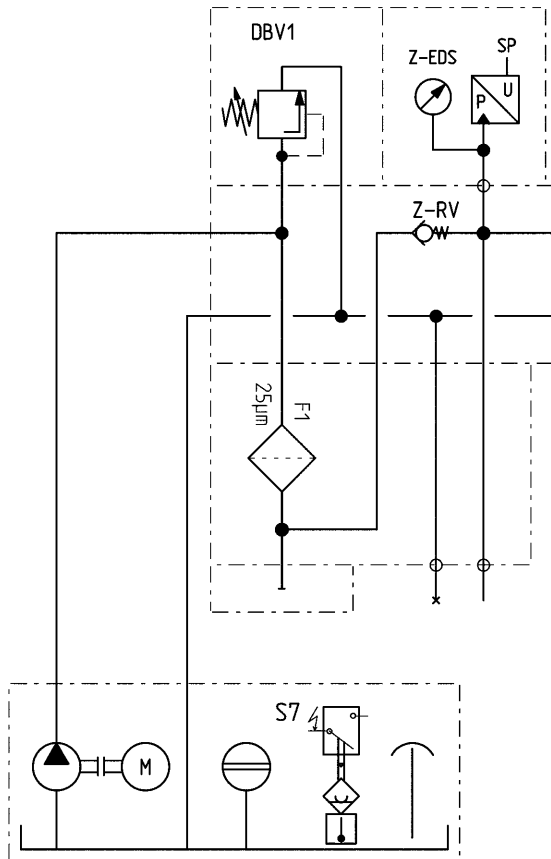
**Oil capacity,  
usable:** 4,0 litres

**Oil-flow rate:** 2,5 l/min. or  
5,0 l/min.

**Clamping  
circuits:** Up to 5 clamping circuits including  
electrical control. For more than 5  
clamping circuits without electrical  
control

**Further options:**

- > Two-hand remote-control panel (only for pump units with 1 clamping circuit)
- > Pressure-control device for stepless pressure adjustment by a single spindle
- > Valve combinations with pressure-control and throttle valves



RKP 2,5 : Q = 2,5 l/min, n = 2900 U/min.  
Tank volume 10 l, P = 1,1 kW

### BASE UNIT



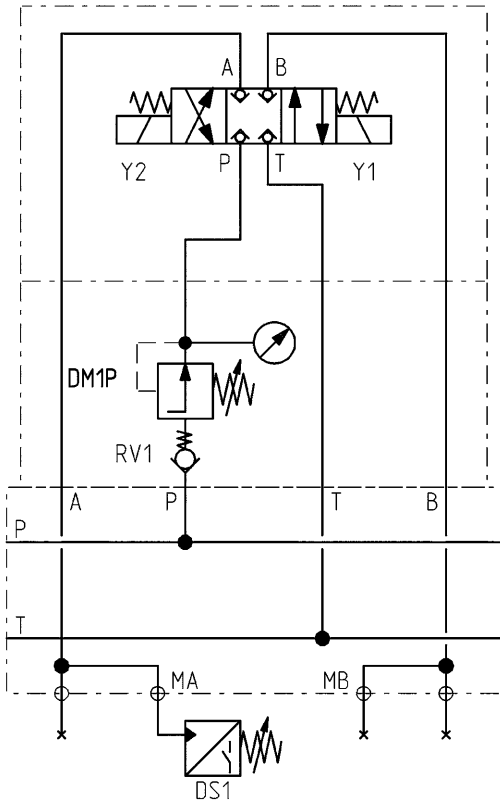
### ... WITH VALVES



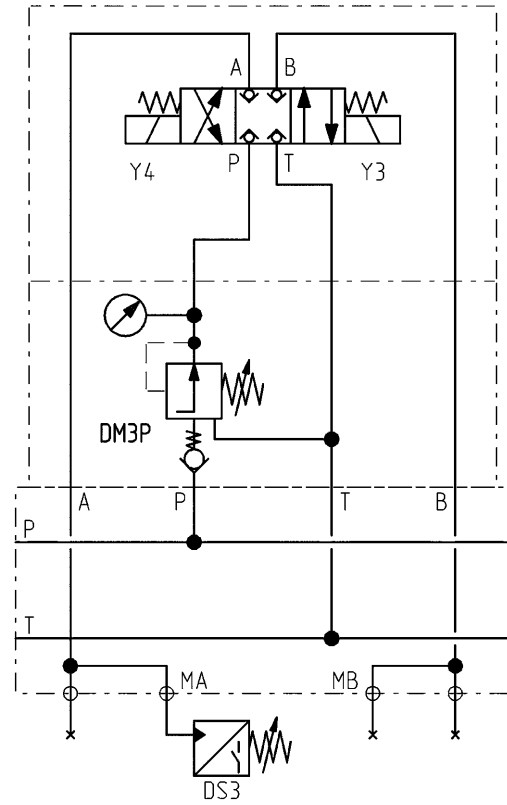
### ... WITH VALVES AND CONTROLLER



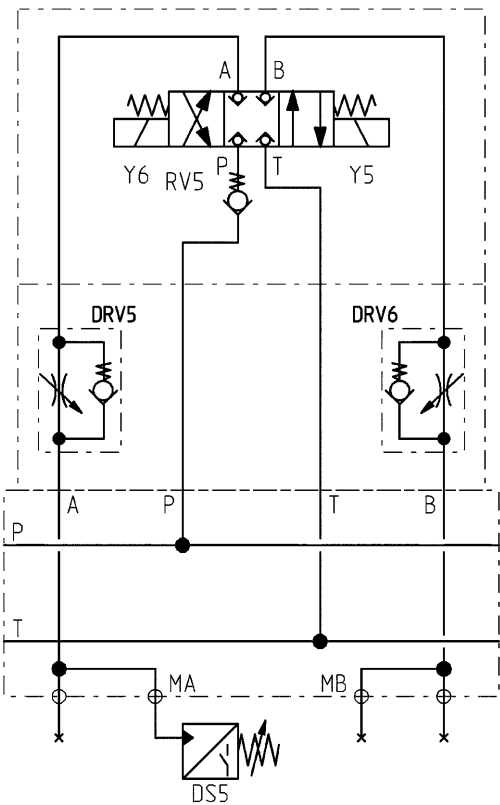
Spacer plates - pressure-control valve  
Control function in P



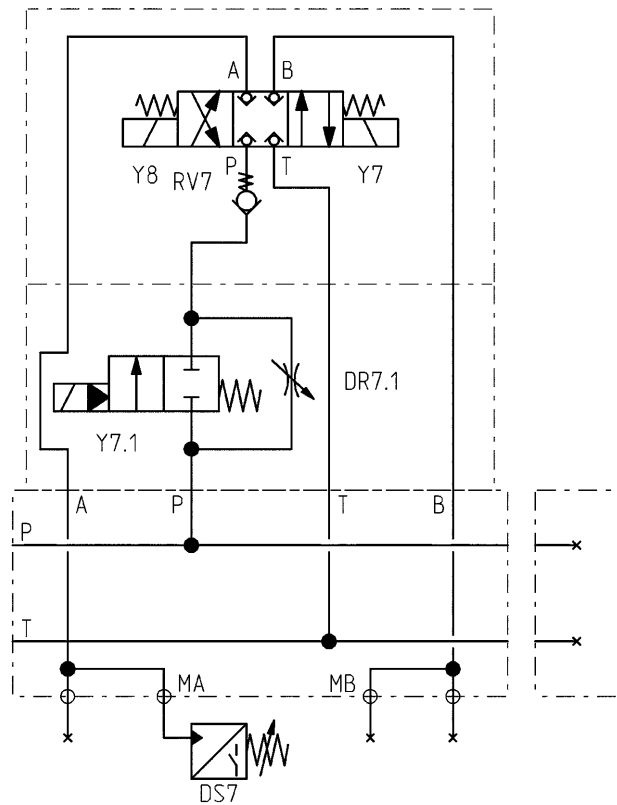
Spacer plates - 3-way pressure-control valve  
Control function in P



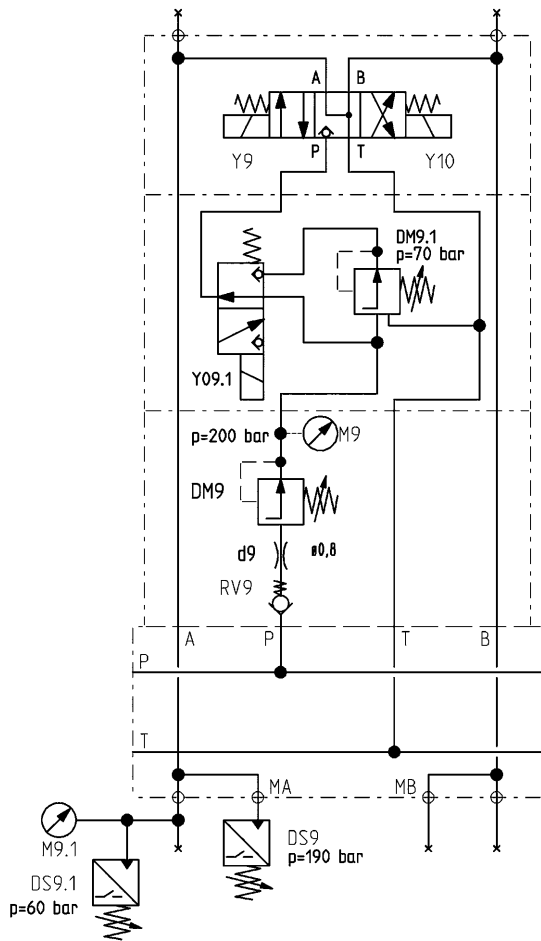
Spacer plates - twin-type  
throttle check valve



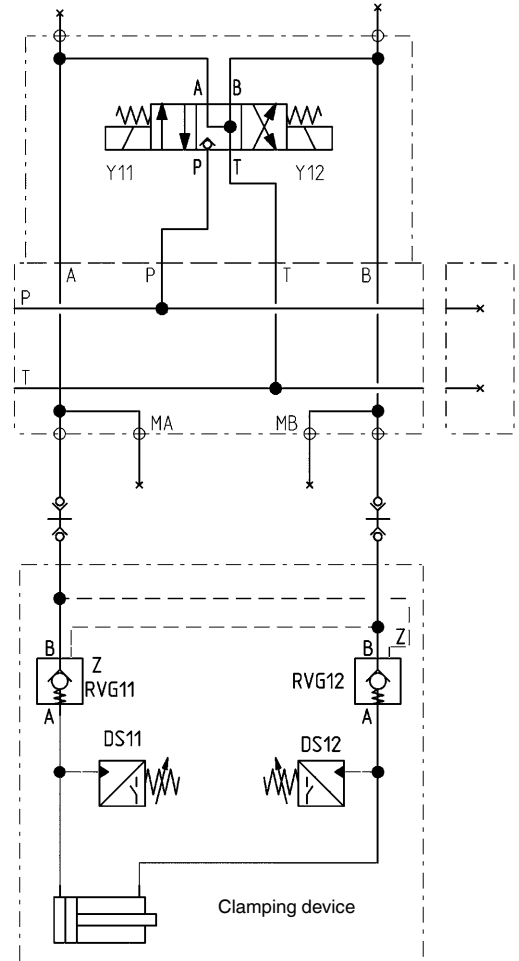
Spacer plate with connectable throttle  
Function in P



Combination of directional valve zero position, in which A, B and T are connected, plus pressure control in P with two pressure levels in one circuit.

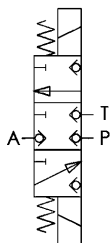


Combination of directional valve zero position, in which A, B and T are connected, plus unlockable check valves at the consumer.

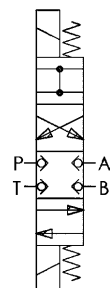


## SPECIAL VALVES AVAILABLE ON REQUEST

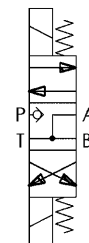
6910A-07-02



6911A-07-01



6911A-07-02



## No. 6906BS-1

### Coupling Plug

with pin



| Order no. | Article no. | Control voltage | Number of poles | Weight [g] |
|-----------|-------------|-----------------|-----------------|------------|
| 60772     | 6906BS-1    | 24 V =          | 24              | 122        |

#### Design:

Aluminium die-cast housing. In locked position - protection class IP65.

#### Application:

Connection to the machine side as replacement part for control panel or for external control of pump unit.

## No. 6906BS-2

### Coupling Plug

with bush



| Order no. | Article no. | Control voltage | Number of poles | Weight [g] |
|-----------|-------------|-----------------|-----------------|------------|
| 61895     | 6906BS-2    | 24 V =          | 24              | 122        |

#### Design:

Aluminium die-cast housing. In locked position - protection class IP65.

#### Application:

Connection to the unit side for external querying of pressure.

## No. 6906BS-3

### Surface-mounted housing

with pin



| Order no. | Article no. | Control voltage | Number of poles | Weight [g] |
|-----------|-------------|-----------------|-----------------|------------|
| 66118     | 6906BS-3    | 24 V =          | 24              | 145        |

#### Design:

Aluminium die-cast housing. In locked position - protection class IP65.

#### Application:

Connection to the unit side for external querying of pressure.

## No. 6906BS-4

### Surface-mounted housing

with bush



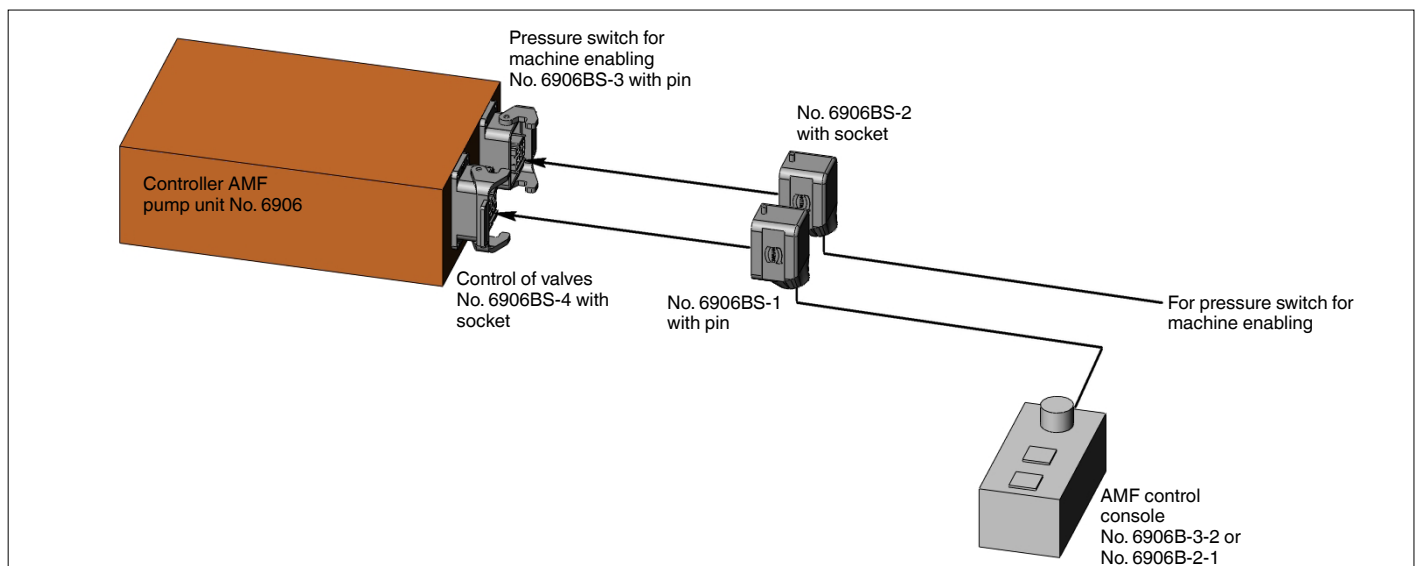
| Order no. | Article no. | Control voltage | Number of poles | Weight [g] |
|-----------|-------------|-----------------|-----------------|------------|
| 66126     | 6906BS-4    | 24 V =          | 24              | 145        |

#### Design:

Aluminium die-cast housing. In locked position - protection class IP65.

#### Application:

Connection to the machine side as replacement part for pump unit.



Subject to technical alterations.



## No. 6906B-2-1

1-circuit remote control (rotary switch)

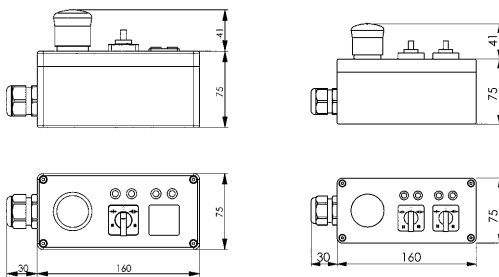
## No. 6906B-3-2

2-circuit remote control (rotary switch)



6906B-2-1

6906B-3-2



| Order no. | Article no. | Control voltage | Number of poles | Cable length | Weight |
|-----------|-------------|-----------------|-----------------|--------------|--------|
|           |             |                 |                 | [m]          | [g]    |
| 324723    | 6906B-2-1   | 24 V =          | 24              | 5            | 1660   |
| 323394    | 6906B-3-2   | 24 V =          | 24              | 5            | 1660   |

### Design:

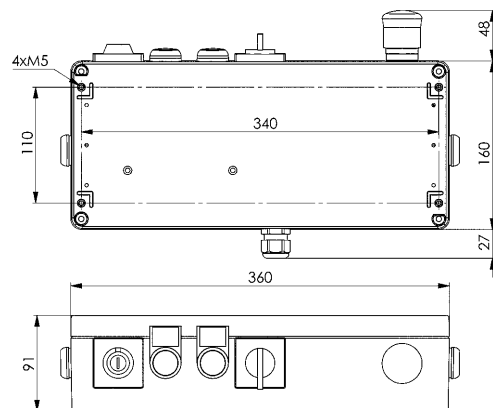
Compact polyester housing with control elements, cable and coupling plug. Protection class IP65.

### Application:

The control panel has a selector switch „coupling-clamping-0-unclamping-coupling“ for each clamping circuit, and a black STOP mushroom push button for stopping the pump and valves. During clamping and unclamping the corresponding valve is switched. In switch position 0, the valve is spring loaded and returns to the zero position (mostly locked zero position). In the coupling position both magnets are switched at the same time. The pump is switched off. In addition, the „Operation“ indicator lights on the unit go out and the readiness for external machine enabling is switched off. In external machine enabling, the signal „ready for operation“ and one pressure switch on each of the clamping points to be monitored should be integrated.

## No. 6906BZH-2

Two-hand safety operator panel



| Order no. | Article no. | Control voltage | Cable length | Weight |
|-----------|-------------|-----------------|--------------|--------|
|           |             |                 | [m]          | [g]    |
| 324426    | 6906BZH-2   | 24 V =          | 5            | 4840   |

### Design:

Compact cast aluminium housing with control elements, cable and coupling plug.

### Application:

The two-handed safety operating panel may be used only in combination with the pump units from Andreas Maier GmbH & Co. KG. It is suitable for the units with the following order numbers: 327635, 325969 or 326041.

The two-handed safety operating panel controls fixtures (cylinders, etc.) on which hazardous extension and retraction movements (strokes  $\geq 4$  mm) can occur.

The following fluidic system requirements must be met for the operating panel function:

- 4/3-way valve with hermetically sealed zero position.

Alternatively, the combination of a 4/3-way valve, in which A, B and T are connected and P locked in the zero position, with at least one controlled check valve for the dangerous consumer line, or a controlled twin check valve, is possible.

- Pressure switch in channels A and B

To convert an existing unit to two-handed operation, please contact Andreas Maier GmbH & Co. KG.

### Mounting:

Plug the cable with the plug into the remote control connector of the pump unit. Set the pressure switch to operate at about 75% of the pressure in the clamping circuit. The M5 threads can be used for external fastening from below.

### Operation:

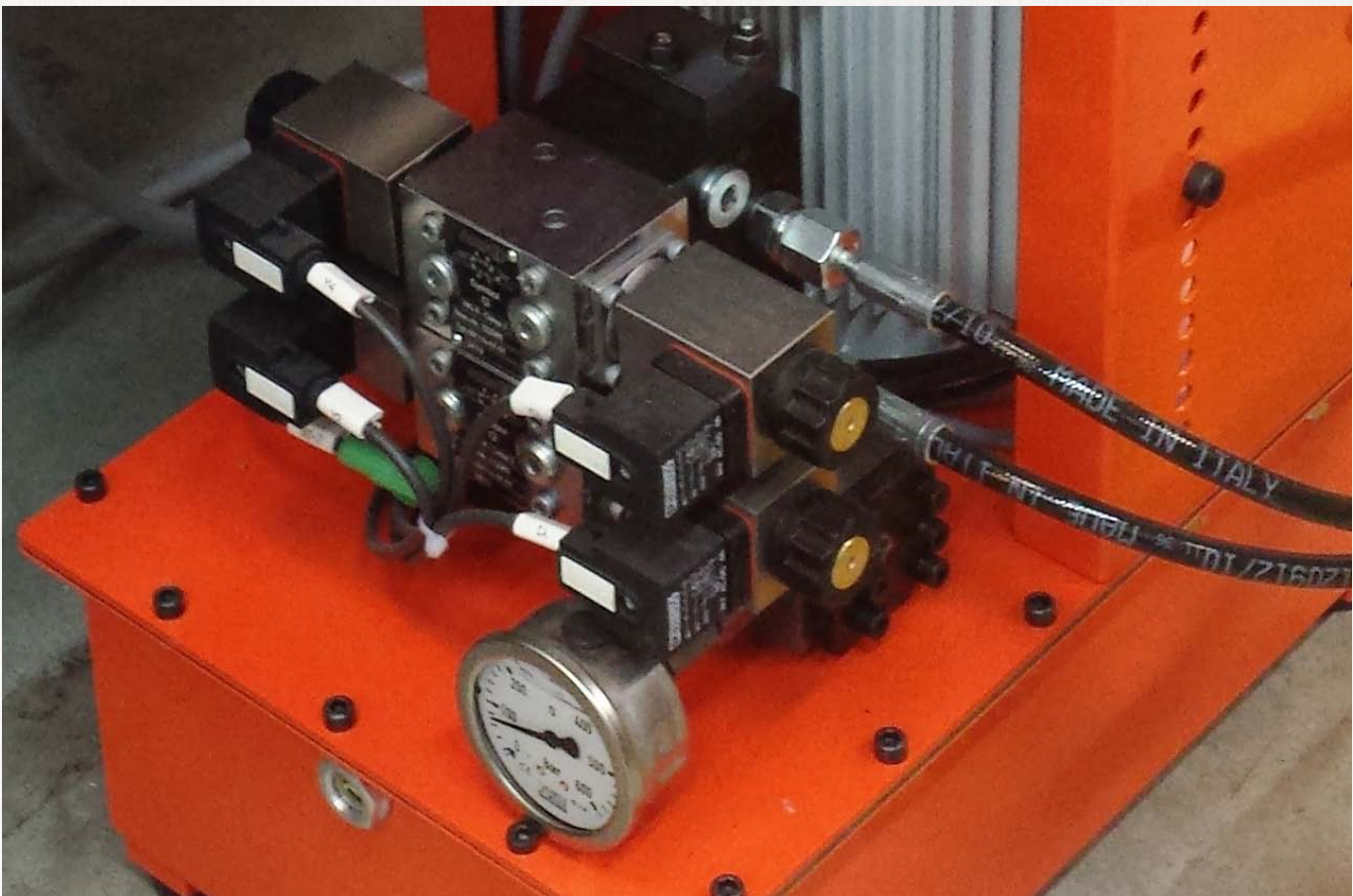
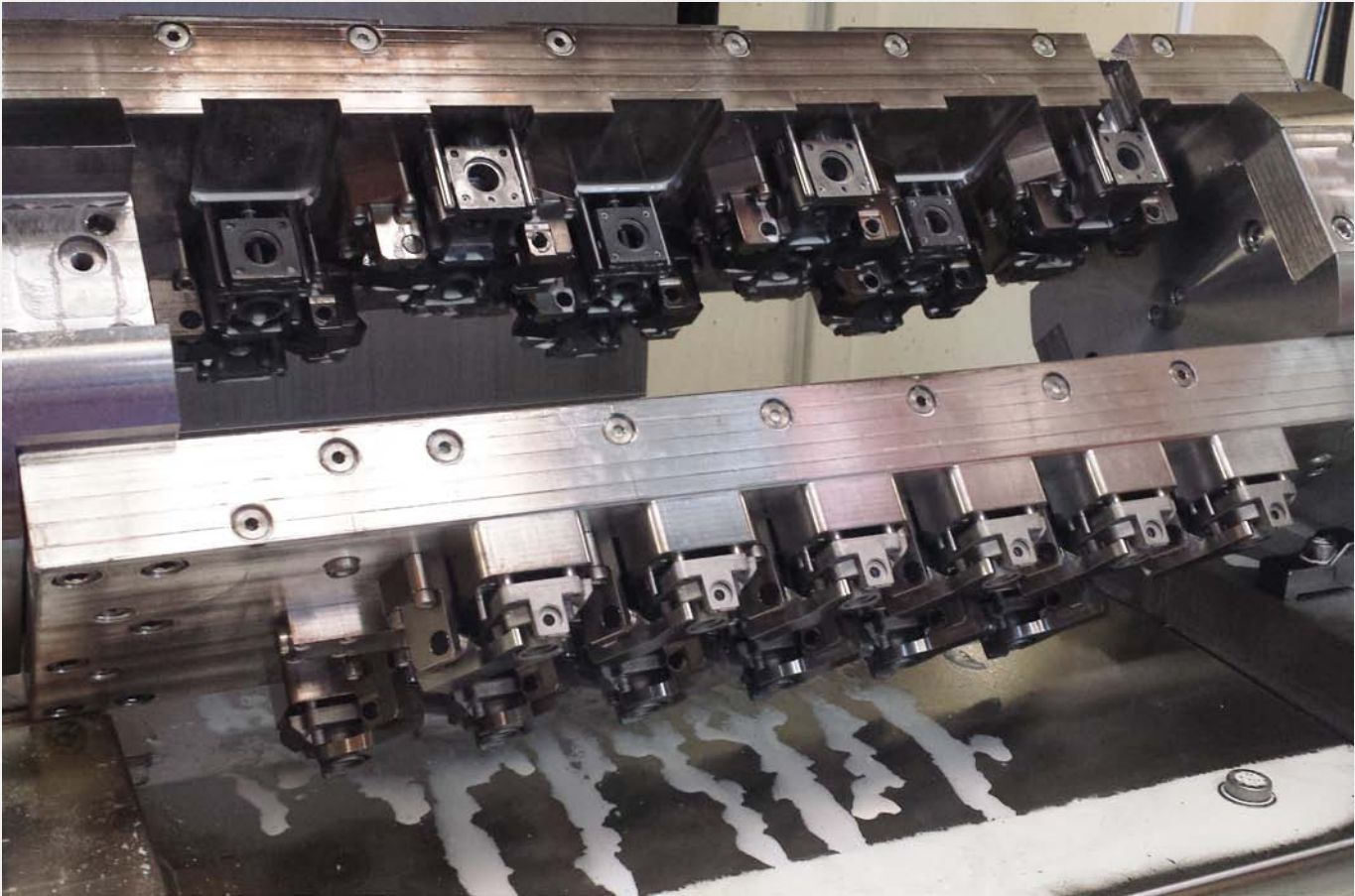
Key switch for turning on and switching to zero position and coupling position. Rotary switch for selecting the following functions - clamping, unclamping and zero position. Two-hand switch for initiating movements. Stop switch for fast switch-off in case of danger. Indicator lights signal the control status.

### General:

Re-clamping required following an electrical voltage outage and after the power supply is restored. With pump unit no. 6906, the solenoid on the directional valve remains energised after self-locking.

### Note:

Each user of the two-handed safety control panel must determine the necessary performance level of the respective safety function by his own risk assessment and must ensure that this is also complied with.



Subject to technical alterations.

# HOLLOW-ROD CYLINDER FOR MULTIPLE USE IN MANUFACTURING PROCESSES

- > clamping force up to 188 kN
- > operating pressure up to 500 bar
- > hollow-piston rod with through-hole, with or without internal thread
- > particularly suitable to convert existing mechanical fixtures into hydraulically operated fixtures
- > for push- and pull operation
- > single and double-acting variants
- > wipers to protect against contamination

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

## PRODUCT OVERVIEW:

| Type  | Clamping force [kN] | Pull force [kN] | Clamping stroke [mm] | No. of models | Operating mode |
|-------|---------------------|-----------------|----------------------|---------------|----------------|
| 6920  | 20 - 125            | 20 - 125        | 8 - 20               | 5             | single acting  |
| 6920G | 20 - 125            | 20 - 125        | 8 - 20               | 5             | single acting  |
| 6920D | 18 - 188            | 14 - 153        | 10 - 25              | 6             | double acting  |
| 6921  | 71 - 101            | 71 - 101        | 6 - 10               | 2             | single acting  |
| 6935  | 20 - 53             | 20 - 53         | 6,5 - 12,5           | 3             | single acting  |
| 6935D | 20 - 53             | 20 - 53         | 6,5 - 12,5           | 3             | double acting  |

## PRODUCT EXAMPLES:

NO. 6920



- > clamping force: 20 - 125 kN
- > cylinder housing: without external thread

NO. 6920D



- > clamping force: 18 - 188 kN
- > cylinder housing: with external thread

NO. 6935D

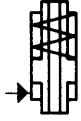


- > clamping force: 20 - 53 kN
- > cylinder housing: without external thread

No. 6920

## Hollow Rod Cylinder

single acting, spring return,  
max. operating pressure 400 bar.



| Order no. | Article no. | push-pull force at 100 bar [kN] | push-pull force at 400 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Spring force min. [N] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|---------------|-------------------------|--|-----------------------|------------|
| 64998     | 6920-20     | 5,0                             | 20                              | 8             | 4                       | 4,9                                      | 200                   | 930        |
| 63016     | 6920-32     | 8,0                             | 32                              | 10            | 8                       | 8,0                                      | 350                   | 1730       |
| 65011     | 6920-50     | 12,5                            | 50                              | 12            | 15                      | 12,8                                     | 540                   | 1650       |
| 63057     | 6920-80     | 20,0                            | 80                              | 15            | 30                      | 20,0                                     | 750                   | 3850       |
| 65003     | 6920-125    | 32,0                            | 125                             | 20            | 64                      | 32,8                                     | 1120                  | 6250       |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Built-in return spring. With sintered bronze filter. 2 wipers and vent screw. Oil supply via threaded port.

### Application:

Particularly suitable for retrofitting existing fixtures for hydraulic actuation. When workpieces are clamped onto a machine tool table, the hollow rod cylinder can be fitted over the clamp bolt instead of the nut. The hollow rod cylinders can be used for push or pull applications.

### Features:

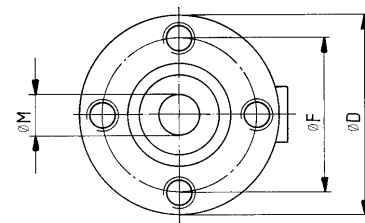
Completely sealed against contamination and chips by means of sinter metal breather and two wipers. Piston can be moved to its end stop. Oil connection at both ends, thus easy lining up in series.

### Note:

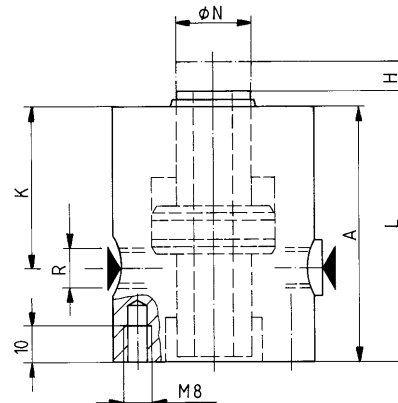
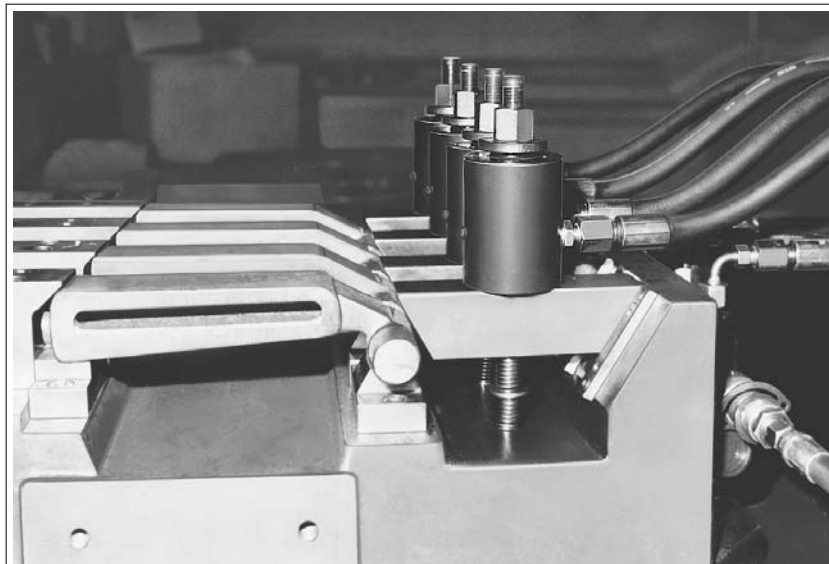
Cylinders are designed for use in combination with tempered bolts, material grade 8.8, e. g. DIN 787 and DIN 6379. Bolts matching the hole are recommended. For single acting cylinders there is risk of sucking in coolant during the return stroke. In this case the cylinders have to be protected against the direct effect of coolant. The sinter metal breather should be protected.

### Dimensions:

| Order no. | Article no. | Piston dia. [mm] | A   | dia. D | dia. F | K     | L   | dia. M | dia. N | R    |
|-----------|-------------|------------------|-----|--------|--------|-------|-----|--------|--------|------|
| 64998     | 6920-20     | 32               | 80  | 52     | 40     | 56,0  | 82  | 12,5   | 20     | G1/8 |
| 63016     | 6920-32     | 40               | 90  | 60     | 44     | 60,5  | 94  | 14,5   | 24     | G1/8 |
| 65011     | 6920-50     | 48               | 101 | 70     | 50     | 71,5  | 103 | 18,5   | 26     | G1/8 |
| 63057     | 6920-80     | 60               | 115 | 80     | 60     | 87,0  | 119 | 22,5   | 32     | G1/4 |
| 65003     | 6920-125    | 75               | 149 | 100    | 75     | 108,0 | 151 | 27,5   | 38     | G1/4 |



Hollow rod cylinder no. 6920-50 in milling device for link lever.

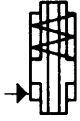


Subject to technical alterations.

## No. 6920G

### Hollow Rod Cylinder with internal thread

single acting, spring return,  
max. operating pressure 400 bar.



| Order no. | Article no. | push-pull force at 100 bar [kN] | push-pull force at 400 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Spring force min. [N] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|---------------|-------------------------|--|-----------------------|------------|
| 65318     | 6920G-20    | 5,0                             | 20                              | 8             | 4                       | 4,9                                      | 200                   | 1000       |
| 63032     | 6920G-32    | 8,0                             | 32                              | 10            | 8                       | 8,0                                      | 350                   | 1750       |
| 65334     | 6920G-50    | 12,5                            | 50                              | 12            | 15                      | 12,8                                     | 540                   | 1700       |
| 63073     | 6920G-80    | 20,0                            | 80                              | 15            | 30                      | 20,0                                     | 750                   | 3900       |
| 65359     | 6920G-125   | 32,0                            | 125                             | 20            | 64                      | 32,8                                     | 1120                  | 6400       |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Built-in return spring. Built-in sintered bronze filter. 2 wipers and vent screw. Oil supply via threaded port.

### Application:

Particularly suitable for retrofitting existing fixtures for hydraulic actuation. When workpieces are clamped onto a machine tool table, the hollow rod cylinder can be fitted over the clamp bolt instead of the nut. The hollow rod cylinders can be used for push or pull applications.

### Features:

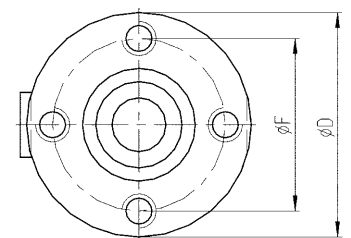
Completely sealed against contamination and chips by means of sinter metal breather and two wipers. Piston can be moved to its end stop. Oil connection at both ends, thus easy lining up in series.

### Note:

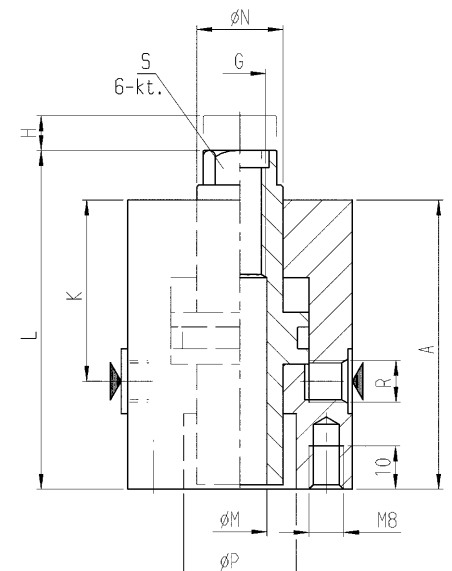
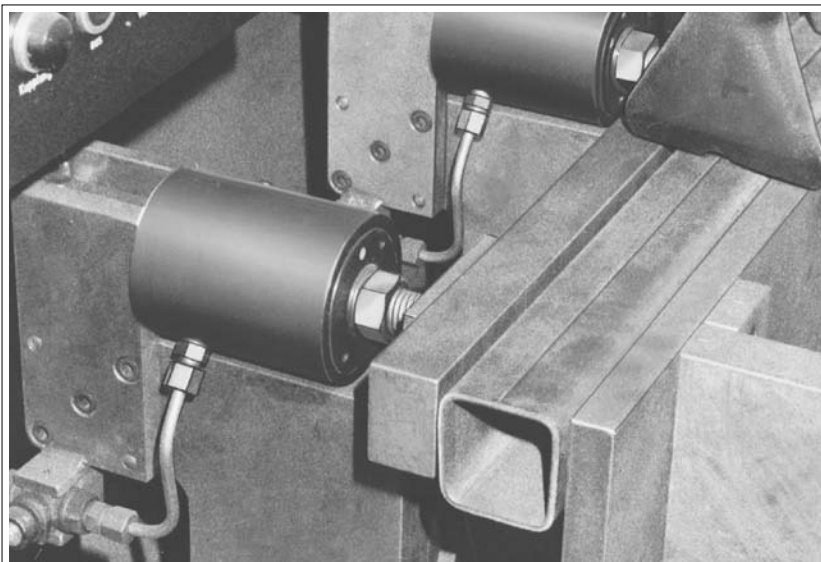
Cylinder size 20 to 50 are designed for use in combination with tempered bolts, material grade 8.8. For size 80 and 125 bolts of material grade 12.9 must be used. For single acting cylinders there is risk of sucking in coolant during the return stroke. In this case the cylinders have to be protected against the direct effect of coolant. The built in sinter metal breather should be protected.

### Dimensions:

| Order no. | Article no. | Piston dia. [mm] | A   | dia. D | dia. F | K     | L     | dia. M | dia. N | R    | dia. P | G x depth | S  |
|-----------|-------------|------------------|-----|--------|--------|-------|-------|--------|--------|------|--------|-----------|----|
| 65318     | 6920G-20    | 32               | 80  | 52     | 40     | 56,0  | 90,0  | 12,5   | 20     | G1/8 | 27     | M12x29    | 17 |
| 63032     | 6920G-32    | 40               | 90  | 60     | 44     | 60,5  | 101,5 | 14,5   | 24     | G1/8 | 30     | M14x30    | 19 |
| 65334     | 6920G-50    | 48               | 101 | 70     | 50     | 71,5  | 113,0 | 16,5   | 26     | G1/8 | 35     | M16x39    | 22 |
| 63073     | 6920G-80    | 60               | 115 | 80     | 60     | 87,0  | 132,5 | 18,5   | 32     | G1/4 | 38     | M18x38    | 27 |
| 65359     | 6920G-125   | 75               | 149 | 100    | 75     | 108,0 | 163,0 | 20,5   | 38     | G1/4 | 49     | M20x47    | 32 |



Hollow rod cylinder no. 6920G-125 in powder welding system for clamping of U-profile panels.

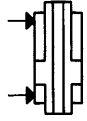


Subject to technical alterations.

## No. 6920D

### Hollow Rod Cylinder

double acting,  
max. operating pressure 500 bar.



CAD

| Order no. | Article no.   | push-pull force VH 100 bar [kN] | push-pull force VH at 500 bar [kN] | push-pull force RH at 100 bar [kN] | push-pull force RH at 500 bar [kN] | Stroke H [mm] | Vol. VH [cm <sup>3</sup> ] | Vol. RH [cm <sup>3</sup> ] | effektive piston area VH [cm <sup>2</sup> ] | effektive piston area RH [cm <sup>2</sup> ] | Weight [g] |
|-----------|---------------|---------------------------------|------------------------------------|------------------------------------|------------------------------------|---------------|----------------------------|----------------------------|---|---|------------|
| 62794     | 6920D-15-001  | 3,77                            | 18,85                              | 2,89                               | 14,45                              | 10            | 3,77                       | 2,89                       | 3,77  | 2,89  | 850        |
| 62836     | 6920D-24-001  | 6,03                            | 30,15                              | 4,90                               | 24,50                              | 10            | 6,03                       | 4,90                       | 6,03  | 4,90  | 1100       |
| 62844     | 6920D-38-001  | 9,42                            | 47,10                              | 7,65                               | 38,25                              | 16            | 15,10                      | 12,20                      | 9,42  | 7,65  | 1650       |
| 62851     | 6920D-59-001  | 14,72                           | 73,60                              | 11,59                              | 57,95                              | 16            | 23,50                      | 18,50                      | 14,72                                       | 11,59                                       | 2000       |
| 62869     | 6920D-92-001  | 23,12                           | 115,60                             | 18,60                              | 93,00                              | 20            | 46,20                      | 37,20                      | 23,12                                       | 18,60                                       | 3050       |
| 62877     | 6920D-150-001 | 37,68                           | 188,40                             | 30,63                              | 153,15                             | 25            | 94,20                      | 76,50                      | 37,68                                       | 30,63                                       | 5350       |

VH = work stroke, RH = back stroke

### Design:

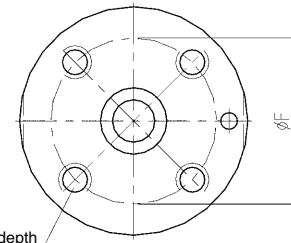
Cylinder barrel from steel, burnished. Piston case hardened and ground. Piston rod is supplied as standard with HC threads. If a piston rod with internal thread is desired, a HELI-COIL insert (diameter x1.5) is screwed into the HC thread. Oil supply via threaded port.

### Application:

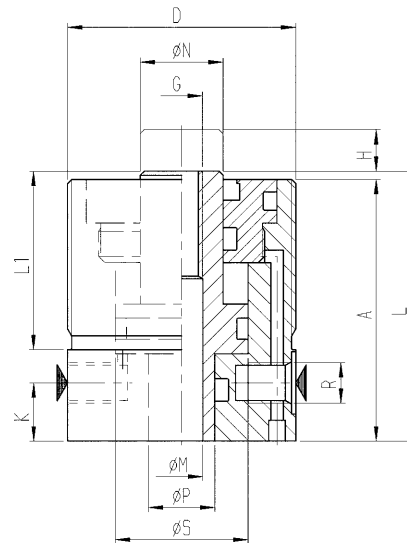
Particularly suitable for retrofitting existing fixtures for hydraulic actuation. When workpieces are clamped onto a machine tool table, the hollow rod cylinder can be fitted over the clamp bolt instead of the nut. The hollow rod cylinders can be used for push or pull applications.

### Note:

Cylinders are designed for use in combination with tempered bolts, material grade 12.9 (e.g. DIN 787). Threaded body provides a wide range of adjustability. Suitable flange nuts DIN 70852.



M8 10 depth



### Dimensions:

| Order no. | Article no.   | A   | D x depth | dia. F | G      | K  | L   | L1 | dia. M | dia. N | dia. P | R    | dia. S |
|-----------|---------------|-----|-----------|--------|--------|----|-----|----|--------|--------|--------|------|--------|
| 62794     | 6920D-15-001  | 59  | M50x1,5   | 35     | HCM 8  | 11 | 60  | 36 | 8,2    | 16     | 12     | G1/8 | 25     |
| 62836     | 6920D-24-001  | 64  | M55x1,5   | 40     | HCM 10 | 12 | 65  | 41 | 10,2   | 20     | 16     | G1/4 | 32     |
| 62844     | 6920D-38-001  | 72  | M65x1,5   | 45     | HCM 12 | 14 | 73  | 45 | 12,2   | 25     | 20     | G1/4 | 40     |
| 62851     | 6920D-59-001  | 78  | M70x1,5   | 50     | HCM 16 | 14 | 79  | 50 | 16,2   | 32     | 25     | G1/4 | 50     |
| 62869     | 6920D-92-001  | 95  | M80x2,0   | 60     | HCM 20 | 18 | 96  | 60 | 20,2   | 40     | 32     | G1/4 | 63     |
| 62877     | 6920D-150-001 | 109 | M100x2,0  | 75     | HCM 27 | 22 | 110 | 65 | 27,2   | 50     | 40     | G1/4 | 80     |

### HELI-COIL thread insert

Accessories



| Order no. | Thread insert x length | for cylinder size | Weight [g] |
|-----------|------------------------|-------------------|------------|
| 67538     | M 8x12                 | 6920D-15-001      | 1          |
| 67546     | M10x15                 | 6920D-24-001      | 3          |
| 67595     | M12x18                 | 6920D-38-001      | 4          |
| 67603     | M16x24                 | 6920D-59-001      | 9          |
| 67611     | M20x30                 | 6920D-92-001      | 19         |
| 67629     | M27x40,5               | 6920D-150-001     | 43         |

### Note:

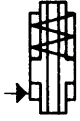
The HELI-COIL thread insert can be installed using a manual or automatic installation tool. The driving pin is used only for installation, and must subsequently be removed using a special pin-breaker. Without the HELI-COIL insert the piston through-hole has the value of the gap ØM (see dimensions table).

Subject to technical alterations.

No. 6921

## Hollow Rod Cylinder

single acting, spring return,  
max. operating pressure 400 bar.



| Order no. | Article no. | push-pull force at 100 bar [kN] | push-pull force at 400 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Spring force min. [N] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|---------------|-------------------------|--|-----------------------|------------|
| 63768     | 6921-70x6   | 17,8                            | 71                              | 6             | 11                      | 18,5                                     | 700                   | 1675       |
| 63149     | 6921-100x10 | 24,4                            | 101                             | 10            | 26                      | 25,9                                     | 1500                  | 4800       |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Retraction by disc springs. 1 wiper. Piston rod with internal thread and two flats (size 70 x 6) or hexagon (size 100 x 10). Built-in sintered bronze filter. Oil supply via threaded port.

### Application:

When workpieces are clamped onto a machine tool table, the hollow rod cylinder can be screwed onto the clamp bolt and be joined to the clamp by the two threads in the body. Also suitable for holding and clamping devices directly on a machine tool table. The hollow rod cylinder is designed for use in combination with tempered bolts of material grade 8.8 for size 100x10 and material grade 12.9 for the size 70x6. In case bolts of material grade 8.8 and grade 10.9 are used the pressure has to be reduced for size 70x6 for continuous operation (see diagramme).

### Features:

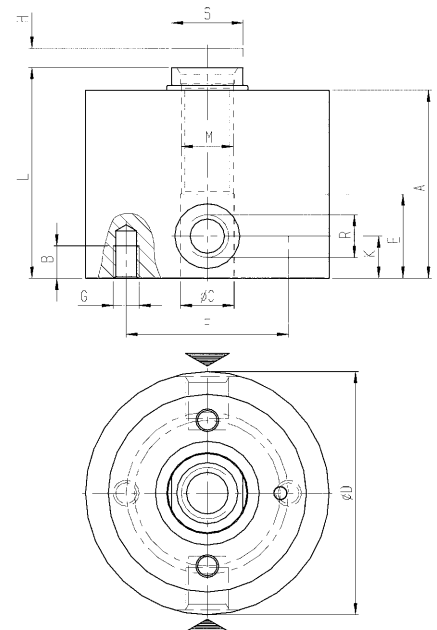
Protected against contamination and chips by a wiper. High forces in a small design.

### Note:

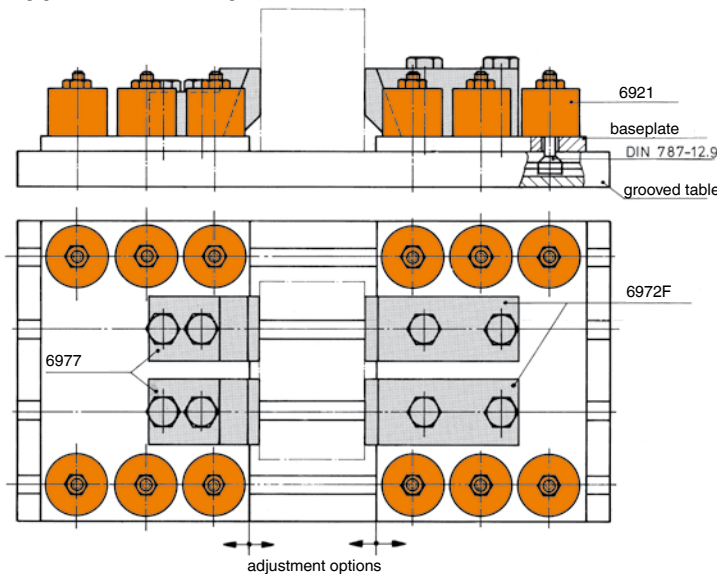
For single acting cylinders there is risk of sucking in coolant during the return stroke. In this case the cylinders have to be protected against the direct effect of coolant. The built in sinter metal breather should be protected.

### Dimensions:

| Order no. | Article no. | Piston dia. [mm] | A  | B  | dia. C | dia. D | E  | F  | G   | K  | L  | M   | R    | S    |
|-----------|-------------|------------------|----|----|--------|--------|----|----|-----|----|----|-----|------|------|
| 63768     | 6921-70x6   | 55               | 58 | 10 | 16,5   | 75     | 26 | 50 | M8  | 13 | 65 | M16 | G1/4 | SW22 |
| 63149     | 6921-100x10 | 70               | 85 | 10 | 25,0   | 100    | 56 | 70 | M10 | 16 | 97 | M24 | G1/4 | SW36 |

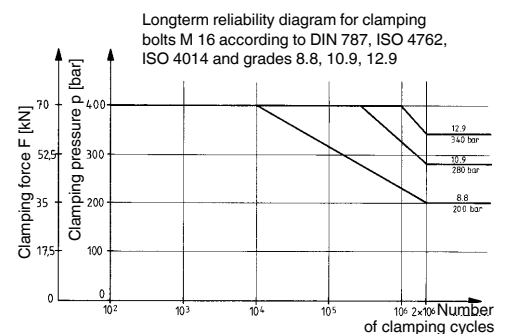


### Application example:



The shown hydraulic clamping device shows casts of several sizes that are clamped by hydraulic pull-down clamp no. 6972F and pull-down counterpart no. 6977. To obtain an efficient means of adjustment, 2 base plates are each equipped with 6 hydraulic nuts no. 6921 which are connected to the grooved table via bolts for T-nut according to DIN 787. The adjustment of the base plate and the clamping of the workpiece can be performed independently by a pump unit with 2 clamping circuits.

### Diagram for size 70x6:

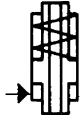


Subject to technical alterations.

No. 6935

## Hollow Rod Cylinder with internal thread

Single acting, with spring return,  
max. operating pressure 350 bar.



| Order no. | Article no. | push-pull force<br>VH 100 bar<br>[kN] | push-pull force<br>VH 350 bar<br>[kN] | Stroke B<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | effective piston area<br>[cm <sup>2</sup> ] | Weight<br>[g] |
|-----------|-------------|---------------------------------------|---------------------------------------|------------------|----------------------------|---|---------------|
| 67850     | 6935-20     | 5,8                                   | 20,6                                  | 6,5              | 3,8                        | 5,9   | 572           |
| 67876     | 6935-30     | 8,4                                   | 29,7                                  | 9,5              | 8,1                        | 8,5   | 940           |
| 67892     | 6935-53     | 15,2                                  | 53,2                                  | 12,5             | 19,3                       | 15,2  | 1837          |

VH = work stroke, RH = back stroke

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod with through-hole and internal thread. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded port.

### Application:

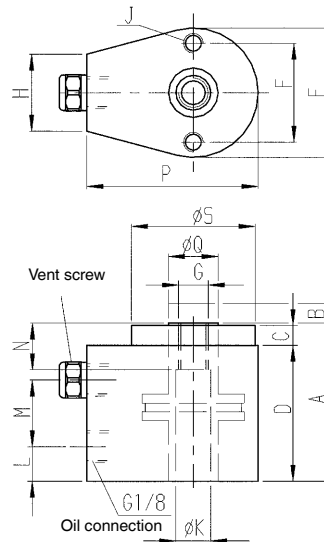
Particularly suitable to retrofit existing mechanical fixtures for hydraulic actuation. The hollow cylinder can be operated as push or pull cylinder. Universal cylinder for clamping, pushing, locking and punching.

### Features:

Clamping cylinder with tapped piston rod. Tapped piston rod ends allow the use of custom end attachments.

### Note:

For single acting cylinders there is the risk of sucking in coolant through the breather port. Therefore, the sinter metal breather has to be protected e.g. by cover plates from direct access of coolant. The system has to be completely vented thoroughly during installation.



### Dimensions:

| Order no. | Article no. | A    | C   | D    | E    | F  | G   | H    | J x depth | dia. K | L  | M    | N  | P  | dia. Q | dia. S |
|-----------|-------------|------|-----|------|------|----|-----|------|-----------|--------|----|------|----|----|--------|--------|
| 67850     | 6935-20     | 51,0 | 7,0 | 43,5 | 41,5 | 32 | M10 | 28,5 | M6x6      | 10,5   | 12 | 20,5 | 15 | 55 | 16,0   | 39,5   |
| 67876     | 6935-30     | 63,5 | 7,0 | 56,5 | 49,5 | 36 | M12 | 24,5 | M8x8      | 13,5   | 18 | 25,5 | 15 | 62 | 19,0   | 47,5   |
| 67892     | 6935-53     | 76,0 | 9,5 | 66,0 | 64,5 | 50 | M16 | 25,0 | M10x13    | 16,5   | 23 | 30,0 | 18 | 76 | 25,5   | 63,5   |

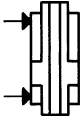
Subject to technical alterations.



## No. 6935D

### Hollow Rod Cylinder with internal thread

Double-acting,  
max. operating pressure 350 bar.



| Order no. | Article no. | push-pull force VH 100 bar [kN] | push-pull force VH 350 bar [kN] | push-pull force RH at 100 bar [kN] | push-pull force RH at 350 bar [kN] | Stroke B [mm] | Vol. [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|------------------------------------|------------------------------------|---------------|-------------------------|--|------------|
| 67918     | 6935D-20    | 5,8                             | 20,6                            | 5,8                                | 20,6                               | 6,5           | 3,8                     | 5,9                                      | 572        |
| 67934     | 6935D-30    | 8,4                             | 29,7                            | 8,4                                | 29,7                               | 9,5           | 8,1                     | 8,5                                      | 940        |
| 67959     | 6935D-53    | 15,2                            | 53,2                            | 15,2                               | 53,2                               | 12,5          | 19,3                    | 15,2                                     | 1837       |

VH = work stroke, RH = back stroke

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod with through-hole and internal thread. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded port.

### Application:

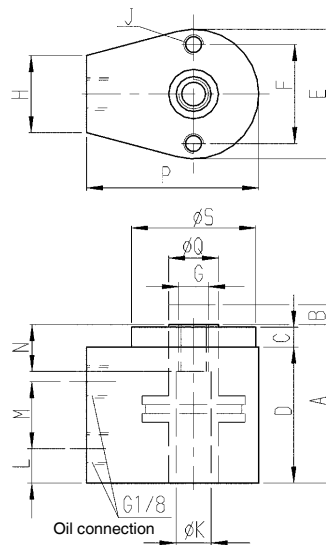
Particularly suitable to retrofit existing mechanical fixtures for hydraulic actuation. The hollow cylinder can be operated as push or pull cylinder. Universal cylinder for clamping, pushing, locking and punching.

### Features:

Clamping cylinder with tapped piston rod. Tapped piston rod ends allow the use of custom end attachments.

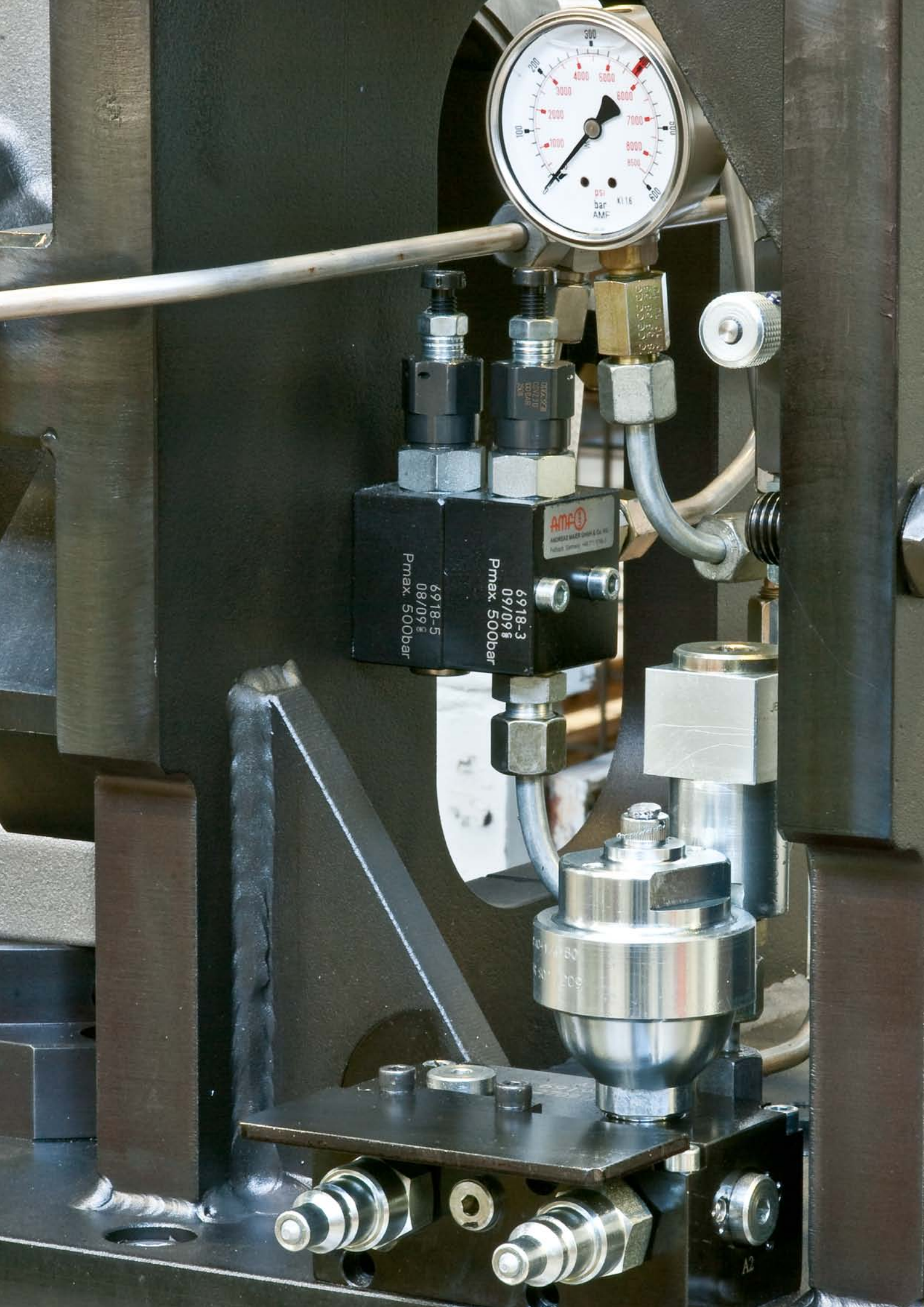
### Note:

For single acting cylinders there is the risk of sucking in coolant through the breather port. Therefore, the sinter metal breather has to be protected e.g. by cover plates from direct access of coolant. The system has to be completely vented thoroughly during installation.



### Dimensions:

| Order no. | Article no. | A    | C   | D    | E    | F  | G   | H    | J x depth | dia. K | L  | M    | N  | P  | dia. Q | dia. S |
|-----------|-------------|------|-----|------|------|----|-----|------|-----------|--------|----|------|----|----|--------|--------|
| 67918     | 6935D-20    | 51,0 | 7,0 | 43,5 | 41,5 | 32 | M10 | 28,5 | M6x6      | 10,5   | 12 | 20,5 | 15 | 55 | 16,0   | 39,5   |
| 67934     | 6935D-30    | 63,5 | 7,0 | 56,5 | 49,5 | 36 | M12 | 24,5 | M8x8      | 13,5   | 18 | 25,5 | 15 | 62 | 19,0   | 47,5   |
| 67959     | 6935D-53    | 76,0 | 9,5 | 66,0 | 64,5 | 50 | M16 | 25,0 | M10x13    | 16,5   | 23 | 30,0 | 18 | 76 | 25,5   | 63,5   |



## BUILT-IN CYLINDERS FOR UNIVERSAL USE

- > clamping force up to 70 kN
- > operating pressure up to 400 bar
- > piston with and without internal thread
- > for push- and pull operation
- > quick adjustment, secured using standard grooved nuts
- > single and double-acting variants
- > wipers to protect against contamination

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

### PRODUCT OVERVIEW:

| Type  | Clamping force [kN] | Clamping stroke [mm] | No. of models | Operating mode |
|-------|---------------------|----------------------|---------------|----------------|
| 6924  | 4,5 - 70            | 6 - 15               | 7             | single acting  |
| 6925  | 4,4 - 39,9          | 6,5 - 32             | 11            | single acting  |
| 6925D | 17,8 - 39,9         | 25,5 - 51            | 4             | double acting  |

### PRODUCT EXAMPLES:

NO. 6924



- > clamping force: 4,5 - 70 kN
- > cylinder housing: with fine thread

NO. 6925



- > clamping force: 4,4 - 39,9 kN
- > cylinder housing: nitrided, with fine thread

NO. 6925D



- > clamping force: 17,8 - 39,9 kN
- > cylinder housing: nitrided, with fine thread

No. 6924

## Built-In Cylinder

single acting, spring return,  
max. operating pressure 400 bar.



CAD



| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 400 bar<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|------------------|----------------------------|---------------------|-----------------------------------|--------------------------|---------------|
| 63024     | 6924-05     | 1,1                           | 4,5                           | 6                | 0,66                       | 12                  | 1,1                               | 45                       | 300           |
| 63099     | 6924-08     | 2,0                           | 8,0                           | 6                | 1,20                       | 16                  | 2,0                               | 60                       | 270           |
| 63115     | 6924-12     | 3,0                           | 12,0                          | 8                | 2,50                       | 20                  | 3,1                               | 95                       | 480           |
| 63131     | 6924-20     | 5,0                           | 20,0                          | 8                | 4,00                       | 25                  | 4,9                               | 205                      | 500           |
| 63164     | 6924-32     | 8,0                           | 32,0                          | 10               | 8,00                       | 32                  | 8,0                               | 340                      | 850           |
| 63156     | 6924-50     | 12,5                          | 50,0                          | 12               | 15,00                      | 40                  | 12,5                              | 400                      | 1450          |
| 63180     | 6924-70     | 17,5                          | 70,0                          | 15               | 27,00                      | 48                  | 18,0                              | 650                      | 2050          |

### Design:

Cylinder from steel, burnished. Piston and piston rod case hardened and ground. Built-in return spring, sintered bronze breather. Wiper at piston rod. Cylinder barrel with metric fine thread for locknuts to DIN 70852. Oil supply via threaded port.

### Application:

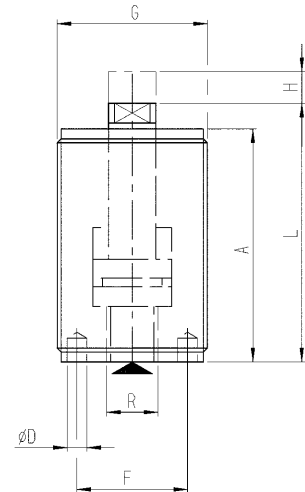
Suitable for converting mechanical to hydraulic clamping devices. The built-in cylinder is inserted through holes and counter screwed at both ends with grooved nuts. General-purpose clamping element for clamping, pushing, pressing, riveting and punching.

### Features:

The metric thread extending over the whole length of the cylinder permits with its two flange nuts DIN 70852 lengthwise adjustment over a large range and fast positioning in the required by two flange nuts. Fast attachment of fixture elements and thrust pieces the piston thread.

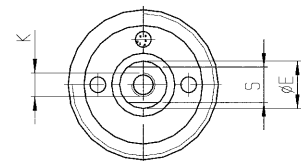
### Note:

For single acting cylinder types there is a risk of sucking coolant liquid at the return stroke. In this case the cylinder has to be protected against the direct effect of coolant. The built in sinter metal breather should be protected.



### Dimensions:

| Order no. | Article no. | A    | dia. D | dia. E | F  | G       | K x depth | L     | S  | R    |
|-----------|-------------|------|--------|--------|----|---------|-----------|-------|----|------|
| 63024     | 6924-05     | 50,0 | 4      | 8      | 20 | M30x1,5 | M4x10     | 56,0  | 6  | G1/8 |
| 63099     | 6924-08     | 46,5 | 4      | 10     | 20 | M32x1,5 | M5x12     | 52,5  | 8  | G1/8 |
| 63115     | 6924-12     | 59,0 | 5      | 12     | 28 | M38x1,5 | M6x14     | 65,5  | 9  | G1/4 |
| 63131     | 6924-20     | 63,5 | 4      | 12     | 25 | M40x1,5 | M8x20     | 70,5  | 10 | G1/4 |
| 63164     | 6924-32     | 72,0 | 4      | 16     | 30 | M48x1,5 | M10x25    | 81,0  | 13 | G1/4 |
| 63156     | 6924-50     | 80,0 | 5      | 20     | 35 | M60x1,5 | M12x28    | 89,0  | 17 | G1/4 |
| 63180     | 6924-70     | 93,0 | 6      | 25     | 44 | M70x1,5 | M16x35    | 105,0 | 22 | G1/4 |



## No. 6925

### Built-In Cylinder

Single acting, with spring return,  
max. operating pressure 350 bar.



CAD



6925-04



6925-10

| Order no. | Article no. | Push force at 100 bar |      | Push force at 350 bar |      | Stroke C [mm] | Vol. [cm <sup>3</sup> ] | Piston area [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|-----------------------|------|-----------------------|------|---------------|-------------------------|--------------------------------|------------|
|           |             | [kN]                  | [kN] | [kN]                  | [kN] |               |                         |                                |            |
| 67975     | 6925-04-1   | 1,25                  | 4,4  | 9,5                   | 1,2  | 1,3           | 73                      |                                |            |
| 67991     | 6925-04-2   | 1,25                  | 4,4  | 19,0                  | 2,5  | 1,3           | 91                      |                                |            |
| 68015     | 6925-04-3   | 1,25                  | 4,4  | 32,0                  | 4,1  | 1,3           | 118                     |                                |            |
| 68031     | 6925-10-1   | 2,88                  | 10,1 | 6,5                   | 1,8  | 2,9           | 200                     |                                |            |
| 67801     | 6925-10-2   | 2,88                  | 10,1 | 19,0                  | 5,5  | 2,9           | 210                     |                                |            |
| 67827     | 6925-10-3   | 2,88                  | 10,1 | 32,0                  | 9,2  | 2,9           | 254                     |                                |            |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod with internal thread. Wiper at piston rod. Cylinder barrel with metric fine thread for locknut to DIN 70852. Return spring from stainless steel. Oil supply via threaded port.

### Application:

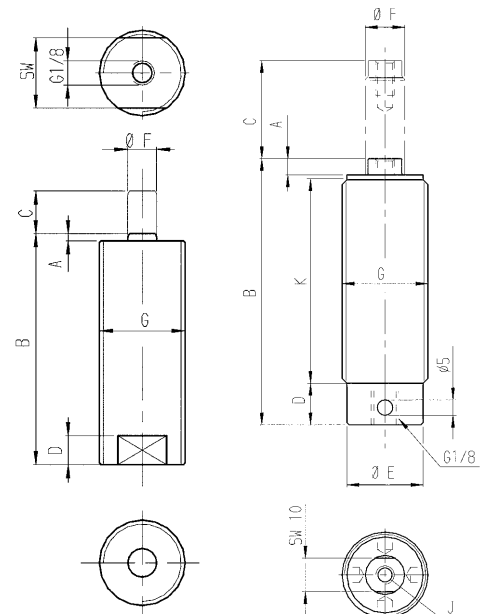
Suitable to convert mechanical fixtures into hydraulic operated. The built-in cylinder can easily be mounted and adjusted into fixture walls by grooved nuts. Universal cylinder for clamping, pushing, locking and rivetting.

### Features:

The metric thread extending over the whole length of the cylinder permits with its two flange nuts DIN 70852 lengthwise adjustment over a large range. Tapped piston rod end allows the use of individual contact bolts.

### Dimensions:

| Order no. | Article no. | A   | B    | D    | dia. E | dia. F | G       | J x depth | K    | SW |
|-----------|-------------|-----|------|------|--------|--------|---------|-----------|------|----|
| 67975     | 6925-04-1   | 1,5 | 51,0 | 6,5  | -      | 6,5    | M20x1,5 | -         | -    | 16 |
| 67991     | 6925-04-2   | 1,5 | 65,5 | 6,5  | -      | 6,5    | M20x1,5 | -         | -    | 16 |
| 68015     | 6925-04-3   | 1,5 | 83,0 | 6,5  | -      | 6,5    | M20x1,5 | -         | -    | 16 |
| 68031     | 6925-10-1   | 6,5 | 55,5 | 12,5 | 24,5   | 12,5   | M28x1,5 | M6x11     | 35,5 | -  |
| 67801     | 6925-10-2   | 6,5 | 68,5 | 12,5 | 24,5   | 12,5   | M28x1,5 | M6x11     | 48,0 | -  |
| 67827     | 6925-10-3   | 5,0 | 86,0 | 12,5 | 24,5   | 12,5   | M28x1,5 | M6x11     | 67,0 | -  |



6925-04

6925-10

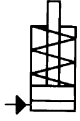


Subject to technical alterations.

No. 6925

## Built-In Cylinder

Single acting, with spring return, max. operating pressure 350 bar.



| Order no. | Article no. | Compressive force Vh at 100 bar [kN] | Compressive force Vh at 350 bar [kN] | Stroke C [mm] | Vol. VH [cm <sup>3</sup> ] | Piston area VH [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|--------------------------------------|--------------------------------------|---------------|----------------------------|-----------------------------------|------------|
| 67843     | 6925-18-1   | 5,08                                 | 17,8                                 | 12,5          | 6,4                        | 5,1                               | 304        |
| 67868     | 6925-18-2   | 5,08                                 | 17,8                                 | 25,5          | 13,0                       | 5,1                               | 354        |
| 67884     | 6925-18-3   | 5,08                                 | 17,8                                 | 51,0          | 26,0                       | 5,1                               | 463        |
| 67900     | 6925-40-1   | 11,40                                | 39,9                                 | 12,5          | 14,2                       | 11,4                              | 644        |
| 67926     | 6925-40-2   | 11,40                                | 39,9                                 | 25,5          | 29,0                       | 11,4                              | 744        |

VH = work stroke, RH = back stroke

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod with internal thread. Wiper at piston rod. Cylinder barrel with metric fine thread for locknut to DIN 70852. Oil supply via threaded port.

### Application:

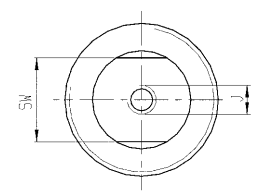
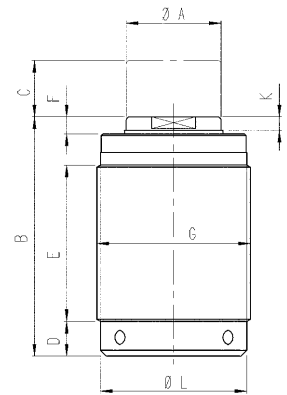
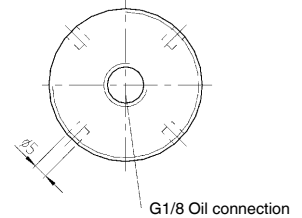
Suitable to convert mechanical fixtures into hydraulic operated. The built-in cylinder can easily be mounted and adjusted into fixture walls by flange nuts. Universal cylinder for clamping, pushing, locking, rivetting and punching.

### Features:

The metric thread extending over the whole length of the cylinder permits with its two flange nuts DIN 70852 lengthwise adjustment over a large range. Tapped piston rod end allows the use of individual contact bolts.

### Note:

The system has to be completely vented during installation.



### Dimensions:

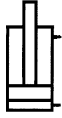
| Order no. | Article no. | dia. A | B     | D    | E    | F  | G       | SW | J x depth | K   | dia. L |
|-----------|-------------|--------|-------|------|------|----|---------|----|-----------|-----|--------|
| 67843     | 6925-18-1   | 20,1   | 68,0  | 12,5 | 39,5 | 8  | M35x1,5 | 17 | M8x11     | 6,5 | 30,5   |
| 67868     | 6925-18-2   | 20,1   | 80,5  | 12,5 | 52,5 | 8  | M35x1,5 | 17 | M8x11     | 6,5 | 30,5   |
| 67884     | 6925-18-3   | 20,1   | 109,0 | 12,5 | 81,0 | 8  | M35x1,5 | 17 | M8x11     | 6,5 | 30,5   |
| 67900     | 6925-40-1   | 28,2   | 70,0  | 12,5 | 39,5 | 10 | M48x1,5 | 25 | M12x13    | 9,0 | 45,0   |
| 67926     | 6925-40-2   | 28,2   | 83,0  | 12,5 | 52,5 | 10 | M48x1,5 | 25 | M12x13    | 9,0 | 45,0   |

Subject to technical alterations.

## No. 6925D

### Built-In Cylinder

Double-acting,  
max. operating pressure 350 bar.



CAD

| Order no. | Article no. | Compressive force Vh at 100 bar [kN] | Compressive force Vh at 350 bar [kN] | Compressive force RH at 100 bar [kN] | Compressive force RH at 350 bar [kN] | Stroke C [mm] | Vol. VH [cm <sup>3</sup> ] | Vol. RH [cm <sup>3</sup> ] | Piston area VH [cm <sup>2</sup> ] | Piston area RH [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------------|----------------------------|----------------------------|-----------------------------------|-----------------------------------|------------|
| 67942     | 6925D-18-1  | 5,08                                 | 17,8                                 | 1,6                                  | 5,9                                  | 25,5          | 13,0                       | 4,4                        | 5,1                               | 1,7                               | 762        |
| 67967     | 6925D-18-2  | 5,08                                 | 17,8                                 | 1,6                                  | 5,9                                  | 51,0          | 26,0                       | 8,8                        | 5,1                               | 1,7                               | 1061       |
| 67983     | 6925D-40-1  | 11,40                                | 39,9                                 | 5,0                                  | 17,5                                 | 25,5          | 29,0                       | 12,7                       | 11,4                              | 5,0                               | 1379       |
| 68007     | 6925D-40-2  | 11,40                                | 39,9                                 | 5,0                                  | 17,5                                 | 51,0          | 58,1                       | 25,5                       | 11,4                              | 5,0                               | 1869       |

VH = work stroke, RH = back stroke

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod with internal thread. Wiper at piston rod. Cylinder barrel with metric fine thread for locknut to DIN 70852. Oil supply via threaded port.

### Application:

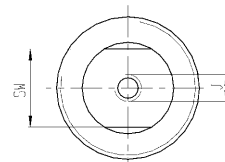
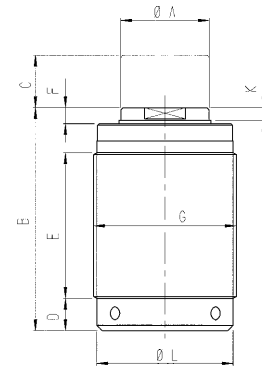
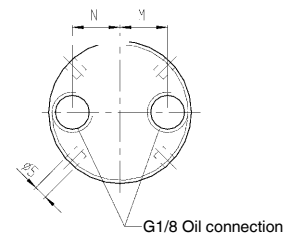
Suitable to convert mechanical fixtures into hydraulic operated. The built-in cylinder can easily be mounted and adjusted into fixture walls by flange nuts. Universal cylinder for clamping, pushing, locking, rivetting and punching.

### Features:

The metric thread extending over the whole length of the cylinder permits with its two flange nuts DIN 70852 lengthwise adjustment over a large range. Tapped piston rod end allows the use of individual contact bolts.

### Note:

The system has to be completely vented during installation.



### Dimensions:

| Order no. | Article no. | dia. A | B     | D    | E    | F  | G       | SW | J x depth | K   | dia. L | M    | N  |
|-----------|-------------|--------|-------|------|------|----|---------|----|-----------|-----|--------|------|----|
| 67942     | 6925D-18-1  | 20,1   | 80,5  | 12,5 | 52,5 | 8  | M48x1,5 | 17 | M8x11     | 6,5 | 45,0   | 14,0 | 14 |
| 67967     | 6925D-18-2  | 20,1   | 109,0 | 12,5 | 81,0 | 8  | M48x1,5 | 17 | M8x11     | 6,5 | 45,0   | 14,0 | 14 |
| 67983     | 6925D-40-1  | 28,2   | 82,0  | 12,5 | 52,5 | 10 | M65x1,5 | 25 | M12x13    | 9,0 | 60,5   | 20,5 | 11 |
| 68007     | 6925D-40-2  | 28,2   | 111,0 | 12,5 | 81,0 | 10 | M65x1,5 | 25 | M12x13    | 9,0 | 60,5   | 20,5 | 11 |

Subject to technical alterations.

DIN 70852

Flange Nut



| Order no. | Article no.  | dia. A | B  | dia. D | E    | F   | G        | No's grooves | Weight [g] |
|-----------|--------------|--------|----|--------|------|-----|----------|--------------|------------|
| 63974     | 70852-M20    | 27     | 6  | 32     | 5,5  | 2,3 | M20x1,5  | 4            | 19         |
| 63784     | 70852-M28    | 36     | 7  | 42     | 6,5  | 2,8 | M28x1,5  | 4            | 35         |
| 63792     | 70852-M30    | 38     | 7  | 44     | 6,5  | 2,8 | M30x1,5  | 4            | 36         |
| 63800     | 70852-M32    | 41     | 8  | 48     | 7,0  | 3,3 | M32x1,5  | 4            | 52         |
| 63818     | 70852-M35    | 43     | 8  | 50     | 7,0  | 3,3 | M35x1,5  | 4            | 51         |
| 63826     | 70852-M38    | 47     | 8  | 54     | 7,0  | 3,3 | M38x1,5  | 4            | 60         |
| 63834     | 70852-M40    | 49     | 8  | 56     | 7,0  | 3,3 | M40x1,5  | 4            | 62         |
| 63842     | 70852-M48    | 57     | 8  | 65     | 8,0  | 3,8 | M48x1,5  | 6            | 75         |
| 63859     | 70852-M50    | 60     | 8  | 68     | 8,0  | 3,8 | M50x1,5  | 6            | 84         |
| 63867     | 70852-M52    | 62     | 8  | 70     | 8,0  | 3,8 | M52x1,5  | 6            | 87         |
| 63875     | 70852-M55    | 67     | 8  | 75     | 8,0  | 3,8 | M55x1,5  | 6            | 100        |
| 63883     | 70852-M58 *  | 71     | 9  | 80     | 11,0 | 4,3 | M58x1,5  | 6            | 140        |
| 63891     | 70852-M60    | 71     | 9  | 80     | 11,0 | 4,3 | M60x1,5  | 6            | 130        |
| 63909     | 70852-M65    | 76     | 9  | 85     | 11,0 | 4,3 | M65x1,5  | 6            | 130        |
| 63917     | 70852-M70    | 81     | 9  | 90     | 11,0 | 4,3 | M70x1,5  | 6            | 140        |
| 63925     | 70852-M80 *  | 91     | 10 | 100    | 11,0 | 4,3 | M80x2,0  | 6            | 180        |
| 267062    | 70852-M85 *  | 99     | 10 | 108    | 11,0 | 4,3 | M85x2,0  | 6            | 239        |
| 63933     | 70852-M100 * | 116    | 10 | 125    | 11,0 | 4,3 | M100x2,0 | 6            | 299        |

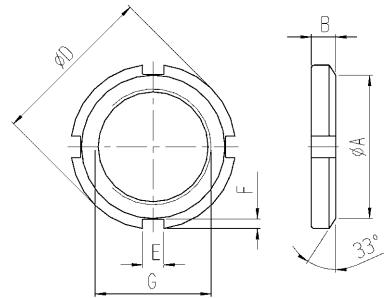
\* not to DIN

**Design:**

Steel, zinc-plated.

**Application:**

The flange nuts hold cylinders in the required position.



Subject to technical alterations.



## THREADED CYLINDERS - SPACE-SAVING AND EASY TO INSTALL

- > clamping force up to 40 kN
- > operating pressure up to 500 bar
- > piston with and without internal thread
- > wipers to protect against contamination
- > oil supply via fixture body
- > single and double-acting variants

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

### PRODUCT OVERVIEW:

| Type  | Clamping force [kN] | Clamping stroke [mm] | No. of models | Operating mode |
|-------|---------------------|----------------------|---------------|----------------|
| 6929  | 2,5 - 40,0          | 5 - 20               | 8             | single acting  |
| 6930  | 5,5 - 40,0          | 10 - 20              | 5             | single acting  |
| 6930D | 4,5 - 50,2          | 12 - 40              | 6             | double acting  |
| 6932  | 2,5 - 24,5          | 4 - 12               | 5             | single acting  |
| 6933  | 5,5 - 40,0          | 8 - 12               | 5             | single acting  |
| 6934  | 2,4 - 17,5          | 5 - 19               | 5             | single acting  |

### PRODUCT EXAMPLES:

NO. 6930



- > clamping force: 5,5 - 40 kN
- > cylinder housing: with fine thread

NO. 6932



- > clamping force: 2,5 - 24,5 kN
- > cylinder housing: with fine thread

NO. 6934



- > clamping force: 2,4 - 17,5 kN
- > cylinder housing: nitrided, with fine thread

## No. 6929-03

### Threaded Cylinder for tube connection, with spherical piston rod

single acting, spring return,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD

| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Vol.<br>[cm <sup>3</sup> ] | Stroke H<br>[mm] | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|----------------------------|------------------|---------------------|-----------------------------------|--------------------------|---------------|
| 60111     | 6929-03x10  | 0,5                           | 2,5                           | 0,5                        | 10               | 8                   | 0,5                               | 24                       | 80            |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod, union nut with cutting ring.  
Oil supply via threaded port.

### Features:

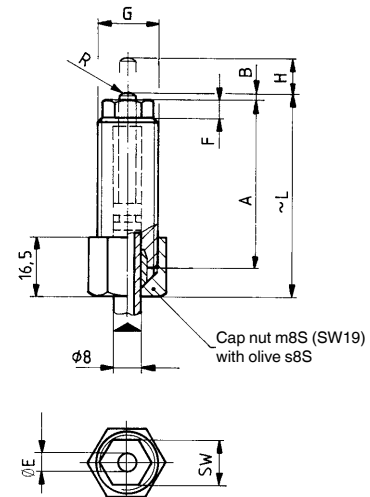
Hoses or tubes can be directly screwed onto the threaded cylinders.

### Note:

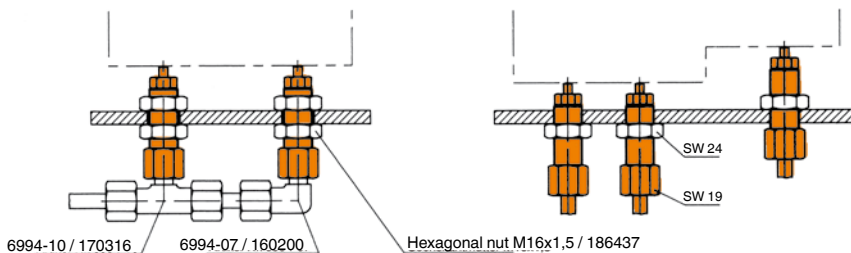
Pistons of these cylinders must not be loaded in retracted position. Care for protection against aggressive lubricants and coolants. As the cylinder has no stop for the tube, the preassembly of the cutting ring has to be effected by means of a hardened pre-mounting tool. Due to the construction size, an internal stop for the piston is not possible. Therefore, please do not operate the threaded cylinder without workpiece, as the spring could be damaged or its spring force could be reduced.

### Dimensions:

| Order no. | Article no. | A  | B | dia. E | F | G       | ~L | R | SW |
|-----------|-------------|----|---|--------|---|---------|----|---|----|
| 60111     | 6929-03x10  | 48 | 1 | 5      | 6 | M16x1,5 | 57 | 6 | 13 |



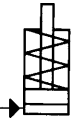
### Application examples:



## No. 6929

### Threaded Cylinder bottom sealing, with spherical piston rod

single acting, spring return,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD

| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Md max.<br>[Nm] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|------------------|----------------------------|---------------------|-----------------------------------|-----------------|--------------------------|---------------|
| 60095     | 6929-02x05  | 0,5                           | 2,5                           | 5                | 0,25                       | 8                   | 0,5                               | 10              | 24                       | 15            |
| 60103     | 6929-02x10  | 0,5                           | 2,5                           | 10               | 0,50                       | 8                   | 0,5                               | 10              | 24                       | 25            |
| 60046     | 6929-05     | 1,1                           | 5,5                           | 10               | 1,10                       | 12                  | 1,1                               | 40              | 45                       | 80            |
| 60053     | 6929-08     | 2,0                           | 10,0                          | 12               | 2,40                       | 16                  | 2,0                               | 50              | 70                       | 140           |
| 60061     | 6929-12     | 3,0                           | 15,5                          | 15               | 4,70                       | 20                  | 3,1                               | 60              | 105                      | 220           |
| 60079     | 6929-20     | 4,9                           | 24,5                          | 16               | 7,80                       | 25                  | 4,9                               | 80              | 145                      | 390           |
| 60087     | 6929-32     | 8,0                           | 40,0                          | 20               | 16,00                      | 32                  | 8,0                               | 225             | 270                      | 930           |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod, with plastic seal for bottom sealing of the cylinder. For no. 6929-02x05 and 6929-02 x 10 sealing with Cu-ring. Oil supply via oil channel in fixture body.

### Application:

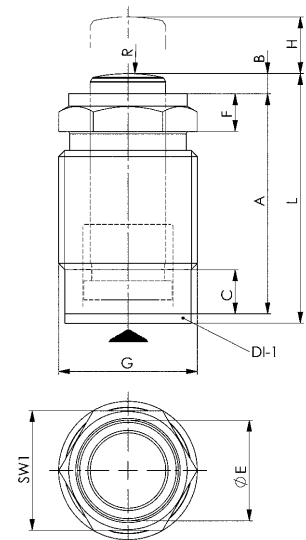
These threaded cylinders can be used in all types of clamping fixtures. Ideal for pressure bars for tolerance compensation in multiple-workpiece clamping fixtures, and for positioning, holding or ejecting, and clamping workpieces.

### Features:

Small dimensions, can be installed closely spaced side-by-side. The cylinders can be screwed into the fixture body up to the hexagon.

### Note:

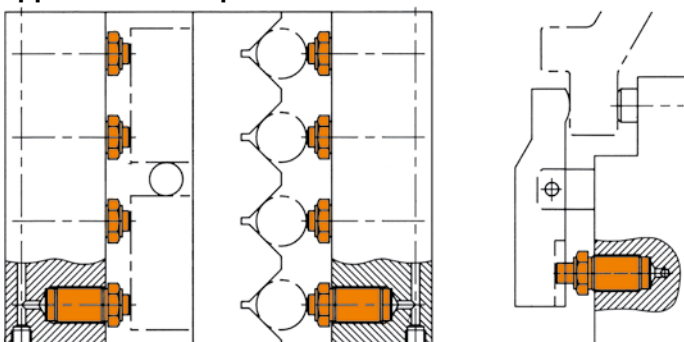
Pistons of these cylinders must not be loaded in retracted position. Care for protection against aggressive lubricants and coolants. The sealing surface of the mounting hole to the thread must be at a right angle and even. For sizes 02x05 and 02x10, a internal stop for the piston is not possible due to the construction size. Therefore, do not operate the threaded cylinder without workpiece, as the spring could be damaged or its spring force could be reduced.



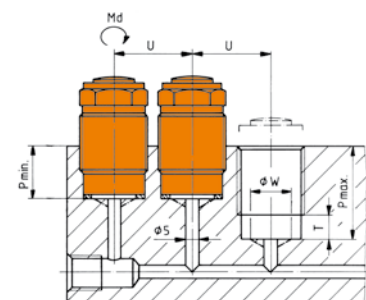
### Dimensions:

| Order no. | Article no. | A    | B   | C  | dia. E | F  | G       | L    | P min. | P max. | R   | SW1 | T max. | U min. | dia. W max. | DI-1 Seal Order No. |
|-----------|-------------|------|-----|----|--------|----|---------|------|--------|--------|-----|-----|--------|--------|-------------|---------------------|
| 60095     | 6929-02x05  | 27,0 | 1,0 | 4  | 5      | 4  | M12x1,5 | 29,0 | 12     | 23     | 6   | 11  | -      | 15     | -           | 120105              |
| 60103     | 6929-02x10  | 40,0 | 1,0 | 4  | 5      | 4  | M12x1,5 | 42,0 | 12     | 36     | 6   | 11  | -      | 15     | -           | 120105              |
| 60046     | 6929-05     | 35,0 | 2,0 | 7  | 12     | 6  | M22x1,5 | 38,5 | 16     | 29     | 25  | 19  | 8      | 25     | 12          | 182162              |
| 60053     | 6929-08     | 43,0 | 2,0 | 8  | 16     | 9  | M26x1,5 | 46,5 | 20     | 34     | 35  | 24  | 9      | 30     | 16          | 182170              |
| 60061     | 6929-12     | 53,0 | 2,0 | 8  | 20     | 10 | M30x1,5 | 56,5 | 24     | 43     | 50  | 30  | 9      | 38     | 20          | 182188              |
| 60079     | 6929-20     | 55,5 | 2,5 | 11 | 25     | 12 | M38x1,5 | 60,0 | 28     | 44     | 70  | 36  | 11     | 45     | 25          | 182196              |
| 60087     | 6929-32     | 82,5 | 2,5 | 12 | 32     | 15 | M48x1,5 | 87,5 | 42     | 68     | 100 | 46  | 13     | 57     | 30          | 182204              |

### Application examples:



### Installation dimensions:

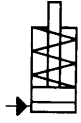


Subject to technical alterations.

No. 6930

## Threaded Cylinder bottom sealing, piston rod with internal thread

single acting, spring return,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD

| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Md max.<br>[Nm] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|------------------|----------------------------|---------------------|-----------------------------------|-----------------|--------------------------|---------------|
| 60129     | 6930-05     | 1,1                           | 5,5                           | 10               | 1,1                        | 12                  | 1,1                               | 40              | 45                       | 80            |
| 60137     | 6930-08     | 2,0                           | 10,0                          | 12               | 2,4                        | 16                  | 2,0                               | 50              | 70                       | 140           |
| 60145     | 6930-12     | 3,0                           | 15,5                          | 15               | 4,7                        | 20                  | 3,1                               | 60              | 105                      | 230           |
| 60152     | 6930-20     | 4,9                           | 24,5                          | 16               | 7,8                        | 25                  | 4,9                               | 80              | 145                      | 410           |
| 60160     | 6930-32     | 8,0                           | 40,0                          | 20               | 16,0                       | 32                  | 8,0                               | 225             | 270                      | 970           |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod, with plastic seal for bottom sealing of the cylinder. Oil supply via oil channel in fixture body.

### Application:

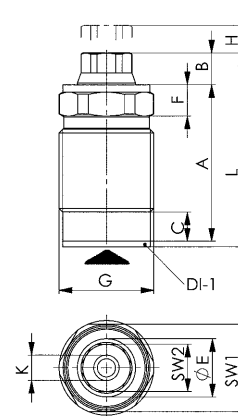
These threaded cylinders can be used in all types of clamping fixtures. Ideal for pressure bars for tolerance compensation in multiple-workpiece clamping fixtures, and for positioning, holding or ejecting, and clamping workpieces.

### Features:

Small dimensions, can be installed closely spaced side-by-side. The cylinders can be screwed into the fixture body up to the hexagon.

### Note:

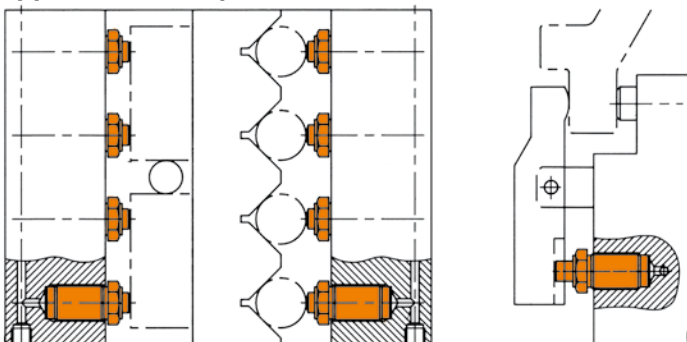
Pistons of these cylinders must not be loaded in retracted position. Care for protection against aggressive lubricants and coolants. The sealing surface of the mounting hole to the thread must be at a right angle and even.



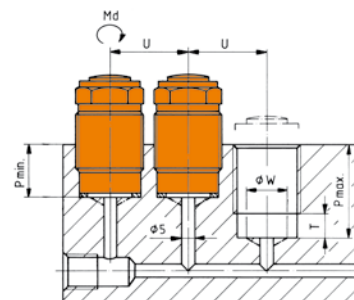
### Dimensions:

| Order no. | Article no. | A    | B    | C  | dia. E | F  | G       | K x depth | L    | P min. | P max. | SW1 | SW2 | T max. | U min. | dia. W max. | DI-1 Seal Order No. |
|-----------|-------------|------|------|----|--------|----|---------|-----------|------|--------|--------|-----|-----|--------|--------|-------------|---------------------|
| 60129     | 6930-05     | 35,0 | 9,0  | 7  | 12     | 6  | M22x1,5 | M6x6      | 45,5 | 16     | 29     | 19  | 10  | 8      | 25     | 12          | 182162              |
| 60137     | 6930-08     | 43,0 | 8,5  | 8  | 16     | 9  | M26x1,5 | M6x6      | 53,0 | 20     | 34     | 24  | 13  | 9      | 30     | 16          | 182170              |
| 60145     | 6930-12     | 53,0 | 11,5 | 8  | 20     | 10 | M30x1,5 | M8x8      | 66,0 | 24     | 43     | 30  | 17  | 9      | 38     | 20          | 182188              |
| 60152     | 6930-20     | 55,5 | 11,5 | 11 | 25     | 12 | M38x1,5 | M8x8      | 69,0 | 28     | 44     | 36  | 19  | 11     | 45     | 25          | 182196              |
| 60160     | 6930-32     | 82,5 | 13,5 | 12 | 32     | 15 | M48x1,5 | M12x12    | 98,5 | 42     | 68     | 46  | 24  | 13     | 57     | 30          | 182204              |

### Application examples:



### Installation dimensions:



Subject to technical alterations.

## No. 6930D

### Threaded Cylinder

double-acting,  
max. working pressure 400 bar,  
min. operating pressure 25 bar.



CAD

| Order no. | Article no. | Push force at 100 bar [kN] | Push force at 400 bar [kN] | Pull force at 100 bar [kN] | Pull force at 400 bar [kN] | Stroke H ±1 [mm] | Vol. push [cm³] | Vol. pull [cm³] | Piston area push [cm²] | Piston area pull [cm²] | Md [Nm] | Weight [g] |
|-----------|-------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------|-----------------|-----------------|------------------------|------------------------|---------|------------|
| 320507    | 6930D-05    | 1,1                        | 4,5                        | 0,6                        | 2,5                        | 12               | 1,4             | 0,8             | 1,1                    | 0,6                    | 44      | 107        |
| 320515    | 6930D-08    | 2,0                        | 8,0                        | 1,2                        | 4,9                        | 16               | 3,2             | 2,0             | 2,0                    | 1,2                    | 77      | 186        |
| 320523    | 6930D-12    | 3,1                        | 12,5                       | 2,0                        | 8,0                        | 20               | 6,3             | 4,0             | 3,1                    | 2,0                    | 154     | 270        |
| 320531    | 6930D-20    | 4,9                        | 19,6                       | 2,9                        | 11,6                       | 25               | 12,3            | 7,3             | 4,9                    | 2,9                    | 301     | 519        |
| 320549    | 6930D-32    | 8,0                        | 32,1                       | 4,9                        | 19,6                       | 32               | 25,7            | 15,7            | 8,0                    | 4,9                    | 594     | 920        |
| 320556    | 6930D-50    | 12,5                       | 50,2                       | 7,6                        | 30,6                       | 40               | 50,2            | 30,6            | 12,5                   | 7,7                    | 1115    | 1639       |

### Design:

Cylinder housing from hardened steel, burnished. Piston tempered, ground, nitrided, and treated with a corrosion-resistant coating. Oil supply via oil channel in fixture body.

### Application:

These threaded cylinders can be used in all types of clamping fixtures. Ideal for pressure bars for tolerance compensation in multiple-workpiece clamping fixtures, and for positioning, holding or ejecting, and clamping workpieces. Can be used extending or retracting.

### Features:

The O-rings are smaller than the diameter of the screw-in thread. This reduces the risk of damage to the seal during the installation process.

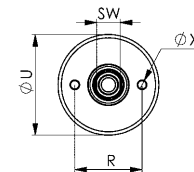
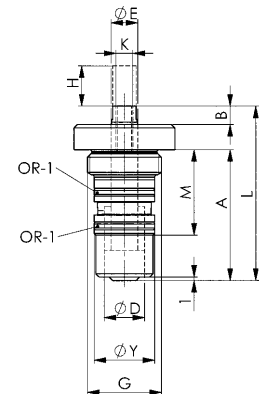
Two-piece body makes it easier to change the piston-rod seal. Housing seals against the surface of the hole sleeve. For sizes 05 and 08, there is additional sealing between the housing head and the fixture body.

Small dimensions, can be installed closely spaced side-by-side. The cylinder must be screwed into the fixture body up to its flange.

### Note:

Maximum speed of operation 0.5 m/s

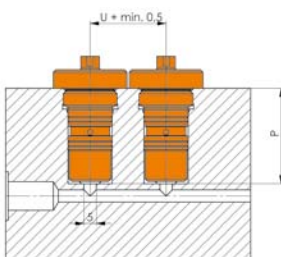
Can be supplied on request for higher pressures and temperatures.



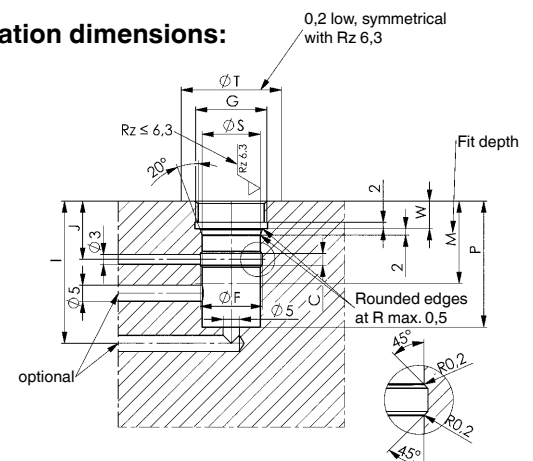
### Dimensions:

| Order no. | Article no. | A  | B    | C   | dia. D | dia. E F7 | F    | G       | I  | J    | K x depth | L ±1 | M +1 | P ±0,2 | R  | dia. S H7 | min. dia. T | dia. U | W ±0,2 | dia. X | dia. Y f7 | SW | OR-1 O-ring Order No. |
|-----------|-------------|----|------|-----|--------|-----------|------|---------|----|------|-----------|------|------|--------|----|-----------|-------------|--------|--------|--------|-----------|----|-----------------------|
| 320507    | 6930D-05    | 39 | 5,5  | 3,6 | 12     | 8         | 19,2 | M22x1,5 | 44 | 18,0 | M5x11     | 52   | 25,5 | 39     | 20 | 18        | 31          | 30     | 8,5    | 2,5    | 18        | 7  | 321141                |
| 320515    | 6930D-08    | 48 | 6,0  | 4,0 | 16     | 10        | 23,0 | M26x1,5 | 53 | 19,0 | M6x14     | 65   | 30,0 | 48     | 25 | 22        | 33          | 31     | 8,5    | 2,5    | 22        | 8  | 321240                |
| 320523    | 6930D-12    | 53 | 7,0  | 4,0 | 20     | 12        | 29,2 | M32x1,5 | 62 | 20,0 | M8x14     | 67   | 31,5 | 53     | 30 | 28        | 38          | 37     | 10,5   | 4,2    | 28        | 10 | 320952                |
| 320531    | 6930D-20    | 65 | 7,0  | 4,4 | 25     | 16        | 35,8 | M40x1,5 | 72 | 25,0 | M10x18    | 82   | 39,0 | 65     | 35 | 35        | 45          | 44     | 13,5   | 5,2    | 35        | 13 | 321018                |
| 320549    | 6930D-32    | 72 | 10,0 | 4,4 | 32     | 20        | 44,8 | M50x1,5 | 79 | 28,0 | M12x18    | 94   | 44,0 | 72     | 42 | 44        | 55          | 54     | 15,5   | 6,2    | 44        | 17 | 320091                |
| 320556    | 6930D-50    | 86 | 12,0 | 5,2 | 40     | 25        | 56,2 | M60x1,5 | 94 | 30,5 | M16x28    | 112  | 47,0 | 86     | 50 | 55        | 66          | 65     | 19,0   | 6,2    | 55        | 22 | 321174                |

### Application example:



### Installation dimensions:

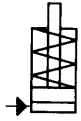


Subject to technical alterations.

No. 6932

## Threaded Cylinder with spherical piston rod

single acting, spring return,  
max. operating pressure 500 bar.



CAD

| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston area<br>[cm <sup>2</sup> ] | Md max.<br>[Nm] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|------------------|----------------------------|-----------------------------------|-----------------|--------------------------|---------------|
| 60178     | 6932-02     | 0,5                           | 2,5                           | 4                | 0,20                       | 0,5                               | 80              | 25                       | 50            |
| 60186     | 6932-05     | 1,1                           | 5,5                           | 4                | 0,45                       | 1,1                               | 90              | 35                       | 80            |
| 60194     | 6932-08     | 2,0                           | 10,0                          | 6                | 1,20                       | 2,0                               | 110             | 65                       | 130           |
| 60202     | 6932-12     | 3,0                           | 15,0                          | 8                | 2,50                       | 3,1                               | 120             | 100                      | 300           |
| 60210     | 6932-20     | 5,0                           | 24,5                          | 12               | 5,90                       | 4,9                               | 130             | 155                      | 470           |

### Design:

Cylinder barrel from steel, burnished with hex nut. Piston and piston rod case hardened and ground. Wiper at piston rod. Built-in return spring. Sintered bronze breather. Attachment with standard fine thread. Sealing by sealing edge, see „Notes“. Oil supply via oil channel in fixture body.

### Application:

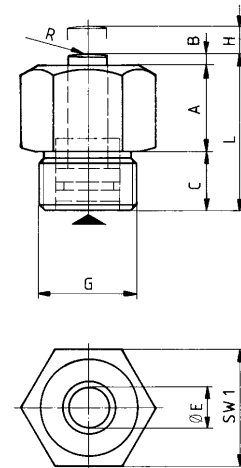
Ideal for clamping bars for tolerance compensation in multiple fixtures and for positioning, clamping or discharging workpieces.

### Features:

Small dimensions, can be installed closely spaced side-by-side. The cylinders must be screwed into the fixture body up to the hexagon.

### Note:

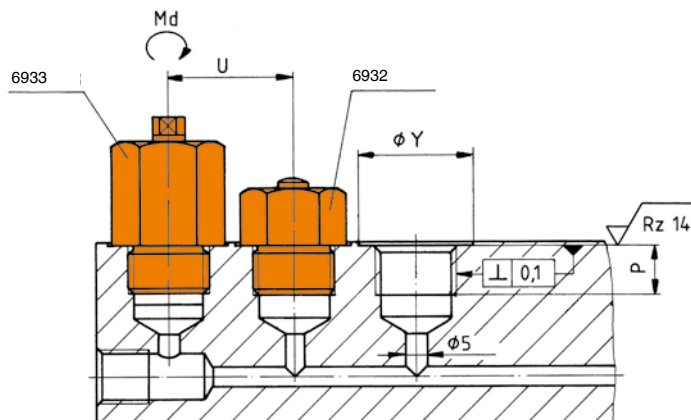
The screw-in cylinders cannot be loaded in the retracted position. For single acting cylinder types, there is a risk of sucking in liquid. The cylinders must be protected against direct penetration of cutting and cooling liquids. The built-in sintered bronze filter should be protected by appropriate arrangement or by a cover. Sealing by sealing edge. For the locating hole, the sealing surface must be at right angles to the thread, flat and not hardened.



### Dimensions:

| Order no. | Article no. | Piston dia. [mm] | A  | B | C  | dia. E | G       | L  | P+1 | R  | SW1 | U min. | dia. Y |
|-----------|-------------|------------------|----|---|----|--------|---------|----|-----|----|-----|--------|--------|
| 60178     | 6932-02     | 8                | 14 | 1 | 12 | 5      | M16x1,5 | 27 | 12  | 10 | 19  | 24     | 23     |
| 60186     | 6932-05     | 12               | 14 | 1 | 12 | 8      | M20x1,5 | 27 | 12  | 28 | 24  | 30     | 29     |
| 60194     | 6932-08     | 16               | 21 | 2 | 14 | 10     | M24x1,5 | 37 | 14  | 30 | 27  | 34     | 33     |
| 60202     | 6932-12     | 20               | 27 | 2 | 18 | 12     | M30x1,5 | 47 | 18  | 36 | 36  | 44     | 43     |
| 60210     | 6932-20     | 25               | 33 | 2 | 21 | 16     | M36x1,5 | 56 | 21  | 50 | 41  | 50     | 49     |

### Installation dimensions:

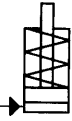


Subject to technical alterations.

## No. 6933

### Threaded Cylinder, piston rod with internal thread

single acting, spring return,  
max. operating pressure 500 bar.



CAD

| Order no. | Article no. | Push force at 100 bar [kN] | Push force at 500 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | Piston dia. [mm] | Piston area [cm <sup>2</sup> ] | Md max. [Nm] | Spring force min. [N] | Weight [g] |
|-----------|-------------|----------------------------|----------------------------|---------------|-------------------------|------------------|--------------------------------|--------------|-----------------------|------------|
| 60004     | 6933-05     | 1,1                        | 5,5                        | 8             | 0,9                     | 12               | 1,1                            | 90           | 35                    | 120        |
| 60012     | 6933-08     | 2,0                        | 10,0                       | 10            | 2,0                     | 16               | 2,0                            | 110          | 70                    | 200        |
| 60020     | 6933-12     | 3,0                        | 15,0                       | 10            | 3,1                     | 20               | 3,1                            | 120          | 115                   | 370        |
| 60038     | 6933-20     | 5,0                        | 24,5                       | 12            | 5,9                     | 25               | 4,9                            | 130          | 160                   | 510        |
| 61176     | 6933-32     | 8,0                        | 40,0                       | 12            | 9,6                     | 32               | 8,0                            | 150          | 240                   | 750        |

### Design:

Cylinder barrel from steel, burnished with hex nut. Piston and piston rod case hardened and ground. Wiper at piston rod. Built-in return spring. Sintered bronze breather. Attachment with standard fine thread. Sealing by sealing edge, see „Notes“. Oil supply via oil channel in fixture body.

### Application:

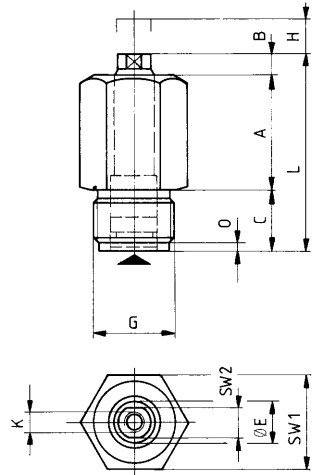
Ideal for clamping bars for tolerance compensation in multiple fixtures and for positioning, clamping or discharging workpieces.

### Features:

Small dimensions, can be installed closely spaced side-by-side. The cylinders must be screwed into the fixture body up to the hexagon.

### Note:

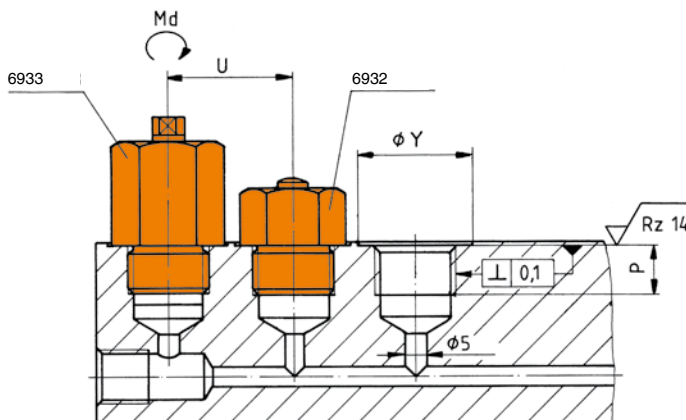
The screw-in cylinders cannot be loaded in the retracted position. For single acting cylinder types, there is a risk of sucking in liquid. The cylinders must be protected against direct penetration of cutting and cooling liquids. The built-in sintered bronze filter should be protected by appropriate arrangement or by a cover. Sealing by sealing edge. For the locating hole, the sealing surface must be at right angles to the thread, flat and not hardened.



### Dimensions:

| Order no. | Article no. | A  | B | C  | dia. E | G       | K x depth | L  | O | P+1 | SW1 | SW2 | U min. | dia. Y |
|-----------|-------------|----|---|----|--------|---------|-----------|----|---|-----|-----|-----|--------|--------|
| 60004     | 6933-05     | 25 | 6 | 15 | 8      | M20x1,5 | M4x10     | 46 | 3 | 12  | 24  | 6   | 30     | 29     |
| 60012     | 6933-08     | 34 | 6 | 18 | 10     | M24x1,5 | M5x12     | 58 | 3 | 15  | 27  | 8   | 34     | 33     |
| 60020     | 6933-12     | 34 | 6 | 21 | 12     | M30x1,5 | M6x14     | 61 | 3 | 18  | 36  | 9   | 44     | 43     |
| 60038     | 6933-20     | 35 | 8 | 23 | 16     | M36x1,5 | M8x17     | 66 | 3 | 20  | 41  | 13  | 50     | 49     |
| 61176     | 6933-32     | 35 | 9 | 25 | 16     | M42x1,5 | M8x17     | 69 | 3 | 22  | 50  | 13  | 61     | 60     |

### Installation dimensions:



Subject to technical alterations.

No. 6934

## Threaded Cylinder bottom sealing

Single acting, with spring return,  
max. operating pressure 350 bar.



| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 350 bar<br>[kN] | Stroke C<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston area<br>[cm <sup>2</sup> ] | Md<br>CU seal<br>[Nm] | Md<br>Plastic seal<br>[Nm] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|------------------|----------------------------|-----------------------------------|-----------------------|----------------------------|---------------|
| 68312     | 6934-02     | 0,68                          | 2,4                           | 5,0              | 0,3                        | 0,7                               | 40                    | 20                         | 27            |
| 68338     | 6934-04     | 1,25                          | 4,4                           | 6,5              | 0,8                        | 1,3                               | 54                    | 30                         | 54            |
| 68353     | 6934-10-1   | 2,88                          | 10,1                          | 9,5              | 2,7                        | 2,9                               | 68                    | 35                         | 95            |
| 68379     | 6934-10-2   | 2,88                          | 10,1                          | 19,0             | 5,5                        | 2,9                               | 68                    | 35                         | 191           |
| 68395     | 6934-17     | 5,00                          | 17,5                          | 8,0              | 4,0                        | 5,1                               | 50                    | 50                         | 159           |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Piston rod spherical or with internal thread. Wiper at piston rod. Return spring from stainless steel. Oil supply via oil channel in fixture body.

### Application:

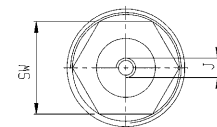
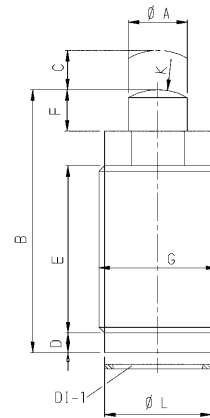
Threaded cylinders are designed for space saving installation at fixtures. Universal clamping cylinder for clamping, pushing, locking and positioning.

### Features:

Small dimensions, can be installed closely spaced side-by-side.

### Note:

The cylinders must not be loaded in retracted position. The cylinders must be protected against direct access of lubricants and coolant. The system has to be completely vented during installation.

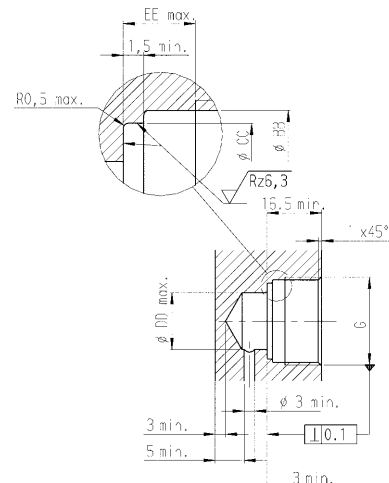


### Dimensions:

| Order no. | Article no. | dia. A | B    | D | E    | F   | G       | SW | J x depth | K    | dia. L | DI-1<br>Cu seal<br>Order No. | DI-1<br>Plastic seal<br>Order No. |
|-----------|-------------|--------|------|---|------|-----|---------|----|-----------|------|--------|------------------------------|-----------------------------------|
| 68312     | 6934-02     | 4,5    | 28,0 | 5 | 17,5 | 0,5 | M16x1,5 | 13 | -         | 6,5  | 13,5   | 554568                       | 554567                            |
| 68338     | 6934-04     | 6,5    | 37,0 | 5 | 25,0 | 1,5 | M20x1,5 | 16 | -         | 6,5  | 16,5   | 554570                       | 554569                            |
| 68353     | 6934-10-1   | 12,5   | 34,5 | 8 | 15,5 | 1,5 | M28x1,5 | 22 | -         | 19,0 | 23,0   | 554572                       | 554571                            |
| 68379     | 6934-10-2   | 12,5   | 61,5 | 8 | 15,5 | 1,5 | M28x1,5 | 22 | M6x11,0   | -    | 23,0   | 554572                       | 554571                            |
| 68395     | 6934-17     | 16,0   | 37,5 | 8 | 19,0 | 2,5 | M35x1,5 | 27 | M6x12,5   | -    | 31,0   | -                            | 554573                            |

### Installation dimensions:

| Order no. | Article no. | G       | ØBB ±0.15 | ØCC ±0.13 | dia. DD | EE |
|-----------|-------------|---------|-----------|-----------|---------|----|
| 68312     | 6934-02     | M16x1,5 | 14,5      | 13,8      | 8,0     | 4  |
| 68338     | 6934-04     | M20x1,5 | 18,5      | 16,8      | 9,5     | 4  |
| 68353     | 6934-10-1   | M28x1,5 | 26,5      | 23,4      | 16,0    | 7  |
| 68379     | 6934-10-2   | M28x1,5 | 26,5      | 23,4      | 16,0    | 7  |
| 68395     | 6934-17     | M35x1,5 | 33,5      | 31,2      | 22,0    | 7  |



Subject to technical alterations.



## BLOCK CYLINDERS FOR VARIOUS DESIGN APPLICATIONS

- > piston with internal thread
- > for push- and pull operation
- > with longitudinal and cross bores and perpendicular support groove
- > wipers to protect against contamination
- > single and double-acting variants
- > oil supply via O-ring
- > oil supply via threaded port

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

### PRODUCT OVERVIEW:

| Type  | Clamping force [kN] | Pull force [kN] | Clamping stroke [mm] | Max. operating pressure [bar] | No. of models | Operating mode |
|-------|---------------------|-----------------|----------------------|-------------------------------|---------------|----------------|
| 6926  | 10 - 155,5          | -               | 8 - 25               | 500                           | 28            | single acting  |
| 6926D | 10 - 251,5          | 6 - 153         | 16 - 100             | 500                           | 111           | double acting  |
| 6936  | 10,1 - 39,9         | -               | 6,5 - 51             | 350                           | 7             | single acting  |
| 6936D | 10,1 - 39,9         | 5,6 - 17,5      | 6,5 - 51             | 350                           | 8             | double acting  |

### PRODUCT EXAMPLES:

NO. 6926



- > clamping force: 10 - 155,5 kN
- > two mounting versions
- > two strokes

NO. 6926D



- > clamping force: 10 - 251,5 kN
- > two mounting versions
- > three strokes

NO. 6936D

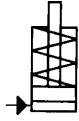


- > clamping force: 10,1 - 39,9 kN
- > two mounting versions
- > three strokes

No. 6926

## Block Cylinder

single acting, spring return,  
max. operating pressure 500 bar.



| Order no. | Article no.  | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Piston area<br>[cm <sup>2</sup> ] | Spring force min.<br>[N] | Weight<br>[g] |
|-----------|--------------|-------------------------------|-------------------------------|------------------|----------------------------|---------------------|-----------------------------------|--------------------------|---------------|
| 63354     | 6926-8-001   | 2,0                           | 10,0                          | 8                | 1,6                        | 16                  | 2,0                               | 50                       | 840           |
| 63362     | 6926-8-002   | 2,0                           | 10,0                          | 20               | 4,0                        | 16                  | 2,0                               | 50                       | 1370          |
| 63370     | 6926-12-001  | 3,1                           | 15,5                          | 8                | 2,4                        | 20                  | 3,1                               | 70                       | 920           |
| 63388     | 6926-12-002  | 3,1                           | 15,5                          | 20               | 6,2                        | 20                  | 3,1                               | 70                       | 1420          |
| 63396     | 6926-20-001  | 5,0                           | 25,0                          | 8                | 4,0                        | 25                  | 5,0                               | 140                      | 1250          |
| 63404     | 6926-20-002  | 5,0                           | 25,0                          | 20               | 10,0                       | 25                  | 5,0                               | 140                      | 1870          |
| 63412     | 6926-32-001  | 8,0                           | 40,0                          | 10               | 8,0                        | 32                  | 8,0                               | 195                      | 2060          |
| 63420     | 6926-32-002  | 8,0                           | 40,0                          | 20               | 16,0                       | 32                  | 8,0                               | 195                      | 2740          |
| 63438     | 6926-50-001  | 12,5                          | 62,5                          | 10               | 12,5                       | 40                  | 12,5                              | 270                      | 2830          |
| 63446     | 6926-50-002  | 12,5                          | 62,5                          | 20               | 25,0                       | 40                  | 12,5                              | 270                      | 3730          |
| 63453     | 6926-78-001  | 19,6                          | 98,0                          | 12               | 23,5                       | 50                  | 19,6                              | 410                      | 4430          |
| 63461     | 6926-78-002  | 19,6                          | 98,0                          | 20               | 39,2                       | 50                  | 19,6                              | 410                      | 5670          |
| 63479     | 6926-125-001 | 31,3                          | 155,5                         | 12               | 37,3                       | 63                  | 31,1                              | 430                      | 9500          |
| 63487     | 6926-125-002 | 31,3                          | 155,5                         | 25               | 77,75                      | 63                  | 31,1                              | 430                      | 9540          |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod. Piston rod with internal thread. Oil supply via threaded port.

### Features:

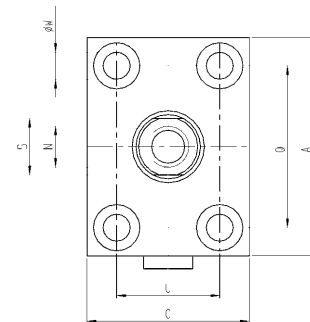
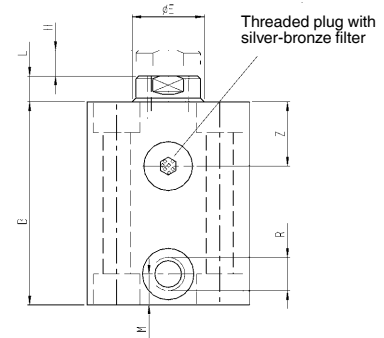
Universal mounting by means of mounting holes. Each cylinder size is available with two different strokes.

### Note:

For single acting cylinders there is risk of sucking in coolant during return stroke. In this case the sinter metal breather shall be piped to a clean, protected area. Further sizes are available on request. For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.  | A   | B   | C  | dia. E | L  | M  | N x depth | Q  | R    | S  | U  | dia. W | Z  |
|-----------|--------------|-----|-----|----|--------|----|----|-----------|----|------|----|----|--------|----|
| 63354     | 6926-8-001   | 60  | 56  | 35 | 10     | 6  | 11 | M6x12     | 40 | G1/4 | 8  | 22 | 6,5    | 17 |
| 63362     | 6926-8-002   | 60  | 91  | 35 | 10     | 6  | 11 | M6x12     | 40 | G1/4 | 8  | 22 | 6,5    | 17 |
| 63370     | 6926-12-001  | 60  | 61  | 35 | 14     | 7  | 11 | M8x15     | 40 | G1/4 | 10 | 22 | 6,5    | 17 |
| 63388     | 6926-12-002  | 60  | 95  | 35 | 14     | 7  | 11 | M8x15     | 40 | G1/4 | 10 | 22 | 6,5    | 17 |
| 63396     | 6926-20-001  | 65  | 64  | 45 | 16     | 7  | 11 | M10x15    | 50 | G1/4 | 13 | 30 | 8,5    | 18 |
| 63404     | 6926-20-002  | 65  | 94  | 45 | 16     | 7  | 11 | M10x15    | 50 | G1/4 | 13 | 30 | 8,5    | 18 |
| 63412     | 6926-32-001  | 75  | 75  | 55 | 20     | 10 | 11 | M12x15    | 55 | G1/4 | 17 | 35 | 10,5   | 22 |
| 63420     | 6926-32-002  | 75  | 100 | 55 | 20     | 10 | 11 | M12x15    | 55 | G1/4 | 17 | 35 | 10,5   | 22 |
| 63438     | 6926-50-001  | 85  | 79  | 63 | 25     | 10 | 11 | M16x25    | 63 | G1/4 | 22 | 40 | 10,5   | 24 |
| 63446     | 6926-50-002  | 85  | 104 | 63 | 25     | 10 | 11 | M16x25    | 63 | G1/4 | 22 | 40 | 10,5   | 24 |
| 63453     | 6926-78-001  | 100 | 90  | 75 | 32     | 10 | 13 | M20x30    | 76 | G1/4 | 27 | 45 | 13,0   | 27 |
| 63461     | 6926-78-002  | 100 | 115 | 75 | 32     | 10 | 13 | M20x30    | 76 | G1/4 | 27 | 45 | 13,0   | 27 |
| 63479     | 6926-125-001 | 125 | 102 | 95 | 40     | 14 | 17 | M27x40    | 95 | G1/4 | 36 | 65 | 17,0   | 26 |
| 63487     | 6926-125-002 | 125 | 122 | 95 | 40     | 14 | 17 | M27x40    | 95 | G1/4 | 36 | 65 | 17,0   | 26 |

Subject to technical alterations.

No. 6926

## Block Cylinder

single acting, spring return,  
max. operating pressure 500 bar.



| Order no. | Article no.  | Push force at 100 bar | Push force at 500 bar | Stroke H | Vol.               | Piston dia. | Piston area        | Spring force min. | Weight |
|-----------|--------------|-----------------------|-----------------------|----------|--------------------|-------------|--------------------|-------------------|--------|
|           |              | [kN]                  | [kN]                  | [mm]     | [cm <sup>3</sup> ] | [mm]        | [cm <sup>2</sup> ] | [N]               | [g]    |
| 63511     | 6926-8-003   | 2,0                   | 10,0                  | 8        | 1,6                | 16          | 2,0                | 50                | 900    |
| 63529     | 6926-8-004   | 2,0                   | 10,0                  | 20       | 4,0                | 16          | 2,0                | 50                | 1450   |
| 63537     | 6926-12-003  | 3,1                   | 15,5                  | 8        | 2,4                | 20          | 3,1                | 70                | 980    |
| 63545     | 6926-12-004  | 3,1                   | 15,5                  | 20       | 6,2                | 20          | 3,1                | 70                | 1520   |
| 63552     | 6926-20-003  | 5,0                   | 25,0                  | 8        | 4,0                | 25          | 5,0                | 140               | 1370   |
| 63560     | 6926-20-004  | 5,0                   | 25,0                  | 20       | 10,0               | 25          | 5,0                | 140               | 2030   |
| 63578     | 6926-32-003  | 8,0                   | 40,0                  | 10       | 8,0                | 32          | 8,0                | 195               | 2270   |
| 63586     | 6926-32-004  | 8,0                   | 40,0                  | 20       | 16,0               | 32          | 8,0                | 195               | 3010   |
| 63594     | 6926-50-003  | 12,5                  | 62,5                  | 10       | 12,5               | 40          | 12,5               | 270               | 3040   |
| 63602     | 6926-50-004  | 12,5                  | 62,5                  | 20       | 25,0               | 40          | 12,5               | 270               | 4010   |
| 63610     | 6926-78-003  | 19,6                  | 98,0                  | 12       | 23,5               | 50          | 19,6               | 410               | 4760   |
| 63628     | 6926-78-004  | 19,6                  | 98,0                  | 20       | 39,2               | 50          | 19,6               | 410               | 6080   |
| 63636     | 6926-125-003 | 31,1                  | 155,5                 | 12       | 37,3               | 63          | 31,1               | 430               | 8720   |
| 63644     | 6926-125-004 | 31,1                  | 155,5                 | 25       | 77,75              | 63          | 31,1               | 430               | 10520  |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod. Piston rod with internal thread. Oil supply via threaded port.

### Features:

Universal mounting to fixtures by means of mounting holes. Each cylinder size is available with two different strokes.

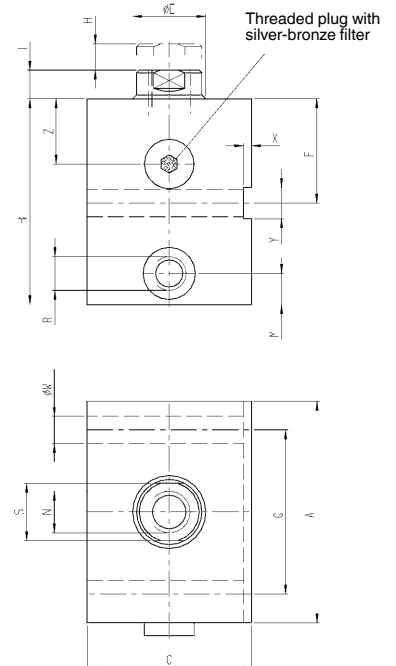
### Note:

For single acting cylinders there is risk of sucking in coolant during return stroke. In this case the sinter metal breather shall be piped to a clean, protected area. For applications above 160 bar operating pressure, cylinders must be tenon-blocked at slot or being backed up at cylinder body. For fixing screws must be strength class 12.9.

All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.  | A   | B   | C  | dia. E | F  | L  | M  | N x depth | Q  | R    | S  | dia. W | X | Y  | Z  |
|-----------|--------------|-----|-----|----|--------|----|----|----|-----------|----|------|----|--------|---|----|----|
| 63511     | 6926-8-003   | 60  | 56  | 35 | 10     | 30 | 6  | 11 | M6x12     | 40 | G1/4 | 8  | 6,5    | 2 | 8  | 17 |
| 63529     | 6926-8-004   | 60  | 91  | 35 | 10     | 30 | 6  | 11 | M6x12     | 40 | G1/4 | 8  | 6,5    | 2 | 8  | 17 |
| 63537     | 6926-12-003  | 60  | 61  | 35 | 14     | 30 | 7  | 11 | M8x15     | 40 | G1/4 | 10 | 6,5    | 2 | 8  | 17 |
| 63545     | 6926-12-004  | 60  | 95  | 35 | 14     | 30 | 7  | 11 | M8x15     | 40 | G1/4 | 10 | 6,5    | 2 | 8  | 17 |
| 63552     | 6926-20-003  | 65  | 64  | 45 | 16     | 33 | 7  | 11 | M10x15    | 50 | G1/4 | 13 | 8,5    | 2 | 10 | 18 |
| 63560     | 6926-20-004  | 65  | 94  | 45 | 16     | 33 | 7  | 11 | M10x15    | 50 | G1/4 | 13 | 8,5    | 2 | 10 | 18 |
| 63578     | 6926-32-003  | 75  | 75  | 55 | 20     | 38 | 10 | 11 | M12x15    | 55 | G1/4 | 17 | 10,5   | 3 | 12 | 22 |
| 63586     | 6926-32-004  | 75  | 100 | 55 | 20     | 38 | 10 | 11 | M12x15    | 55 | G1/4 | 17 | 10,5   | 3 | 12 | 22 |
| 63594     | 6926-50-003  | 85  | 79  | 63 | 25     | 40 | 10 | 11 | M16x25    | 63 | G1/4 | 22 | 10,5   | 3 | 12 | 24 |
| 63602     | 6926-50-004  | 85  | 104 | 63 | 25     | 40 | 10 | 11 | M16x25    | 63 | G1/4 | 22 | 10,5   | 3 | 12 | 24 |
| 63610     | 6926-78-003  | 100 | 90  | 75 | 32     | 44 | 10 | 13 | M20x30    | 76 | G1/4 | 27 | 13,0   | 5 | 16 | 27 |
| 63628     | 6926-78-004  | 100 | 115 | 75 | 32     | 44 | 10 | 13 | M20x30    | 76 | G1/4 | 27 | 13,0   | 5 | 16 | 27 |
| 63636     | 6926-125-003 | 125 | 102 | 95 | 40     | 50 | 14 | 17 | M27x40    | 95 | G1/4 | 36 | 17,0   | 5 | 20 | 26 |
| 63644     | 6926-125-004 | 125 | 122 | 95 | 40     | 50 | 14 | 17 | M27x40    | 95 | G1/4 | 36 | 17,0   | 5 | 20 | 26 |

Subject to technical alterations.

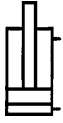
No. 6926D

## Block Cylinder

double acting,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD



| Order no. | Article no.   | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Pull force at 100 bar<br>[kN] | Pull force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol. push<br>[cm <sup>3</sup> ] | Vol. pull<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Weight<br>[g] |
|-----------|---------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------|---------------------------------|---------------------------------|---------------------|---------------|
| 62034     | 6926D-8-001   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 16               | 3,2                             | 1,9                             | 16                  | 820           |
| 62042     | 6926D-8-002   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 50               | 10,0                            | 6,0                             | 16                  | 1330          |
| 295410    | 6926D-8-200   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 100              | 20,0                            | 12,0                            | 16                  | 2200          |
| 62117     | 6926D-12-001  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 16               | 5,0                             | 2,6                             | 20                  | 880           |
| 62133     | 6926D-12-002  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 50               | 15,5                            | 8,0                             | 20                  | 1380          |
| 295436    | 6926D-12-200  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 100              | 31,0                            | 20,0                            | 20                  | 2300          |
| 62174     | 6926D-20-001  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 20               | 9,8                             | 5,8                             | 25                  | 1220          |
| 62182     | 6926D-20-002  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 50               | 25,0                            | 14,5                            | 25                  | 1800          |
| 295451    | 6926D-20-200  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 100              | 50,0                            | 29,0                            | 25                  | 3100          |
| 62257     | 6926D-32-001  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 25               | 20,0                            | 12,2                            | 32                  | 1990          |
| 62323     | 6926D-32-002  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 50               | 40,0                            | 24,5                            | 32                  | 2630          |
| 295477    | 6926D-32-200  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 100              | 80,0                            | 49,0                            | 32                  | 4500          |
| 62398     | 6926D-50-001  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 25               | 31,4                            | 19,1                            | 40                  | 2760          |
| 62406     | 6926D-50-002  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 50               | 62,5                            | 38,0                            | 40                  | 3590          |
| 283184    | 6926D-50-200  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 100              | 125,0                           | 76,0                            | 40                  | 5800          |
| 62554     | 6926D-78-001  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 25               | 49,0                            | 29,0                            | 50                  | 4380          |
| 62562     | 6926D-78-002  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 50               | 98,0                            | 58,0                            | 50                  | 5520          |
| 294637    | 6926D-78-200  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 100              | 196,0                           | 116,0                           | 50                  | 8500          |
| 62596     | 6926D-125-001 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 30               | 93,5                            | 55,8                            | 63                  | 7900          |
| 62604     | 6926D-125-002 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 50               | 155,5                           | 93,0                            | 63                  | 9280          |
| 295535    | 6926D-125-200 | 31,1                          | 155,0                         | 18,6                          | 93,0                          | 100              | 311,0                           | 186,0                           | 63                  | 14500         |
| 295550    | 6926D-200-001 | 50,3                          | 251,5                         | 30,6                          | 153,0                         | 32               | 160,0                           | 98,0                            | 80                  | 15000         |
| 295360    | 6926D-200-002 | 50,3                          | 251,5                         | 30,6                          | 153,0                         | 80               | 402,0                           | 245,0                           | 80                  | 21000         |
| 295592    | 6926D-200-200 | 50,3                          | 251,5                         | 30,6                          | 153,0                         | 100              | 503,0                           | 305,0                           | 80                  | 24000         |

### Design:

Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Tandem sealing and wiper at piston rod. Piston rod with internal thread. Oil supply via threaded port.

### Features:

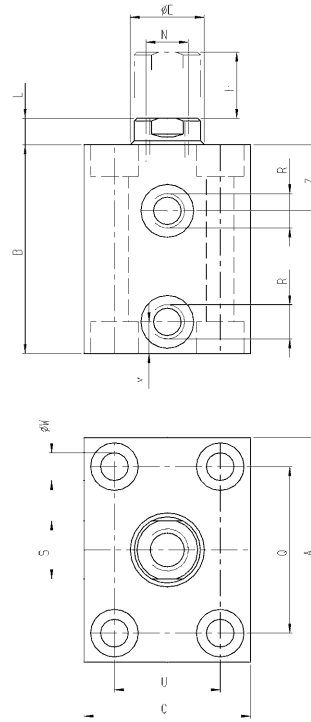
Universal mounting to fixtures through fastening holes. Each cylinder size is available with three different strokes.

### Note:

For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

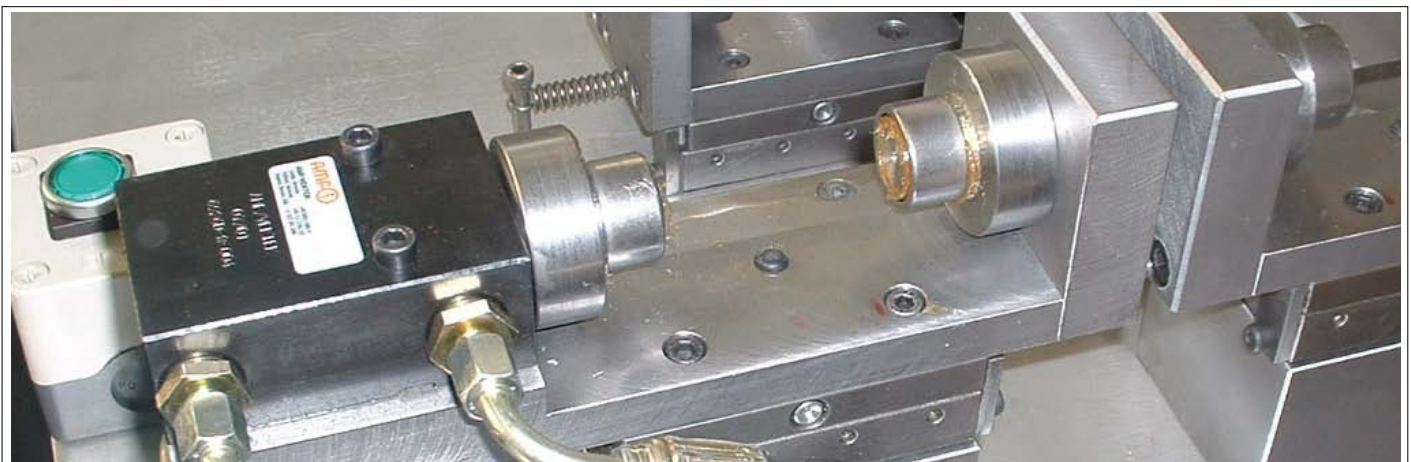
### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.   | A   | B   | C   | dia. E | L  | M  | N x depth | Q   | R    | S  | U  | dia. W | Z    |
|-----------|---------------|-----|-----|-----|--------|----|----|-----------|-----|------|----|----|--------|------|
| 62034     | 6926D-8-001   | 60  | 56  | 35  | 10     | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 22 | 6,5    | 16,5 |
| 62042     | 6926D-8-002   | 60  | 91  | 35  | 10     | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 22 | 6,5    | 16,5 |
| 295410    | 6926D-8-200   | 60  | 144 | 35  | 10     | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 22 | 6,5    | 16,5 |
| 62117     | 6926D-12-001  | 60  | 61  | 35  | 14     | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 22 | 6,5    | 17,0 |
| 62133     | 6926D-12-002  | 60  | 95  | 35  | 14     | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 22 | 6,5    | 17,0 |
| 295436    | 6926D-12-200  | 60  | 148 | 35  | 14     | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 22 | 6,5    | 17,0 |
| 62174     | 6926D-20-001  | 65  | 64  | 45  | 16     | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 30 | 8,5    | 18,0 |
| 62182     | 6926D-20-002  | 65  | 94  | 45  | 16     | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 30 | 8,5    | 18,0 |
| 295451    | 6926D-20-200  | 65  | 144 | 45  | 16     | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 30 | 8,5    | 18,0 |
| 62257     | 6926D-32-001  | 75  | 75  | 55  | 20     | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 35 | 10,5   | 22,0 |
| 62323     | 6926D-32-002  | 75  | 100 | 55  | 20     | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 35 | 10,5   | 22,0 |
| 295477    | 6926D-32-200  | 75  | 150 | 55  | 20     | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 35 | 10,5   | 22,0 |
| 62398     | 6926D-50-001  | 85  | 79  | 63  | 25     | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 40 | 10,5   | 24,0 |
| 62406     | 6926D-50-002  | 85  | 104 | 63  | 25     | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 40 | 10,5   | 24,0 |
| 283184    | 6926D-50-200  | 85  | 154 | 63  | 25     | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 40 | 10,5   | 24,0 |
| 62554     | 6926D-78-001  | 100 | 90  | 75  | 32     | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 45 | 13,0   | 27,0 |
| 62562     | 6926D-78-002  | 100 | 115 | 75  | 32     | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 45 | 13,0   | 27,0 |
| 294637    | 6926D-78-200  | 100 | 165 | 75  | 32     | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 45 | 13,0   | 27,0 |
| 62596     | 6926D-125-001 | 125 | 102 | 95  | 40     | 14 | 17 | M27x40    | 95  | G1/4 | 36 | 65 | 17,0   | 26,0 |
| 62604     | 6926D-125-002 | 125 | 122 | 95  | 40     | 14 | 17 | M27x40    | 95  | G1/4 | 36 | 65 | 17,0   | 26,0 |
| 295535    | 6926D-125-200 | 125 | 172 | 95  | 40     | 14 | 17 | M27x40    | 95  | G1/2 | 36 | 65 | 17,0   | 26,0 |
| 295550    | 6926D-200-001 | 160 | 117 | 120 | 50     | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 80 | 21,0   | 34,0 |
| 295360    | 6926D-200-002 | 160 | 165 | 120 | 50     | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 80 | 21,0   | 34,0 |
| 295592    | 6926D-200-200 | 160 | 185 | 120 | 50     | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 80 | 21,0   | 34,0 |

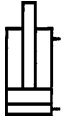


Subject to technical alterations.

No. 6926D

## Block Cylinder

double acting,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



| Order no. | Article no.   | Push force at 100 bar | Push force at 500 bar | Pull force at 100 bar | Pull force at 500 bar | Stroke H<br>[mm] | Vol. push          | Vol. pull          | Piston dia.<br>[mm] | Weight<br>[g] |
|-----------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|--------------------|--------------------|---------------------|---------------|
|           |               | [kN]                  | [kN]                  | [kN]                  | [kN]                  |                  | [cm <sup>3</sup> ] | [cm <sup>3</sup> ] |                     |               |
| 62067     | 6926D-8-003   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 16               | 3,2                | 1,9                | 16                  | 880           |
| 62091     | 6926D-8-004   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 50               | 10,0               | 6,0                | 16                  | 1420          |
| 295618    | 6926D-8-400   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 100              | 20,0               | 12,0               | 16                  | 2200          |
| 62158     | 6926D-12-003  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 16               | 5,0                | 3,2                | 20                  | 950           |
| 62166     | 6926D-12-004  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 50               | 15,5               | 10,0               | 20                  | 1470          |
| 295626    | 6926D-12-400  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 100              | 31,0               | 20,0               | 20                  | 2300          |
| 62190     | 6926D-20-003  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 20               | 9,8                | 5,8                | 25                  | 1340          |
| 62208     | 6926D-20-004  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 50               | 25,0               | 14,5               | 25                  | 1980          |
| 295634    | 6926D-20-400  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 100              | 50,0               | 29,0               | 25                  | 3100          |
| 62372     | 6926D-32-003  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 25               | 20,0               | 12,2               | 32                  | 2200          |
| 62380     | 6926D-32-004  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 50               | 40,0               | 24,5               | 32                  | 2910          |
| 295642    | 6926D-32-400  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 100              | 80,0               | 49,0               | 32                  | 4500          |
| 62455     | 6926D-50-003  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 25               | 31,4               | 19,1               | 40                  | 2970          |
| 62463     | 6926D-50-004  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 50               | 62,5               | 38,0               | 40                  | 3860          |
| 295246    | 6926D-50-400  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 100              | 125,0              | 76,0               | 40                  | 5800          |
| 62570     | 6926D-78-003  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 25               | 49,0               | 29,0               | 50                  | 4700          |
| 62588     | 6926D-78-004  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 50               | 98,0               | 58,0               | 50                  | 5940          |
| 295667    | 6926D-78-400  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 100              | 196,0              | 116,0              | 50                  | 8500          |
| 62653     | 6926D-125-003 | 31,1                  | 155,5                 | 18,6                  | 93,0                  | 30               | 93,5               | 55,8               | 63                  | 8440          |
| 62786     | 6926D-125-004 | 31,1                  | 155,5                 | 18,6                  | 93,0                  | 50               | 155,5              | 93,0               | 63                  | 10010         |
| 295675    | 6926D-125-400 | 31,1                  | 155,0                 | 18,6                  | 93,0                  | 100              | 311,0              | 186,0              | 63                  | 14500         |
| 295683    | 6926D-200-003 | 50,3                  | 251,5                 | 30,6                  | 153,0                 | 32               | 160,0              | 98,0               | 80                  | 15000         |
| 295691    | 6926D-200-004 | 50,3                  | 251,5                 | 30,6                  | 153,0                 | 80               | 402,0              | 245,0              | 80                  | 21000         |
| 295709    | 6926D-200-400 | 50,3                  | 251,5                 | 30,6                  | 153,0                 | 100              | 503,0              | 305,0              | 80                  | 24000         |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston and piston rod case hardened and ground. Tandem sealing and wiper at piston rod. Piston rod with internal thread. Oil supply via threaded port.

### Features:

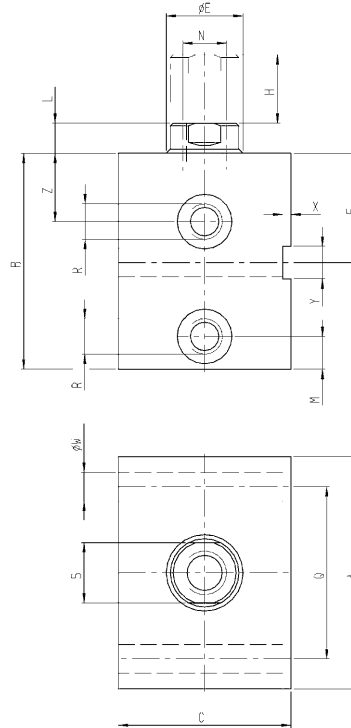
Universal mounting to fixtures through fastening holes. Each cylinder size is available with three different strokes.

### Note:

The block cylinders are designed with slots for keys. For applications above 160 bar operating pressure, cylinders must be tenon-blocked at slot or being backed up at cylinder body. For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.   | A   | B   | C   | dia. E | F  | L  | M  | N x depth | Q   | R    | S  | dia. W | X | Y  | Z    |
|-----------|---------------|-----|-----|-----|--------|----|----|----|-----------|-----|------|----|--------|---|----|------|
| 62067     | 6926D-8-003   | 60  | 56  | 35  | 10     | 30 | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 6,5    | 2 | 8  | 16,5 |
| 62091     | 6926D-8-004   | 60  | 91  | 35  | 10     | 30 | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 6,5    | 2 | 8  | 16,5 |
| 295618    | 6926D-8-400   | 60  | 144 | 35  | 10     | 30 | 6  | 11 | M6x12     | 40  | G1/4 | 8  | 6,5    | 2 | 8  | 16,5 |
| 62158     | 6926D-12-003  | 60  | 61  | 35  | 14     | 30 | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 6,5    | 2 | 8  | 17,0 |
| 62166     | 6926D-12-004  | 60  | 95  | 35  | 14     | 30 | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 6,5    | 2 | 8  | 17,0 |
| 295626    | 6926D-12-400  | 60  | 148 | 35  | 14     | 30 | 7  | 11 | M8x15     | 40  | G1/4 | 10 | 6,5    | 2 | 8  | 17,0 |
| 62190     | 6926D-20-003  | 65  | 64  | 45  | 16     | 33 | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 8,5    | 2 | 10 | 18,0 |
| 62208     | 6926D-20-004  | 65  | 94  | 45  | 16     | 33 | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 8,5    | 2 | 10 | 18,0 |
| 295634    | 6926D-20-400  | 65  | 144 | 45  | 16     | 33 | 7  | 11 | M10x15    | 50  | G1/4 | 13 | 8,5    | 2 | 10 | 18,0 |
| 62372     | 6926D-32-003  | 75  | 75  | 55  | 20     | 38 | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 10,5   | 3 | 12 | 22,0 |
| 62380     | 6926D-32-004  | 75  | 100 | 55  | 20     | 38 | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 10,5   | 3 | 12 | 22,0 |
| 295642    | 6926D-32-400  | 75  | 150 | 55  | 20     | 38 | 10 | 11 | M12x15    | 55  | G1/4 | 17 | 10,5   | 3 | 12 | 22,0 |
| 62455     | 6926D-50-003  | 85  | 79  | 63  | 25     | 40 | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 10,5   | 3 | 12 | 24,0 |
| 62463     | 6926D-50-004  | 85  | 104 | 63  | 25     | 40 | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 10,5   | 3 | 12 | 24,0 |
| 295246    | 6926D-50-400  | 85  | 154 | 63  | 25     | 40 | 10 | 11 | M16x25    | 63  | G1/4 | 22 | 10,5   | 3 | 12 | 24,0 |
| 62570     | 6926D-78-003  | 100 | 90  | 75  | 32     | 44 | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 13,0   | 5 | 16 | 27,0 |
| 62588     | 6926D-78-004  | 100 | 115 | 75  | 32     | 44 | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 13,0   | 5 | 16 | 27,0 |
| 295667    | 6926D-78-400  | 100 | 165 | 75  | 32     | 44 | 10 | 13 | M20x30    | 76  | G1/4 | 27 | 13,0   | 5 | 16 | 27,0 |
| 62653     | 6926D-125-003 | 125 | 102 | 95  | 40     | 50 | 14 | 17 | M27x40    | 95  | G1/4 | 36 | 17,0   | 5 | 20 | 26,0 |
| 62786     | 6926D-125-004 | 125 | 122 | 95  | 40     | 50 | 14 | 17 | M27x40    | 95  | G1/4 | 36 | 17,0   | 5 | 20 | 26,0 |
| 295675    | 6926D-125-400 | 125 | 172 | 95  | 40     | 50 | 14 | 17 | M27x40    | 95  | G1/2 | 36 | 17,0   | 5 | 20 | 26,0 |
| 295683    | 6926D-200-003 | 160 | 117 | 120 | 50     | 60 | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 21,0   | 7 | 24 | 34,0 |
| 295691    | 6926D-200-004 | 160 | 165 | 120 | 50     | 60 | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 21,0   | 7 | 24 | 34,0 |
| 295709    | 6926D-200-400 | 160 | 185 | 120 | 50     | 60 | 14 | 21 | M30x40    | 120 | G1/2 | 46 | 21,0   | 7 | 24 | 34,0 |



Subject to technical alterations.

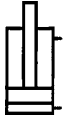
## No. 6926D

### Block cylinder with O-ring connection on side

double acting,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD



| Order no. | Article no.  | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Pull force at 100 bar<br>[kN] | Pull force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol. push<br>[cm <sup>3</sup> ] | Vol. pull<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Weight<br>[g] |
|-----------|--------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------|---------------------------------|---------------------------------|---------------------|---------------|
| 476895    | 6926D-8-10   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 16               | 3,2                             | 1,9                             | 16                  | 880           |
| 328435    | 6926D-8-11   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 50               | 10,0                            | 6,0                             | 16                  | 1420          |
| 328146    | 6926D-8-15   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 100              | 20,0                            | 12,0                            | 16                  | 2200          |
| 328310    | 6926D-12-10  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 16               | 5,0                             | 3,2                             | 20                  | 950           |
| 487900    | 6926D-12-11  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 50               | 15,5                            | 10,0                            | 20                  | 1470          |
| 328161    | 6926D-12-15  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 100              | 31,0                            | 20,0                            | 20                  | 2300          |
| 330332    | 6926D-20-10  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 20               | 9,8                             | 5,8                             | 25                  | 1340          |
| 319491    | 6926D-20-11  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 50               | 25,0                            | 14,5                            | 25                  | 1980          |
| 328336    | 6926D-20-15  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 100              | 50,0                            | 29,0                            | 25                  | 3100          |
| 278903    | 6926D-32-10  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 25               | 20,0                            | 12,2                            | 32                  | 2200          |
| 443143    | 6926D-32-11  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 50               | 40,0                            | 24,5                            | 32                  | 2910          |
| 485458    | 6926D-32-15  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 100              | 80,0                            | 49,0                            | 32                  | 4500          |
| 441964    | 6926D-50-10  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 25               | 31,4                            | 19,1                            | 40                  | 2970          |
| 455279    | 6926D-50-11  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 50               | 62,5                            | 38,0                            | 40                  | 3860          |
| 349654    | 6926D-50-15  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 100              | 125,0                           | 76,0                            | 40                  | 5800          |
| 328351    | 6926D-78-10  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 25               | 49,0                            | 29,0                            | 50                  | 4700          |
| 328187    | 6926D-78-11  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 50               | 98,0                            | 58,0                            | 50                  | 5940          |
| 328203    | 6926D-78-15  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 100              | 196,0                           | 116,0                           | 50                  | 8500          |
| 328229    | 6926D-125-10 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 30               | 93,5                            | 55,8                            | 63                  | 8440          |
| 328245    | 6926D-125-11 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 63               | 196,0                           | 117,0                           | 63                  | 11041         |
| 328260    | 6926D-125-15 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 100              | 311,0                           | 186,0                           | 63                  | 14500         |

### Design:

Cylinder barrel from steel, burnished  
Piston and piston rod case hardened and ground. Tandem sealing and wiper at piston rod. Piston rod with internal thread. Oil supply via oil channel in fixture body.

### Features:

Universal mounting to fixtures through fastening holes.  
Each cylinder size is available with three different strokes.

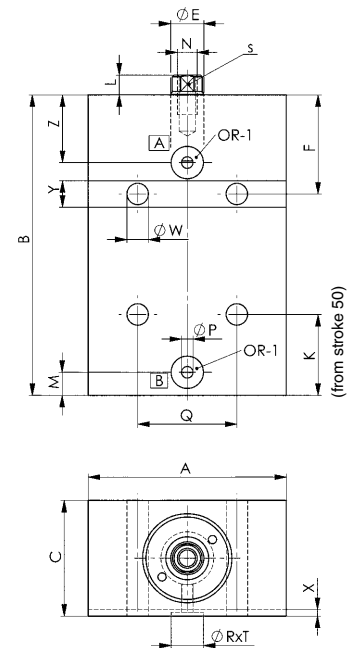
### Note:

The block cylinders are designed with slots for keys. For applications above 160 bar operating pressure, cylinders must be tenon-blocked at slot or being backed up at cylinder body. For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

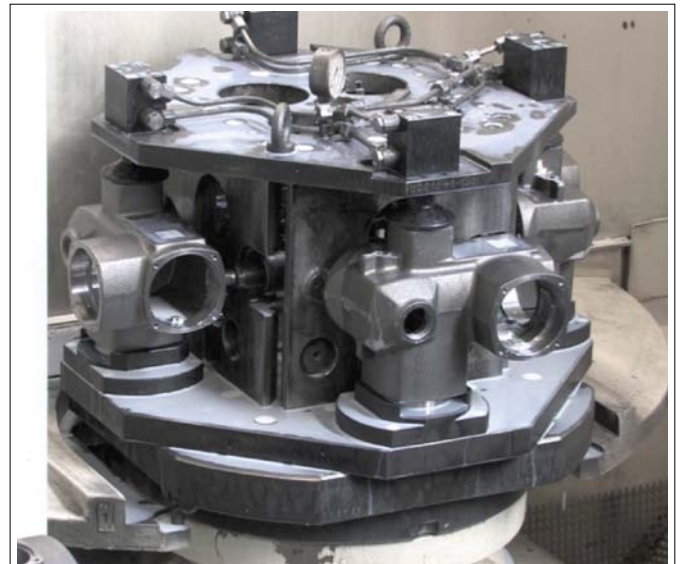
Special sizes are available on request.





### Dimensions:

| Order no. | Article no.  | A   | B   | C  | dia. E | F  | K    | L  | M    | N x depth | dia. P | Q  | ØR x T   | S  | dia. W | X | Y  | Z    | OR-1 O-ring Order No. |
|-----------|--------------|-----|-----|----|--------|----|------|----|------|-----------|--------|----|----------|----|--------|---|----|------|-----------------------|
| 476895    | 6926D-8-10   | 60  | 56  | 35 | 10     | 30 | -    | 6  | 7,0  | M6x12     | 3,5    | 30 | 9,8x1,1  | 8  | 6,5    | 2 | 8  | 20,5 | 537969                |
| 328435    | 6926D-8-11   | 60  | 91  | 35 | 10     | 30 | 24,5 | 6  | 7,0  | M6x12     | 3,5    | 30 | 9,8x1,1  | 8  | 6,5    | 2 | 8  | 20,5 | 537969                |
| 328146    | 6926D-8-15   | 60  | 144 | 35 | 10     | 30 | 24,5 | 6  | 7,0  | M6x12     | 3,5    | 30 | 9,8x1,1  | 8  | 6,5    | 2 | 8  | 20,5 | 537969                |
| 328310    | 6926D-12-10  | 60  | 61  | 35 | 14     | 30 | -    | 7  | 7,5  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 6,5    | 2 | 8  | 20,5 | 537969                |
| 487900    | 6926D-12-11  | 60  | 95  | 35 | 14     | 30 | 26,0 | 7  | 7,5  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 6,5    | 2 | 8  | 20,5 | 537969                |
| 328161    | 6926D-12-15  | 60  | 148 | 35 | 14     | 30 | 26,0 | 7  | 7,5  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 6,5    | 2 | 8  | 20,5 | 537969                |
| 330332    | 6926D-20-10  | 65  | 64  | 45 | 16     | 33 | -    | 7  | 7,5  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 8,5    | 2 | 10 | 21,0 | 537969                |
| 319491    | 6926D-20-11  | 65  | 94  | 45 | 16     | 33 | 26,0 | 7  | 7,5  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 8,5    | 2 | 10 | 21,0 | 537969                |
| 328336    | 6926D-20-15  | 65  | 144 | 45 | 16     | 33 | 26,0 | 7  | 7,5  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 8,5    | 2 | 10 | 21,0 | 537969                |
| 278903    | 6926D-32-10  | 75  | 75  | 55 | 20     | 38 | -    | 10 | 10,0 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 10,5   | 3 | 12 | 25,0 | 537969                |
| 443143    | 6926D-32-11  | 75  | 100 | 55 | 20     | 38 | 27,0 | 10 | 10,0 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 10,5   | 3 | 12 | 25,0 | 537969                |
| 485458    | 6926D-32-15  | 75  | 150 | 55 | 20     | 38 | 27,0 | 10 | 10,0 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 10,5   | 3 | 12 | 25,0 | 537969                |
| 441964    | 6926D-50-10  | 85  | 79  | 63 | 25     | 40 | -    | 10 | 10,0 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 10,5   | 3 | 12 | 27,0 | 537969                |
| 455279    | 6926D-50-11  | 85  | 104 | 63 | 25     | 40 | 27,0 | 10 | 10,0 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 10,5   | 3 | 12 | 27,0 | 537969                |
| 349654    | 6926D-50-15  | 85  | 154 | 63 | 25     | 40 | 27,0 | 10 | 10,0 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 10,5   | 3 | 12 | 27,0 | 537969                |
| 328351    | 6926D-78-10  | 100 | 90  | 75 | 32     | 44 | -    | 10 | 13,0 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 13,0   | 5 | 16 | 29,5 | 161554                |
| 328187    | 6926D-78-11  | 100 | 115 | 75 | 32     | 44 | 30,0 | 10 | 13,0 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 13,0   | 5 | 16 | 29,5 | 161554                |
| 328203    | 6926D-78-15  | 100 | 165 | 75 | 32     | 44 | 30,0 | 10 | 13,0 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 13,0   | 5 | 16 | 29,5 | 161554                |
| 328229    | 6926D-125-10 | 125 | 102 | 95 | 40     | 50 | -    | 14 | 16,0 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 17,0   | 5 | 20 | 32,0 | 492264                |
| 328245    | 6926D-125-11 | 125 | 135 | 95 | 40     | 50 | 41,0 | 14 | 16,0 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 17,0   | 5 | 20 | 32,0 | 492264                |
| 328260    | 6926D-125-15 | 125 | 172 | 95 | 40     | 50 | 41,0 | 14 | 16,0 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 17,0   | 5 | 20 | 32,0 | 492264                |



Subject to technical alterations.

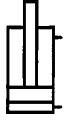
## No. 6926D

### Block cylinder with O-ring connection on base

double acting,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



CAD



| Order no. | Article no.  | Push force at 100 bar<br>[kN] | Push force at 500 bar<br>[kN] | Pull force at 100 bar<br>[kN] | Pull force at 500 bar<br>[kN] | Stroke H<br>[mm] | Vol. push<br>[cm <sup>3</sup> ] | Vol. pull<br>[cm <sup>3</sup> ] | Piston dia.<br>[mm] | Weight<br>[g] |
|-----------|--------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------|---------------------------------|---------------------------------|---------------------|---------------|
| 454793    | 6926D-8-20   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 16               | 3,2                             | 1,9                             | 16                  | 820           |
| 328286    | 6926D-8-21   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 50               | 10,0                            | 6,0                             | 16                  | 1330          |
| 328302    | 6926D-8-25   | 2,0                           | 10,0                          | 1,2                           | 6,0                           | 100              | 20,0                            | 12,0                            | 16                  | 2200          |
| 298521    | 6926D-12-20  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 16               | 5,0                             | 3,2                             | 20                  | 880           |
| 328377    | 6926D-12-21  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 50               | 15,5                            | 10,0                            | 20                  | 1380          |
| 328328    | 6926D-12-25  | 3,1                           | 15,5                          | 1,6                           | 8,0                           | 100              | 31,0                            | 20,0                            | 20                  | 2300          |
| 330522    | 6926D-20-20  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 20               | 9,8                             | 5,8                             | 25                  | 1220          |
| 298513    | 6926D-20-21  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 50               | 25,0                            | 14,5                            | 25                  | 1800          |
| 328344    | 6926D-20-25  | 5,0                           | 25,0                          | 2,9                           | 14,5                          | 100              | 50,0                            | 29,0                            | 25                  | 3100          |
| 442319    | 6926D-32-20  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 25               | 20,0                            | 12,2                            | 32                  | 1990          |
| 298497    | 6926D-32-21  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 50               | 40,0                            | 24,5                            | 32                  | 2630          |
| 328369    | 6926D-32-25  | 8,0                           | 40,0                          | 4,9                           | 24,5                          | 100              | 80,0                            | 49,0                            | 32                  | 4500          |
| 319517    | 6926D-50-20  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 25               | 31,4                            | 19,1                            | 40                  | 2760          |
| 298307    | 6926D-50-21  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 50               | 62,5                            | 38,0                            | 40                  | 3590          |
| 328385    | 6926D-50-25  | 12,5                          | 62,5                          | 7,6                           | 38,0                          | 100              | 125,0                           | 76,0                            | 40                  | 5800          |
| 294884    | 6926D-78-20  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 25               | 49,0                            | 29,0                            | 50                  | 4380          |
| 328401    | 6926D-78-21  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 50               | 98,0                            | 58,0                            | 50                  | 5520          |
| 328427    | 6926D-78-25  | 19,6                          | 98,0                          | 11,6                          | 58,0                          | 100              | 196,0                           | 116,0                           | 50                  | 8500          |
| 328443    | 6926D-125-20 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 30               | 93,5                            | 55,8                            | 63                  | 7900          |
| 328468    | 6926D-125-21 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 63               | 196,0                           | 117,0                           | 63                  | 9280          |
| 328138    | 6926D-125-25 | 31,1                          | 155,5                         | 18,6                          | 93,0                          | 100              | 311,0                           | 186,0                           | 63                  | 14500         |

### Design:

Cylinder barrel from steel, burnished  
Piston and piston rod case hardened and ground. Tandem sealing and wiper at piston rod. Piston rod with internal thread. Oil supply via oil channel in fixture body.

### Features:

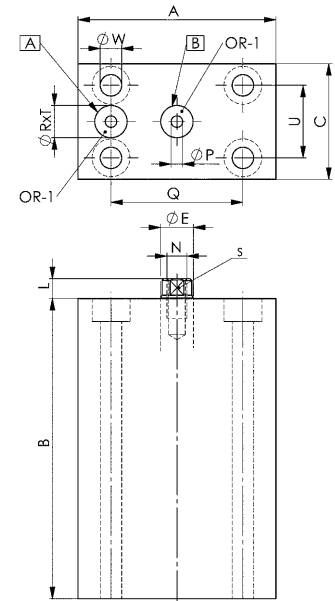
Universal mounting to fixtures through fastening holes.  
Each cylinder size is available with three different strokes.

### Note:

For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.  | A   | B   | C  | dia. E | L  | N x depth | dia. P | Q  | ØR x T   | S  | U  | dia. W | OR-1 O-ring Order No. |
|-----------|--------------|-----|-----|----|--------|----|-----------|--------|----|----------|----|----|--------|-----------------------|
| 454793    | 6926D-8-20   | 60  | 56  | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 328286    | 6926D-8-21   | 60  | 91  | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 328302    | 6926D-8-25   | 60  | 144 | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 298521    | 6926D-12-20  | 60  | 61  | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 328377    | 6926D-12-21  | 60  | 95  | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 328328    | 6926D-12-25  | 60  | 148 | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 330522    | 6926D-20-20  | 65  | 64  | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 298513    | 6926D-20-21  | 65  | 94  | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 328344    | 6926D-20-25  | 65  | 144 | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 442319    | 6926D-32-20  | 75  | 75  | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 298497    | 6926D-32-21  | 75  | 100 | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 328369    | 6926D-32-25  | 75  | 150 | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 319517    | 6926D-50-20  | 85  | 79  | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 298307    | 6926D-50-21  | 85  | 104 | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 328385    | 6926D-50-25  | 85  | 154 | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 294884    | 6926D-78-20  | 100 | 90  | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 328401    | 6926D-78-21  | 100 | 115 | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 328427    | 6926D-78-25  | 100 | 165 | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 328443    | 6926D-125-20 | 125 | 102 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |
| 328468    | 6926D-125-21 | 125 | 135 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |
| 328138    | 6926D-125-25 | 125 | 172 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |



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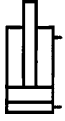
No. 6926D



CAD

## Block cylinder with O-ring connection on rod side

double acting,  
max. operating pressure 500 bar,  
min. operating pressure 25 bar.



| Order no. | Article no.  | Push force at 100 bar | Push force at 500 bar | Pull force at 100 bar | Pull force at 500 bar | Stroke H [mm] | Vol. push [cm <sup>3</sup> ] | Vol. pull [cm <sup>3</sup> ] | Piston dia. [mm] | Weight [g] |
|-----------|--------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------|------------------------------|------------------------------|------------------|------------|
|           |              | [kN]                  | [kN]                  | [kN]                  | [kN]                  |               |                              |                              |                  |            |
| 349696    | 6926D-8-30   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 16            | 3,2                          | 1,9                          | 16               | 820        |
| 477554    | 6926D-8-31   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 50            | 10,0                         | 6,0                          | 16               | 1330       |
| 328153    | 6926D-8-35   | 2,0                   | 10,0                  | 1,2                   | 6,0                   | 100           | 20,0                         | 12,0                         | 16               | 2200       |
| 461434    | 6926D-12-30  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 16            | 5,0                          | 3,2                          | 20               | 880        |
| 328393    | 6926D-12-31  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 50            | 15,5                         | 10,0                         | 20               | 1380       |
| 328179    | 6926D-12-35  | 3,1                   | 15,5                  | 1,6                   | 8,0                   | 100           | 31,0                         | 20,0                         | 20               | 2300       |
| 299487    | 6926D-20-30  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 20            | 9,8                          | 5,8                          | 25               | 1220       |
| 347575    | 6926D-20-31  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 50            | 25,0                         | 14,5                         | 25               | 1800       |
| 328195    | 6926D-20-35  | 5,0                   | 25,0                  | 2,9                   | 14,5                  | 100           | 50,0                         | 29,0                         | 25               | 3100       |
| 299339    | 6926D-32-30  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 25            | 20,0                         | 12,2                         | 32               | 1990       |
| 452821    | 6926D-32-31  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 50            | 40,0                         | 24,5                         | 32               | 2630       |
| 454975    | 6926D-32-35  | 8,0                   | 40,0                  | 4,9                   | 24,5                  | 100           | 80,0                         | 49,0                         | 32               | 4500       |
| 456160    | 6926D-50-30  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 25            | 31,4                         | 19,1                         | 40               | 2760       |
| 328419    | 6926D-50-31  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 50            | 62,5                         | 38,0                         | 40               | 3590       |
| 328211    | 6926D-50-35  | 12,5                  | 62,5                  | 7,6                   | 38,0                  | 100           | 125,0                        | 76,0                         | 40               | 5800       |
| 489567    | 6926D-78-30  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 25            | 49,0                         | 29,0                         | 50               | 4380       |
| 334847    | 6926D-78-31  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 50            | 98,0                         | 58,0                         | 50               | 5520       |
| 328237    | 6926D-78-35  | 19,6                  | 98,0                  | 11,6                  | 58,0                  | 100           | 196,0                        | 116,0                        | 50               | 8500       |
| 328252    | 6926D-125-30 | 31,1                  | 155,5                 | 18,6                  | 93,0                  | 30            | 93,5                         | 55,8                         | 63               | 7900       |
| 328278    | 6926D-125-31 | 31,1                  | 155,5                 | 18,6                  | 93,0                  | 63            | 196,0                        | 117,0                        | 63               | 9280       |
| 328294    | 6926D-125-35 | 31,1                  | 155,5                 | 18,6                  | 93,0                  | 100           | 311,0                        | 186,0                        | 63               | 14500      |

### Design:

Cylinder barrel from steel, burnished  
Piston and piston rod case hardened and ground. Tandem sealing and wiper at piston rod. Piston rod with internal thread. Oil supply via oil channel in fixture body.

### Features:

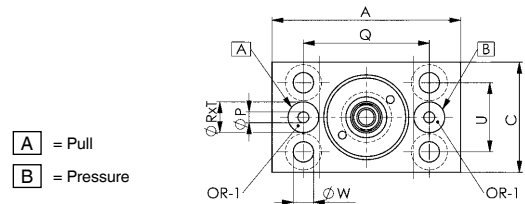
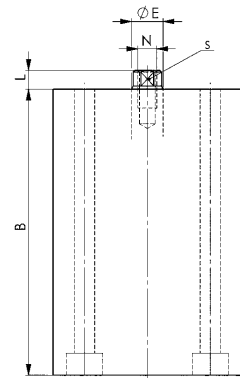
Universal mounting to fixtures through fastening holes.  
Each cylinder size is available with three different strokes.

### Note:

For fixing screws must be strength class 12.9. All tolerances other than specified refer to DIN ISO 2768 medium.

### On request:

Special sizes are available on request.



### Dimensions:

| Order no. | Article no.  | A   | B   | C  | dia. E | L  | N x depth | dia. P | Q  | Ø R x T  | S  | U  | dia. W | OR-1 O-ring Order No. |
|-----------|--------------|-----|-----|----|--------|----|-----------|--------|----|----------|----|----|--------|-----------------------|
| 349696    | 6926D-8-30   | 60  | 56  | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 477554    | 6926D-8-31   | 60  | 91  | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 328153    | 6926D-8-35   | 60  | 144 | 35 | 10     | 6  | M6x12     | 3,5    | 40 | 9,8x1,1  | 8  | 22 | 6,5    | 537969                |
| 461434    | 6926D-12-30  | 60  | 61  | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 328393    | 6926D-12-31  | 60  | 95  | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 328179    | 6926D-12-35  | 60  | 148 | 35 | 14     | 7  | M8x15     | 3,5    | 40 | 9,8x1,1  | 10 | 22 | 6,5    | 537969                |
| 299487    | 6926D-20-30  | 65  | 64  | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 347575    | 6926D-20-31  | 65  | 94  | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 328195    | 6926D-20-35  | 65  | 144 | 45 | 16     | 7  | M10x15    | 4,0    | 50 | 9,8x1,1  | 13 | 30 | 8,5    | 537969                |
| 299339    | 6926D-32-30  | 75  | 75  | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 452821    | 6926D-32-31  | 75  | 100 | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 454975    | 6926D-32-35  | 75  | 150 | 55 | 20     | 10 | M12x15    | 5,0    | 55 | 9,8x1,1  | 17 | 35 | 10,5   | 537969                |
| 456160    | 6926D-50-30  | 85  | 79  | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 328419    | 6926D-50-31  | 85  | 104 | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 328211    | 6926D-50-35  | 85  | 154 | 63 | 25     | 10 | M16x25    | 6,0    | 63 | 9,8x1,1  | 22 | 40 | 10,5   | 537969                |
| 489567    | 6926D-78-30  | 100 | 90  | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 334847    | 6926D-78-31  | 100 | 115 | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 328237    | 6926D-78-35  | 100 | 165 | 75 | 32     | 10 | M20x30    | 6,0    | 76 | 10,8x1,1 | 27 | 45 | 13,0   | 161554                |
| 328252    | 6926D-125-30 | 125 | 102 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |
| 328278    | 6926D-125-31 | 125 | 135 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |
| 328294    | 6926D-125-35 | 125 | 172 | 95 | 40     | 14 | M27x40    | 8,0    | 95 | 13,8x1,5 | 36 | 65 | 17,0   | 492264                |

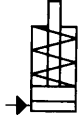


Subject to technical alterations.

No. 6936

## Block Cylinder

Single acting, with spring return,  
max. operating pressure 350 bar.



| Order no. | Article no. | Push force      |                 | Stroke B [mm] | Vol. [cm <sup>3</sup> ] | Piston area [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|-----------------|-----------------|---------------|-------------------------|--------------------------------|------------|
|           |             | at 100 bar [kN] | at 350 bar [kN] |               |                         |                                |            |
| 68023     | 6936-10-1   | 2,88            | 10,1            | 6,5           | 1,9                     | 2,9                            | 463        |
| 68049     | 6936-10-2   | 2,88            | 10,1            | 19,0          | 5,7                     | 2,9                            | 653        |
| 68056     | 6936-18-1   | 5,08            | 17,8            | 12,5          | 6,5                     | 5,1                            | 880        |
| 68072     | 6936-18-2   | 5,08            | 17,8            | 25,5          | 13,0                    | 5,1                            | 1061       |
| 68098     | 6936-18-3   | 5,08            | 17,8            | 51,0          | 26,0                    | 5,1                            | 1442       |
| 68114     | 6936-40-1   | 11,40           | 39,9            | 12,5          | 14,5                    | 11,4                           | 1270       |
| 68130     | 6936-40-2   | 11,40           | 39,9            | 25,5          | 29,0                    | 11,4                           | 1506       |

### Design:

Hardened and burnished steel cylinder barrels. Piston and piston rod case hardened and ground. Piston rod with internal thread. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded port.

### Application:

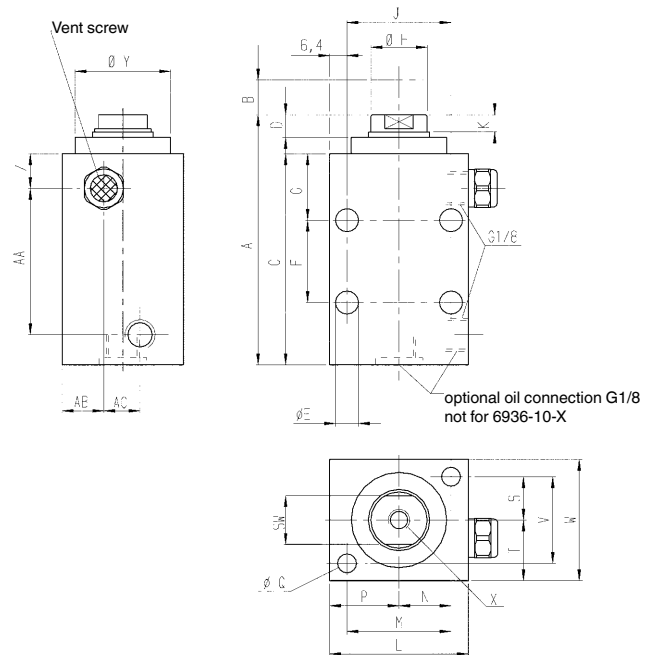
Universal mounting. Universal block cylinder for e.g. clamping, pushing, locking, rivetting.

### Features:

Different strokes are available for each cylinder size. Every model is furnished with parallel and perpendicular mounting holes. Tapped piston rod ends allow the use of custom end attachments.

### Note:

For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When placing into operation, ensure that all air is bled from the system. For applications above 100 bar operating pressure, the cylinders must be supported by the cross bores at the cylinder body when fastening. Screws of strength class 12.9 must be used for fastening.



### Dimensions:

| Order no. | Article no. | A     | C    | D    | dia. E | F  | G    | dia. H | J    | K   | L    | M    | N    | P    | dia. Q | S    | SW | T    | V    | W    | X x depth | dia. Y | Z    | AA   | AB  | AC   |
|-----------|-------------|-------|------|------|--------|----|------|--------|------|-----|------|------|------|------|--------|------|----|------|------|------|-----------|--------|------|------|-----|------|
| 68023     | 6936-10-1   | 60,0  | 46,5 | 7,5  | 7      | -  | 23,5 | 12,2   | 33,5 | 5,5 | 51,0 | 33,5 | 16,5 | 23,0 | 7      | 8,0  | 11 | 14,0 | 16,0 | 28,5 | M6x11     | 27,0   | 9,5  | 28,0 | 9,5 | -    |
| 68049     | 6936-10-2   | 79,0  | 66,0 | 7,5  | 7      | -  | 23,5 | 12,2   | 33,5 | 5,5 | 51,0 | 33,5 | 16,5 | 23,0 | 7      | 8,0  | 11 | 14,0 | 16,0 | 28,5 | M6x11     | 27,0   | 9,5  | 47,0 | 9,5 | -    |
| 68056     | 6936-18-1   | 71,0  | 57,0 | 8,0  | 9      | -  | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 28,5 | 8,0 | 14,5 |
| 68072     | 6936-18-2   | 84,0  | 69,5 | 8,0  | 9      | -  | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 41,0 | 8,0 | 14,5 |
| 68098     | 6936-18-3   | 112,5 | 98,5 | 8,0  | 9      | 41 | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 70,0 | 8,0 | 14,5 |
| 68114     | 6936-40-1   | 73,0  | 57,0 | 10,0 | 9      | -  | 26,5 | 28,2   | 51,0 | 9,0 | 63,5 | 48,0 | 24,0 | 31,5 | 9      | 17,5 | 25 | 25,5 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 28,5 | 8,0 | 17,5 |
| 68130     | 6936-40-2   | 86,0  | 69,5 | 10,0 | 9      | -  | 26,5 | 28,2   | 51,0 | 9,0 | 63,5 | 48,0 | 24,0 | 31,5 | 9      | 17,5 | 25 | 25,5 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 41,0 | 8,0 | 17,5 |

Subject to technical alterations.

## No. 6936D

### Block Cylinder

double acting,  
max. operating pressure 350 bar.



CAD

| Order no. | Article no. | Push force at 100 bar<br>[kN] | Push force at 350 bar<br>[kN] | Pull force at 100 bar<br>[kN] | Pull force at 350 bar<br>[kN] | Stoke B<br>[mm] | Vol. VH<br>[cm <sup>3</sup> ] | Piston area VH<br>[cm <sup>2</sup> ] | Piston area RH<br>[cm <sup>2</sup> ] | Weight<br>[g] |
|-----------|-------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------|-------------------------------|--------------------------------------|--------------------------------------|---------------|
| 68155     | 6936D-10-1  | 2,9                           | 10,1                          | 1,6                           | 5,6                           | 6,5             | 1,9                           | 2,9                                  | 1,6                                  | 467           |
| 68171     | 6936D-10-2  | 2,9                           | 10,1                          | 1,6                           | 5,6                           | 19,0            | 5,7                           | 2,9                                  | 1,6                                  | 644           |
| 68197     | 6936D-18-1  | 5,1                           | 17,8                          | 1,7                           | 6,0                           | 12,5            | 6,5                           | 5,1                                  | 1,7                                  | 463           |
| 68213     | 6936D-18-2  | 5,1                           | 17,8                          | 1,7                           | 6,0                           | 25,5            | 13,0                          | 5,1                                  | 1,7                                  | 1030          |
| 68239     | 6936D-18-3  | 5,1                           | 17,8                          | 1,7                           | 6,0                           | 51,0            | 26,0                          | 5,1                                  | 1,7                                  | 1397          |
| 68254     | 6936D-40-1  | 11,4                          | 39,9                          | 5,0                           | 17,5                          | 12,5            | 14,5                          | 11,4                                 | 5,0                                  | 1225          |
| 68270     | 6936D-40-2  | 11,4                          | 39,9                          | 5,0                           | 17,5                          | 25,5            | 29,0                          | 11,4                                 | 5,0                                  | 1447          |
| 68296     | 6936D-40-3  | 11,4                          | 39,9                          | 5,0                           | 17,5                          | 51,0            | 58,0                          | 11,4                                 | 5,0                                  | 1851          |

VH = work stroke, RH = back stroke

### Design:

Cylinder housing made of steel, hardened and blued. Piston and piston rod with internal thread, case-hardened and ground. Wiper at piston rod prevents from contamination.

### Application:

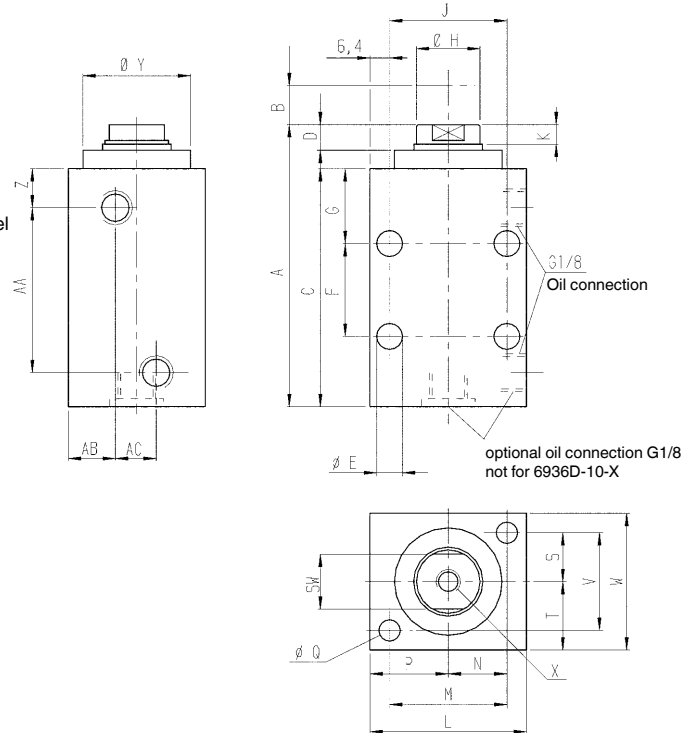
Universal mounting to equipment using mounting holes. Universal element clamping, pressurising, riveting and punching.

### Features:

Different strokes are available for each cylinder size. Every model is furnished with parallel and perpendicular mounting holes. Tapped piston rod ends allow the use of custom end attachments.

### Note:

When placing into operation, ensure that all air is bled from the system. For applications above 100 bar operating pressure, the cylinders must be supported by the cross bores at the cylinder body when fastening. Screws of strength class 12.9 must be used for fastening.



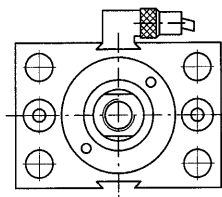
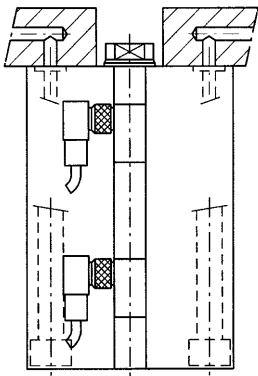
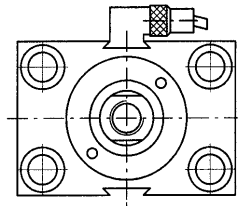
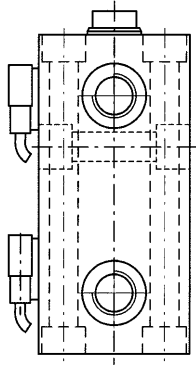
### Dimensions:

| Order no. | Article no. | A     | C    | D    | dia. E | F  | G    | dia. H | J    | K   | L    | M    | N    | P    | dia. Q | S    | SW | T    | V    | W    | X x depth | dia. Y | Z    | AA   | AB  | AC   |
|-----------|-------------|-------|------|------|--------|----|------|--------|------|-----|------|------|------|------|--------|------|----|------|------|------|-----------|--------|------|------|-----|------|
| 68155     | 6936D-10-1  | 60,0  | 46,5 | 7,5  | 7      | -  | 23,5 | 12,2   | 33,5 | 5,5 | 51,0 | 33,5 | 16,5 | 23,0 | 7      | 8,0  | 11 | 14,0 | 16,0 | 28,5 | M6x11     | 27,0   | 9,5  | 28,0 | 9,5 | -    |
| 68171     | 6936D-10-2  | 79,0  | 66,0 | 7,5  | 7      | -  | 23,5 | 12,2   | 33,5 | 5,5 | 51,0 | 33,5 | 16,5 | 23,0 | 7      | 8,0  | 11 | 14,0 | 16,0 | 28,5 | M6x11     | 27,0   | 9,5  | 47,0 | 9,5 | -    |
| 68197     | 6936D-18-1  | 71,0  | 57,0 | 8,0  | 9      | -  | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 28,5 | 8,0 | 14,5 |
| 68213     | 6936D-18-2  | 84,0  | 69,5 | 8,0  | 9      | -  | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 41,0 | 8,0 | 14,5 |
| 68239     | 6936D-18-3  | 112,5 | 98,5 | 8,0  | 9      | 41 | 26,5 | 20,1   | 38,0 | 6,5 | 51,0 | 38,0 | 19,0 | 25,5 | 7      | 16,0 | 17 | 22,0 | 32,0 | 44,5 | M8x11     | 35,0   | 12,5 | 70,0 | 8,0 | 14,5 |
| 68254     | 6936D-40-1  | 73,0  | 57,0 | 10,0 | 9      | -  | 26,5 | 28,2   | 51,0 | 9,0 | 63,5 | 48,0 | 24,0 | 31,5 | 9      | 17,5 | 25 | 25,5 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 28,5 | 8,0 | 17,5 |
| 68270     | 6936D-40-2  | 86,0  | 69,5 | 10,0 | 9      | -  | 26,5 | 28,2   | 51,0 | 9,0 | 63,5 | 48,0 | 24,0 | 31,5 | 9      | 17,5 | 25 | 25,5 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 41,0 | 8,0 | 17,5 |
| 68296     | 6936D-40-3  | 114,5 | 98,5 | 10,0 | 9      | 41 | 26,5 | 28,2   | 51,0 | 9,0 | 63,5 | 48,0 | 24,0 | 31,5 | 9      | 17,5 | 25 | 25,5 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 70,0 | 8,0 | 17,5 |

Subject to technical alterations.

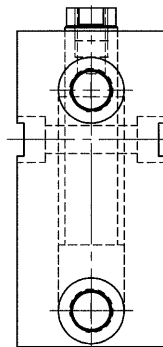
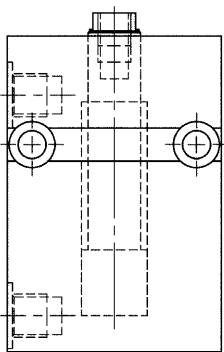
Available upon request. Block cylinders with O-ring- or threaded connection as special variant, double-acting, aluminium housing. With individually-adjustable magnetic sensors for position monitoring, and transverse or axial mounting holes. Block cylinders with double crosswise slot.

Block cylinders with position monitoring are used for clamping and releasing tasks and in automatic plant and production operations where they must be integrated into a cycle. The current piston position is detected by magnetic sensors which are mounted in an axial slot for easy adjustment.



### DESIGN:

- 350 bar max. operating pressure.
- 16 to 200 mm stroke.
- Cylinder barrel made from aluminium.
- Piston case hardened and ground.
- Compact size.
- Individual connections and mountings are possible.



### DESIGN:

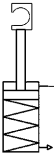
- 500 bar max. operating pressure.
- 16 to 200 mm stroke.
- Cylinder barrel made from steel, burnished.
- Piston case hardened and ground.
- Dimensions like standard version 6926D with crosswise slot.
- Oil supply via threaded port.



## No. 6926Z

### Hook ends, hydraulic

max. operating pressure 400 bar.



| Order no. | Article no. | Slot           | G   | Stroke H [mm] | R    | max. possible clamping force [kN] | Weight [g] |
|-----------|-------------|----------------|-----|---------------|------|-----------------------------------|------------|
| 325373    | 6926Z-12    | 14, 16, 18     | M12 | 20            | G1/4 | 13                                | 1430       |
| 325399    | 6926Z-16    | 18, 20, 22, 24 | M16 | 30            | G1/4 | 39                                | 3650       |
| 326959    | 6926ZL-16   | 18, 20, 22, 24 | M16 | 40            | G1/4 | 39                                | 3950       |

### Design:

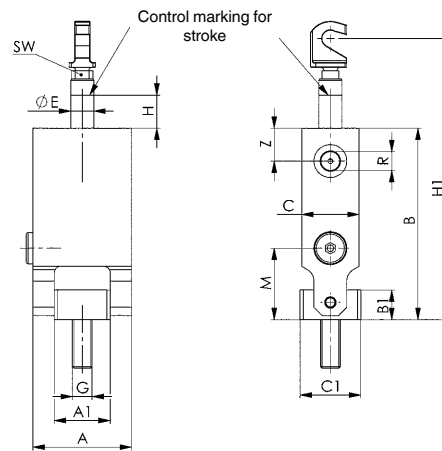
Cylinder barrel from steel, burnished. Piston and piston rod case hardened and ground. Wiper at piston rod. Piston rod with internal thread. Oil supply via threaded port.

### Application:

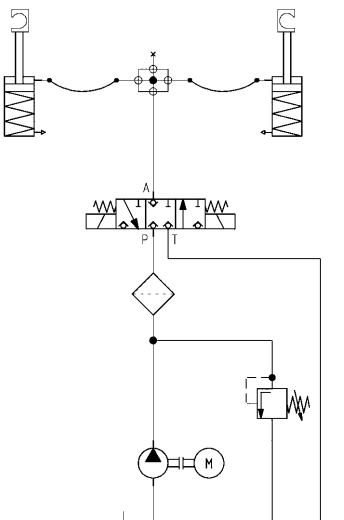
For tensioning primarily cylindrical parts - on both the machine table and clamping plates. The chain length and clamping force are preset on the counter catch using knurled nuts. The hook end is then placed under hydraulic pressure to tension the chain. The control marking on the piston rod marks the max. stroke and shows how far the hydraulic cylinder has been run out.

### Advantage:

Even pressure distribution reduces workpiece deformation.

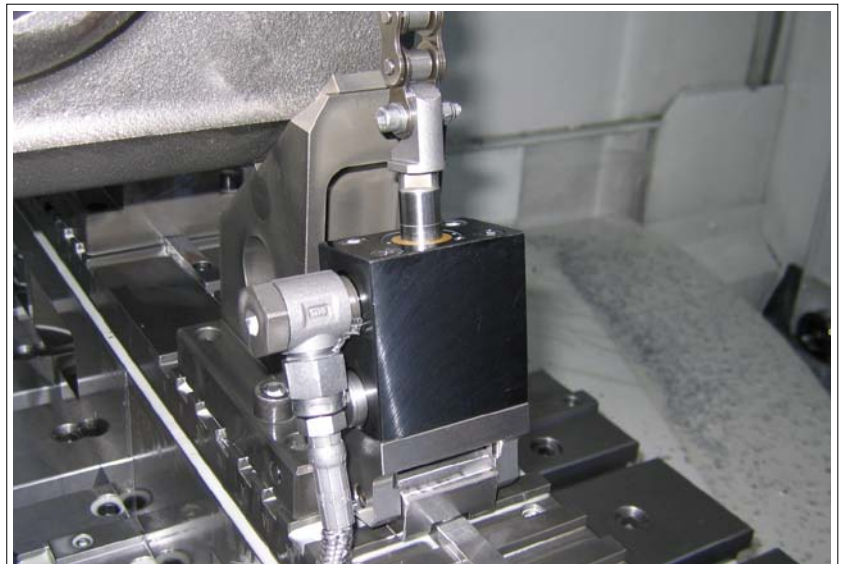


### Hydraulic diagram:



### Dimensions:

| Order no. | Article no. | A  | A1 | B     | B1 | C  | C1 | dia. E | H1            | M    | SW | Z  |
|-----------|-------------|----|----|-------|----|----|----|--------|---------------|------|----|----|
| 325373    | 6926Z-12    | 60 | 34 | 116,5 | 18 | 35 | 37 | 14     | 151,5 - 171,5 | 43,5 | 10 | 20 |
| 325399    | 6926Z-16    | 75 | 44 | 154,0 | 25 | 55 | 37 | 20     | 188,0 - 218,0 | 54,0 | 17 | 25 |
| 326959    | 6926ZL-16   | 75 | 44 | 164,0 | 25 | 55 | 37 | 20     | 198,0 - 238,0 | 54,0 | 17 | 25 |



Subject to technical alterations.



## No. 6540

### Chain clamping set

Hook ends and counter catches tempered. Chain made of tempered steel. Please order fixture for T-slots 6541 separately. Consisting of:

- hook end
- protection set for clamp chain
- counter catch
- 4 roller chains
- 87601: 492 mm (2x), 238 mm (1x), 15.9 mm (1x)
- 87627: 991 mm (1x), 229 mm (1x), 483 mm (1x), 25.4 mm (1x)
- 4 locking links with split pins for connecting
- 6 snap-in plastic elements (for workpiece protection)

| Order no. | Slot           | Screw G | max. permissible torque [Nm] | max. possible clamping force [kN] | Weight [g] |
|-----------|----------------|---------|------------------------------|-----------------------------------|------------|
| 87601     | 14, 16, 18     | M12     | 45                           | 15                                | 2628       |
| 87627     | 18, 20, 22, 24 | M16     | 90                           | 40                                | 7640       |

### Application:

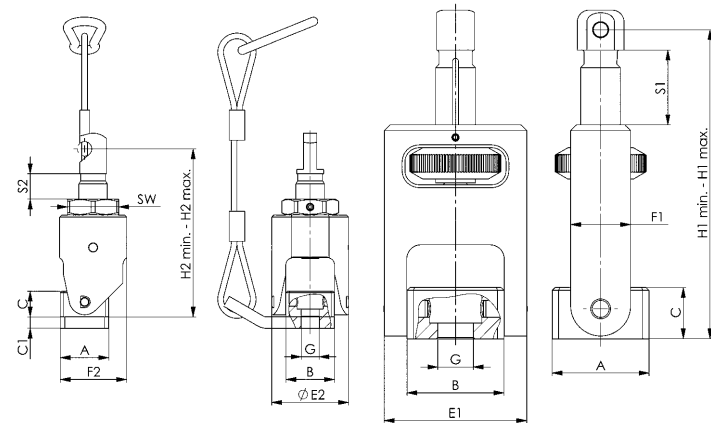
Mainly used for clamping cylindrical parts, such as valve bodies, flanges, pump housings, pistons etc. this device can be used both on machine tables and on clamping pallets. Initial selection of the chain length and setting clamping force is carried out at the take-up unit by turning the knurled nut. Finally, the torque necessary to generate clamping force is applied to the tensioning hook. Plastic pressure pads can be inserted in the chain links to protect the workpiece surface.

### Advantage:

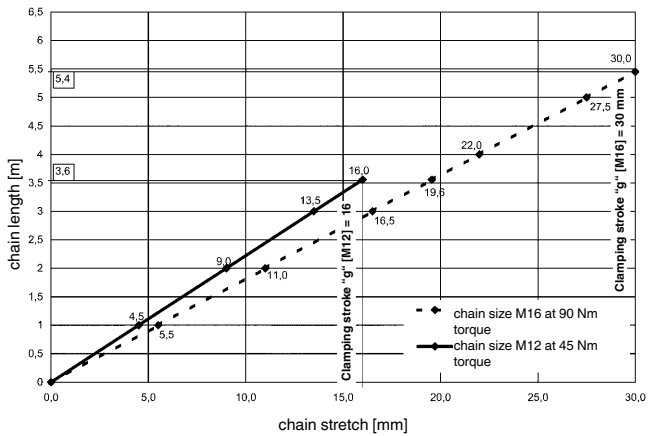
- Uniform pressure distribution reduces workpiece deformation.
- Workpiece can be protected by plastic pressure pads inserted in the chain links.
- Large range of adjustment (tensioning stroke) at take-up unit and tensioning hook.

### Note:

For larger clamping tasks, the clamping hooks, counterholders and clamping chains of size 20 and 24 are used.

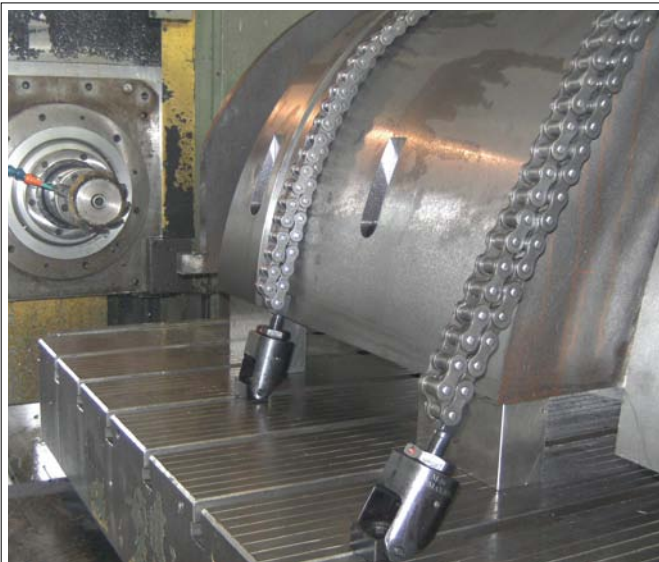


Chain stretch at specified torques



### Dimensions:

| Order no. | A  | B  | C  | C1 | E1 | F1 | H1 min. | H1 max. | Clamping stroke S1 | E2 | F2   | H2 min. | H2 max. | Clamping stroke S2 | SW |
|-----------|----|----|----|----|----|----|---------|---------|--------------------|----|------|---------|---------|--------------------|----|
| 87601     | 34 | 34 | 18 | 8  | 50 | 21 | 83      | 108     | 25                 | 54 | 46,5 | 100     | 118     | 18                 | 36 |
| 87627     | 37 | 44 | 25 | 10 | 64 | 29 | 110     | 146     | 36                 | 70 | 61,5 | 122     | 153     | 31                 | 46 |



Subject to technical alterations.

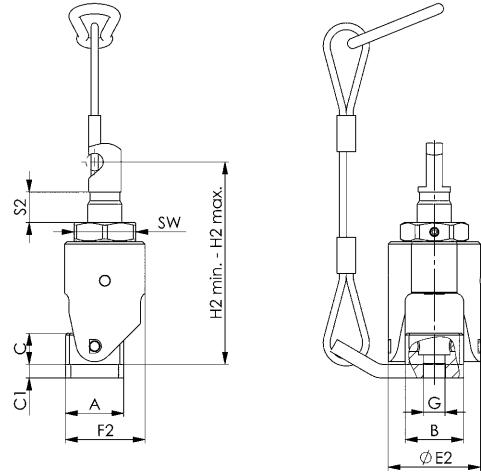
## No. 6540H

### Hook end, mechanical

incl. protection set no. 6540KS



| Order no. | Size | Slot           | G   | max. permissible torque [Nm] | max. possible clamping force [kN] | SW | Weight [g] |
|-----------|------|----------------|-----|------------------------------|-----------------------------------|----|------------|
| 374934    | 12   | 14, 16, 18     | M12 | 45                           | 15                                | 36 | 853        |
| 374959    | 16   | 18, 20, 22, 24 | M16 | 90                           | 40                                | 46 | 1902       |
| 376517    | 20   | 22-28          | M20 | 190                          | 75                                | 65 | 6037       |
| 376533    | 24   | 28-36          | M24 | 300                          | 120                               | 65 | 6040       |



### Dimensions:

| Order no. | Size | A  | B  | C  | C1 | E2 | F2 | H2 min. | H2 max. | Clamping stroke S2 |
|-----------|------|----|----|----|----|----|----|---------|---------|--------------------|
| 374934    | 12   | 34 | 34 | 18 | 8  | 54 | 47 | 100     | 118     | 18                 |
| 374959    | 16   | 37 | 44 | 25 | 10 | 70 | 62 | 122     | 153     | 31                 |
| 376517    | 20   | 58 | 64 | 41 | 10 | 98 | 86 | 195     | 250     | 55                 |
| 376533    | 24   | 58 | 64 | 41 | 10 | 98 | 86 | 199     | 260     | 61                 |

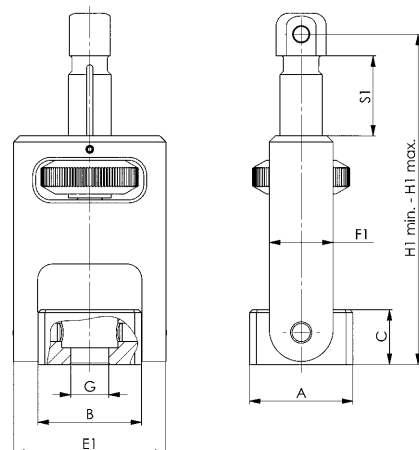


## No. 6540G

### Counter catch



| Order no. | Size | Slot           | G   | S1 Stroke | max. possible clamping force [kN] | Weight [g] |
|-----------|------|----------------|-----|-----------|-----------------------------------|------------|
| 374710    | 12   | 14, 16, 18     | M12 | 25,0      | 15                                | 553        |
| 374728    | 16   | 18, 20, 22, 24 | M16 | 36,0      | 40                                | 1235       |
| 376657    | 20   | 22-28          | M20 | 43,5      | 75                                | 4088       |
| 376632    | 24   | 28-36          | M24 | 43,0      | 120                               | 4145       |



### Dimensions:

| Order no. | Size | A  | B  | C  | E1 | F1 | H1 min. | H1 max. |
|-----------|------|----|----|----|----|----|---------|---------|
| 374710    | 12   | 34 | 34 | 18 | 50 | 21 | 83      | 108,0   |
| 374728    | 16   | 37 | 44 | 25 | 64 | 29 | 110     | 146,0   |
| 376657    | 20   | 58 | 64 | 41 | 91 | 48 | 162     | 205,5   |
| 376632    | 24   | 58 | 64 | 41 | 91 | 48 | 166     | 209,0   |

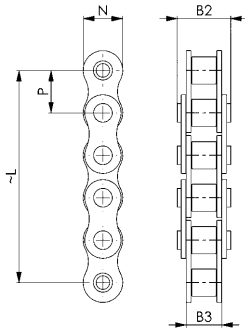
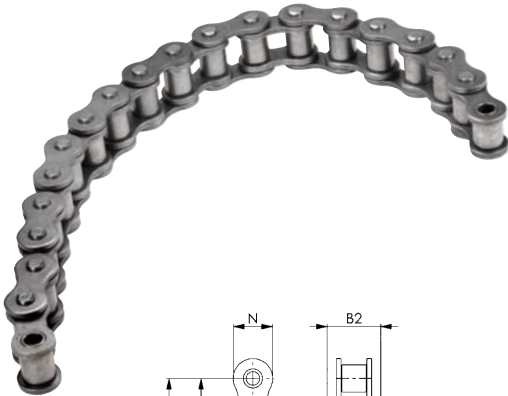


Subject to technical alterations.

## No. 6540K

### Roller chain

Single roller chain DIN 8187, ISO R 606 B, ST 37-2.  
Surface: plain.



| Order no. | Size | Nominal size | L    | B2 | B3 | N  | P      | max. possible clamping force [kN] | Weight [g] |
|-----------|------|--------------|------|----|----|----|--------|-----------------------------------|------------|
| 374736    | 12   | 125          | 111  | 20 | 13 | 15 | 15,875 | 15                                | 114        |
| 374744    | 12   | 250          | 238  | 20 | 13 | 15 | 15,875 | 15                                | 228        |
| 374751    | 12   | 500          | 492  | 20 | 13 | 15 | 15,875 | 15                                | 455        |
| 374769    | 12   | 1000         | 1000 | 20 | 13 | 15 | 15,875 | 15                                | 910        |
| 374777    | 16   | 125          | 127  | 23 | 25 | 21 | 25,400 | 40                                | 335        |
| 374785    | 16   | 250          | 229  | 23 | 25 | 21 | 25,400 | 40                                | 670        |
| 374793    | 16   | 500          | 483  | 23 | 25 | 21 | 25,400 | 40                                | 1340       |
| 374801    | 16   | 1000         | 991  | 23 | 25 | 21 | 25,400 | 40                                | 2680       |
| 376673    | 20   | 1000         | 984  | 44 | 29 | 26 | 31,750 | 75                                | 3720       |
| 376699    | 20   | 1500         | 1492 | 44 | 29 | 26 | 31,750 | 75                                | 5580       |
| 376715    | 20   | 2000         | 2000 | 44 | 29 | 26 | 31,750 | 75                                | 7440       |
| 376723    | 24   | 1000         | 1028 | 54 | 38 | 33 | 38,100 | 120                               | 7050       |
| 376749    | 24   | 1500         | 1485 | 54 | 38 | 33 | 38,100 | 120                               | 10575      |
| 376764    | 24   | 2000         | 2019 | 54 | 38 | 33 | 38,100 | 120                               | 14100      |

### Application:

The individual chain lengths can be joined as required using the connecting links (No. 6540V). The chain can be shortened to any length as required.

### Advantage:

- Chain can be extended or shortened to the required length with ease
- both sides usable with counter catches or hook ends
- resistant to temperature influences and soiling
- chains are tensioned to minimise elongation.

### On request:

Customised lengths available!

## No. 6540KS

### Clamp chain protection set

Completely pre-assembled.



| Order no. | Size | Max. clamping force to be secured [kN] | Weight [g] |
|-----------|------|--|------------|
| 376111    | 12   | 15                                     | 280        |
| 376129    | 16   | 40                                     | 350        |
| 376491    | 20   | 75                                     | 1313       |
| 376558    | 24   | 120                                    | 1313       |

### Application:

To use the clamp chain safely, the protection set is simply screwed below the hook end or the counterholder. Then, using the supplied connecting link, the protection set is fastened above the hook end or counterholder. This prevents the clamp chain from snapping uncontrolledly if the hook end or counterholder breaks.

### Advantage:

- Easy mounting of the protection set
- Safe handling of the clamp chain
- Improved work safety.

### Note:

If the protection set is damaged, the entire set must be replaced.

## No. 6540F

### Spring cotter pin

Packaging unit: 10 pcs.



| Order no. | Size | Packaging unit [St] | Weight [g] |
|-----------|------|---------------------|------------|
| 374835    | 12   | 10                  | 0,5        |
| 374843    | 16   | 10                  | 1,0        |
| 376822    | 20   | 10                  | 2,2        |
| 376848    | 24   | 10                  | 6,5        |

## No. 6540V

Connecting links with spring cotter pin



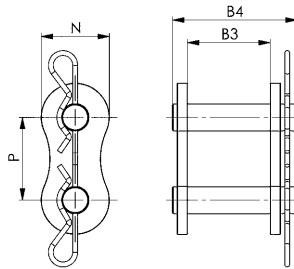
| Order no. | Size | B3 | B4 | N  | P      | max. possible clamping force [kN] | Weight [g] |
|-----------|------|----|----|----|--------|-----------------------------------|------------|
| 374819    | 12   | 13 | 22 | 14 | 15,875 | 15                                | 15         |
| 374827    | 16   | 25 | 39 | 21 | 25,400 | 40                                | 67         |
| 376780    | 20   | 29 | 44 | 26 | 31,750 | 75                                | 113        |
| 376806    | 24   | 38 | 59 | 33 | 38,100 | 120                               | 274        |

### Application:

The connecting links are used for joining two chains together.

### Advantage:

Chains simple and quick to combine and replace.



## No. 6540VS

Turnbuckle



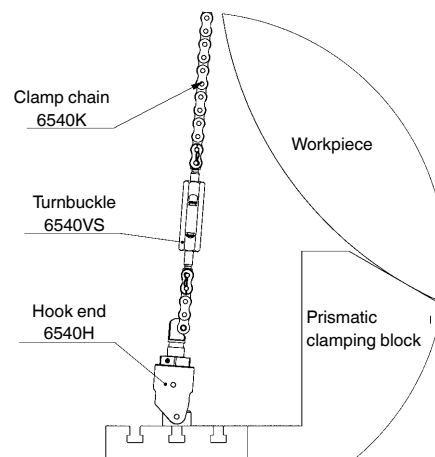
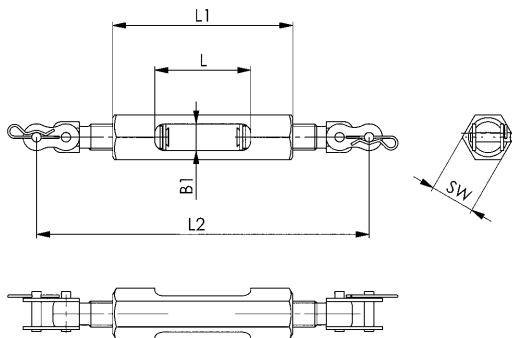
| Order no. | Size | L   | L1  | L2        | B1 | SW | max. possible clamping force [kN] | Weight [g] |
|-----------|------|-----|-----|-----------|----|----|-----------------------------------|------------|
| 376459    | 12   | 52  | 97  | 111 - 147 | 14 | 24 | 15                                | 240        |
| 376616    | 16   | 66  | 126 | 151 - 203 | 20 | 30 | 40                                | 720        |
| 551514    | 20   | 100 | 180 | 206 - 270 | 31 | 50 | 75                                | 2222       |
| 551515    | 24   | 105 | 180 | 214 - 284 | 31 | 50 | 120                               | 3517       |

### Application:

The turnbuckle is clamped between the chains using two locking links. The chain is pretensioned through turning, and the play (caused by lengthening of the chain) is removed.

### Advantage:

- Optimal application of pretensioning with use of long clamping chains (3 m or longer)
- Counteracting chain stretching for long chains



## No. 6540S

Protective elements

for workpiece protection.  
Packaging unit: 6 pcs.



| Order no. | Size | Packaging unit [St] | Weight [g] |
|-----------|------|---------------------|------------|
| 374850    | 12   | 6                   | 3          |
| 374868    | 16   | 6                   | 5          |
| 376574    | 20   | 6                   | 10         |
| 376590    | 24   | 6                   | 16         |

### Application:

The protective elements are pushed into the gaps between the chain links.

### Advantage:

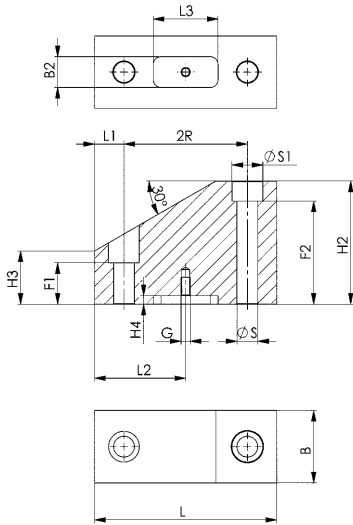
The workpiece surface is protected.

Subject to technical alterations.

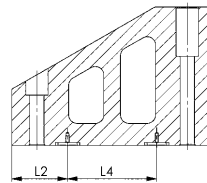
## No. 6540P

### Angle block, 120°

Tempered and burnished.



M12 - M16



M20 - M24



| Order no. | Size | 2R  | B  | B2 | F1 | F2  | G  | H2  | H3  | H4  | L   | L1 | L2  | L3 | L4  | dia. S | dia. S1 | Weight [g] |
|-----------|------|-----|----|----|----|-----|----|-----|-----|-----|-----|----|-----|----|-----|--------|---------|------------|
| 375568    | 12   | 80  | 47 | 20 | 27 | 67  | M6 | 80  | 35  | 5,5 | 118 | 19 | 59  | 42 | -   | 13,5   | 20      | 3230       |
| 375584    | 16   | 100 | 47 | 20 | 33 | 33  | M6 | 100 | 44  | 5,5 | 148 | 24 | 74  | 44 | -   | 17,5   | 26      | 3960       |
| 35121     | 20   | 270 | 78 | 20 | 91 | 161 | M6 | 250 | 102 | 5,5 | 360 | 45 | 100 | 44 | 160 | 22,0   | 33      | 32455      |
| 35162     | 24   | 270 | 78 | 20 | 91 | 161 | M6 | 250 | 102 | 5,5 | 360 | 45 | 100 | 44 | 160 | 26,0   | 40      | 31760      |

### Advantage:

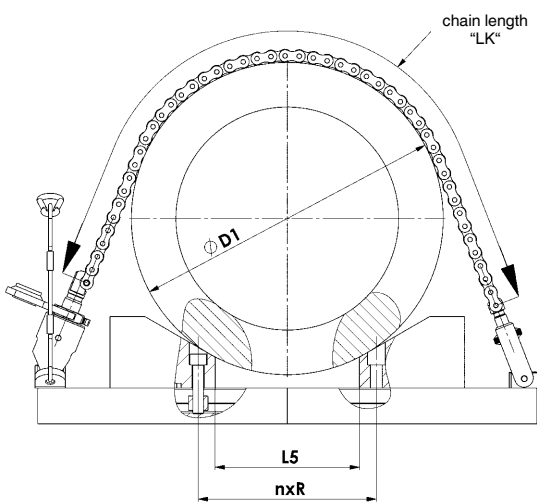
Optimised use of the clamp chain thanks to flexible positioning of the clamping prisms in the machine table groove.

### Note:

The use of a flat T-nut no. 6322A or no. 6322B enables the clamping prisms to be precisely positioned in the machine table groove.

### On request:

Special versions are available on request.



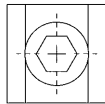
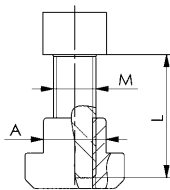
| Order no. | n x R [m]<br>Clearance of angle blocks | Ø D1 [mm]   | Chain length LK [mm]<br>(x) = Number of links | L5  |
|-----------|--|-------------|---|-----|
| 375568    | 1 x 40 = 40                            | 190 - 280   | 413 (26) - 635 (40)                           | 2   |
|           | 2 x 40 = 80                            | 250 - 360   | 540 (34) - 826 (52)                           | 42  |
|           | 3 x 40 = 120                           | 270 - 440   | 603 (38) - 1048 (66)                          | 82  |
|           | 4 x 40 = 160                           | 300 - 520   | 635 (40) - 1238 (78)                          | 122 |
|           | 5 x 40 = 200                           | 350 - 600   | 762 (48) - 1429 (90)                          | 162 |
|           | 6 x 40 = 240                           | 430 - 680   | 953 (60) - 1619 (102)                         | 202 |
|           | 7 x 40 = 280                           | 510 - 760   | 1143 (72) - 1810 (114)                        | 242 |
|           | 8 x 40 = 320                           | 620 - 840   | 1397 (88) - 2000 (126)                        | 282 |
|           | 9 x 40 = 360                           | 760 - 920   | 1778 (112) - 2191 (138)                       | 322 |
|           | 10 x 40 = 400                          | 920 - 1000  | 2191 (138) - 2413 (152)                       | 362 |
| 375584    | 1 x 50 = 50                            | 250 - 370   | 559 (22) - 864 (34)                           | 2   |
|           | 2 x 50 = 100                           | 320 - 470   | 711 (28) - 1118 (44)                          | 52  |
|           | 3 x 50 = 150                           | 320 - 570   | 711 (28) - 1372 (54)                          | 102 |
|           | 4 x 50 = 200                           | 320 - 670   | 711 (28) - 1575 (62)                          | 152 |
|           | 5 x 50 = 250                           | 430 - 770   | 965 (38) - 1829 (72)                          | 202 |
|           | 6 x 50 = 300                           | 530 - 870   | 1168 (46) - 2083 (82)                         | 252 |
|           | 7 x 50 = 350                           | 630 - 970   | 1422 (56) - 2337 (92)                         | 302 |
|           | 8 x 50 = 400                           | 760 - 1070  | 1727 (68) - 2591 (102)                        | 352 |
|           | 9 x 50 = 450                           | 960 - 1170  | 2235 (88) - 1794 (110)                        | 402 |
|           | 10 x 50 = 500                          | 1160 - 1270 | 2743 (108) - 3048 (120)                       | 452 |
| 35121     | 3 x 135 = 405                          | 1200 - 1550 | 2889 (91) - 3842 (121)                        | 315 |
|           | 5 x 135 = 675                          | 1550 - 2100 | 3683 (116) - 5175 (163)                       | 585 |
|           | 7 x 135 = 945                          | 2100 - 2500 | 5017 (158) - 6096 (192)                       | 855 |
| 35162     | 3 x 135 = 405                          | 1200 - 1550 | 2324 (61) - 3848 (101)                        | 315 |
|           | 5 x 135 = 675                          | 1550 - 2100 | 3657 (96) - 5143 (135)                        | 858 |
|           | 7 x 135 = 945                          | 2100 - 2500 | 5029 (132) - 6096 (160)                       | 855 |

Subject to technical alterations.

## No. 6541

### Mounting kit

For attaching the chain clamping set no. 6540 on the subplate, composed of nut for T-nut, resembling DIN 508, and screw complying with ISO 4762, class 8.8.



| Order no. | A  | L    | M   | Weight [g] |
|-----------|----|------|-----|------------|
| 84251     | 14 | 25   | M12 | 60         |
| 84269     | 16 | 30   | M12 | 80         |
| 84277     | 18 | 30   | M12 | 105        |
| 84285     | 18 | 30   | M16 | 115        |
| 84293     | 20 | 35   | M16 | 170        |
| 84343     | 22 | 40   | M16 | 240        |
| 84350     | 24 | 45   | M16 | 335        |
| 376483    | 14 | 35 * | M12 | 88         |
| 376509    | 16 | 40 * | M12 | 114        |
| 376525    | 18 | 40 * | M12 | 141        |
| 376541    | 18 | 45 * | M16 | 189        |
| 376566    | 20 | 50 * | M16 | 248        |
| 376582    | 22 | 50 * | M16 | 305        |
| 376608    | 24 | 55 * | M16 | 407        |

\* For use of the protection set no. 6540KS

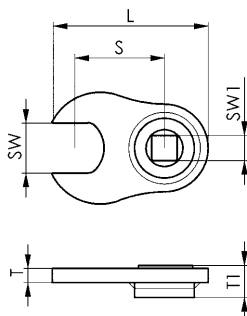
### Note:

Mounting kit for the sizes 20 and 24 available on request.

## No. 902Md

### Open-ended spanner with torque wrench socket

for clamping nuts. Drive 1/2" square socket with ball-engagement groove. Special steel, hardened and zinc-plated.



| Order no. | SW | L   | S  | SW1 [inch] | T | T1 | Weight [g] |
|-----------|----|-----|----|------------|---|----|------------|
| 52506     | 25 | 78  | 45 | 1/2        | 6 | 16 | 170        |
| 52514     | 36 | 101 | 60 | 1/2        | 7 | 16 | 255        |
| 52522     | 46 | 108 | 60 | 1/2        | 8 | 16 | 340        |

### Advantage:

Controlled tightening prevents damage to spindle changing tools on a machine.

### Note:

The set value for the torque wrench is dependant on insertion dimension „S“.

The operating manual provided with your torque wrench contains the requisite information and calculation formulae.

### On request:

SW 65 fits clip no. 6540H - size M20/M24 available on request.



Subject to technical alterations.



## PUSH-PULL CYLINDERS FOR INDIVIDUAL CLAMPING APPLICATION

- > pull force 2,2 to 40 kN
- > operating pressure 350 bar
- > guided or unguided piston rod
- > hardened and chrome-plated piston rod
- > nitrided and burnished body
- > oil supply via threaded port and/or O-ring-sealed ports

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

### PRODUCT OVERVIEW:

| Type       | Clamping stroke [mm] | Pull force [kN] | No. of models | Operating mode          |
|------------|----------------------|-----------------|---------------|-------------------------|
| 6927B      | 25,5 - 51,0          | 5,9 - 17,5      | 4             | single acting           |
| 6951KZ/KZP | 14,5 - 30,0          | 2,2 - 40,0      | 8             | single or double-acting |
| 6951FZ/FZP | 14,5 - 30,0          | 2,2 - 40,0      | 8             | single or double-acting |
| 6951GZ     | 14,5 - 51,0          | 2,2 - 13,9      | 8             | single acting           |

### PRODUCT EXAMPLES:

NO. 6927B



- > pull force: 5,9 - 17,5 kN
- > connection type: threaded port

NO. 6951KZP



- > pull force: 2,2 - 40 kN
- > connection type: O-ring or threaded port

NO. 6951FZP

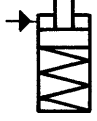


- > pull force: 2,2 - 40 kN
- > connection type: O-ring or threaded port

## No. 6927B

### Pull Cylinder, block type

Single acting, with spring return,  
max. operating pressure 350 bar.



| Order no. | Article no. | Pull force at 350 bar |      | Stoke B | Vol. pull | Piston area pull | Weight |
|-----------|-------------|-----------------------|------|---------|-----------|------------------|--------|
|           |             | [kN]                  | [mm] |         |           |                  |        |
| 68064     | 6927B-06-1  | 5,9                   | 25,5 | 25,5    | 4,4       | 1,7              | 1075   |
| 68080     | 6927B-06-2  | 5,9                   | 51,0 | 51,0    | 8,8       | 1,7              | 1433   |
| 68106     | 6927B-18-1  | 17,5                  | 25,5 | 25,5    | 12,7      | 5,0              | 1483   |
| 68122     | 6927B-18-2  | 17,5                  | 51,0 | 51,0    | 25,4      | 5,0              | 1905   |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated. Piston rod with internal thread. Wiper at piston rod. Oil supply via threaded port.

### Application:

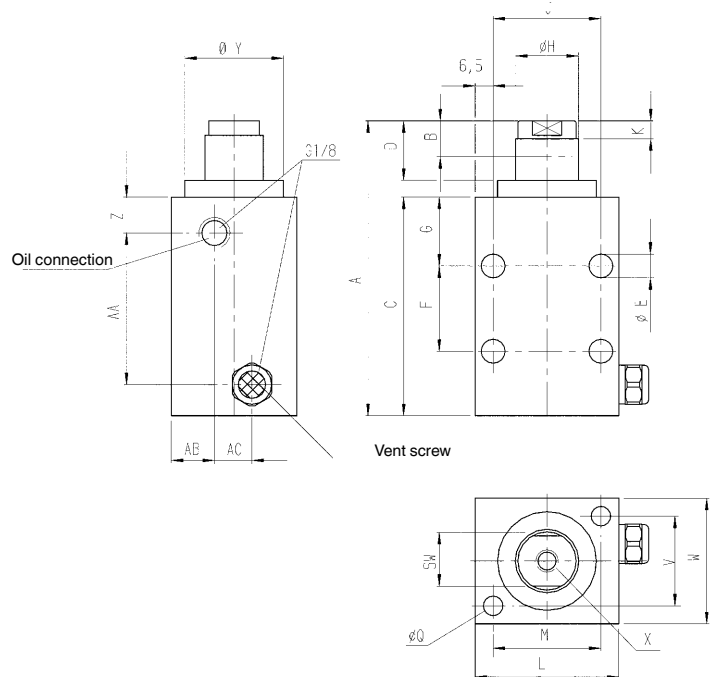
Universal pull cylinder for various applications.

### Features:

Piston rod not guided. Tapped piston rod ends allow the use of custom end attachments. Clamping bars can be attached like the swivel clamps. Cylinder body with longitudinal and crosswise mounting holes.

### Note:

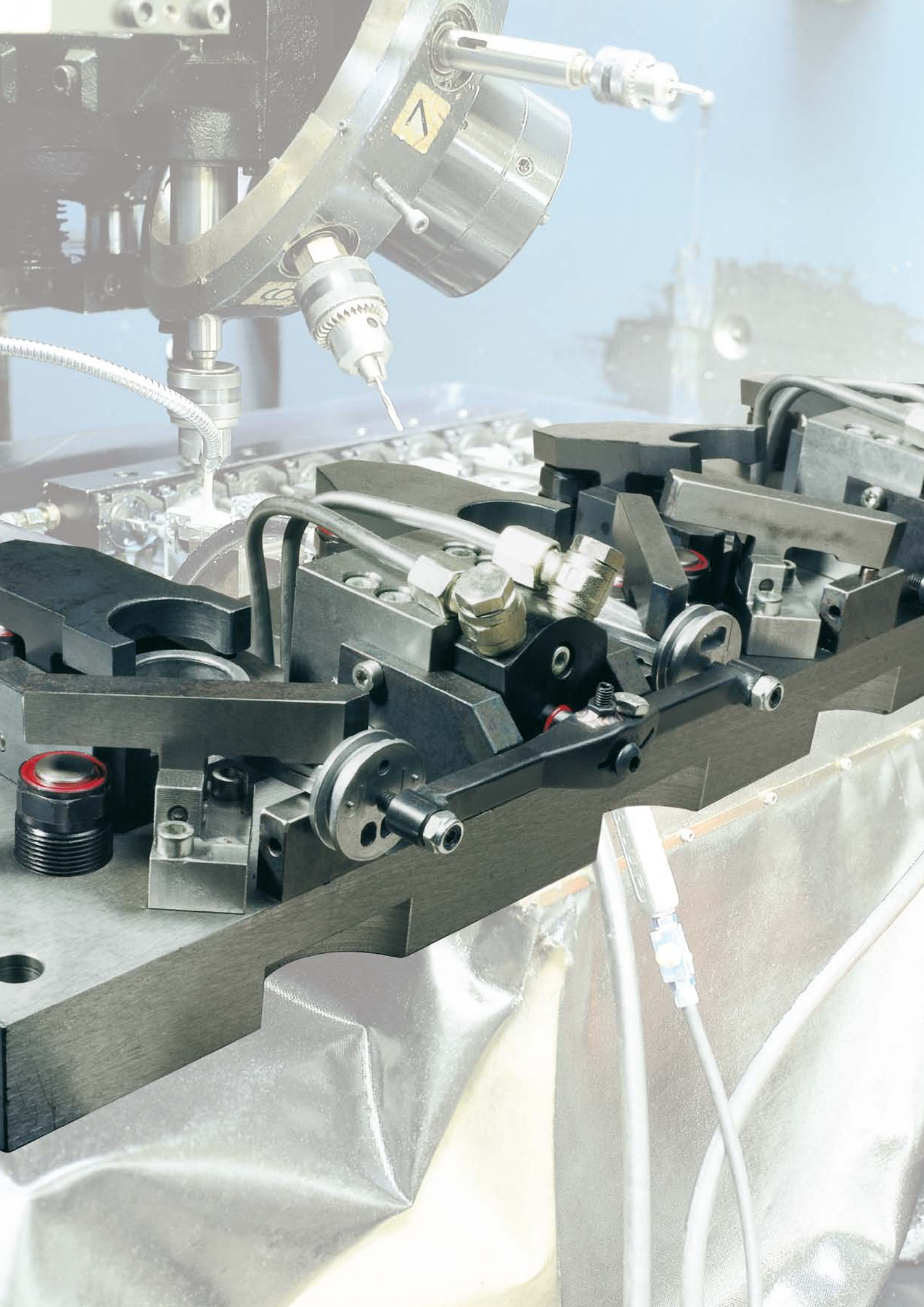
For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation.



### Dimensions:

| Order no. | Article no. | A     | C    | D    | dia. E | F    | G    | dia. H | J  | K   | L    | M  | dia. Q | SW | V    | W    | X x depth | dia. Y | Z    | AA | AB | AC   |
|-----------|-------------|-------|------|------|--------|------|------|--------|----|-----|------|----|--------|----|------|------|-----------|--------|------|----|----|------|
| 68064     | 6927B-06-1  | 109,0 | 69,5 | 33,5 | 8,7    | -    | 26,5 | 20,64  | 38 | 6,5 | 51,0 | 38 | 7      | 17 | 31,5 | 44,5 | M8x11     | 35,0   | 12,5 | 41 | 8  | 14,5 |
| 68080     | 6927B-06-2  | 163,5 | 98,5 | 59,0 | 8,7    | 41,3 | 26,5 | 20,64  | 38 | 6,5 | 51,0 | 38 | 7      | 17 | 31,5 | 44,5 | M8x11     | 35,0   | 12,5 | 70 | 8  | 14,5 |
| 68106     | 6927B-18-1  | 111,0 | 69,5 | 35,5 | 8,7    | -    | 26,5 | 28,58  | 51 | 9,0 | 63,5 | 48 | 9      | 25 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 41 | 8  | 17,5 |
| 68122     | 6927B-18-2  | 165,0 | 98,5 | 61,0 | 8,7    | 41,3 | 26,5 | 28,58  | 51 | 9,0 | 63,5 | 48 | 9      | 25 | 35,5 | 51,0 | M12x13    | 44,5   | 12,5 | 70 | 8  | 17,5 |

Subject to technical alterations.



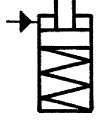
## No. 6951KZ

### Pull Cylinder, top-flange-mounting, with guided piston rod

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD



| Order no. | Article no.  | Pull force at 350 bar |  | Stroke [mm] | Vol. pull [cm <sup>3</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|-----------------------|--|-------------|------------------------------|----------------|------------|
|           |              | [kN]                  |  |             |                              |                |            |
| 66498     | 6951KZ-02-10 | 2,2                   |  | 14,5        | 0,92                         | 0,165          | 372        |
| 66530     | 6951KZ-05-10 | 6,6                   |  | 20,0        | 3,82                         | 0,40           | 903        |
| 66571     | 6951KZ-11-10 | 13,9                  |  | 29,5        | 11,90                        | 1,64           | 1520       |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. O-ring for flange seal. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

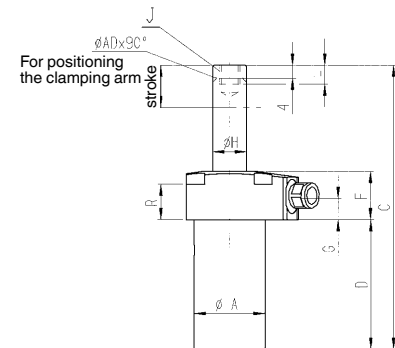
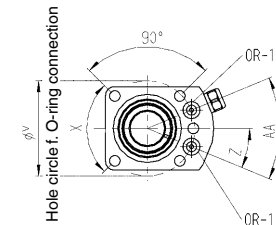
Universal Push-Pull Cylinder for various applications.

### Features:

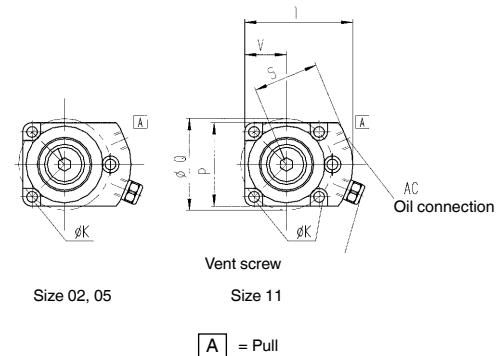
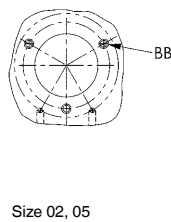
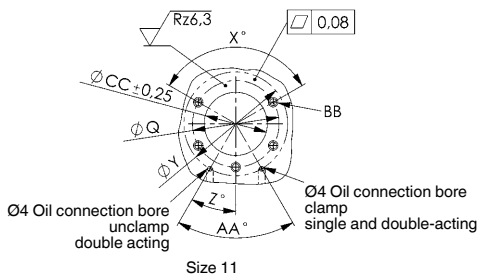
Each cylinder size is available for single or double-acting operation. Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max. must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation.



### Drilling template device:



### Dimensions:

| Order no. | Article no.  | dia. A | C     | D    | F  | G    | dia. H | J   | dia. K | L  | P  | dia. Q | R    | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | dia. CC | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|------|----|------|--------|-----|--------|----|----|--------|------|------|----|------|-----|--------|------|-----|------|-----|----|---------|-----------------------|
| 66498     | 6951KZ-02-10 | 25     | 101,5 | 44,0 | 26 | 13,0 | 11,13  | M6  | 6      | 7  | 45 | 40,0   | 18,0 | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 26      | 183608                |
| 66530     | 6951KZ-05-10 | 36     | 134,0 | 64,5 | 27 | 13,0 | 15,88  | M10 | 7      | 12 | 57 | 50,0   | 19,0 | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 37      | 183608                |
| 66571     | 6951KZ-11-10 | 44     | 172,0 | 81,0 | 30 | 14,5 | 22,23  | M12 | 9      | 13 | 55 | 59,4   | 22,1 | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 45      | 183608                |

Subject to technical alterations.

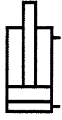
## No. 6951KZ

### Push-Pull Cylinder, top-flange-mounting, with guided piston rod

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD



| Order no. | Article no.  | Push force at 350 bar |      | Pull force at 350 bar |      | Stroke [mm] | Vol. push [cm³] | Vol. pull [cm³] | Q max. [l/min] | Weight [g] |
|-----------|--------------|-----------------------|------|-----------------------|------|-------------|-----------------|-----------------|----------------|------------|
|           |              | [kN]                  | [kN] | [kN]                  | [kN] |             |                 |                 |                |            |
| 66514     | 6951KZ-02-20 | 5,6                   | 2,2  | 14,5                  | 2,3  | 0,92        | 0,165           | 372             |                |            |
| 66555     | 6951KZ-05-20 | 13,5                  | 6,6  | 20,0                  | 7,8  | 3,82        | 0,40            | 903             |                |            |
| 66597     | 6951KZ-11-20 | 27,7                  | 13,9 | 29,5                  | 23,0 | 11,90       | 1,64            | 1520            |                |            |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. O-ring for flange seal. Wiper at piston rod. Oil supply via threaded port or oil channel in fixture body.

### Application:

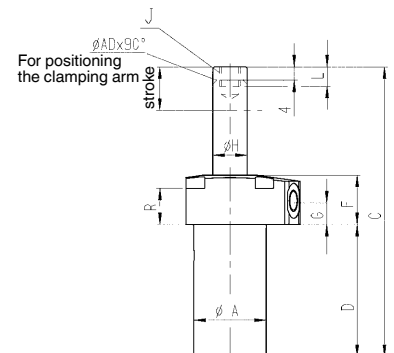
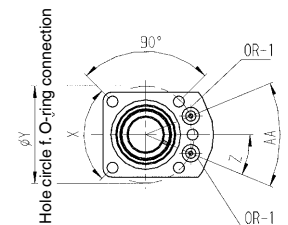
Universal Push-Pull Cylinder for various applications.

### Features:

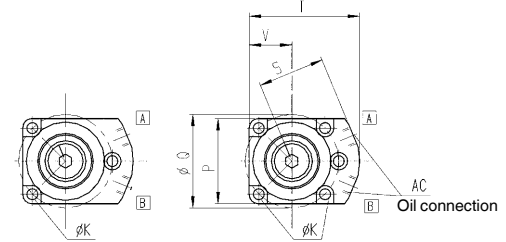
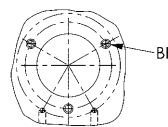
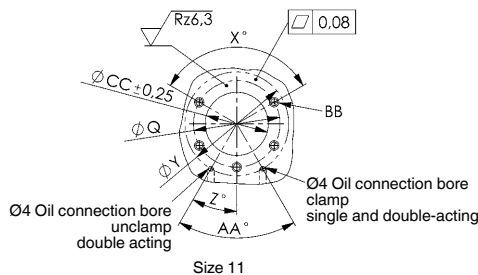
Each cylinder size is available for single or double-acting operation. Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

### Note:

The piston stroke is guided, respect Q max. volume flow. When mounting accessories at the piston, no force may be applied to the piston. When placing into operation, ensure that all air is bled from the system.



### Drilling template device:



Size 02, 05

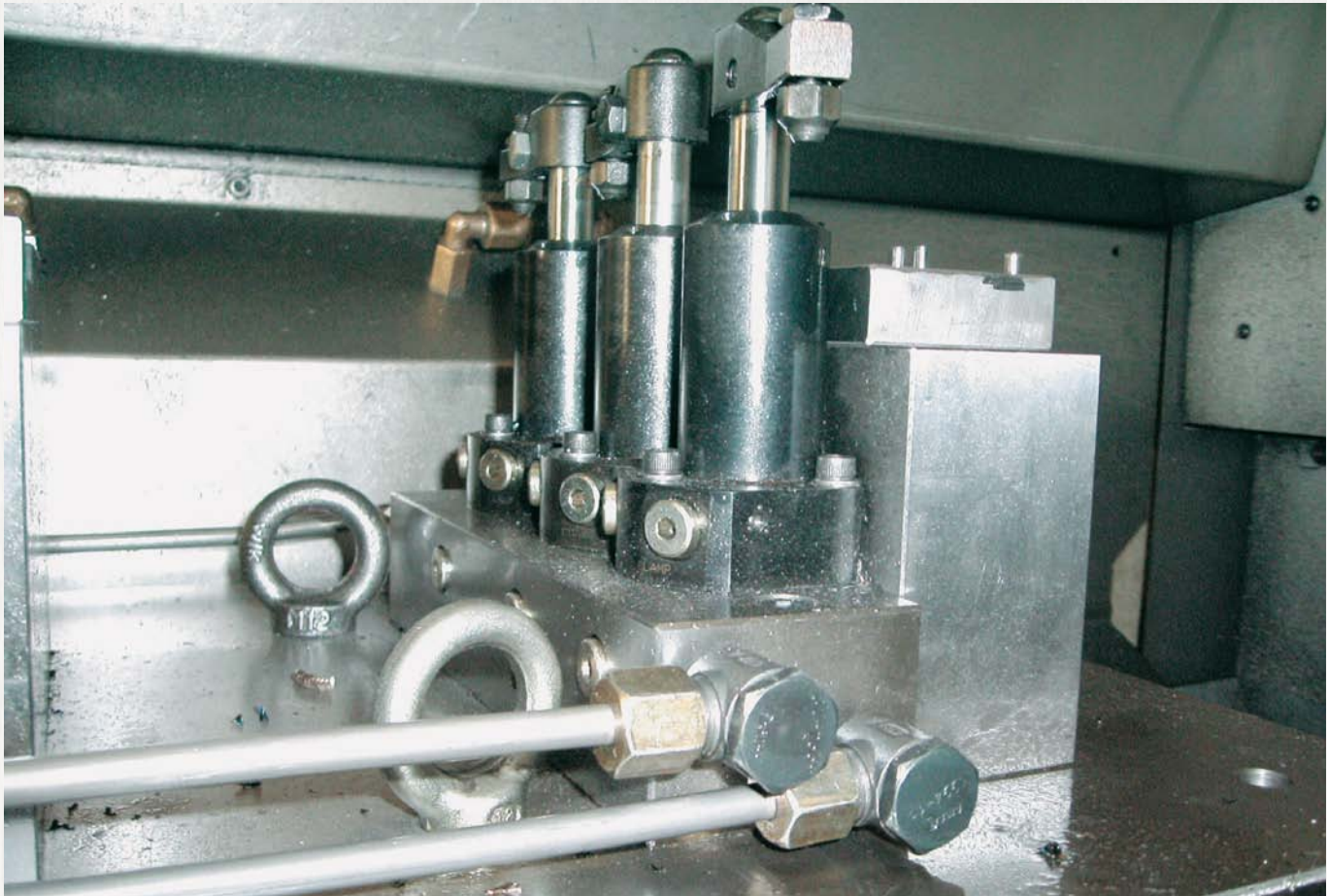
Size 11

**A** = Pull  
**B** = Pressure

### Dimensions:

| Order no. | Article no.  | dia. A | C     | D    | F  | G    | dia. H | J   | dia. K | L  | P  | dia. Q | R    | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | dia. CC | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|------|----|------|--------|-----|--------|----|----|--------|------|------|----|------|-----|--------|------|-----|------|-----|----|---------|-----------------------|
| 66514     | 6951KZ-02-20 | 25     | 101,5 | 44,0 | 26 | 13,0 | 11,13  | M6  | 6      | 7  | 45 | 40,0   | 18,0 | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 26      | 183608                |
| 66555     | 6951KZ-05-20 | 36     | 134,0 | 64,5 | 27 | 13,0 | 15,88  | M10 | 7      | 12 | 57 | 50,0   | 19,0 | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 37      | 183608                |
| 66597     | 6951KZ-11-20 | 44     | 172,0 | 81,0 | 30 | 14,5 | 22,23  | M12 | 9      | 13 | 55 | 59,4   | 22,1 | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 45      | 183608                |

Subject to technical alterations.



Subject to technical alterations.

## No. 6951KZP

### Push-Pull Cylinder, top-flange-mounting, with guided piston rod

double acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD

| Order no. | Article no.   | Push force at 350 bar | Pull force at 350 bar | Stroke | Vol. push          | Vol. pull          | Q max. | Weight |
|-----------|---------------|-----------------------|-----------------------|--------|--------------------|--------------------|--------|--------|
|           |               | [kN]                  | [kN]                  |        | [cm <sup>3</sup> ] | [cm <sup>3</sup> ] |        |        |
| 327106    | 6951KZP-22-20 | 54                    | 26                    | 28     | 43,3               | 21,2               | 2,5    | 2590   |
| 327098    | 6951KZP-33-20 | 80                    | 40                    | 30     | 68,4               | 34,3               | 2,5    | 4355   |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated. Piston rod with internal thread. O-ring for flange seal. Wiper at piston rod. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Universal Push-Pull Cylinder for various applications.

### Features:

Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

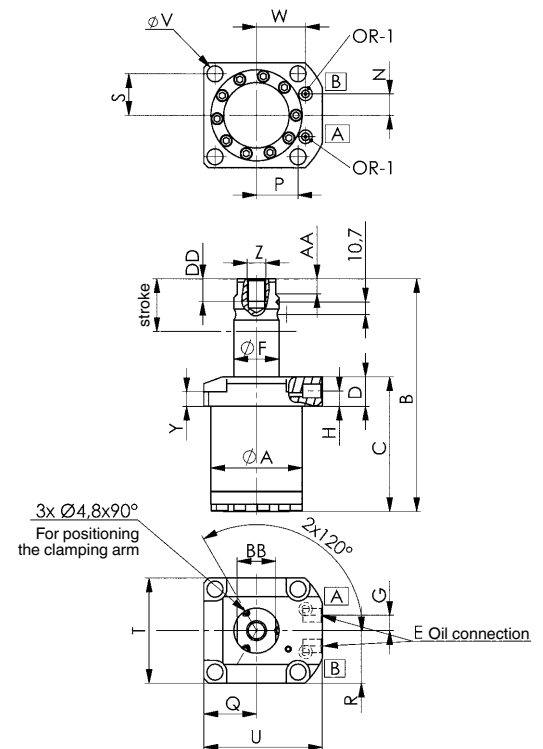
### Advantage:

- Increase in the number of balls and slots to 3 to achieve a higher positioning accuracy and repetition accuracy. Also prolongs service life.
- More precise guidance
- contact force of balls into groove increased, thus guaranteeing highly-precise guidance over a long period of us.
- V-profile of the ball running groove guarantees a deeper ball run in the groove wall than at the groove edge.
- New materials for prolonging the service life of piston rod and guide.

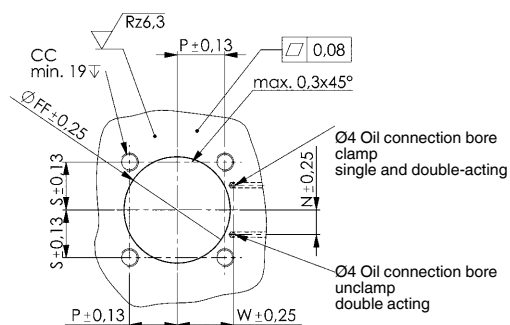
### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. The system has to be completely vented during installation.

To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used.



### Drilling template device:



A = Pull  
B = Pressure

### Dimensions:

| Order no. | Article no.   | dia. A | B     | C     | D  | E    | dia. F | G  | H  | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | Z   | AA   | BB   | CC  | DD | dia. FF | OR-1 O-ring Order No. |
|-----------|---------------|--------|-------|-------|----|------|--------|----|----|------|------|------|------|------|----|-------|--------|------|------|-----|------|------|-----|----|---------|-----------------------|
| 327106    | 6951KZP-22-20 | 62,8   | 185,5 | 104,5 | 25 | G1/4 | 31,74  | 13 | 13 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 63,4    | 183608                |
| 327098    | 6951KZP-33-20 | 77,0   | 196,5 | 114,0 | 25 | G1/4 | 38,09  | 13 | 13 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 77,6    | 183608                |

Subject to technical alterations.

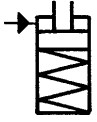
## No. 6951FZ

### Pull Cylinder, base-flange-mounting, with guided piston rod

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD



| Order no. | Article no.  | Pull force at 350 bar |  | Stroke [mm] | Vol. pull [cm <sup>3</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|-----------------------|--|-------------|------------------------------|----------------|------------|
|           |              | [kN]                  |  |             |                              |                |            |
| 66480     | 6951FZ-02-10 | 2,2                   |  | 14,5        | 0,92                         | 0,165          | 463        |
| 66522     | 6951FZ-05-10 | 6,6                   |  | 20,0        | 3,82                         | 0,400          | 1150       |
| 66563     | 6951FZ-11-10 | 13,9                  |  | 29,5        | 11,90                        | 1,640          | 2050       |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. O-ring for flange seal. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

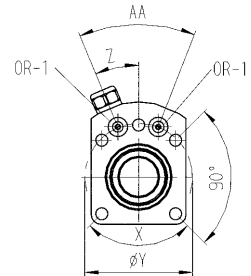
Universal Push-Pull Cylinder for various applications.

### Features:

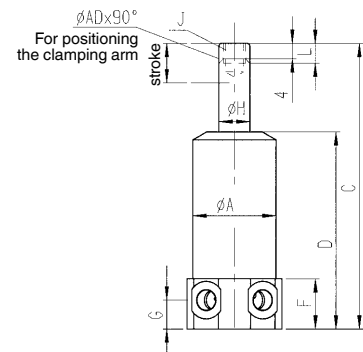
Each cylinder size is available for single or double-acting operation. Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max. must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation.

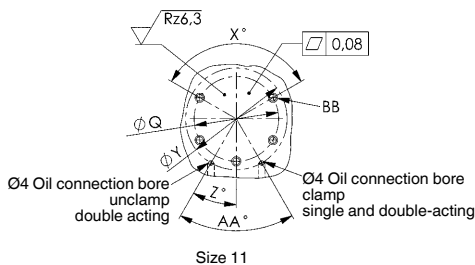


Hole circle f. O-ring connection

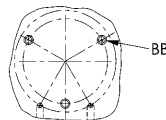


For positioning the clamping arm

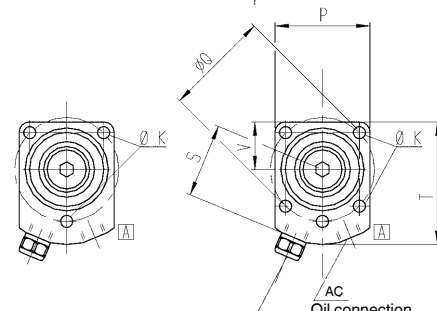
### Drilling template device:



Size 11



Size 02, 05



Size 02, 05

Size 11

[A] = Pull

### Dimensions:

| Order no. | Article no.  | dia. A | C   | D     | F    | G    | dia. H | J   | dia. K | L  | P  | dia. Q | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | OR-1 O-ring Order No. |
|-----------|--------------|--------|-----|-------|------|------|--------|-----|--------|----|----|--------|------|----|------|-----|--------|------|-----|------|-----|----|-----------------------|
| 66480     | 6951FZ-02-10 | 26,8   | 103 | 71,0  | 26,5 | 13,5 | 11,13  | M6  | 6      | 7  | 45 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 66522     | 6951FZ-05-10 | 38,0   | 135 | 92,5  | 25,0 | 15,0 | 15,88  | M10 | 7      | 12 | 57 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 66563     | 6951FZ-11-10 | 45,4   | 173 | 112,5 | 28,5 | 16,5 | 22,23  | M12 | 9      | 13 | 55 | 59,5   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |

Subject to technical alterations.



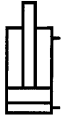
## No. 6951FZ

### Push-Pull Cylinder, base-flange-mounting, with guided piston rod

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD



| Order no. | Article no.  | Push force at 350 bar |      | Pull force at 350 bar |      | Stroke [mm] | Vol. push [cm <sup>3</sup> ] | Vol. pull [cm <sup>3</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|-----------------------|------|-----------------------|------|-------------|------------------------------|------------------------------|----------------|------------|
|           |              | [kN]                  | [kN] | [kN]                  | [kN] |             |                              |                              |                |            |
| 66506     | 6951FZ-02-20 | 5,6                   | 2,2  | 14,5                  | 2,3  | 0,92        | 0,165                        | 463                          |                |            |
| 66548     | 6951FZ-05-20 | 13,5                  | 6,6  | 20,0                  | 7,8  | 3,82        | 0,400                        | 1150                         |                |            |
| 66589     | 6951FZ-11-20 | 27,7                  | 13,9 | 29,5                  | 23,0 | 11,90       | 1,640                        | 2050                         |                |            |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. O-ring for flange seal. Wiper at piston rod. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

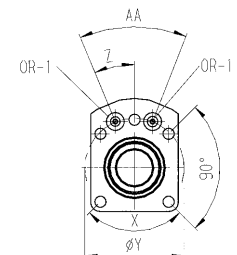
Universal Push-Pull Cylinder for various applications.

### Features:

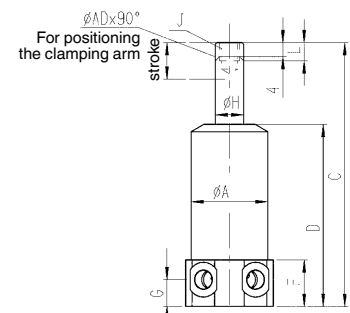
Each cylinder size is available for single or double-acting operation. Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

### Note:

The piston stroke is guided, respect Q max. volume flow. When mounting accessories at the piston, no force may be applied to the piston. When placing into operation, ensure that all air is bled from the system.

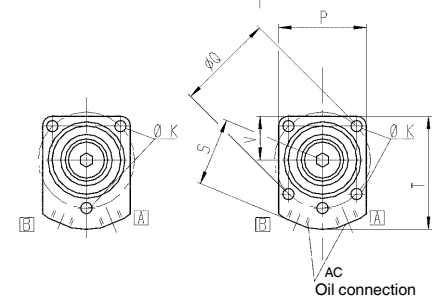
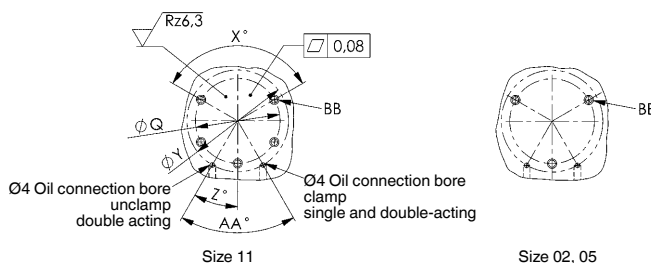


Hole circle f. O-ring connection



For positioning the clamping arm

### Drilling template device:



Size 02, 05

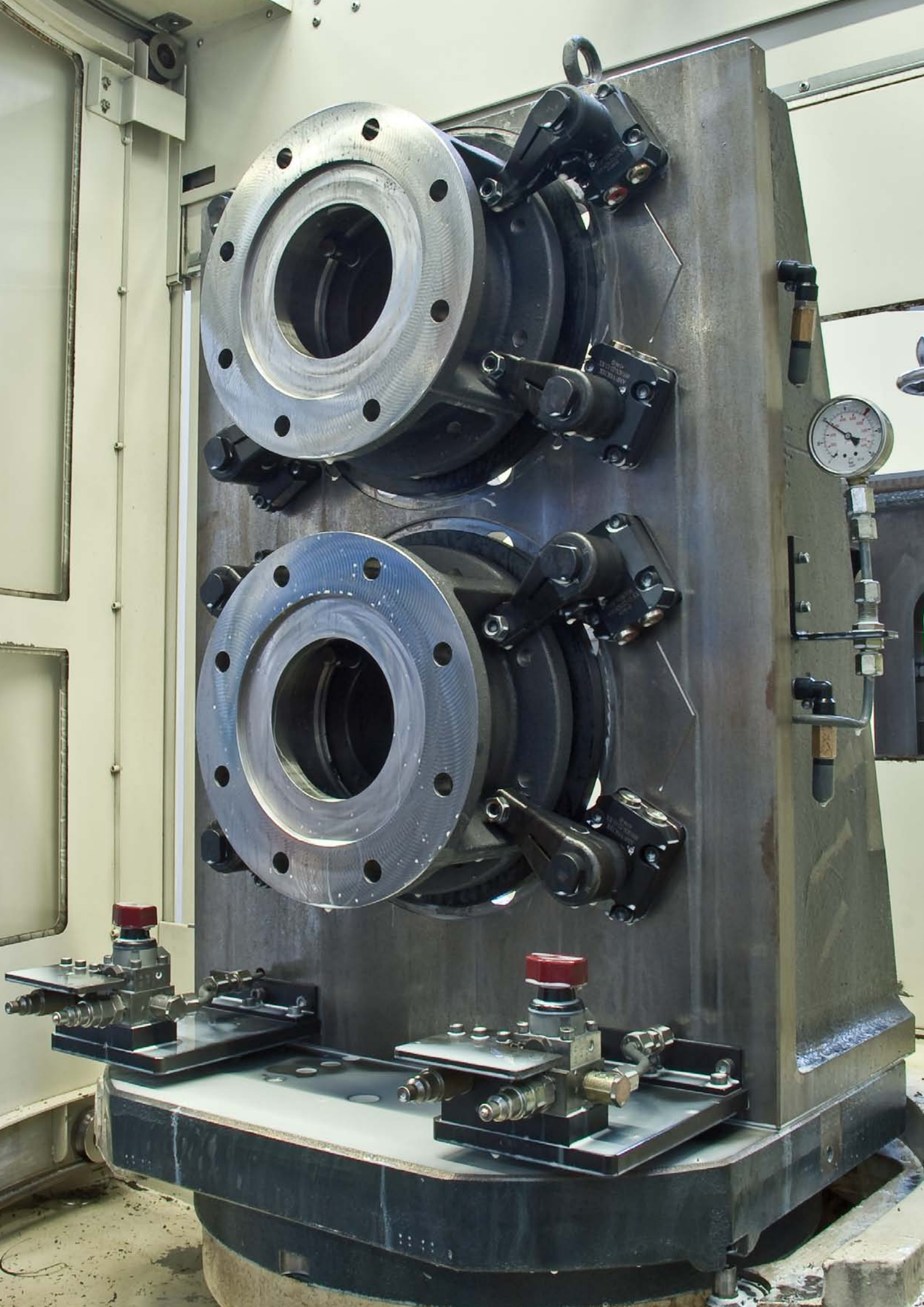
Size 11

**A** = Pull  
**B** = Pressure

### Dimensions:

| Order no. | Article no.  | dia. A | C   | D     | F    | G    | dia. H | J   | dia. K | L  | P  | dia. Q | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | OR-1 O-ring Order No. |
|-----------|--------------|--------|-----|-------|------|------|--------|-----|--------|----|----|--------|------|----|------|-----|--------|------|-----|------|-----|----|-----------------------|
| 66506     | 6951FZ-02-20 | 26,8   | 103 | 71,0  | 26,5 | 13,5 | 11,13  | M6  | 6      | 7  | 45 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 66548     | 6951FZ-05-20 | 38,0   | 135 | 92,5  | 25,0 | 15,0 | 15,88  | M10 | 7      | 12 | 57 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 66589     | 6951FZ-11-20 | 45,4   | 173 | 112,5 | 28,5 | 16,5 | 22,23  | M12 | 9      | 13 | 55 | 59,5   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |

Subject to technical alterations.



## No. 6951FZP

### Push-Pull Cylinder, base-flange-mounting, with guided piston rod

double acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



| Order no. | Article no.   | Push force at 350 bar | Pull force at 350 bar | Stroke | Vol. push          | Vol. pull          | Q max. | Weight |
|-----------|---------------|-----------------------|-----------------------|--------|--------------------|--------------------|--------|--------|
|           |               | [kN]                  | [kN]                  |        | [cm <sup>3</sup> ] | [cm <sup>3</sup> ] |        |        |
| 327114    | 6951FZP-22-20 | 54                    | 26                    | 28     | 43,0               | 21,2               | 2,5    | 3070   |
| 327122    | 6951FZP-33-20 | 80                    | 40                    | 30     | 68,6               | 34,3               | 2,5    | 4854   |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread. O-ring for flange seal. Wiper at piston rod. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Universal Push-Pull Cylinder for various applications.

### Features:

Various thrust pieces can be attached in the tapped piston rod ends. Clamps can be attached, as with the swing clamps.

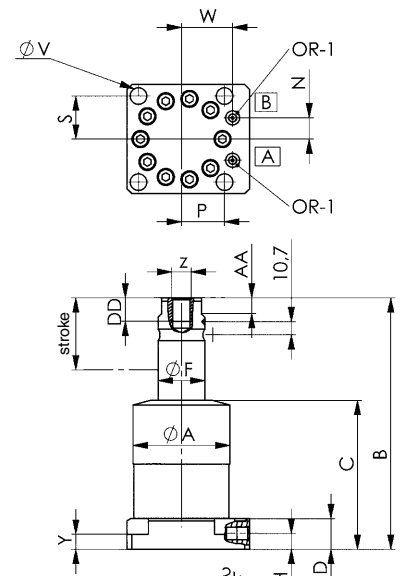
### Advantage:

- Increase in the number of balls and slots to 3 to achieve a higher positioning accuracy and repetition accuracy. Also prolongs service life.
- More precise guidance
- contact force of balls into groove increased, thus guaranteeing highly-precise guidance over a long period of use.
- V-profile of the ball running groove guarantees a deeper ball run in the groove wall than at the groove edge.
- New materials for prolonging the service life of piston rod and guide.

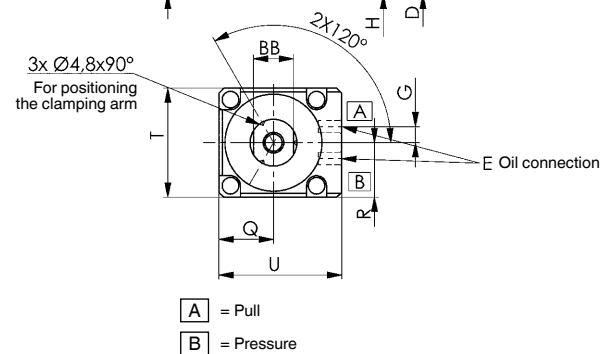
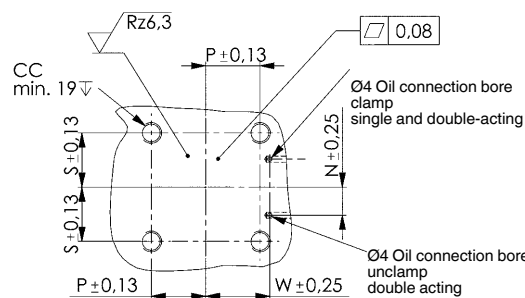
### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. The system has to be completely vented during installation.

To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used.



### Drilling template device:



### Dimensions:

| Order no. | Article no.   | dia. A | B   | C     | D  | E    | dia. F | G  | H    | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | Z   | AA   | BB   | CC  | DD | OR-1 O-ring Order No. |
|-----------|---------------|--------|-----|-------|----|------|--------|----|------|------|------|------|------|------|----|-------|--------|------|------|-----|------|------|-----|----|-----------------------|
| 327114    | 6951FZP-22-20 | 62,8   | 194 | 112,0 | 25 | G1/4 | 31,74  | 13 | 12,5 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 183608                |
| 327122    | 6951FZP-33-20 | 79,0   | 205 | 121,5 | 25 | G1/4 | 38,09  | 13 | 13,0 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 183608                |

Subject to technical alterations.

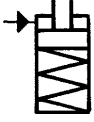
## No. 6951GZ

### Pull Cylinder, thread-flange-mounting, with guided piston rod

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD



| Order no. | Article no.  | Pull force at 350 bar |      |      | Vol. pull [cm <sup>3</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|-----------------------|------|------|------------------------------|----------------|------------|
|           |              | [kN]                  | [mm] | [mm] |                              |                |            |
| 66605     | 6951GZ-02-10 | 2,2                   | 14,5 |      | 0,92                         | 0,165          | 308        |
| 66670     | 6951GZ-05-10 | 6,6                   | 20,0 |      | 3,82                         | 0,400          | 771        |
| 66712     | 6951GZ-11-10 | 13,9                  | 29,5 |      | 11,90                        | 1,640          | 1424       |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. Wiper at piston rod. Return spring from stainless steel. Oil supply via threaded port.

### Application:

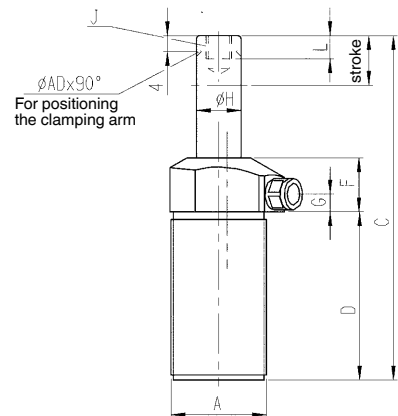
Universal Push-Pull Cylinder for various applications.

### Features:

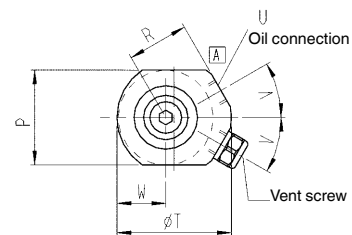
Each model is available for single or double acting operation. The internal thread at piston rod allows mounting of attachments like clamping arms and set screws.

### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max. must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation. Suitable flange nuts DIN 70852.



[A] = Pull



### Dimensions:

| Order no. | Article no.  | A       | C     | D  | F    | G  | dia. H | J x depth | L  | P    | R    | dia. T | U    | V   | W    | ØAD |
|-----------|--------------|---------|-------|----|------|----|--------|-----------|----|------|------|--------|------|-----|------|-----|
| 66605     | 6951GZ-02-10 | M28x1,5 | 102,0 | 44 | 25,5 | 13 | 11,13  | M6 x 7    | 7  | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 66670     | 6951GZ-05-10 | M38x1,5 | 134,0 | 60 | 31,0 | 13 | 15,88  | M10 x 12  | 12 | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 66712     | 6951GZ-11-10 | M48x1,5 | 172,0 | 79 | 32,0 | 13 | 22,23  | M12 x 13  | 13 | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |

Subject to technical alterations.

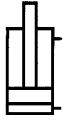
## No. 6951GZ

### Push-Pull Cylinder, thread-flange-mounting, with guided piston rod

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD



| Order no. | Article no.   | Push force at 350 bar [kN] | Pull force at 350 bar [kN] | Stroke [mm] | Vol. push [cm <sup>3</sup> ] | Vol. pull [cm <sup>3</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|---------------|----------------------------|----------------------------|-------------|------------------------------|------------------------------|----------------|------------|
| 66613     | 6951GZ-02-20  | 5,6                        | 2,2                        | 14,5        | 2,3                          | 0,92                         | 0,165          | 300        |
| 66696     | 6951GZ-05-20  | 13,5                       | 6,6                        | 20,0        | 7,8                          | 3,82                         | 0,400          | 744        |
| 66795     | 6951GZ-05-200 | 13,5                       | 6,6                        | 31,0        | 11,9                         | 5,90                         | 0,400          | 850        |
| 66738     | 6951GZ-11-20  | 27,7                       | 13,9                       | 29,5        | 23,0                         | 11,90                        | 1,640          | 1379       |
| 66928     | 6951GZ-11-200 | 27,7                       | 13,9                       | 51,0        | 40,0                         | 20,50                        | 1,640          | 1941       |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. Wiper at piston rod. Oil supply via threaded port.

### Application:

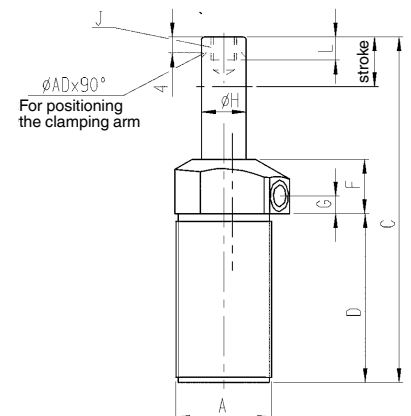
Universal Push-Pull Cylinder for various applications.

### Features:

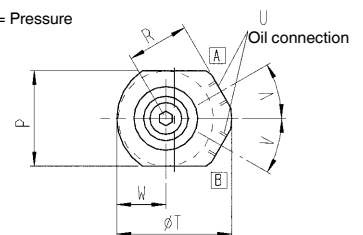
Each model is available for single or double acting operation. The internal thread at piston rod allows mounting of attachments like clamping arms and set screws.

### Note:

The piston is guided, therefore, the max. permissible oil flow rate Q max. must be observed in order to protect the mechanism. No force must be introduced at the piston when mounting accessory. For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation. Suitable flange nuts DIN 70852.



- A** = Pull
- B** = Pressure



### Dimensions:

| Order no. | Article no.   | A       | C     | D   | F    | G    | dia. H | J x depth | L  | P    | R    | dia. T | U    | V   | W    | ØAD |
|-----------|---------------|---------|-------|-----|------|------|--------|-----------|----|------|------|--------|------|-----|------|-----|
| 66613     | 6951GZ-02-20  | M28x1,5 | 102,0 | 44  | 25,5 | 13,0 | 11,13  | M6 x 7    | 7  | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 66696     | 6951GZ-05-20  | M38x1,5 | 134,0 | 60  | 31,0 | 13,0 | 15,88  | M10 x 12  | 12 | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 66795     | 6951GZ-05-200 | M38x1,5 | 167,0 | 86  | 27,5 | 9,5  | 15,88  | M10 x 12  | 12 | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 66738     | 6951GZ-11-20  | M48x1,5 | 172,0 | 79  | 32,0 | 13,0 | 22,23  | M12 x 13  | 13 | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |
| 66928     | 6951GZ-11-200 | M48x1,5 | 235,5 | 124 | 29,5 | 10,5 | 22,23  | M12 x 13  | 13 | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |

Subject to technical alterations.

# SWING CLAMPS - THE SOLUTION FOR COST-EFFECTIVE HYDRAULIC CLAMPING OF WORKPIECES!

## DESIGN:

Burnished body, hardened and ground piston rod. Swing clamps are delivered without clamping arm.

## APPLICATION:

Swing clamps are used in fixtures of all kinds, especially in applications where workpieces must be freely accessible and loaded from above. Workpieces with complex geometries can be clamped using special clamping arms (available upon request).

## FEATURES:

Design variants: > **thread flange**

The swing motion is realized by a patented ball-guide mechanism. Standard swivel angle is 90°.

The newly designed clamping-arm mount prevents the induction of forces into the swing mechanism during assembly.

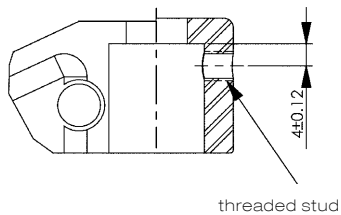
## IMPORTANT NOTE:

Clamping arm length, max. permissible flow rate Q max. and clamping arm weight must be observed! In case of a larger flow rates, a throttle/check valve must be connected upstream.

The motion of the swing clamp must not be obstructed. Clamping must only be done in the vertical stroke area.

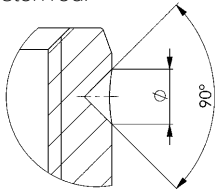
## POSITIONING:

Positioning hole for clamp arm 6951G:



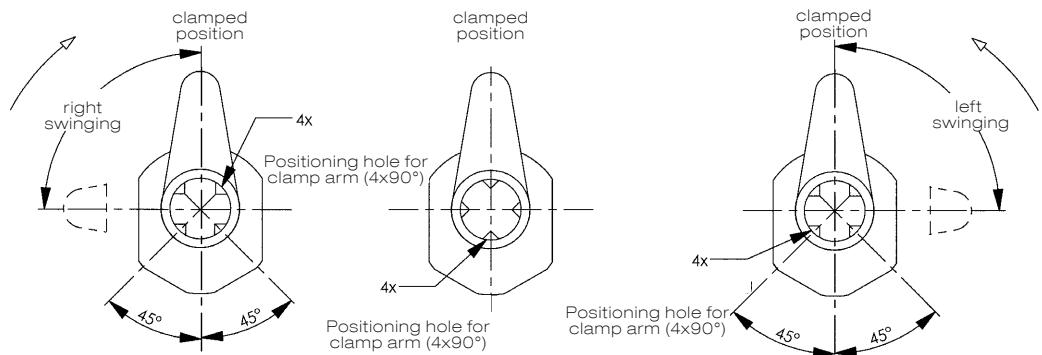
threaded stud

Positioning bore at the piston rod:



## SWING DIRECTIONS:

Positioning hole for clamp arm:



## CODE OF TYPES:

**Type 11** = single acting, right swinging

**Type 12** = single acting, left swinging

**Type 21** = double acting, right swinging

**Type 22** = double acting, left swinging

**Type 210** = double acting, right swinging, extended stroke

**Type 220** = double acting, left swinging, extended stroke

## CLAMPING TIME AND Q OF THE SWING CLAMP 6951G

| Swing clamp clamping force [kN] | Clamp arm, Standard               |                 | Clamp arm, long                   |                 |
|---------------------------------|-----------------------------------|-----------------|-----------------------------------|-----------------|
|                                 | min. allowed clamping time [sec.] | Q max. [l/min.] | min. allowed clamping time [sec.] | Q max. [l/min.] |
| 2                               | 0,4                               | 0,138           | 0,9                               | 0,061           |
| 5                               | 0,6                               | 0,382           | 1,2                               | 0,191           |
| 11                              | 0,6                               | 1,19            | 1,4                               | 0,51            |

Subject to technical alterations.

# SWING CLAMPS FOR DEMANDING CLAMPING APPLICATIONS

- > clamping force 2 to 11 kN
- > operating pressure 350 bar
- > easy change of swing direction (version 2 - 11 kN)
- > hardened piston rod
- > nitrited body
- > oil supply via threaded port
- > optimal size-to-clamping-force ratio

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

## PRODUCT OVERVIEW:

| Type  | Clamping force [kN] | Clamping stroke [mm] | Total stroke [mm] | Threaded flange | Operating mode          |
|-------|---------------------|----------------------|-------------------|-----------------|-------------------------|
| 6951G | 2                   | 6,0                  | 14,5              | ●               | single or double-acting |
| 6951G | 5                   | 8,0<br>19,0          | 20,0<br>31,0      | ●               | single or double-acting |
| 6951G | 11                  | 13,0<br>34,0         | 29,5<br>51,0      | ●               | single or double-acting |

## PRODUCT EXAMPLES:

NO. 6951G



- > piston tensile force: 2,2 - 13,9 kN
- > connection type: threaded port

NO. 6951G

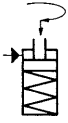


- > piston tensile force: 2,2 - 13,9 kN
- > connection type: threaded port

## No. 6951G

### Swing Clamp, thread-flange-mounting

Single-acting, with spring return,  
max. operating pressure 350 bar,  
min. operating pressure 52 bar.



| Order no. | Article no. | Clamping force at 350 bar Sp* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|-------------|------------------------------------|------------------------|---------------------|----------------------------|--|----------------|------------|
| 68619     | 6951G-02-11 | 2                                  | 6                      | 14,5                | 0,92                       | 0,63                                   | 0,165          | 308        |
| 68635     | 6951G-02-12 | 2                                  | 6                      | 14,5                | 0,92                       | 0,63                                   | 0,165          | 308        |
| 68692     | 6951G-05-11 | 5                                  | 8                      | 20,0                | 3,82                       | 1,90                                   | 0,400          | 771        |
| 68718     | 6951G-05-12 | 5                                  | 8                      | 20,0                | 3,82                       | 1,90                                   | 0,400          | 771        |
| 68429     | 6951G-11-11 | 11                                 | 13                     | 29,5                | 11,90                      | 4,04                                   | 1,640          | 1424       |
| 68445     | 6951G-11-12 | 11                                 | 13                     | 29,5                | 11,90                      | 4,04                                   | 1,640          | 1424       |

Sp = clamp, Lo = unclamp

\* Clamping forces with short clamping arm.

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded port.

### Application:

Swing clamps are used particularly in fixtures in which the workpiece must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

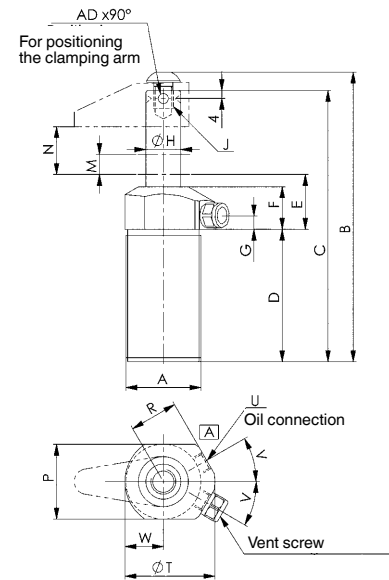
### Features:

Each cylinder size is available for single or double-acting operation. The swing motion employs a patented ball guide mechanism.

### Note:

The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. For single-acting cylinders, there is risk of sucking in coolant through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When installing, ensure that all air is bled from the system. Grooved nuts DIN 70852 can also be used for attachment.

Other swivel angles are available on request.



**A** = clamp

### Dimensions:

| Order no. | Article no. | A       | B     | C     | D    | E    | F    | G  | dia. H | J x depth | P    | R    | dia. T | U    | V   | W    | AD  |
|-----------|-------------|---------|-------|-------|------|------|------|----|--------|-----------|------|------|--------|------|-----|------|-----|
| 68619     | 6951G-02-11 | M28x1,5 | 108,0 | 102,0 | 44,0 | 30,5 | 25,5 | 13 | 11,13  | M6 x 7    | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 68635     | 6951G-02-12 | M28x1,5 | 108,0 | 102,0 | 44,0 | 30,5 | 25,5 | 13 | 11,13  | M6 x 7    | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 68692     | 6951G-05-11 | M38x1,5 | 143,0 | 134,0 | 60,0 | 36,0 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68718     | 6951G-05-12 | M38x1,5 | 143,0 | 134,0 | 60,0 | 36,0 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68429     | 6951G-11-11 | M48x1,5 | 185,0 | 172,0 | 79,0 | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |
| 68445     | 6951G-11-12 | M48x1,5 | 185,0 | 172,0 | 79,0 | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |

Subject to technical alterations.



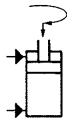
## No. 6951G

### Swing Clamp, thread-flange-mounting

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD



| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Clamping force at 350 bar Lo* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------------------|------------------------|---------------------|----------------------------|----------------------------|--|--|----------------|------------|
| 68650     | 6951G-02-21  | 2                                  | 5,6                                | 6                      | 14,5                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,165          | 300        |
| 68676     | 6951G-02-22  | 2                                  | 5,6                                | 6                      | 14,5                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,165          | 300        |
| 68734     | 6951G-05-21  | 5                                  | 13,5                               | 8                      | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,400          | 744        |
| 68759     | 6951G-05-22  | 5                                  | 13,5                               | 8                      | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,400          | 744        |
| 68452     | 6951G-05-210 | 5                                  | 13,5                               | 19                     | 31,0                | 5,90                       | 11,9                       | 1,90                                   | 3,88                                   | 0,400          | 850        |
| 68478     | 6951G-05-220 | 5                                  | 13,5                               | 19                     | 31,0                | 5,90                       | 11,9                       | 1,90                                   | 3,88                                   | 0,400          | 850        |
| 68460     | 6951G-11-21  | 11                                 | 27,7                               | 13                     | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,640          | 1379       |
| 68486     | 6951G-11-22  | 11                                 | 27,7                               | 13                     | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,640          | 1379       |
| 68502     | 6951G-11-210 | 11                                 | 27,7                               | 34                     | 51,0                | 20,50                      | 40,0                       | 4,04                                   | 7,92                                   | 1,640          | 1941       |
| 68627     | 6951G-11-220 | 11                                 | 27,7                               | 34                     | 51,0                | 20,50                      | 40,0                       | 4,04                                   | 7,92                                   | 1,640          | 1941       |

Sp = clamp, Lo = unclamp

\* Clamping forces with short clamping arm.

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated. Piston rod with internal thread and clamping arm positioning. Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded port.

### Application:

Swing clamps are used particularly in fixtures in which the workpiece must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

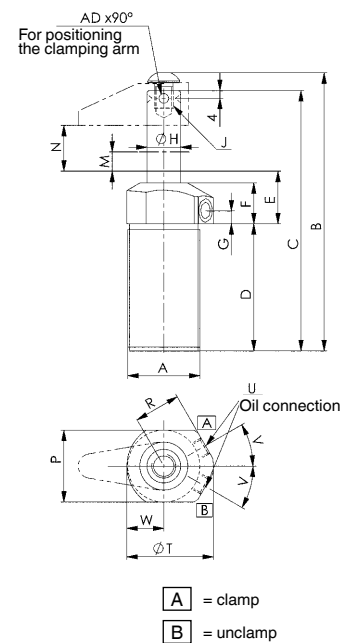
### Features:

Each cylinder size is available for single or double-acting operation. The swing motion employs a patented ball guide mechanism.

### Note:

The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. For single-acting cylinders, there is risk of sucking in coolant through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When installing, ensure that all air is bled from the system. Grooved nuts DIN 70852 can also be used for attachment.

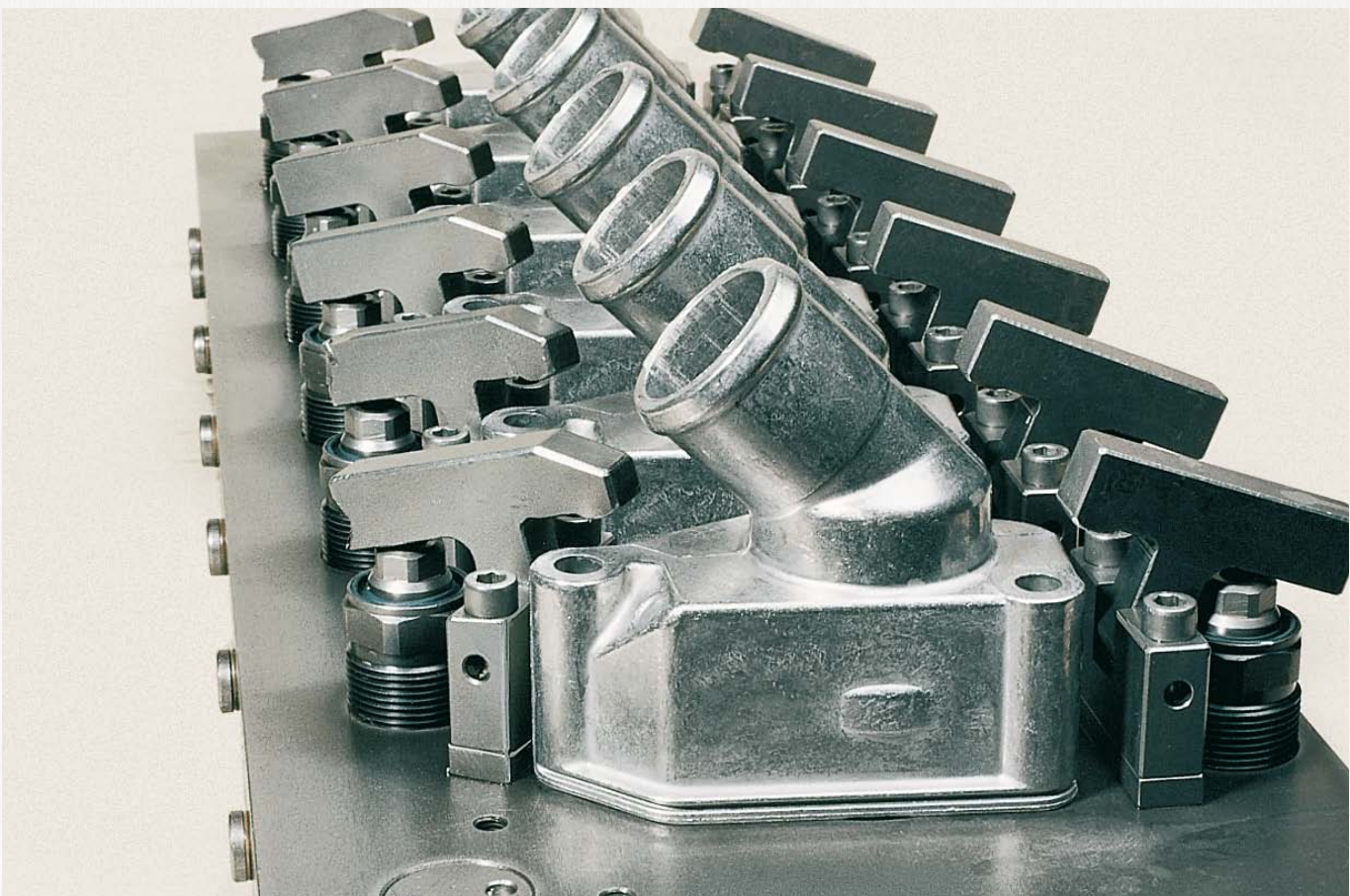
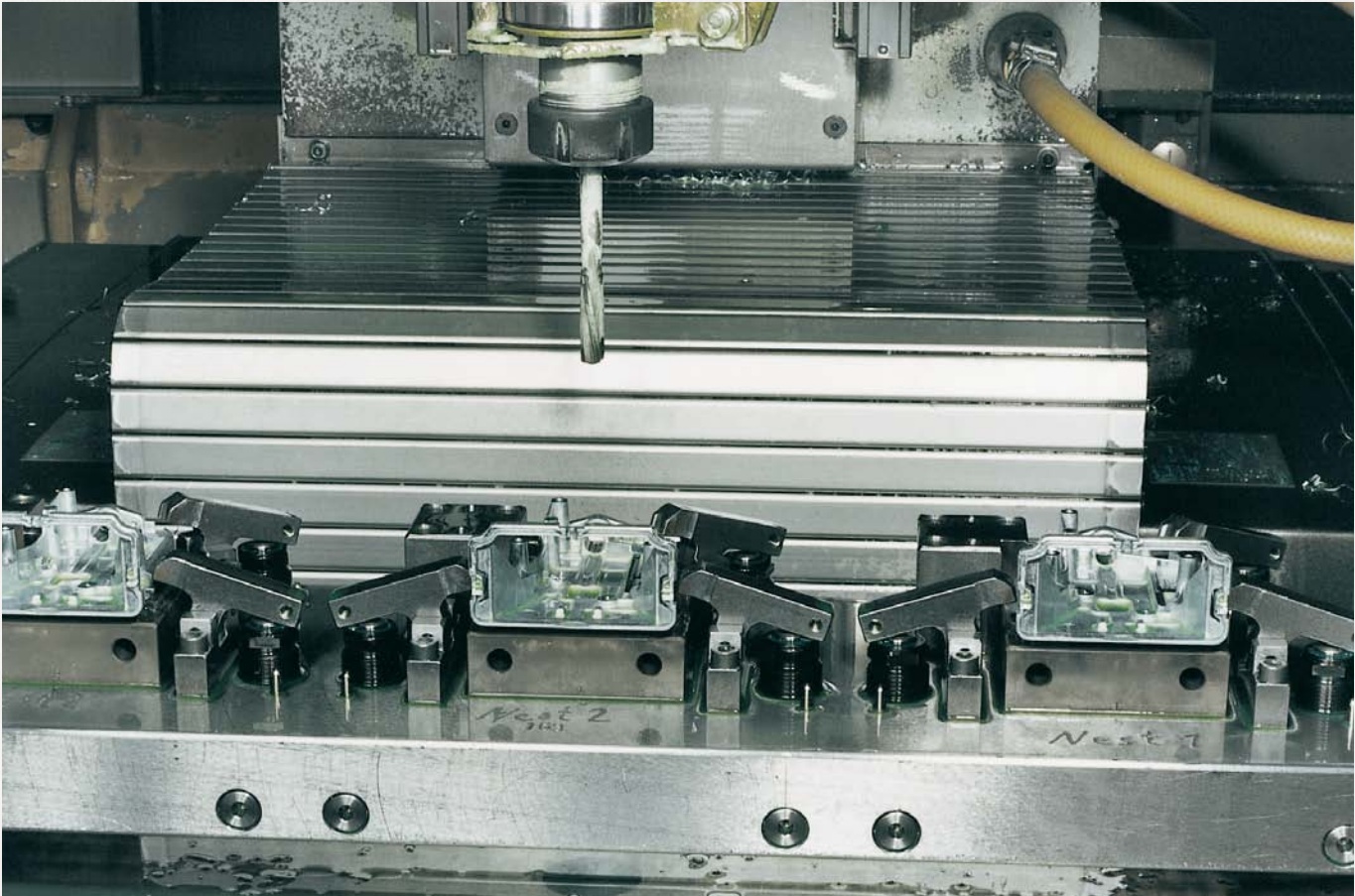
Other swivel angles are available on request.



### Dimensions:

| Order no. | Article no.  | A       | B     | C     | D     | E    | F    | G  | dia. H | J x depth | P    | R    | dia. T | U    | V   | W    | AD  |
|-----------|--------------|---------|-------|-------|-------|------|------|----|--------|-----------|------|------|--------|------|-----|------|-----|
| 68650     | 6951G-02-21  | M28x1,5 | 108,0 | 102,0 | 44,0  | 30,5 | 25,5 | 13 | 11,13  | M6 x 7    | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 68676     | 6951G-02-22  | M28x1,5 | 108,0 | 102,0 | 44,0  | 30,5 | 25,5 | 13 | 11,13  | M6 x 7    | 32,0 | 20,5 | 38,0   | G1/8 | 25° | 14,0 | 3,2 |
| 68734     | 6951G-05-21  | M38x1,5 | 143,0 | 134,0 | 60,0  | 36,0 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68759     | 6951G-05-22  | M38x1,5 | 143,0 | 134,0 | 60,0  | 36,0 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68452     | 6951G-05-210 | M38x1,5 | 176,5 | 167,0 | 82,5  | 35,5 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68478     | 6951G-05-220 | M38x1,5 | 176,5 | 167,0 | 82,5  | 35,5 | 31,0 | 13 | 15,88  | M10 x 12  | 38,0 | 26,0 | 47,5   | G1/8 | 35° | 19,5 | 4,8 |
| 68460     | 6951G-11-21  | M48x1,5 | 185,0 | 172,0 | 79,0  | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |
| 68486     | 6951G-11-22  | M48x1,5 | 185,0 | 172,0 | 79,0  | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |
| 68502     | 6951G-11-210 | M48x1,5 | 249,0 | 235,5 | 121,5 | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |
| 68627     | 6951G-11-220 | M48x1,5 | 249,0 | 235,5 | 121,5 | 38,0 | 32,0 | 13 | 22,23  | M12 x 13  | 47,5 | 31,5 | 60,0   | G1/4 | 30° | 25,5 | 4,8 |

Subject to technical alterations.



Subject to technical alterations.

# SWING CLAMPS FOR DEMANDING CLAMPING APPLICATIONS

- > clamping force 2,0 to 33 kN
- > operating pressure 350 bar
- > precise swivel angle of 90°
- > hardened piston rod
- > nitrided body
- > oil supply via threaded port and/or O-ring-sealed ports
- > optimal size-to-clamping-force ratio
- > position-repeatable clamping arm mounting

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

## PRODUCT OVERVIEW:

| Type             | Clamping force [kN] | Clamping stroke [mm] | Total stroke [mm] | Top flange | Base flange | Cartridge flange | Plug-in mounting | Operating mode                           |
|------------------|---------------------|----------------------|-------------------|------------|-------------|------------------|------------------|--|
| 6952EP           | 2                   | 6,0                  | 14,5              | -          | -           | ●                | -                | double acting                            |
| 6952CP           | 6 - 15              | 12 - 15              | 23 - 30           | -          | -           | -                | ●                | double acting                            |
| 6951FP<br>6951KP | 2,0                 | 5,5                  | 14,5              | ●          | ●           | -                | -                | single or double-acting                  |
| 6951FP<br>6951KP | 4,9                 | 8,0<br>19,0          | 20,0<br>31,0      | ●          | ●           | -                | -                | single or double-acting                  |
| 6951FP<br>6951KP | 11,6                | 13,0<br>34,0         | 29,5<br>51,0      | ●          | ●           | -                | -                | single or double-acting                  |
| 6951FP<br>6951KP | 22,0                | 14,5<br>34,0         | 28,0<br>51,0      | ●          | ●           | -                | -                | single or double-acting<br>double acting |
| 6951FP<br>6951KP | 33,0                | 16,0<br>32,0         | 30,0<br>46,0      | ●          | ●           | -                | -                | single or double-acting<br>double acting |

## PRODUCT EXAMPLES:

NO. 6952EP



- > piston tensile force: 2,0 kN
- > connection type: drilled oil channels

NO. 6952CP



- > piston tensile force: 6,0 - 15 kN
- > connection type: drilled oil channels

NO. 6951FP AND 6951KP



- > piston tensile force: 2,0 - 33 kN
- > connection type: O-ring or threaded port

# SWING CLAMPS - THE SOLUTION FOR COST-EFFECTIVE HYDRAULIC CLAMPING OF WORKPIECES!

## DESIGN:

Burnished body, hardened and ground piston rod. Swing clamps are delivered without clamping arm.

## APPLICATION:

Swing clamps are used in fixtures of all kinds, especially in applications where workpieces must be freely accessible and loaded from above. Workpieces with complex geometries can be clamped using special clamping arms (available upon request).

## FEATURES:

Design variants: > **top flange** > **base flange** > **cartridge flange** > **plug-in mounting**

Top and base-flange models accommodate O-ring as well as threaded hydraulic connections.

There are also designs for drilled oil channels. The swing motion is realized by a rigid 3-way ball-guide mechanism.

Standard swivel angle is 90°. The newly designed clamping-arm mount prevents the induction of forces into the swing mechanism during assembly.

## IMPORTANT NOTE:

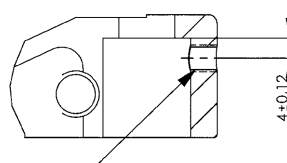
Clamping arm length, max. permissible flow rate  $Q_{max}$  and clamping arm weight must be observed! In case of a larger flow rates, a throttle/check valve must be connected upstream.

The motion of the swing clamp must not be obstructed. Clamping must only be done in the vertical stroke area.



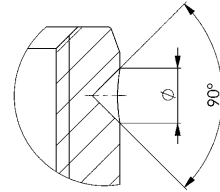
## POSITIONING:

Positioning hole for clamp arm:



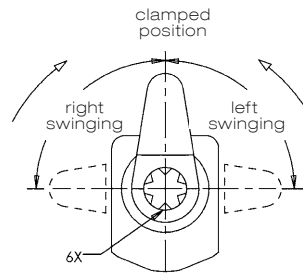
threaded stud

Positioning bore at the piston rod:



## SWING DIRECTIONS:

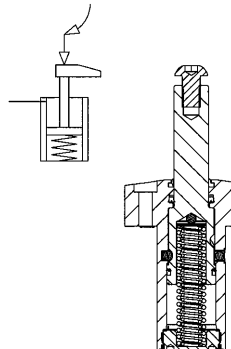
Positioning hole for clamp arm:



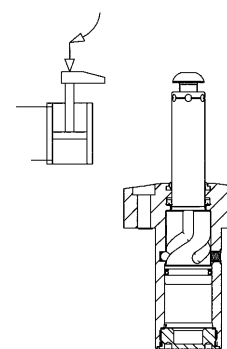
Positioning hole for clamp arm (6x60°)

## DESIGN:

single acting cylinder

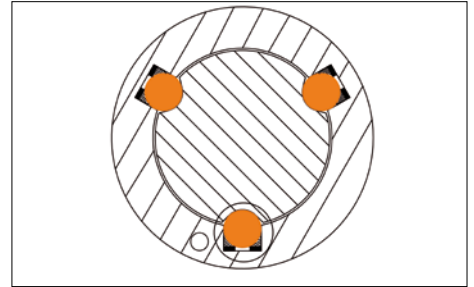
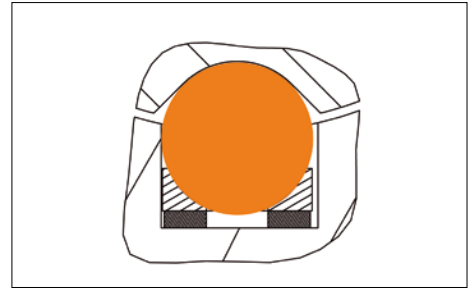


double acting cylinder



**BENEFITS:**

- > Increase in the number of balls and grooves to 3 to achieve a higher positioning accuracy and repetition accuracy. This also extends the service life.
- > Precise swivel angle of 90°.
- > Increases pressing force of the balls in the swivel slot, which ensures a very precise swivel angle over a long period of use.
- > Improved radius transition from straight to swivel stroke.
- > The simple-acting models receive a stronger spring force to ensure a better return stroke.
- > In addition, all models receive a position-repeatable clamping arm mounting.
- > New materials for extending the service life of piston rod and swivel mechanism.



**CODE OF TYPES:**

**Type 11** = single acting, right swinging  
**Type 12** = single acting, left swinging

**Type 21** = double acting, right swinging  
**Type 22** = double acting, left swinging

**CLAMPING TIME AND Q OF THE SWING CLAMPS 6952EP, 6952CP, 6951FP, 6951KP**

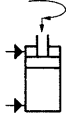
| Swing clamp clamping force [kN] | Clamp arm, standard               |                 | Clamp arm, long                   |                 | Clamping arm length [mm] |
|---------------------------------|-----------------------------------|-----------------|-----------------------------------|-----------------|--------------------------|
|                                 | min. allowed clamping time [sec.] | Q max. [l/min.] | min. allowed clamping time [sec.] | Q max. [l/min.] |                          |
| 2,0                             | 0,20                              | 0,276           | 0,50                              | 0,1100          | 82,5                     |
| 4,9                             | 0,30                              | 0,764           | 0,70                              | 0,327           | 136,5                    |
| 6,0                             | 0,35                              | 1,000           | 1,10                              | 0,300           | 136,0                    |
| 8,0                             | 0,32                              | 1,300           | 1,18                              | 0,470           | 145,0                    |
| 11,6                            | 0,40                              | 1,785           | 0,80                              | 0,893           | 162,0                    |
| 15,0                            | 0,49                              | 2,500           | 1,36                              | 1,250           | 160,0                    |



## No. 6952EP

### Swing clamp, cartridge flange, precision design

double acting,  
max. operating pressure 350 bar,  
min. operating pressure 40 bar.



| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Clamping stroke M [mm] | Total stroke N [mm] | Q max. * [l/min] | Weight [g] |
|-----------|--------------|------------------------------------|----------------------------|----------------------------|--|--|--------------|------------------------|---------------------|------------------|------------|
| 554491    | 6952EP-02-21 | 2                                  | 0,92                       | 2,46                       | 0,63                                   | 1,7                                    | 100          | 6                      | 14,5                | 0,165            | 370        |
| 554492    | 6952EP-02-22 | 2                                  | 0,92                       | 2,46                       | 0,63                                   | 1,7                                    | 100          | 6                      | 14,5                | 0,165            | 370        |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Piston rod with internal thread. Wiper at piston rod. Supply scope does not include clamping arm. Oil supply via oil channel in fixture body.

### Application:

The swing clamp is used particularly in fixtures in which the workpieces must be freely accessible and placed from above. Workpieces with dedicated shapes can also be clamped using special clamp arms (available on request).

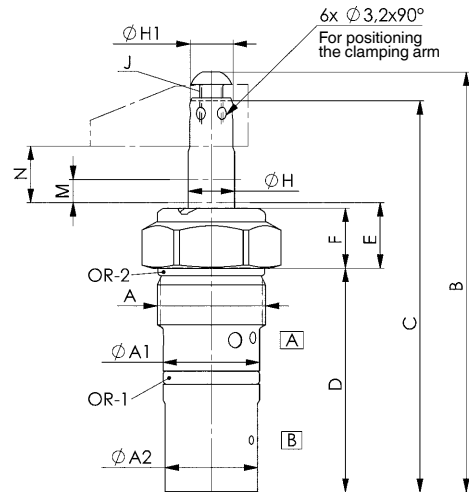
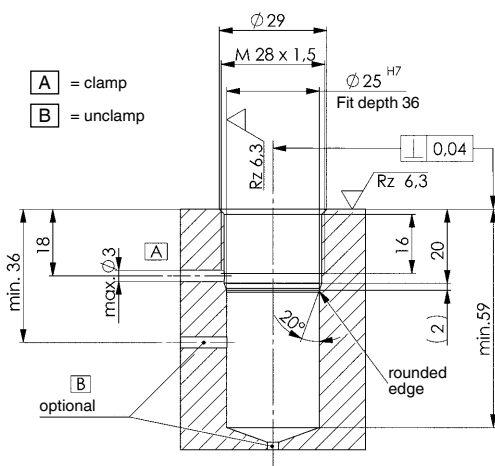
### Features:

The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston stroke is executed with spheres, so volume flow Q max. must be complied with. Clamping arm length and clamping arm weight must be strictly observed. No force may be applied to the piston when mounting accessories to it. When placing into operation, ensure that all air is bled from the system.

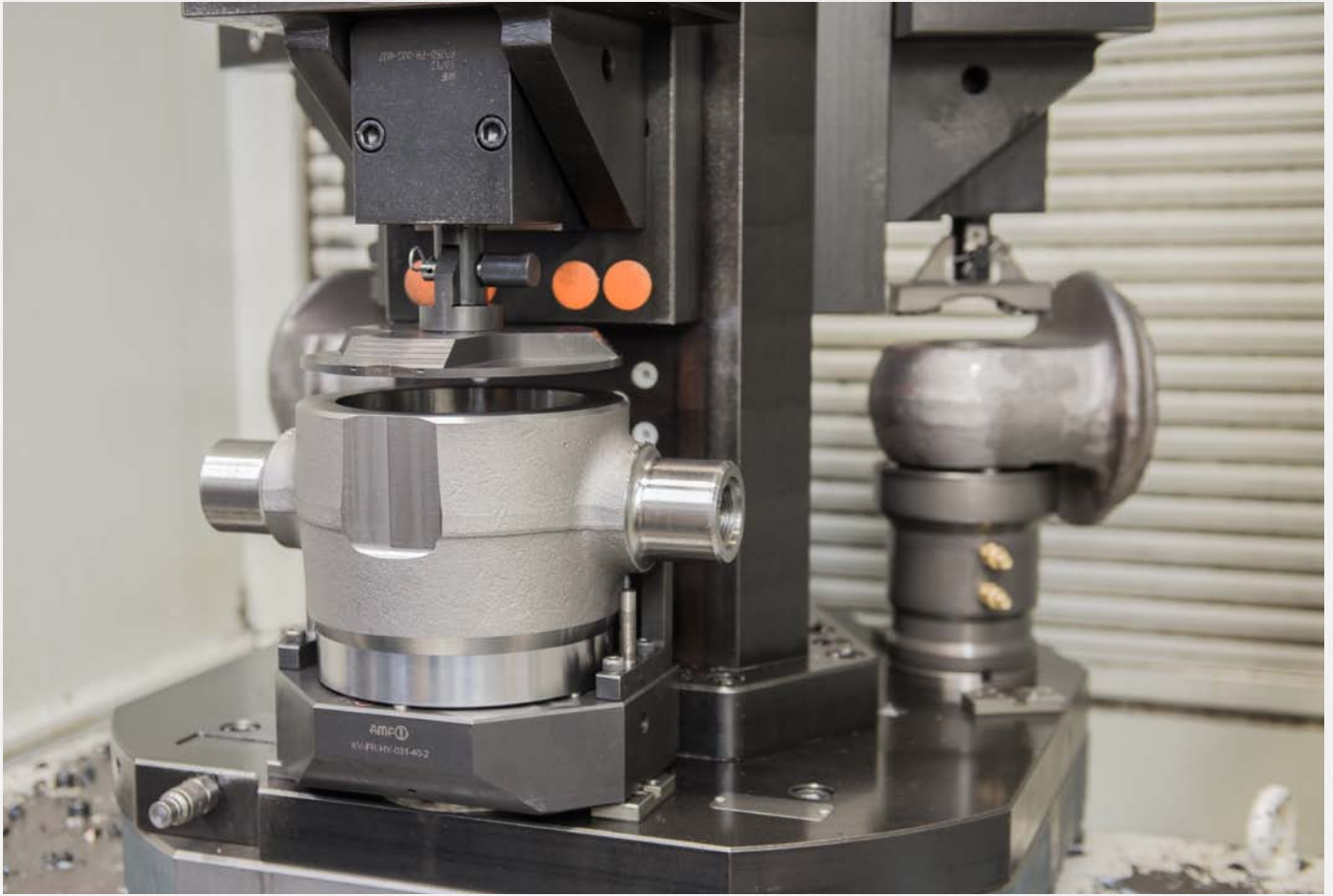
### Installation dimensions:



### Dimensions:

| Order no. | Article no.  | A       | dia. A1 | dia. A2 | B     | C     | D  | E  | F    | dia. H | dia. H1 | J  | P    | dia. T | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|--------------|---------|---------|---------|-------|-------|----|----|------|--------|---------|----|------|--------|-----------------------|-----------------------|
| 554491    | 6952EP-02-21 | M28x1,5 | 25 f7   | 24      | 108,5 | 101,5 | 58 | 17 | 15,5 | 12     | 11,13   | M6 | SW32 | 36     | 409664                | 321166                |
| 554492    | 6952EP-02-22 | M28x1,5 | 25 f7   | 24      | 108,5 | 101,5 | 58 | 17 | 15,5 | 12     | 11,13   | M6 | SW32 | 36     | 409664                | 321166                |

Subject to technical alterations.

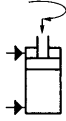


Subject to technical alterations.

## No. 6952CP

### Swing clamp, plug-in mounting

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 40 bar.



CAD

| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | min. permitted clamping time * [s] | Q max. * [l/min] | Piston mass moment of inertia JK [kgm <sup>2</sup> ] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------|---------------------|----------------------------|----------------------------|--|--|------------------------------------|------------------|--|------------|
| 556954    | 6952CP-06-21 | 6,0                                | 12                     | 23                  | 5,7                        | 10,3                       | 2,51                                   | 4,52                                   | 0,35                               | 0,7              | 0,000012193  | 725        |
| 556955    | 6952CP-06-22 | 6,0                                | 12                     | 23                  | 5,7                        | 10,3                       | 2,51                                   | 4,52                                   | 0,35                               | 0,7              | 0,000012193  | 725        |
| 556956    | 6952CP-08-21 | 8,0                                | 12                     | 24                  | 7,2                        | 14,7                       | 3,01                                   | 6,15                                   | 0,32                               | 1,0              | 0,000025865  | 1200       |
| 556957    | 6952CP-08-22 | 8,0                                | 12                     | 24                  | 7,2                        | 14,7                       | 3,01                                   | 6,15                                   | 0,32                               | 1,0              | 0,000025865  | 1200       |
| 556958    | 6952CP-15-21 | 15,0                               | 15                     | 30                  | 15,8                       | 30,5                       | 5,27                                   | 10,17                                  | 0,49                               | 2,0              | 0,000088178  | 2150       |
| 556959    | 6952CP-15-22 | 15,0                               | 15                     | 30                  | 15,8                       | 30,5                       | 5,27                                   | 10,17                                  | 0,49                               | 2,0              | 0,000088178  | 2150       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel made of steel, hardened and burnished. Piston rod hardened. Piston rod with internal thread and clamp arm positioning. Wiper at the piston rod. Clamp arm not supplied as standard. Oil supply via oil channel in fixture body.

### Application:

The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

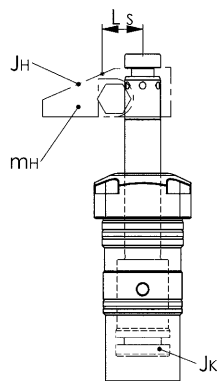
The piston stroke is executed with spheres, so volume flow Q max. must be complied with. Clamping arm length and clamping arm weight must be strictly observed. No force may be applied to the piston when mounting accessories to it. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. When placing into operation, ensure that all air is bled from the system. To control the oil feed, the throttle/check valve no. 6916-12-01 can be optionally used with G1/8 and 6916-12-04 with G1/4. Other swivel angles are available on request.

Formula to determine the total mass moment of inertia and the volume flow:

total mass moment of inertia Jges. [kgm<sup>2</sup>]  
Clamp arm mass moment of inertia JH [kgm<sup>2</sup>]  
Piston mass moment of inertia JK [kgm<sup>2</sup>]  
Clamp arm load mH [kg]  
Centre of gravity distance Ls [m]  
**Jges. = JK + JH + mH x Ls<sup>2</sup> [kgm<sup>2</sup>]**

Volume flow Qmax. [cm<sup>3</sup>/s]  
Volume clamp Vol.sp [cm<sup>3</sup>]  
Minimum permitted clamp time tmin. [s]  
**Qmax. = Vol.sp / tmin. [cm<sup>3</sup>/s]**

Suitable clamp arms are 6951-XX.

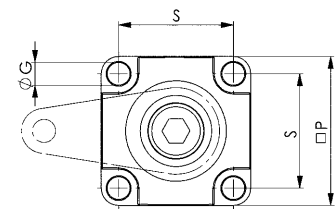
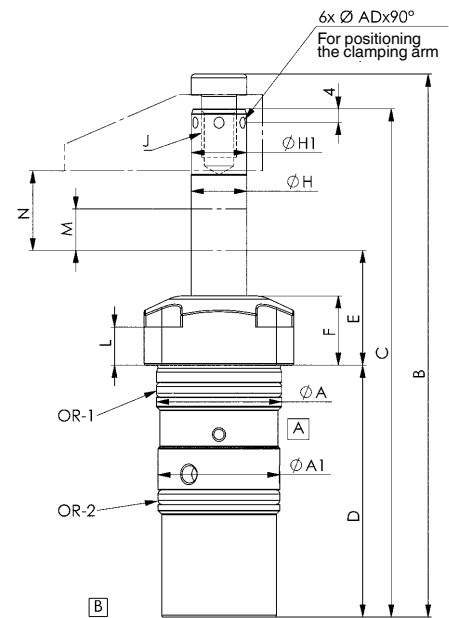
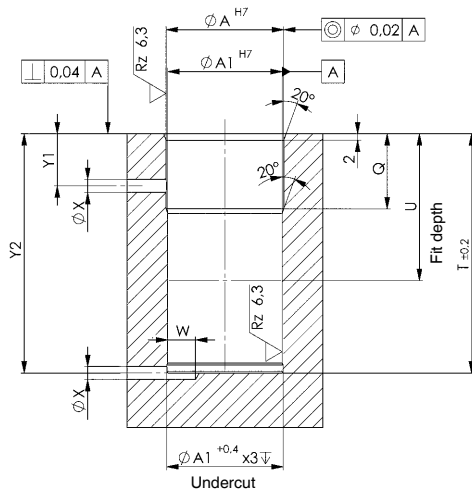




## Dimensions:

| Order no. | Article no.  | dia. A | dia. A1 | B     | C     | D    | E    | F  | dia. G | dia. H | dia. H1 | J x depth | L  | M  | N  | P  | Q  | U  | S  | T    | W  | dia. X | Y1      | Y2        | ØAD | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|--------------|--------|---------|-------|-------|------|------|----|--------|--------|---------|-----------|----|----|----|----|----|----|----|------|----|--------|---------|-----------|-----|-----------------------|-----------------------|
| 556954    | 6952CP-06-21 | 36     | 35      | 156,7 | 146,7 | 72,7 | 33,0 | 20 | 6,6    | 16     | 15,88   | M10 x 14  | 11 | 12 | 23 | 43 | 23 | 45 | 33 | 73,3 | 8  | 4      | 16 - 20 | 45 - 73,3 | 3,2 | 321018                | 321018                |
| 556955    | 6952CP-06-22 | 36     | 35      | 156,7 | 146,7 | 72,7 | 33,0 | 20 | 6,6    | 16     | 15,88   | M10 x 14  | 11 | 12 | 23 | 43 | 23 | 45 | 33 | 73,3 | 8  | 4      | 16 - 20 | 45 - 73,3 | 3,2 | 321018                | 321018                |
| 556956    | 6952CP-08-21 | 44     | 42      | 168,4 | 157,4 | 77,7 | 33,7 | 23 | 8,5    | 20     | 20,0    | M10 x 14  | 10 | 12 | 24 | 54 | 27 | 50 | 40 | 78,3 | 9  | 4      | 16 - 24 | 53 - 78,3 | 4,8 | 409748                | 557639                |
| 556957    | 6952CP-08-22 | 44     | 42      | 168,4 | 157,4 | 77,7 | 33,7 | 23 | 8,5    | 20     | 20,0    | M10 x 14  | 10 | 12 | 24 | 54 | 27 | 50 | 40 | 78,3 | 9  | 4      | 16 - 24 | 53 - 78,3 | 4,8 | 409748                | 557639                |
| 556958    | 6952CP-15-21 | 55     | 52      | 204,2 | 189,2 | 88,5 | 40,2 | 28 | 10,5   | 25     | 25,0    | M12 x 14  | 14 | 15 | 30 | 67 | 25 | 53 | 50 | 89,3 | 10 | 4      | 16 - 22 | 56 - 89,3 | 4,8 | 321174                | 557640                |
| 556959    | 6952CP-15-22 | 55     | 52      | 204,2 | 189,2 | 88,5 | 40,2 | 28 | 10,5   | 25     | 25,0    | M12 x 14  | 14 | 15 | 30 | 67 | 25 | 53 | 50 | 89,3 | 10 | 4      | 16 - 22 | 56 - 89,3 | 4,8 | 321174                | 557640                |

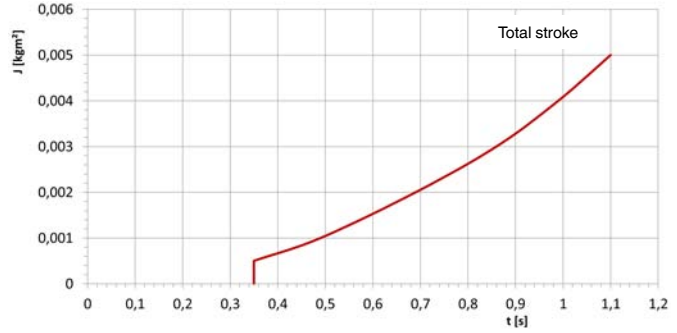
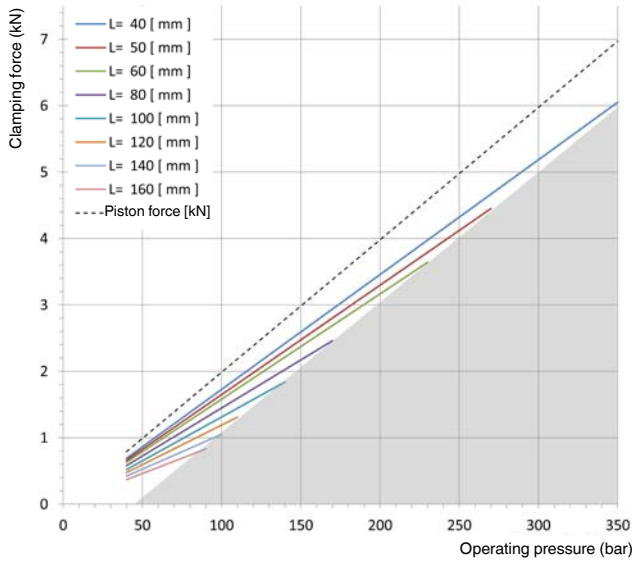
## Installation dimensions:



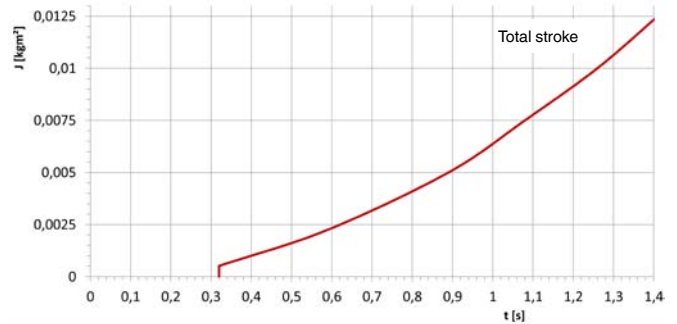
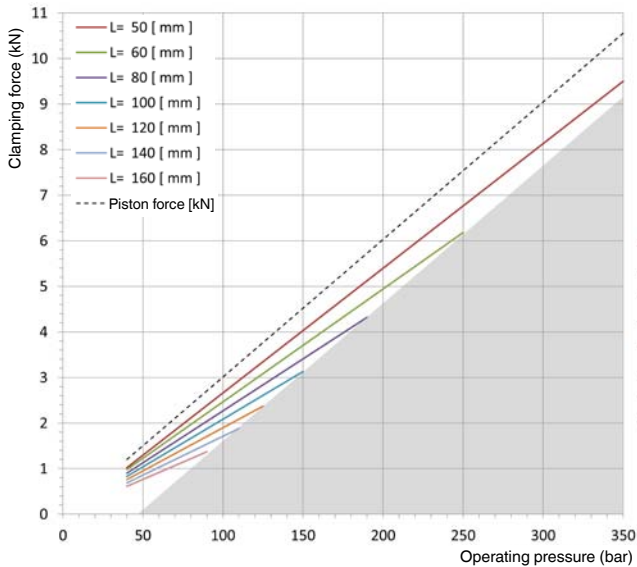
- A = clamp
- B = unclamp

## Diagrams:

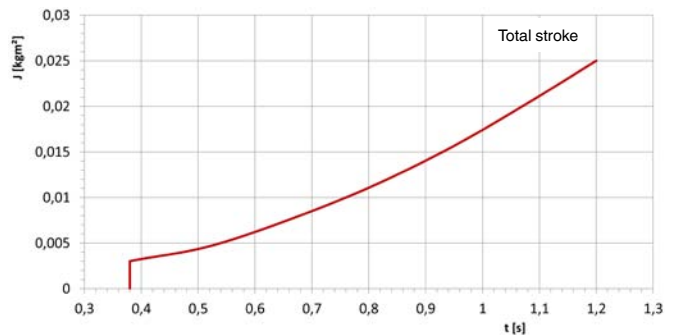
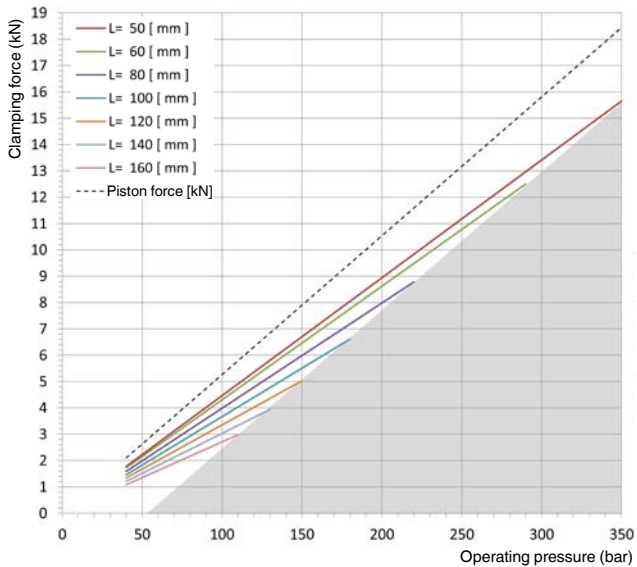
### 6952CP-06



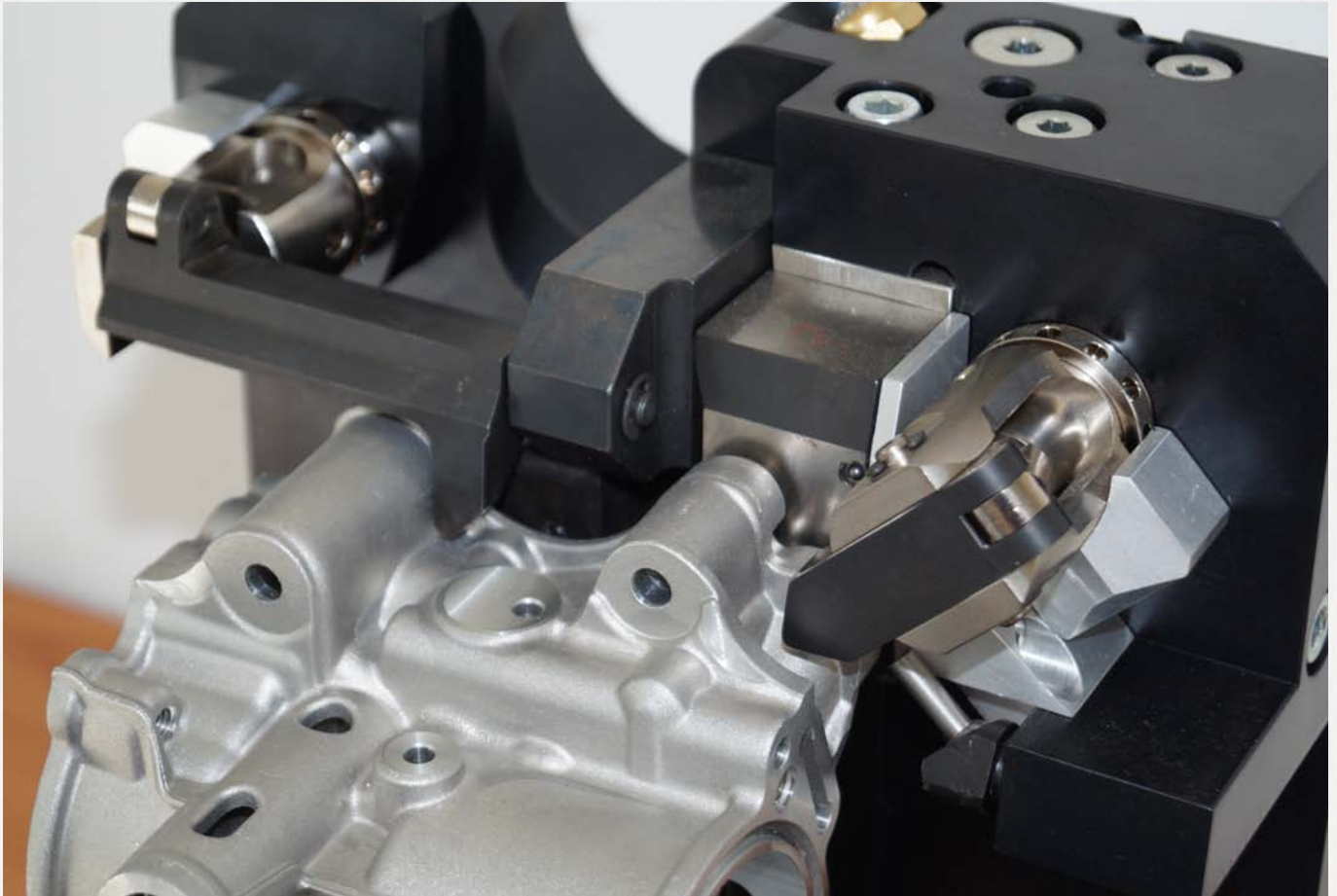
### 6952CP-08



### 6952CP-15



Subject to technical alterations.

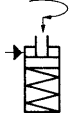


Subject to technical alterations.

## No. 6951KP

### Swing clamp, top-flange-mounting, precision design

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD

| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | Q max. * [l/min] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------|---------------------|----------------------------|--|------------------|------------|
| 327734    | 6951KP-02-11 | 2,0                                | 5,5                    | 14,0                | 0,92                       | 0,63                                   | 0,276            | 372        |
| 327759    | 6951KP-02-12 | 2,0                                | 5,5                    | 14,0                | 0,92                       | 0,63                                   | 0,276            | 372        |
| 327767    | 6951KP-05-11 | 4,9                                | 8,0                    | 20,0                | 3,82                       | 1,90                                   | 0,764            | 903        |
| 327783    | 6951KP-05-12 | 4,9                                | 8,0                    | 20,0                | 3,82                       | 1,90                                   | 0,764            | 903        |
| 327809    | 6951KP-11-11 | 11,6                               | 13,0                   | 29,5                | 11,90                      | 4,04                                   | 1,785            | 1520       |
| 327825    | 6951KP-11-12 | 11,6                               | 13,0                   | 29,5                | 11,90                      | 4,04                                   | 1,785            | 1520       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated.

Piston rod with internal thread and clamping arm positioning. O-ring for flange seal.

Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

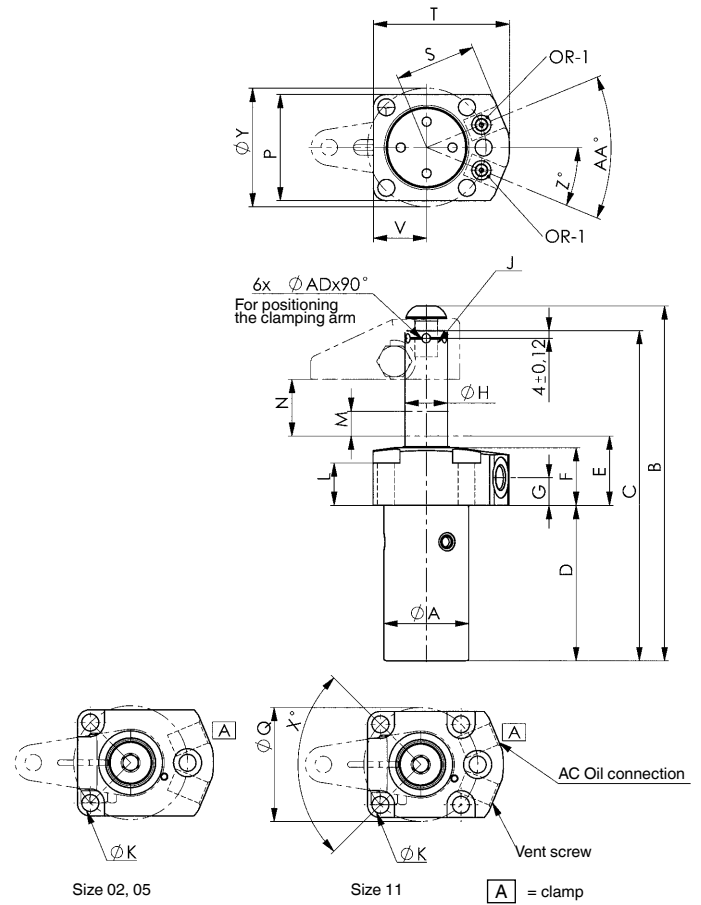
The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

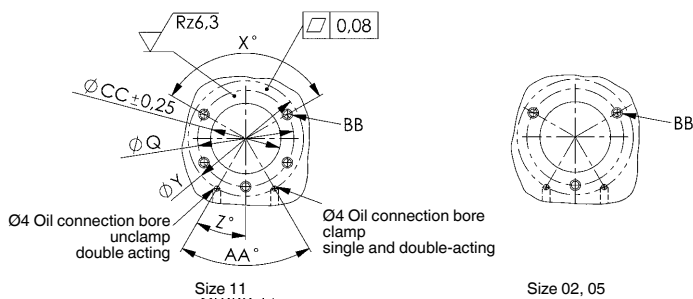
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston stroke is executed with balls, respect Q max. volume flow. Clamping arm length and clamping arm weight must be strictly observed. When mounting accessories at the piston, no force may be applied to the piston. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When placing into operation, ensure that all air is bled from the system. Optionally, throttle non-return valve no. 6916-12-01 with G1/8 and 6916-12-04 with G1/4 can be used to throttle the oil supply. Other swivel angles are available on request.



## Drilling template device:



## Dimensions:

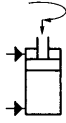
| Order no. | Article no.  | dia. A | B   | C     | D    | E    | F  | G    | dia. H | J x depth | dia. K | L    | M    | N    | P    | dia. Q | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | dia. CC | OR-1 O-ring Order No. |
|-----------|--------------|--------|-----|-------|------|------|----|------|--------|-----------|--------|------|------|------|------|--------|------|----|------|-----|--------|------|-----|------|-----|----|---------|-----------------------|
| 327734    | 6951KP-02-11 | 25,2   | 108 | 101,5 | 44,0 | 31,0 | 26 | 13,0 | 11,13  | M6x7      | 6      | 18,0 | 5,5  | 14,0 | 45,0 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 25,5    | 183608                |
| 327759    | 6951KP-02-12 | 25,2   | 108 | 101,5 | 44,0 | 31,0 | 26 | 13,0 | 11,13  | M6x7      | 6      | 18,0 | 5,5  | 14,0 | 45,0 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 25,5    | 183608                |
| 327767    | 6951KP-05-11 | 36,3   | 143 | 134,0 | 64,5 | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 17,8 | 8,0  | 20,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 36,6    | 183608                |
| 327783    | 6951KP-05-12 | 36,3   | 143 | 134,0 | 64,5 | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 17,8 | 8,0  | 20,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 36,6    | 183608                |
| 327809    | 6951KP-11-11 | 44,2   | 185 | 172,0 | 81,0 | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 13,0 | 29,5 | 55,5 | 59,5   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 44,5    | 173096                |
| 327825    | 6951KP-11-12 | 44,2   | 185 | 172,0 | 81,0 | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 13,0 | 29,5 | 55,5 | 59,5   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 44,5    | 173096                |

Subject to technical alterations.

## No. 6951KP

### Swing clamp, top-flange-mounting, precision design

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD

| Order no. | Article no.   | Clamping force at 350 bar Sp* [kN] | Clamping force at 350 bar Lo* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Q max. * [l/min] | Weight [g] |
|-----------|---------------|------------------------------------|------------------------------------|------------------------|---------------------|----------------------------|----------------------------|--|--|------------------|------------|
| 327841    | 6951KP-02-21  | 2,0                                | 5,1                                | 5,5                    | 14,0                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,276            | 358        |
| 327866    | 6951KP-02-22  | 2,0                                | 5,1                                | 5,5                    | 14,0                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,276            | 358        |
| 327882    | 6951KP-05-21  | 4,9                                | 10,0                               | 8,0                    | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 871        |
| 327908    | 6951KP-05-22  | 4,9                                | 10,0                               | 8,0                    | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 871        |
| 562237    | 6951KP-05-210 | 4,9                                | 10,0                               | 19,0                   | 31,0                | 5,90                       | 11,96                      | 1,90                                   | 3,88                                   | 0,764            | 1114       |
| 562238    | 6951KP-05-220 | 4,9                                | 10,0                               | 19,0                   | 31,0                | 5,90                       | 11,96                      | 1,90                                   | 3,88                                   | 0,764            | 1114       |
| 327924    | 6951KP-11-21  | 11,6                               | 18,2                               | 13,0                   | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 1465       |
| 327940    | 6951KP-11-22  | 11,6                               | 18,2                               | 13,0                   | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 1465       |
| 562239    | 6951KP-11-210 | 11,6                               | 18,2                               | 34,0                   | 51,0                | 20,48                      | 40,15                      | 4,04                                   | 7,92                                   | 1,785            | 2223       |
| 562240    | 6951KP-11-220 | 11,6                               | 18,2                               | 34,0                   | 51,0                | 20,48                      | 40,15                      | 4,04                                   | 7,92                                   | 1,785            | 2223       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated.

Piston rod with internal thread and clamping arm positioning. O-ring for flange seal.

Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

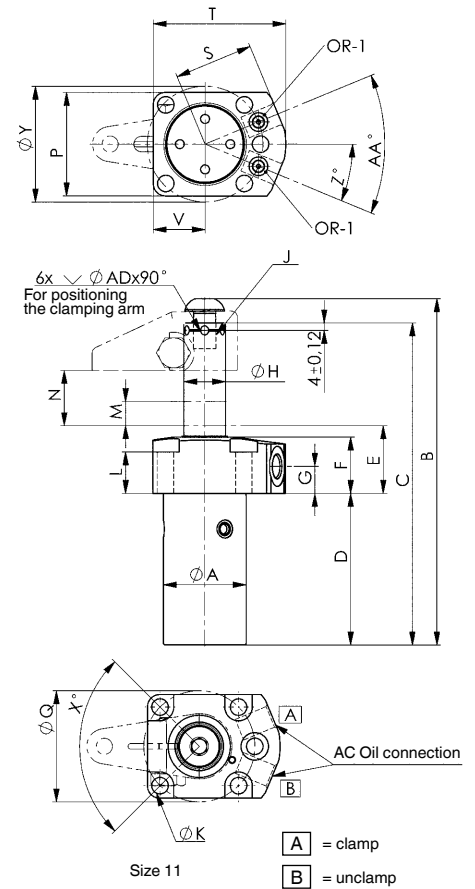
The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

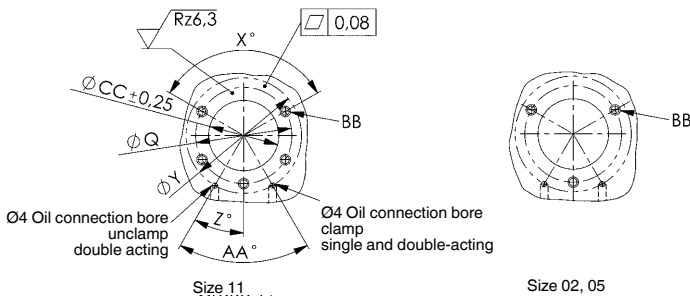
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston stroke is executed with balls, respect Q max. volume flow. Clamping arm length and clamping arm weight must be strictly observed. When mounting accessories at the piston, no force may be applied to the piston. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When placing into operation, ensure that all air is bled from the system. Optionally, throttle non-return valve no. 6916-12-01 with G1/8 and 6916-12-04 with G1/4 can be used to throttle the oil supply. Other swivel angles are available on request.



## Drilling template device:



## Dimensions:

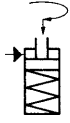
| Order no. | Article no.   | dia. A | B   | C     | D     | E    | F  | G    | dia. H | J x depth | dia. K | L    | M    | N    | P    | dia. Q | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | BB | ØAD | dia. CC | OR-1 O-ring Order No. |
|-----------|---------------|--------|-----|-------|-------|------|----|------|--------|-----------|--------|------|------|------|------|--------|------|----|------|-----|--------|------|-----|------|----|-----|---------|-----------------------|
| 327841    | 6951KP-02-21  | 25,2   | 108 | 101,5 | 44,0  | 31,0 | 26 | 13,0 | 11,13  | M6x7      | 6      | 18,0 | 5,5  | 14,0 | 45,0 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | M5 | 3,2 | 25,5    | 183608                |
| 327866    | 6951KP-02-22  | 25,2   | 108 | 101,5 | 44,0  | 31,0 | 26 | 13,0 | 11,13  | M6x7      | 6      | 18,0 | 5,5  | 14,0 | 45,0 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | M5 | 3,2 | 25,5    | 183608                |
| 327882    | 6951KP-05-21  | 36,3   | 143 | 134,0 | 64,5  | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 17,8 | 8,0  | 20,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | M6 | 4,8 | 36,5    | 183608                |
| 327908    | 6951KP-05-22  | 36,3   | 143 | 134,0 | 64,5  | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 17,8 | 8,0  | 20,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | M6 | 4,8 | 36,5    | 183608                |
| 562237    | 6951KP-05-210 | 36,3   | 177 | 167,0 | 86,5  | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 19,0 | 19,0 | 31,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | M6 | 4,8 | 36,5    | 183608                |
| 562238    | 6951KP-05-220 | 36,3   | 177 | 167,0 | 86,5  | 31,5 | 27 | 13,0 | 15,88  | M10x12    | 7      | 19,0 | 19,0 | 31,0 | 57,0 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | M6 | 4,8 | 36,5    | 183608                |
| 327924    | 6951KP-11-21  | 44,2   | 185 | 172,0 | 81,0  | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 13,0 | 29,5 | 55,5 | 59,4   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | M8 | 4,8 | 44,5    | 173096                |
| 327940    | 6951KP-11-22  | 44,2   | 185 | 172,0 | 81,0  | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 13,0 | 29,5 | 55,5 | 59,4   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | M8 | 4,8 | 44,5    | 173096                |
| 562239    | 6951KP-11-210 | 47,4   | 249 | 236,0 | 123,5 | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 34,0 | 51,0 | 55,5 | 59,4   | 42,0 | 71 | 27,5 | 120 | 62     | 22,5 | 45  | G1/4 | M8 | 4,8 | 44,5    | 173096                |
| 562240    | 6951KP-11-220 | 47,4   | 249 | 236,0 | 123,5 | 36,0 | 30 | 14,5 | 22,23  | M12x13    | 9      | 22,1 | 34,0 | 51,0 | 55,5 | 59,4   | 42,0 | 71 | 27,5 | 120 | 62     | 22,5 | 45  | G1/4 | M8 | 4,8 | 44,5    | 173096                |

Subject to technical alterations.

## No. 6951FP

### Swing clamp, base-flange-mounting, precision design

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD

| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | Q max. * [l/min] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------|---------------------|----------------------------|--|------------------|------------|
| 327775    | 6951FP-02-11 | 2,0                                | 5,5                    | 14,0                | 0,92                       | 0,63                                   | 0,276            | 372        |
| 327791    | 6951FP-02-12 | 2,0                                | 5,5                    | 14,0                | 0,92                       | 0,63                                   | 0,276            | 372        |
| 327817    | 6951FP-05-11 | 4,9                                | 8,0                    | 20,0                | 3,82                       | 1,90                                   | 0,764            | 903        |
| 327833    | 6951FP-05-12 | 4,9                                | 8,0                    | 20,0                | 3,82                       | 1,90                                   | 0,764            | 903        |
| 327858    | 6951FP-11-11 | 11,6                               | 13,0                   | 29,5                | 11,90                      | 4,04                                   | 1,785            | 1520       |
| 327874    | 6951FP-11-12 | 11,6                               | 13,0                   | 29,5                | 11,90                      | 4,04                                   | 1,785            | 1520       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated.

Piston rod with internal thread and clamping arm positioning. O-ring for flange seal.

Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

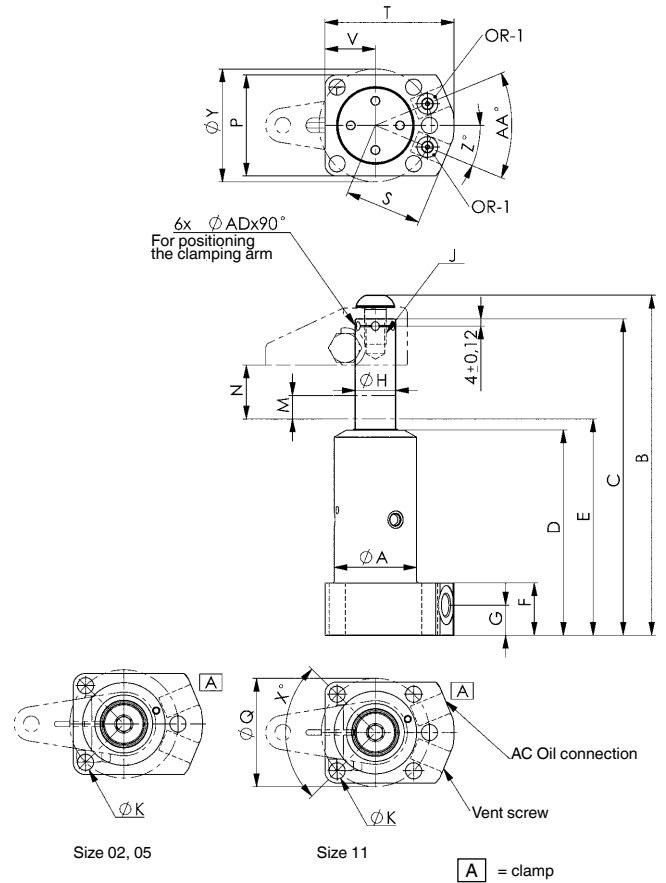
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

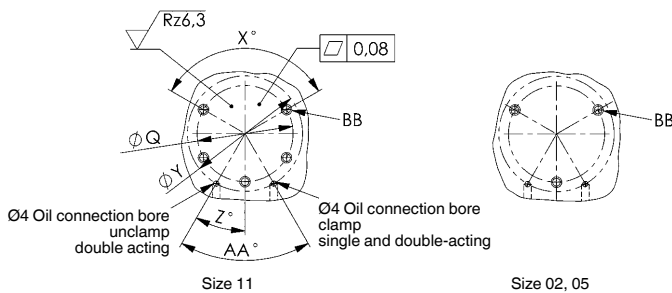
The piston stroke is executed with balls, respect Q max. volume flow. Clamping arm length and clamping arm weight must be strictly observed. When mounting accessories at the piston, no force may be applied to the piston. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When placing into operation, ensure that all air is bled from the system. Optionally, throttle non-return valve no. 6916-12-01 with G1/8 and 6916-12-04 with G1/4 can be used to throttle the oil supply. Other swivel angles are available on request.

Subject to technical alterations.





## Drilling template device:



## Dimensions:

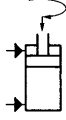
| Order no. | Article no.  | dia. A | B     | C     | D     | E     | F    | G    | dia. H | J x depth | dia. K | M    | N    | P  | dia. Q | S    | T  | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|-------|-------|-------|------|------|--------|-----------|--------|------|------|----|--------|------|----|------|-----|--------|------|-----|------|-----|----|-----------------------|
| 327775    | 6951FP-02-11 | 26,5   | 109,5 | 103,0 | 71,0  | 76,0  | 26,5 | 13,5 | 11,13  | M6x7      | 6      | 5,5  | 14,0 | 45 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 327791    | 6951FP-02-12 | 26,5   | 109,5 | 103,0 | 71,0  | 76,0  | 26,5 | 13,5 | 11,13  | M6x7      | 6      | 5,5  | 14,0 | 45 | 40,0   | 31,0 | 47 | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 327817    | 6951FP-05-11 | 38,0   | 145,0 | 135,5 | 92,5  | 97,5  | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 8,0  | 20,0 | 57 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 327833    | 6951FP-05-12 | 38,0   | 145,0 | 135,5 | 92,5  | 97,5  | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 8,0  | 20,0 | 57 | 50,0   | 33,5 | 54 | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 327858    | 6951FP-11-11 | 45,5   | 186,5 | 173,5 | 112,5 | 118,5 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 13,0 | 29,5 | 55 | 59,4   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |
| 327874    | 6951FP-11-12 | 45,5   | 186,5 | 173,5 | 112,5 | 118,5 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 13,0 | 29,5 | 55 | 59,4   | 42,0 | 71 | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |

Subject to technical alterations.

## No. 6951FP

### Swing clamp, base-flange-mounting, precision design

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD

| Order no. | Article no.   | Clamping force at 350 bar Sp* [kN] | Clamping force at 350 bar Lo* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Q max. * [l/min] | Weight [g] |
|-----------|---------------|------------------------------------|------------------------------------|------------------------|---------------------|----------------------------|----------------------------|--|--|------------------|------------|
| 327890    | 6951FP-02-21  | 2,0                                | 5,1                                | 5,5                    | 14,0                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,276            | 358        |
| 327916    | 6951FP-02-22  | 2,0                                | 5,1                                | 5,5                    | 14,0                | 0,92                       | 2,3                        | 0,63                                   | 1,60                                   | 0,276            | 358        |
| 327932    | 6951FP-05-21  | 4,9                                | 10,0                               | 8,0                    | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 871        |
| 327957    | 6951FP-05-22  | 4,9                                | 10,0                               | 8,0                    | 20,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 871        |
| 562241    | 6951FP-05-210 | 4,9                                | 10,0                               | 19,0                   | 31,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 1265       |
| 562242    | 6951FP-05-210 | 4,9                                | 10,0                               | 19,0                   | 31,0                | 3,82                       | 7,8                        | 1,90                                   | 3,88                                   | 0,764            | 1265       |
| 327973    | 6951FP-11-21  | 11,6                               | 18,2                               | 13,0                   | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 1465       |
| 327999    | 6951FP-11-22  | 11,6                               | 18,2                               | 13,0                   | 29,5                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 1465       |
| 562243    | 6951FP-11-210 | 11,6                               | 18,2                               | 34,0                   | 51,0                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 2495       |
| 562244    | 6951FP-11-220 | 11,6                               | 18,2                               | 34,0                   | 51,0                | 11,90                      | 23,0                       | 4,04                                   | 7,92                                   | 1,785            | 2495       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated.

Piston rod with internal thread and clamping arm positioning. O-ring for flange seal.

Wiper at piston rod. Single acting version with return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

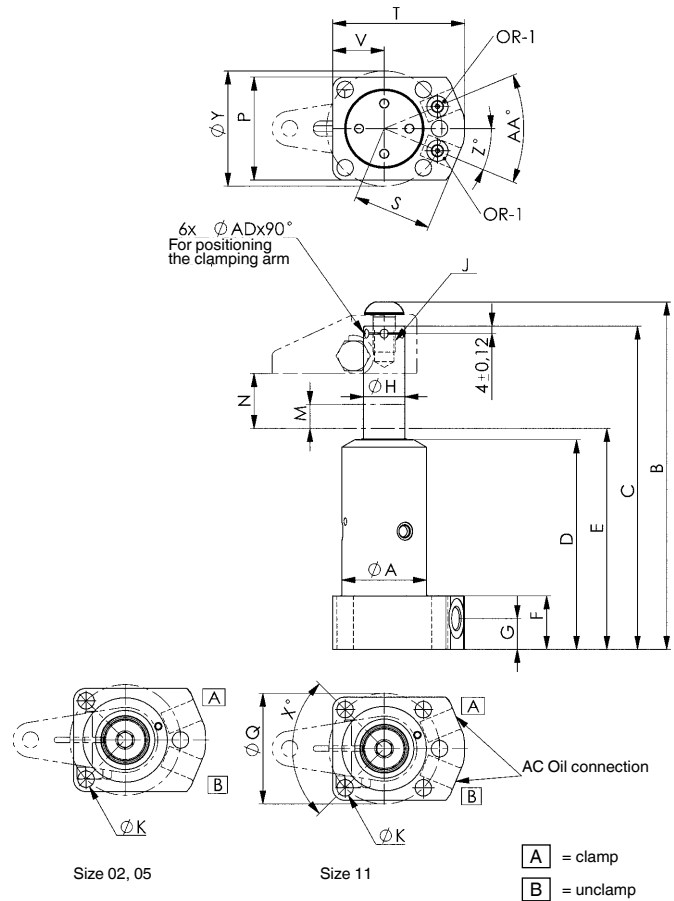
The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

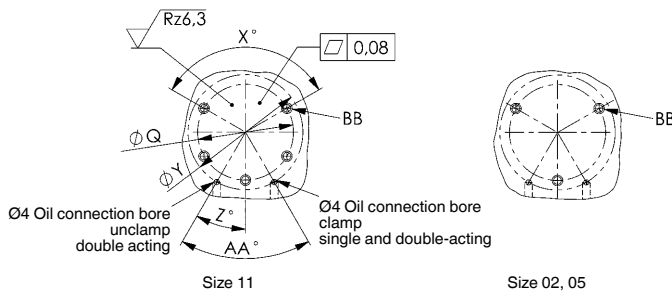
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston stroke is executed with balls, respect Q max. volume flow. Clamping arm length and clamping arm weight must be strictly observed. When mounting accessories at the piston, no force may be applied to the piston. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When placing into operation, ensure that all air is bled from the system. Optionally, throttle non-return valve no. 6916-12-01 with G1/8 and 6916-12-04 with G1/4 can be used to throttle the oil supply. Other swivel angles are available on request.



## Drilling template device:



## Dimensions:

| Order no. | Article no.   | dia. A | B     | C     | D     | E     | F    | G    | dia. H | J x depth | dia. K | M    | N    | P    | dia. Q | S    | T    | V    | X°  | dia. Y | Z°   | AA° | AC   | ØAD | BB | OR-1 O-ring Order No. |
|-----------|---------------|--------|-------|-------|-------|-------|------|------|--------|-----------|--------|------|------|------|--------|------|------|------|-----|--------|------|-----|------|-----|----|-----------------------|
| 327890    | 6951FP-02-21  | 26,5   | 109,5 | 103,0 | 71,0  | 76,0  | 26,5 | 13,5 | 11,13  | M6x7      | 6      | 5,5  | 14,0 | 45   | 40,0   | 31,0 | 47   | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 327916    | 6951FP-02-22  | 26,5   | 109,5 | 103,0 | 71,0  | 76,0  | 26,5 | 13,5 | 11,13  | M6x7      | 6      | 5,5  | 14,0 | 45   | 40,0   | 31,0 | 47   | 15,5 | 120 | 42     | 30,0 | 60  | G1/8 | 3,2 | M5 | 183608                |
| 327932    | 6951FP-05-21  | 38,0   | 145,0 | 135,5 | 92,5  | 97,5  | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 8,0  | 20,0 | 57   | 50,0   | 33,5 | 54   | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 327957    | 6951FP-05-22  | 38,0   | 145,0 | 135,5 | 92,5  | 97,5  | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 8,0  | 20,0 | 57   | 50,0   | 33,5 | 54   | 19,0 | 120 | 50     | 55,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 562241    | 6951FP-05-210 | 38,0   | 178,0 | 168,5 | 115,0 | 119,5 | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 19,0 | 31,0 | 57   | 50,0   | 33,5 | 54   | 19,0 | 120 | 50     | 30,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 562242    | 6951FP-05-210 | 38,0   | 178,0 | 168,5 | 115,0 | 119,5 | 25,0 | 15,0 | 15,88  | M10x12    | 7      | 19,0 | 31,0 | 57   | 50,0   | 33,5 | 54   | 19,0 | 120 | 50     | 30,0 | 110 | G1/8 | 4,8 | M6 | 183608                |
| 327973    | 6951FP-11-21  | 45,5   | 186,5 | 173,5 | 112,5 | 118,5 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 13,0 | 29,5 | 55   | 59,4   | 42,0 | 71   | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |
| 327999    | 6951FP-11-22  | 45,5   | 186,5 | 173,5 | 112,5 | 118,5 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 13,0 | 29,5 | 55   | 59,4   | 42,0 | 71   | 27,5 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |
| 562243    | 6951FP-11-210 | 47,5   | 250,0 | 237,0 | 155,0 | 161,0 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 34,0 | 51,0 | 58,5 | 63,0   | 42,0 | 72,5 | 29,0 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |
| 562244    | 6951FP-11-220 | 47,5   | 250,0 | 237,0 | 155,0 | 161,0 | 28,5 | 16,5 | 22,23  | M12x13    | 9      | 34,0 | 51,0 | 58,5 | 63,0   | 42,0 | 72,5 | 29,0 | 90  | 62     | 22,5 | 45  | G1/4 | 4,8 | M8 | 183608                |

Subject to technical alterations.

No. 6951

Swing Clamp Arm, standard



| Order no. | Article no. | A  | C    | D    | dia. E      | dia. F | G    | H    | J    | K    | L        | N     | P        | R    | Weight [g] |
|-----------|-------------|----|------|------|-------------|--------|------|------|------|------|----------|-------|----------|------|------------|
| 68973     | 6951-02-27  | 27 | 4,5  | 6,5  | 11,13 +0,05 | 7,0    | 15,0 | 12,5 | 7,0  | 9,5  | M6x1,00  | 22°   | M6x1,00  | 9,5  | 44         |
| 559217    | 6951-04-47  | 47 | 8,0  | 9,0  | 18,00 ±0,02 | 10,5   | 27,0 | 22,0 | 8,0  | 14,7 | M6x1,25  | 23,5° | M8x1,25  | 14,5 | 212        |
| 68999     | 6951-05-38  | 38 | 6,5  | 7,5  | 15,89 +0,05 | 10,5   | 21,0 | 18,0 | 8,0  | 12,7 | M8x1,25  | 25°   | M8x1,25  | 12,5 | 109        |
| 556974    | 6951-08-47  | 47 | 8,0  | 9,0  | 20,00 ±0,02 | 10,5   | 27,0 | 22,0 | 8,0  | 14,7 | M6x1,25  | 23,5° | M8x1,25  | 14,5 | 212        |
| 69070     | 6951-11-51  | 51 | 9,5  | 12,0 | 22,24 +0,05 | 13,5   | 32,0 | 25,5 | 9,5  | 16,6 | M10x1,25 | 25°   | M10x1,50 | 17,5 | 299        |
| 556975    | 6951-15-50  | 50 | 11,0 | 17,0 | 25,00 ±0,02 | 12,5   | 38,5 | 30,5 | 11,5 | 23,2 | M12x1,75 | 23,5° | M10x1,50 | 17,5 | 411        |

**Design:**

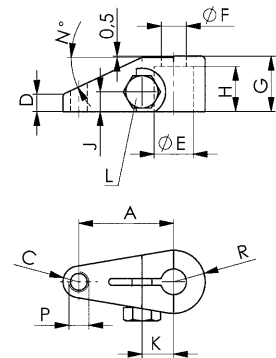
Tempered and blued steel.

**Application:**

For all swing clamps  
 order no. 68973 for sizes 6951xx-02-xx, 6952EP-02-xx  
 order no. 559217 for sizes 6941KP-04-xx  
 order no. 68999 for sizes 6951xx-05-xx, 6952CP-06-xx, 6941KP-03-xx  
 order no. 556974 for sizes 6952CP-08-xx  
 order no. 69070 for sizes 6951xx-11-xx, 6941KP-05-xx  
 order no. 556975 for sizes 6952CP-15-xx, 6941KP-09-xx

**Note:**

Clamping pressure, flow volume and clamping arm weight must be observed. Special versions available on request.



No. 6951

Swing Clamp Arm, upreach



| Order no. | Article no. | A    | B    | C   | D   | dia. E      | dia. F | G    | H    | J   | K    | L        | M    | N  | P  | Weight [g] |
|-----------|-------------|------|------|-----|-----|-------------|--------|------|------|-----|------|----------|------|----|----|------------|
| 69112     | 6951-02-32  | 32,0 | 19,0 | 5,0 | 5,0 | 11,13 +0,05 | 7,0    | 25,5 | 12,5 | 6,5 | 9,5  | M6x1,00  | 12,5 | 16 | 16 | 87         |
| 69138     | 6951-05-44  | 44,5 | 25,5 | 6,5 | 6,5 | 15,89 +0,05 | 10,5   | 35,0 | 18,0 | 8,0 | 12,5 | M8x1,25  | 19,0 | 22 | 19 | 209        |
| 69153     | 6951-11-63  | 63,5 | 35,0 | 9,5 | 9,5 | 22,24 +0,05 | 13,5   | 51,0 | 25,5 | 9,5 | 16,5 | M10x1,25 | 26,5 | 32 | 26 | 590        |

**Design:**

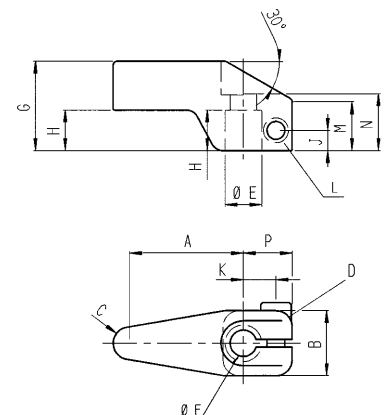
Tempered and blued steel.

**Application:**

For all swing clamps  
 order no. 69112 for sizes 6951xx-02-xx, 6952EP-02-xx  
 order no. 69138 for sizes 6951xx-05-xx, 6952CP-06-xx, 6941KP-03-xx  
 order no. 69153 for sizes 6951xx-11-xx, 6941KP-05-xx

**Note:**

Clamping pressure, flow volume and clamping arm weight must be observed. Special versions available on request.



Subject to technical alterations.

No. 6951

## Swing Clamp Arm, long



| Order no. | Article no. | A     | B    | C    | D    | dia. E     | dia. F | G    | H    | J   | K    | L        | N  | R    | Weight [g] |
|-----------|-------------|-------|------|------|------|------------|--------|------|------|-----|------|----------|----|------|------------|
| 69229     | 6951-02-82  | 82,5  | 26,0 | 10,5 | 8,1  | 11,13+0,05 | 7,0    | 15,2 | 12,5 | 7,0 | 9,5  | M6x1,00  | 22 | 9,5  | 73         |
| 69245     | 6951-05-136 | 136,5 | 33,0 | 14,5 | 12,5 | 15,89+0,05 | 10,5   | 22,0 | 18,0 | 8,0 | 12,7 | M8x1,25  | 25 | 12,5 | 240        |
| 69260     | 6951-11-162 | 162,0 | 50,5 | 19,0 | 15,2 | 22,24+0,05 | 13,5   | 31,1 | 25,5 | 9,5 | 16,6 | M10x1,25 | 25 | 17,5 | 553        |

### Design:

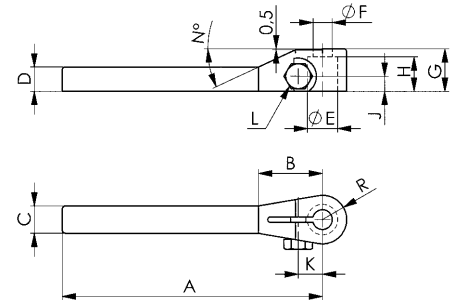
Tempered and blued steel.

### Application:

For all swing clamps  
 order no. 69229 for sizes 6951xx-02-xx, 6952EP-02-xx  
 order no. 69245 for sizes 6951xx-05-xx, 6952CP-06-xx, 6941KP-03-xx  
 order no. 69260 for sizes 6951xx-11-xx, 6941KP-05-xx  
 Clamp arm can be shortened for your application.

### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. Special versions available on request.



No. 6951

## Swing Clamp Arm, double ended



| Order no. | Article no. | 2A  | B    | C    | D    | dia. E     | dia. F | G    | H    | J   | K    | L        | N  | R    | Weight [g] |
|-----------|-------------|-----|------|------|------|------------|--------|------|------|-----|------|----------|----|------|------------|
| 69252     | 6951-02-140 | 140 | 26,0 | 10,5 | 8,1  | 11,13+0,05 | 7,0    | 15,2 | 12,5 | 7,0 | 9,5  | M6x1,00  | 22 | 9,5  | 118        |
| 69278     | 6951-05-222 | 222 | 33,0 | 14,5 | 12,1 | 15,89+0,05 | 10,5   | 21,6 | 18,0 | 8,0 | 12,7 | M8x1,25  | 25 | 12,5 | 354        |
| 69294     | 6951-11-272 | 272 | 50,5 | 19,0 | 15,2 | 22,24+0,05 | 13,5   | 31,1 | 25,5 | 9,5 | 16,6 | M10x1,25 | 25 | 17,5 | 801        |

### Design:

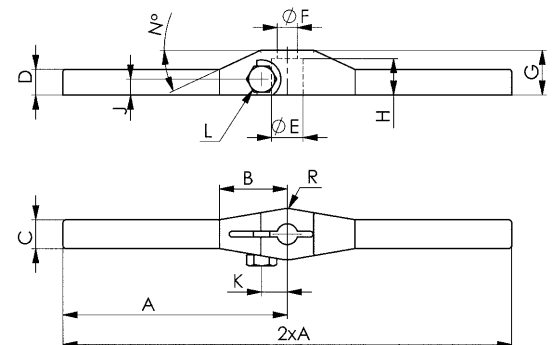
Tempered and blued steel.

### Application:

For all swing clamps  
 order no. 69252 for sizes 6951xx-02-xx, 6952EP-02-xx  
 order no. 69278 for sizes 6951xx-05-xx, 6952CP-06-xx, 6941KP-03-xx  
 order no. 69294 for sizes 6951xx-11-xx, 6941KP-05-xx  
 Clamp arm can be shortened for your application.

### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. It is also essential that clamping or support heights in either side are identical. Special versions available on request.



Subject to technical alterations.

## No. 6951WN

### Swing Clamp arm, double-ended

pivoted



| Order no. | Article no.   | 2A  | B  | C  | D  | dia. E | F  | G  | H  | J    | dia. K | L    | M  | N   | W max. | Weight [g] |
|-----------|---------------|-----|----|----|----|--------|----|----|----|------|--------|------|----|-----|--------|------------|
| 320457    | 6951WN-02-100 | 100 | 39 | 11 | 8  | 11,2   | 13 | 9  | 24 | 21,0 | 6      | 13,5 | M4 | M6  | 6°     | 150        |
| 320465    | 6951WN-05-150 | 150 | 52 | 16 | 12 | 15,9   | 19 | 15 | 35 | 31,0 | 8      | 19,5 | M6 | M10 | 6°     | 440        |
| 320473    | 6951WN-11-180 | 180 | 74 | 19 | 16 | 22,3   | 28 | 19 | 40 | 38,0 | 12     | 25,0 | M6 | M12 | 6°     | 880        |

### Design:

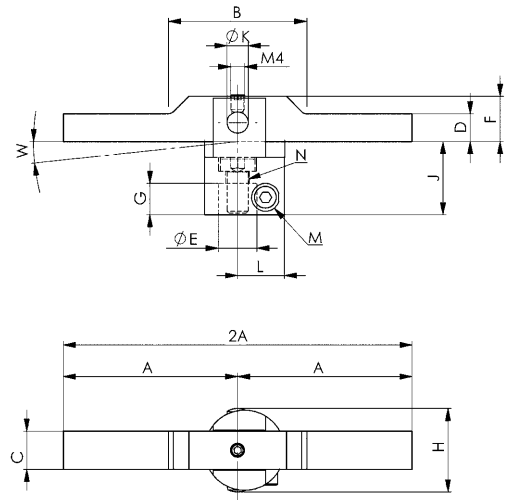
Steel, blued. Clamping arm tempered.

### Application:

For all swing clamps  
 order no. 320457 for sizes 6951xx-02-xx, 6952EP-02-xx  
 order no. 320465 for sizes 6951xx-05-xx, 6952CP-06-xx, 6941KP-03-xx  
 order no. 320473 for sizes 6951xx-11-xx, 6941KP-05-xx  
 Used for clamping two workpieces with different heights.

### Note:

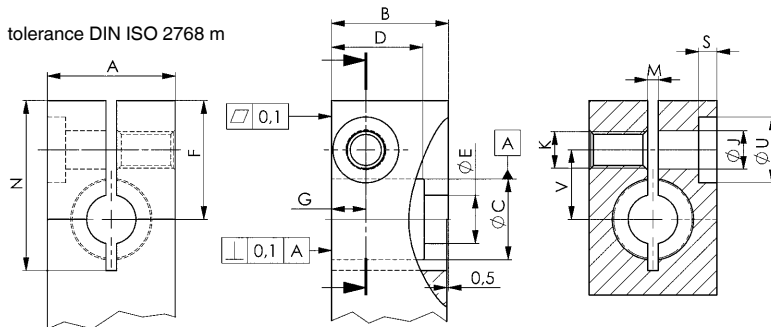
Clamping pressure and maximum tilt angle (W) must not be exceeded. Special versions are available on request.



## No. 6951

### Dimensions for proprietary manufacturing of clamping arms

tolerance DIN ISO 2768 m



### Important note:

Lever lengths and lever weights (see no. 6951-xx above) must be observed!

### Dimensions table (proprietary manufacture):

| for size  | A    | B    | ØC           | D     | ØE   | F    | G    | ØJ   | K   | M   | N    | S | ØU | V    |
|-----------|------|------|--------------|-------|------|------|------|------|-----|-----|------|---|----|------|
| 6952EP-02 | 19,0 | 16,0 | 11,151 +0,05 | 12,70 | 7,0  | 22,5 | 7,0  | 6,4  | M6  | 2,4 | 30,0 | 2 | 11 | 9,5  |
| 6951XX-02 | 19,0 | 16,0 | 11,151 +0,05 | 12,70 | 7,0  | 22,5 | 7,0  | 6,4  | M6  | 2,4 | 30,0 | 2 | 11 | 9,5  |
| 6952CP-06 | 25,5 | 22,0 | 15,913 +0,05 | 18,03 | 11,0 | 27,5 | 8,8  | 8,5  | M8  | 2,9 | 38,5 | 5 | 15 | 17,0 |
| 6951XX-05 | 25,5 | 22,0 | 15,913 +0,05 | 18,03 | 11,0 | 27,5 | 8,8  | 8,5  | M8  | 2,9 | 38,5 | 5 | 15 | 17,0 |
| 6952CP-08 | 29,0 | 27,0 | 20,000 +0,02 | 22,00 | 11,0 | 31,5 | 8,0  | 8,5  | M8  | 2,9 | 43,5 | 5 | 15 | 18,2 |
| 6951XX-11 | 35,0 | 32,0 | 22,263 +0,05 | 25,40 | 13,5 | 32,5 | 12,0 | 10,5 | M10 | 2,9 | 46,5 | 5 | 18 | 19,0 |
| 6952CP-15 | 35,0 | 38,5 | 25,000 +0,02 | 30,50 | 12,5 | 42,5 | 11,0 | 12,5 | M12 | 2,9 | 52,5 | 4 | 18 | 23,2 |

Subject to technical alterations.



Subject to technical alterations.

# SWING CLAMPS - THE SOLUTION FOR COST-EFFECTIVE HYDRAULIC CLAMPING OF WORKPIECES!

## DESIGN:

Burnished body, hardened and ground piston rod. Swing clamps are delivered without clamping arm.

## APPLICATION:

Swing clamps are used in fixtures of all kinds, especially in applications where workpieces must be freely accessible and loaded from above. Workpieces with complex geometries can be clamped using special clamping arms (available upon request).

## FEATURES:

Design variants: > **top flange** > **base flange**

Top and base-flange models accommodate O-ring as well as threaded hydraulic connections.

The swing motion is realized by a rigid 3-way ball-guide mechanism. Standard swivel angle is 90°.

The newly designed clamping-arm mount prevents the induction of forces into the swing mechanism during assembly.

## IMPORTANT NOTE:

Clamping arm length, max. permissible flow rate  $Q_{max}$  and clamping arm weight must be observed!

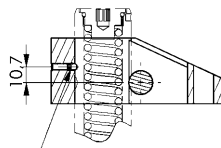
In case of a larger flow rates, a throttle/check valve must be connected upstream.

The motion of the swing clamp must not be obstructed. Clamping must only be done in the vertical stroke area.



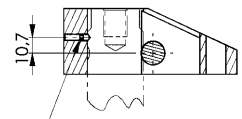
## POSITIONING:

Positioning hole for clamp arm:  
single acting cylinder



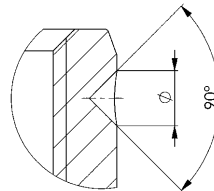
threaded stud

double acting cylinder



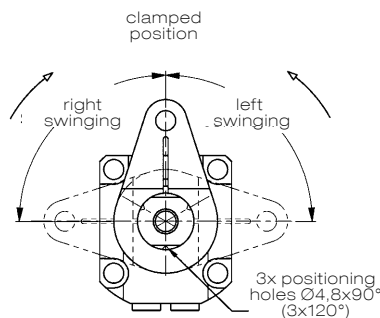
threaded stud

Positioning bore at the piston rod:



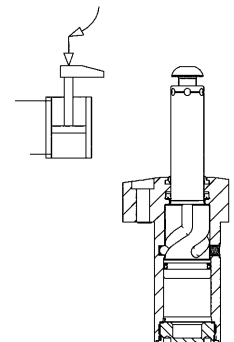
## SWING DIRECTIONS:

Positioning hole for clamp arm:



## DESIGN:

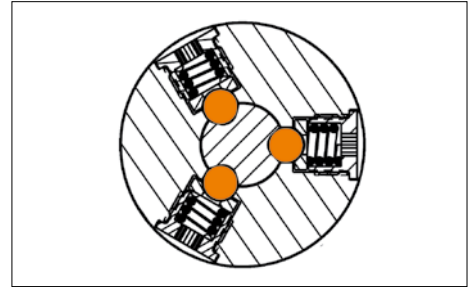
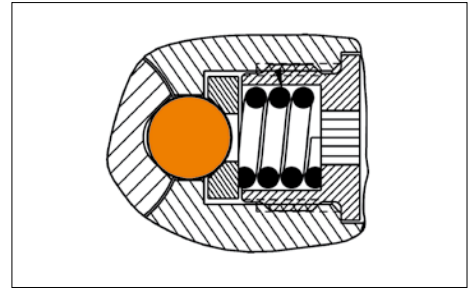
double acting cylinder





**BENEFITS:**

- > Increase in the number of balls and grooves to 3 to achieve a higher positioning accuracy and repetition accuracy. This also extends the service life.
- > Precise swivel angle of 90°.
- > Increases pressing force of the balls in the swivel slot, which ensures a very precise swivel angle over a long period of use.
- > V-profile of the ball running groove ensures a deeper ball run in the slot wall than on the slot edge.
- > Improved radius transition from straight to swivel stroke.
- > The simple-acting models receive a stronger spring force to ensure a better return stroke.
- > In addition, all models receive a position-repeatable clamping arm mounting.
- > New materials for extending the service life of piston rod and swivel mechanism.



**CODE OF TYPES:**

Type 21 = double acting, right swinging

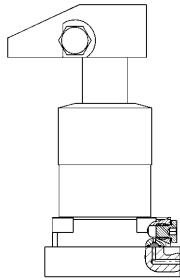
Type 22 = double acting, left swinging

Type 210 = double acting, right swinging, extended stroke

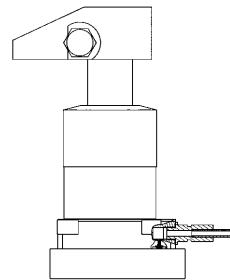
Type 220 = double acting, left swinging, extended stroke

**CONNECTION OPTIONS:**

> o-ring connection



> threaded connection



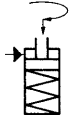
**CLAMPING TIME AND Q OF THE SWING CLAMP 6951KP AND FP**

| Swing clamp clamping force [kN] | Clamp arm, standard               |                 | Clamp arm, long                   |                 |
|---------------------------------|-----------------------------------|-----------------|-----------------------------------|-----------------|
|                                 | min. allowed clamping time [sec.] | Q max. [l/min.] | min. allowed clamping time [sec.] | Q max. [l/min.] |
| 22,0                            | 0,5                               | 2,544           | 1,0                               | 1,272           |
| 33,0                            | 0,5                               | 4,116           | 1,0                               | 2,058           |

## No. 6951KP

### Swing clamp, top-flange-mounting, precision design

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



| Order no. | Article no.  | Clamping force at 350 bar* [kN] | Clamping stroke K [mm] | Total stroke L [mm] | Oil capacity [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|---------------------------------|------------------------|---------------------|---------------------------------|--|----------------|------------|
| 327155    | 6951KP-22-11 | 22                              | 14,5                   | 28                  | 21,2                            | 7,6                                      | 2,5            | 2550       |
| 327163    | 6951KP-22-12 | 22                              | 14,5                   | 28                  | 21,2                            | 7,6                                      | 2,5            | 2550       |
| 327171    | 6951KP-33-11 | 33                              | 16,0                   | 30                  | 34,3                            | 11,4                                     | 2,5            | 3992       |
| 327189    | 6951KP-33-12 | 33                              | 16,0                   | 30                  | 34,3                            | 11,4                                     | 2,5            | 3992       |

\* Clamping forces with short clamping arm.

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated. Wiper at piston rod. Return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The swing clamp is used particularly in fixtures in which the workpieces must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

### Features:

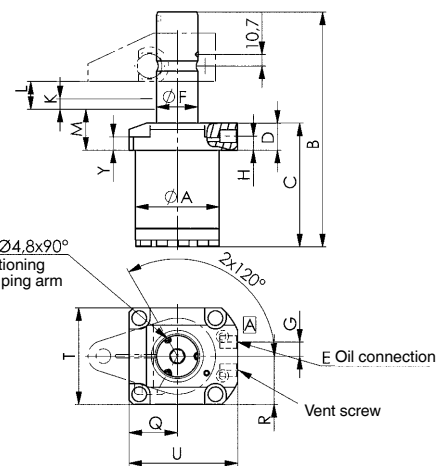
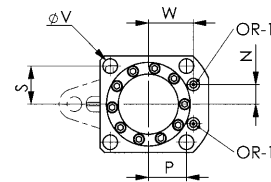
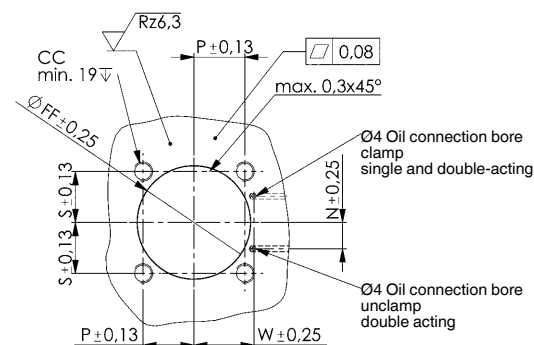
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. For single-acting cylinders, there is risk of sucking in coolant through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When installing, ensure that all air is bled from the system.

To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used. Other swivel angles are available on request.

### Drilling template device:



**A** = clamp

### Dimensions:

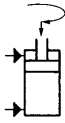
| Order no. | Article no.  | dia. A | B     | C     | D  | E    | dia. F | G  | H  | K    | L  | M    | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | CC  | dia. FF | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|-------|----|------|--------|----|----|------|----|------|------|------|------|------|------|----|-------|--------|------|------|-----|---------|-----------------------|
| 327155    | 6951KP-22-11 | 62,8   | 196,0 | 104,5 | 25 | G1/4 | 31,74  | 13 | 13 | 14,5 | 28 | 33,5 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M10 | 63,4    | 183608                |
| 327163    | 6951KP-22-12 | 62,8   | 196,0 | 104,5 | 25 | G1/4 | 31,74  | 13 | 13 | 14,5 | 28 | 33,5 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M10 | 63,4    | 183608                |
| 327171    | 6951KP-33-11 | 77,0   | 216,5 | 114,0 | 25 | G1/4 | 38,09  | 13 | 13 | 16,0 | 30 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M12 | 77,6    | 183608                |
| 327189    | 6951KP-33-12 | 77,0   | 216,5 | 114,0 | 25 | G1/4 | 38,09  | 13 | 13 | 16,0 | 30 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M12 | 77,6    | 183608                |

Subject to technical alterations.

## No. 6951KP

### Swing clamp, top-flange-mounting, precision design

double acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



| Order no. | Article no.     | Clamping force at 350 bar Sp* [kN] | Clamping force at 350 bar Lo* [kN] | Clamping stroke K [mm] | Total stroke L [mm] | Vol. Sp [cm³] | Vol. Lo [cm³] | eff. piston area Sp [cm²] | eff. piston area Lo [cm²] | Q max. [l/min] | Weight [g] |
|-----------|-----------------|------------------------------------|------------------------------------|------------------------|---------------------|---------------|---------------|---------------------------|---------------------------|----------------|------------|
| 327197    | 6951KP-22-21    | 22                                 | 54                                 | 14,5                   | 28,0                | 21,2          | 43,3          | 7,6                       | 15,5                      | 2,5            | 2590       |
| 327205    | 6951KP-22-22    | 22                                 | 54                                 | 14,5                   | 28,0                | 21,2          | 43,3          | 7,6                       | 15,5                      | 2,5            | 2590       |
| 327213    | 6951KP-22-210** | 22                                 | 54                                 | 32,0                   | 45,5                | 34,9          | 71,3          | 7,6                       | 15,5                      | 2,5            | 2948       |
| 327221    | 6951KP-22-220   | 22                                 | 54                                 | 32,0                   | 45,5                | 34,9          | 71,3          | 7,6                       | 15,5                      | 2,5            | 2948       |
| 327239    | 6951KP-33-21    | 33                                 | 80                                 | 16,0                   | 30,0                | 34,3          | 68,4          | 11,4                      | 22,8                      | 2,5            | 4355       |
| 327247    | 6951KP-33-22    | 33                                 | 80                                 | 16,0                   | 30,0                | 34,3          | 68,4          | 11,4                      | 22,8                      | 2,5            | 4355       |
| 327254    | 6951KP-33-210** | 33                                 | 80                                 | 32,0                   | 46,0                | 52,6          | 105,0         | 11,4                      | 22,8                      | 2,5            | 4881       |
| 327262    | 6951KP-33-220** | 33                                 | 80                                 | 32,0                   | 46,0                | 52,6          | 105,0         | 11,4                      | 22,8                      | 2,5            | 4881       |

Sp = clamp, Lo = unclamp

\* Clamping forces with short clamping arm. \*\* Not a stock item!

### Design:

Hardened and burnished steel cylinder barrels. Piston rod hardened and chrome plated. Wiper at piston rod. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The swing clamp is used particularly in fixtures in which the workpieces must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

### Features:

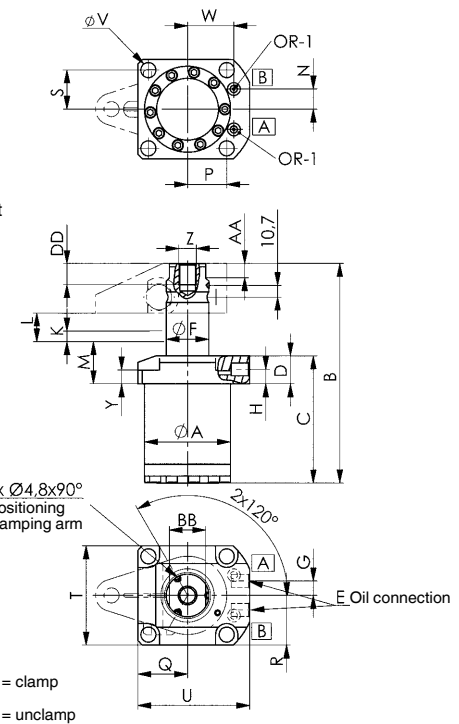
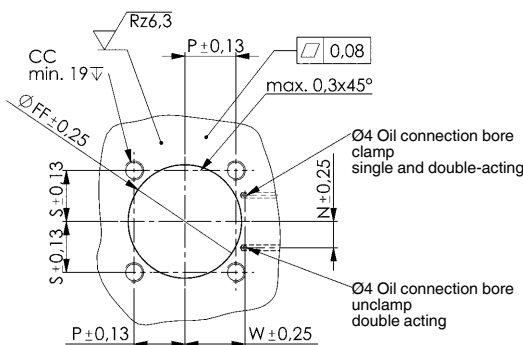
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. When installing, ensure that all air is bled from the system.

To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used. Other swivel angles are available on request.

### Drilling template device:



### Dimensions:

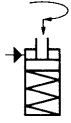
| Order no. | Article no.     | dia. A | B     | C     | D  | E    | dia. F | G  | H  | K    | L    | M    | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | Z   | AA   | BB   | CC  | DD | dia. FF | OR-1 O-ring Order No. |
|-----------|-----------------|--------|-------|-------|----|------|--------|----|----|------|------|------|------|------|------|------|------|----|-------|--------|------|------|-----|------|------|-----|----|---------|-----------------------|
| 327197    | 6951KP-22-21    | 62,8   | 185,5 | 104,5 | 25 | G1/4 | 31,74  | 13 | 13 | 14,5 | 28,0 | 33,5 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 63,4    | 183608                |
| 327205    | 6951KP-22-22    | 62,8   | 185,5 | 104,5 | 25 | G1/4 | 31,74  | 13 | 13 | 14,5 | 28,0 | 33,5 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 63,4    | 183608                |
| 327213    | 6951KP-22-210** | 62,8   | 220,5 | 122,0 | 25 | G1/4 | 31,74  | 13 | 13 | 32,0 | 45,5 | 33,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 63,4    | 183608                |
| 327221    | 6951KP-22-220   | 62,8   | 220,5 | 122,0 | 25 | G1/4 | 31,74  | 13 | 13 | 32,0 | 45,5 | 33,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 63,4    | 183608                |
| 327239    | 6951KP-33-21    | 77,0   | 196,5 | 114,0 | 25 | G1/4 | 38,09  | 13 | 13 | 16,0 | 30,0 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 77,6    | 183608                |
| 327247    | 6951KP-33-22    | 77,0   | 196,5 | 114,0 | 25 | G1/4 | 38,09  | 13 | 13 | 16,0 | 30,0 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 77,6    | 183608                |
| 327254    | 6951KP-33-210** | 77,0   | 228,5 | 130,0 | 25 | G1/4 | 38,09  | 13 | 13 | 32,0 | 46,0 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 77,6    | 183608                |
| 327262    | 6951KP-33-220** | 77,0   | 228,5 | 130,0 | 25 | G1/4 | 38,09  | 13 | 13 | 32,0 | 46,0 | 33,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 77,6    | 183608                |

Subject to technical alterations.

## No. 6951FP

### Swing clamp, base-flange-mounting, precision design

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 52 bar.



CAD

| Order no. | Article no.  | Clamping force at 350 bar* [kN] | Clamping stroke K [mm] | Total stroke L [mm] | Oil capacity [cm <sup>3</sup> ] | effective piston area [cm <sup>2</sup> ] | Q max. [l/min] | Weight [g] |
|-----------|--------------|---------------------------------|------------------------|---------------------|---------------------------------|--|----------------|------------|
| 327270    | 6951FP-22-11 | 22                              | 14,5                   | 28                  | 21,2                            | 7,6                                      | 2,5            | 3030       |
| 327288    | 6951FP-22-12 | 22                              | 14,5                   | 28                  | 21,2                            | 7,6                                      | 2,5            | 3030       |
| 327296    | 6951FP-33-11 | 33                              | 16,0                   | 30                  | 34,3                            | 11,4                                     | 2,5            | 4854       |
| 327304    | 6951FP-33-12 | 33                              | 16,0                   | 30                  | 34,3                            | 11,4                                     | 2,5            | 4854       |

\* Clamping forces with short clamping arm.

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod hardened and chrome plated. Wiper at piston rod. Return spring from stainless steel. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

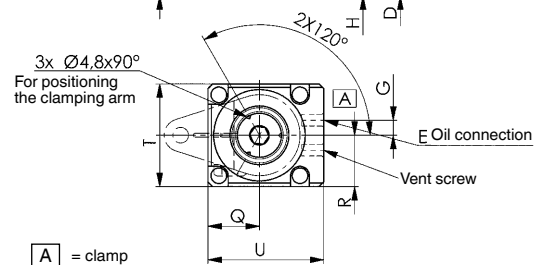
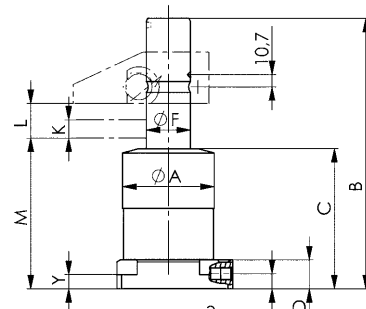
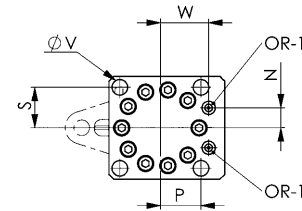
The swing clamp is used particularly in fixtures in which the workpieces must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

### Features:

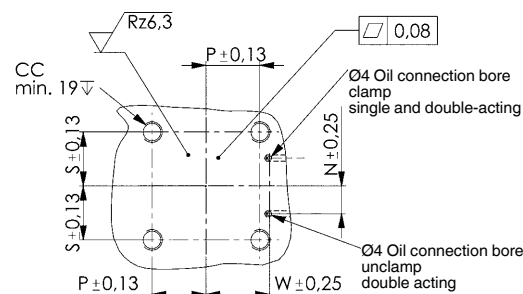
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. For single-acting cylinders, there is risk of sucking in coolant through the breather port. In such cases the breather port has to be moved to a clean protected area via a connection line. When installing, ensure that all air is bled from the system. To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used. Other swivel angles are available on request.



### Drilling template device:



### Dimensions:

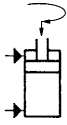
| Order no. | Article no.  | dia. A | B     | C     | D  | E    | dia. F | G  | H    | K    | L  | M     | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | CC  | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|-------|----|------|--------|----|------|------|----|-------|------|------|------|------|------|----|-------|--------|------|------|-----|-----------------------|
| 327270    | 6951FP-22-11 | 62,8   | 204,0 | 112,0 | 25 | G1/4 | 31,74  | 13 | 12,5 | 14,5 | 28 | 121,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M10 | 183608                |
| 327288    | 6951FP-22-12 | 62,8   | 204,0 | 112,0 | 25 | G1/4 | 31,74  | 13 | 12,5 | 14,5 | 28 | 121,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M10 | 183608                |
| 327296    | 6951FP-33-11 | 79,0   | 224,5 | 121,5 | 25 | G1/4 | 38,09  | 13 | 13,0 | 16,0 | 30 | 130,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M12 | 183608                |
| 327304    | 6951FP-33-12 | 79,0   | 224,5 | 121,5 | 25 | G1/4 | 38,09  | 13 | 13,0 | 16,0 | 30 | 130,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M12 | 183608                |

Subject to technical alterations.

## No. 6951FP

### Swing clamp, base-flange-mounting, precision design

double acting,  
max. operating pressure 350 bar,  
min. operating pressure 35 bar.



CAD

| Order no. | Article no.  | Clamping force at 350 bar Sp* [kN] | Clamping force at 350 bar Lo* [kN] | Clamping stroke K [mm] | Total stroke L [mm] | Vol. Sp [cm³] | Vol. Lo [cm³] | eff. piston area Sp [cm²] | eff. piston area Lo [cm²] | Q max. [l/min] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------------------|------------------------|---------------------|---------------|---------------|---------------------------|---------------------------|----------------|------------|
| 327312    | 6951FP-22-21 | 22                                 | 54                                 | 14,5                   | 28                  | 21,2          | 43,3          | 7,6                       | 15,5                      | 2,5            | 3070       |
| 327320    | 6951FP-22-22 | 22                                 | 54                                 | 14,5                   | 28                  | 21,2          | 43,3          | 7,6                       | 15,5                      | 2,5            | 3070       |
| 327338    | 6951FP-33-21 | 33                                 | 80                                 | 16,0                   | 30                  | 34,3          | 68,4          | 11,4                      | 22,8                      | 2,5            | 4854       |
| 327346    | 6951FP-33-22 | 33                                 | 80                                 | 16,0                   | 30                  | 34,3          | 68,4          | 11,4                      | 22,8                      | 2,5            | 4854       |

Sp = clamp, Lo = unclamp

\* Clamping forces with short clamping arm.

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and chrome plated. Wiper at piston rod. Supply scope does not include clamping arm. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The swing clamp is used particularly in fixtures in which the workpieces must be freely accessible and placed from above. Workpieces with difficult shapes can also be clamped using special clamp arms (available on request).

### Features:

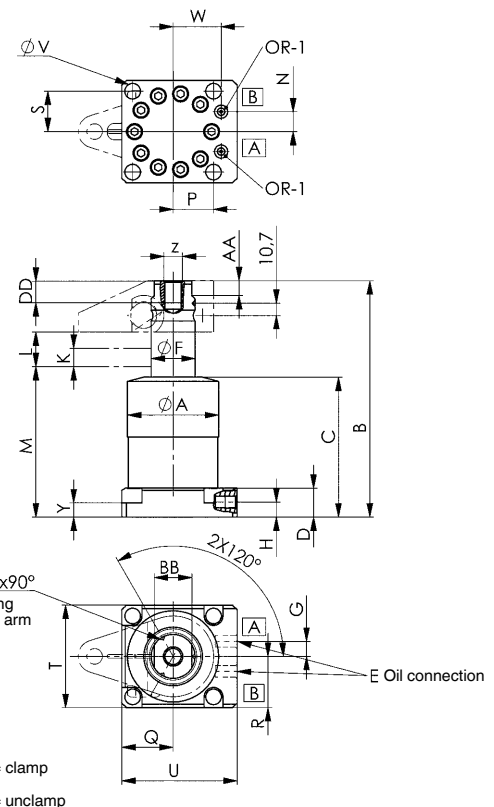
The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

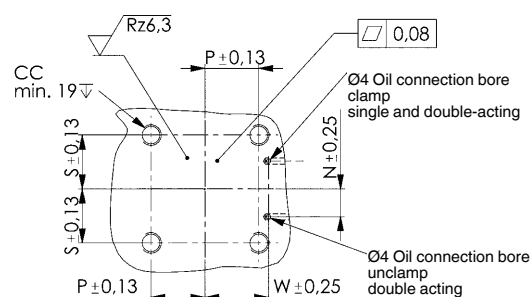
The piston is guided, and so the max. permissible oil flow rate Q max. as well as the clamping arm length and weight must be observed. When mounting accessories at the piston, no force may be applied to the piston. When installing, ensure that all air is bled from the system.

To control the oil feed, the throttle/check valve no. 6916-12-04 can be optionally used.

Other swivel angles are available on request.



### Drilling template device:



### Dimensions:

| Order no. | Article no.  | dia. A | B   | C     | D  | E    | dia. F | G  | H    | K    | L  | M     | N    | P    | Q    | R    | S    | T  | U     | dia. V | W    | Y    | Z   | AA   | BB   | CC  | DD | OR-1 O-ring Order No. |
|-----------|--------------|--------|-----|-------|----|------|--------|----|------|------|----|-------|------|------|------|------|------|----|-------|--------|------|------|-----|------|------|-----|----|-----------------------|
| 327312    | 6951FP-22-21 | 62,8   | 194 | 112,0 | 25 | G1/4 | 31,74  | 13 | 12,5 | 14,5 | 28 | 121,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 183608                |
| 327320    | 6951FP-22-22 | 62,8   | 194 | 112,0 | 25 | G1/4 | 31,74  | 13 | 12,5 | 14,5 | 28 | 121,0 | 14,5 | 27,4 | 35,5 | 35,5 | 27,4 | 71 | 85,5  | 10,7   | 35,1 | 13,0 | M16 | 12,5 | 26,5 | M10 | 19 | 183608                |
| 327338    | 6951FP-33-21 | 79,0   | 205 | 121,5 | 25 | G1/4 | 38,09  | 13 | 13,0 | 16,0 | 30 | 130,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 183608                |
| 327346    | 6951FP-33-22 | 79,0   | 205 | 121,5 | 25 | G1/4 | 38,09  | 13 | 13,0 | 16,0 | 30 | 130,5 | 18,1 | 35,1 | 44,5 | 44,5 | 35,1 | 89 | 100,0 | 13,5   | 41,4 | 12,5 | M16 | 12,5 | 32,5 | M12 | 19 | 183608                |

Subject to technical alterations.

## No. 6951N

### Swing Clamp Arm, standard



| Order no. | Article no. | A    | C    | D    | dia. E      | G    | H   | J    | K    | L       | N   | P   | R    | Weight [g] |
|-----------|-------------|------|------|------|-------------|------|-----|------|------|---------|-----|-----|------|------------|
| 69146     | 6951N-22-63 | 63,5 | 14,5 | 15,4 | 31,75 +0,05 | 43,8 | 0,5 | 12,5 | 22,5 | M16x1,5 | 25° | M12 | 25,5 | 801        |
| 60848     | 6951N-33-68 | 68,0 | 14,2 | 16,4 | 38,11 +0,05 | 44,5 | -   | 14,2 | 25,6 | M16x1,5 | 25° | M16 | 35,0 | 1134       |

#### Design:

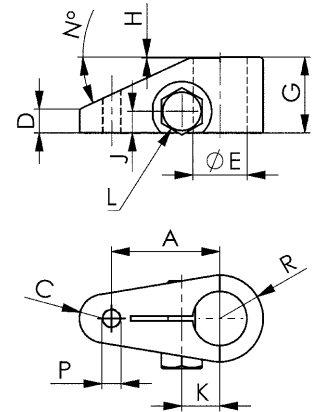
Tempered and blued steel.

#### Application:

For swing clamps  
 order no. 69146 for sizes 6951xx-22-xx, 6941KP-11-xx  
 order no. 60848 for sizes 6951xx-33-xx

#### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. Special versions available on request.



## No. 6951N

### Swing Clamp Arm, upreach



| Order no. | Article no. | A  | B  | C    | D    | dia. E      | F    | G    | H    | J    | K       | L  | M    | N    | Weight [g] |
|-----------|-------------|----|----|------|------|-------------|------|------|------|------|---------|----|------|------|------------|
| 69500     | 6951N-22-76 | 76 | 51 | 14,5 | 14,5 | 31,75 +0,05 | 70,0 | 36,5 | 13,5 | 22,5 | M16x1,5 | 38 | 44,5 | 38,0 | 1580       |
| 61879     | 6951N-33-81 | 81 | 70 | 14,3 | 14,3 | 38,11 +0,05 | 76,2 | 39,6 | 13,5 | 25,6 | M16x1,5 | 45 | 44,5 | 41,3 | 2313       |

#### Design:

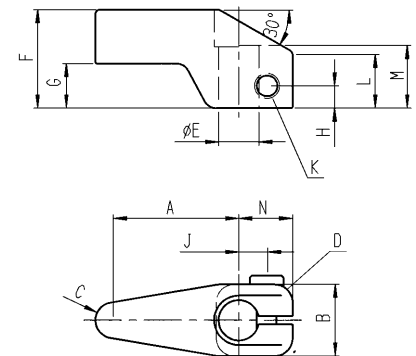
Tempered and blued steel.

#### Application:

For swing clamps  
 order no. 69500 for sizes 6951xx-22-xx, 6941KP-11-xx  
 order no. 61879 for sizes 6951xx-33-xx

#### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. Special versions available on request.



## No. 6951N

### Swing Clamp Arm, long



| Order no. | Article no.  | A     | B    | C    | D    | dia. E      | G    | J    | K    | L       | M    | N   | R    | Weight [g] |
|-----------|--------------|-------|------|------|------|-------------|------|------|------|---------|------|-----|------|------------|
| 69161     | 6951N-22-165 | 165,0 | 71,1 | 28,5 | 18,4 | 31,75 +0,05 | 43,8 | 12,5 | 22,5 | M16x1,5 | 71,1 | 25° | 25,5 | 1161       |
| 60855     | 6951N-33-180 | 180,3 | 68,3 | 30,2 | 33,8 | 38,11 +0,05 | 44,5 | 14,2 | 25,6 | M16x1,5 | 44,9 | 25° | 35,0 | 1996       |

#### Design:

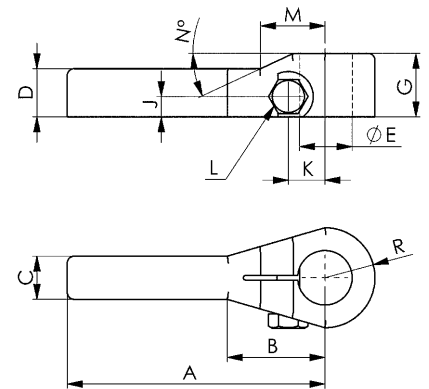
Tempered and blued steel.

#### Application:

For swing clamps  
 order no. 69161 for sizes 6951xx-22-xx, 6941KP-11-xx  
 order no. 60855 for sizes 6951xx-33-xx

#### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. Clamp arms can be shortened where necessary. Special versions available on request.



## No. 6951N

### Swing Clamp Arm, double ended



| Order no. | Article no.  | A     | 2A    | B    | C    | D    | dia. E      | G    | J    | K    | L       | N   | R    | Weight [g] |
|-----------|--------------|-------|-------|------|------|------|-------------|------|------|------|---------|-----|------|------------|
| 69526     | 6951N-22-280 | 140,0 | 280,0 | 70,5 | 28,5 | 18,4 | 31,75 +0,05 | 43,8 | 12,5 | 22,5 | M16x1,5 | 25° | 25,5 | 1869       |
| 60863     | 6951N-33-360 | 180,3 | 360,7 | 44,6 | 30,2 | 33,8 | 38,11 +0,05 | 44,5 | 14,2 | 25,6 | M16x1,5 | 25° | 35,0 | 3311       |

#### Design:

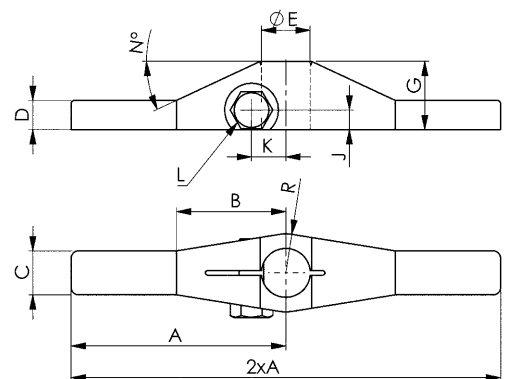
Tempered and blued steel.

#### Application:

For swing clamps  
 order no. 69526 for sizes 6951xx-22-xx, 6941KP-11-xx  
 order no. 60863 for sizes 6951xx-33-xx

#### Note:

Clamping pressure, flow volume and clamping arm weight must be observed. Clamp arms can be shortened where necessary. It is also essential that clamping or support heights in either side are identical. Special versions available on request.



Subject to technical alterations.

## No. 6951WN

### Swing Clamp arm, double-ended

pivoted



| Order no. | Article no.   | 2A  | B   | C  | D  | dia. E | F  | G  | H  | J    | dia. K | L    | M   | W max. | Weight [g] |
|-----------|---------------|-----|-----|----|----|--------|----|----|----|------|--------|------|-----|--------|------------|
| 320481    | 6951WN-22-200 | 200 | 107 | 25 | 20 | 31,8   | 35 | 10 | 55 | 57,5 | 16     | 30,5 | M8  | 6°     | 1800       |
| 320499    | 6951WN-33-250 | 250 | 125 | 33 | 22 | 38,2   | 38 | 10 | 65 | 64,5 | 20     | 36,0 | M10 | 6°     | 3100       |

#### Design:

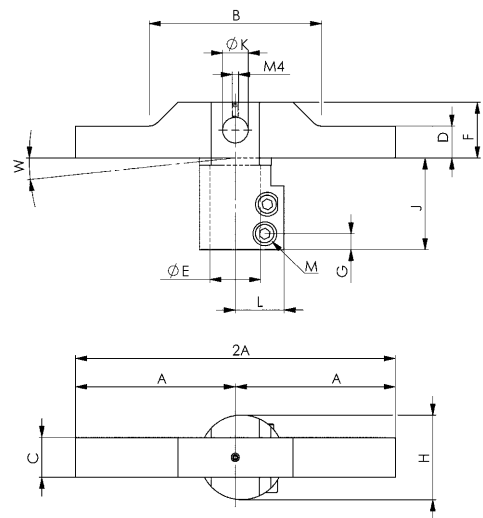
Steel, blued. Clamping arm tempered.

#### Application:

For all swing clamps  
 order no. 320481 for sizes 6951xx-22-xx  
 order no. 320499 for sizes 6951xx-33-xx  
 Used for clamping two workpieces with different heights.

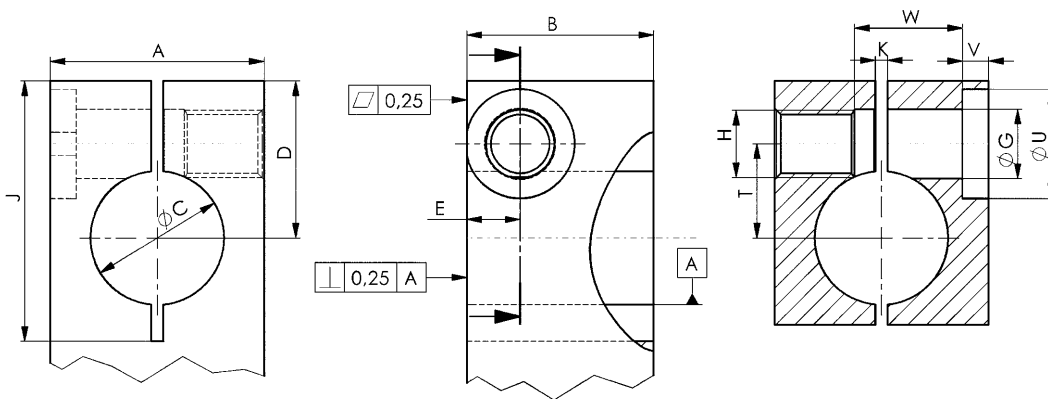
#### Note:

Clamping pressure and maximum tilt angle (W) must not be exceeded. Special versions are available on request.



## No. 6951

### Dimensions for proprietary manufacturing of clamping arms



tolerance DIN ISO 2768 m

#### Important note:

Lever lengths and lever weights must be observed!

#### Dimensions table (proprietary manufacture):

| for size | A  | B    | $\varnothing C$<br>+0,025 | D    | E    | $\varnothing G$ | H           | J  | K    | T    | U  | V   | W    |
|----------|----|------|---------------------------|------|------|-----------------|-------------|----|------|------|----|-----|------|
| -22      | 51 | 44,5 | 31,775                    | 37,4 | 12,5 | 16,5            | M16x1,50-6H | 59 | 2,93 | 22,4 | 26 | 6,2 | 25,7 |
| -33      | 70 | 44,5 | 38,138                    | 40,4 | 14,2 | 16,5            | M16x1,50-6H | 65 | 3,23 | 25,5 | 26 | 9,6 | 35,5 |

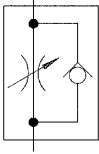
Subject to technical alterations.



## No. 6916-12

### Throttle/Check Valve

cartridge flange  
max. operating pressure 350 bar.



| Order no. | Article no. | A max. | C    | D     | dia. E | SW | Md max. [Nm] | Q max. [l/min] | G    | Weight [g] |
|-----------|-------------|--------|------|-------|--------|----|--------------|----------------|------|------------|
| 326579    | 6916-12-01  | 20,7   | 11,1 | 15,16 | 15,9   | 14 | 27           | 5,7            | G1/8 | 47         |
| 326611    | 6916-12-04  | 20,9   | 11,2 | 18,72 | 21,0   | 19 | 47           | 5,7            | G1/4 | 47         |

#### Design:

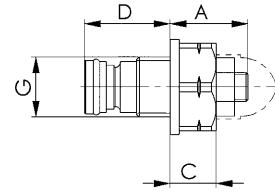
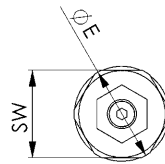
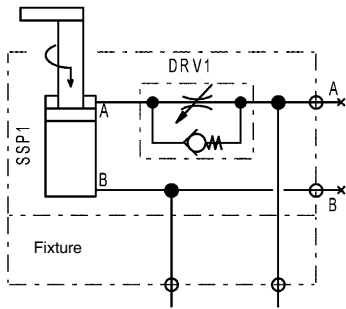
Housing made of steel, hardened and blued. Compact size.

#### Application:

For single and double-acting loads. The traversing speed can be set by controlling the flow.

#### Note:

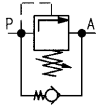
The screw-in throttle check valve is screwed into the installation bore. The upstream pressure relief valve in the hydraulic control guarantees to drain the surplus volume. The throttle check valves should preferably be used for feed control. Return flow control poses the risk of excess pressure.



## No. 6918-XX-XXX

### Sequence valve, threaded design

Max. operating pressure 350 bar.



**NEW!**



| Order no. | Article no. | Setting pressure set at factory [bar] | Setting range at A [bar] | L max. | B     | C    | dia. E | F   | G    | SW | SW1 | SW2 | Md max. [Nm] | Md 1 max. [Nm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|---------------------------------------|--------------------------|--------|-------|------|--------|-----|------|----|-----|-----|--------------|----------------|----------------|------------|
| 562224    | 6918-30-50  | 50                                    | 20 - 60                  | 28,0   | 15,16 | 20,3 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 37         |
| 562225    | 6918-30-100 | 100                                   | 35 - 150                 | 28,0   | 15,16 | 20,3 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 37         |
| 562226    | 6918-30-200 | 200                                   | 125 - 275                | 31,7   | 15,16 | 24,0 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 45         |
| 562227    | 6918-40-50  | 50                                    | 20 - 55                  | 34,5   | 18,72 | 27,4 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 68         |
| 562228    | 6918-40-100 | 100                                   | 35 - 150                 | 34,5   | 18,72 | 27,4 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 72         |
| 562229    | 6918-40-200 | 200                                   | 125 - 275                | 31,8   | 18,72 | 24,6 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 72         |

#### Design:

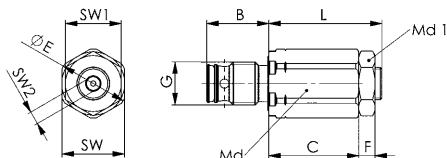
Housing from steel, hardened and burnished.

#### Application:

The sequence valve is used in cases where another consumer is connected to the circuit after a set pressure has been reached. The sequence valve ensures a controlled clamping sequence. Once a defined pressure is reached, another hydraulic circuit is opened.

#### Note:

The sequence valve can be screwed directly into the threaded connection for the swing clamp top flange and base flange types 6951KP, 6951FP, 6941KP and link clamp 6942KK. The oil must be supplied via the O-ring connection. The sequence valve can be screwed directly into fixtures as well.



## Size 02

|                             |        |       |     |      |
|-----------------------------|--------|-------|-----|------|
| Clamping arm length         | mm     | 27    | 51  | 76   |
| Max. clamping pressure      | bar    | 350   | 183 | 122  |
| Clamping force              | kN     | 2     | 0,8 | 0,44 |
| Output flow                 | l/min. | 0,165 | 0,1 | 0,1  |
| Max. clamping arm weight ** | g      | 118   |     |      |
| Spring force*               | N      | 78    |     |      |

\* single acting version

\*\* 6951 and 6952EP

## Size 05

|                             |        |     |      |      |
|-----------------------------|--------|-----|------|------|
| Clamping arm length         | mm     | 38  | 76   | 127  |
| Max. clamping pressure      | bar    | 350 | 176  | 107  |
| Clamping force              | kN     | 5   | 2,2  | 0,88 |
| Output flow                 | l/min. | 0,4 | 0,35 | 0,35 |
| Max. clamping arm weight ** | g      | 354 |      |      |
| Spring force*               | N      | 210 |      |      |

\* single acting version

\*\* 6951

## Size 11

|                             |        |      |       |     |
|-----------------------------|--------|------|-------|-----|
| Clamping arm length         | mm     | 51   | 101,5 | 152 |
| Max. clamping pressure      | bar    | 350  | 177   | 119 |
| Clamping force              | kN     | 11   | 5,1   | 3,0 |
| Output flow                 | l/min. | 1,64 | 1,3   | 1,3 |
| Max. clamping arm weight ** | g      | 807  |       |     |
| Spring force*               | N      | 696  |       |     |

\* single acting version

\*\* bei 6951

## Size 22

|                             |        |      |       |     |
|-----------------------------|--------|------|-------|-----|
| Clamping arm length         | mm     | 63,5 | 101,5 | 152 |
| Max. clamping pressure      | bar    | 350  | 192   | 138 |
| Clamping force              | kN     | 22   | 10    | 6,7 |
| Output flow                 | l/min. | 2,5  | 1,8   | 1,8 |
| Max. clamping arm weight ** | g      | 1869 |       |     |
| Spring force*               | N      | 943  |       |     |

\* single acting version

\*\* 6951

## Size 33

|                             |        |      |       |     |
|-----------------------------|--------|------|-------|-----|
| Clamping arm length         | mm     | 68   | 101,5 | 178 |
| Max. clamping pressure      | bar    | 350  | 233   | 133 |
| Clamping force              | kN     | 33,4 | 22,2  | 12  |
| Output flow                 | l/min. | 2,5  | 1,7   | 1,0 |
| Max. clamping arm weight ** | g      | 3311 |       |     |
| Spring force*               | N      | 1188 |       |     |

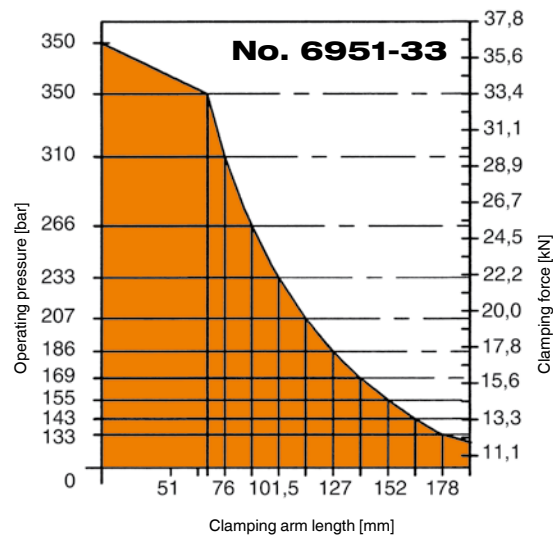
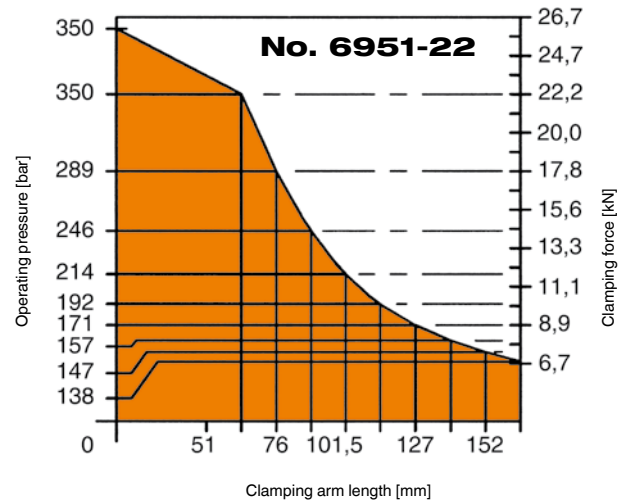
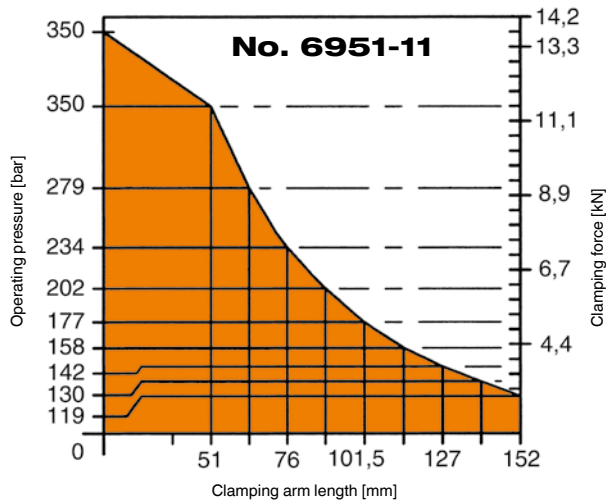
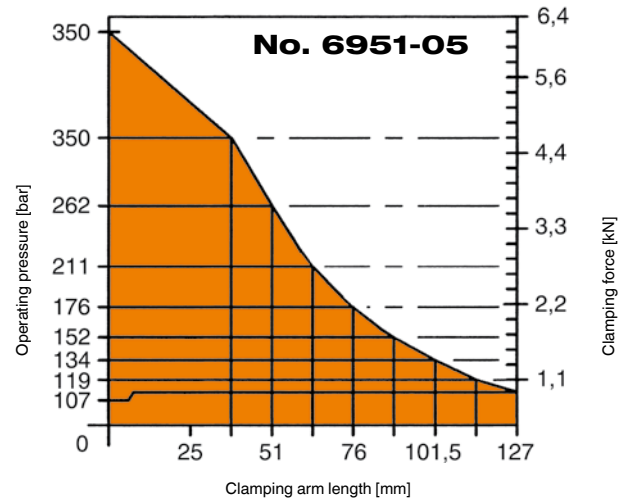
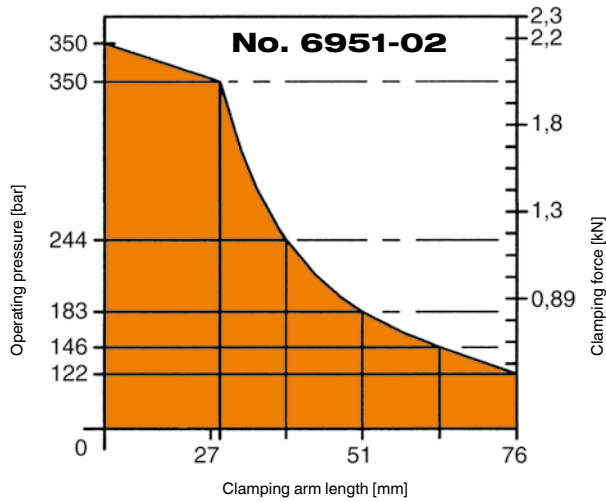
\* single acting version

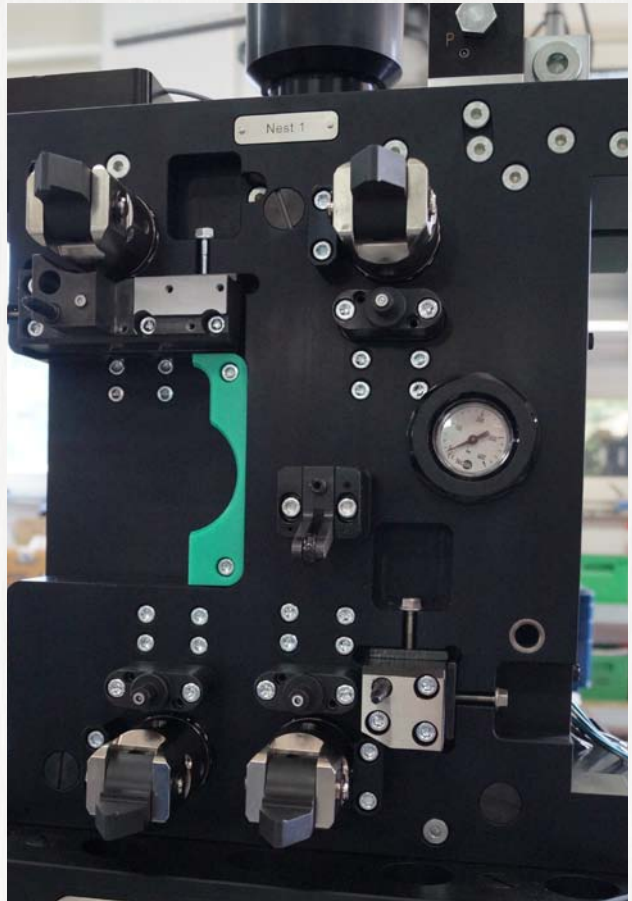
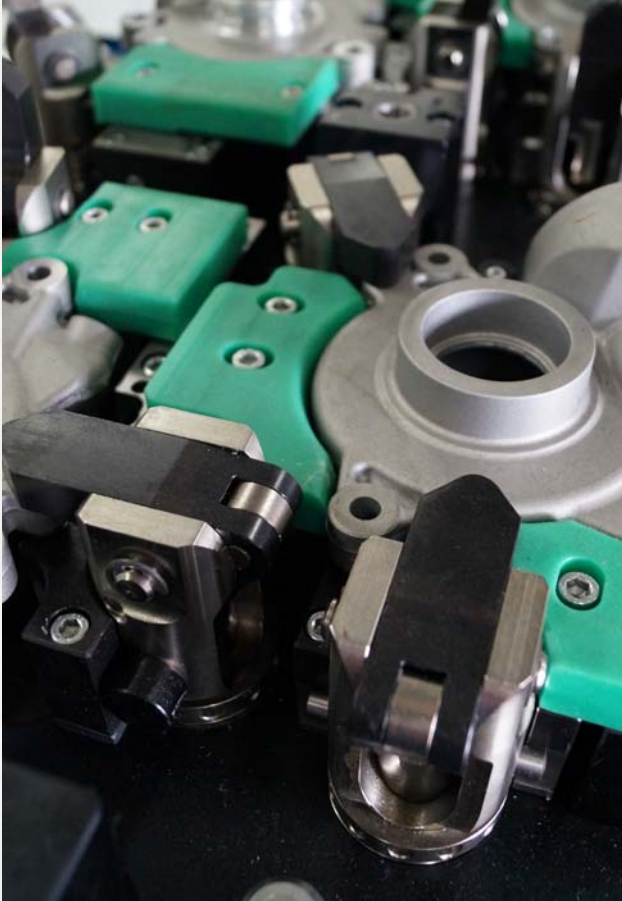
\*\* 6951

Subject to technical alterations.

## DIAGRAM DESCRIPTION:

The diagrams show the maximum operating pressure in relation to the clamping arm length and the resulting clamping force.





Subject to technical alterations.

# VERTICAL CLAMPS AND VERTICAL CLAMPS WITH LINEAR STROKE FOR DEMANDING TASKS

## VERTICAL CLAMP

- > cartridge flange
- > piston force up to 49 kN
- > operating pressure 250 bar
- > 90° aperture angle
- > oil supply via oil channel in fixture body

## VERTICAL CLAMP

- > piston force up to 20,1 kN
- > operating pressure up to 350 bar
- > oil supply via oil channel in fixture body

## VERTICAL CLAMP WITH LINEAR STROKE

- > hydraulic force up to 9,8 kN
- > operating pressure 250 bar
- > oil supply via oil channel in fixture body

### PRODUCT OVERVIEW:

| Type      | Hydraulic force,<br>piston force<br>[kN] | No. of models | Max. operating pressure<br>[bar] | Operating mode |
|-----------|--|---------------|----------------------------------|----------------|
| 6958E     | 3,1 - 19,6                               | 3             | 250                              | double acting  |
| 6958SU/ST | 7,0                                      | 1             | 350                              | single acting  |
| 6958AU/AT | 5,0 - 20,0                               | 4             | 250                              | single acting  |
| 6958DU/DT | 2,8 - 20,1                               | 5             | 250                              | double acting  |
| 6958CK    | 2,5 - 6,3                                | 1             | 250                              | double acting  |
| 6958C     | 3,1 - 9,8                                | 4             | 250                              | double acting  |

### PRODUCT EXAMPLES:

NO. 6958E



> piston force: 3,1 - 19,6 kN

NO. 6958DT



> piston force: 2,8 - 20,1 kN

NO. 6958C

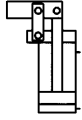


> hydraulic force: 3,1 - 9,8 kN

## No. 6958E-XX

### Vertical clamp, cartridge flange

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 15 bar



| Order no. | Article no. | Piston force F5 at 100 bar [kN] | Piston force F5 at 250 bar [kN] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | Piston dia. [mm] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|----------------------------|----------------------------|------------------|--|--|------------|
| 328013    | 6958E-20    | 3,1                             | 7,8                             | 6,6                        | 2,3                        | 20               | 3,1                                    | 1,10                                   | 350        |
| 328039    | 6958E-30    | 7,0                             | 17,5                            | 22,6                       | 7,8                        | 30               | 7,0                                    | 2,54                                   | 1100       |
| 562196    | 6958E-50    | 19,6                            | 49,0                            | 93,3                       | 37,1                       | 50               | 19,6                                   | 7,8                                    | 3850       |

Sp = clamp, Lo = unclamp

### Design:

Housing made of steel, outer surface nickel-coated, piston rod hardened. Clamp arm not included. Housing with two holes for connection of anti-twist protection. One cylinder pin for anti-rotation device is enclosed loose. Oil supply via oil channel in fixture body.

### Application:

Vertical clamp is especially suited for clamping fixtures in which oil is supplied through conduits drilled in the fixture body. Insert for clamping fixtures with limited space. Installation of the vertical clamp can be adjusted 360°.

### Features:

Large clamping force in the smallest installation space. Clamping lever opens 90°, resulting in easy loading or removal of the workpieces, manually or by robots.

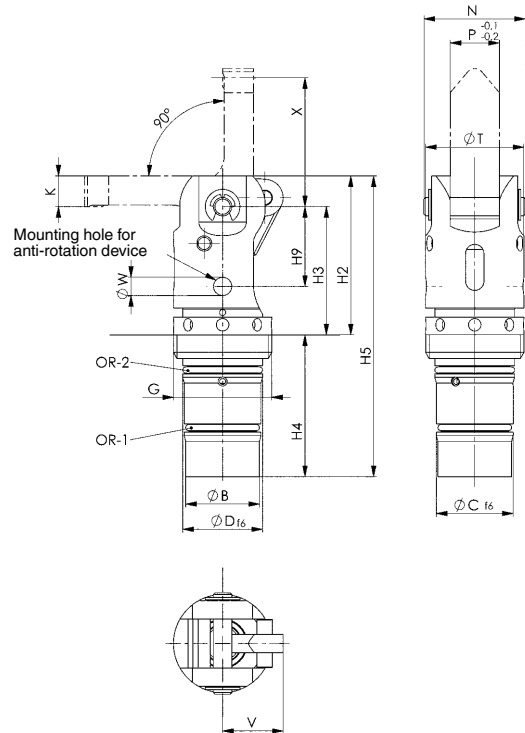
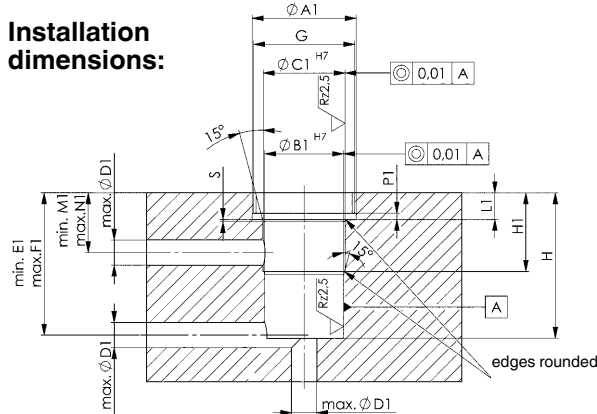
### Note:

The insertion bevels for the seals must not have any sharp transitions. Mill the thread up to the flat. Lubricate housing for mounting. For installation, use hook spanner for size 20 = order no. 54916 and for size 30 = order no. 54940 and for size 50 = order no 54973.

### On request:

Other sizes available on request.

### Installation dimensions:



### Dimensions:

| Order no. | Article no. | dia. B | dia. C | dia. D | G       | H2    | H3   | H4   | H5  | H9 | N    | P  | K  | dia. T | V     | dia. W |
|-----------|-------------|--------|--------|--------|---------|-------|------|------|-----|----|------|----|----|--------|-------|--------|
| 328013    | 6958E-20    | 24     | 25     | 26     | M32x1,5 | 51,8  | 41,8 | 46,2 | 98  | 26 | 33,0 | 22 | 10 | 32     | 19,69 | 6      |
| 328039    | 6958E-30    | 36     | 37     | 38     | M48x1,5 | 77,0  | 62,0 | 69,0 | 146 | 38 | 49,5 | 32 | 15 | 48     | 29,54 | 8      |
| 562196    | 6958E-50    | 58     | 59     | 60     | M72x2,0 | 116,0 | 93,0 | 99,0 | 215 | 57 | 73,0 | 40 | 23 | 72     | 48,43 | 12     |

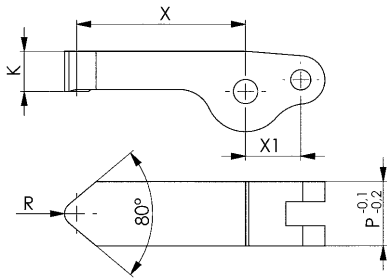
### Installation dimensions:

| Order no. | Article no. | dia. A1 | B1 H7 | dia. C1 H7 | dia. D1 | min. E1 | max. F1 | G       | H    | H1   | L1   | min. M1 | max. N1 | P1  | S   | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|---------|-------|------------|---------|---------|---------|---------|------|------|------|---------|---------|-----|-----|-----------------------|-----------------------|
| 328013    | 6958E-20    | 33      | 25    | 26         | 8       | 45,2    | 47,2    | M32x1,5 | 46,2 | 25   | 8,5  | 19,0    | 21,0    | 2,0 | 0,7 | 554575                | 554576                |
| 328039    | 6958E-30    | 49      | 37    | 38         | 10      | 68,0    | 70,0    | M48x1,5 | 69,0 | 35   | 12,0 | 27,5    | 29,5    | 2,5 | 0,6 | 554577                | 554578                |
| 562196    | 6958E-50    | 73      | 59    | 60         | 12      | 97,0    | 101,0   | M72x2,0 | 99,0 | 55,1 | 16,0 | 34,5    | 38,5    | 2,5 | 1,0 | 562535                | 562536                |

Subject to technical alterations.

## No. 6958E-XX-0X

### Clamping arm out of steel



**NEW!**  
**NEW!**  
**NEW!**

| Order no. | Article no.    | Clamping force at 100 bar [kN] | Clamping force at 250 bar [kN] | X  | X1*  | K  | P  | R | Weight [g] |
|-----------|----------------|--------------------------------|--------------------------------|----|------|----|----|---|------------|
| 328054    | 6958E-20-00-01 | 1,38                           | 3,46                           | 28 | 13,7 | 10 | 16 | 3 | 66         |
| 328070    | 6958E-20-00-02 | 1,11                           | 2,72                           | 35 | 13,7 | 10 | 16 | 3 | 74         |
| 328096    | 6958E-20-00-03 | 0,92                           | 2,30                           | 42 | 13,7 | 10 | 16 | 3 | 82         |
| 328062    | 6858E-30-00-01 | 3,19                           | 7,96                           | 41 | 20,5 | 15 | 24 | 5 | 215        |
| 328088    | 6958E-30-00-02 | 2,56                           | 6,40                           | 51 | 20,5 | 15 | 24 | 5 | 242        |
| 328104    | 6958E-30-00-03 | 2,14                           | 5,35                           | 61 | 20,5 | 15 | 24 | 5 | 270        |
| 562252    | 6958E-50-00-01 | 9,25                           | 23,13                          | 64 | 33,5 | 23 | 40 | 6 | 844        |
| 562253    | 6958E-50-00-02 | 7,50                           | 18,74                          | 79 | 33,5 | 23 | 40 | 6 | 950        |
| 562254    | 6958E-50-00-03 | 6,30                           | 15,75                          | 94 | 33,5 | 23 | 40 | 6 | 1056       |

\*X1 = Lever length at 90°

#### Design:

Case-hardening steel, case-hardened.

#### Application:

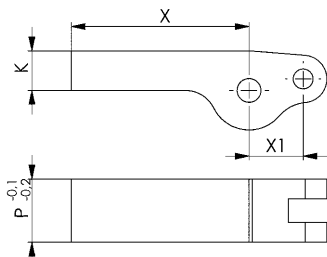
For vertical clamps 6958E.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

## No. 6958ER-XX-00

### Clamping arm blank from steel



**NEW!**

| Order no. | Article no. | X   | X1*  | K  | P  | Weight [g] |
|-----------|-------------|-----|------|----|----|------------|
| 328112    | 6958E-20-00 | 45  | 13,7 | 10 | 16 | 88         |
| 328120    | 6958E-30-00 | 66  | 20,5 | 15 | 24 | 287        |
| 562250    | 6958E-50-00 | 100 | 33,5 | 23 | 40 | 1130       |

\*X1 = Lever length at 90°

#### Design:

Case-hardened steel, unhardened.

#### Application:

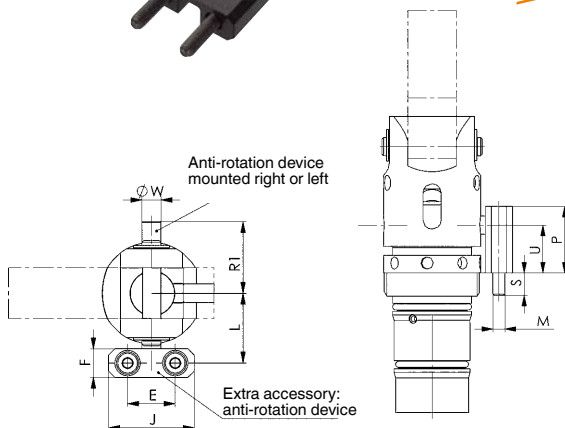
For vertical clamps 6958E.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

## No. 6958E-XX-00-00

### Anti-rotation device



**NEW!**

| Order no. | Article no.    | E  | F  | J  | L    | M  | P  | S    | U    | R1   | dia. W | Weight [g] |
|-----------|----------------|----|----|----|------|----|----|------|------|------|--------|------------|
| 328963    | 6958E-20-00-00 | 15 | 9  | 27 | 22,0 | M4 | 22 | 7    | 15,8 | 22,5 | 6      | 40         |
| 328989    | 6958E-30-00-00 | 25 | 15 | 40 | 31,5 | M6 | 32 | 10   | 24,0 | 33,0 | 8      | 145        |
| 562251    | 6958E-50-00-00 | 32 | 20 | 50 | 49,0 | M8 | 46 | 12,6 | 36,0 | 50,0 | 12     | 130        |

#### Design:

Made of aluminium, black anodised.

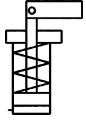


Subject to technical alterations.

## No. 6958Sx-16

### Vertical Clamp

Single-acting, with spring return, max. operating pressure 350 bar, min. operating pressure 40 bar.



| Order no. | Article no. | Piston force at 100 bar [kN] | Piston force at 350 bar [kN] | Vol. [cm <sup>3</sup> ] | Piston dia. [mm] | Piston area [cm <sup>2</sup> ] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|------------------------------|------------------------------|-------------------------|------------------|--------------------------------|-----------------------|------------|
| 322248    | 6958SU-16   | 2,0                          | 7,0                          | 1,9                     | 16               | 2                              | 334821                | 280        |
| 322255    | 6958ST-16   | 2,0                          | 7,0                          | 1,9                     | 16               | 2                              | 334821                | 290        |

### Design:

Cylinder body from steel, burnished. Piston rod nitrided. Wiper at piston rod. Built-in return spring. Supply scope includes clamping lever pin, but not clamping lever. Oil supply via oil channel in fixture body.

### Application:

This vertical clamp can be used for clamping in cavities or in very tight spaces.

### Features:

Small dimensions, can be installed closely spaced side-by-side. The clamping levers can be exchanged easily in the installed position.

### Note:

Screws according to ISO4762 M6, strength class 12.9, lightly oiled, tightening torque  $M_d = 18 \text{ Nm}$  not supplied as standard.

During unclamping, the vertical clamp allows a **max. dynamic pressure of 3 bar**, which must be strictly taken into account when using control valves.

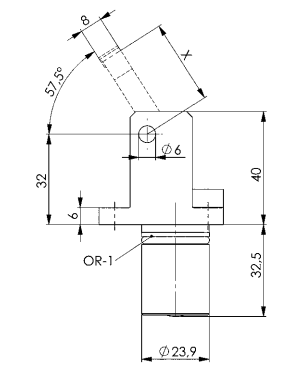


322248

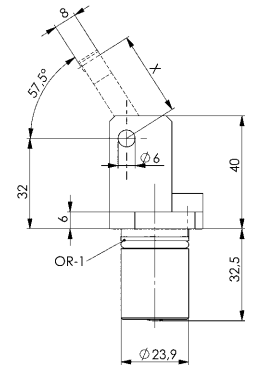


322255

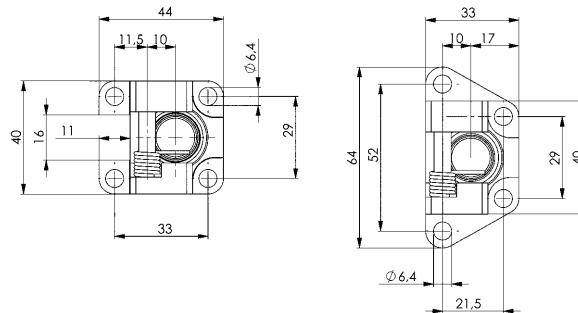
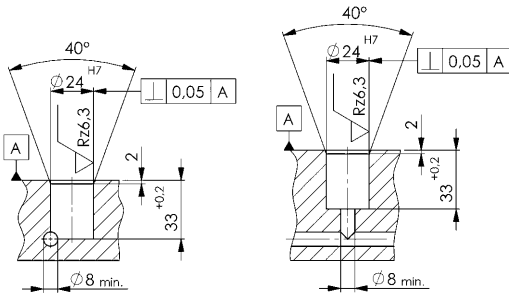
322248



322255



### Installation dimensions:



CAD

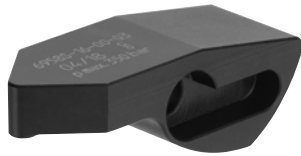


Subject to technical alterations.



## No. 6958S-16

### Clamping arm out of steel



| Order no. | Article no.      | X  | X1* | Clamping force at 100 bar [kN] | Clamping force at 250 bar [kN] | Clamping force at 350 bar [kN] | Weight [g] |
|-----------|------------------|----|-----|--------------------------------|--------------------------------|--------------------------------|------------|
| 320218    | 6958S-16-00-01   | 12 | 12  | 2,0                            | 5,0                            | 7,0                            | 52         |
| 320234    | 6958S-16-00-02   | 18 | 12  | 1,3                            | 3,3                            | 4,6                            | 60         |
| 320259    | 6958S-16-00-03   | 24 | 12  | 1,0                            | 2,5                            | 3,5                            | 66         |
| 320275    | 6958S-16-00-04   | 30 | 12  | 0,8                            | 2,0                            | 2,8                            | 72         |
| 322438    | 6958S-16-00-05** | -  | 12  | -                              | -                              | -                              | 74         |

\* X1 = level length at 90°

\*\*Clamp arm blank, unhardened

#### Design:

Case-hardening steel, case-hardened.

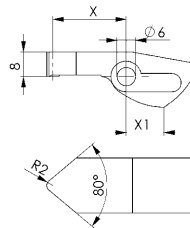
#### Application:

For vertical clamp 6958SU-16 and 6958ST-16.

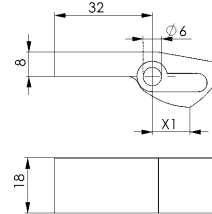
#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

Clamping arm



Clamping arm blank



## No. 6958A-16

### Clamping arm out of aluminium



| Order no. | Article no.      | X  | X1* | Clamping force at 100 bar [kN] | Weight [g] |
|-----------|------------------|----|-----|--------------------------------|------------|
| 320242    | 6958A-16-00-02   | 18 | 12  | 1,3                            | 21         |
| 320267    | 6958A-16-00-03   | 24 | 12  | 1,0                            | 23         |
| 320283    | 6958A-16-00-04   | 30 | 12  | 0,8                            | 25         |
| 322453    | 6958A-16-00-05** | -  | 12  | -                              | 26         |

\* X1 = level length at 90°

\*\* Clamp arm blank

#### Design:

Aluminium.

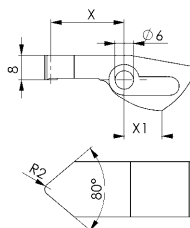
#### Application:

For vertical clamp 6958SU-16 and 6958ST-16.

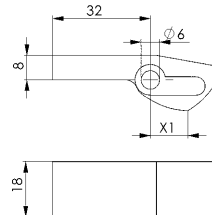
#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed. Max. operating pressure 100 bar.

Clamping arm



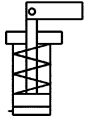
Clamping arm blank



## No. 6958AU

### Vertical Clamp

Single-acting, with spring return,  
max. operating pressure 250 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | Piston force at 100 bar [kN] | Piston force at 250 bar [kN] | Vol. [cm <sup>3</sup> ] | Piston dia. [mm] | effective piston area [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|------------------------------|------------------------------|-------------------------|------------------|--|--------------|------------|
| 322404    | 6958AU-16   | 2                            | 5                            | 1,9                     | 16               | 2,0                                      | 18           | 220        |
| 322446    | 6958AU-20   | 3                            | 8                            | 4,0                     | 20               | 3,1                                      | 43           | 357        |
| 322487    | 6958AU-25   | 4                            | 12                           | 6,7                     | 25               | 4,9                                      | 84           | 576        |
| 322529    | 6958AU-32   | 8                            | 20                           | 14,4                    | 32               | 8,0                                      | 145          | 926        |

### Design:

Cylinder body from steel, chemically nickel-plated. Piston rod nitrided. Wiper at piston rod. Built-in return spring. Supply scope includes clamping lever pin, but not clamping lever. Oil supply via oil channel in fixture body.

### Application:

This vertical clamp can be used for clamping in cavities or in very tight spaces.

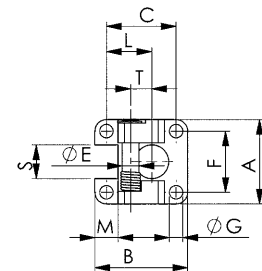
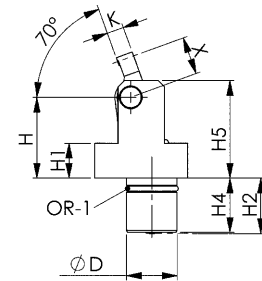
### Features:

Small dimensions, can be installed closely spaced side-by-side. The clamping levers can be exchanged easily in the installed position.

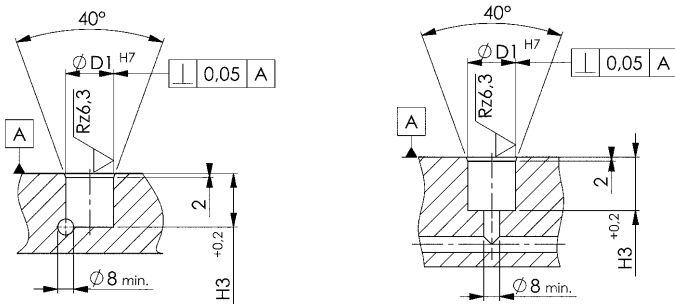
### Note:

Screws according to ISO 4762, strength class 12.9, lightly oiled, are not supplied as standard.

During unclamping, the vertical clamp allows a **max. dynamic pressure of 3 bar**, which must be strictly taken into account when using control valves. Important: Please note the cross-section of the supply line.



### Installation dimensions:



### Dimensions:

| Order no. | Article no. | A  | B  | C  | dia. D | dia. D1 H7 | L    | F  | dia. G | H    | H1   | H2   | H3   | H4   | H5   | T  | M  | dia. E | S  | K  | OR-1 O-ring Order No. |
|-----------|-------------|----|----|----|--------|------------|------|----|--------|------|------|------|------|------|------|----|----|--------|----|----|-----------------------|
| 322404    | 6958AU-16   | 40 | 44 | 33 | 24     | 24         | 21,5 | 29 | 6,4    | 38,3 | 16,5 | 26,3 | 26,8 | 25,8 | 46,3 | 10 | 11 | 8      | 16 | 8  | 195347                |
| 322446    | 6958AU-20   | 46 | 53 | 40 | 30     | 30         | 26,0 | 33 | 8,5    | 49,0 | 20,3 | 32,7 | 34,0 | -    | 59,0 | 11 | 13 | 10     | 20 | 10 | 195842                |
| 322487    | 6958AU-25   | 55 | 67 | 51 | 35     | 35         | 32,0 | 39 | 10,5   | 51,0 | 21,2 | 34,6 | 37,0 | -    | 62,0 | 13 | 16 | 12     | 23 | 11 | 195909                |
| 322529    | 6958AU-32   | 66 | 76 | 58 | 42     | 42         | 36,0 | 48 | 12,5   | 60,0 | 24,1 | 56,7 | 59,5 | -    | 76,0 | 15 | 18 | 15     | 30 | 16 | 195925                |

Dimension X, see clamping lever

Subject to technical alterations.

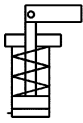
## No. 6958AT

### Vertical Clamp

Single-acting, with spring return,  
max. operating pressure 250 bar,  
min. operating pressure 40 bar.



CAD



| Order no. | Article no. | Piston force at 100 bar [kN] | Piston force at 250 bar [kN] | Vol. [cm³] | Piston dia. [mm] | effective piston area [cm²] | Md max. [Nm] | Weight [g] |
|-----------|-------------|------------------------------|------------------------------|------------|------------------|-----------------------------|--------------|------------|
| 322420    | 6958AT-16   | 2                            | 5                            | 1,9        | 16               | 2,0                         | 18           | 237        |
| 322461    | 6958AT-20   | 3                            | 8                            | 4,0        | 20               | 3,1                         | 43           | 392        |
| 322503    | 6958AT-25   | 4                            | 12                           | 6,7        | 25               | 4,9                         | 84           | 640        |
| 322545    | 6958AT-32   | 8                            | 20                           | 14,4       | 32               | 8,0                         | 145          | 1014       |

### Design:

Cylinder body made of steel, chemically nickel-plated. Piston rod nitrided. Wiper at piston rod. Built-in return spring. Scope of supply includes clamp arm pin, but clamp arm not included.

### Application:

This vertical clamp can be used for clamping in cavities or in very tight spaces.

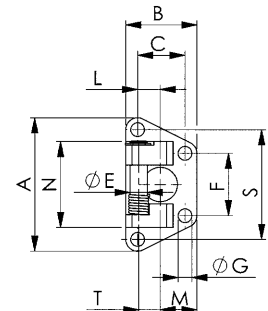
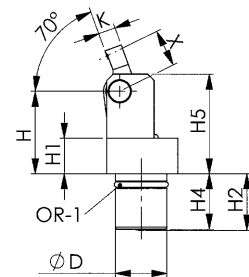
### Features:

Small dimensions, can be installed closely spaced side-by-side. The clamping arms can be exchanged easily in the installed position.

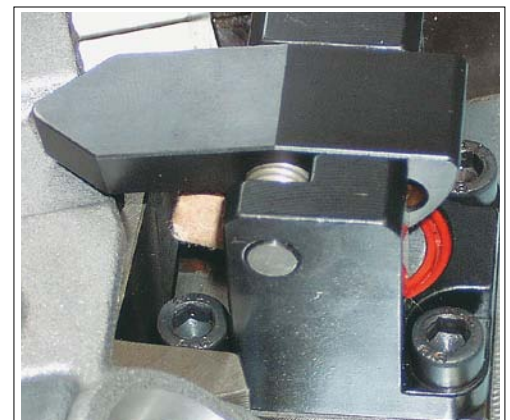
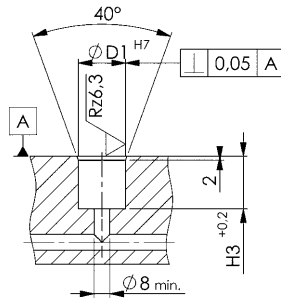
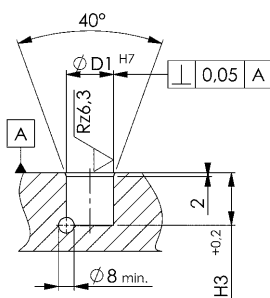
### Note:

Screws according to ISO 4762, strength class 12.9, lightly oiled, are not supplied as standard.

During unclamping, the vertical clamp allows a **max. dynamic pressure of 3 bar**, which must be strictly taken into account when using control valves. Important: Please note the cross-section of the supply line.



### Installation dimensions:



### Dimensions:

| Order no. | Article no. | A   | B  | C  | dia. D | dia. D1 H7 | L    | F  | dia. G | H    | H1   | H2   | H3   | H4   | H5   | T  | M    | N  | dia. E | S  | K  | OR-1 O-ring Order No. |
|-----------|-------------|-----|----|----|--------|------------|------|----|--------|------|------|------|------|------|------|----|------|----|--------|----|----|-----------------------|
| 322420    | 6958AT-16   | 62  | 33 | 22 | 24     | 24         | 10,5 | 29 | 6,4    | 38,3 | 16,5 | 26,3 | 26,8 | 25,8 | 46,3 | 10 | 17,0 | 40 | 8      | 51 | 8  | 195347                |
| 322461    | 6958AT-20   | 72  | 40 | 27 | 30     | 30         | 13,0 | 33 | 8,5    | 49,0 | 20,3 | 32,7 | 34,0 | -    | 59,0 | 11 | 20,5 | 46 | 10     | 59 | 10 | 195842                |
| 322503    | 6958AT-25   | 87  | 51 | 35 | 35     | 35         | 16,0 | 39 | 10,5   | 51,0 | 21,2 | 34,6 | 37,0 | -    | 62,0 | 13 | 27,0 | 55 | 12     | 71 | 11 | 195909                |
| 322545    | 6958AT-32   | 102 | 58 | 40 | 42     | 42         | 18,0 | 48 | 12,5   | 60,0 | 24,1 | 56,7 | 59,5 | -    | 76,0 | 15 | 31,0 | 66 | 15     | 84 | 16 | 195925                |

Dimension X, see clamping lever

Subject to technical alterations.

## No. 6958S

### Clamping arm out of steel



| Order no. | Article no.    | dia. E | R | K  | P  | X  | X1* | Clamping force at 100 bar [kN] | Clamping force at 250 bar [kN] | Weight [g] |
|-----------|----------------|--------|---|----|----|----|-----|--------------------------------|--------------------------------|------------|
| 324186    | 6958S-16-01-02 | 8      | 2 | 8  | 18 | 18 | 12  | 1,3                            | 3,3                            | 60         |
| 324178    | 6958S-16-01-03 | 8      | 2 | 8  | 18 | 24 | 12  | 1,0                            | 2,5                            | 66         |
| 324194    | 6958S-16-01-04 | 8      | 2 | 8  | 18 | 30 | 12  | 0,8                            | 2,0                            | 72         |
| 322495    | 6958S-20-00-02 | 10     | 2 | 10 | 22 | 18 | 12  | 2,0                            | 5,2                            | 114        |
| 322511    | 6958S-20-00-03 | 10     | 2 | 10 | 22 | 24 | 12  | 1,5                            | 3,9                            | 125        |
| 322537    | 6958S-20-00-04 | 10     | 2 | 10 | 22 | 30 | 12  | 1,2                            | 3,1                            | 135        |
| 322693    | 6958S-25-00-02 | 12     | 4 | 11 | 27 | 24 | 16  | 2,6                            | 8,2                            | 171        |
| 322719    | 6958S-25-00-03 | 12     | 4 | 11 | 27 | 32 | 16  | 2,0                            | 6,1                            | 191        |
| 322735    | 6958S-25-00-04 | 12     | 4 | 11 | 27 | 40 | 16  | 1,6                            | 4,9                            | 211        |
| 322891    | 6958S-32-00-02 | 15     | 4 | 16 | 34 | 30 | 20  | 5,3                            | 13,3                           | 375        |
| 322917    | 6958S-32-00-03 | 15     | 4 | 16 | 34 | 40 | 20  | 4,0                            | 10,0                           | 417        |
| 322933    | 6958S-32-00-04 | 15     | 4 | 16 | 34 | 50 | 20  | 3,2                            | 8,0                            | 457        |

\* X1 = level length at 90°

#### Design:

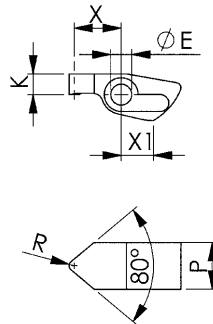
Case-hardening steel, case-hardened.

#### Application:

For vertical clamp 6958AU and 6958AT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

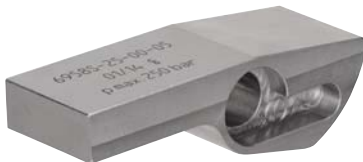


CAD



## No. 6958S

### Clamping arm blank from steel



| Order no. | Article no.    | dia. E | R | K  | P  | X  | X1* | Weight [g] |
|-----------|----------------|--------|---|----|----|----|-----|------------|
| 324418    | 6958S-16-01-05 | 8      | 2 | 8  | 18 | 32 | 12  | 74         |
| 322552    | 6958S-20-00-05 | 10     | 2 | 10 | 22 | 32 | 12  | 141        |
| 322750    | 6958S-25-00-05 | 12     | 4 | 11 | 27 | 44 | 16  | 217        |
| 322958    | 6958S-32-00-05 | 15     | 4 | 16 | 34 | 54 | 20  | 476        |

\* X1 = level length at 90°

#### Design:

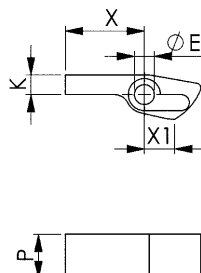
Case-hardened steel, unhardened.

#### Application:

For vertical clamp 6958AU and 6958AT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



CAD



Subject to technical alterations.

## No. 6958A

### Clamping arm out of aluminium



| Order no. | Article no.    | dia. E | R | K  | P  | X  | X1* | Clamping force at 100 bar [kN] | Weight [g] |
|-----------|----------------|--------|---|----|----|----|-----|--------------------------------|------------|
| 324434    | 6958A-16-01-02 | 8      | 2 | 8  | 18 | 18 | 12  | 1,3                            | 21         |
| 324459    | 6958A-16-01-03 | 8      | 2 | 8  | 18 | 24 | 12  | 1,0                            | 23         |
| 324475    | 6958A-16-01-04 | 8      | 2 | 8  | 18 | 30 | 12  | 0,8                            | 25         |
| 322594    | 6958A-20-00-02 | 10     | 2 | 10 | 22 | 18 | 12  | 2,0                            | 40         |
| 322610    | 6958A-20-00-03 | 10     | 2 | 10 | 22 | 24 | 12  | 1,5                            | 43         |
| 322636    | 6958A-20-00-04 | 10     | 2 | 10 | 22 | 30 | 12  | 1,2                            | 47         |
| 322792    | 6958A-25-00-02 | 12     | 4 | 11 | 27 | 24 | 16  | 2,6                            | 59         |
| 322818    | 6958A-25-00-03 | 12     | 4 | 11 | 27 | 32 | 16  | 2,0                            | 66         |
| 322834    | 6958A-25-00-04 | 12     | 4 | 11 | 27 | 40 | 16  | 1,6                            | 73         |
| 322990    | 6958A-32-00-02 | 15     | 4 | 16 | 34 | 30 | 20  | 5,3                            | 130        |
| 323014    | 6958A-32-00-03 | 15     | 4 | 16 | 34 | 40 | 20  | 4,0                            | 144        |
| 323030    | 6958A-32-00-04 | 15     | 4 | 16 | 34 | 50 | 20  | 3,2                            | 158        |

\* X1 = level length at 90°

#### Design:

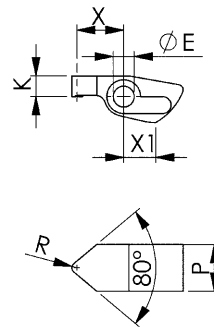
Aluminium.

#### Application:

For vertical clamp 6958AU and 6958AT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed. Max. operating pressure 100 bar.



## No. 6958A

### Clamping arm blank from aluminium



| Order no. | Article no.    | dia. E | K  | P  | X  | X1* | Weight [g] |
|-----------|----------------|--------|----|----|----|-----|------------|
| 324483    | 6958A-16-01-05 | 8      | 8  | 18 | 32 | 12  | 26         |
| 322651    | 6958A-20-00-05 | 10     | 10 | 22 | 32 | 12  | 49         |
| 322859    | 6958A-25-00-05 | 12     | 11 | 27 | 44 | 16  | 75         |
| 323055    | 6958A-32-00-05 | 15     | 16 | 34 | 54 | 20  | 165        |

\* X1 = level length at 90°

#### Design:

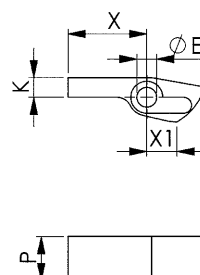
Aluminium.

#### Application:

For vertical clamp 6958AU and 6958AT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed. Max. operating pressure 100 bar.



## No. 6958AU

### Surface-mounted block

with O-ring connection and threaded connection



| Order no. | Article no.     | A  | A1 | B  | B1 | C    | C1   | dia. D1 | L  | OR-1 O-ring Order No. | Weight [g] |
|-----------|-----------------|----|----|----|----|------|------|---------|----|-----------------------|------------|
| 322560    | 6958AU-16-10-01 | 40 | 29 | 44 | 33 | 17,0 | 11,5 | 6,5     | 50 | 321646                | 145        |
| 322586    | 6958AU-20-10-01 | 46 | 33 | 53 | 40 | 20,5 | 14,0 | 8,5     | 57 | 321646                | 229        |
| 322602    | 6958AU-25-10-01 | 55 | 39 | 67 | 51 | 27,0 | 19,0 | 10,5    | 60 | 321646                | 379        |
| 322628    | 6958AU-32-10-01 | 66 | 48 | 76 | 58 | 31,0 | 22,0 | 12,5    | 82 | 321646                | 653        |

#### Design:

Made of aluminium, red anodised.

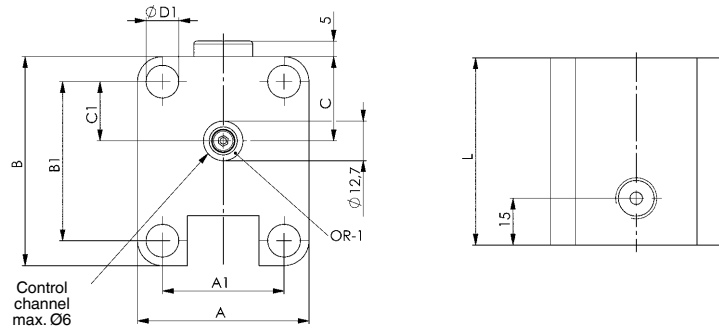
Supply scope includes O-ring dia.9x2, threaded plugs and fastening screws.

#### Application:

The surface-mounted block with O-ring connection from below and threaded connection can be flanged into the fixture as an adapter over the control channel without restriction for the cylindrical part of the vertical clamp or where the control oil supply to the vertical clamp has to be routed via external lines.

#### Note:

The flange surface on the fixture must be even, and must have a surface finish of Rz 6.3 in the area of the O-ring sealing surface. Other lengths are available on request.



CAD



## No. 6958AT

### Surface-mounted block

with O-ring connection and threaded connection



| Order no. | Article no.     | A   | A1 | A2 | B  | B1 | C    | C1   | dia. D1 | L  | OR-1 O-ring Order No. | Weight [g] |
|-----------|-----------------|-----|----|----|----|----|------|------|---------|----|-----------------------|------------|
| 323089    | 6958AT-16-10-01 | 62  | 29 | 51 | 33 | 22 | 17,0 | 11,5 | 6,5     | 50 | 321646                | 161        |
| 323105    | 6958AT-20-10-01 | 72  | 33 | 59 | 40 | 27 | 20,5 | 14,0 | 8,5     | 57 | 321646                | 263        |
| 323121    | 6958AT-25-10-01 | 87  | 39 | 71 | 51 | 35 | 27,0 | 19,0 | 10,5    | 60 | 321646                | 437        |
| 323147    | 6958AT-32-10-01 | 102 | 48 | 84 | 58 | 40 | 31,0 | 22,0 | 12,5    | 82 | 321646                | 756        |

#### Design:

Made of aluminium, red anodised.

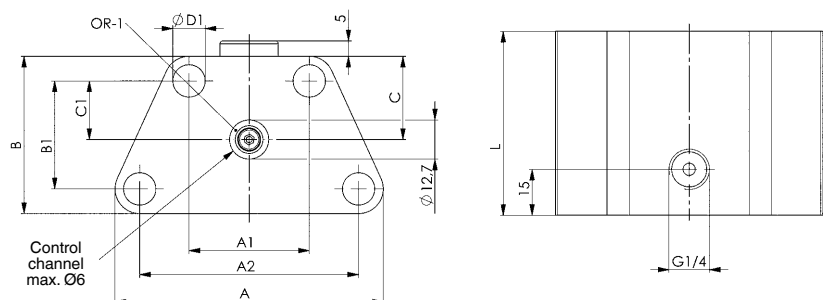
Supply scope includes O-ring dia.9x2, threaded plugs and fastening screws.

#### Application:

The surface-mounted block with O-ring connection from below and threaded connection can be flanged into the fixture as an adapter over the control channel without restriction for the cylindrical part of the vertical clamp or where the control oil supply to the vertical clamp has to be routed via external lines

#### Note:

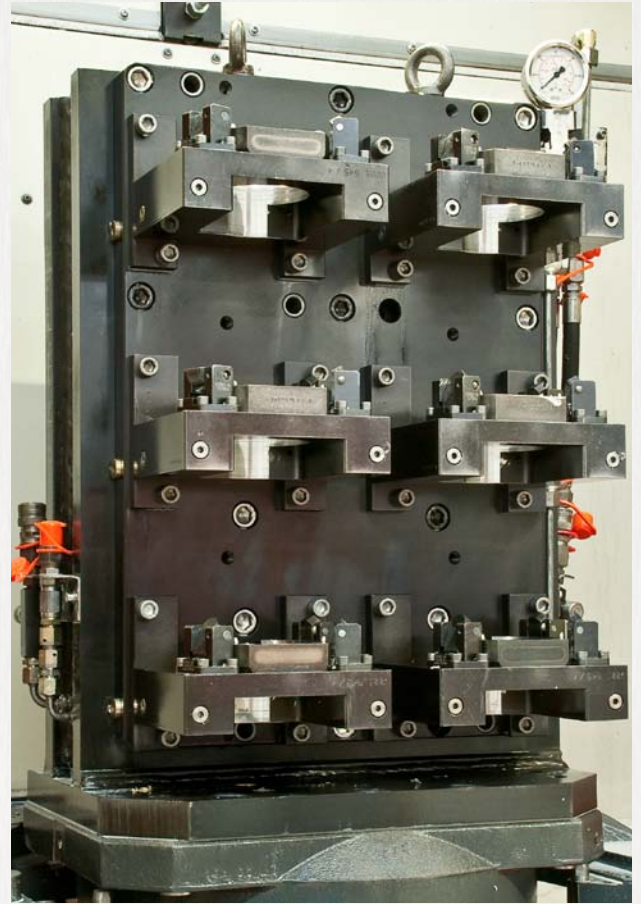
The flange surface on the fixture must be even, and must have a surface finish of Rz 6.3 in the area of the O-ring sealing surface. Other lengths are available on request.



CAD



Subject to technical alterations.

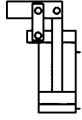


Subject to technical alterations.

## No. 6958DU

### Vertical Clamp

Double-acting,  
max. working pressure 250 bar,  
min. operating pressure 25 bar.



| Order no. | Article no. | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 250 bar [kN] | Piston force F5 at 100 bar [kN] | Piston force F5 at 250 bar [kN] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-----------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------------------|----------------------------|--|--|--------------|------------|
| 326272    | 6958DU-16   | 1,3                               | 3,3                               | 2,0                             | 5,0                             | 2,0                        | 1,2                        | 2,0                                    | 1,2                                    | 7,5          | 334        |
| 326314    | 6958DU-20   | 2,1                               | 5,2                               | 3,1                             | 7,8                             | 3,8                        | 2,4                        | 3,1                                    | 2,0                                    | 15,0         | 624        |
| 326371    | 6958DU-25   | 3,2                               | 8,2                               | 4,9                             | 12,2                            | 6,9                        | 4,1                        | 4,9                                    | 2,9                                    | 27,0         | 906        |
| 327536    | 6958DU-32   | 5,3                               | 13,4                              | 8,0                             | 20,1                            | 13,7                       | 8,3                        | 8,0                                    | 4,9                                    | 47,0         | 1920       |

Sp = clamp, Lo = unclamp

### Design:

Hydraulic cylinder as a drop-in cartridge. Top mounting with four cylinder screws (resistance min. 10.9); these are supplied as standard. All components are made of hardened steel, tempered and burnished. Piston and pivot bolts are made from tempered steel, hardened and nitrided. Metal wiper to protect the dirt wiper is integrated into the housing. Compressed air nozzle for pneumatic clamping control. Pivot bolts, tensioning straps and compressed air nozzle are supplied as standard, but not clamping arms. Oil supply via oil channel in fixture body.

### Application:

The double-acting vertical clamp is highly suited to clamping in clamping pockets. For clearly defined return movements.

### Features:

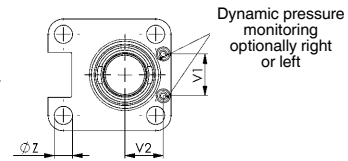
Small dimensions. Allows close side-by-side positioning. Clamping levers easy to change with built-in vertical clamp. The horizontal centre axis at the clamping lever and the pressure point on the workpiece lie in one plane. This prevents relative movement on the workpiece. To protect the O-rings sitting radially on the clamp, the cross channels at the installation hole must be rotated freely and equipped with insertion lead-ins. If the vertical clamp is closed, the compressed air that previously streamed out freely is blocked in the compressed air nozzle. The resulting back pressure can be used for clamping control with the help of a signal converter.

### Note:

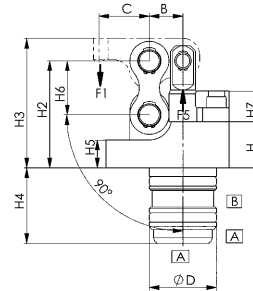
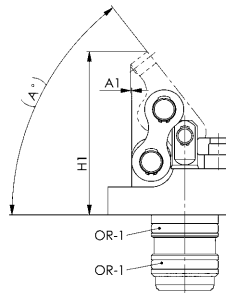
The signal converter is not included in the supply scope.

The lever ratio B to C is 1 to 1.5 for the standard levers!

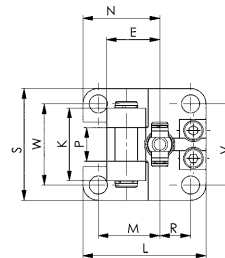
In preparing the blank levers, deviations that cause a higher clamping force are permitted only in exceptional cases.



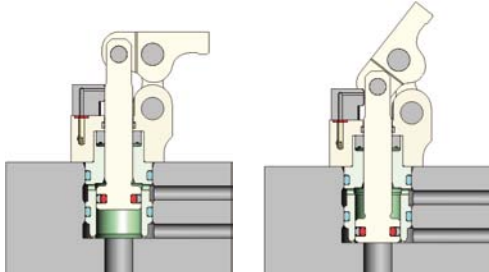
Dynamic pressure monitoring optionally right or left



A = clamp  
B = unclamp



### Dynamic pressure monitoring:



closed: clamped

open: unclamped

### Dimensions:

| Order no. | Article no. | A    | A1   | B  | C    | E    | dia. D | H    | H1   | H2   | H3   | H4   | H5 | H6   | H7 | K  | L  | M  | N    | P  | R  | S  | V  | V1 | V2   | W  | ØZ   | OR-1 O-ring Order No. |
|-----------|-------------|------|------|----|------|------|--------|------|------|------|------|------|----|------|----|----|----|----|------|----|----|----|----|----|------|----|------|-----------------------|
| 326272    | 6958DU-16   | 51,9 | 0,40 | 12 | 18,0 | 19,0 | 24     | 16,5 | 58,4 | 38,3 | 46,3 | 27,0 | 10 | 19,3 | 11 | 26 | 44 | 22 | 27,5 | 12 | 11 | 40 | 29 | 15 | 13,7 | 29 | 6,5  | 497461                |
| 326314    | 6958DU-20   | 54,0 | 1,25 | 14 | 21,0 | 23,0 | 30     | 20,3 | 73,2 | 49,0 | 59,0 | 34,0 | 10 | 25,0 | 16 | 32 | 53 | 26 | 32,5 | 16 | 14 | 46 | 33 | 15 | 17,5 | 33 | 8,5  | 490342                |
| 326371    | 6958DU-25   | 51,2 | 0,70 | 17 | 25,5 | 27,5 | 35     | 21,0 | 79,4 | 51,0 | 62,0 | 37,0 | 10 | 27,0 | 16 | 39 | 67 | 32 | 40,0 | 20 | 19 | 55 | 39 | 15 | 21,0 | 39 | 10,5 | 321018                |
| 327536    | 6958DU-32   | 53,4 | -1,0 | 20 | 30,0 | 33,0 | 42     | 24,0 | 97,1 | 63,0 | 76,0 | 59,5 | 11 | 35,0 | 18 | 50 | 76 | 36 | 45,0 | 26 | 22 | 66 | 48 | 15 | 24,0 | 48 | 12,5 | 409748                |

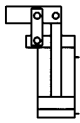
Subject to technical alterations.



## No. 6958DT

### Vertical Clamp

Double-acting,  
max. working pressure 250 bar,  
min. operating pressure 25 bar.



| Order no. | Article no. | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 250 bar [kN] | Piston force F5 at 100 bar [kN] | Piston force F5 at 250 bar [kN] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-----------------------------------|-----------------------------------|---------------------------------|---------------------------------|----------------------------|----------------------------|--|--|--------------|------------|
| 553427    | 6958DT-12   | 0,7                               | 1,8                               | 1,1                             | 2,8                             | 0,9                        | 0,5                        | 1,1                                    | 0,6                                    | 2,7          | 175        |
| 326231    | 6958DT-16   | 1,3                               | 3,3                               | 2,0                             | 5,0                             | 2,0                        | 1,2                        | 2,0                                    | 1,2                                    | 7,5          | 365        |
| 326298    | 6958DT-20   | 2,1                               | 5,2                               | 3,1                             | 7,8                             | 3,8                        | 2,4                        | 3,1                                    | 2,0                                    | 15,0         | 386        |
| 326397    | 6958DT-25   | 3,2                               | 8,2                               | 4,9                             | 12,2                            | 6,9                        | 4,1                        | 4,9                                    | 2,9                                    | 27,0         | 1015       |
| 327510    | 6958DT-32   | 5,3                               | 13,4                              | 8,0                             | 20,1                            | 13,7                       | 8,3                        | 8,0                                    | 4,9                                    | 47,0         | 1970       |

Sp = clamp, Lo = unclamp

### Design:

Hydraulic cylinder as a drop-in cartridge. Top mounting with four cylinder screws (resistance min. 10.9); these are supplied as standard. All components are made from hardened, tempered and burnished steel. Piston and pivot bolts are made from tempered steel, hardened and nitrided. Metal wiper to protect the dirt wiper is integrated into the housing. Compressed air nozzle for pneumatic clamping control. Pivot bolts, tensioning straps and compressed air nozzle are supplied as standard, but not clamping arms. Oil supply via oil channel in fixture body.

### Application:

The double-acting vertical clamp is highly suited to clamping in clamping pockets. For clearly defined return movements.

### Features:

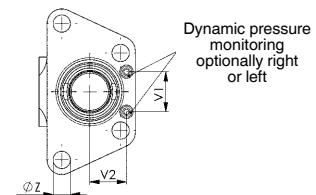
Small dimensions. Allows close side-by-side positioning. Clamping levers easy to change with built-in vertical clamp. The horizontal centre axis at the clamping lever and the pressure point on the workpiece lie in one plane. This prevents relative movement on the workpiece. To protect the O-rings sitting radially on the clamp, the cross channels at the installation hole must be rotated freely and equipped with insertion lead-ins. If the vertical clamp is closed, the compressed air that previously streamed out freely is blocked in the compressed air nozzle. The resulting back pressure can be used for clamping control with the help of a signal converter.

### Note:

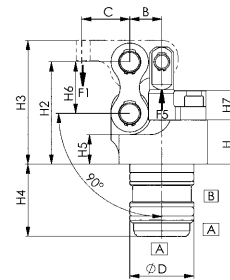
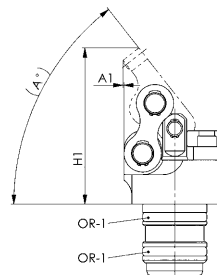
The signal converter is not included in the supply scope.

The lever ratio B to C is 1 to 1.5 for the standard levers!

In preparing the blank levers, deviations that cause a higher clamping force are permitted only in exceptional cases.

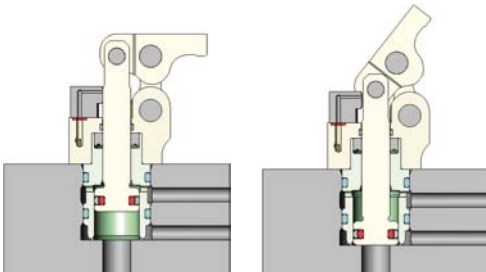


Dynamic pressure monitoring optionally right or left



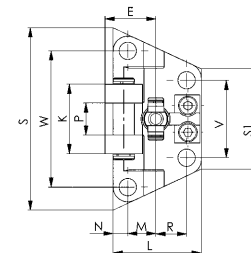
A = clamp  
B = unclamp

### Dynamic pressure monitoring:



closed: clamped

open: unclamped



### Dimensions:

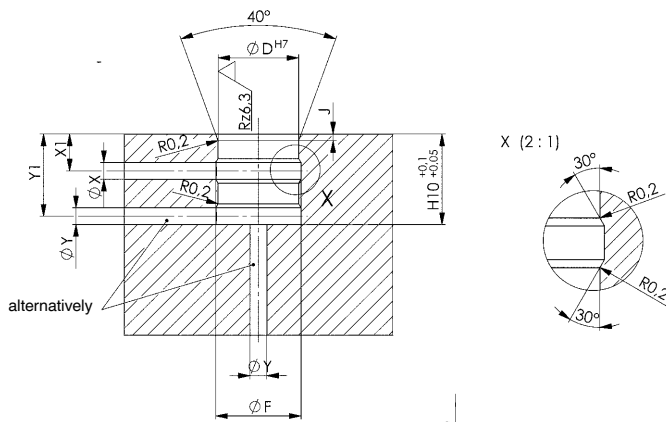
| Order no. | Article no. | A    | A1   | B  | C    | E    | dia. D | H    | H1   | H2   | H3   | H4   | H5 | H6   | H7   | K  | L    | M    | N   | P  | R    | S      | S1    | V  | V1 | V2   | W  | ØZ   | OR-1 O-ring Order No. |
|-----------|-------------|------|------|----|------|------|--------|------|------|------|------|------|----|------|------|----|------|------|-----|----|------|--------|-------|----|----|------|----|------|-----------------------|
| 553427    | 6958DT-12   | 49,5 | 0,13 | 10 | 15,0 | 17,0 | 18     | 13,5 | 47,7 | 31,0 | 38,0 | 22,0 | 7  | 16,0 | 12,2 | 20 | 28,5 | 10,0 | 4,5 | 10 | 8,5  | 50,1   | 23,55 | 20 | 7  | 11,4 | 36 | 4,5  | 409953                |
| 326231    | 6958DT-16   | 51,9 | 0,40 | 12 | 18,0 | 19,0 | 24     | 16,5 | 58,4 | 38,3 | 46,3 | 27,0 | 11 | 19,3 | 11   | 26 | 33   | 10,5 | 5,5 | 12 | 11,5 | 68,3   | 37,49 | 29 | 15 | 13,7 | 51 | 6,5  | 497461                |
| 326298    | 6958DT-20   | 54,0 | 1,25 | 14 | 21,0 | 23,0 | 30     | 20,3 | 73,2 | 49,0 | 59,0 | 34,0 | 14 | 25,0 | 16   | 32 | 40   | 13,0 | 6,0 | 16 | 14,0 | 78,9   | 41,60 | 33 | 15 | 17,5 | 59 | 8,5  | 490342                |
| 326397    | 6958DT-25   | 51,2 | 0,70 | 17 | 25,5 | 27,5 | 35     | 21,0 | 79,4 | 51,0 | 62,0 | 37,0 | 12 | 27,0 | 16   | 39 | 51   | 16,0 | 8,0 | 20 | 19,0 | 96,1   | 48,55 | 39 | 15 | 21,0 | 71 | 10,5 | 321018                |
| 327510    | 6958DT-32   | 53,4 | -1,0 | 20 | 30,0 | 33,0 | 42     | 24,0 | 97,1 | 63,0 | 76,0 | 59,5 | 13 | 35,0 | 18   | 50 | 58   | 18,0 | 9,0 | 26 | 22,0 | 112,25 | 58,16 | 48 | 15 | 24,0 | 84 | 12,5 | 409748                |

Subject to technical alterations.

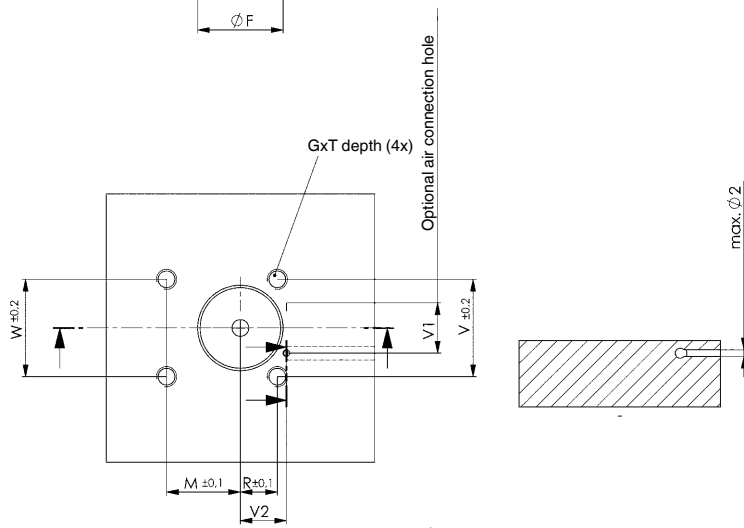
## Installation dimensions:

| Order no. | Article no. | dia. D H7 | dia. F | G x T  | H10  | J   | M  | R  | V  | V1 | V2   | W  | dia. X | X1 | dia. Y | Y1   |
|-----------|-------------|-----------|--------|--------|------|-----|----|----|----|----|------|----|--------|----|--------|------|
| 326272    | 6958DU-16   | 24        | 25,4   | M6x15  | 27,0 | 2,0 | 22 | 11 | 29 | 15 | 13,7 | 29 | 5      | 11 | 5      | 24,5 |
| 326314    | 6958DU-20   | 30        | 31,4   | M8x16  | 34,0 | 2,0 | 26 | 14 | 33 | 15 | 17,5 | 33 | 5      | 13 | 5      | 31,5 |
| 326371    | 6958DU-25   | 35        | 36,4   | M10x20 | 37,0 | 2,0 | 32 | 19 | 39 | 15 | 21,0 | 39 | 5      | 14 | 5      | 34,5 |
| 327536    | 6958DU-32   | 42        | 43,4   | M12x20 | 59,5 | 2,5 | 36 | 22 | 48 | 15 | 24,0 | 48 | 6      | 18 | 6      | 56,5 |

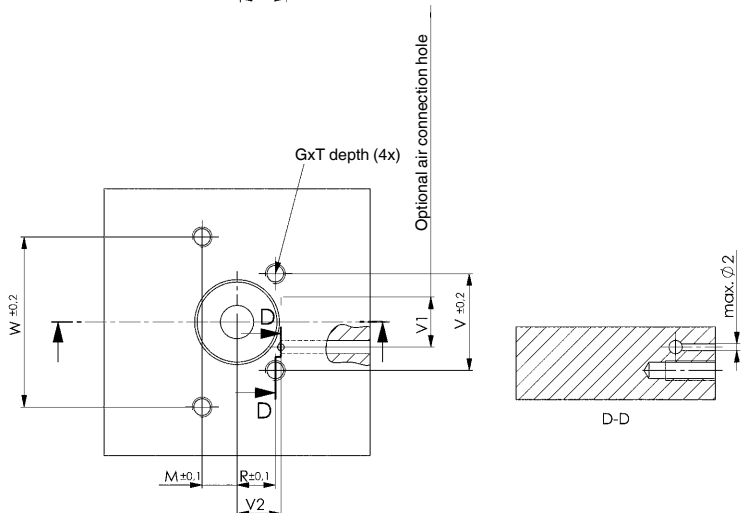
| Order no. | Article no. | dia. D H7 | dia. F | G x T  | H10  | J   | M    | R    | V  | V1 | V2   | W  | dia. X | X1 | dia. Y | Y1   |
|-----------|-------------|-----------|--------|--------|------|-----|------|------|----|----|------|----|--------|----|--------|------|
| 553427    | 6958DT-12   | 18        | 19,4   | M4x8   | 22,0 | 0,5 | 10,0 | 8,5  | 20 | 7  | 11,4 | 36 | 4      | 8  | 4      | 20,0 |
| 326231    | 6958DT-16   | 24        | 25,4   | M6x15  | 27,0 | 2,0 | 10,5 | 11,5 | 29 | 15 | 13,7 | 51 | 5      | 11 | 5      | 24,5 |
| 326298    | 6958DT-20   | 30        | 31,4   | M8x16  | 34,0 | 2,0 | 13,0 | 14,0 | 33 | 15 | 17,5 | 59 | 5      | 13 | 5      | 31,5 |
| 326397    | 6958DT-25   | 35        | 36,4   | M10x20 | 37,0 | 2,0 | 16,0 | 19,0 | 39 | 15 | 21,0 | 71 | 5      | 14 | 5      | 34,5 |
| 327510    | 6958DT-32   | 42        | 43,4   | M12x20 | 59,5 | 2,5 | 18,0 | 22,0 | 48 | 15 | 24,0 | 84 | 6      | 18 | 6      | 56,5 |



6958DU



6958DT



Subject to technical alterations.

## No. 6958D-xx-04

### Clamping arm



| Order no. | Article no. | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 250 bar [kN] | B  | C    | dia. D | dia. E | G  | K  | L    | N   | N1  | P  | R   | R1  | Weight [g] |
|-----------|-------------|-----------------------------------|-----------------------------------|----|------|--------|--------|----|----|------|-----|-----|----|-----|-----|------------|
| 553428    | 6958D-12-04 | 0,7                               | 1,8                               | 10 | 15,0 | 6      | 4      | 90 | 7  | 30,5 | 5,0 | 3,4 | 10 | 1,5 | 4,0 | 19         |
| 326215    | 6958D-16-04 | 1,3                               | 3,3                               | 12 | 18,0 | 8      | 6      | 90 | 8  | 38,0 | 5,0 | 4,5 | 12 | 2,0 | 5,0 | 31         |
| 326322    | 6958D-20-04 | 2,1                               | 5,2                               | 14 | 21,0 | 10     | 7      | 80 | 10 | 44,5 | 4,5 | 7,0 | 16 | 2,5 | 7,5 | 60         |
| 326413    | 6958D-25-04 | 2,6                               | 8,2                               | 17 | 25,5 | 12     | 9      | 80 | 11 | 53,5 | 7,0 | 7,0 | 20 | 3,0 | 7,5 | 94         |
| 327551    | 6958D-32-04 | 5,3                               | 13,4                              | 20 | 30,0 | 15     | 11     | 80 | 13 | 64,0 | 8,0 | 7,5 | 26 | 4,0 | 8,0 | 178        |

#### Design:

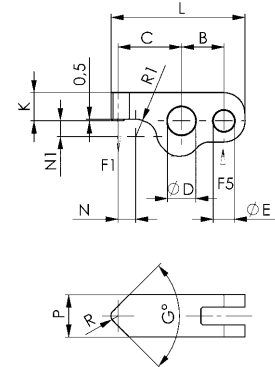
Hardened, tempered and burnished steel.

#### Application:

For vertical clamp 6958DU and 6958DT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6958DR

### Clamping arm, blank



| Order no. | Article no.  | B  | C  | dia. D | dia. E | K  | L  | N    | N1  | P  | R1  | Weight [g] |
|-----------|--------------|----|----|--------|--------|----|----|------|-----|----|-----|------------|
| 553429    | 6958DR-12-04 | 10 | 26 | 6      | 4      | 7  | 40 | 16   | 3,6 | 10 | 4,0 | 25         |
| 326256    | 6958DR-16-04 | 12 | 32 | 8      | 6      | 8  | 50 | 20,0 | 5,0 | 12 | 5,0 | 42         |
| 326348    | 6958DR-20-04 | 14 | 40 | 10     | 7      | 10 | 61 | 23,5 | 7,5 | 16 | 7,5 | 86         |
| 326439    | 6958DR-25-04 | 17 | 50 | 12     | 9      | 11 | 75 | 31,5 | 7,5 | 20 | 7,5 | 140        |
| 327577    | 6958DR-32-04 | 20 | 58 | 15     | 11     | 13 | 88 | 36,0 | 8,0 | 26 | 8,0 | 258        |

#### Design:

Hardened, tempered and burnished steel.

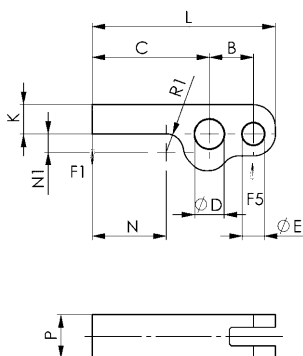
#### Application:

For vertical clamp 6958DU and 6958DT.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

Formula to determine the clamping force F1:  
 Clamping force = F1 [kN], piston force = F5 [kN],  
 operating lever = B [mm], load lever = C [mm]  
 $F1 = F5 \times B / C$



Subject to technical alterations.

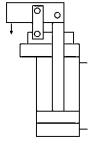
No. 6958CK

## Vertical clamp MINI

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 35 bar.



CAD



**NEW!**

| Order no. | Article no. | Clamping force F1 at 100 bar*<br>[kN] | Clamping force F1 at 250 bar*<br>[kN] | Piston force F5 at 100 bar<br>[kN] | Piston force F5 at 250 bar<br>[kN] | Vol. Sp<br>[cm <sup>3</sup> ] | Vol. Lo<br>[cm <sup>3</sup> ] | eff. piston area Sp<br>[cm <sup>2</sup> ] | Md<br>[Nm] | Q max. **<br>[l/min] | Weight<br>[g] |
|-----------|-------------|---------------------------------------|---------------------------------------|------------------------------------|------------------------------------|-------------------------------|-------------------------------|---|------------|----------------------|---------------|
| 562236    | 6958CK-16   | 1,36                                  | 3,4                                   | 2,54                               | 6,36                               | 2,75                          | 1,53                          | 2,545                                     | 5,8        | 0,5                  | 333           |

Sp = clamping, Lo = unclamp

\* Clamping task with clamping arm, standard

\*\* Qmax. with clamping arm, standard

### Design:

Housing, piston, piston crown made of tempered steel, tempered and nitrided, housing burnished. Two brass wipers integrated on the joint head. Connections for pneumatic monitoring of the clamping arm position.

Supplied as standard with 4 x cylinder screws (strength 12.9) and clamping arm. Oil supply via oil channel in fixture body.

### Application:

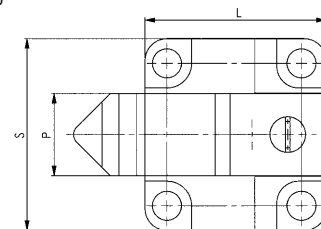
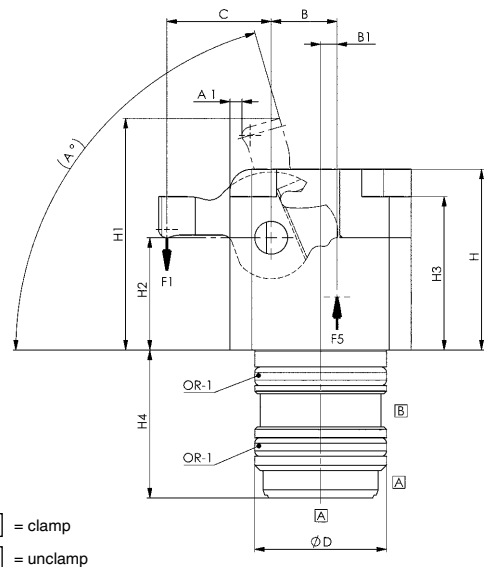
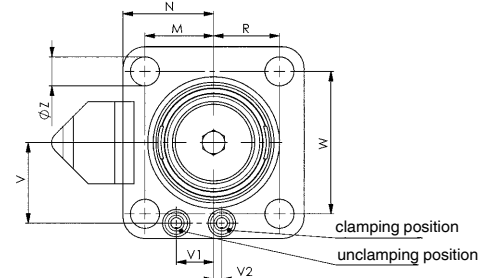
The MINI vertical clamp is preferred for use in devices with little installation space. Through the oil supply in the fixture body, a very close array of the clamping elements is possible. The clamping arm position can be monitored pneumatically in the release and clamping position. Workpieces can be installed or removed automatically with handling devices.

### Features:

The double-acting MINI vertical clamp permits a clearly defined movement of the clamp arm. The horizontal centre axis at the clamping lever and the pressure point on the workpiece lie in one plane. The pneumatic monitoring of the clamp arm position enables use in automatic production processes. The mechanism of the clamp is encapsulated by brass wipers, thereby ensuring very good protection against dirt.

### Note:

Collision of the workpiece with the clamping arm must be avoided during loading and unloading of the clamp. Soiling at the vertical clamp must be considered or avoided through inclusion in the cleaning process. The lever ratio and operating pressure must be observed when using special clamping levers.



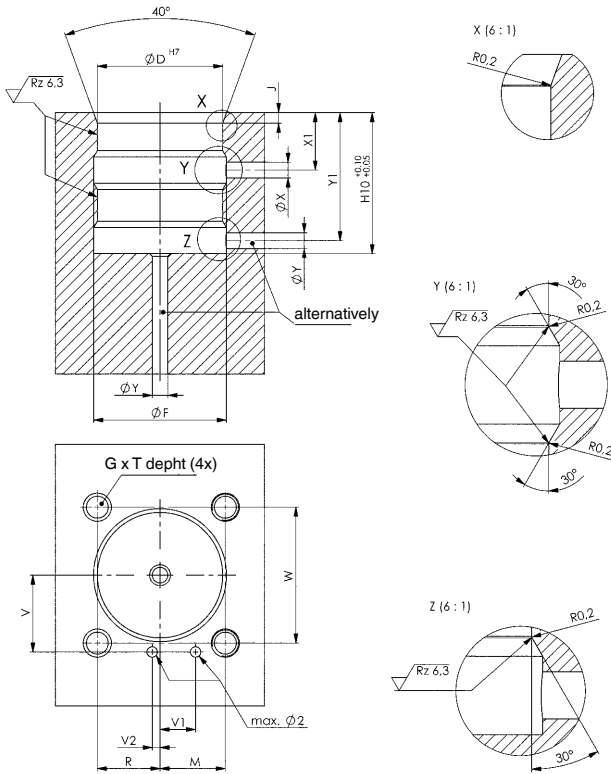
### Dimensions:

| Order no. | Article no. | A° | A1  | B  | B1 | C  | ØD f7 | H  | H1   | H2   | H3 | H4 | L  | M    | N    | P  | R  | S  | V    | V1  | V2  | W  | ØZ  | OR-1 O-ring Order No. |
|-----------|-------------|----|-----|----|----|----|-------|----|------|------|----|----|----|------|------|----|----|----|------|-----|-----|----|-----|-----------------------|
| 562236    | 6958CK-16   | 73 | 2,1 | 12 | 3  | 19 | 24    | 33 | 42,3 | 20,5 | 28 | 27 | 33 | 12,5 | 16,5 | 15 | 12 | 35 | 14,7 | 6,8 | 1,5 | 26 | 5,3 | 497461                |

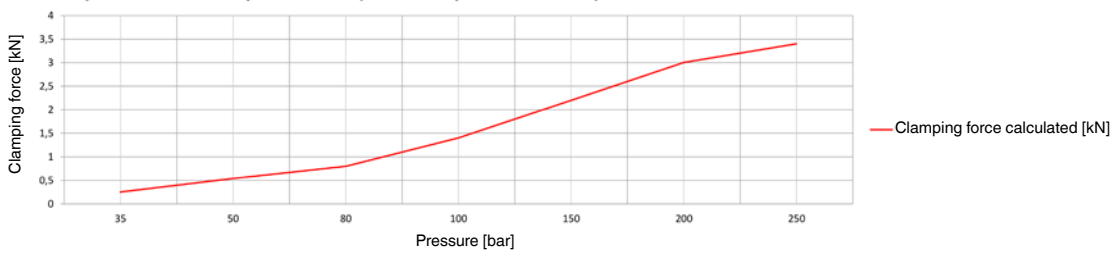
Subject to technical alterations.

## Installation dimensions:

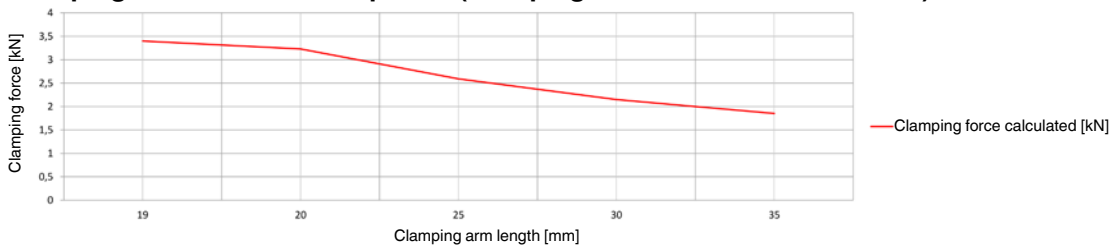
| Order no. | Article no. | dia. D H7 | dia. F | G x T   | J    | H10 | M    | R  | V    | V1  | V2  | X1 | Y1   | dia. X | dia. Y |
|-----------|-------------|-----------|--------|---------|------|-----|------|----|------|-----|-----|----|------|--------|--------|
| 562236    | 6958CK-16   | 24        | 25,4   | M5 x 10 | 2,09 | 27  | 12,5 | 12 | 14,7 | 6,8 | 1,5 | 11 | 24,5 | 3      | 3      |



### Clamping force vertical clamp MINI (clamping arm, standard 19 mm)



### Clamping force vertical clamp MINI (clamping arm blank 19 mm - 35 mm)



No. 6958CK-XX-04

Clamping arm

**NEW!**



CAD

| Order no. | Article no.  | B  | B1 | C  | G° | K   | L    | N  | P  | R | R1 | Weight [g] |
|-----------|--------------|----|----|----|----|-----|------|----|----|---|----|------------|
| 562272    | 6958CK-16-04 | 12 | 3  | 19 | 90 | 7,5 | 32,7 | 10 | 15 | 2 | 2  | 34         |

**Design:**

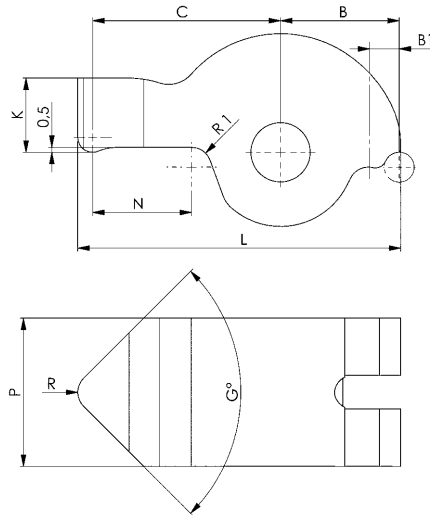
Heat treated and burnished steel.

**Application:**

For MINI vertical clamp 6958CK.

**Note:**

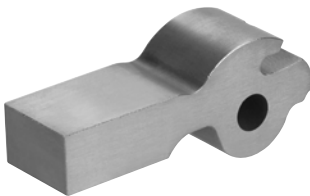
Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



No. 6958CKR-XX-04

Clamping arm blank

**NEW!**



CAD

| Order no. | Article no.   | B  | B1 | C  | dia. D H7 | J   | K  | L    | N  | P  | R | R1 | Weight [g] |
|-----------|---------------|----|----|----|-----------|-----|----|------|----|----|---|----|------------|
| 562277    | 6958CKR-16-04 | 12 | 3  | 35 | 6         | 2,5 | 10 | 47,2 | 26 | 15 | 6 | 2  | 56         |

**Design:**

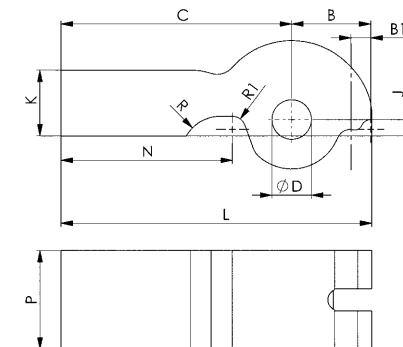
Heat treated and burnished steel.

**Application:**

For MINI vertical clamp 6958CK.

**Note:**

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

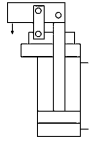




## No. 6958C-XX-1

### Vertical clamp with linear stroke

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 40 bar.



**NEW!**



| Order no. | Article no.  | Clamping force at 250 bar Sp* |      | Clamping stroke H [mm] | Vol. Sp [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | Md [Nm] | Q max. * [l/min] | Weight [g] |
|-----------|--------------|-------------------------------|------|------------------------|----------------------------|--|---------|------------------|------------|
|           |              | [kN]                          | [mm] |                        |                            |  |         |                  |            |
| 561039    | 6958C-03-1   | 2,8                           | 6    | 0,9                    | 1,3                        | 7,0                                    | 0,5     | 486              |            |
| 561040    | 6958C-04-1   | 5,0                           | 6    | 1,6                    | 2,3                        | 13,0                                   | 0,9     | 744              |            |
| 556978    | 6958C-07-1** | 8,3                           | 7    | 2,4                    | 3,8                        | 15                                     | 1,5     | 1200             |            |
| 556979    | 6958C-10-1** | 11,1                          | 9    | 3,8                    | 5,1                        | 30                                     | 2,0     | 1660             |            |

Cl = clamping

\* Specifications with clamping arm, standard \*\* Delivery time on request

### Design:

Hydraulic clamp as drop-in cartridge with hardened running socket, which can be screwed into the fixture. Top mounting with four cylinder screws (resistance min. 12.9); these are supplied as standard. All components are made from hardened, tempered and burnished steel. Piston and pivot bolts are made from tempered steel, hardened and nitrided. Metal wiper to protect the dirt wiper is integrated into the housing. Compressed air nozzle for pneumatic clamping control. Pivot bolts, tensioning straps and compressed air nozzle are supplied as standard, but not clamping arms. Oil supply via oil channel in fixture body.

### Application:

The double-acting vertical clamp is preferred for use in hydraulic fixtures in which there is very little installation space for a hydraulic clamping element. For complex workpieces, a small area is sufficient to clamp the workpiece. Through the oil supply in the fixture body, a very close array of the clamping elements is possible. Pneumatic release control permits monitoring of the clamp arm. Workpieces can be installed or removed automatically with handling devices.

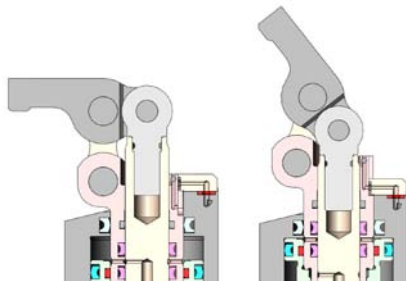
### Features:

The double-acting vertical clamp permits a clearly defined movement of the clamp arm. After the rotary movement of the clamping arm, there follows a linear clamping stroke on the workpiece, which can compensate for large workpiece tolerances. There is no relative movement on the workpiece during its clamping. Very small dimensions, so workpieces can be installed closely spaced side-by-side. Due to the pneumatic release control, the clamp is used optimally in automated sequences.

### Note:

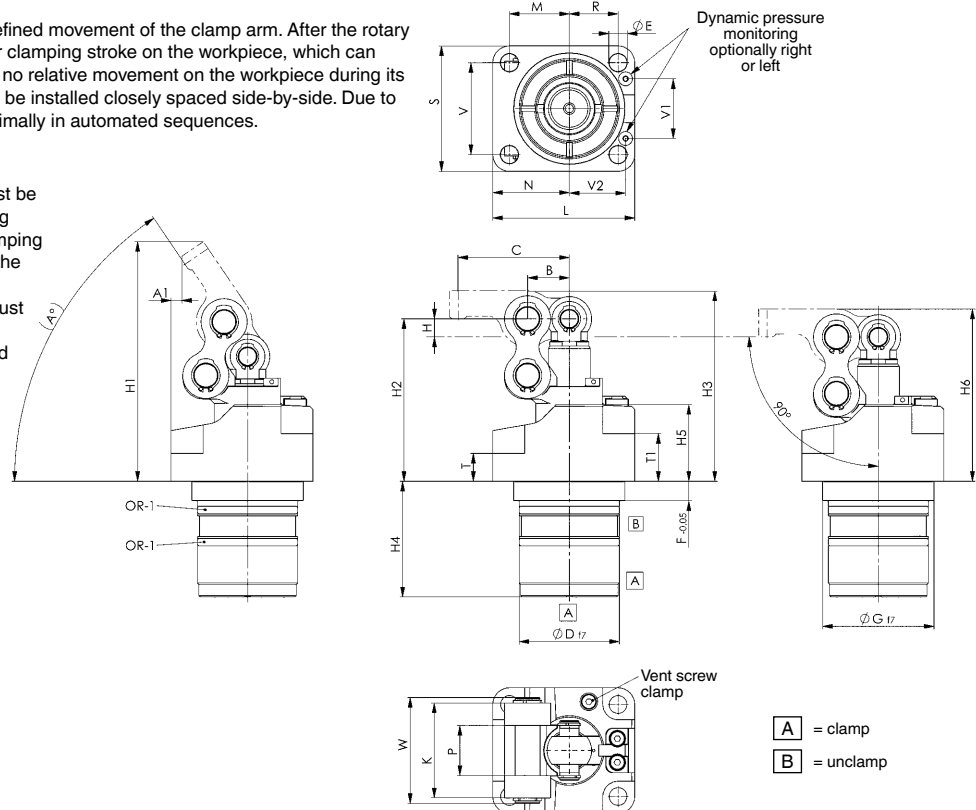
Collision of the workpiece with the clamping arm must be avoided during loading and unloading of the clamping fixture. When designing the clamping fixture, the clamping position must be laid approximately in the middle of the clamping stroke in order to have enough reserve for workpiece tolerances. Soiling at the vertical clamp must be considered or avoided through inclusion in the cleaning process. The signal converter is not supplied as standard. The lever ratio must be observed when using special clamping levers.

### Dynamic pressure monitoring:



closed: clamped

open: unclamped



### Dimensions:

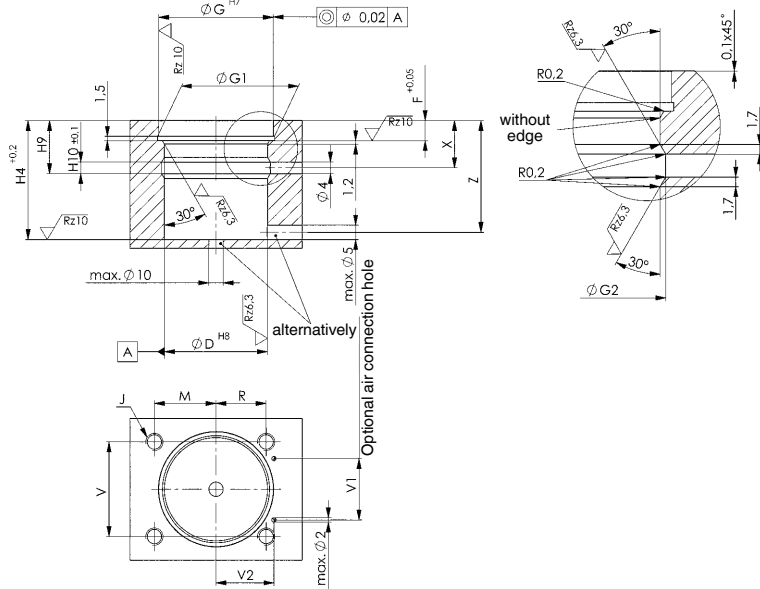
| Order no. | Article no.  | A° | A1  | B  | C  | ØD f7 | dia. E | F -0.05 | ØG f7 | H | H1    | H2   | H3   | H4   | H5   | H6   | K  | L  | M    | N    | P  | R    | S  | T  | T1   | V    | V1   | V2   | W  | OR-1 O-ring Order No. |
|-----------|--------------|----|-----|----|----|-------|--------|---------|-------|---|-------|------|------|------|------|------|----|----|------|------|----|------|----|----|------|------|------|------|----|-----------------------|
| 561039    | 6958C-03-1   | 52 | 0,5 | 12 | 35 | 29    | 5,3    | 7       | 33    | 6 | 80    | 54,3 | 63,3 | 36,0 | 27,5 | 57,3 | 29 | 42 | 17,4 | 22,5 | 15 | 14,4 | 39 | 10 | 18,0 | 28,5 | 18,4 | 16,6 | 33 | 321265                |
| 561040    | 6958C-04-1   | 56 | 3,4 | 15 | 40 | 36    | 6,4    | 7       | 40    | 6 | 86    | 58,3 | 68,3 | 41,5 | 27,5 | 62,3 | 34 | 51 | 21,5 | 27,5 | 18 | 17,5 | 45 | 10 | 17,1 | 33,0 | 21,4 | 20,2 | 38 | 555899                |
| 556978    | 6958C-07-1** | 53 | 4,0 | 18 | 48 | 40    | 8,4    | 7       | 48    | 7 | 93,5  | 64,0 | 75,0 | 44,5 | 29,5 | 68,0 | 36 | 62 | 24,5 | 32,5 | 20 | 21,5 | 56 | 10 | 15,9 | 40,0 | 26,0 | 25,0 | 40 | 555939                |
| 556979    | 6958C-10-1** | 51 | 1,6 | 21 | 50 | 45    | 8,4    | 7       | 55    | 9 | 104,8 | 73,5 | 85,5 | 51,0 | 33,5 | 76,5 | 36 | 66 | 28,0 | 34,5 | 20 | 25,0 | 63 | 14 | 19,9 | 50,0 | 32,0 | 27,8 | 40 | 556478                |

Subject to technical alterations.



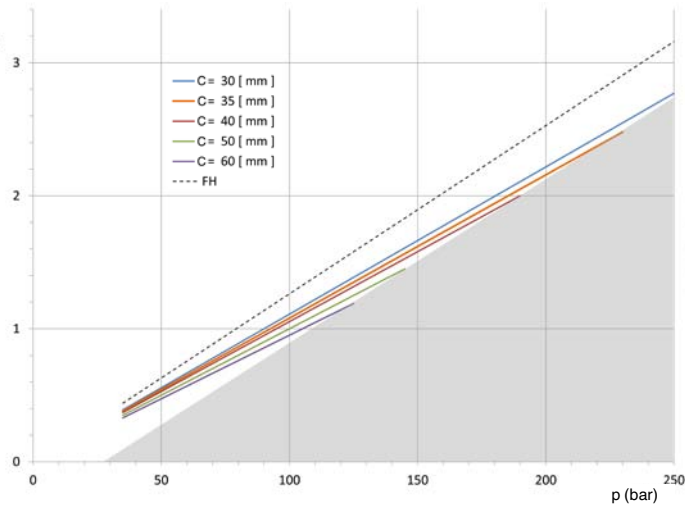
## Installation dimensions:

| Order no. | Article no.  | dia. D H8 | ØG H7 | ØG1  | ØG2 | H4   | H9   | H10 ±0.1 | J x depth | M    | R    | V    | V1   | V2   | F +0.05 | X    | Z    |
|-----------|--------------|-----------|-------|------|-----|------|------|----------|-----------|------|------|------|------|------|---------|------|------|
| 561039    | 6958C-03-1   | 29        | 33    | 34,0 | 31  | 36,0 | 18,5 | 4        | M5 x 15   | 17,4 | 14,4 | 28,5 | 18,4 | 16,6 | 7       | 16,5 | 33,5 |
| 561040    | 6958C-04-1   | 36        | 40    | 40,8 | 38  | 41,5 | 18,5 | 4        | M6 x 15   | 21,5 | 17,5 | 33,0 | 21,4 | 20,2 | 7       | 16,5 | 39,0 |
| 556978    | 6958C-07-1** | 40        | 48    | 48,6 | 42  | 44,5 | 21,0 | 6        | M8 x 15   | 24,5 | 21,5 | 40,0 | 26,0 | 25,0 | 7       | 18,0 | 42,0 |
| 556979    | 6958C-10-1** | 45        | 55    | 56,5 | 47  | 51,0 | 25,5 | 9        | M8 x 15   | 28,0 | 25,0 | 50,0 | 32,0 | 27,8 | 7       | 21,0 | 48,5 |



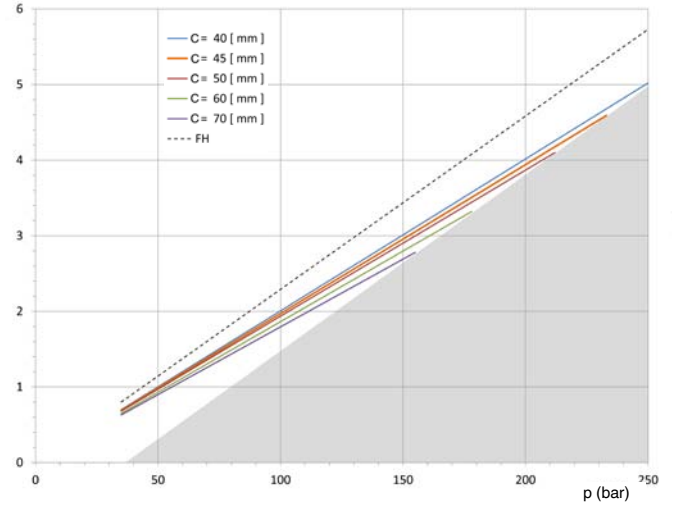
### 6958C-03-1

Fsp (kN)



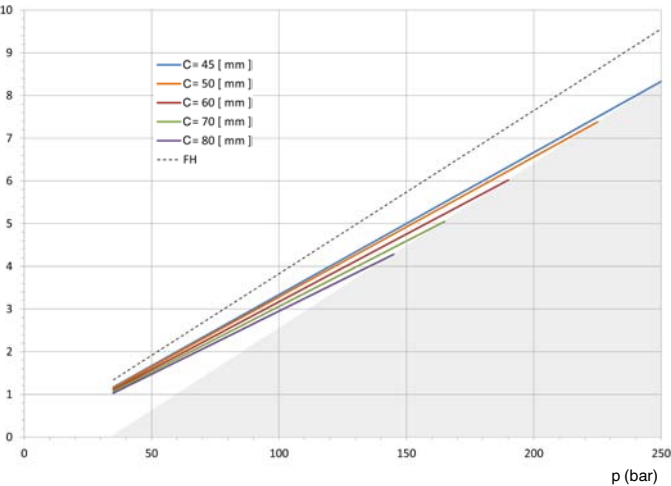
### 6958C-04-1

Fsp (kN)



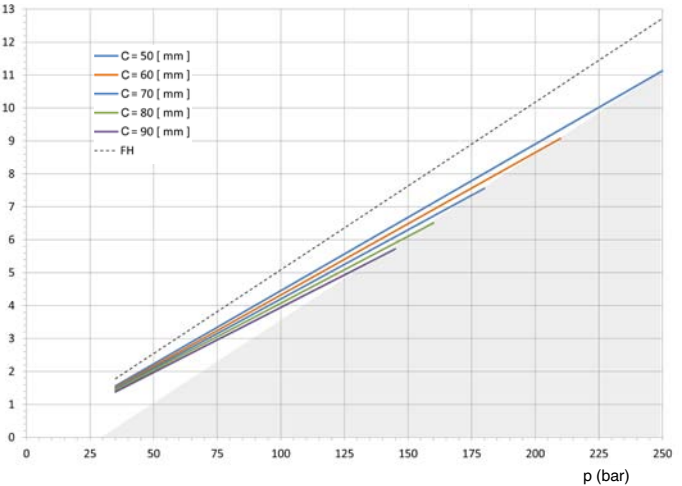
### 6958C-07-1

Fsp (kN)



### 6958C-10-1

Fsp (kN)



Subject to technical alterations.

## No. 6958C-XX-04

### Clamping arm

**NEW!**



CAD

| Order no. | Article no. | B  | C  | G° | K  | L    | N    | P  | R | R1 | Weight [g] |
|-----------|-------------|----|----|----|----|------|------|----|---|----|------------|
| 556980    | 6958C-03-04 | 12 | 35 | 80 | 9  | 44,5 | 9,5  | 15 | 3 | 5  | 42         |
| 556981    | 6958C-04-04 | 15 | 40 | 80 | 10 | 50,5 | 10,5 | 18 | 3 | 5  | 64         |
| 556982    | 6958C-07-04 | 18 | 45 | 80 | 11 | 56,5 | 11,5 | 20 | 3 | 5  | 83         |
| 556983    | 6958C-10-04 | 21 | 50 | 80 | 12 | 62,0 | 12,5 | 20 | 3 | 5  | 103        |

#### Design:

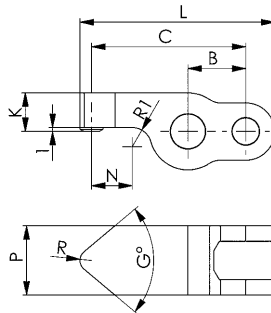
Hardened, tempered and burnished steel.

#### Application:

For vertical clamps 6958C and 6943C.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6958CR-XX-04

### Clamping arm, blank

**NEW!**



CAD

| Order no. | Article no.  | B  | C  | G  | J  | L    | P  | Weight [g] |
|-----------|--------------|----|----|----|----|------|----|------------|
| 556984    | 6958CR-03-04 | 12 | 50 | 18 | 9  | 56,5 | 15 | 92         |
| 556985    | 6958CR-04-04 | 15 | 60 | 20 | 10 | 67,5 | 18 | 147        |
| 556986    | 6958CR-07-04 | 18 | 49 | 22 | 11 | 75,5 | 20 | 195        |
| 556987    | 6958CR-10-04 | 21 | 54 | 24 | 12 | 84,0 | 20 | 238        |

#### Design:

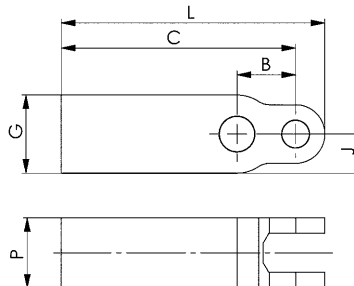
Hardened, tempered and burnished steel.

#### Application:

For vertical clamps 6958C and 6943C.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## LINK CLAMPS FOR DEMANDING TASKS

### LINK CLAMP

- > piston force up to 20,1 kN
- > operating pressure 250 bar
- > 90° aperture angle
- > oil supply via oil channel in fixture body

### LINK CLAMP

- > piston force up to 44,0 kN
- > operating pressure 350 bar
- > oil supply via threaded port and/or O-ring-sealed ports

### PRODUCT OVERVIEW:

| Type   | Piston force [kN] | No. of models | Max. operating pressure [bar] | Operating mode |
|--------|-------------------|---------------|-------------------------------|----------------|
| 6959C  | 2,8 - 20,1        | 5             | 250                           | double acting  |
| 6959KL | 7,0 - 44,0        | 5             | 350                           | double acting  |
| 6959KB | 7,0 - 28,1        | 4             | 350                           | double acting  |

### PRODUCT EXAMPLES:

NO. 6959C



> piston force: 2,8 - 20,1 kN

NO. 6959KL



> piston force: 7,0 - 44,0 kN

NO. 6959KB

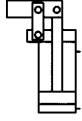


> piston force: 7,0 - 28,1 kN

## No. 6959C

### Link clamp

double-acting  
max. operating pressure 250 bar,  
min. operating pressure 25 bar.



| Order no. | Article no. | Clamping force F1 at 100 bar* [kN] | Clamping force F1 at 250 bar* [kN] | Piston force F5 at 100 bar [kN] | Piston force F5 at 250 bar [kN] | Vol. Sp [cm³] | Vol. Lo [cm³] | eff. piston area Sp [cm²] | eff. piston area Lo [cm²] | Md max. [Nm] | Weight [g] |
|-----------|-------------|------------------------------------|------------------------------------|---------------------------------|---------------------------------|---------------|---------------|---------------------------|---------------------------|--------------|------------|
| 325563    | 6959C-12    | 0,7                                | 1,7                                | 1,1                             | 2,8                             | 1,7           | 0,9           | 1,1                       | 0,6                       | 2,4          | 188        |
| 325019    | 6959C-16    | 1,2                                | 3,1                                | 2,0                             | 5,0                             | 3,2           | 1,4           | 2,0                       | 0,9                       | 3,6          | 350        |
| 324905    | 6959C-20    | 1,9                                | 4,9                                | 3,1                             | 7,8                             | 6,0           | 2,6           | 3,1                       | 1,4                       | 10,0         | 590        |
| 324657    | 6959C-25    | 3,2                                | 8,0                                | 4,9                             | 12,2                            | 10,3          | 3,7           | 4,9                       | 1,8                       | 21,0         | 1155       |
| 325589    | 6959C-32    | 5,2                                | 12,9                               | 8,0                             | 20,1                            | 21,7          | 9,5           | 8,0                       | 3,5                       | 43,0         | 2125       |

Sp = clamp, Lo = unclamp

\* Clamping force when using standard clamping lever

### Design:

Hydraulic cylinder as a drop-in cartridge. Top mounting with four cylinder screws (resistance min. 10.9), these are included in the supply scope. All components from hardened, tempered and burnished steel. Piston rod and hinge pins from hardened steel, tempered and nitrided. Additional bronze wiper for piston rod protection. Supply scope includes hinge pins and tension plates, but not clamping levers. Oil supply via oil channel in fixture body.

### Application:

The double-acting link clamp is highly suited to clamping in clamping pockets.

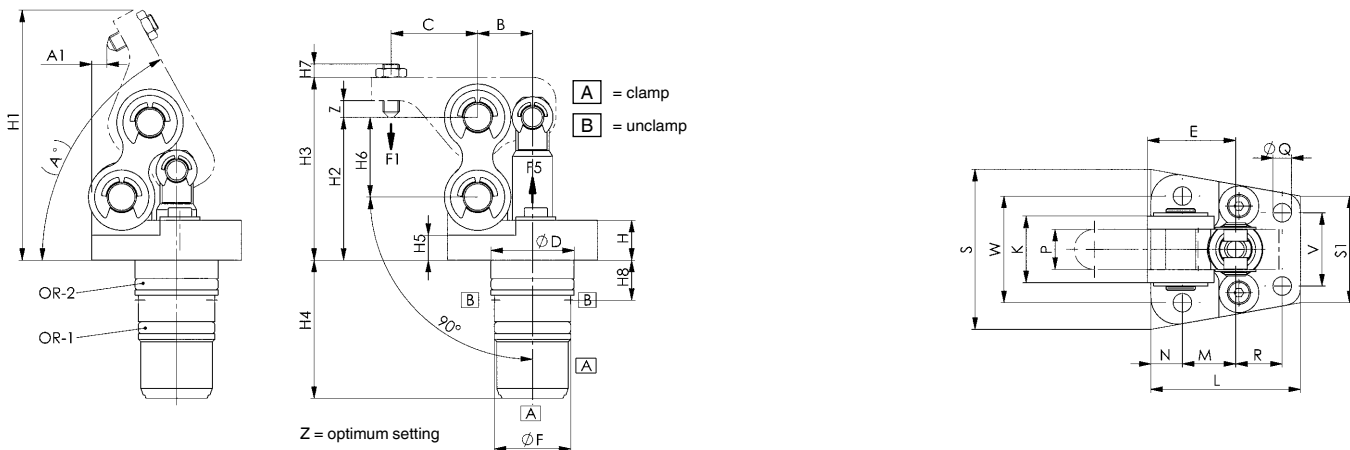
### Features:

Small dimensions. Allows close side-by-side positioning. Clamping levers easy to change with link clamps mounted. The clamping lever centre axis and the pressure point on the workpiece are always in one plane at (Z). This prevents relative movement on the workpiece. The integrated cartridge is stepped. This prevents the radial O-rings from becoming damaged as they are installed in or removed from the cross channels.

### Note:

With standard levers, the ratio of B to C is 1 to 1.5.

In preparing the blank lever, deviations that cause a higher clamping force F1 are permitted only in exceptional cases.



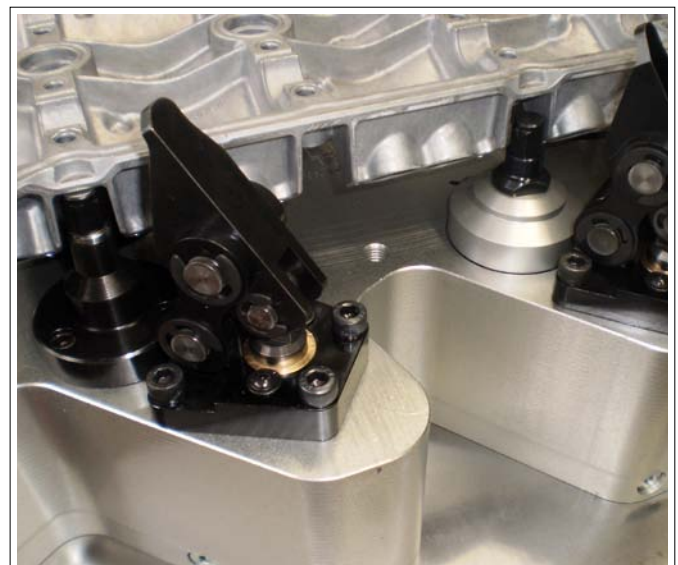
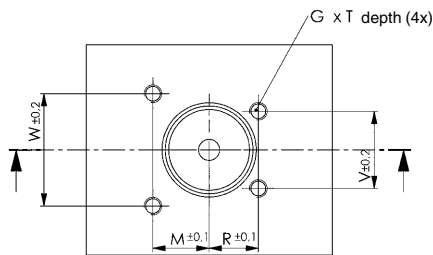
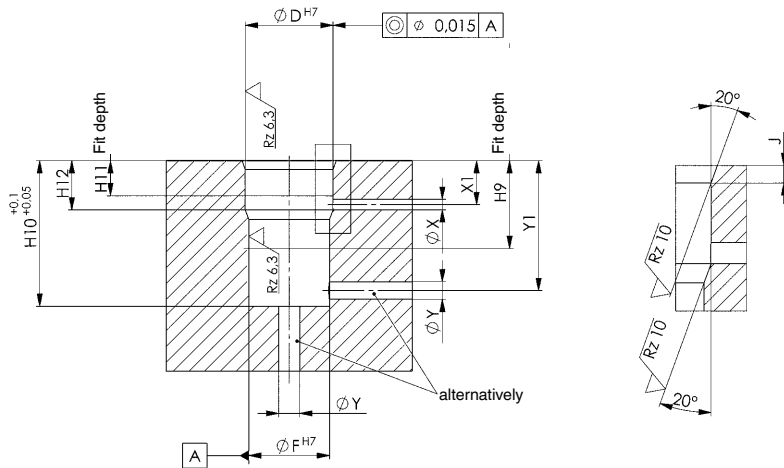
### Dimensions:

| Order no. | Article no. | A     | A1  | B    | C  | dia. D | E    | dia. F | H    | H1    | H2 | H3   | H4   | H5   | H6 | H7   | H8   | K  | L    | M    | N   | P  | R    | dia. Q | S  | S1 | V  | W  | Z | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|-------|-----|------|----|--------|------|--------|------|-------|----|------|------|------|----|------|------|----|------|------|-----|----|------|--------|----|----|----|----|---|-----------------------|-----------------------|
| 325563    | 6959C-12    | 60,0° | 3,0 | 13,5 | 22 | 20     | 21,0 | 17     | 10,0 | 58,9  | 33 | 41,5 | 34,0 | 5,5  | 18 | 3,5  | 11,5 | 16 | 37,5 | 15,0 | 6,0 | 10 | 12,0 | 4,6    | 42 | 28 | 18 | 29 | 4 | 409953                | 339572                |
| 325019    | 6959C-16    | 61,0° | 5,6 | 16,5 | 26 | 25     | 26,5 | 23     | 12,0 | 75,2  | 43 | 55,0 | 41,5 | 7,5  | 24 | 4,0  | 12,0 | 20 | 45,0 | 16,0 | 9,5 | 12 | 14,0 | 5,6    | 48 | 32 | 22 | 32 | 4 | 407148                | 409664                |
| 324905    | 6959C-20    | 60,8° | 5,5 | 19,5 | 31 | 30     | 30,5 | 28     | 14,5 | 84,8  | 47 | 60,0 | 50,0 | 9,0  | 26 | 7,0  | 16,5 | 27 | 51,5 | 21,0 | 9,5 | 15 | 16,0 | 6,5    | 56 | 38 | 28 | 42 | 5 | 321570                | 490342                |
| 324657    | 6959C-25    | 54,3° | 1,0 | 24,0 | 37 | 38     | 37,5 | 35     | 16,0 | 106,4 | 61 | 76,0 | 52,5 | 11,5 | 34 | 5,0  | 17,0 | 34 | 65,0 | 30,5 | 7,0 | 20 | 20,5 | 8,5    | 72 | 46 | 34 | 54 | 5 | 321018                | 492728                |
| 325589    | 6959C-32    | 53,9° | 4,2 | 30,0 | 45 | 47     | 47,5 | 45     | 16,0 | 131,0 | 75 | 92,0 | 62,5 | 11,5 | 44 | 13,0 | 17,3 | 42 | 82,0 | 38,5 | 9,0 | 24 | 25,5 | 10,5   | 87 | 56 | 40 | 65 | 5 | 321190                | 321190                |

Subject to technical alterations.

## Installation dimensions:

| Order no. | Article no. | dia. D H7 | dia. F H7 | G x T  | H9   | H10  | H11 | H12 | J   | M    | R    | V  | W  | dia. X | X1      | dia. Y | Y1    |
|-----------|-------------|-----------|-----------|--------|------|------|-----|-----|-----|------|------|----|----|--------|---------|--------|-------|
| 325563    | 6959C-12    | 20        | 17        | M4x12  | 25   | 34,0 | 10  | 14  | 2,5 | 15,0 | 12,0 | 18 | 29 | 4      | 11,0-12 | 6      | 28-31 |
| 325019    | 6959C-16    | 25        | 23        | M5x10  | 25   | 41,5 | 10  | 14  | 2,5 | 16,0 | 14,0 | 22 | 32 | 4      | 11,5-12 | 6      | 27-38 |
| 324905    | 6959C-20    | 30        | 28        | M6x13  | 36   | 50,0 | 14  | 20  | 3,3 | 21,0 | 16,0 | 28 | 42 | 4      | 15,0-18 | 6      | 38-47 |
| 324657    | 6959C-25    | 38        | 35        | M8x16  | 38   | 52,5 | 14  | 20  | 2,5 | 30,5 | 20,5 | 34 | 54 | 4      | 13,0-18 | 6      | 39-49 |
| 325589    | 6959C-32    | 47        | 45        | M10x22 | 46,5 | 62,5 | 15  | 21  | 2,5 | 38,5 | 25,5 | 40 | 65 | 4      | 13,0-19 | 6      | 48-59 |



Subject to technical alterations.

## No. 6959C-xx-30

### Clamping arm, standard



| Order no. | Article no. | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 250 bar [kN] | B    | C  | dia. D | dia. E | G   | H    | K    | L     | N    | O   | P  | R   | SW1 | SW2 | Weight [g] |
|-----------|-------------|-----------------------------------|-----------------------------------|------|----|--------|--------|-----|------|------|-------|------|-----|----|-----|-----|-----|------------|
| 325522    | 6959C-12-30 | 0,67                              | 1,7                               | 13,5 | 22 | 7      | 5      | 50° | 4,5  | 8,5  | 45,5  | 20,8 | M4  | 10 | 5,0 | 7   | 2,0 | 35         |
| 325225    | 6959C-16-30 | 1,2                               | 3,1                               | 16,5 | 26 | 9      | 7      | 50° | 7,0  | 12,0 | 55,5  | 26,7 | M5  | 12 | 6,0 | 8   | 2,5 | 70         |
| 325233    | 6959C-20-30 | 1,9                               | 4,9                               | 19,5 | 31 | 10     | 8      | 50° | 8,0  | 13,0 | 65,0  | 32,4 | M6  | 15 | 7,5 | 10  | 3,0 | 106        |
| 325464    | 6959C-25-30 | 3,1                               | 7,9                               | 24,0 | 37 | 13     | 10     | 45° | 10,0 | 15,0 | 80,0  | 37,0 | M8  | 20 | 6,0 | 13  | 4,0 | 222        |
| 325274    | 6959C-32-30 | 5,2                               | 12,9                              | 30,0 | 45 | 17     | 13     | 45° | 12,0 | 17,0 | 100,0 | 50,0 | M10 | 24 | 2x8 | 17  | 5,0 | 395        |

#### Design:

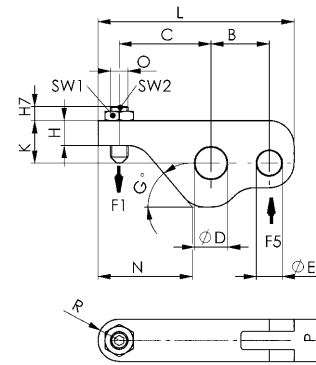
Hardened, tempered and burnished steel. Supply scope includes pressure screw.

#### Application:

For link clamp 6959C.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6959CR-xx-04

### Clamping arm, blank



| Order no. | Article no.  | B    | C    | dia. D | dia. E | G   | K    | L     | N    | P  | Weight [g] |
|-----------|--------------|------|------|--------|--------|-----|------|-------|------|----|------------|
| 325548    | 6959CR-12-04 | 13,5 | 34,0 | 7      | 5      | 50° | 8,5  | 53,0  | 30,5 | 10 | 41         |
| 325035    | 6959CR-16-04 | 16,5 | 42,5 | 9      | 7      | 50° | 12,0 | 66,0  | 37,2 | 12 | 85         |
| 324996    | 6959CR-20-04 | 19,5 | 50,0 | 10     | 8      | 50° | 13,0 | 77,5  | 45,0 | 15 | 134        |
| 325506    | 6959CR-25-04 | 24,0 | 63,5 | 13     | 10     | 45° | 15,0 | 98,0  | 57,0 | 20 | 272        |
| 325258    | 6959CR-32-04 | 30,0 | 76,0 | 17     | 13     | 45° | 17,0 | 120,0 | 70,0 | 24 | 464        |

#### Design:

Hardened, tempered and burnished steel.

#### Application:

For link clamp 6959C.

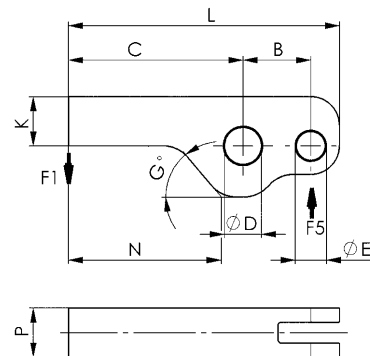
#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

Formula to determine the clamping force F1:

Clamping force = F1 [kN], piston force = F5 [kN], operating lever = B [mm], load lever = C [mm]

$F1 = F5 \times B / C$



## No. 6959C-xx-15-01

### Surface-mounted block

with O-ring and threaded connection



| Order no. | Article no.    | Screws for each size   | A    | B    | C   | dia. D | E  | F    | G    | H  | K | L  | M  | N    | O  | P    | R   | S   | T    | dia. U | dia. W | OR-1 O-ring Order No. | Weight [g] |
|-----------|----------------|------------------------|------|------|-----|--------|----|------|------|----|---|----|----|------|----|------|-----|-----|------|--------|--------|-----------------------|------------|
| 325290    | 6959C-12-15-01 | 2x M4x70, 2x M4x65     | 39,1 | 50,0 | 6,0 | 4,5    | 27 | 21,0 | G1/8 | 29 | 4 | 50 | 25 | 11,5 | 18 | 12,0 | 2,5 | 1,0 | 23,0 | 6      | 6      | 321646                | 505        |
| 324632    | 6959C-16-15-01 | 2x M5x75, 2x M5x70     | 44,9 | 60,0 | 9,5 | 5,5    | 30 | 25,5 | G1/4 | 32 | 5 | 54 | 30 | 11,0 | 22 | 15,5 | 3,0 | 1,0 | 26,5 | 6      | 6      | 321646                | 750        |
| 324640    | 6959C-20-15-01 | 2x M6x85, 2x M6x80     | 53,0 | 68,5 | 9,5 | 7,0    | 37 | 30,5 | G1/4 | 42 | 5 | 60 | 30 | 13,0 | 28 | 20,0 | 5,0 | 0,0 | 32,0 | 6      | 6      | 321646                | 1100       |
| 325480    | 6959C-25-15-01 | 2x M8x95, 2x M8x90     | 69,0 | 78,0 | 7,0 | 8,5    | 51 | 37,5 | G1/4 | 54 | 5 | 65 | 31 | 15,0 | 34 | 27,0 | 8,0 | 5,0 | 41,0 | 6      | 6      | 321646                | 1685       |
| 325316    | 6959C-32-15-01 | 2x M10x105, 2x M10x110 | 87,0 | 92,5 | 9,0 | 10,5   | 64 | 47,5 | G1/4 | 65 | 5 | 75 | 38 | 17,5 | 40 | 32,5 | -   | -   | 52,0 | 6      | 6      | 321646                | 3050       |

### Design:

Steel, burnished.

Supply scope includes O-ring dia.9x2, threaded plugs and fastening screws.

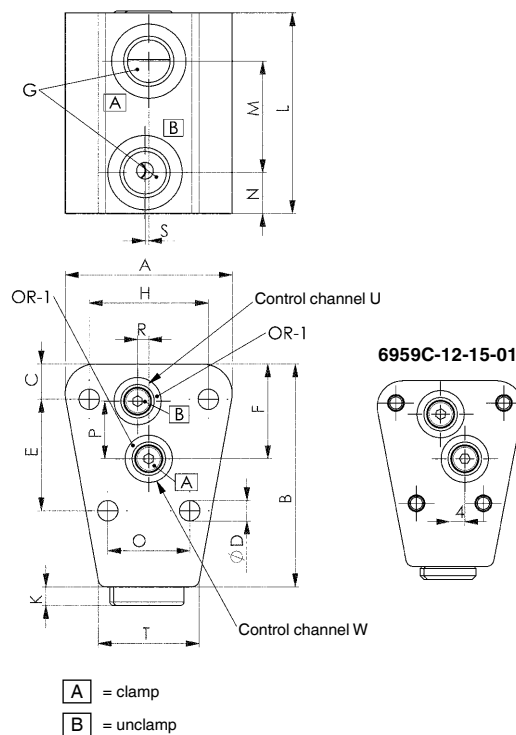
### Application:

The surface-mounted block can be flange-mounted as an adapter via the control channels in the fixture. It can also be arranged on the fixture and used there when the control oil supply has to be routed to the link clamps via external lines.

### Note:

The flange surface on the fixture must be even for using the O-ring connection and must have a surface finish of Rz 6.3 around the O-ring sealing surface. The flange surface on the fixture must be even for using the threaded connections.

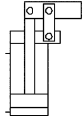
Other lengths available on request.



## No. 6959KL

### Link Clamp

double-acting  
max. operating pressure 350 bar,  
min. operating pressure 25 bar.



| Order no. | Article no. | Clamping force at 100 bar * [kN] | Clamping force at 350 bar* [kN] | Piston force at 100 bar [kN] | Piston force at 350 bar [kN] | Stroke [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Piston rod dia. [mm] | Piston dia. [mm] | Weight [g] |
|-----------|-------------|----------------------------------|---------------------------------|------------------------------|------------------------------|-------------|----------------------------|----------------------------|--|--|--------------|----------------------|------------------|------------|
| 321695    | 6959KL-160  | 1,5                              | 5,4                             | 2,0                          | 7,0                          | 17,0        | 7,4                        | 1,5                        | 2,0                                    | 0,9                                    | 6,3          | 12                   | 16               | 755        |
| 322057    | 6959KL-200  | 2,4                              | 8,4                             | 3,1                          | 11,0                         | 23,0        | 7,2                        | 3,2                        | 3,1                                    | 1,4                                    | 12,0         | 15                   | 20               | 1876       |
| 321711    | 6959KL-250  | 3,8                              | 13,2                            | 4,9                          | 17,2                         | 26,5        | 13,0                       | 6,3                        | 4,9                                    | 2,4                                    | 25,0         | 18                   | 25               | 2390       |
| 322032    | 6959KL-320  | 6,2                              | 21,6                            | 8,0                          | 28,1                         | 34,0        | 27,3                       | 10,7                       | 8,0                                    | 3,1                                    | 50,0         | 25                   | 32               | 5320       |
| 322040    | 6959KL-400  | 9,7                              | 33,8                            | 12,6                         | 44,0                         | 43,0        | 54,0                       | 27,6                       | 12,6                                   | 6,4                                    | 95,0         | 28                   | 40               | 8820       |

Sp = clamp, Lo = unclamp

\* Clamping force when using standard clamping lever

### Design:

Cylinder housing from hardened steel, tempered. Top mounting with four cylinder screws (resistance min. 12.9), these are included in the supply scope. Pistons and bolts from hardened steel, tempered, ground and nitrided. All parts nickel plated.  
Supply scope includes hinge pins and tension plates, but not clamping levers. Oil supply via threaded port or oil channel in fixture body.

### Application:

Link clamps are used in clamping fixtures in which workpieces must be freely accessible and loaded from above. Particularly suitable for clamping in clamping pockets.

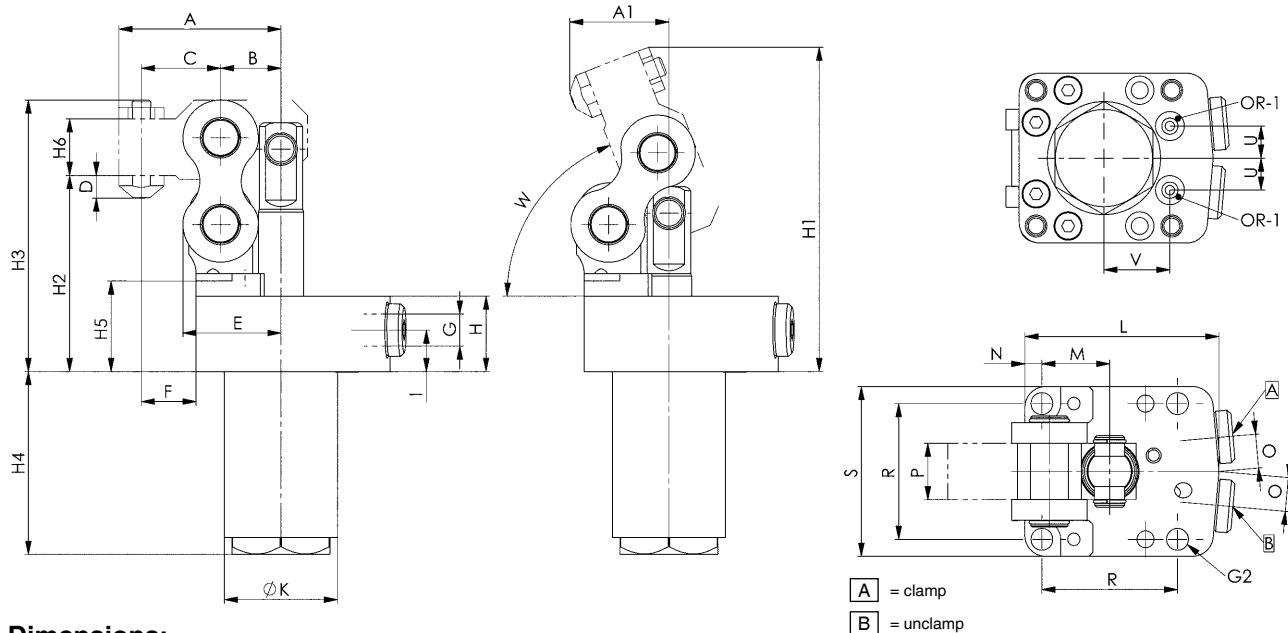
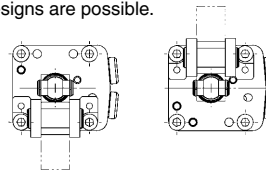
### Features:

Top flange version, lever mechanism can be turned in the range of 180° in 90° steps. Special designs are possible.

### Note:

Maximum speed of operation 0.5 m/s.

Proximity switch and electrical pressure-point monitoring can be supplied on request.



### Dimensions:

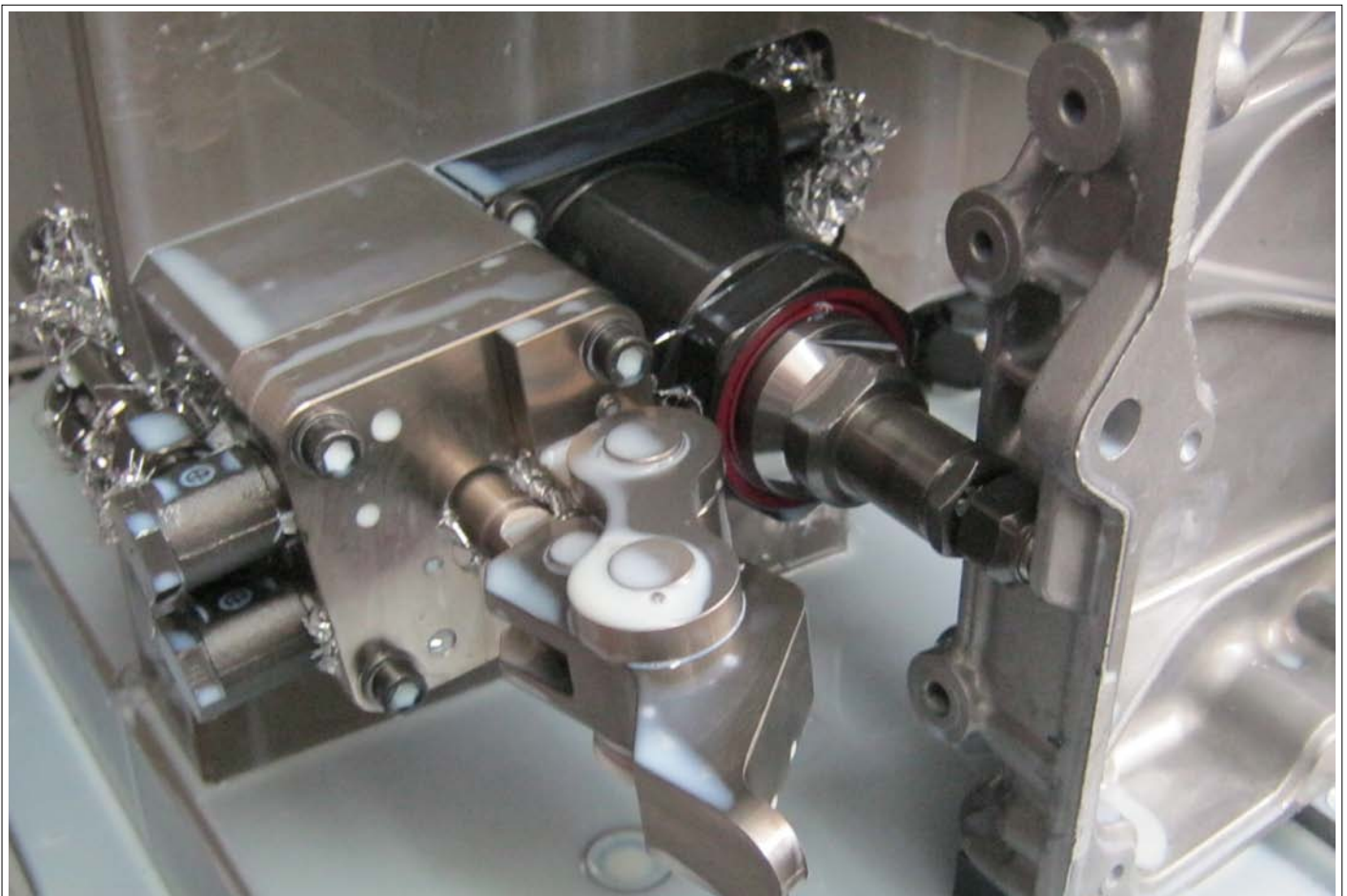
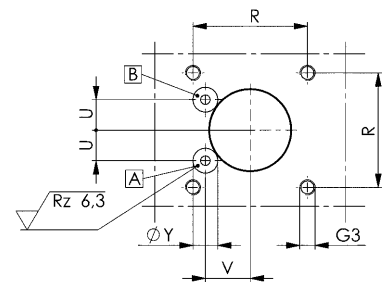
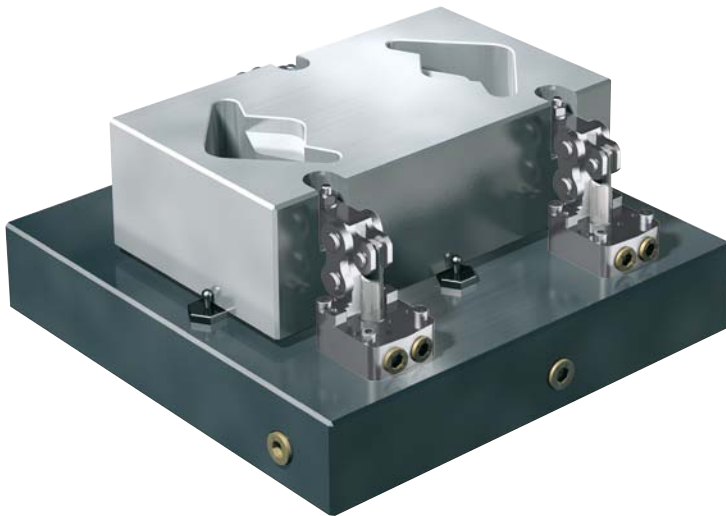
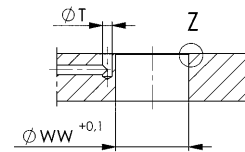
| Order no. | Article no. | A     | A1   | B    | C    | D   | E    | F    | G    | H  | H1    | H2  | H3  | H4   | H5 | H6 | I    | dia. K | L     | M  | N    | P  | O  | R   | S   | W     | ØG2  | U    | V    | OR-1 O-ring Order No. |
|-----------|-------------|-------|------|------|------|-----|------|------|------|----|-------|-----|-----|------|----|----|------|--------|-------|----|------|----|----|-----|-----|-------|------|------|------|-----------------------|
| 321695    | 6959KL-160  | 43,0  | 26,3 | 16,0 | 21,0 | 6,0 | 26,0 | 14,5 | G1/8 | 20 | 86,0  | 52  | 72  | 48,5 | 24 | 15 | 11,0 | 30     | 51,5  | 18 | 4,5  | 15 | 9  | 36  | 45  | 68,6° | 5,8  | 8,5  | 17,5 | 161802                |
| 322057    | 6959KL-200  | 56,5  | 33,0 | 21,0 | 27,5 | 6,0 | 35,0 | 13,5 | G1/4 | 26 | 120,5 | 72  | 103 | 61,5 | 34 | 25 | 14,0 | 38     | 70,0  | 27 | 8,0  | 20 | 14 | 54  | 70  | 74,4° | 6,5  | 15,0 | 21,5 | 321646                |
| 321711    | 6959KL-250  | 63,5  | 40,3 | 24,0 | 31,5 | 8,0 | 40,0 | 18,5 | G1/4 | 27 | 129,3 | 75  | 110 | 65,0 | 37 | 27 | 14,0 | 42     | 74,0  | 30 | 7,0  | 24 | 14 | 60  | 74  | 73,7° | 8,5  | 16,0 | 23,5 | 321646                |
| 322032    | 6959KL-320  | 82,0  | 51,0 | 32,0 | 42,0 | 8,0 | 52,0 | 24,0 | G1/4 | 35 | 167,5 | 103 | 145 | 81,5 | 47 | 27 | 15,0 | 52     | 100,0 | 39 | 11,0 | 30 | 14 | 78  | 100 | 70,5° | 10,5 | 16,0 | 30,0 | 321646                |
| 322040    | 6959KL-400  | 101,0 | 61,5 | 39,5 | 51,5 | 8,0 | 65,5 | 28,5 | G1/4 | 35 | 193,0 | 113 | 169 | 94,5 | 50 | 27 | 17,5 | 63     | 125,0 | 50 | 12,5 | 35 | 18 | 100 | 125 | 72,2° | 12,5 | 18,0 | 38,0 | 321646                |

Subject to technical alterations.



## Installation dimensions:

| Order no. | Article no. | G3 x depth | R ±0,2 | dia. T | U    | V    | ØWW +0.1 | X         | dia. Y x max. depth |
|-----------|-------------|------------|--------|--------|------|------|----------|-----------|---------------------|
| 321695    | 6959KL-160  | M5 x 11    | 36     | 3,0    | 8,5  | 17,5 | 30,2     | 0,2 x 45° | 7,8 x 0,1           |
| 322057    | 6959KL-200  | M6 x 18    | 54     | 5,0    | 15,0 | 21,5 | 38,2     | 0,2 x 45° | 12,7 x 0,1          |
| 321711    | 6959KL-250  | M8 x 16    | 60     | 5,0    | 16,0 | 23,5 | 42,2     | 0,2 x 45° | 12,7 x 0,1          |
| 322032    | 6959KL-320  | M10x16     | 78     | 5,0    | 16,0 | 30,0 | 52,2     | 0,2 x 45° | 12,7 x 0,1          |
| 322040    | 6959KL-400  | M12x18     | 100    | 5,6    | 18,0 | 38,0 | 63,2     | 0,2 x 45° | 12,7 x 0,1          |



Subject to technical alterations.

## No. 6959KL-xx-30

### Clamping arm, standard



CAD

| Order no. | Article no.  | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 350 bar [kN] | B    | C    | dia. D | dia. E | H  | H1 | H2 | H3 | H4 | H5 | K  | L   | P  | SW1 | SW2 | Weight [g] |
|-----------|--------------|-----------------------------------|-----------------------------------|------|------|--------|--------|----|----|----|----|----|----|----|-----|----|-----|-----|------------|
| 325241    | 6959KL-16-30 | 1,5                               | 5,4                               | 16,0 | 21,0 | 10     | 8      | 21 | 15 | 2  | 8  | 3  | 5  | 21 | 50  | 15 | 11  | 11  | 65         |
| 325266    | 6959KL-20-30 | 2,4                               | 8,4                               | 21,0 | 27,5 | 14     | 10     | 31 | 25 | 6  | 15 | 3  | 5  | 31 | 68  | 20 | 11  | 11  | 203        |
| 325282    | 6959KL-25-30 | 3,8                               | 13,2                              | 24,0 | 31,5 | 16     | 12     | 35 | 27 | 6  | 17 | 3  | 8  | 35 | 76  | 24 | 11  | 13  | 286        |
| 325308    | 6959KL-32-30 | 6,2                               | 21,6                              | 32,0 | 42,0 | 20     | 16     | 42 | 27 | 6  | 19 | 3  | 15 | 35 | 95  | 30 | 11  | 13  | 522        |
| 325324    | 6959KL-40-30 | 9,7                               | 33,8                              | 39,5 | 51,5 | 26     | 20     | 52 | 27 | 10 | 27 | 3  | 25 | 35 | 117 | 35 | 11  | 17  | 867        |

#### Design:

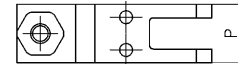
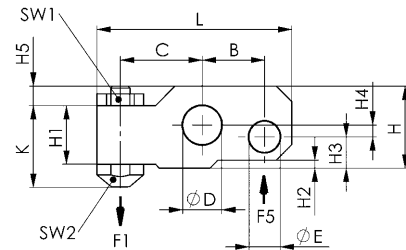
Hardened, tempered and nickel-plated steel. Scope of supply includes pressure screw.

#### Application:

For link clamp 6959KL.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6959KR-xx-04

### Clamping arm, blank



CAD

| Order no. | Article no.  | B    | C  | dia. D | dia. E | K  | H2 | H3 | H4 | L     | P  | Weight [g] |
|-----------|--------------|------|----|--------|--------|----|----|----|----|-------|----|------------|
| 400267    | 6959KR-16-04 | 16,0 | 34 | 10     | 8      | 21 | 2  | 8  | 3  | 57,0  | 15 | 104        |
| 401299    | 6959KR-20-04 | 21,0 | 42 | 14     | 10     | 31 | 6  | 15 | 3  | 74,5  | 20 | 261        |
| 400283    | 6959KR-25-04 | 24,0 | 48 | 16     | 12     | 35 | 6  | 17 | 3  | 84,5  | 24 | 399        |
| 400309    | 6959KR-32-04 | 32,0 | 64 | 20     | 16     | 42 | 6  | 19 | 3  | 109,0 | 30 | 778        |
| 400325    | 6959KR-40-04 | 39,5 | 79 | 26     | 20     | 52 | 10 | 27 | 3  | 134,5 | 35 | 1372       |

#### Design:

Hardened, tempered and burnished steel.

#### Application:

For link clamp 6959KL and 6959KB.

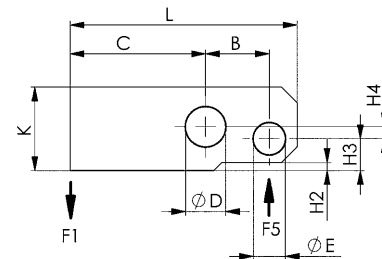
#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

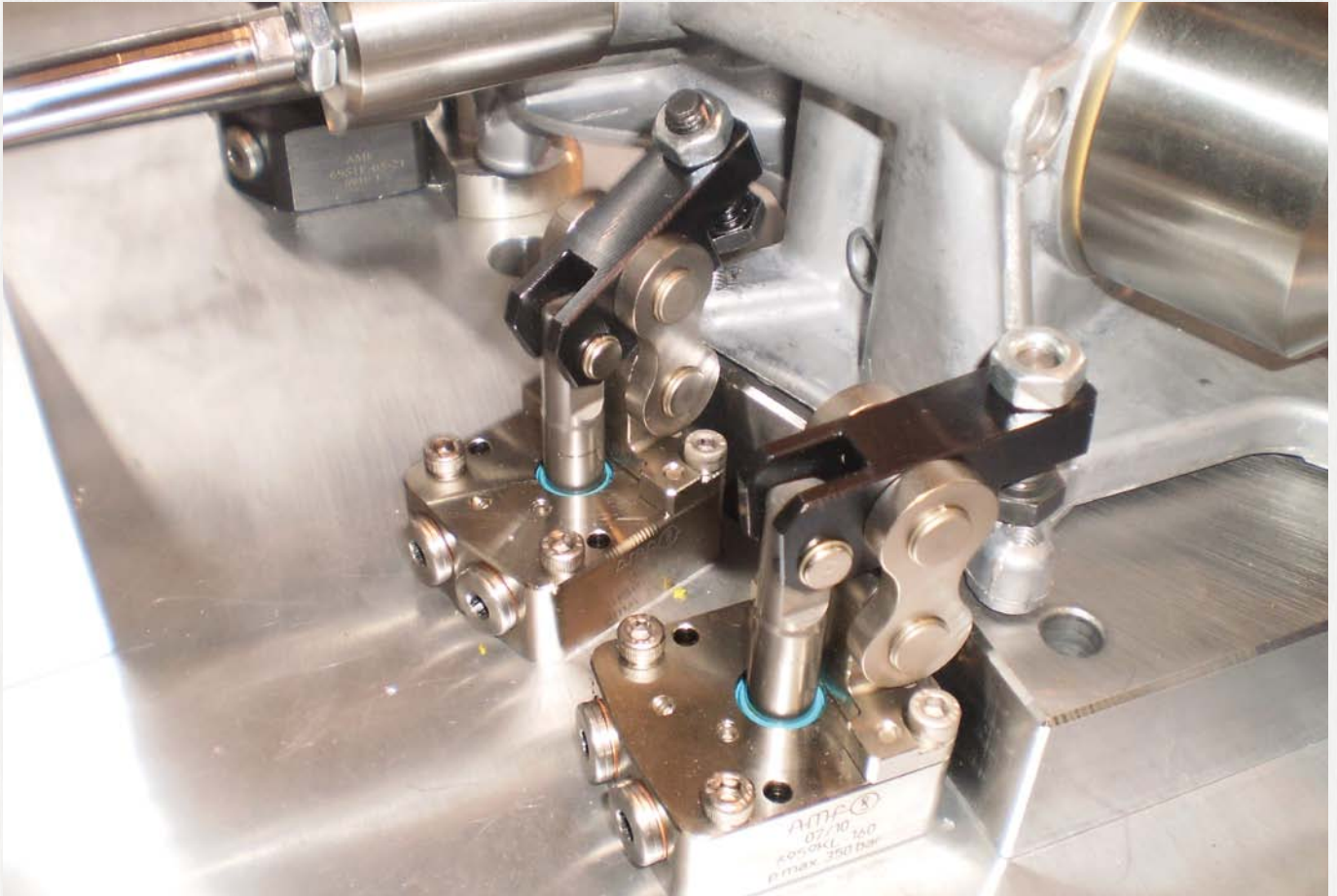
Formula to determine the clamping force F1:

Clamping force = F1 [kN], piston force = F5 [kN], operating lever = B [mm], load lever = C [mm]

$F1 = F5 \times B / C$



Subject to technical alterations.

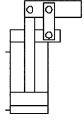


Subject to technical alterations.

## No. 6959KB

### Link Clamp

double-acting  
max. operating pressure 350 bar,  
min. operating pressure 25 bar.



| Order no. | Article no. | Clamping force at 100 bar* [kN] | Clamping force at 350 bar* [kN] | Piston force at 100 bar [kN] | Piston force at 350 bar [kN] | Stroke [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Piston rod dia. [mm] | Piston dia. [mm] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|------------------------------|------------------------------|-------------|----------------------------|----------------------------|--|--|--------------|----------------------|------------------|------------|
| 554667    | 6959KB-16   | 1,5                             | 5,4                             | 2,0                          | 7,0                          | 17,0        | 7,4                        | 1,5                        | 2,0                                    | 0,9                                    | 6,3          | 12                   | 16               | 755        |
| 554668    | 6959KB-20   | 2,4                             | 8,4                             | 3,1                          | 11,0                         | 23,0        | 7,2                        | 3,2                        | 3,1                                    | 1,4                                    | 12,0         | 15                   | 20               | 1876       |
| 554669    | 6959KB-25   | 3,8                             | 13,2                            | 4,9                          | 17,2                         | 26,5        | 13,0                       | 6,3                        | 4,9                                    | 2,4                                    | 25,0         | 18                   | 25               | 2390       |
| 554670    | 6959KB-32   | 6,2                             | 21,6                            | 8,0                          | 28,1                         | 34,0        | 27,3                       | 10,7                       | 8,0                                    | 3,1                                    | 50,0         | 25                   | 32               | 5320       |

Sp = clamp, Lo = unclamp

\* Clamping force when using standard clamping lever

### Design:

Cylinder housing made from tempered steel, tempered and burnished. Top mounting with four cylinder screws (resistance min. 12.9), these are supplied as standard. Pistons and bolts from from hardened steel, tempered, ground and nitrided.

Hinge pins and tension plates are supplied as standard, but not clamping levers. Oil supply via threaded port or oil channel in fixture body.

### Application:

Link clamps are used in clamping fixtures in which workpieces must be freely accessible and loaded from above. Particularly suitable for clamping in clamping pockets.

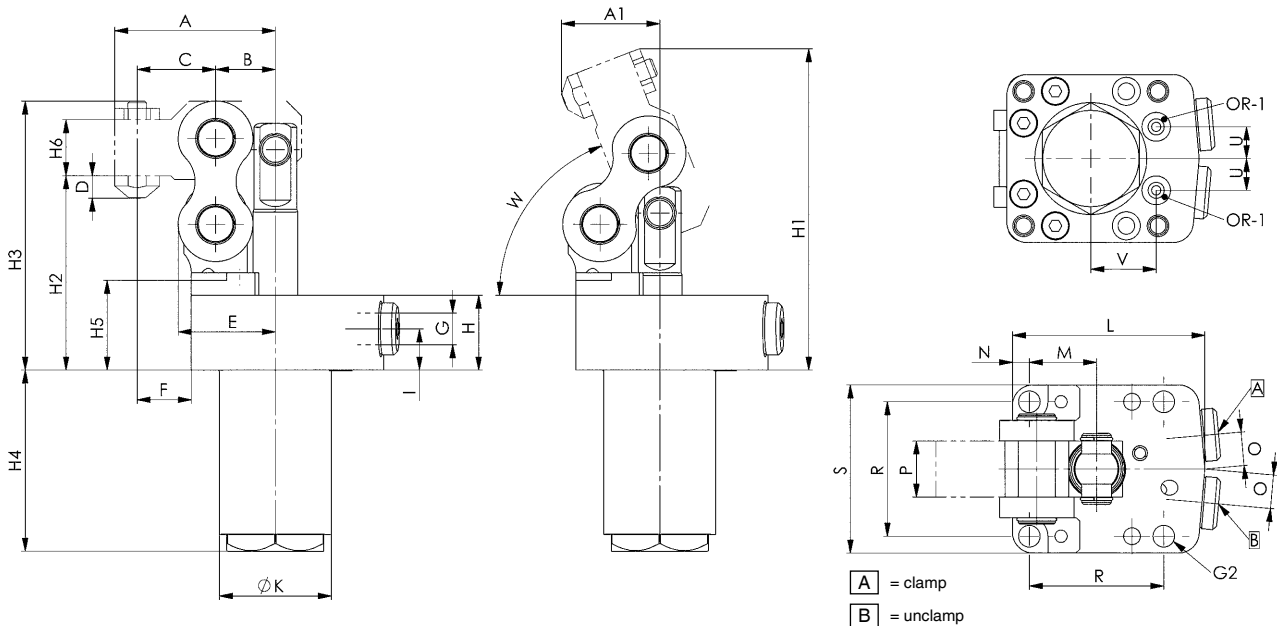
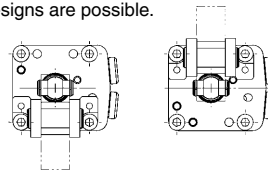
### Features:

Top flange version, lever mechanism can be turned in the range of 180° in 90° steps. Special designs are possible.

### Note:

Maximum speed of operation 0.5 m/s.

Proximity switch and electrical pressure-point monitoring can be supplied on request.



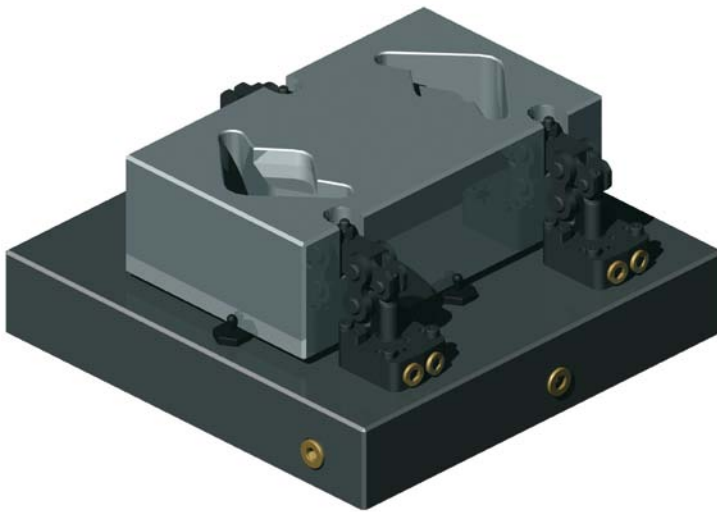
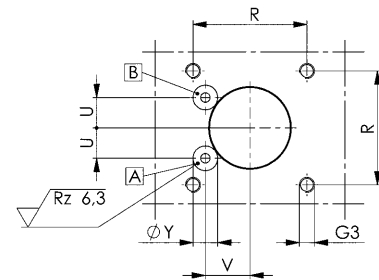
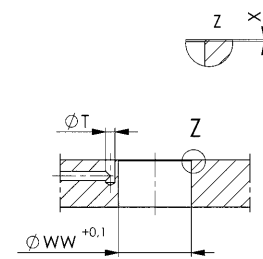
### Dimensions:

| Order no. | Article no. | A    | A1   | B    | C    | D   | E    | F    | G    | H  | H1    | H2  | H3  | H4   | H5 | H6 | I    | dia. K | L     | M  | N    | P  | O  | R  | S   | W     | ØG2  | U    | V    | OR-1 O-ring Order No. |
|-----------|-------------|------|------|------|------|-----|------|------|------|----|-------|-----|-----|------|----|----|------|--------|-------|----|------|----|----|----|-----|-------|------|------|------|-----------------------|
| 554667    | 6959KB-16   | 43,0 | 26,3 | 16,0 | 21,0 | 6,0 | 26,0 | 14,5 | G1/8 | 20 | 86,0  | 52  | 72  | 48,5 | 24 | 15 | 11,0 | 30     | 51,5  | 18 | 4,5  | 15 | 9  | 36 | 45  | 68,6° | 5,8  | 8,5  | 17,5 | 161802                |
| 554668    | 6959KB-20   | 56,5 | 33,0 | 21,0 | 27,5 | 6,0 | 35,0 | 13,5 | G1/4 | 26 | 120,5 | 72  | 103 | 61,5 | 34 | 25 | 14,0 | 38     | 70,0  | 27 | 8,0  | 20 | 14 | 54 | 70  | 74,4° | 6,5  | 15,0 | 21,5 | 321646                |
| 554669    | 6959KB-25   | 63,5 | 40,3 | 24,0 | 31,5 | 8,0 | 40,0 | 18,5 | G1/4 | 27 | 129,3 | 75  | 110 | 65,0 | 37 | 27 | 14,0 | 42     | 74,0  | 30 | 7,0  | 24 | 14 | 60 | 74  | 73,7° | 8,5  | 16,0 | 23,5 | 321646                |
| 554670    | 6959KB-32   | 82,0 | 51,0 | 32,0 | 42,0 | 8,0 | 52,0 | 24,0 | G1/4 | 35 | 167,5 | 103 | 145 | 81,5 | 47 | 27 | 15,0 | 52     | 100,0 | 39 | 11,0 | 30 | 14 | 78 | 100 | 70,5° | 10,5 | 16,0 | 30,0 | 321646                |

Subject to technical alterations.

## Installation dimensions:

| Order no. | Article no. | G3 x depth | R ±0,2 | dia. T | U    | V    | ØWW +0.1 | X         | dia. Y x max. depth |
|-----------|-------------|------------|--------|--------|------|------|----------|-----------|---------------------|
| 554667    | 6959KB-16   | M5 x 11    | 36     | 3,0    | 8,5  | 17,5 | 30,2     | 0,2 x 45° | 7,8 x 0,1           |
| 554668    | 6959KB-20   | M6 x 18    | 54     | 5,0    | 15,0 | 21,5 | 38,2     | 0,2 x 45° | 12,7 x 0,1          |
| 554669    | 6959KB-25   | M8 x 16    | 60     | 5,0    | 16,0 | 23,5 | 42,2     | 0,2 x 45° | 12,7 x 0,1          |
| 554670    | 6959KB-32   | M10 x 16   | 78     | 5,0    | 16,0 | 30,0 | 52,2     | 0,2 x 45° | 12,7 x 0,1          |



Subject to technical alterations.

## No. 6959KB-xx-30

### Clamping arm, standard



CAD

| Order no. | Article no.  | Clamping force F1 at 100 bar [kN] | Clamping force F1 at 350 bar [kN] | B    | C    | dia. D | dia. E | H  | H1 | H2 | H3 | H4 | H5 | K  | L  | P  | SW1 | SW2 | Weight [g] |
|-----------|--------------|-----------------------------------|-----------------------------------|------|------|--------|--------|----|----|----|----|----|----|----|----|----|-----|-----|------------|
| 554671    | 6959KB-16-30 | 1,5                               | 5,4                               | 16,0 | 21,0 | 10     | 8      | 21 | 15 | 2  | 8  | 3  | 5  | 21 | 50 | 15 | 11  | 11  | 65         |
| 554673    | 6959KB-20-30 | 2,4                               | 8,4                               | 21,0 | 27,5 | 14     | 10     | 31 | 25 | 6  | 15 | 3  | 5  | 31 | 68 | 20 | 11  | 11  | 203        |
| 554674    | 6959KB-25-30 | 3,8                               | 13,2                              | 24,0 | 31,5 | 16     | 12     | 35 | 27 | 6  | 17 | 3  | 8  | 35 | 76 | 24 | 11  | 13  | 286        |
| 554675    | 6959KB-32-30 | 6,2                               | 21,6                              | 32,0 | 42,0 | 20     | 16     | 42 | 27 | 6  | 19 | 3  | 15 | 35 | 95 | 30 | 11  | 13  | 522        |

### Design:

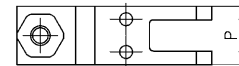
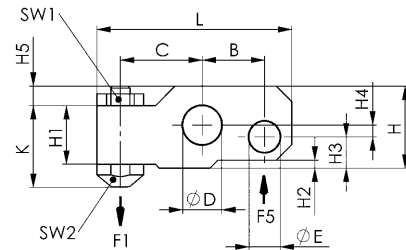
Tempered steel, tempered and burnished. Scope of supply includes pressure screw.

### Application:

For link clamp 6959KB.

### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6959KR-xx-04

### Clamping arm, blank



CAD

| Order no. | Article no.  | B    | C  | dia. D | dia. E | K  | H2 | H3 | H4 | L     | P  | Weight [g] |
|-----------|--------------|------|----|--------|--------|----|----|----|----|-------|----|------------|
| 400267    | 6959KR-16-04 | 16,0 | 34 | 10     | 8      | 21 | 2  | 8  | 3  | 57,0  | 15 | 104        |
| 401299    | 6959KR-20-04 | 21,0 | 42 | 14     | 10     | 31 | 6  | 15 | 3  | 74,5  | 20 | 261        |
| 400283    | 6959KR-25-04 | 24,0 | 48 | 16     | 12     | 35 | 6  | 17 | 3  | 84,5  | 24 | 399        |
| 400309    | 6959KR-32-04 | 32,0 | 64 | 20     | 16     | 42 | 6  | 19 | 3  | 109,0 | 30 | 778        |
| 400325    | 6959KR-40-04 | 39,5 | 79 | 26     | 20     | 52 | 10 | 27 | 3  | 134,5 | 35 | 1372       |

### Design:

Hardened, tempered and burnished steel.

### Application:

For link clamp 6959KL and 6959KB.

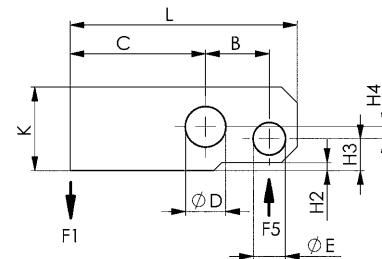
### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

Formula to determine the clamping force F1:

Clamping force = F1 [kN], piston force = F5 [kN], operating lever = B [mm], load lever = C [mm]

$F1 = F5 \times B / C$



Subject to technical alterations.

## TOGGLE JOINT CLAMPS FOR UNIVERSAL USE

- > operating pressure 250 bar
- > hardened and chrome-plated piston rod
- > heat-treated bolts
- > PTFE bearings
- > safe clamping or locking by clamp moving beyond deadcentre
- > oil supply via threaded port

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

### PRODUCT OVERVIEW:

| Type  | Clamping height [mm] | Clamping force [kN] | No. of models | Operating mode |
|-------|----------------------|---------------------|---------------|----------------|
| 6960C | 57 - 86              | 6 - 22,7            | 3             | double acting  |

### PRODUCT EXAMPLE:

#### NO. 6960C

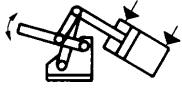


- > clamping force: 6 - 22,7 kN
- > connection type: threaded port
- > available upon request

No. 6960C

## Toggle joint clamp, hydraulic

double acting,  
max. operating pressure 250 bar.



| Order no. | Article no. | Clamping force*<br>F1=F3<br>[kN] | Clamping force*<br>F2=F5<br>[kN] | Clamping force*<br>F5<br>[kN] | p max.<br>[bar] | pD max. **<br>[bar] | Cylinder stroke<br>[mm] | Piston area<br>A1<br>[cm <sup>2</sup> ] | Piston ring-surface<br>A2<br>[cm <sup>2</sup> ] | Oil capacity forward<br>[cm <sup>3</sup> ] | Oil capacity backward<br>[cm <sup>3</sup> ] | Weight<br>[g] |
|-----------|-------------|----------------------------------|----------------------------------|-------------------------------|-----------------|---------------------|-------------------------|---|---|--|---|---------------|
| 66647     | 6960C-4     | 6                                | 9                                | 3                             | 100             | 250                 | 80                      | 3,14                                    | 2,0   | 25   | 15  | 5400          |
| 66654     | 6960C-6     | 12                               | 18                               | 5                             | 100             | 250                 | 90                      | 4,90                                    | 2,9   | 44   | 26  | 9600          |
| 66662     | 6960C-8     | 18                               | 27                               | 8                             | 100             | 250                 | 120                     | 8,00                                    | 4,9   | 96   | 59  | 18900         |

\* at p max. or pD max.

\*\* pD = pressure during differential switching

### Design:

Hardened steel, burnished, with hydraulic cylinder mounted ready for connection to standard double circuit (see circuit Fig. 1) or differential circuit (see circuit Fig. 2). Oil supply via threaded port.

### Application:

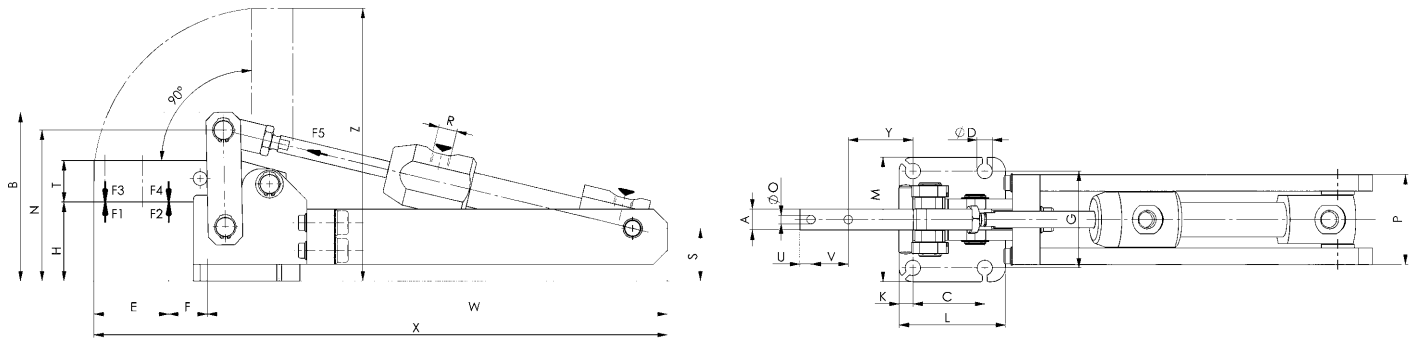
The clamp is particularly suitable for use in transfer and special-purpose machines. Any thrust pieces can be attached to the sturdy holding arm. With the differential circuit (see Fig. 2 below) the differential piston area A2 of the cylinder is directly connected to P of the pressure generator, while the full piston area is connected by a 3/2-way seat valve.

### Features:

The clamp, of machine quality, is maintenance-free thanks to its tempered and ground shafts which run in Teflon bearings. As a result of the hydraulic cylinder operation the possible clamping force is the same as the permissible holding force. The large aperture enables unhindered workpiece handling.

### Note:

Please urgently observe the maximum pressure values in the table above.



### Dimensions:

| Order no. | Article no. | Piston dia. [mm] | Piston rod dia. [mm] | A  | B   | C  | dia. D | E  | F  | G   | H  | K    | L     | M   | N   | dia. O | P  | R    | S  | T  | U  | V  | W     | X     | Y    | Z   |
|-----------|-------------|------------------|----------------------|----|-----|----|--------|----|----|-----|----|------|-------|-----|-----|--------|----|------|----|----|----|----|-------|-------|------|-----|
| 66647     | 6960C-4     | 20               | 12                   | 15 | 122 | 52 | 11     | 54 | 20 | 70  | 57 | 10,0 | 77,0  | 90  | 109 | 6,2    | 65 | G1/4 | 38 | 30 | 8  | 27 | 308,0 | 415,0 | 47,0 | 197 |
| 66654     | 6960C-6     | 25               | 16                   | 20 | 147 | 55 | 11     | 60 | 21 | 83  | 61 | 11,0 | 85,0  | 105 | 129 | 8,2    | 81 | G1/4 | 41 | 40 | 12 | 26 | 353,0 | 466,5 | 52,5 | 216 |
| 66662     | 6960C-8     | 32               | 20                   | 30 | 196 | 80 | 13     | 95 | 22 | 111 | 86 | 12,5 | 112,5 | 136 | 176 | 13,2   | 94 | G1/4 | 46 | 60 | 18 | 40 | 423,5 | 576,0 | 69,5 | 309 |

### Hydraulic diagrams:

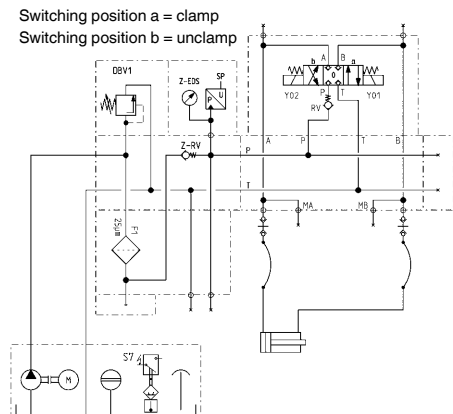


fig. 1

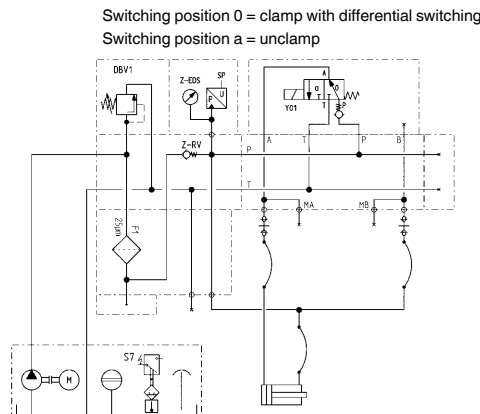


fig. 2

Subject to technical alterations.



## HYDRAULIC BORE CLAMPS FOR 5-SIDE MACHINING

- > clamping force up to 31 kN
- > operating pressure up to 350 bar
- > internal clamping
- > oil supply via threaded port or oil channel in the fixture body

### PRODUCT OVERVIEW:

| Type        | Clamping force [kN] | Bore hole diameter [mm] | No. of models | Oil connection | Operating mode |
|-------------|---------------------|-------------------------|---------------|----------------|----------------|
| 6970        | 4,0 - 31,0          | 8,8 - 25,9              | 17            | thread/o-ring  | single acting  |
| 6970-xx-50  | 3,5 - 11,5          | 6,8 - 14,7              | 8             | thread/o-ring  | single acting  |
| 6970D       | 5,0                 | 5,9 - 10,8              | 8             | o-Ring         | double acting  |
| 6970D       | 9,5                 | 10,9 - 16,8             | 6             | o-Ring         | double acting  |
| 6970CD MINI | 2,76                | 5,2 - 7,7               | 4             | o-Ring         | double acting  |
| 6970CD MAXI | 4,1 - 7,5           | 7,8 - 13,8              | 6             | o-Ring         | double acting  |

### PRODUCT EXAMPLES:

NO. 6970



> clamping force: 4 - 31 kN

NO. 6970D



> clamping force: 5,0 - 9,5 kN

NO. 6970CD



> clamping force: 2,76 - 5,0 kN

No. 6970

## Bore clamp, hydraulic, centric

Single-acting, with spring return,  
max. operating pressure 350 bar,  
min. operating pressure 30 bar.  
lateral compensation per clamp  $\pm 0.25$  mm.



| Order no. | Article no. | Clamping force vertical [kN] | Clamping rim height min. [mm] | Permissible horizontal force [kN] | Radial force of sleeve segments [kN] | dia. K [mm] | L  | Weight [g] |
|-----------|-------------|------------------------------|-------------------------------|-----------------------------------|--------------------------------------|-------------|----|------------|
| 63651     | 6970-09     | 4                            | 6                             | 1,2                               | 12                                   | 8,8-9,7     | 10 | 2600       |
| 60293     | 6970-10     | 4                            | 6                             | 1,2                               | 12                                   | 9,8-10,7    | 10 | 2600       |
| 60301     | 6970-11     | 10                           | 8                             | 3,0                               | 30                                   | 10,8-11,9   | 15 | 2600       |
| 60319     | 6970-12     | 10                           | 8                             | 3,0                               | 30                                   | 12,0-12,9   | 15 | 2600       |
| 63677     | 6970-13     | 10                           | 8                             | 3,0                               | 30                                   | 13,0-13,9   | 15 | 2600       |
| 60418     | 6970-14     | 10                           | 8                             | 3,0                               | 30                                   | 14,0-14,9   | 15 | 2600       |
| 60434     | 6970-15     | 26                           | 9                             | 7,7                               | 77                                   | 15,0-15,9   | 17 | 2800       |
| 60525     | 6970-16     | 26                           | 9                             | 7,7                               | 77                                   | 16,0-16,9   | 17 | 2800       |
| 60426     | 6970-17     | 26                           | 9                             | 7,7                               | 77                                   | 17,0-17,9   | 17 | 2800       |
| 63693     | 6970-18     | 26                           | 9                             | 7,7                               | 77                                   | 18,0-18,9   | 17 | 2800       |
| 60616     | 6970-19     | 26                           | 9                             | 7,7                               | 77                                   | 19,0-19,9   | 17 | 2800       |
| 60715     | 6970-20     | 31                           | 10                            | 9,2                               | 92                                   | 20,0-20,9   | 17 | 2900       |
| 60723     | 6970-21     | 31                           | 10                            | 9,2                               | 92                                   | 21,0-21,9   | 17 | 2900       |
| 63719     | 6970-22     | 31                           | 10                            | 9,2                               | 92                                   | 22,0-22,9   | 17 | 2900       |
| 60731     | 6970-23     | 31                           | 10                            | 9,2                               | 92                                   | 23,0-23,9   | 17 | 2900       |
| 60376     | 6970-24     | 31                           | 10                            | 9,2                               | 92                                   | 24,0-24,9   | 17 | 2900       |
| 60384     | 6970-25     | 31                           | 10                            | 9,2                               | 92                                   | 25,0-25,9   | 17 | 2900       |

### Design:

The actuating piston is single-acting. Cylinder body, clamping segments and tensioning bolts from hardened steel, gas-nitrided. Four-part clamping segments are externally serrated. A  $\varnothing 8$  H7 centring hole located on the underside of the clamping element. Two fastening screws are included in the supply scope. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments are applied to single-attachment clamping holes with low depth, a safe 5-sided processing can be performed without difficulty. Workpieces can be installed or removed automatically with handling devices.

### Features:

The tension bolt has the shape of a four-sided pyramid at the coupling point to the clamping sleeve. The clamping sleeve segments have this shape also, thus ensuring contact on the entire surface in every position of the tension bolt. This facilitates a high clamping force and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a maximum pull-down stroke of approx. 0.2 mm.

The tension bolt has a pyramid shape for improved pre-centring of workpieces.

The bore clamp is also the contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu 0.3$ ), thereby significantly increasing the displacement force.

The eccentric arrangement of the clamping elements is especially suited for clamping workpieces with circumferential contact edge, such as gear and engine housings, oil pans and similar workpieces.

### Note:

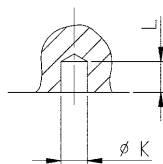
The lateral force when inserting the workpiece must not exceed the „lateral force“ table value. The radial force must be observed.

Please check with us for clamping hardened workpieces or those from GG / GGG.

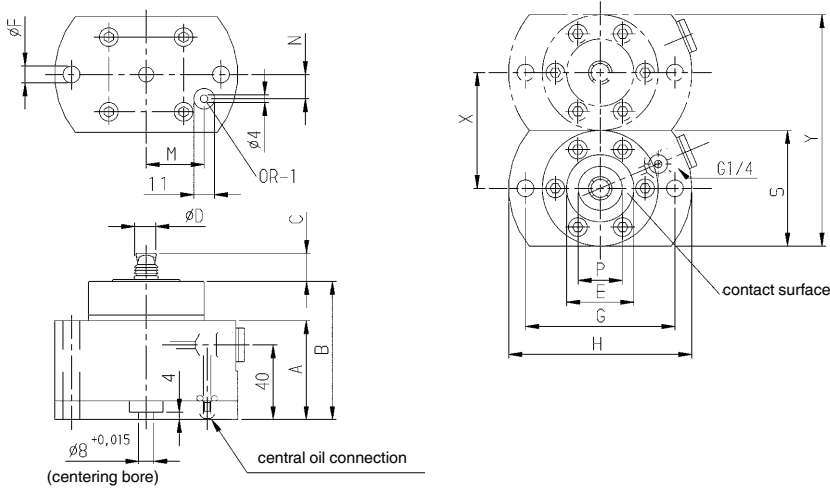
### On request:

Bore clamps for other hole diameters available upon request.

### Clamping hole in workpiece:



CAD



## Dimensions:

| Order no. | Article no. | Expansion of sleeve [mm] | Piston dia. [mm] | Vol. [cm <sup>3</sup> ] | Side load (unclamped) [N] | A  | B ±0.01 | C   | dia. D | E  | dia. F | G  | H   | M  | N  | P  | S  | X ±0.5 | Y   | OR-1 O-ring Order No. |
|-----------|-------------|--------------------------|------------------|-------------------------|---------------------------|----|---------|-----|--------|----|--------|----|-----|----|----|----|----|--------|-----|-----------------------|
| 63651     | 6970-09     | 1,4                      | 28               | 0,5                     | 50                        | 53 | 75      | 9,5 | 8,5    | 36 | 9      | 80 | 98  | 31 | 13 | 15 | 62 | 62     | 124 | 260448                |
| 60293     | 6970-10     | 1,4                      | 28               | 0,5                     | 50                        | 53 | 75      | 9,5 | 9,5    | 36 | 9      | 80 | 98  | 31 | 13 | 15 | 62 | 62     | 124 | 260448                |
| 60301     | 6970-11     | 1,7                      | 32               | 1,6                     | 150                       | 53 | 75      | 14  | 10,5   | 36 | 9      | 80 | 98  | 31 | 13 | 19 | 62 | 62     | 124 | 260448                |
| 60319     | 6970-12     | 1,7                      | 32               | 1,6                     | 150                       | 53 | 75      | 14  | 11,5   | 36 | 9      | 80 | 98  | 31 | 13 | 19 | 62 | 62     | 124 | 260448                |
| 63677     | 6970-13     | 1,7                      | 32               | 1,6                     | 150                       | 53 | 75      | 14  | 12,5   | 36 | 9      | 80 | 98  | 31 | 13 | 19 | 62 | 62     | 124 | 260448                |
| 60418     | 6970-14     | 1,7                      | 32               | 1,6                     | 150                       | 53 | 75      | 14  | 13,5   | 36 | 9      | 80 | 98  | 31 | 13 | 19 | 62 | 62     | 124 | 260448                |
| 60434     | 6970-15     | 1,7                      | 40               | 3,8                     | 200                       | 53 | 75      | 16  | 14,5   | 36 | 13     | 90 | 115 | 35 | 15 | 24 | 62 | 62     | 124 | 260448                |
| 60525     | 6970-16     | 1,7                      | 40               | 3,8                     | 200                       | 53 | 75      | 16  | 15,5   | 36 | 13     | 90 | 115 | 35 | 15 | 24 | 62 | 62     | 124 | 260448                |
| 60426     | 6970-17     | 1,7                      | 40               | 3,8                     | 200                       | 53 | 75      | 16  | 16,5   | 36 | 13     | 90 | 115 | 35 | 15 | 24 | 62 | 62     | 124 | 260448                |
| 63693     | 6970-18     | 1,7                      | 40               | 3,8                     | 200                       | 53 | 75      | 16  | 17,5   | 36 | 13     | 90 | 115 | 35 | 15 | 24 | 62 | 62     | 124 | 260448                |
| 60616     | 6970-19     | 1,7                      | 40               | 3,8                     | 200                       | 53 | 75      | 16  | 18,5   | 36 | 13     | 90 | 115 | 35 | 15 | 24 | 62 | 62     | 124 | 260448                |
| 60715     | 6970-20     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 19,5   | 36 | 13     | 90 | 115 | 35 | 15 | 28 | 62 | 62     | 124 | 260448                |
| 60723     | 6970-21     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 20,5   | 36 | 13     | 90 | 115 | 35 | 15 | 28 | 62 | 62     | 124 | 260448                |
| 63719     | 6970-22     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 21,5   | 36 | 13     | 90 | 115 | 35 | 15 | 28 | 62 | 62     | 124 | 260448                |
| 60731     | 6970-23     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 22,5   | 62 | 13     | 90 | 115 | 35 | 15 | 32 | 62 | 62     | 124 | 260448                |
| 60376     | 6970-24     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 23,5   | 62 | 13     | 90 | 115 | 35 | 15 | 32 | 62 | 62     | 124 | 260448                |
| 60384     | 6970-25     | 1,7                      | 42               | 4,4                     | 300                       | 53 | 75      | 16  | 24,5   | 62 | 13     | 90 | 115 | 35 | 15 | 32 | 62 | 62     | 124 | 260448                |



Subject to technical alterations.

## No. 6970

### Bore clamp, hydraulic, eccentric

Single-acting, with spring return,  
max. operating pressure 150 bar,  
min. operating pressure 30 bar.  
lateral compensation per clamp  $\pm 0.25$  mm.



| Order no. | Article no. | Clamping force vertical [kN] | Clamping rim height min. [mm] | dia. K [mm] | L  | Weight [g] |
|-----------|-------------|------------------------------|-------------------------------|-------------|----|------------|
| 63669     | 6970-07-50  | 3,5                          | 6                             | 6,8-7,7     | 10 | 2600       |
| 60798     | 6970-08-50  | 3,5                          | 6                             | 7,8-8,7     | 10 | 2600       |
| 63685     | 6970-09-50  | 5,3                          | 7                             | 8,8-9,7     | 10 | 2600       |
| 60814     | 6970-10-50  | 5,3                          | 7                             | 9,8-10,7    | 10 | 2800       |
| 63701     | 6970-11-50  | 8,5                          | 8                             | 10,8-11,7   | 13 | 2800       |
| 60830     | 6970-12-50  | 8,5                          | 8                             | 11,8-12,7   | 13 | 2800       |
| 63727     | 6970-13-50  | 11,5                         | 9                             | 12,8-13,7   | 13 | 2900       |
| 60822     | 6970-14-50  | 11,5                         | 9                             | 13,8-14,7   | 13 | 2900       |

#### Design:

The actuating piston is single-acting. Cylinder body, clamping segments and tensioning bolts are from hardened steel, gas-nitrided. Four-part clamping segments are externally serrated. A  $\varnothing 8$  H7 centring hole located on the underside for positioning the clamping element. Three fastening screws are included in the supply scope. Oil supply via threaded connection or oil channel in the fixture body.

#### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments engage into clamping holes attached on one side with low depth, reliable 5-sided machining does not present a problem. Workpieces can be installed or removed automatically with handling devices.

#### Features:

The tension bolt has the shape of a four-sided pyramid at the coupling point to the clamping sleeve. The clamping sleeve segments have this shape also, thus ensuring contact on the entire surface in every position of the tension bolt. This facilitates a high clamping force and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a maximum pull-down stroke of approx. 0.2 mm.

The tension bolt has a pyramid shape for improved pre-centring of workpieces.

The bore clamp is also a contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu 0.3$ ), thereby significantly increasing the displacement force.

The eccentric arrangement of the clamping elements is especially suited for clamping workpieces with circumferential contact edge, such as gear and engine housings, oil pans and similar workpieces.

#### Note:

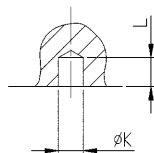
The lateral force when inserting the workpiece must not exceed the „lateral force“ table value. The radial force must be observed.

Please check with us for clamping hardened workpieces or those from GG / GGG.

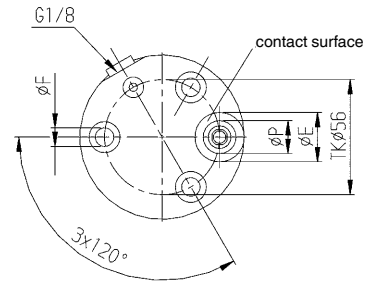
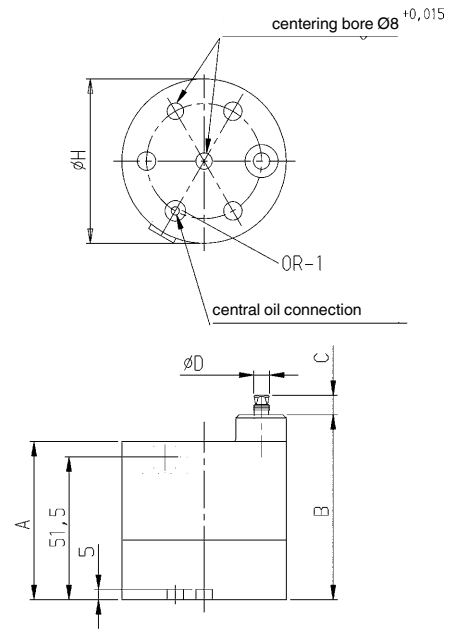
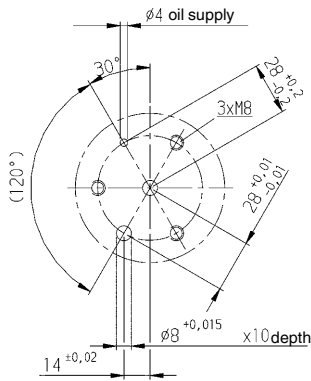
#### On request:

Bore clamps for other hole diameters available upon request.

#### Clamping hole in workpiece:



## Drilling template device:



## Dimensions:

| Order no. | Article no. | Permissible horizontal force [kN] | Radial force of sleeve segments [kN] | Expansion of sleeve [mm] | Piston dia. [mm] | Vol. [cm <sup>3</sup> ] | Side load (unclamped) [N] | A  | B ±0.01 | C   | D    | dia. E | dia. F | dia. H | dia. P | OR-1 O-ring Order No. |
|-----------|-------------|-----------------------------------|--------------------------------------|--------------------------|------------------|-------------------------|---------------------------|----|---------|-----|------|--------|--------|--------|--------|-----------------------|
| 63669     | 6970-07-50  | 1,0                               | 10                                   | 1,4                      | 18               | 1,0                     | 50                        | 59 | 75      | 9,5 | 6,6  | 24     | 9      | 80     | 15     | 260448                |
| 60798     | 6970-08-50  | 1,0                               | 10                                   | 1,4                      | 18               | 1,0                     | 50                        | 59 | 75      | 9,5 | 7,5  | 24     | 9      | 80     | 15     | 260448                |
| 63685     | 6970-09-50  | 1,5                               | 15                                   | 1,4                      | 22               | 1,5                     | 80                        | 59 | 75      | 9,5 | 8,5  | 24     | 9      | 80     | 15     | 260448                |
| 60814     | 6970-10-50  | 1,5                               | 15                                   | 1,4                      | 22               | 1,5                     | 80                        | 59 | 75      | 9,5 | 9,5  | 24     | 9      | 80     | 15     | 260448                |
| 63701     | 6970-11-50  | 2,5                               | 25                                   | 1,4                      | 28               | 2,5                     | 120                       | 59 | 75      | 12  | 10,5 | 24     | 9      | 80     | 19     | 260448                |
| 60830     | 6970-12-50  | 2,5                               | 25                                   | 1,4                      | 28               | 2,5                     | 120                       | 59 | 75      | 12  | 11,5 | 24     | 9      | 80     | 19     | 260448                |
| 63727     | 6970-13-50  | 3,5                               | 35                                   | 1,4                      | 32               | 3,2                     | 150                       | 59 | 75      | 12  | 12,5 | 24     | 9      | 80     | 19     | 260448                |
| 60822     | 6970-14-50  | 3,5                               | 35                                   | 1,4                      | 32               | 3,2                     | 150                       | 59 | 75      | 12  | 13,5 | 24     | 9      | 80     | 19     | 260448                |



Subject to technical alterations.

## No. 6970D

### Bore clamp, hydraulic, eccentric

double acting,  
max. operating pressure 250 bar,  
min. operating pressure 40 bar.  
Lateral compensation per clamp  $\pm 0,25$  mm.



| Order no. | Article no.  | Clamping force vertical [kN] | Clamping rim height min. for Al-alloy [mm] | dia. K [mm] | L  | Weight [g] |
|-----------|--------------|------------------------------|--|-------------|----|------------|
| 323410    | 6970D-06-60  | 5,0                          | 7  | 5,9 - 6,3   | 9  | 1000       |
| 324384    | 6970D-065-60 | 5,0                          | 7  | 6,4 - 6,8   | 9  | 1000       |
| 323436    | 6970D-07-60  | 5,0                          | 7  | 6,9 - 7,3   | 9  | 1000       |
| 324400    | 6970D-075-60 | 5,0                          | 7  | 7,4 - 7,8   | 9  | 1000       |
| 323444    | 6970D-08-60  | 5,0                          | 8  | 7,9 - 8,3   | 9  | 1000       |
| 324392    | 6970D-085-60 | 5,0                          | 8  | 8,4 - 8,8   | 10 | 1000       |
| 323469    | 6970D-09-60  | 5,0                          | 8  | 8,9 - 9,8   | 10 | 1000       |
| 323485    | 6970D-10-60  | 5,0                          | 8  | 9,9 - 10,8  | 10 | 1000       |

#### Design:

The actuating piston is double-acting. Cylinder body, clamping segments and tensioning bolts are from hardened steel, gas-nitrided. Two-part clamping segments are externally serrated. A  $\text{Ø } 8 \text{ H7}$  centring hole located on the underside for positioning the clamping elements. Supply scope includes three fastening screws. Oil supply via oil channel in fixture body.

#### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments engage into clamping holes attached on one side with low depth, reliable 5-sided machining does not present a problem. Workpieces can be installed or removed automatically with handling devices.

#### Features:

Two clamping segments are spread in parallel, thus ensuring contact on the entire surface in every position of the tension bolt. This facilitates a high clamping power and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a max. pull-down stroke of approx. 0.2 mm during clamping.

The integrated air connection is used for cleaning the clamping control. With a suction volume flow meter, the volume flow is measured in the unclamped and clamped state of the workpiece. The difference is used for clamping control. The max. operating pressure should not exceed 6 bar here.

The holding bolts are sword-shaped for better pre-centring of the workpieces. The complete clamping-segment / tension bolt unit can be turned so that an optimal force flow towards the workpiece centre can be set and locked. By setting the clamping elements, overloading of the clamping hole (spreading force) with low clamping rim is avoided.

The drill clamp is simultaneously a contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu 0,3$ ), which markedly increases the displacement force.

The eccentric arrangement of the clamping elements is especially suited for clamping workpieces with circumferential contact edge, such as gear and engine housings, oil pans and similar workpieces.

#### Note:

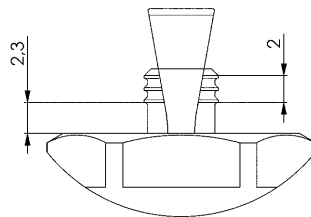
The lateral force when inserting the workpiece must not exceed the „lateral force“ table value. The radial force must be observed.

Please check with us for clamping hardened workpieces or those from GG / GGG.

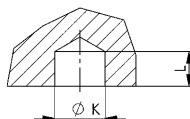
#### On request:

Drill clamps for other hole diameters available upon request.

A blow-out for cleaning the support or support control (pressure query) for blind holes is available on request.



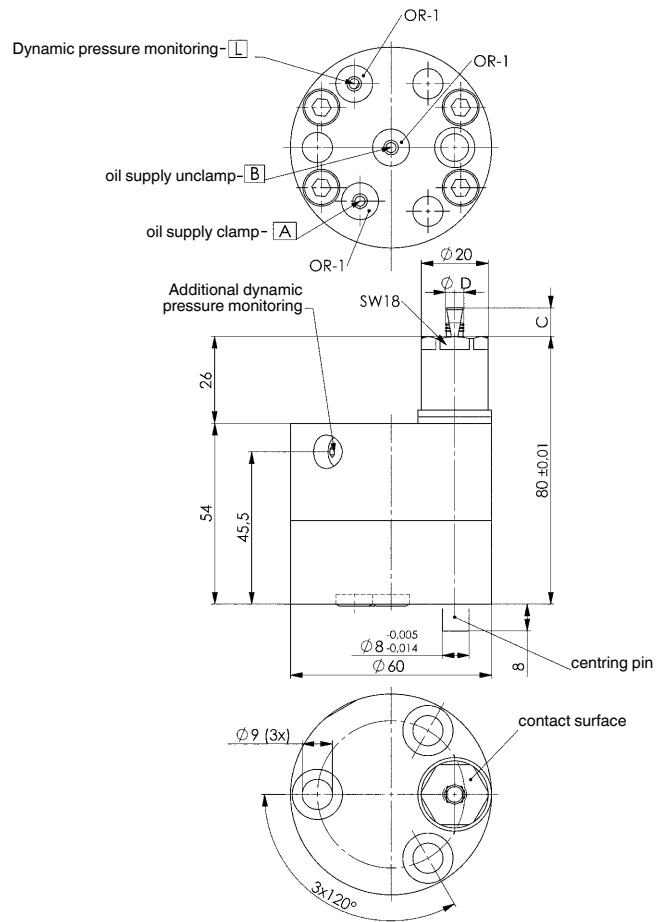
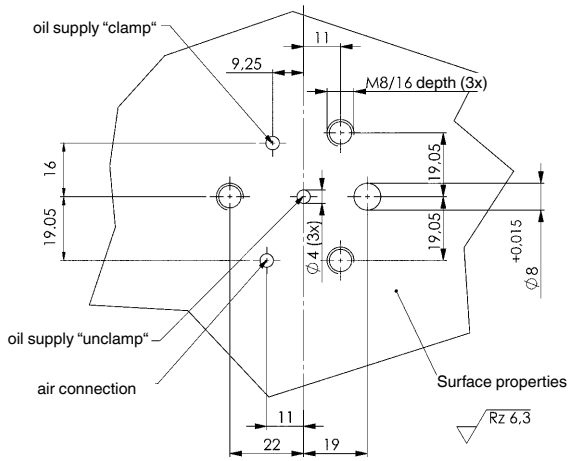
#### Clamping hole in workpiece:



CAD

Subject to technical alterations.

## Drilling template device:



## Dimensions:

| Order no. | Article no.  | Permissible horizontal force [kN] | Radial force of sleeve segments [kN] | Expansion of sleeve [mm] | Clamping piston diameter [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | Side load (unclamped) [N] | C   | dia. D | OR-1 O-ring Order No. |
|-----------|--------------|-----------------------------------|--------------------------------------|--------------------------|-------------------------------|----------------------------|----------------------------|---------------------------|-----|--------|-----------------------|
| 323410    | 6970D-06-60  | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 30                        | 9,5 | 5,6    | 260448                |
| 324384    | 6970D-065-60 | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 30                        | 9,5 | 6,1    | 260448                |
| 323436    | 6970D-07-60  | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 40                        | 9,5 | 6,6    | 260448                |
| 324400    | 6970D-075-60 | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 40                        | 9,5 | 7,1    | 260448                |
| 323444    | 6970D-08-60  | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 50                        | 9,5 | 7,6    | 260448                |
| 324392    | 6970D-085-60 | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 50                        | 9,5 | 8,1    | 260448                |
| 323469    | 6970D-09-60  | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 80                        | 9,5 | 8,6    | 260448                |
| 323485    | 6970D-10-60  | 1,5                               | 14                                   | 1,5                      | 16                            | 0,9                        | 0,5                        | 80                        | 9,5 | 9,6    | 260448                |



## No. 6970D

### Bore clamp, hydraulic, eccentric

double acting,  
max. operating pressure 250 bar,  
min. operating pressure 40 bar.  
Lateral compensation per clamp  $\pm 0,25$  mm.



| Order no. | Article no. | Clamping force vertical [kN] | Clamping rim height min. for Al-alloy [mm] | dia. K [mm] | L  | Weight [g] |
|-----------|-------------|------------------------------|--|-------------|----|------------|
| 323501    | 6970D-11-60 | 9,5                          | 9  | 10,9 - 11,8 | 11 | 2000       |
| 323527    | 6970D-12-60 | 9,5                          | 9  | 11,9 - 12,8 | 11 | 2000       |
| 323543    | 6970D-13-60 | 9,5                          | 9  | 12,9 - 13,8 | 11 | 2000       |
| 323568    | 6970D-14-60 | 9,5                          | 10   | 13,9 - 14,8 | 11 | 2100       |
| 323584    | 6970D-15-60 | 9,5                          | 10   | 14,9 - 15,8 | 11 | 2100       |
| 323600    | 6970D-16-60 | 9,5                          | 10   | 15,9 - 16,8 | 11 | 2100       |

#### Design:

The actuating piston is double-acting. Cylinder body, clamping segments and tensioning bolts are from hardened steel, gas-nitrided. Two-part clamping segments are externally serrated. A  $\text{Ø } 8$  H7 centring hole located on the underside for positioning the clamping elements. Supply scope includes three fastening screws. Oil supply via oil channel in fixture body.

#### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments engage into clamping holes attached on one side with low depth, reliable 5-sided machining does not present a problem. Workpieces can be installed or removed automatically with handling devices.

#### Features:

Two clamping segments are spread in parallel, thus ensuring contact on the entire surface in every position of the tension bolt. This facilitates a high clamping power and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a max. pull-down stroke of approx. 0.2 mm during clamping.

The integrated air connection is used for cleaning the clamping control. With a suction volume flow meter, the volume flow is measured in the unclamped and clamped state of the workpiece. The difference is used for clamping control. The max. operating pressure should not exceed 6 bar here.

The holding bolts are sword-shaped for better pre-centring of the workpieces. The complete clamping-segment / tension bolt unit can be turned so that an optimal force flow towards the workpiece centre can be set and locked. Overloading of the clamping hole (spreading force) with low clamping rim is avoided by setting the clamping elements.

The drill clamp is simultaneously the contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu 0.3$ ), which markedly increases the displacement force.

The eccentric arrangement of the clamping elements is especially suited for clamping workpieces with circumferential contact edge, such as gear and engine housings, oil pans and similar workpieces.

#### Note:

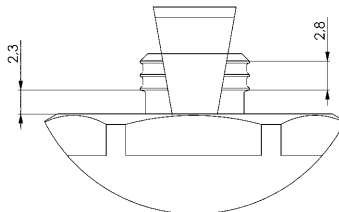
The lateral force when inserting the workpiece must not exceed the „lateral force“ table value. The radial force must be observed.

Please check with us for clamping hardened workpieces or those from GG / GGG.

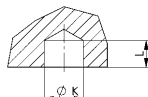
#### On request:

Drill clamps for other hole diameters available upon request.

A blow-out for cleaning the support or support control (pressure query) for blind holes is available on request.



#### Clamping hole in workpiece:



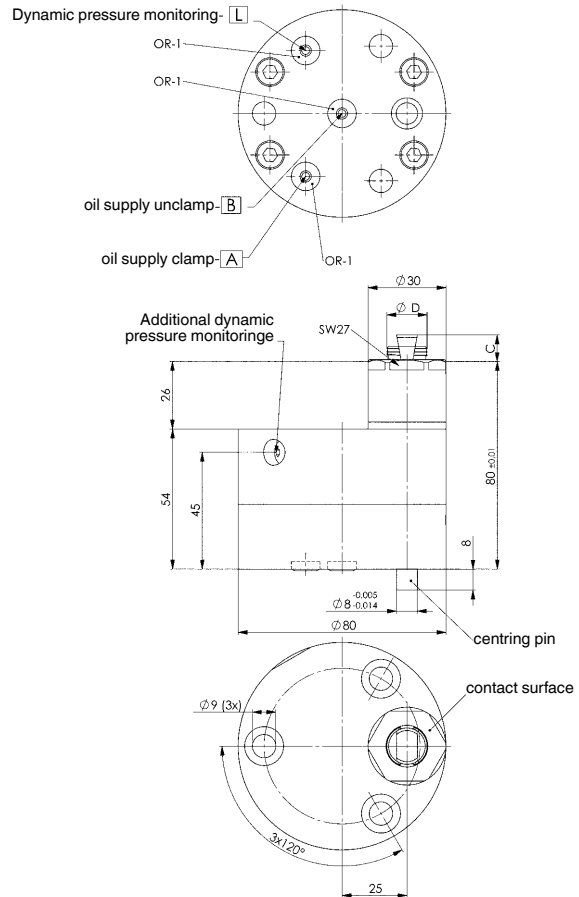
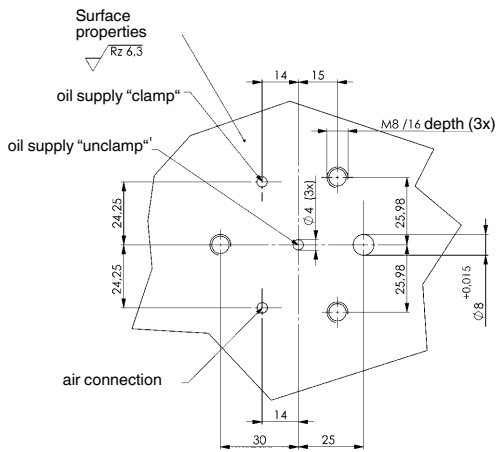
CAD



Subject to technical alterations.



## Drilling template device:



## Dimensions:

| Order no. | Article no. | Permissible horizontal force [kN] | Radial force of sleeve segments [kN] | Expansion of sleeve [mm] | Clamping piston diameter [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | Side load (unclamped) [N] | C    | dia. D | OR-1 O-ring Order No. |
|-----------|-------------|-----------------------------------|--------------------------------------|--------------------------|-------------------------------|----------------------------|----------------------------|---------------------------|------|--------|-----------------------|
| 323501    | 6970D-11-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 100                       | 10,5 | 10,6   | 260448                |
| 323527    | 6970D-12-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 110                       | 10,5 | 11,6   | 260448                |
| 323543    | 6970D-13-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 130                       | 10,5 | 12,6   | 260448                |
| 323568    | 6970D-14-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 160                       | 10,5 | 13,6   | 260448                |
| 323584    | 6970D-15-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 200                       | 10,5 | 14,6   | 260448                |
| 323600    | 6970D-16-60 | 2,8                               | 27                                   | 1,5                      | 22                            | 1,7                        | 0,5                        | 250                       | 10,5 | 15,6   | 260448                |

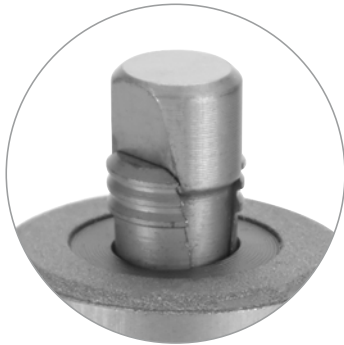
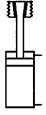


Subject to technical alterations.

## No. 6970CD

### Bore clamp MINI, hydraulic, centric

Double-acting,  
max. operating pressure, see table,  
min. operating pressure 40 bar,  
lateral compensation per clamp  $\pm 0.2$  mm.



| Order no. | Article no. | Clamping force vertical at 100 bar [kN] | Clamping force vertical at 150 bar [kN] | Clamping rim height min. for Al-alloy [mm] | dia. K    | L   | Md [Nm] | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|---|---|--|-----------|-----|---------|-------------------------------|------------|
| 556561    | 6970CD-055  | 2,76                                    | -                                       | 5  | 5,2 - 5,9 | 8,5 | 3,7     | 100                           | 273        |
| 556562    | 6970CD-06   | 2,76                                    | 4,1                                     | 5  | 6,0 - 6,7 | 8,5 | 3,7     | 150                           | 274        |
| 556563    | 6970CD-065  | 2,76                                    | 4,1                                     | 5  | 6,6 - 7,2 | 8,5 | 3,7     | 150                           | 274        |
| 556564    | 6970CD-07   | 2,76                                    | 4,1                                     | 5  | 7,0 - 7,7 | 8,5 | 3,7     | 150                           | 275        |

#### Design:

The actuating piston is double-acting. Body, clamping segments and tension bolts are made of nitrided tempered steel. Two-part clamping segments are externally interlocked. Four fastening screws are supplied as standard. Oil supply via oil channel in fixture body.

#### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments are applied to single-attachment clamping holes with low depth, a secure 5-sided processing can be performed without difficulty. Workpieces can be installed or removed automatically with handling devices.

#### Features:

Two clamping segments are spread in parallel, thus ensuring contact on the entire surface in every position of the tension bolt. This facilitates a high clamping power and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a max. pull-down stroke of approx. 0.2 mm during clamping. The integrated air connection L1 is used for cleaning the clamping area. This blow-off can also be used as a mount check for blind holes.

The integrated air connection is used for cleaning the clamping control. With a suction volume flow meter, the volume flow is measured in the unclamped and clamped state of the workpiece. The difference is used for clamping control. The max. operating pressure should not exceed 6 bar here.

The tension bolts are sword-shaped for better pre-positioning of the workpieces. The complete clamping-segment / tension bolt unit can be turned 90° so that an optimal force flow towards the workpiece centre can be set and locked. By setting the clamping elements, overloading of the clamping hole (spreading force) with low clamping rim is avoided. The drill clamp is also a contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu = 0.3$ ), which markedly increases the displacement force.

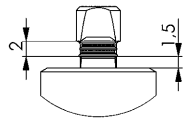
#### Note:

The lateral force when inserting the workpiece must not exceed the "lateral force" table value. The radial force must be observed.

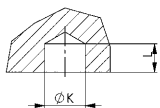
**Please contact us if clamping hardened or cast workpieces.**

#### On request:

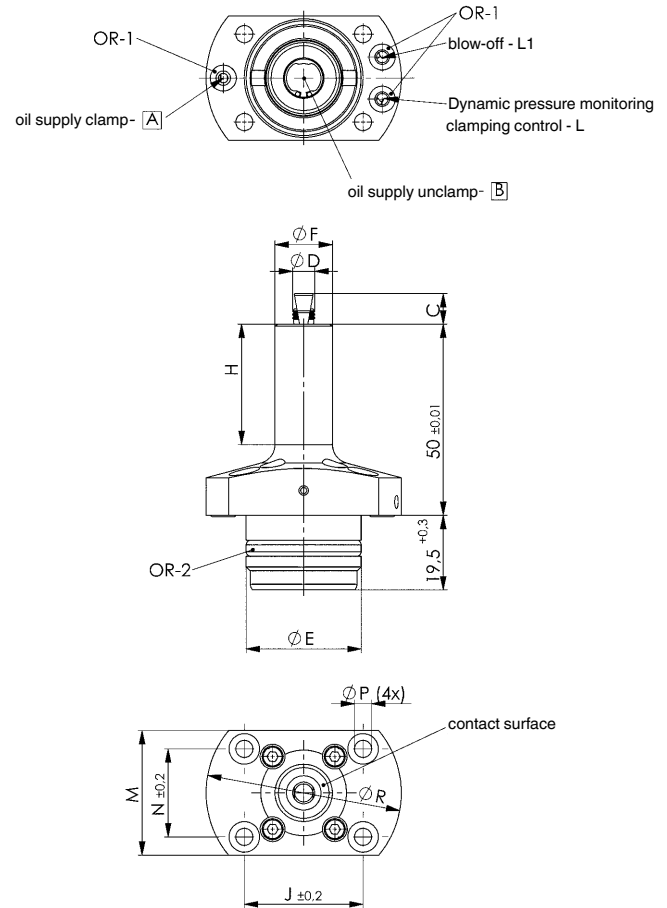
Bore clamps for other hole diameters available upon request.



#### Clamping hole in workpiece:

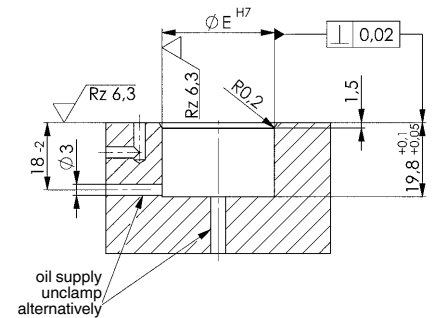


CAD



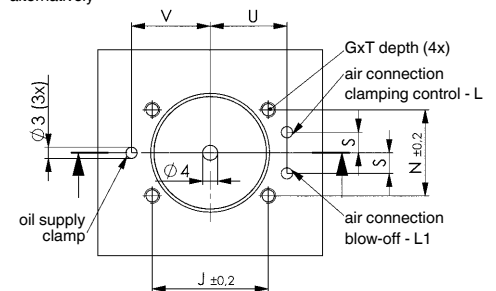
## Dimensions:

| Order no. | Article no. | Displacement force horizontal at 100 bar [kN] | Displacement force horizontal at 150 bar [kN] | Clamping sleeve radial force at 100 bar [kN] | Clamping sleeve radial force at 150 bar [kN] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | C | dia. D | dia. E | dia. F | H    | J  | M    | N  | P   | R  | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|---|---|--|--|----------------------------|----------------------------|---|--------|--------|--------|------|----|------|----|-----|----|-----------------------|-----------------------|
| 556561    | 6970CD-055  | 0,83  | -   | 7,85   | -  | 1,1                        | 1,26                       | 8 | 5,0    | 30     | 15     | 31,5 | 31 | 32,6 | 23 | 4,5 | 51 | 176164                | 490342                |
| 556562    | 6970CD-06   | 0,83  | 1,23  | 7,85   | 11,78  | 1,1                        | 1,26                       | 8 | 5,8    | 30     | 15     | 31,5 | 31 | 32,6 | 23 | 4,5 | 51 | 176164                | 490342                |
| 556563    | 6970CD-065  | 0,83  | 1,23  | 7,85   | 11,78  | 1,1                        | 1,26                       | 8 | 6,3    | 30     | 15     | 31,5 | 31 | 32,6 | 23 | 4,5 | 51 | 176164                | 490342                |
| 556564    | 6970CD-07   | 0,83  | 1,23  | 7,85   | 11,78  | 1,1                        | 1,26                       | 8 | 6,8    | 30     | 15     | 31,5 | 31 | 32,6 | 23 | 4,5 | 51 | 176164                | 490342                |



## Installation dimensions:

| Order no. | Article no. | ØE H7 | G  | S   | T | U    | V  |
|-----------|-------------|-------|----|-----|---|------|----|
| 556561    | 6970CD-055  | 30    | M4 | 5,5 | 8 | 20,5 | 21 |
| 556562    | 6970CD-06   | 30    | M4 | 5,5 | 8 | 20,5 | 21 |
| 556563    | 6970CD-065  | 30    | M4 | 5,5 | 8 | 20,5 | 21 |
| 556564    | 6970CD-07   | 30    | M4 | 5,5 | 8 | 20,5 | 21 |

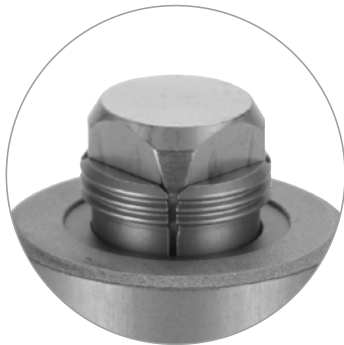
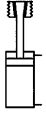


Subject to technical alterations.

## No. 6970CD

### Bore clamp MAXI, hydraulic, centric

Double-acting,  
max. operating pressure 150 bar,  
min. operating pressure 40 bar,  
lateral compensation per clamp  $\pm 0.25$  mm.



| Order no. | Article no. | Clamping force vertical at 100 bar [kN] | Clamping force vertical at 150 bar [kN] | Clamping rim height min. for Al-alloy [mm] | dia. K      | L | Md [Nm] | Weight [g] |
|-----------|-------------|---|---|--|-------------|---|---------|------------|
| 556565    | 6970CD-08   | 2,76                                    | 4,1                                     | 5  | 7,8 - 8,6   | 9 | 3,7     | 298        |
| 556566    | 6970CD-09   | 4,4                                     | 6,6                                     | 6  | 8,7 - 9,6   | 9 | 7,2     | 413        |
| 556567    | 6970CD-10   | 4,4                                     | 6,6                                     | 6  | 9,7 - 10,7  | 9 | 7,2     | 413        |
| 556568    | 6970CD-11   | 5,0                                     | 7,5                                     | 8  | 10,8 - 11,8 | 9 | 10,0    | 530        |
| 556569    | 6970CD-12   | 5,0                                     | 7,5                                     | 8  | 11,9 - 12,8 | 9 | 10,0    | 532        |
| 556570    | 6970CD-13   | 5,0                                     | 7,5                                     | 8  | 12,9 - 13,8 | 9 | 10,0    | 535        |

#### Design:

The actuating piston is double-acting. Body, clamping segments and tension bolts are made of nitrided tempered steel. Four-part clamping segments are externally interlocked. Four fastening screws are supplied as standard. Oil supply via oil channel in fixture body.

#### Application:

The hydraulic bore clamp is preferred for use on workpieces with complex external geometries that must be clamped for machining. After the clamping segments are applied to single-attachment clamping holes with low depth, a secure 5-sided processing can be performed without difficulty. Workpieces can be installed or removed automatically with handling devices.

#### Features:

The tension bolt has the shape of a four-sided pyramid at the coupling point to the clamping sleeve. The clamping sleeve segments have this shape also, thus ensuring the sleeve segments have contact on the entire surface in every position of the tension bolt. This facilitates a high clamping power and ensures very low wear. Elastic rings hold the clamping segments together and seal them against entry of chips. Depending on the material, the external serration is pressed into the clamping hole with more or less force, thus permitting the required positive fit. The built-in plate springs achieve a max. pull-down stroke of approx. 0.2 mm during clamping. The integrated air connection L1 is used for cleaning the clamping area. This blow-off can also be used as a mount check for blind holes.

The integrated air connection is used for cleaning the clamping control. With a suction volume flow meter, the volume flow is measured in the unclamped and clamped state of the workpiece. The difference is used for clamping control. The max. operating pressure should not exceed 6 bar here.

The tension bolt has a pyramid shape for better pre-positioning of the workpieces. The drill clamp is also a contact surface for the workpiece. The workpiece contact surface is hard-metal coated ( $\mu = 0.3$ ), which markedly increases the displacement force.

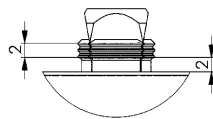
#### Note:

The lateral force when inserting the workpiece must not exceed the "lateral force" table value. The radial force must be observed.

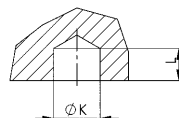
**Please contact us if clamping hardened or cast workpieces.**

#### On request:

Bore clamps for other hole diameters available upon request.



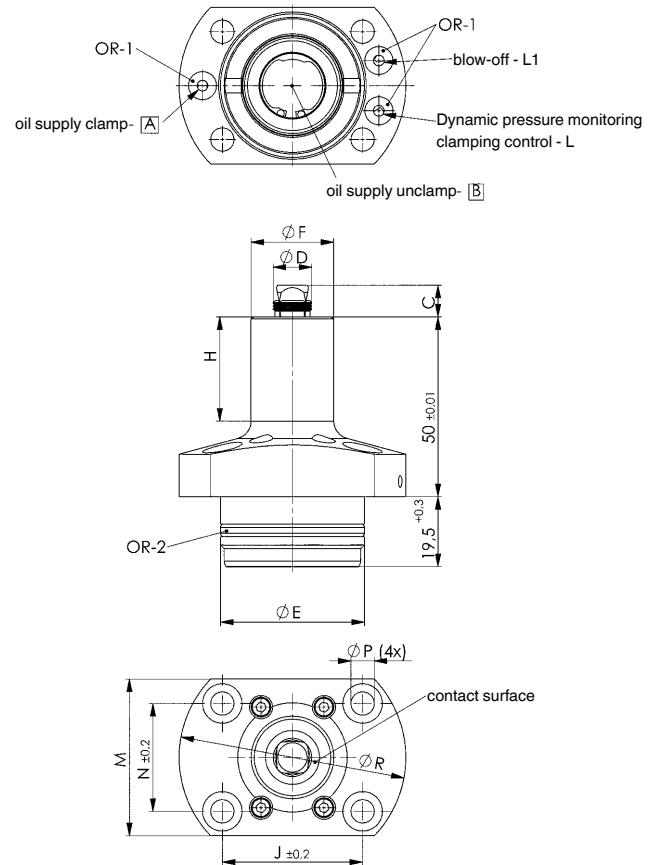
#### Clamping hole in workpiece:



CAD

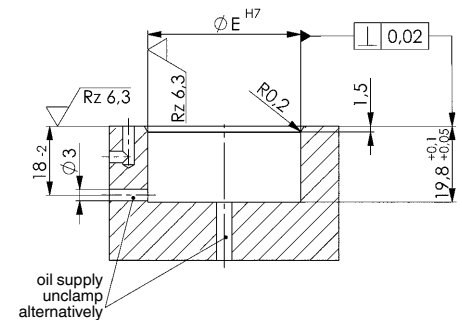


Subject to technical alterations.



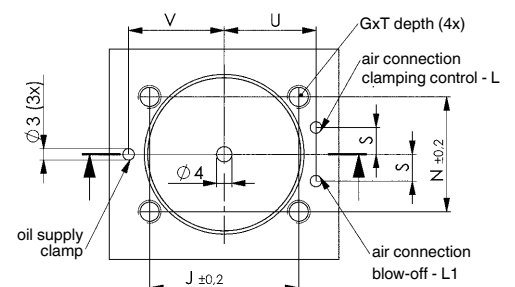
## Dimensions:

| Order no. | Article no. | Displacement force horizontal at 100 bar [kN] | Displacement force horizontal at 150 bar [kN] | Clamping sleeve radial force at 100 bar [kN] | Clamping sleeve radial force at 150 bar [kN] | Vol. Sp [cm³] | Vol. Lo [cm³] | C   | dia. D | dia. E | dia. F | H    | J  | M    | N  | P   | R  | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|---|---|--|--|---------------|---------------|-----|--------|--------|--------|------|----|------|----|-----|----|-----------------------|-----------------------|
| 556565    | 6970CD-08   | 0,83  | 1,23  | 7,85   | 11,78  | 1,10          | 1,26          | 8,5 | 7,6    | 30     | 18     | 31,5 | 31 | 32,6 | 23 | 4,5 | 51 | 176164                | 490342                |
| 556566    | 6970CD-09   | 1,32  | 1,98  | 12,47  | 18,71  | 1,76          | 1,96          | 8,8 | 8,6    | 37     | 20     | 31,5 | 38 | 39,6 | 29 | 5,5 | 60 | 161802                | 492728                |
| 556567    | 6970CD-10   | 1,32  | 1,98  | 12,47  | 18,71  | 1,76          | 1,96          | 8,8 | 9,6    | 37     | 20     | 31,5 | 38 | 39,6 | 29 | 5,5 | 60 | 161802                | 492728                |
| 556568    | 6970CD-11   | 1,51  | 2,26  | 14,26  | 21,39  | 2,01          | 2,46          | 8,8 | 10,7   | 40     | 23     | 29,0 | 39 | 43,6 | 30 | 6,5 | 63 | 161802                | 321117                |
| 556569    | 6970CD-12   | 1,51  | 2,26  | 14,26  | 21,39  | 2,01          | 2,46          | 8,8 | 11,7   | 40     | 23     | 29,0 | 39 | 43,6 | 30 | 6,5 | 63 | 161802                | 321117                |
| 556570    | 6970CD-13   | 1,51  | 2,26  | 14,26  | 21,39  | 2,01          | 2,46          | 8,8 | 12,7   | 40     | 23     | 29,0 | 39 | 43,6 | 30 | 6,5 | 36 | 161802                | 321117                |



## Installation dimensions:

| Order no. | Article no. | ØE H7 | G  | S   | T  | U  | V  |
|-----------|-------------|-------|----|-----|----|----|----|
| 556565    | 6970CD-08   | 30    | M4 | 5,5 | 8  | 24 | 25 |
| 556566    | 6970CD-09   | 37    | M5 | 7,0 | 10 | 24 | 25 |
| 556567    | 6970CD-10   | 37    | M5 | 7,0 | 10 | 24 | 25 |
| 556568    | 6970CD-11   | 40    | M6 | 7,0 | 12 | 24 | 25 |
| 556569    | 6970CD-12   | 40    | M6 | 7,0 | 12 | 24 | 25 |
| 556570    | 6970CD-13   | 40    | M6 | 7,0 | 12 | 24 | 25 |



Subject to technical alterations.



Subject to technical alterations.

# PULL-DOWN CLAMPS AND SIDE CLAMPING ELEMENTS WITHOUT PULL-DOWN ACTION FOR OPTIMAL 3-SIDED MACHINING

## PULL-DOWN CLAMP

- > clamping force up to 50 kN (single acting),
- > clamping force up to 32 kN (double acting)
- > operating pressure up to 400 bar
- > independent of clamping and pull-down stroke
- > oil supply via threaded port or oil channel in the fixture body

## SIDE CLAMPING ELEMENT

- > clamping force up to 27,5 kN
- > operating pressure up to 250 bar
- > lateral clamping without pull-down action
- > oil supply through oil channels in the fixture body

At continuous pressures below 80 bar, this must be stated on ordering as a different seal combination may need to be selected.

## PRODUCT OVERVIEW:

| Type    | Operating pressure [bar] | Clamping force [kN] | Clamping stroke [mm] | No. of models | Oil connection | Operating mode |
|---------|--------------------------|---------------------|----------------------|---------------|----------------|----------------|
| 6972F   | 400                      | 4,5 - 50,0          | 5 - 12               | 4             | thread/o-Ring  | single acting  |
| 6972D   | 400                      | 12,0 - 32,0         | 8 - 12               | 3             | thread/o-Ring  | double acting  |
| 6973    | 350                      | 8,9                 | 5                    | 2             | thread/o-Ring  | single acting  |
| 6978CDA | 250                      | 27,5                | 3                    | 1             | o-Ring         | double acting  |
| 6978CD  | 250                      | 27,5                | 3                    | 1             | o-Ring         | double acting  |

## PRODUCT EXAMPLES:

NO. 6972D



- > clamping force: 4,5 - 32 kN
- > lateral clamping with pull-down action

NO. 6973



- > clamping force: 8,9 kN
- > lateral clamping with pull-down action

NO. 6978CDA



- > clamping force: 27,5 kN
- > lateral clamping without pull-down action

## No. 6972F

### Pull-Down Clamp, hydraulic

single acting, spring return,  
max. operating pressure 400 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | Clamping force at 400 bar [kN] | Stroke H [mm] | Piston dia. [mm] | Vol. [cm <sup>3</sup> ] | Md max. [Nm] | Spring force min. [N] | Weight [g] |
|-----------|-------------|--------------------------------|---------------|------------------|-------------------------|--------------|-----------------------|------------|
| 66951     | 6972F-05    | 4,5                            | 5             | 12               | 0,57                    | 21           | 60                    | 670        |
| 66969     | 6972F-20    | 20,0                           | 8             | 25               | 4                       | 72           | 160                   | 2500       |
| 66977     | 6972F-32    | 32,0                           | 10            | 32               | 8                       | 180          | 210                   | 4700       |
| 66985     | 6972F-50    | 50,0                           | 12            | 40               | 15                      | 350          | 340                   | 8800       |

### Design:

Cylinder body from hardened steel, burnished. Piston case hardened and ground. Exchangeable jaws. Standard version with serrated and hardened jaws. Complete with 2 fastening screws to ISO, built-in return spring. All oil channels are sealed. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Pull-down clamps are used whenever clamping is possible only laterally and the workpiece nevertheless has to be held firmly on the machine tool table. The hydraulic principle enables high pressing and pull-down forces. Mounting by two bolts from above or by four bolts from the bottom.

### Features:

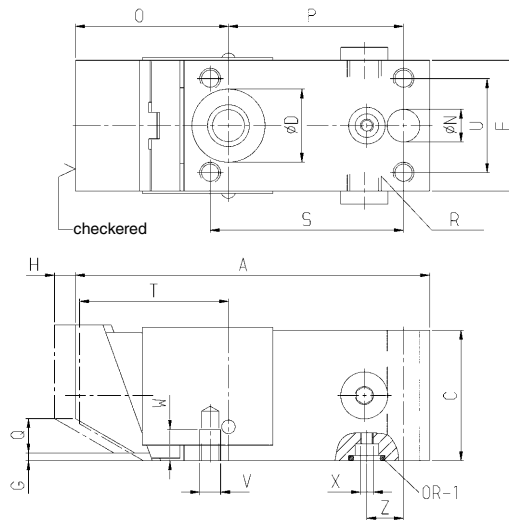
Horizontal and vertical movement is independent of each other (no locked coupling) giving a true pull-down effect. No raising of the clamping jaw, because the clamping bolt is right behind the jaw. Suitable for incorporation in fixtures. New design of jaw connection with rubber buffer ensures sliding without any play.

### Note:

The maximum pull-down stroke of the jaw must not exceed dimension G. Do not overtighten the fastening screws! Observe max. tightening torque Md. The oil channel can be sealed from below. High variability by oil connection on two sides and bottom oil channel. Jaw and hydraulic piston are connected by a joint to prevent the induction of bending forces into the piston, thus increasing the element's service life.

Pull-down force = approx. 1/3 the applicable clamp force

The hole ØD can be used for additional support or positioning.



### Dimensions:

| Order no. | Article no. | ~A    | C  | F  | G | H  | dia. N | O ±0.5 | P  | Q  | R    | S   | T    | U  | V   | W  | X  | Z    | Screw (2 pieces) | ØD +0.05 x depth | OR-1 O-ring Order No. |
|-----------|-------------|-------|----|----|---|----|--------|--------|----|----|------|-----|------|----|-----|----|----|------|------------------|------------------|-----------------------|
| 66951     | 6972F-05    | 100,0 | 30 | 30 | 2 | 5  | 8,5    | 39,0   | 53 | 3  | G1/8 | 59  | 38,0 | 22 | M5  | 6  | M3 | 13,0 | M8x45            | -                | 156067                |
| 66969     | 6972F-20    | 135,0 | 50 | 50 | 3 | 8  | 12,5   | 58,0   | 67 | 14 | G1/4 | 74  | 57,0 | 36 | M8  | 12 | M5 | 14,0 | M12x80           | 28,00 x 6        | 114405                |
| 66977     | 6972F-32    | 149,5 | 65 | 65 | 3 | 10 | 16,5   | 63,5   | 72 | 17 | G1/4 | 83  | 62,5 | 47 | M10 | 16 | M5 | 17,5 | M16x100          | 32,02 x 6        | 114405                |
| 66985     | 6972F-50    | 180,0 | 80 | 80 | 3 | 12 | 20,5   | 71,0   | 93 | 19 | G1/4 | 104 | 70,0 | 60 | M12 | 25 | M5 | 21,0 | M20x120          | 40,02 x 8        | 114405                |

CAD



Subject to technical alterations.



## No. 6972D

### Pull-Down Clamp, hydraulic

double acting,  
max. operating pressure 400 bar.



| Order no. | Article no. | Clamping force at 400 bar Sp* [kN] | Clamping force at 400 bar Lo* [kN] | Stroke H [mm] | Piston dia. [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|------------------------------------|------------------------------------|---------------|------------------|----------------------------|----------------------------|--------------|------------|
| 320150    | 6972D-12    | 12                                 | 4,5                                | 8             | 20               | 2,5                        | 0,9                        | 17           | 1500       |
| 320168    | 6972D-20    | 20                                 | 9,6                                | 10            | 25               | 4,9                        | 2,5                        | 25           | 2900       |
| 320614    | 6972D-32    | 32                                 | 12,5                               | 12            | 32               | 9,7                        | 4,0                        | 46           | 4900       |

Sp = clamp, Lo = unclamp

### Design:

Cylinder body from hardened steel, burnished. Piston case hardened and ground. Exchangeable jaws. Standard version with serrated and hardened jaws. Complete with 4 fastening screws to ISO, O-ring and oil plugs, particle wiper at clamping bolt. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Pull-down clamps are used whenever clamping is possible only laterally and the workpiece nevertheless has to be held firmly on the fixture body. The hydraulic principle facilitates high pressing and pull-down forces. This clamp can be used on fixture bodies with manifold-type oil supply. Fastening is facilitated from above by four screws.

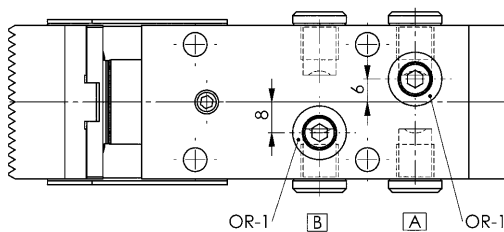
### Features:

Quick and safe return movement, independent of the line lengths or the numbers of elements in the circuit. Independent horizontal and vertical movement (no locked coupling), giving a true pull-down effect. Lifting of the clamping jaw is prevented by the location of the clamping bolt right behind the jaw. Suitable for incorporation in fixtures. New design of jaw connection with rubber buffer ensures a sliding without any play.

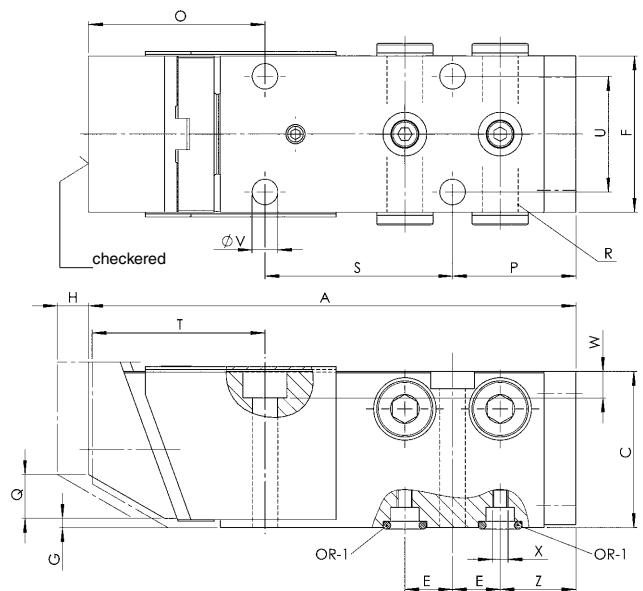
### Note:

The maximum pull-down stroke of the jaw must not exceed dimension G. Do not overtighten the mounting fasteners! The maximum permissible torque must not be exceeded. The bottom oil channel is plugged by a sealing washer and a ISO 4762 - M 5x10 bolt. Minimum operating pressure is 40 bar. High variability by oil connection on two sides and bottom oil channel. Jaw and hydraulic piston are connected by a joint to prevent the induction of bending forces into the piston, thus increasing the element's service life. Pull-down force is equal to approx. 1/3 of the corresponding clamping force.

6972D-12



6972D-20, 6972D-32



### Dimensions:

| Order no. | Article no. | ~A  | C  | E     | F  | G | H  | O ±0,5 | P    | Q    | R    | S  | T    | U ±0,1 | dia. V | W    | X  | Z    | Screw (4 pieces) | OR-1 O-ring Order No. |
|-----------|-------------|-----|----|-------|----|---|----|--------|------|------|------|----|------|--------|--------|------|----|------|------------------|-----------------------|
| 320150    | 6972D-12    | 122 | 40 | 12,50 | 40 | 2 | 8  | 40,5   | 36,5 | 8,5  | G1/8 | 45 | 39,5 | 30     | 6,2    | 7,0  | M5 | 24,0 | M6x50            | 114405                |
| 320168    | 6972D-20    | 156 | 50 | 15,25 | 50 | 3 | 10 | 56,5   | 39,5 | 14,0 | G1/4 | 60 | 55,5 | 37     | 8,2    | 8,5  | M5 | 24,3 | M8x60            | 114405                |
| 320614    | 6972D-32    | 167 | 65 | 15,25 | 65 | 3 | 12 | 64,0   | 42,8 | 17,0 | G1/4 | 60 | 63,0 | 48     | 10,2   | 10,5 | M5 | 27,5 | M10x75           | 114405                |

CAD



Subject to technical alterations.

No. 6977

## Pull-down counter-hold, mechanical



| Order no. | Article no. | Holding force [kN] | Screw (2 pieces) | Weight [g] |
|-----------|-------------|--------------------|------------------|------------|
| 67371     | 6977-05     | 4,5                | M8x35            | 550        |
| 67512     | 6977-20     | 20                 | M12x65           | 1550       |
| 67421     | 6977-32     | 32                 | M16x80           | 3000       |
| 67520     | 6977-50     | 50                 | M20x100          | 5200       |

### Design:

Cylinder body made of tempering steel, blued. Exchangeable jaws. Standard version with serrated and hardened jaw. Jaw exchangeable. Complete with two mounting bolts (ISO).

### Application:

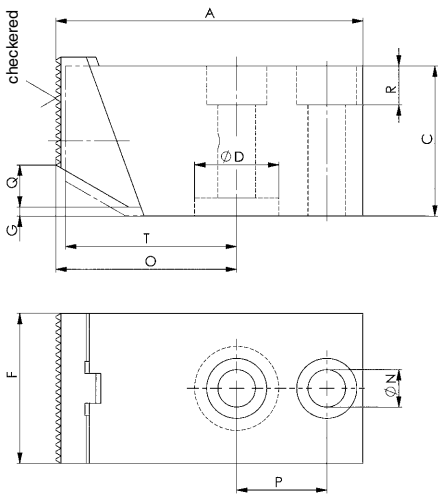
Purely a counter-hold when using a hydraulic or mechanical pull-down clamp. The workpiece is pulled down onto the machine table by the horizontal force that is applied.

### Features:

The smooth clamping jaw moves always against the machine tool table surface, i.e. the stop position is always the same. Clamping on slotted table possible lengthwise and crosswise. No raising of the clamping jaw, because the clamping bolt is right behind the jaw. Suitable for incorporation in fixtures. New design of jaws connection with rubber buffer ensures sliding without any play.

### Note:

The maximum pull-down stroke of the jaw must not exceed dimension G. The hole  $\varnothing D$  can be used for additional support or positioning.



### Dimensions:

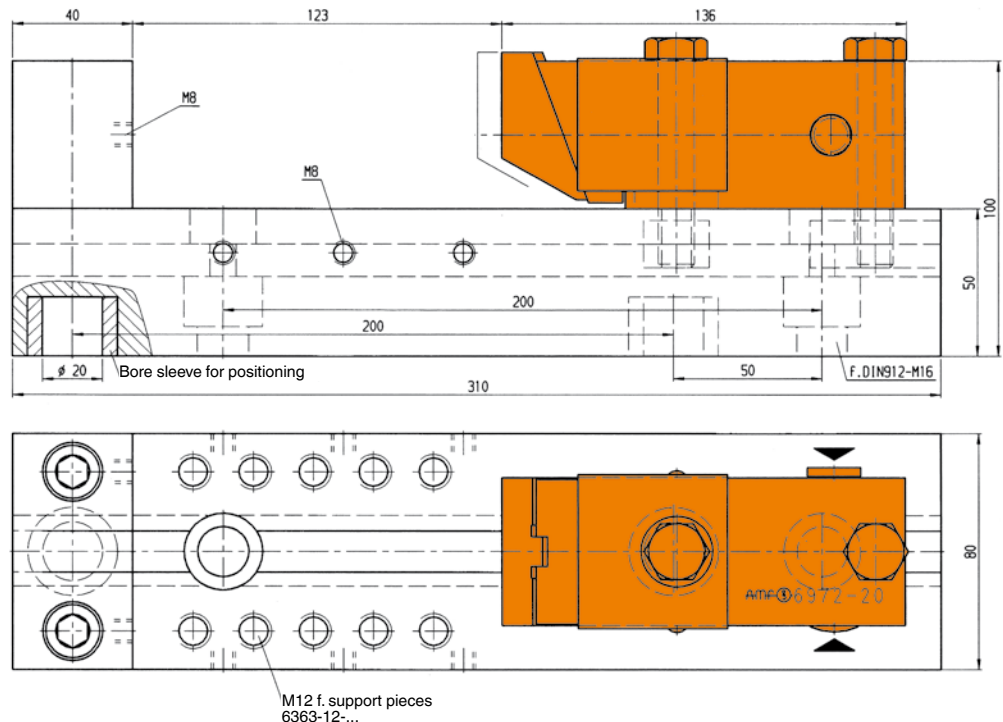
| Order no. | Article no. | ~A  | C  | $\varnothing D +0.05 \times \text{depth}$ | F  | G | dia. N | $O \pm 0.5$ | P  | Q  | R  | T  |
|-----------|-------------|-----|----|---|----|---|--------|-------------|----|----|----|----|
| 67371     | 6977-05     | 79  | 30 | -   | 30 | 2 | 8,5    | 42          | 26 | 3  | 8  | 41 |
| 67512     | 6977-20     | 102 | 50 | 28,02 x 6                                 | 50 | 3 | 12,5   | 60          | 30 | 14 | 13 | 59 |
| 67421     | 6977-32     | 114 | 65 | 32,02 x 6                                 | 65 | 3 | 16,5   | 62          | 37 | 17 | 18 | 61 |
| 67520     | 6977-50     | 133 | 80 | 40,02 x 8                                 | 80 | 3 | 20,5   | 68          | 46 | 19 | 23 | 67 |

CAD



### Application example:

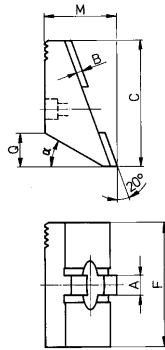
Pull-down clamp No. 6972F-20 as vice.



Subject to technical alterations.

## No. 6972G

### Clamping Jaws, serrated



| Order no. | Article no. | A  | B   | C    | F  | M    | Q    | $\alpha$ | Weight [g] |
|-----------|-------------|----|-----|------|----|------|------|----------|------------|
| 67025     | 6972G-05    | 6  | 2,7 | 29,5 | 30 | 22,0 | 3,0  | 15°      | 75         |
| 320887    | 6972G-12    | 10 | 2,5 | 40,0 | 40 | 23,0 | 8,5  | 30°      | 126        |
| 67165     | 6972G-20    | 10 | 3,0 | 50,0 | 50 | 31,5 | 14,0 | 30°      | 260        |
| 67256     | 6972G-32    | 10 | 3,0 | 65,0 | 65 | 37,0 | 17,0 | 30°      | 505        |
| 67322     | 6972G-50    | 10 | 3,0 | 80,0 | 80 | 39,5 | 19,0 | 30°      | 825        |

#### Design:

Tempering steel, hardened and tempered, with serrated clamping surface.

#### Application:

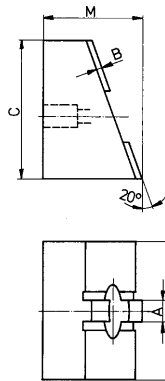
For all workpieces with normal clamping faces.

#### Note:

This clamping jaw is part of the standard equipment of pull-down clamps No. 6972D, 6972F and counter-hold 6977.

## No. 6972W

### Clamping Jaws, soft



| Order no. | Article no. | A  | B   | C    | F  | M    | Weight [g] |
|-----------|-------------|----|-----|------|----|------|------------|
| 67017     | 6972W-05    | 6  | 2,7 | 29,5 | 30 | 32,0 | 145        |
| 320903    | 6972W-12    | 10 | 2,5 | 40,0 | 40 | 33,0 | 277        |
| 67173     | 6972W-20    | 10 | 3,0 | 50,0 | 50 | 41,5 | 525        |
| 67264     | 6972W-32    | 10 | 3,0 | 65,0 | 65 | 52,0 | 1000       |
| 67330     | 6972W-50    | 10 | 3,0 | 80,0 | 80 | 59,5 | 1550       |

#### Design:

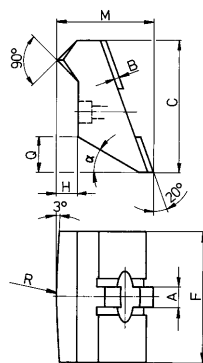
Tempering steel, unhardened, with smooth clamping surface.

#### Application:

These clamping jaws can be shaped into any clamping form or ground flush for sensitive workpieces.

## No. 6972GR

### Clamping Jaws, with clamping edge



| Order no. | Article no. | A  | B   | C    | F  | H    | M    | Q    | R   | $\alpha$ | Weight [g] |
|-----------|-------------|----|-----|------|----|------|------|------|-----|----------|------------|
| 67009     | 6972GR-05   | 6  | 2,7 | 29,5 | 30 | 5,0  | 27,0 | 3,0  | 300 | 15°      | 85         |
| 321620    | 6972GR-12   | 10 | 2,5 | 40,0 | 40 | 6,5  | 29,5 | 8,5  | 200 | 30°      | 147        |
| 67181     | 6972GR-20   | 10 | 3,0 | 50,0 | 50 | 8,0  | 39,5 | 14,0 | 200 | 30°      | 300        |
| 67272     | 6972GR-32   | 10 | 3,0 | 65,0 | 65 | 10,0 | 47,0 | 17,0 | 300 | 30°      | 600        |
| 67348     | 6972GR-50   | 10 | 3,0 | 80,0 | 80 | 12,0 | 51,0 | 19,0 | 300 | 30°      | 940        |

#### Design:

Tempering steel, case-hardened and tempered, with bombed clamping surface.

#### Application:

Clamping jaws are particularly suitable for workpieces with hard and very uneven surfaces.

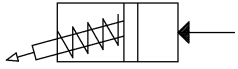


Subject to technical alterations.

## No. 6973

### Pull-Down Clamp

single acting, with spring return,  
max. operating pressure 350 bar.



| Order no. | Article no. | Clamping force horizontal at 350 bar [kN] | Clamping force vertical at 350 bar [kN] | Stroke [mm] | Piston area [cm <sup>2</sup> ] | Vol. [cm <sup>3</sup> ] | Md max. [Nm] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|---|---|-------------|--------------------------------|-------------------------|--------------|-----------------------|------------|
| 66787     | 6973-09-1   | 8,9                                       | 2,2                                     | 5           | 2,9                            | 1,4                     | 11           | -                     | 481        |
| 66803     | 6973-09-2   | 8,9                                       | 2,2                                     | 5           | 2,9                            | 1,4                     | 11           | 550266                | 399        |

### Design:

Cylinder barrel from steel, hardened and burnished. Piston rod case hardened and ground. Hardened clamping jaw. Return spring from stainless steel. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Universal Edge Clamp for various applications.

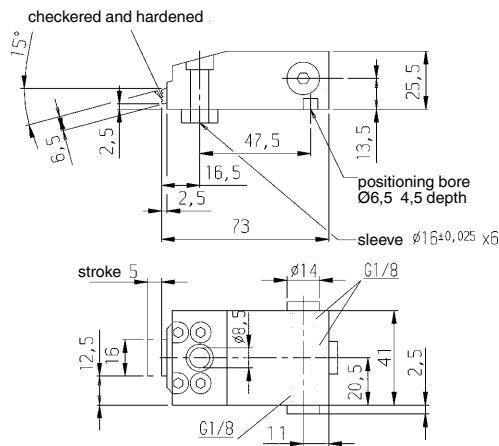
### Features:

Small unit offering large clamping force.

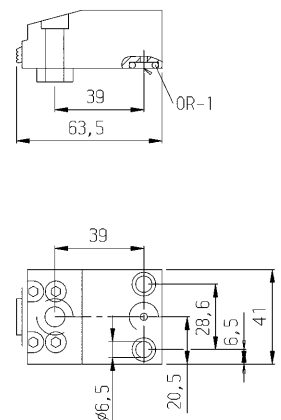
### Note:

When placing into operation, ensure that all air is bled from the system.  
The surface quality of No. 6973-09-2 must be Rz 6.3 at the mating flange surface.

66787



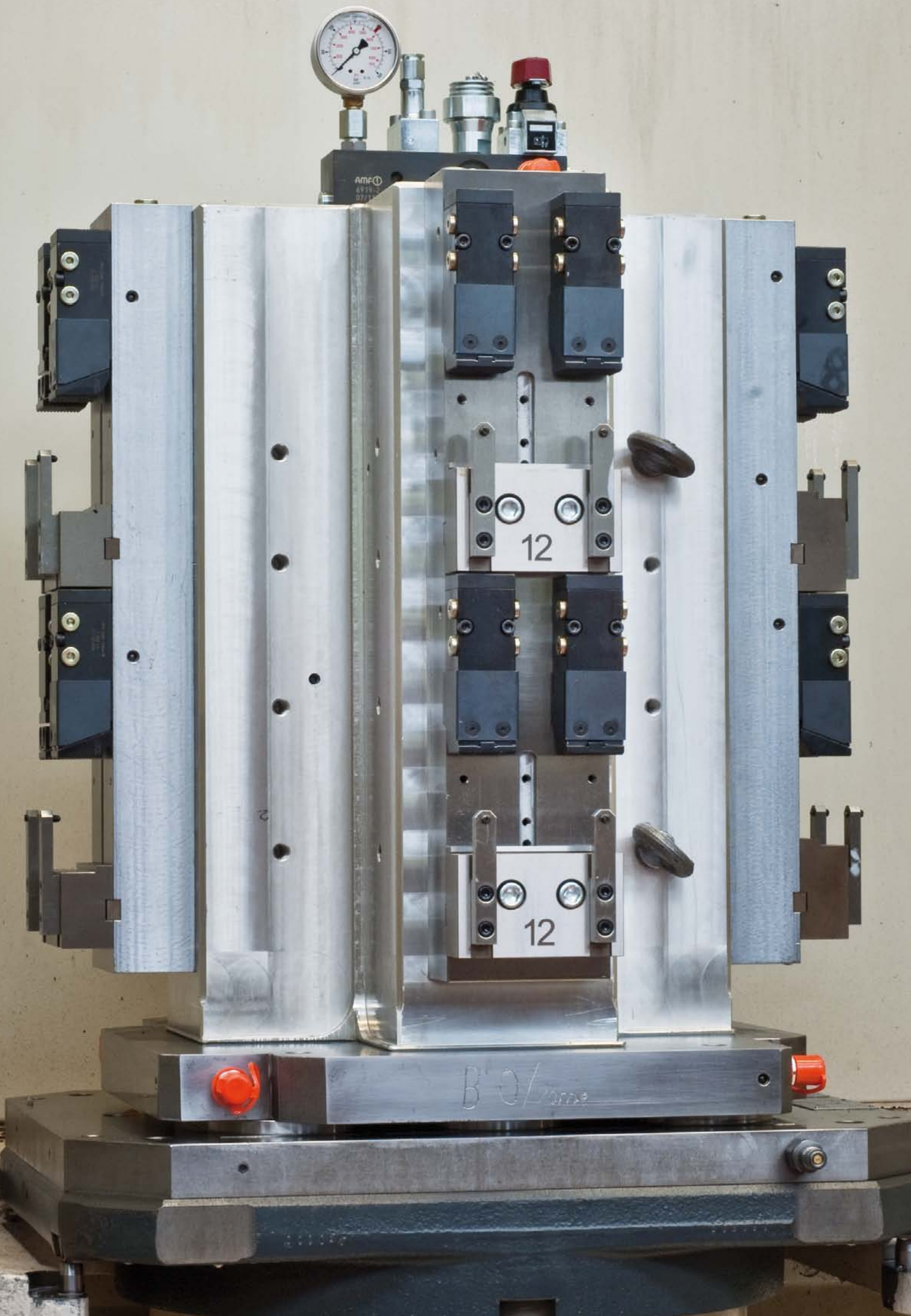
66803



CAD



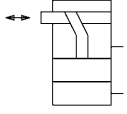
Subject to technical alterations.



## No. 6978CD

### Side clamping element without support

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 30 bar.



**NEW!**



| Order no. | Article no. | Clamping force at 150 bar [kN] | Clamping force at 250 bar [kN] | Stroke | OR-1 O-ring Order No. | OR-2 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------------|--------------------------------|--------|-----------------------|-----------------------|------------|
| 562198    | 6978CD-28   | 16,5                           | 27,5                           | 3      | 562537                | 173096                | 1510       |

#### Design:

Housing made of steel, burnished. Tension slide hardened. Integrated flow rate restrictor, grooved clamping jaw. Oil supply via oil channel in fixture body.

#### Application:

For clamping workpieces in a linear direction. Compact design. The workpiece can be clamped sensitively thanks to the adjustable flow rate restrictor.

#### Features:

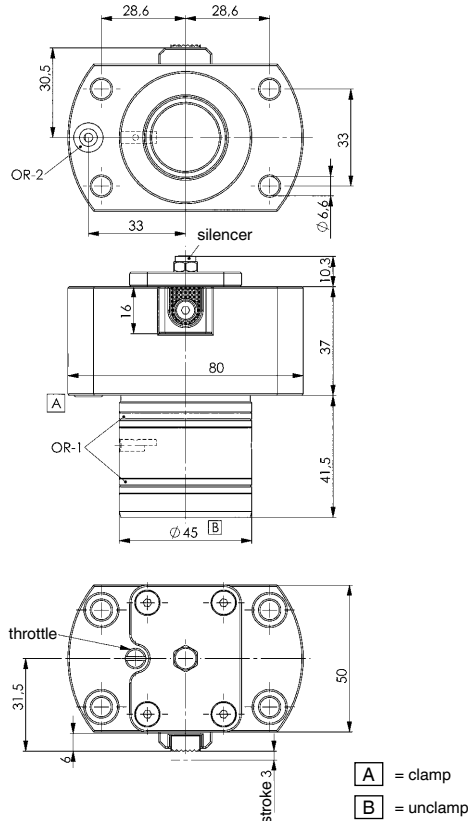
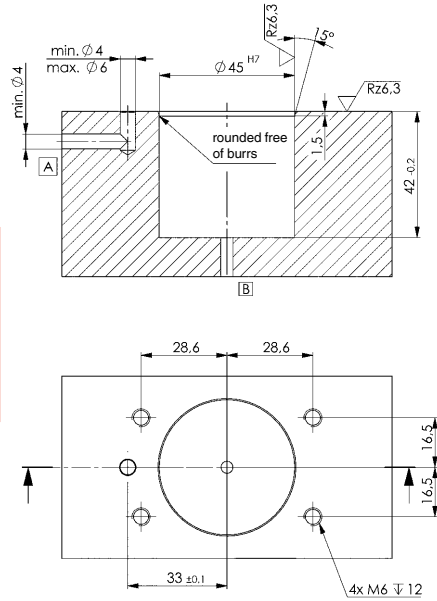
High flexibility through individually designed and exchangeable clamping jaws.

#### Note:

The installation hole must be free of burrs. Seals and housings must be greased during installation. Avoid chips from gathering via oil channels.

#### Installation dimensions:

(with throttle function)



CAD

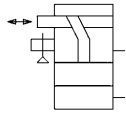
## No. 6978CDA

### Side clamping element with support

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 30 bar.



| Order no. | Article no. | Clamping force at 150 bar [kN] | Clamping force at 250 bar [kN] | Stroke | OR-1 O-ring Order No. | OR-2 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------------|--------------------------------|--------|-----------------------|-----------------------|------------|
| 562197    | 6978CDA-28  | 16,5                           | 27,5                           | 3      | 562537                | 562534                | 1250       |



**NEW!**



#### Design:

Housing made of steel, burnished. Tension slide hardened. Alignment by cylinder pin. Integrated support control and grooved clamping jaw. Oil supply via oil channel in fixture body.

#### Application:

For clamping workpieces in a linear direction. Compact design thanks to integrated support and support control. A pneumatic support control is included as standard, which can be connected if required. The support height can be adjusted to the workpiece height by means of shims.

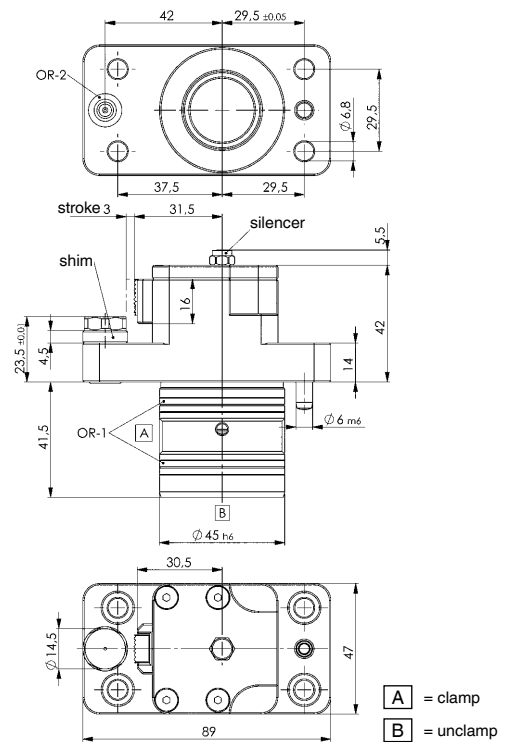
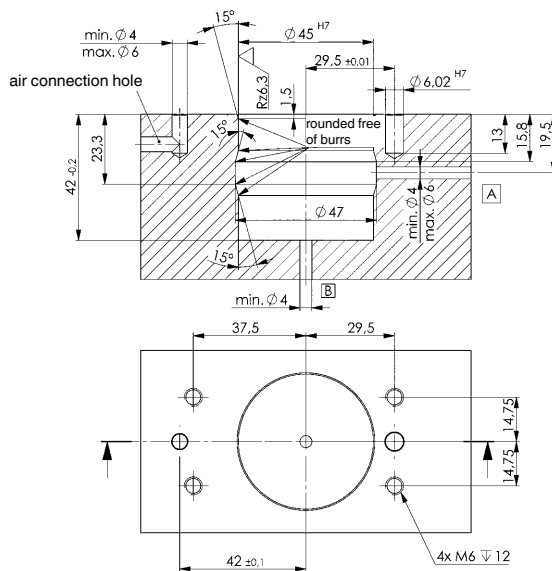
#### Features:

High flexibility through individually designed and exchangeable clamping jaws.

#### Note:

The installation hole must be free of burrs. Seals and housings must be greased during installation. Avoid chips from gathering via oil channels.

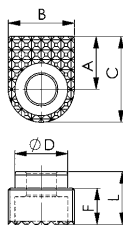
#### Installation dimensions:



## No. 6978CDA-28-06

### Clamping jaws, serrated

**NEW!**



| Order no. | Article no.   | A | B  | C  | dia. D | F   | L | Weight [g] |
|-----------|---------------|---|----|----|--------|-----|---|------------|
| 562201    | 6978CDA-28-06 | 8 | 10 | 13 | 8      | 5,5 | 8 | 4          |

#### Design:

Tempered steel, hardened and tempered, serrated clamping surface, with bolt.

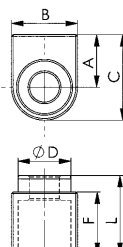
#### Application:

For all workpieces with normal clamping faces.

## No. 6978CDAR-28-06

### Clamping jaws blank, smooth

**NEW!**



| Order no. | Article no.    | A | B  | C  | dia. D | F   | L  | Weight [g] |
|-----------|----------------|---|----|----|--------|-----|----|------------|
| 562202    | 6978CDAR-28-06 | 8 | 10 | 13 | 8      | 9,5 | 12 | 6,5        |

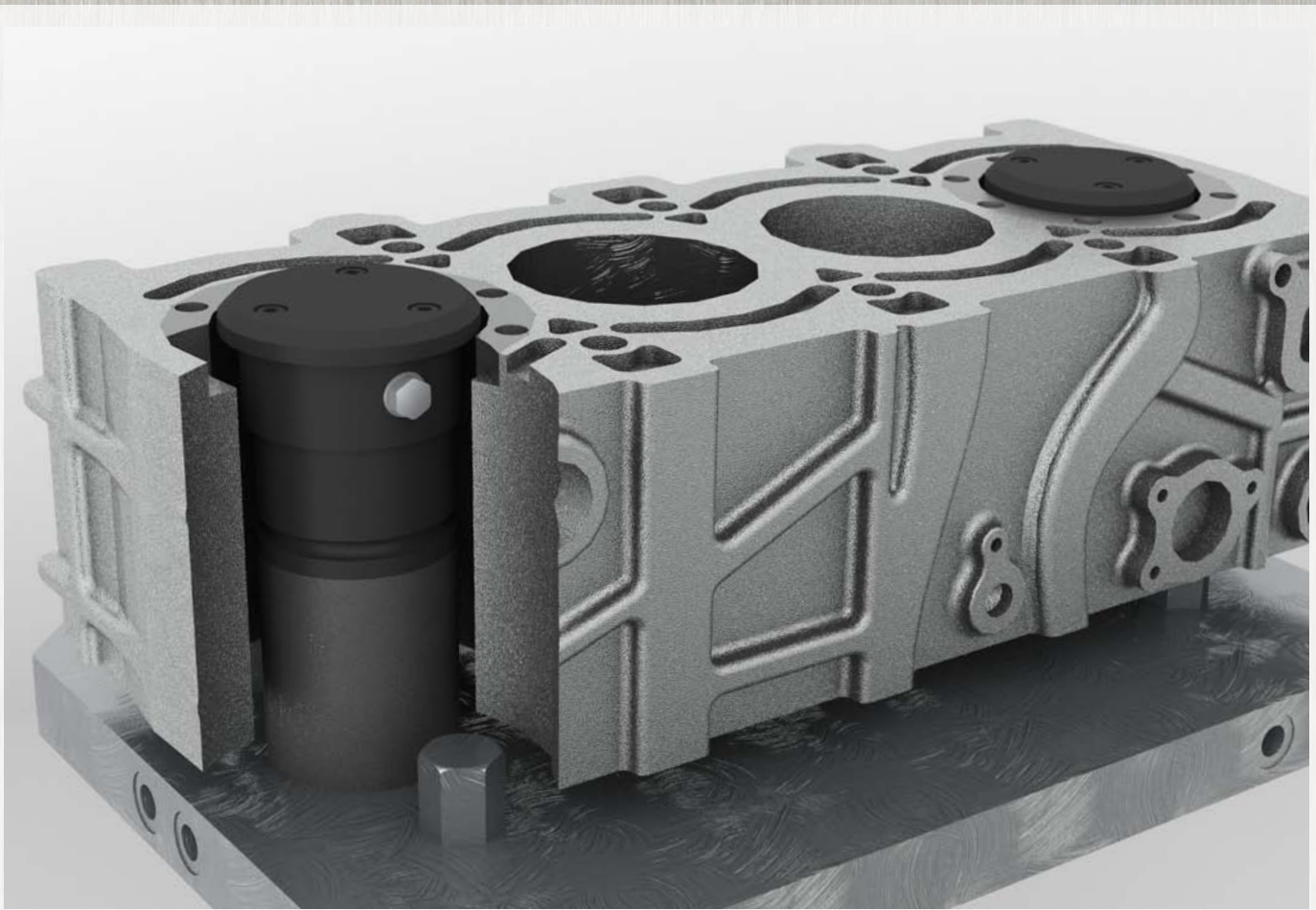
#### Design:

Tempered steel, unhardened, with smooth clamping surface, with bolt.

#### Application:

These clamping jaws can be shaped into any clamping form or ground flush for sensitive workpieces.

Subject to technical alterations.



Subject to technical alterations.



## CENTRING CLAMPS WITH TWO OR THREE CLAMPING POINTS

- > clamping force up to 28 kN
- > operating pressure up to 350 bar
- > centring in holes
- > clamping in holes
- > oil supply via oil channels in device body or via threaded port with connector plate

### PRODUCT OVERVIEW:

| Type             | Clamping force [kN] | Clamping stroke [mm] | Clamping points | No. of models | Operating mode |
|------------------|---------------------|----------------------|-----------------|---------------|----------------|
| 6974-20XX - MINI | 14                  | 3                    | 2               | 9             | double acting  |
| 6974-30XX - MINI | 14                  | 3                    | 3               | 9             | double acting  |
| 6974-20XX - MAXI | 11,2 - 28           | 4 - 6,9              | 2               | 9             | double acting  |
| 6974-30XX - MAXI | 11,2 - 28           | 4 - 6,9              | 3               | 9             | double acting  |

### PRODUCT EXAMPLES:

NO. 6974 - MINI



- > clamping and centring in holes

NO. 6974 - MAXI



- > clamping and centring in holes

NO. 6974-XXXX



- > for o-ring connection
- > for threaded connection

No. 6974

## Centring clamp MINI with two clamping points

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | Clamping force at 100 bar* [kN] | Clamping force at 350 bar* [kN] | Clamping points | Clamping Ø N -1 | Stroke H [mm] | Repeatability [mm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|-----------------|-----------------|---------------|--------------------|----------------|------------|
| 329243    | 6974-2025   | 4,0                             | 14,0                            | 2               | 25-29           | 3,0           | ±0,02              | 1,0            | 440        |
| 329284    | 6974-2028   | 4,0                             | 14,0                            | 2               | 28-32           | 3,0           | ±0,02              | 1,0            | 447        |
| 329326    | 6974-2032   | 4,0                             | 14,0                            | 2               | 32-36           | 3,0           | ±0,02              | 1,0            | 456        |
| 329052    | 6974-2036   | 4,0                             | 14,0                            | 2               | 36-40           | 3,0           | ±0,02              | 1,0            | 574        |
| 329094    | 6974-2039   | 4,0                             | 14,0                            | 2               | 39-43           | 3,0           | ±0,02              | 1,0            | 590        |
| 329136    | 6974-2042   | 4,0                             | 14,0                            | 2               | 42-46           | 3,0           | ±0,02              | 1,0            | 604        |
| 329169    | 6974-2045   | 4,0                             | 14,0                            | 2               | 45-49           | 3,0           | ±0,02              | 1,0            | 620        |
| 329177    | 6974-2048   | 4,0                             | 14,0                            | 2               | 48-52           | 3,0           | ±0,02              | 1,0            | 635        |
| 329201    | 6974-2051   | 4,0                             | 14,0                            | 2               | 51-55           | 3,0           | ±0,02              | 1,0            | 652        |

\* The clamping force is distributed centrally over the 2 clamping points.

### Design:

Double-acting centring clamp with two clamping points.  
All components from high-grade hardened and nitrided steel. Oil supply via oil channel in fixture body.

### Application:

For centring and clamping workpieces with machined or cast holes, cutouts or penetrations.  
Element screwed directly onto the fixture body, sealed with O-ring.

### Features:

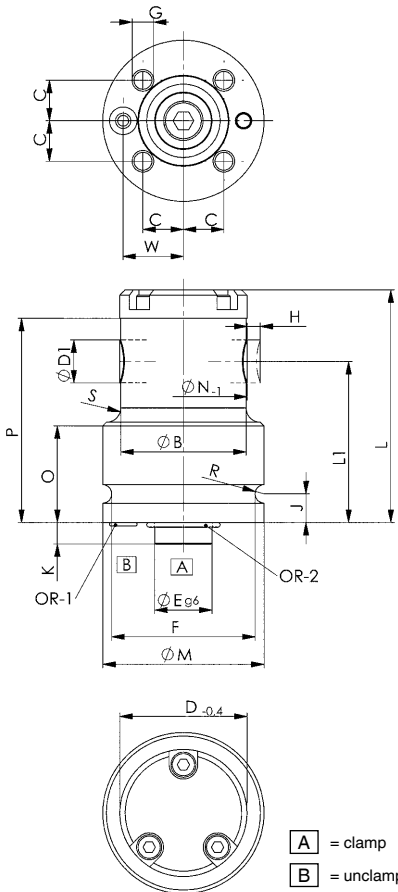
The centring clamp is fastened from below; oil is supplied through drilled channels in the fixture body. If the centring clamp is fastened from above and oil supplied through conduits drilled in the fixture body, a connection plate for O-ring connection is needed. If the centring clamp is fastened from above and oil supplied through pipes, a connection plate for pipe connection is needed.

### Note:

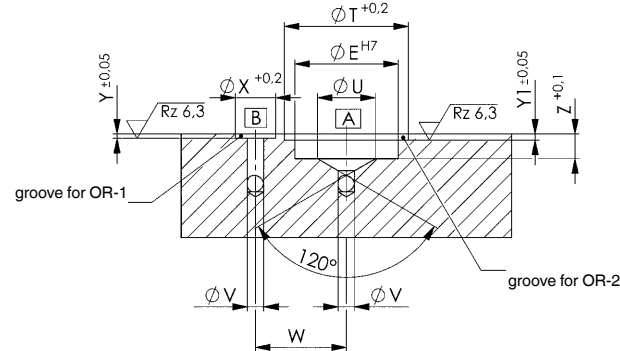
The practical combination of 2-point and 3-point elements can avoid over-determined clamping states. Unsuitable for use on lathes.

### On request:

Other sizes available on request.



### Installation dimensions:



### Dimensions:

| Order no. | Article no. | dia. B | C    | dia. D -0,4 | Bolt Ø D1 [mm] | dia. E g6/h7 | F  | G     | J | K | L    | L1 | dia. M | O  | P    | R   | S   | dia. T | dia. U | dia. V | W    | dia. X | Y   | Y1  | Z | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|--------|------|-------------|----------------|--------------|----|-------|---|---|------|----|--------|----|------|-----|-----|--------|--------|--------|------|--------|-----|-----|---|-----------------------|-----------------------|
| 329243    | 6974-2025   | 24     | 11,3 | 24,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329284    | 6974-2028   | 24     | 11,3 | 27,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329326    | 6974-2032   | 24     | 11,3 | 31,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329052    | 6974-2036   | 35     | 11,3 | 35,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329094    | 6974-2039   | 35     | 11,3 | 38,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329136    | 6974-2042   | 35     | 11,3 | 41,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329169    | 6974-2045   | 35     | 11,3 | 44,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329177    | 6974-2048   | 35     | 11,3 | 47,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329201    | 6974-2051   | 35     | 11,3 | 50,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |

Subject to technical alterations.

No. 6974

## Centring clamp MINI with three clamping points

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | Clamping force at 100 bar * [kN] | Clamping force at 350 bar* [kN] | Clamping points | Clamping Ø N -1 | Stroke H [mm] | Repeatability [mm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|----------------------------------|---------------------------------|-----------------|-----------------|---------------|--------------------|----------------|------------|
| 329268    | 6974-3025   | 4,0                              | 14,0                            | 3               | 25-29           | 3,0           | ±0,02              | 1,0            | 441        |
| 329300    | 6974-3028   | 4,0                              | 14,0                            | 3               | 28-32           | 3,0           | ±0,02              | 1,0            | 449        |
| 329342    | 6974-3032   | 4,0                              | 14,0                            | 3               | 32-36           | 3,0           | ±0,02              | 1,0            | 460        |
| 329078    | 6974-3036   | 4,0                              | 14,0                            | 3               | 36-40           | 3,0           | ±0,02              | 1,0            | 575        |
| 329110    | 6974-3039   | 4,0                              | 14,0                            | 3               | 39-43           | 3,0           | ±0,02              | 1,0            | 591        |
| 329151    | 6974-3042   | 4,0                              | 14,0                            | 3               | 42-46           | 3,0           | ±0,02              | 1,0            | 607        |
| 329185    | 6974-3045   | 4,0                              | 14,0                            | 3               | 45-49           | 3,0           | ±0,02              | 1,0            | 624        |
| 329193    | 6974-3048   | 4,0                              | 14,0                            | 3               | 48-52           | 3,0           | ±0,02              | 1,0            | 641        |
| 329227    | 6974-3051   | 4,0                              | 14,0                            | 3               | 51-55           | 3,0           | ±0,02              | 1,0            | 660        |

\* The clamping force is distributed centrally over the 3 clamping points.

### Design:

Double-acting centring clamp with three clamping points.  
All components from high-grade hardened and nitrided steel. Oil supply via oil channel in fixture body.

### Application:

For centring and clamping workpieces with machined or cast holes, cutouts or penetrations.  
Element screwed directly onto the fixture body, sealed with O-ring.

### Features:

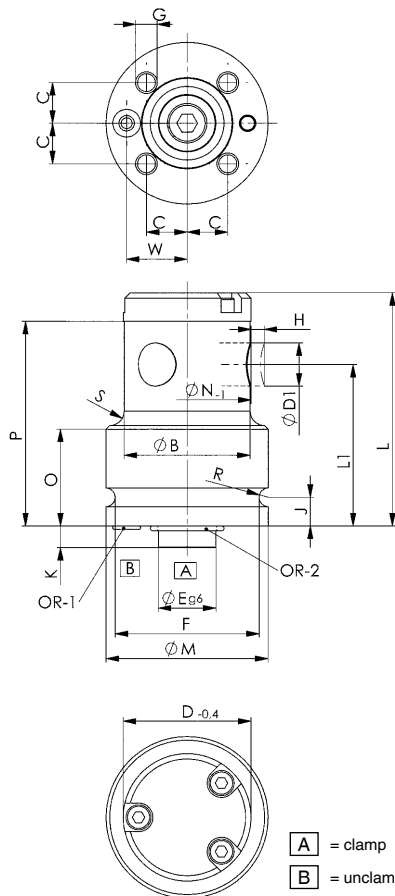
If the centring clamp is fastened from below, oil is supplied through conduits drilled in the fixture body.  
If the centring clamp is fastened from above and oil supplied through conduits drilled in the fixture body, a connection plate for O-ring connection is needed.  
If the centring clamp is fastened from above and oil supplied through pipes, a connection plate for pipe connection is needed.

### Note:

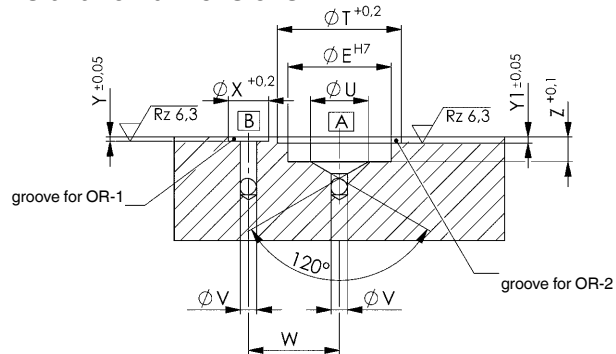
The practical combination of 2-point and 3-point elements can avoid over-determined clamping states. Unsuitable for use on lathes.

### On request:

Other sizes available on request.



### Installation dimensions:



### Dimensions:

| Order no. | Article no. | dia. B | C    | dia. D -0,4 | Bolt Ø D1 [mm] | dia. E g6/h7 | F  | G     | J | K | L    | L1 | dia. M | O  | P    | R   | S   | dia. T | dia. U | dia. V | W    | dia. X | Y   | Y1  | Z | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|--------|------|-------------|----------------|--------------|----|-------|---|---|------|----|--------|----|------|-----|-----|--------|--------|--------|------|--------|-----|-----|---|-----------------------|-----------------------|
| 329268    | 6974-3025   | 24     | 11,3 | 24,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329300    | 6974-3028   | 24     | 11,3 | 27,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329342    | 6974-3032   | 24     | 11,3 | 31,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 66,5 | 45 | 45     | 27 | 62,5 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329078    | 6974-3036   | 35     | 11,3 | 35,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329110    | 6974-3039   | 35     | 11,3 | 38,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329151    | 6974-3042   | 35     | 11,3 | 41,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329185    | 6974-3045   | 35     | 11,3 | 44,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329193    | 6974-3048   | 35     | 11,3 | 47,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 329227    | 6974-3051   | 35     | 11,3 | 50,5        | 12             | 16           | 40 | M6x12 | 8 | 6 | 65,0 | 45 | 45     | 27 | 57,0 | 2,6 | 4,0 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |

Subject to technical alterations.

No. 6974

## Centring clamp MAXI with two clamping points

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | Clamping force at 100 bar* [kN] | Clamping force at 350 bar* [kN] | Clamping points | Clamping Ø N -1 | Stroke H [mm] | Repeatability [mm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|---------------------------------|---------------------------------|-----------------|-----------------|---------------|--------------------|----------------|------------|
| 328799    | 6974-2054   | 3,2                             | 11,2                            | 2               | 54-62           | 4,0           | ±0,02              | 1,0            | 1754       |
| 328831    | 6974-2061   | 3,2                             | 11,2                            | 2               | 61-69           | 4,0           | ±0,02              | 1,0            | 1754       |
| 328864    | 6974-2068   | 3,2                             | 11,2                            | 2               | 68-76           | 4,0           | ±0,02              | 1,0            | 1754       |
| 327619    | 6974-2076   | 5,0                             | 17,5                            | 2               | 76-84           | 5,2           | ±0,02              | 1,5            | 1754       |
| 328872    | 6974-2083   | 5,0                             | 17,5                            | 2               | 83-91           | 5,2           | ±0,02              | 1,5            | 1754       |
| 328914    | 6974-2090   | 5,0                             | 17,5                            | 2               | 90-98           | 5,2           | ±0,02              | 1,5            | 1754       |
| 329029    | 6974-2098   | 8,0                             | 28,0                            | 2               | 98-109          | 6,9           | ±0,02              | 2,0            | 3434       |
| 329060    | 6974-2109   | 8,0                             | 28,0                            | 2               | 109-120         | 6,9           | ±0,02              | 2,0            | 3597       |
| 329102    | 6974-2119   | 8,0                             | 28,0                            | 2               | 119-130         | 6,9           | ±0,02              | 2,0            | 3761       |

\* The clamping force is distributed centrally over the 2 clamping points.

### Design:

Double-acting centring clamp with two clamping points.  
All components from high-grade hardened and nitrided steel. Oil supply via oil channel in fixture body.

### Application:

For centring and clamping workpieces with machined or cast holes, cutouts or penetrations.  
Element screwed directly onto the fixture body, sealed with O-ring.

### Features:

The centring clamp is fastened from below; oil is supplied through drilled channels in the fixture body. If the centring clamp is fastened from above and oil supplied through conduits drilled in the fixture body, a connection plate for O-ring connection is needed. If the centring clamp is fastened from above and oil supplied through pipes, a connection plate for pipe connection is needed. Pressure pieces are replaceable.

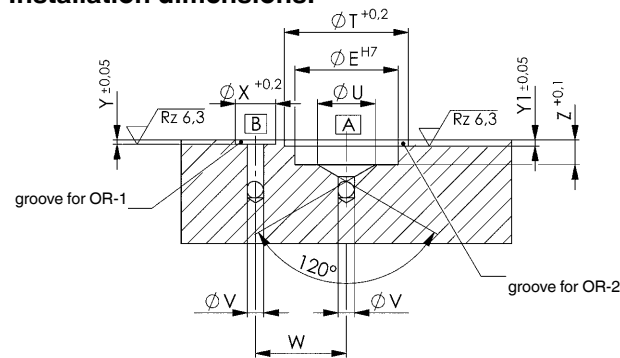
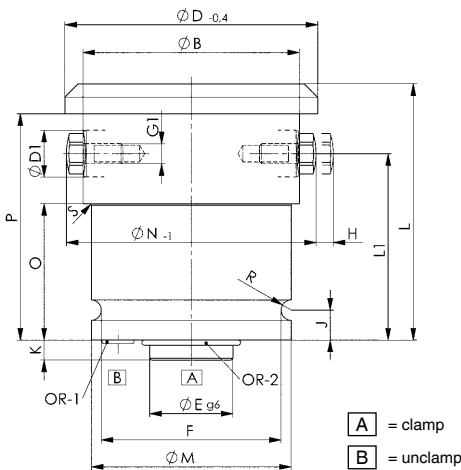
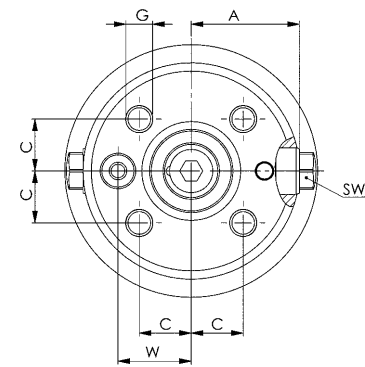
### Note:

The practical combination of 2-point and 3-point elements can avoid over-determined clamping states. Unsuitable for use on lathes.

### On request:

Other sizes available on request.

### Installation dimensions:



### Dimensions:

| Order no. | Article no. | A    | dia. B | C    | dia. D -0,4 | Bolt Ø D1 [mm] | dia. E g6/h7 | F  | G      | G1 | J  | K | L    | L1 | dia. M | O  | P    | R   | S   | SW | dia. T | dia. U | dia. V | W    | dia. X | Y   | Y1  | Z | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|------|--------|------|-------------|----------------|--------------|----|--------|----|----|---|------|----|--------|----|------|-----|-----|----|--------|--------|--------|------|--------|-----|-----|---|-----------------------|-----------------------|
| 328799    | 6974-2054   | 22,9 | 45     | 11,3 | 53,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 328831    | 6974-2061   | 22,9 | 45     | 11,3 | 60,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 328864    | 6974-2068   | 22,9 | 45     | 11,3 | 67,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 327619    | 6974-2076   | 32,5 | 65     | 15,6 | 75,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 328872    | 6974-2083   | 32,5 | 65     | 15,6 | 82,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 328914    | 6974-2090   | 32,5 | 65     | 15,6 | 89,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 329029    | 6974-2098   | 42,5 | 85     | 19,1 | 97,9        | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27,0 | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |
| 329060    | 6974-2109   | 42,5 | 85     | 19,1 | 108,9       | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27,0 | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |
| 329102    | 6974-2119   | 42,5 | 85     | 19,1 | 118,9       | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27,0 | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |

Subject to technical alterations.

No. 6974

## Centring clamp MAXI with three clamping points

Double-acting,  
max. operating pressure 350 bar,  
min. operating pressure 10 bar.



CAD

| Order no. | Article no. | Clamping force at 100 bar * [kN] | Clamping force at 350 bar* [kN] | Clamping points | Clamping Ø N -1 | Stroke H [mm] | Repeatability [mm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|----------------------------------|---------------------------------|-----------------|-----------------|---------------|--------------------|----------------|------------|
| 328773    | 6974-3054   | 3,2                              | 11,2                            | 3               | 54-62           | 4,0           | ±0,02              | 1,0            | 1754       |
| 328815    | 6974-3061   | 3,2                              | 11,2                            | 3               | 61-69           | 4,0           | ±0,02              | 1,0            | 1754       |
| 328849    | 6974-3068   | 3,2                              | 11,2                            | 3               | 68-76           | 4,0           | ±0,02              | 1,0            | 1754       |
| 327593    | 6974-3076   | 5,0                              | 17,5                            | 3               | 76-84           | 5,2           | ±0,02              | 1,5            | 1754       |
| 328856    | 6974-3083   | 5,0                              | 17,5                            | 3               | 83-91           | 5,2           | ±0,02              | 1,5            | 1754       |
| 328898    | 6974-3090   | 5,0                              | 17,5                            | 3               | 90-98           | 5,2           | ±0,02              | 1,5            | 1754       |
| 329003    | 6974-3098   | 8,0                              | 28,0                            | 3               | 98-109          | 6,9           | ±0,02              | 2,0            | 3432       |
| 329045    | 6974-3109   | 8,0                              | 28,0                            | 3               | 109-120         | 6,9           | ±0,02              | 2,0            | 3603       |
| 329086    | 6974-3119   | 8,0                              | 28,0                            | 3               | 119-130         | 6,9           | ±0,02              | 2,0            | 3773       |

\* The clamping force is distributed centrally over the 3 clamping points.

### Design:

Double-acting centring clamp with three clamping points.  
All components from high-grade hardened and nitrided steel. Oil supply via oil channel in fixture body.

### Application:

For centring and clamping workpieces with machined or cast holes, cutouts or penetrations.  
Element screwed directly onto the fixture body, sealed with O-ring.

### Features:

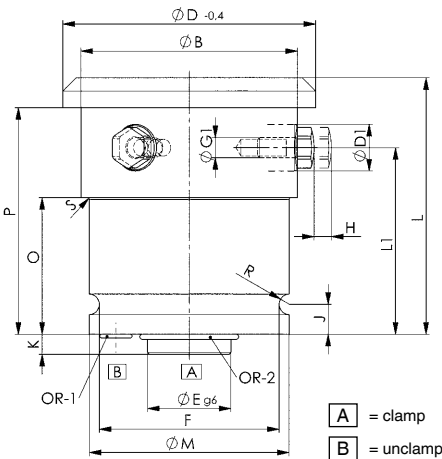
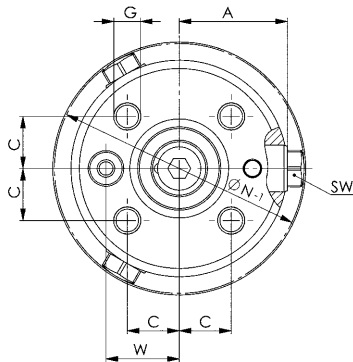
If the centring clamp is fastened from below, oil is supplied through conduits drilled in the fixture body.  
If the centring clamp is fastened from above and oil supplied through conduits drilled in the fixture body, a connection plate for O-ring connection is needed.  
If the centring clamp is fastened from above and oil supplied through pipes, a connection plate for pipe connection is needed. Pressure pieces are replaceable.

### Note:

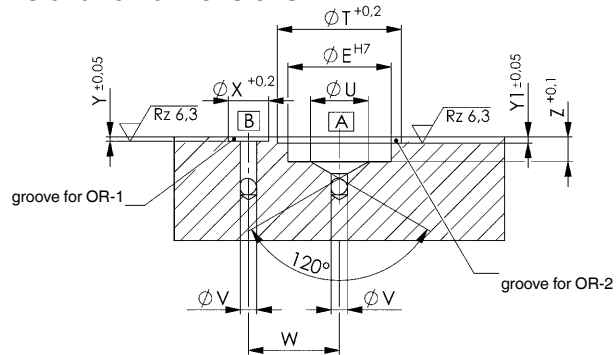
The practical combination of 2-point and 3-point elements can avoid over-determined clamping states. Unsuitable for use on lathes.

### On request:

Other sizes available on request.



### Installation dimensions:



### Dimensions:

| Order no. | Article no. | A    | dia. B | C    | dia. D -0,4 | Bolt Ø D1 [mm] | dia. E g6/h7 | F  | G      | G1 | J  | K | L    | L1 | dia. M | O  | P    | R   | S   | SW | dia. T | dia. U | dia. V | W    | dia. X | Y   | Y1  | Z | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|------|--------|------|-------------|----------------|--------------|----|--------|----|----|---|------|----|--------|----|------|-----|-----|----|--------|--------|--------|------|--------|-----|-----|---|-----------------------|-----------------------|
| 328773    | 6974-3054   | 22,9 | 45     | 11,3 | 53,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 328815    | 6974-3061   | 22,9 | 45     | 11,3 | 60,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 328849    | 6974-3068   | 22,9 | 45     | 11,3 | 67,9        | 12             | 16           | 40 | M6x12  | M6 | 8  | 6 | 65,0 | 45 | 45     | 0  | 57,0 | 2,6 | 0   | 10 | 20,5   | 8      | 3      | 16,8 | 7,7    | 1,1 | 1,3 | 6 | 409508                | 537985                |
| 327593    | 6974-3076   | 32,5 | 65     | 15,6 | 75,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 328856    | 6974-3083   | 32,5 | 65     | 15,6 | 82,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 328898    | 6974-3090   | 32,5 | 65     | 15,6 | 89,9        | 14             | 25           | 54 | M8x16  | M6 | 9  | 6 | 77,0 | 56 | 60     | 41 | 68,0 | 3,1 | 0,5 | 11 | 30,0   | 14     | 4      | 22,0 | 9,8    | 1,1 | 1,5 | 6 | 537969                | 321265                |
| 329003    | 6974-3098   | 42,5 | 85     | 19,1 | 97,9        | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27   | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |
| 329045    | 6974-3109   | 42,5 | 85     | 19,1 | 108,9       | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27   | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |
| 329086    | 6974-3119   | 42,5 | 85     | 19,1 | 118,9       | 18             | 32           | 67 | M10x20 | M8 | 10 | 6 | 91,0 | 64 | 74     | 47 | 80,0 | 3,6 | 2,5 | 13 | 36,6   | 16     | 5      | 27   | 10,8   | 1,1 | 1,3 | 6 | 542464                | 542308                |

Subject to technical alterations.

## No. 6974-XXXX-1

### Connection plate for centring clamp

for O-ring connection

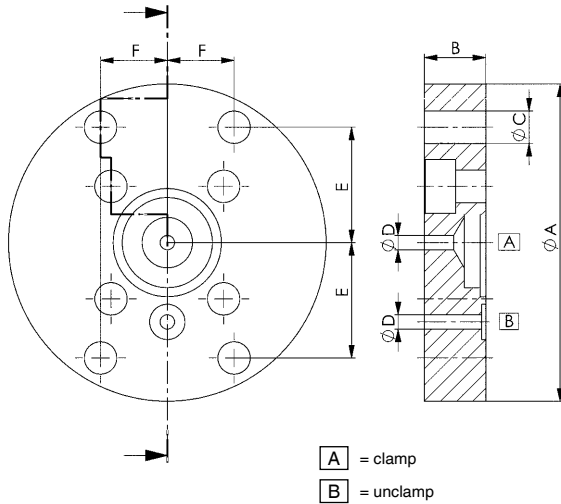
| Order no. | Article no.  | dia. AxB<br>[mm] | dia. C | dia. D | E    | F    | Screw (4 pieces) | Weight<br>[g] |
|-----------|--------------|------------------|--------|--------|------|------|------------------|---------------|
| 328971    | 6974-5476-1  | 68x15            | 6,6    | 3      | 24,2 | 14,0 | M6x16            | 370           |
| 328997    | 6974-7698-1  | 88x17            | 9,0    | 4      | 32,0 | 18,5 | M8x20            | 680           |
| 329128    | 6974-98130-1 | 110x20           | 11,0   | 5      | 39,8 | 23,0 | M10x25           | 1271          |

#### Design:

Tempering steel, TEM-deburred and phosphatised.

#### Application:

If the centring clamp is fastened from above and oil is supplied through conduits drilled in the fixture body.



## No. 6974-XXXX-2

### Connection plate for centring clamp

for pipeline connection

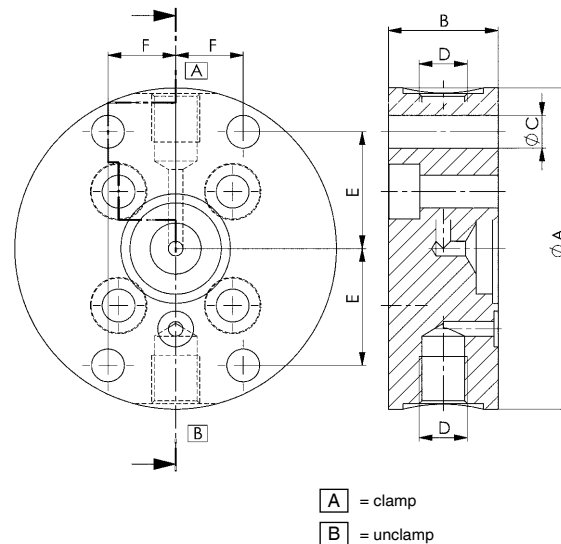
| Order no. | Article no.  | dia. AxB<br>[mm] | dia. C | dia. D | E    | F    | Screw (4 pieces) | Weight<br>[g] |
|-----------|--------------|------------------|--------|--------|------|------|------------------|---------------|
| 329011    | 6974-5476-2  | 68x30            | 6,6    | G1/4   | 24,2 | 14,0 | M6x35            | 725           |
| 329037    | 6974-7698-2  | 88x30            | 9,0    | G1/4   | 32,0 | 18,5 | M8x35            | 1210          |
| 329144    | 6974-98130-2 | 110x30           | 11,0   | G1/4   | 39,8 | 23,0 | M10x35           | 1909          |

#### Design:

Tempering steel, TEM-deburred and phosphatised.

#### Application:

If the centring clamp is fastened from above and oil is supplied through pipes.



Subject to technical alterations.

## SUPPORT ELEMENTS FOR STRESS-FREE CLAMPING AND LOW-VIBRATION MACHINING

- > supporting force up to 50 kN
- > observe safety factor for supporting force
- > operating pressure up to 400 bar
- > piston with internal thread
- > wipers to protect against contamination
- > oil supply via threaded port or oil channel in the fixture body
- > various design variants:
  - block version
  - installation version
  - screw-in version
  - flange version

### PRODUCT OVERVIEW:

| Type    | Supporting force [kN] | Supporting stroke [mm] | Positioning | No. of models | Operating mode |
|---------|-----------------------|------------------------|-------------|---------------|----------------|
| 6961F/L | 8,0 - 20,0            | 6,0 - 10,0             | spring/air  | 6             | single acting  |
| 6962F/L | 8,0 - 20,0            | 6,0 - 10,0             | spring/air  | 6             | single acting  |
| 6964F/L | 4,4 - 55,6            | 6,5 - 19,0             | spring/air  | 12            | single acting  |
| 6964H   | 4,4 - 17,0            | 6,5 - 12,5             | hydraulic   | 7             | single acting  |

### PRODUCT EXAMPLES:

NO. 6961F



- > supporting force: 8 - 20 kN
- > three design variants

NO. 6964F



- > supporting force: 4,4 - 55,6 kN
- > one design variant

NO. 6964H



- > supporting force: 4,4 - 17 kN
- > two design variants

# SUPPORT ELEMENTS - TECHNICAL INFORMATION

## OPERATING PRESSURE:

To achieve a guaranteed clamping function, the min. operating pressure must not be fallen below. The highest clamping force is achieved at max. operating pressure.

## CONTACT FORCE:

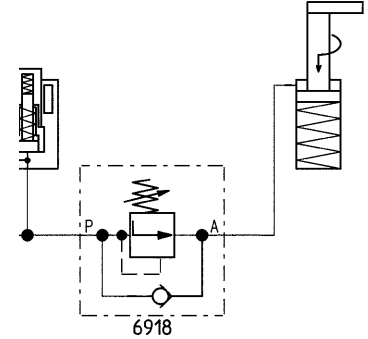
The spring-loaded contact force is at its greatest at a min. distance between the installation position and workpiece.

## SHEAR FORCES:

Support elements only absorb forces in axial direction of the piston. If shear forces occur, the thin-walled clamping sleeve will be deformed. The function of the support element can no longer be guaranteed.

## VOLUME FLOW:

The permissible volume flow must not be exceeded. The permitted volume flow can be controlled with a throttle/check valve. If the volume flow is too high, the oil pressure increases so quickly that the anchor is clamped before it is on the workpiece. If several support elements are used, the permissible volume flow is the total of the individually permissible volume flows.

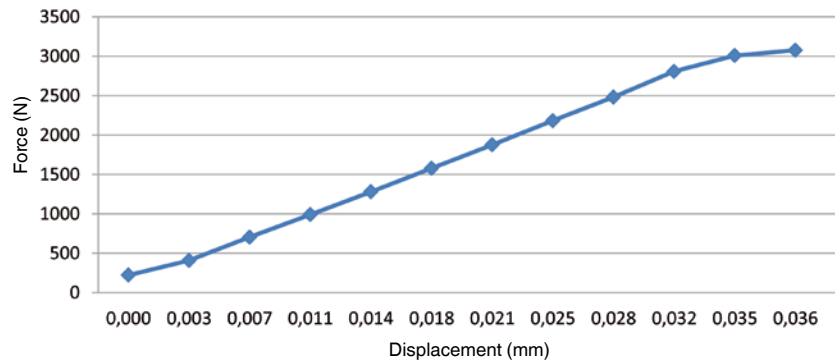


## ELASTIC CHANGE IN LENGTH:

Just like any steel component, the support elements also have an elastic behaviour. During heavy loading, a setting behaviour occurs.

## VENTING:

Support elements only need a very small oil volume. Since the hydraulic oil in the connection line hardly moves, careful venting is necessary. Air in the oil can prolong the clamping time considerably. If venting is not carried out properly, a diesel effect may occur and destroy the element. Always vent at low pressure.



## DIESEL EFFECT:

If petroleum containing air bubbles is compressed very quickly, the bubbles will be heated so strongly that a self-ignition of the air/gas mixture could occur. As a result, a very high pressure and temperature increase occurs locally, which could also damage seals as well as cause accelerated ageing of the oil.

## SPRING SPACE VENTILATION:

The free loading and venting of the spring spaces must be ensured. The pressure connection must be protected or arrayed properly so no coolant is taken in. Failure to observe this can lead to malfunctions.

## COOLANT AND SHAVINGS:

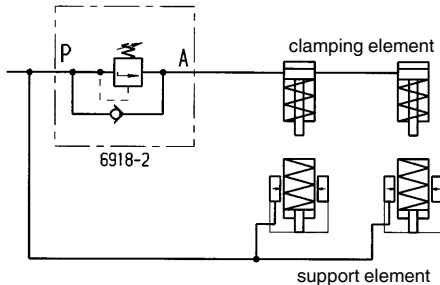
Support elements should normally be protected against shavings and cooling water.





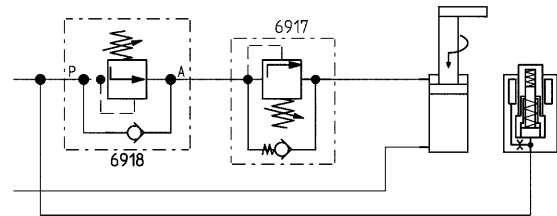
### CONTROLLING THE CLAMPING SEQUENCE:

The sequence of supports and clamps must be controlled time-dependent or pressure-dependent. This can be done using a sequence valve 6918 or supply valve 6918-80-10.



### PRESSURE REDUCTION OF THE CLAMPING ELEMENTS:

The pressure in the clamping circuit is reduced with a pressure control seat valve 6917.



### SUPPORTING FORCE:

The permissible loading force of support elements must always be regulated so that the clamping force of the clamping elements used and the static and dynamic machining forces can be absorbed safely. Permissible loading force minus clamping force minus safety reserve results in the possible machining force.

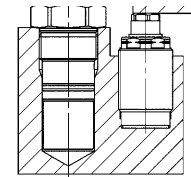
If the total number of occurring forces exceeds the permissible loading force, the anchor of the support element will be pressed backwards thereby damaging the support element.

**The supporting force should always be at least twice as high as the clamping force.**

### COMBINATIONS OF SUPPORT ELEMENT WITH SWING CLAMP

Example of support element 6964H-04-1 and swing clamp 6952E-02-21

|                 | min. operating pressure [bar] | max. operating pressure [bar] | max. supporting force [kN] | max. clamping force [kN] |
|-----------------|-------------------------------|-------------------------------|----------------------------|--------------------------|
| support element | 50                            | 350                           | 4,4                        | -                        |
| swing clamp     | 40                            | 350                           | -                          | 2,0                      |



### POSSIBLE MACHINING FORCE AT 350 BAR:

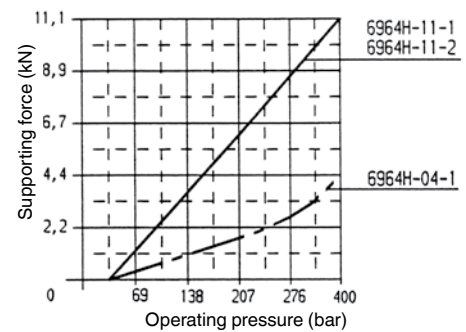
perm. loading force = 4,4 kN  
 minus clamping force = 2,0 kN  


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 arithmetic machining force ≤ 2,4 kN  
 perm. machining force max. ≤ 2,0 kN

### NOTE:

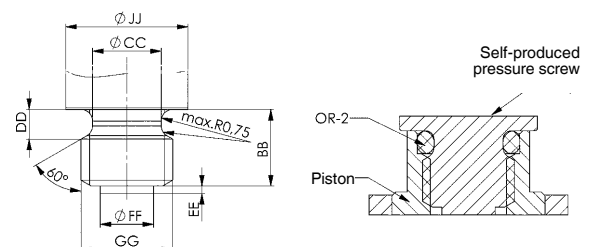
The permissible supporting forces in the diagram are static. Vibrations occurring during the machining could be far higher. For these cases, a large reserve must be included.



### SET SCREWS:

Support elements must never be operated without set screws, since penetrating dirt and cooling water impair the function. Most support elements are fitted with a set screw as standard.

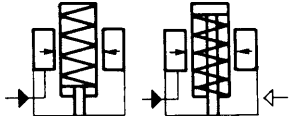
When using special set screws, make sure that the set screws are tempered and designed slightly ball-shaped. Set screws with a tip or fluting should not be used. Special set screws can jeopardise the function of return stroke of the support pin and the spring-loaded system. During in-house production, please manufacture according to our specifications.



## No. 6961F/L

### Support Element, block type

spring advanced or air advancing,  
max. operating pressure 400 bar,  
min. operating pressure 50 bar.



| Order no. | Article no. | Contact force F1*<br>[N] | Support force F2<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston area<br>[cm <sup>2</sup> ] | Weight<br>[g] |
|-----------|-------------|--------------------------|--------------------------|------------------|----------------------------|-----------------------------------|---------------|
| 65250     | 6961F-08    | 20-32                    | 8                        | 6                | 5,5                        | 2,00                              | 1100          |
| 65268     | 6961F-12    | 32-41                    | 12                       | 8                | 8,0                        | 3,14                              | 1800          |
| 65276     | 6961F-20    | 40-72                    | 20                       | 10               | 13,0                       | 4,90                              | 3100          |
| 65284     | 6961L-08    | 170                      | 8                        | 6                | 5,5                        | 2,00                              | 1100          |
| 65292     | 6961L-12    | 270                      | 12                       | 8                | 8,0                        | 3,14                              | 1800          |
| 65300     | 6961L-20    | 440                      | 20                       | 10               | 13,0                       | 4,90                              | 3100          |

\*Article No. 6961F-\*\*: Contact force F1 dependent on spring pretensioning and setting travel.

Article No. 6961L-\*\*: Contact force F1 dependent on air pressure at max. 10 bar.

### Design:

Cylinder body from steel, burnished. Support pin case hardened and ground. Internal locking sleeve system Kostyrka. Special wiper prevents contamination. Support pin with internal thread. Home position retracted or extended, depending on function. Internal parts from stainless steel. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Support element no. 6961F-\*\*: Plunger extended, spring adjustable contact force.

Support element no. 6961L-\*\*: Plunger retracted, pneumatic advance spring return.

These spring or pneumatic advancing hydraulic support elements provide additional support to avoid vibration or deflection during machining. Even large workpiece tolerances can be compensated (castings). Fitted directly below a clamping point they prevent distortion of the workpiece. The support elements can be matched with clamping cylinders of same nominal size into one circuit. To prevent the support plunger from possible slackening during a clamping procedure, it is advisable to connect a sequence valve (no. 6918-2) to control the support elements. Due to this fact, the support element is locked before the clamping procedure can be activated (fig. 1). Being used as an additional support to prevent from bending and vibration, the element should be preceded by a sequence valve (no. 6918-2) in order to ensure supporting before clamping. In case the clamping force is higher than the support force, the clamping force has to be reduced by using a pressure reducing valve no. 6917 (fig. 2).

### Features:

High resilience due to high operating pressure, matched to the forces of the clamping cylinder row. Smooth contacting of the workpiece by adjustable spring or pneumatic pressure. Universal use in each position.

Easy attachment of thrust pieces in the piston rod thread.

### Note:

For spring advanced types, there is risk of sucking in coolant! To avoid this, a breather hose has to be connected to the pneumatic port and moved to a protected area. Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. The support elements must be properly vented! The vent port must always be on top. Failure to do so can cause destruction of the clamping element by the escaping diesel.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

### Hydraulic diagrams:

fig. 1

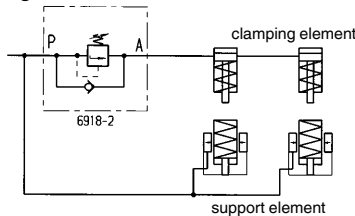
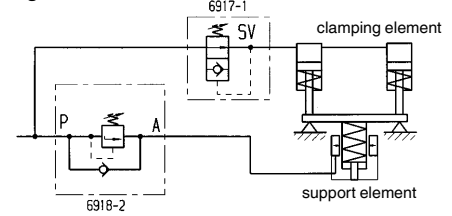


fig. 2



CAD

Subject to technical alterations.

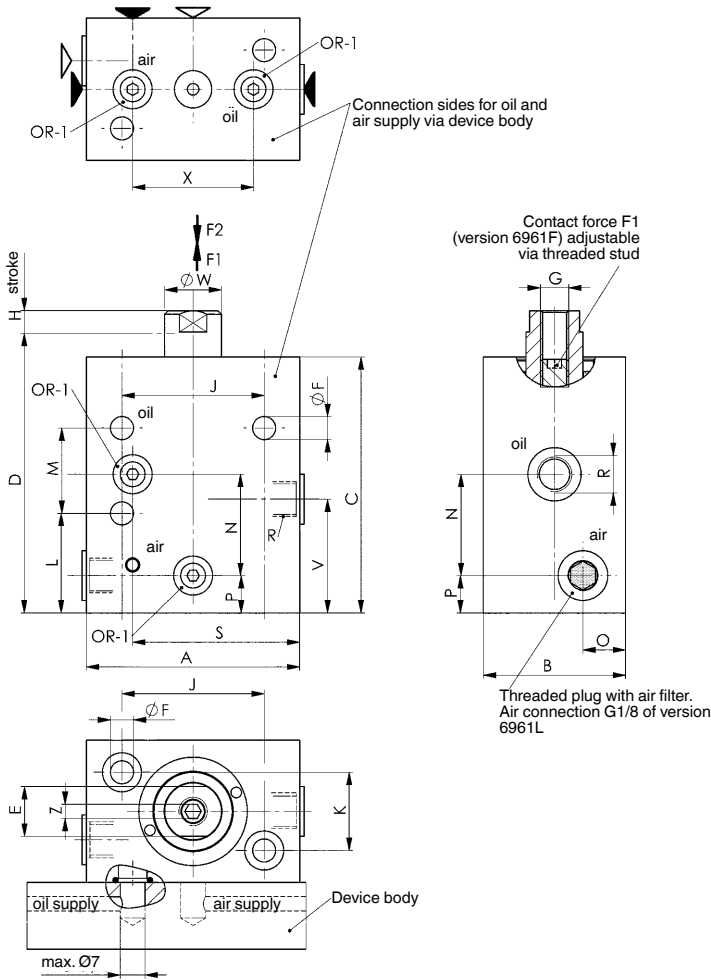
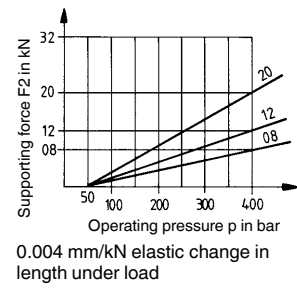


Diagram:



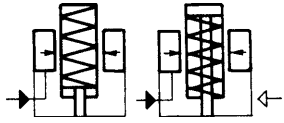
## Dimensions:

| Order no. | Article no. | A  | B  | C   | D     | E    | dia. F | G   | J  | K  | L  | M  | N    | O  | P    | R    | S  | V  | dia. W | X  | Z   | OR-1 O-ring Order No. |
|-----------|-------------|----|----|-----|-------|------|--------|-----|----|----|----|----|------|----|------|------|----|----|--------|----|-----|-----------------------|
| 65250     | 6961F-08    | 60 | 40 | 72  | 79,0  | SW14 | 6,5    | M8  | 40 | 22 | 28 | 24 | 28,5 | 12 | 10,5 | G1/8 | 47 | 32 | 16     | 34 | SW4 | 161554                |
| 65268     | 6961F-12    | 70 | 50 | 86  | 93,5  | SW17 | 8,5    | M10 | 50 | 30 | 32 | 32 | 33,5 | 16 | 12,5 | G1/8 | 56 | 36 | 20     | 42 | SW5 | 161554                |
| 65276     | 6961F-20    | 80 | 60 | 104 | 113,5 | SW22 | 10,5   | M12 | 60 | 40 | 33 | 40 | 40,0 | 20 | 14,0 | G1/8 | 62 | 39 | 25     | 44 | SW6 | 161554                |
| 65284     | 6961L-08    | 60 | 40 | 72  | 79,0  | SW14 | 6,5    | M8  | 40 | 22 | 28 | 24 | 28,5 | 12 | 10,5 | G1/8 | 47 | 32 | 16     | 34 | SW4 | 161554                |
| 65292     | 6961L-12    | 70 | 50 | 86  | 93,5  | SW17 | 8,5    | M10 | 50 | 30 | 32 | 32 | 33,5 | 16 | 12,5 | G1/8 | 56 | 36 | 20     | 42 | SW5 | 161554                |
| 65300     | 6961L-20    | 80 | 60 | 104 | 113,5 | SW22 | 10,5   | M12 | 60 | 40 | 33 | 40 | 40,0 | 20 | 14,0 | G1/8 | 62 | 39 | 25     | 44 | SW6 | 161554                |

## No. 6962F/L

### Support Element, cartridge flange

spring advanced or air advancing,  
max. operating pressure 400 bar,  
min. operating pressure 50 bar.



CAD

| Order no. | Article no. | Contact force F1*<br>[N] | Support force F2<br>[kN] | Stroke H<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Piston area<br>[cm <sup>2</sup> ] | Weight<br>[g] |
|-----------|-------------|--------------------------|--------------------------|------------------|----------------------------|-----------------------------------|---------------|
| 65052     | 6962F-08    | 20-32                    | 8                        | 6                | 5,5                        | 2,00                              | 500           |
| 65078     | 6962F-12    | 32-41                    | 12                       | 8                | 8,0                        | 3,14                              | 700           |
| 65094     | 6962F-20    | 40-72                    | 20                       | 10               | 13,0                       | 4,90                              | 1100          |
| 65060     | 6962L-08    | 170                      | 8                        | 6                | 5,5                        | 2,00                              | 500           |
| 65086     | 6962L-12    | 270                      | 12                       | 8                | 8,0                        | 3,14                              | 700           |
| 65102     | 6962L-20    | 440                      | 20                       | 10               | 13,0                       | 4,90                              | 1100          |

\*Article No. 6962F-\*\*: Contact force F1 dependent on spring pretensioning and setting travel.  
Article No. 6962L-\*\*: Contact force F1 dependent on air pressure at max. 10 bar.

### Design:

Cylinder body from steel, burnished. Support pin case hardened and ground. Internal locking sleeve system Kostyrka. Special wiper prevents contamination. Support pin with internal thread. Home position retracted or extended, depending on function. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

### Application:

Support element no. 6962F-\*\*: Plunger extended, spring adjustable contact force.  
Support element no. 6962L-\*\*: Plunger retracted, pneumatic advance spring return.  
These spring or pneumatic advancing hydraulic support elements provide additional support to avoid vibration or deflection during machining. Even large workpiece tolerances can be compensated (castings). Fitted directly below a clamping point they prevent distortion of the workpiece. The support elements can be matched with clamping cylinders of same nominal size into one circuit. To prevent the support plunger from possible slackening during a clamping procedure, it is advisable to connect a sequence valve (no. 6918-2) to control the support elements. Due to this fact, the support element is locked before the clamping procedure can be activated (fig. 1, page 96). Being used as an additional support to prevent from bending and vibration, the element should be preceded by a sequence valve (no. 6918-2) in order to ensure supporting before clamping. In case the clamping force is higher than the support force, the clamping force has to be reduced by using a pressure reducing valve no. 6917.

### Features:

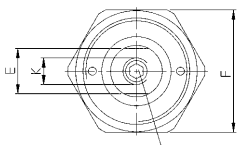
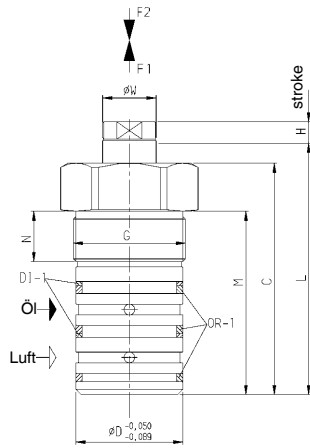
High resilience due to high operating pressure, matched to the forces of the clamping cylinder row. Smooth contacting of the workpiece by adjustable spring or pneumatic pressure. The threaded type allows the supporting element to be accommodated in fixtures in a space-saving manner. Easy attachment of thrust pieces and/or thrust bolts in the piston rod thread.

### Note:

For spring advanced types, there is risk of sucking in coolant! To avoid this, a breather hose has to be connected to the pneumatic port and moved to a protected area. Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. The support elements must be properly vented! The vent port must always be on top. Failure to do so can cause destruction of the clamping element by the escaping diesel.

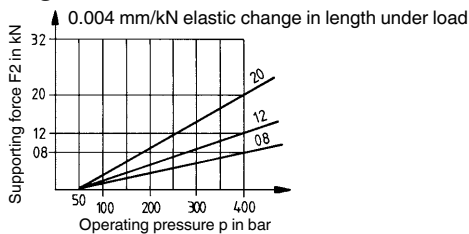
**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

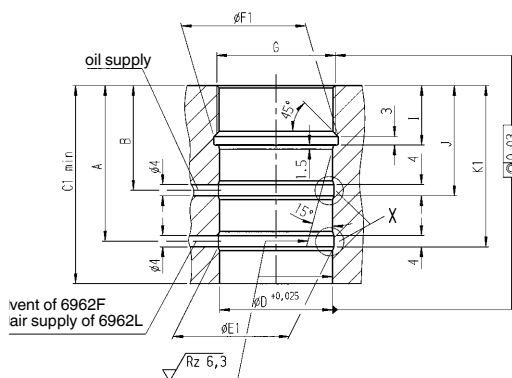


Contact force F1 (version 6962F)  
adjustable via threaded stud

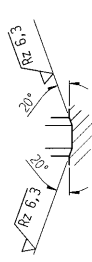
### Diagram:



### Installation dimensions:



detail X



### Installation dimensions:

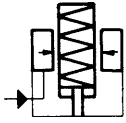
| Order no. | Article no. | A    | B    | C1 min. | dia. D H7 | dia. E1 | dia. F1 | G       | I    | J    | K1   | OR-1 O-ring Order No. | DI-1 Seal Order No. |
|-----------|-------------|------|------|---------|-----------|---------|---------|---------|------|------|------|-----------------------|---------------------|
| 65052     | 6962F-08    | 44,5 | 27,5 | 58      | 36        | 37      | 40      | M38x1,5 | 14,5 | 29,5 | 46,5 | 110254                | 136192              |
| 65078     | 6962F-12    | 55,0 | 37,0 | 70      | 40        | 41      | 44      | M42x1,5 | 21,0 | 39,0 | 57,0 | 173047                | 136200              |
| 65094     | 6962F-20    | 71,0 | 48,0 | 86      | 45        | 46      | 50      | M48x1,5 | 24,0 | 50,0 | 73,0 | 136218                | 136226              |
| 65060     | 6962L-08    | 44,5 | 27,5 | 58      | 36        | 37      | 40      | M38x1,5 | 14,5 | 29,5 | 46,5 | 110254                | 136192              |
| 65086     | 6962L-12    | 55,0 | 37,0 | 70      | 40        | 41      | 44      | M42x1,5 | 21,0 | 39,0 | 57,0 | 173047                | 136200              |
| 65102     | 6962L-20    | 71,0 | 48,0 | 86      | 45        | 46      | 50      | M48x1,5 | 24,0 | 50,0 | 73,0 | 136218                | 136226              |

Subject to technical alterations.

## No. 6964F

### Support Element, base-flange-mounting

Normally extended. Spring advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

| Order no. | Article no. | Contact force F1 [N] | Support force at 350 bar [kN] | Stroke C [mm] | Vol. [cm <sup>3</sup> ] | Weight [g] |
|-----------|-------------|----------------------|-------------------------------|---------------|-------------------------|------------|
| 66852     | 6964F-04-2  | 4,5 - 9,0            | 4,4                           | 6,5           | 0,16                    | 281        |
| 66878     | 6964F-11-2  | 9,0 - 26,5           | 11,0                          | 9,5           | 0,33                    | 660        |
| 66894     | 6964F-33    | 40 - 80              | 33,4                          | 12,5          | 1,64                    | 2019       |
| 66910     | 6964F-55    | 49 - 71              | 55,6                          | 19,0          | 4,26                    | 4291       |

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

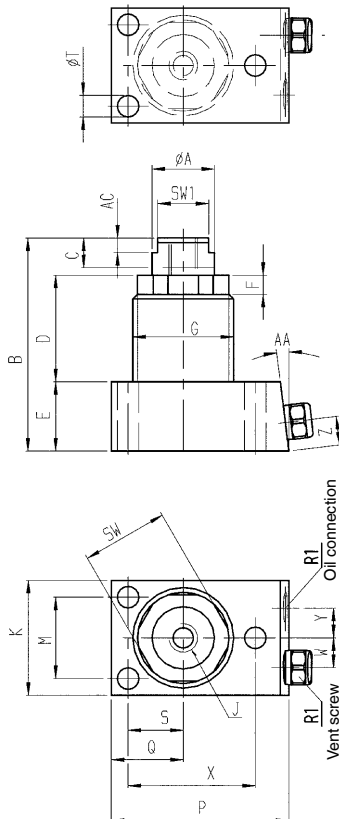
Element with high load capacity and low height. Spring extension: the plunger is normally extended. Variable spring setting permits sensitive adjustment of contact force.

### Note:

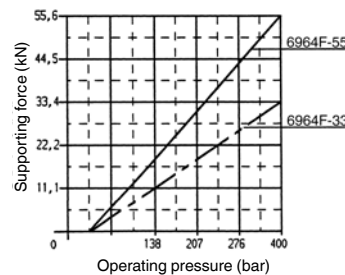
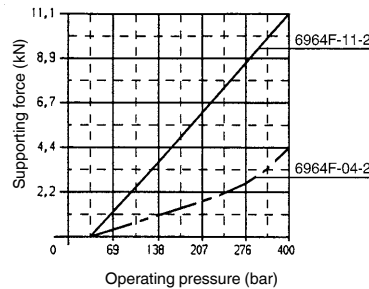
Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



### Diagrams:



0.004 mm/kN elastic change in length under load

### Dimensions:

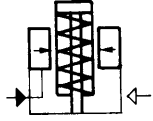
| Order no. | Article no. | dia. A | B     | D    | E    | F    | G       | SW | SW1  | J x depth | K    | M    | P    | Q    | R1   | S    | dia. T | W  | X    | Y  | Z    | AA | AC |
|-----------|-------------|--------|-------|------|------|------|---------|----|------|-----------|------|------|------|------|------|------|--------|----|------|----|------|----|----|
| 66852     | 6964F-04-2  | 16,0   | 56,0  | 25,0 | 24,0 | 5,5  | M26x1,5 | 23 | -    | M8x7,5    | 33,5 | 24,5 | 44,5 | 17,5 | G1/8 | 13,0 | 5,5    | 9  | 31,0 | 9  | 8,5  | 7° | -  |
| 66878     | 6964F-11-2  | 20,5   | 70,5  | 33,0 | 25,0 | 6,5  | M35x1,5 | 30 | -    | M10x11,5  | 41,5 | 30,0 | 59,0 | 24,0 | G1/8 | 18,0 | 7,0    | 10 | 43,0 | 10 | 8,5  | 7° | -  |
| 66894     | 6964F-33    | 38,0   | 111,0 | 68,5 | 25,0 | 12,5 | Ø 57    | 50 | 28,5 | M12x15    | 63,5 | 52,5 | 76,0 | 31,5 | G1/8 | 26,0 | 7,0    | 16 | 61,0 | 16 | 10,3 | -  | 4  |
| 66910     | 6964F-55    | 51,0   | 133,0 | 76,0 | 31,5 | 12,5 | Ø 76    | 70 | 41,5 | M16x20    | 89,0 | 73,0 | 97,0 | 44,5 | G1/8 | 36,5 | 9,0    | 24 | 81,5 | 24 | 10,3 | -  | 4  |

Subject to technical alterations.

## No. 6964L

### Support Element, base-flange-mounting

Normally retracted. Air advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

| Order no. | Article no. | Contact force F1 [N] | Support force at 350 bar [kN] | Stroke C [mm] | Vol. [cm <sup>3</sup> ] | Weight [g] |
|-----------|-------------|----------------------|-------------------------------|---------------|-------------------------|------------|
| 66936     | 6964L-04-2  | 17,5*                | 4,4                           | 6,5           | 0,16                    | 255        |
| 66621     | 6964L-11-2  | 35,5*                | 11,0                          | 9,5           | 0,33                    | 665        |
| 66688     | 6964L-33    | 89,0*                | 33,4                          | 12,5          | 1,64                    | 2023       |
| 66704     | 6964L-55    | 253,3*               | 55,6                          | 19,0          | 4,26                    | 4300       |

\* Contact force with max. 1.7 bar air pressure.

### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

Element with high load capacity and low height. Pneumatic: the plunger is normally retracted. Sensitive adjustment of contact force by varying the air pressure.

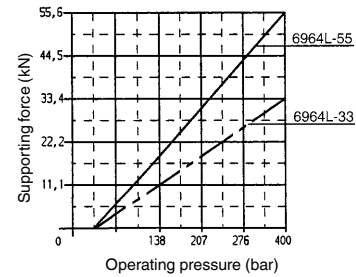
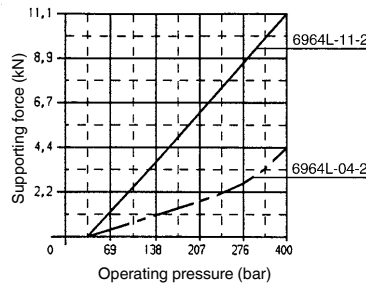
### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

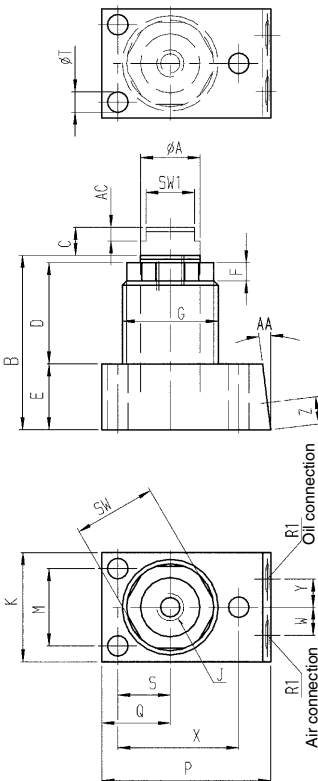
**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

### Diagrams:



0.004 mm/kN elastic change in length under load



### Dimensions:

| Order no. | Article no. | dia. A | B    | D    | E    | F    | G       | SW | SW1  | J x depth | K    | M    | P    | Q    | R1   | S    | dia. T | W  | X    | Y  | Z    | AA | AC |
|-----------|-------------|--------|------|------|------|------|---------|----|------|-----------|------|------|------|------|------|------|--------|----|------|----|------|----|----|
| 66936     | 6964L-04-2  | 16,0   | 49,5 | 25,0 | 24,0 | 5,5  | M26x1,5 | 23 | -    | M6x7,5    | 33,5 | 24,5 | 44,5 | 17,5 | G1/8 | 13,0 | 5,5    | 9  | 31,0 | 9  | 8,5  | 7° | -  |
| 66621     | 6964L-11-2  | 20,5   | 61   | 33,0 | 25,0 | 6,5  | M35x1,5 | 30 | -    | M8x6,0    | 41,0 | 30,0 | 59,0 | 24,0 | G1/8 | 18,0 | 7,0    | 10 | 43,0 | 10 | 8,5  | 7° | -  |
| 66688     | 6964L-33    | 38,0   | 98   | 68,5 | 25,0 | 12,5 | Ø 57    | 50 | 28,5 | M12x15,0  | 63,5 | 52,5 | 76,0 | 31,5 | G1/8 | 26,0 | 7,0    | 16 | 61,0 | 16 | 10,3 | -  | 4  |
| 66704     | 6964L-55    | 51,0   | 114  | 76,0 | 31,5 | 12,5 | Ø 76    | 70 | 41,5 | M16x20,0  | 89,0 | 73,0 | 97,0 | 44,5 | G1/8 | 36,5 | 9,0    | 24 | 81,5 | 24 | 10,3 | -  | 4  |

Subject to technical alterations.

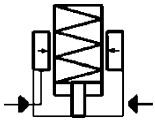
## No. 6964H

### Support Element, base-flange-mounting

Normally retracted. Hydraulic advanced. Spring force for contact, max. operating pressure 350 bar, min. operating pressure 50 bar.



| Order no. | Article no. | Contact force F1 [N] | Support force at 350 bar [kN] | Stroke C [mm] | Q max. [l/min] | Vol. [cm <sup>3</sup> ] | Weight [g] |
|-----------|-------------|----------------------|-------------------------------|---------------|----------------|-------------------------|------------|
| 66746     | 6964H-11-2  | 13,5-44,5            | 11                            | 6,5           | 2,13           | 3,0                     | 845        |
| 325878    | 6964H-17-3  | 26,5 - 53,5          | 17                            | 12,5          | 2,13           | 10,5                    | 1920       |



### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via threaded port.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

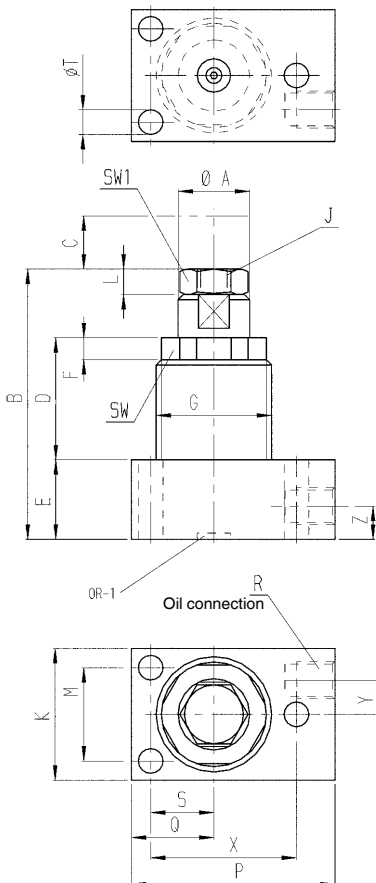
Element with high load capacity and low height. Hydraulic and spring: the plunger is normally retracted. When pressure is applied, the support pin advances with a weak spring-applied force to contact the workpiece. The spring force varies with the stroke. As the hydraulic pressure rises, the support plunger is hydraulically clamped. When the pressure is released, the support plunger returns to the retracted position. Very high repeatability ensures optimum production quality.

### Note:

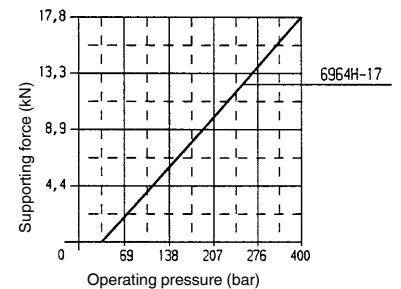
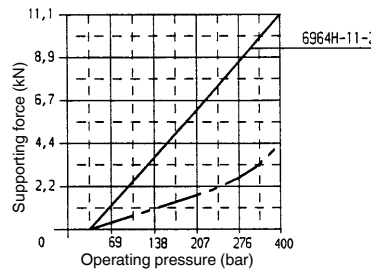
Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

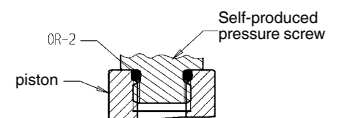
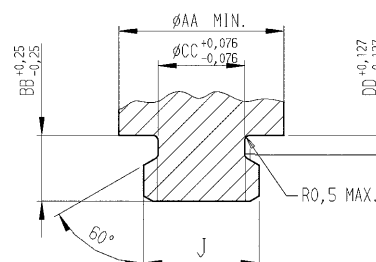


### Diagrams:



0,004 mm/kN elastic change in length under load

### Production dimensions with self-production of the clamping screw for support element:



### Dimensions:

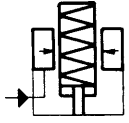
| Order no. | Article no. | dia. A | B    | D  | E    | F    | G       | SW | SW1 | J x depth | K    | L | M    | P    | Q    | R    | S    | dia. T | X    | Y    | Z    | ØAA  | BB   | dia. CC | DD   | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|--------|------|----|------|------|---------|----|-----|-----------|------|---|------|------|------|------|------|--------|------|------|------|------|------|---------|------|-----------------------|-----------------------|
| 66746     | 6964H-11-2  | 20,5   | 82,5 | 34 | 31,5 | 9,0  | M35x1,5 | 30 | 19  | M12x6,5   | 41,5 | 5 | 30,2 | 58,5 | 24,0 | G1/8 | 18,3 | 7,1    | 43,1 | 10,5 | 10,5 | 14,1 | 6,35 | 9,91    | 1,78 | 330803                | 335422                |
| 325878    | 6964H-17-3  | 38,0   | 82,5 | 40 | 25,0 | 12,5 | M60x1,5 | 54 | 19  | M12x6,5   | 73,0 | 5 | 52,4 | 81,0 | 36,5 | G1/8 | 26,2 | 7,1    | 62,6 | 16,0 | 10,5 | 14,1 | 6,35 | 9,91    | 1,78 | 330803                | 335422                |

Subject to technical alterations.

## No. 6964F

### Support Element, cartridge flange

Normally extended. Spring advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

| Order no. | Article no. | Contact force F1 [N] | Support force at 350 bar [kN] | Stroke C [mm] | Vol. [cm <sup>3</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|----------------------|-------------------------------|---------------|-------------------------|--------------|------------|
| 165092    | 6964F-04-1  | 4,5-9,0              | 4,4                           | 6,5           | 0,16                    | 40,5         | 160        |
| 165100    | 6964F-11-1  | 9,0-26,5             | 11,0                          | 9,5           | 0,33                    | 40,5         | 320        |

#### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

#### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

#### Features:

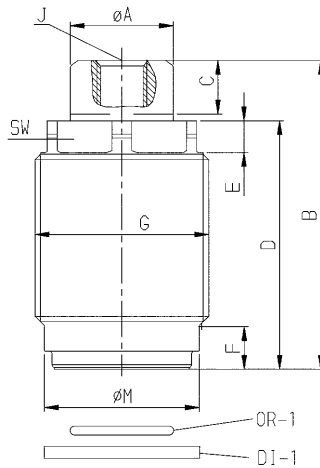
Element with high load capacity and low height. Spring extension: the plunger is normally extended. Variable spring setting permits sensitive adjustment of contact force.

#### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



#### Dimensions:

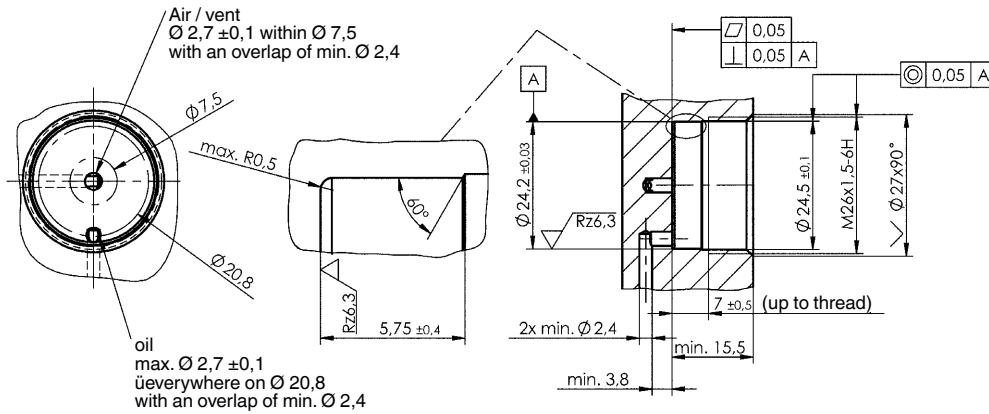
| Order no. | Article no. | dia. A | B    | D    | E   | F   | G         | J x depth | dia. M | SW | OR-1 O-ring Order No. | DI-1 Seal Order No. |
|-----------|-------------|--------|------|------|-----|-----|-----------|-----------|--------|----|-----------------------|---------------------|
| 165092    | 6964F-04-1  | 16,0   | 47,5 | 40,5 | 5,5 | 7,5 | M26 x 1,5 | M8x7,5    | 24     | 23 | 479550                | 346270              |
| 165100    | 6964F-11-1  | 20,5   | 62,0 | 49,5 | 6,5 | 8,5 | M35 x 1,5 | M10x11,5  | 31     | 30 | 479618                | 550211              |

Subject to technical alterations.

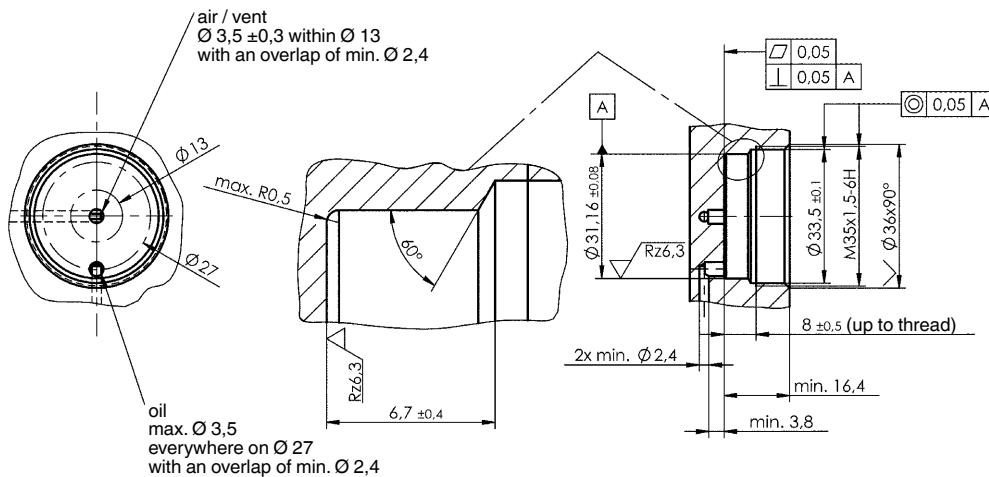


## Installation dimensions:

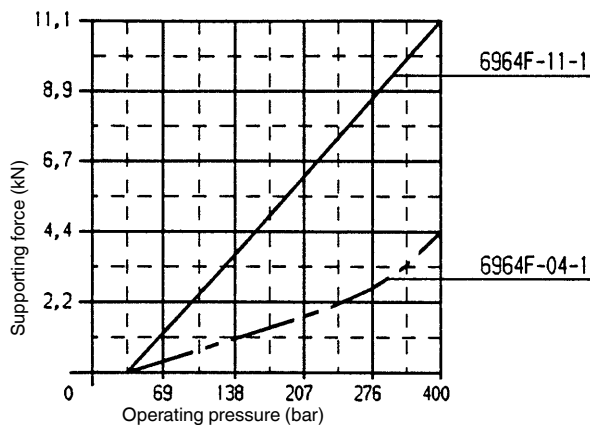
### 6964F-04-1



### 6964F-11-1



## Diagram:

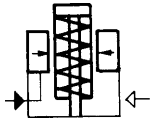


0.004 mm/kN elastic change in length under load

## No. 6964L

### Support Element, cartridge flange

Normally retracted. Air advanced, max. operating pressure 350 bar, min. operating pressure 50 bar.



CAD

| Order no. | Article no. | Contact force F1<br>[N] | Support force at 350 bar<br>[kN] | Stroke C<br>[mm] | Vol.<br>[cm <sup>3</sup> ] | Md max.<br>[Nm] | Weight<br>[g] |
|-----------|-------------|-------------------------|----------------------------------|------------------|----------------------------|-----------------|---------------|
| 165167    | 6964L-04-1  | 17,5*                   | 4,4                              | 6,5              | 0,16                       | 40,5            | 150           |
| 165183    | 6964L-11-1  | 35,5*                   | 11,0                             | 9,5              | 0,33                       | 40,5            | 340           |

\* Contact force with max. 1.7 bar air pressure.

#### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

#### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

#### Features:

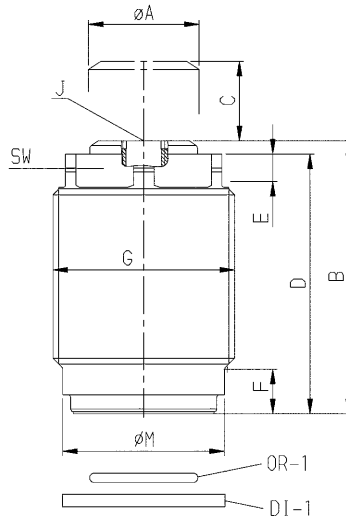
Element with high load capacity and low height. Pneumatic: the plunger is normally retracted. Sensitive adjustment of contact force by varying the air pressure.

#### Note:

Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**

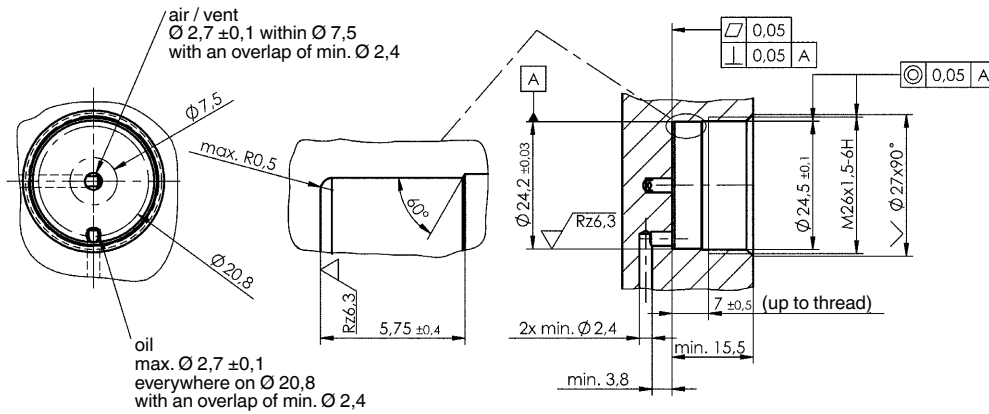


#### Dimensions:

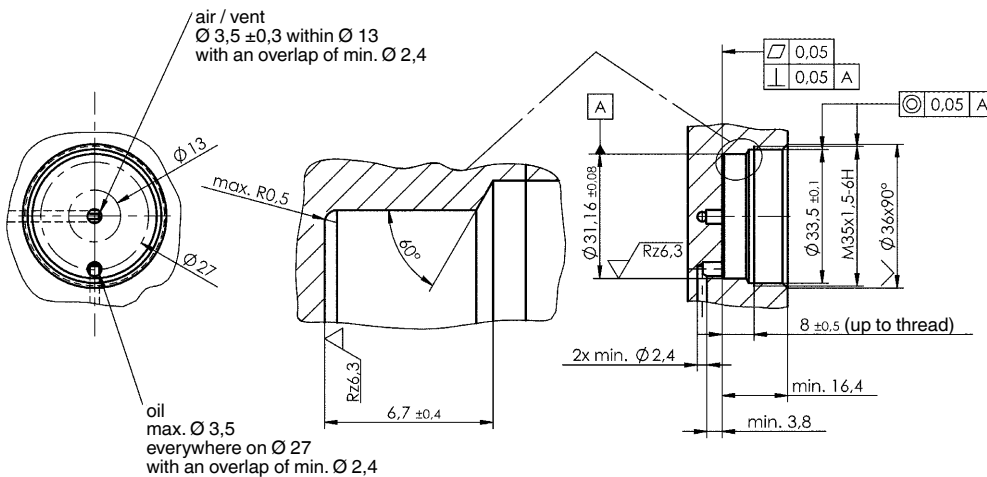
| Order no. | Article no. | dia. A | B    | D    | E   | F   | G       | J x depth | dia. M | SW | OR-1<br>O-ring<br>Order No. | DI-1<br>Seal<br>Order No. |
|-----------|-------------|--------|------|------|-----|-----|---------|-----------|--------|----|-----------------------------|---------------------------|
| 165167    | 6964L-04-1  | 16,0   | 41,0 | 40,5 | 5,5 | 7,5 | M26x1,5 | M6x7,5    | 24     | 23 | 479550                      | 346270                    |
| 165183    | 6964L-11-1  | 20,5   | 52,5 | 49,5 | 6,5 | 8,5 | M35x1,5 | M8x6,0    | 31     | 30 | 479618                      | 550211                    |

## Installation dimensions:

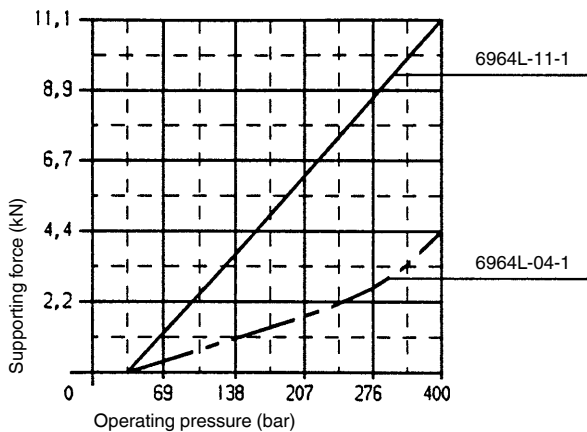
### 6964L-04-1



### 6964L-11-1



## Diagram:

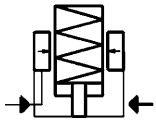


0.004 mm/kN elastic change in length under load

## No. 6964H

### Support Element, cartridge flange

Normally retracted. Hydraulic advanced. Spring force for contact, max. operating pressure 350 bar, min. operating pressure 50 bar.



**NEW!**

**NEW!**

| Order no. | Article no. | Contact force F1 [N] | Support force at 350 bar [kN] | Stroke C [mm] | max. oil flow rate [l/min.] | Vol. [cm <sup>3</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|----------------------|-------------------------------|---------------|-----------------------------|-------------------------|--------------|------------|
| 165225    | 6964H-04-1  | 4,4-26,7             | 4,4                           | 6,5           | 2,13                        | 1,3                     | 40,5         | 180        |
| 562248    | 6964H-04-10 | 4,4-26,7             | 6,2                           | 12,5          | 2,13                        | 1,5                     | 40,5         | 187        |
| 66720     | 6964H-11-1  | 13,5-44,5            | 11,0                          | 6,5           | 2,13                        | 2,0                     | 54,0         | 380        |
| 562249    | 6964H-11-10 | 13,5-44,5            | 13,4                          | 12,5          | 2,13                        | 2,3                     | 54,0         | 417        |
| 165241    | 6964H-17-1  | 27,0-53,0            | 17,0                          | 12,5          | 2,13                        | 9,7                     | 136,0        | 1150       |

#### Design:

Cylinder body from steel, hardened. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Internal parts from stainless steel. Oil supply via oil channel in fixture body.

#### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

#### Features:

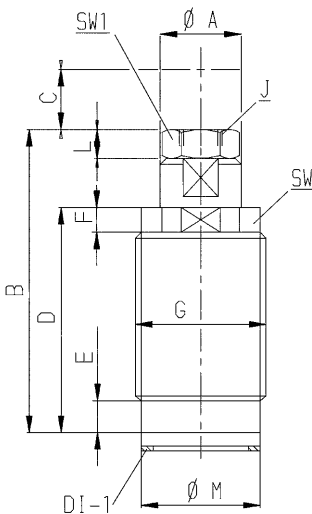
Element with high load capacity and low height. Hydraulic and spring: the plunger is normally retracted. When pressure is applied, the support pin advances with a weak spring-applied force to contact the workpiece. The spring force varies with the stroke. As the hydraulic pressure rises, the support pin is hydraulically clamped. When the pressure is released, the support pin returns to the retracted position. Very high repeatability ensures optimum production quality.

#### Note:

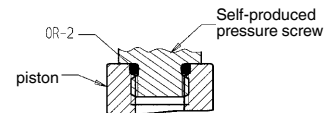
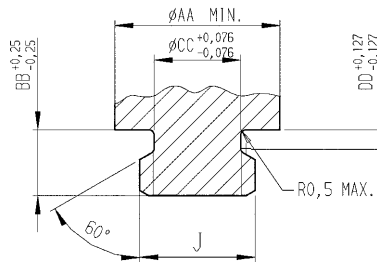
Support pin must be protected against the entry of dirt and splash water by fitting a set screw or plug. When placing into operation, ensure that all air is bled from the system. Failure to do so can cause destruction of the clamping element by the escaping diesel effect.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



#### Production dimensions with self-production of the clamping screw for support element:



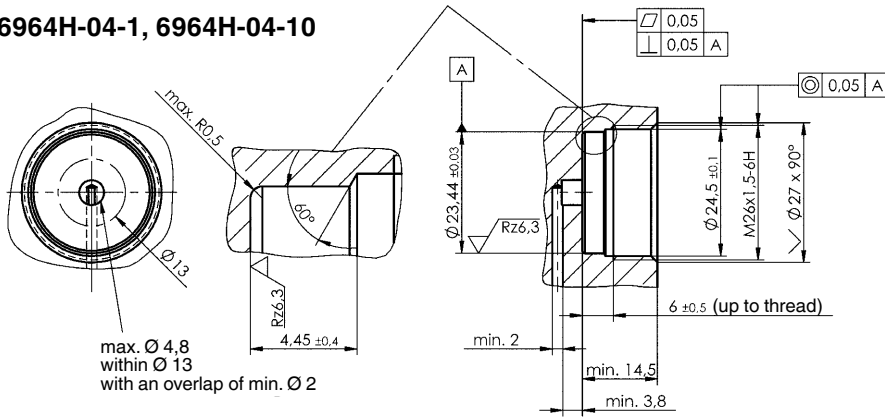
#### Dimensions:

| Order no. | Article no. | dia. A | B    | D    | E   | F    | G       | J x depth | L   | dia. M | SW | SW1 | ØAA   | BB   | dia. CC | DD   | OR-2 O-ring Order No. | DI-1 Seal Order No. |
|-----------|-------------|--------|------|------|-----|------|---------|-----------|-----|--------|----|-----|-------|------|---------|------|-----------------------|---------------------|
| 165225    | 6964H-04-1  | 16,0   | 53,5 | 42,5 | 7,0 | 5,5  | M26x1,5 | M8x5,0    | 3,5 | 23,3   | 23 | 13  | 9,75  | 5,00 | 6,05    | 1,19 | 181289                | 550124              |
| 562248    | 6964H-04-10 | 16,0   | 66,5 | 55,5 | 7,0 | 5,5  | M26x1,5 | M10x6,8   | 3,5 | 23,3   | 23 | 13  | 11,43 | 5,00 | 6,05    | 1,19 | 181289                | 550124              |
| 66720     | 6964H-11-1  | 20,5   | 72,0 | 55,0 | 9,5 | 9,0  | M35x1,5 | M12x6,5   | 5,0 | 29,7   | 30 | 19  | 14,10 | 6,35 | 9,91    | 1,78 | 335422                | 550125              |
| 562249    | 6964H-11-10 | 20,5   | 84,5 | 68,0 | 9,5 | 9,0  | M35x1,5 | M12x6,5   | 5,0 | 29,7   | 30 | 19  | 14,10 | 6,35 | 9,91    | 1,78 | 335422                | 550125              |
| 165241    | 6964H-17-1  | 38,0   | 72,5 | 55,0 | 6,5 | 12,5 | M60x1,5 | M12x6,5   | 5,0 | 54,8   | 54 | 19  | 14,10 | 6,35 | 9,91    | 1,78 | 335422                | 474445              |

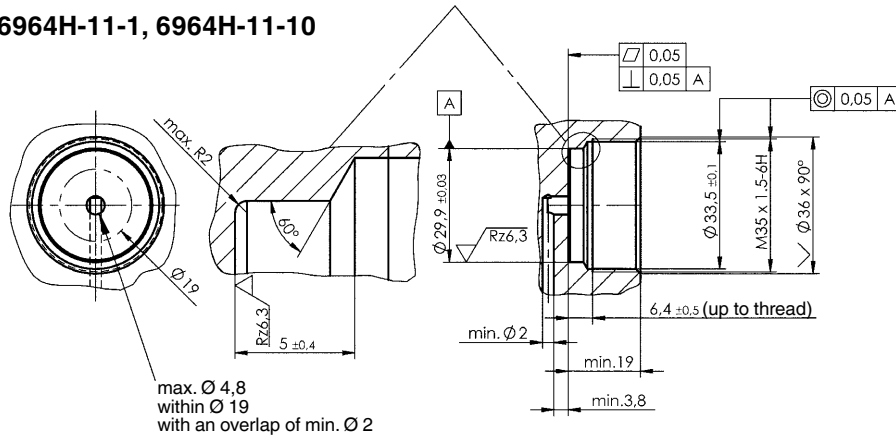
Subject to technical alterations.

## Installation dimensions:

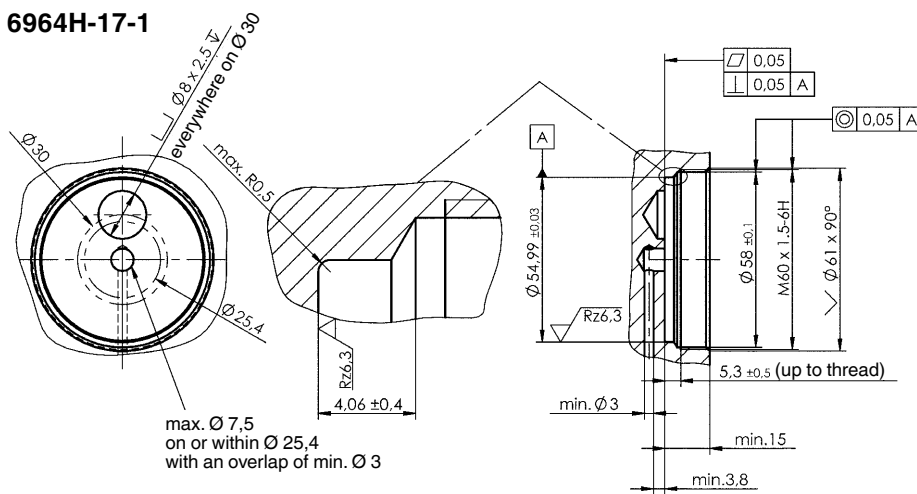
### 6964H-04-1, 6964H-04-10



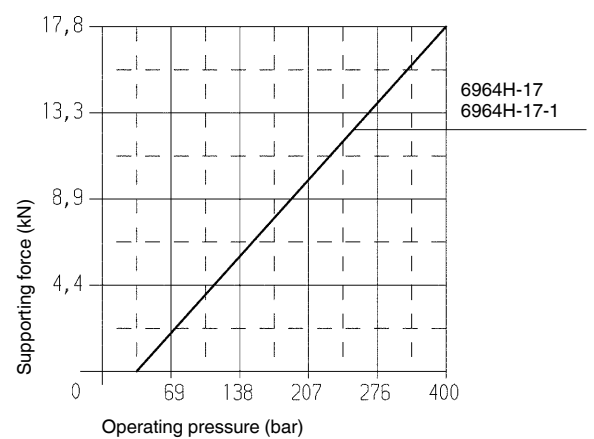
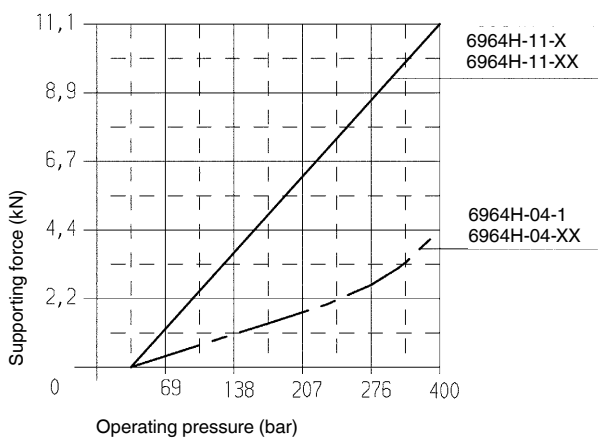
### 6964H-11-1, 6964H-11-10



### 6964H-17-1



## Diagrams:



0.004 mm/kN elastic change in length under load

Subject to technical alterations.

No. 6964H-xx-20

Splash protection



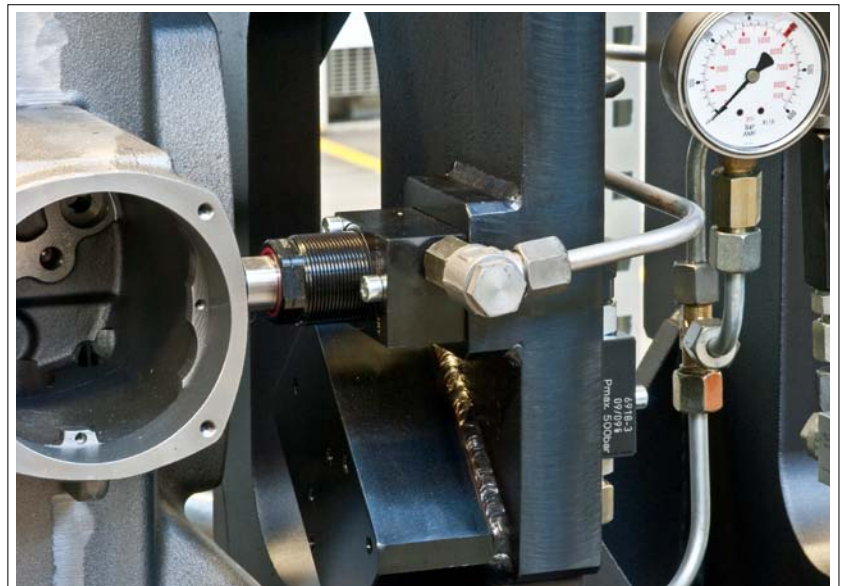
| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 326520    | 6964H-04-20 | 6          |
| 326546    | 6964H-11-20 | 12         |
| 326561    | 6964H-17-20 | 33         |

**Application:**

For protection against entry of chips and splash water.

**Note:**

Use only for hydraulic support element. Observe mounting position!



Subject to technical alterations.

# CLAMPING ELEMENTS FOR STRESS-FREE CLAMPING AND LOW- VIBRATION MACHINING

## COUNTER BALANCERS

- > clamping force 2,0 kN
- > clamping stroke 12 mm
- > counterbalance stroke 3 mm

## COMPENSATING COLLET

- > clamping force 2,5 kN
- > gripping force 0,5 kN / per piston
- > counterbalance stroke 3,75 mm

## CLAMPING TONGS

- > holding force 0,78 kN
- > piston force 1,25 kN
- > clamping range 2 - 10 mm

## CLAMPING TONGS

- > holding force 6,7 kN
- > piston force 7,8 kN
- > clamping range up to 10 mm

## PRODUCT OVERVIEW:

| Type     | Operating pressure [bar] | Clamping force [kN] | Piston force [kN] | Gripping force [kN] | Holding force [kN] | No. of models | Operating mode |
|----------|--------------------------|---------------------|-------------------|---------------------|--------------------|---------------|----------------|
| 6965-08  | 100                      | 2,0                 | 2,0               | 3,0                 | 0,5                | 1             | single acting  |
| 6965-10  | 250                      | 2,5                 | 2,8               | 5,0                 | 0,34               | 1             | single acting  |
| 6966-01  | 250                      | -                   | 1,25              | -                   | 0,78               | 1             | single acting  |
| 6966D-07 | 250                      | -                   | 7,8               | -                   | 6,7                | 1             | double acting  |

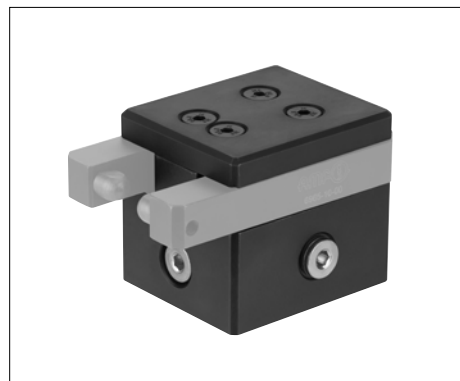
## PRODUCT EXAMPLES:

NO. 6965-08



- > holding force: 0,5 kN
- > clamping stroke: 12,0 mm

NO. 6965-10



- > holding force: 0,3 kN
- > clamping stroke: 7,5 mm

NO. 6966-01

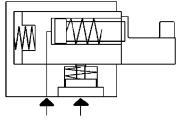


- > holding force: 0,78 kN
- > clamping range: 2 - 10 mm

No. 6965

## Hydraulic Compensating Clamp

Single acting, with spring return, max. operating pressure 100 bar.



| Order no. | Article no. | max. clamping force [kN] | max. locking force [kN] | max. piston force [kN] | Holding force [kN] | Clamping stroke [mm] | Compensating stroke [mm] | Pin dia. | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------|-------------------------|------------------------|--------------------|----------------------|--------------------------|----------|-----------------------|------------|
| 320333    | 6965-08-00  | 2                        | 3                       | 2                      | 0,5                | 12                   | 3                        | 16,0*    | 550265                | 1675       |
| 320341    | 6965-08-01  | 2                        | 3                       | 2                      | 0,5                | 12                   | 3                        | 5,5      | 550265                | 1675       |
| 320358    | 6965-08-02  | 2                        | 3                       | 2                      | 0,5                | 12                   | 3                        | 8,5      | 550265                | 1675       |

\* Clamping bolt blank not hardened

### Design:

Housing from steel, burnished. Piston from case-hardened steel, hardened and ground. Complete with four fixing screws M6 x 70 and O-ring for flange seal. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

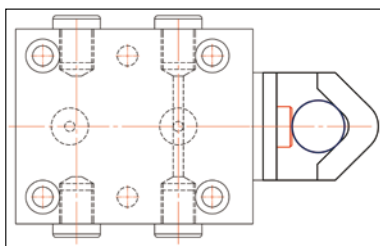
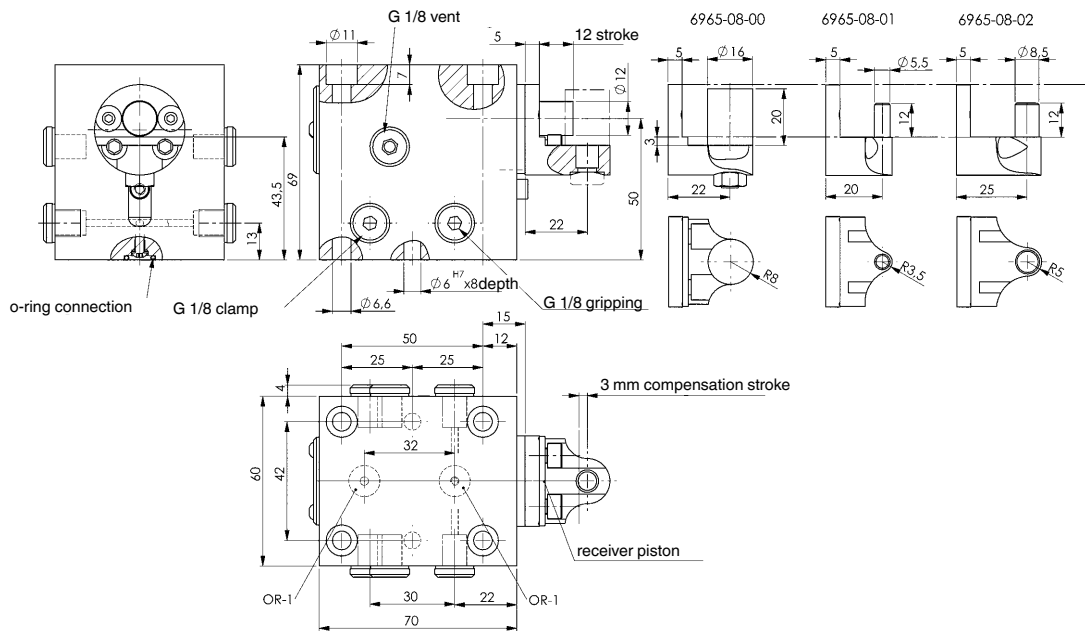
The Hydraulic Compensating Clamp is employed in fixtures for the distortion-free, floating clamping and support of workpieces. It is possible to use several Hydraulic Compensating Clamps without distorting a workpiece.

### Features:

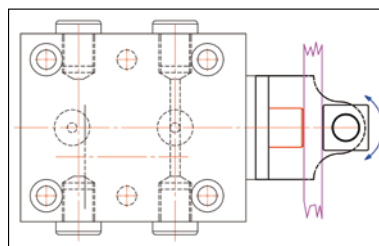
The floating piston has a compensating stroke of 3 mm, thereby also permitting the clamping of workpieces with large shape deviations or differing and inaccurate drill hole tolerances. Immediately after the clamping process, the support piston is clamped, specifically in a clamped position, via a sequence valve! The workpiece holder on the adjustable clamp is easy to change and is therefore simply and quickly adapted to the various workpiece contours.

### Note:

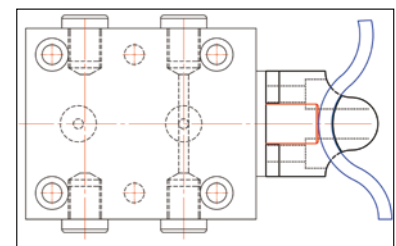
Please do not operate a Hydraulic Compensating Clamp without a workpiece in place; doing so can damage the return spring or cause it to set and lose force. For single acting cylinders there is risk of sucking in coolant through the breather port. In such cases the breather port has to be piped to a clean protected area. The system has to be completely vented during installation.



Clamping of workpiece with moulded lugs.



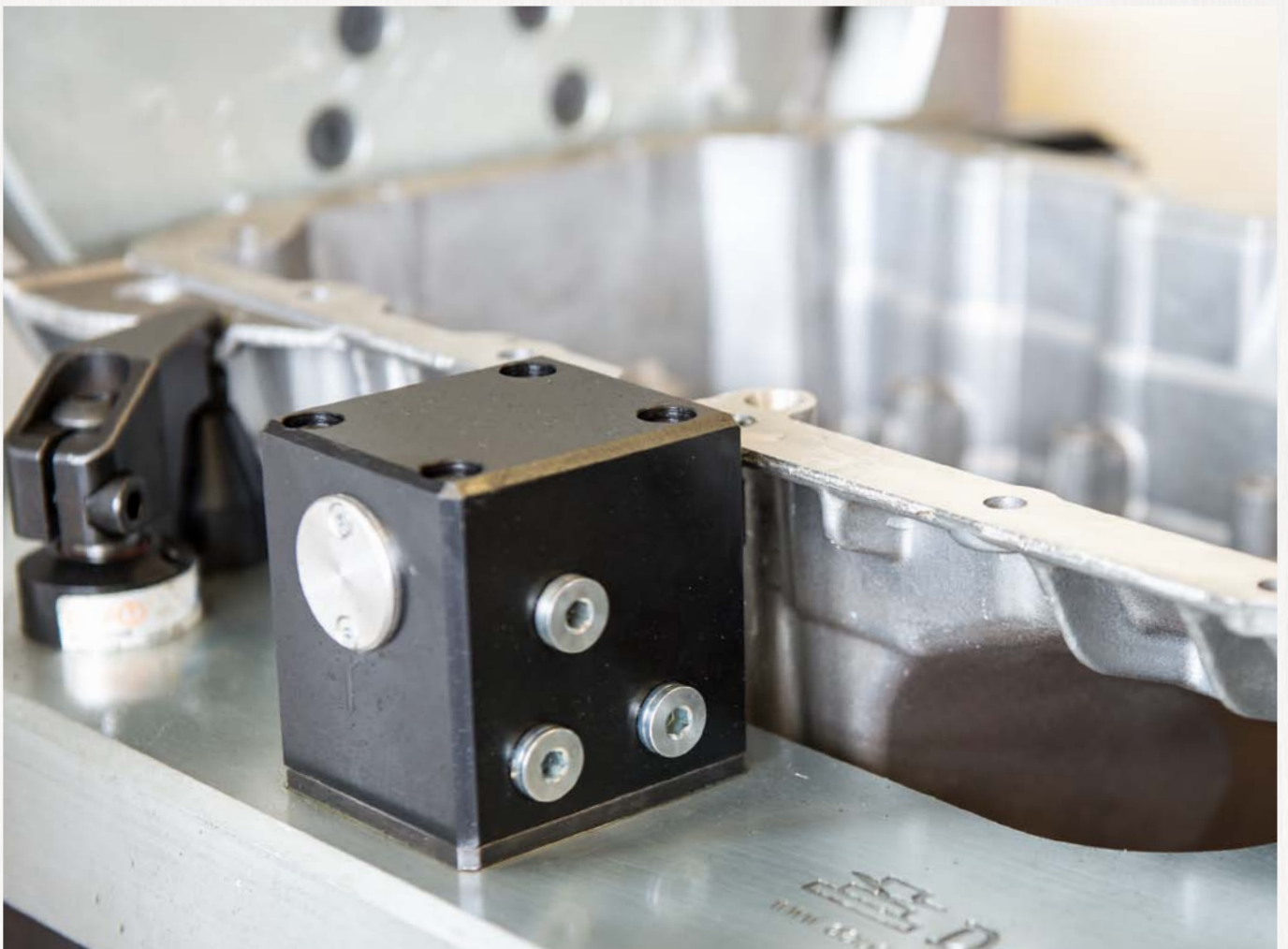
Clamping at heat fin.



Clamping to CAD-data geometry.

Subject to technical alterations.



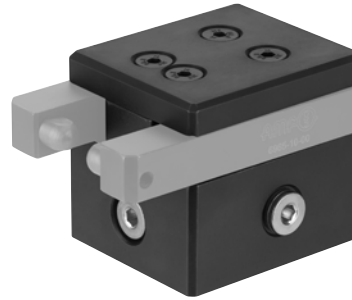
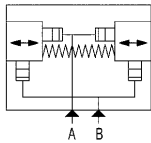


Subject to technical alterations.

## No. 6965-10

### Compensating collet

Single-acting, with spring return,  
 max. operating pressure 250 bar,  
 min. operating pressure 30 bar.



**NEW!**

| Order no. | Article no. | max. clamping force [kN] | max. locking force [kN] | max. piston force [kN] | Holding force [kN] | Clamping stroke [mm] | Compensating stroke [mm] | Workpiece clamping range [mm] | G    | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------|-------------------------|------------------------|--------------------|----------------------|--------------------------|-------------------------------|------|-----------------------|------------|
| 562219    | 6965-10     | 2,5                      | 5                       | 2,8                    | 0,34               | 7,5                  | 3,75                     | 2,5 - 8,5                     | G1/8 | 550265                | 1900       |

#### Design:

Housing made of steel, burnished. Complete with four fastening bolts and O-ring for flange seal. Oil supply via threaded connection or oil channel in the fixture body. Clamping lever standard is not supplied as standard.

#### Application:

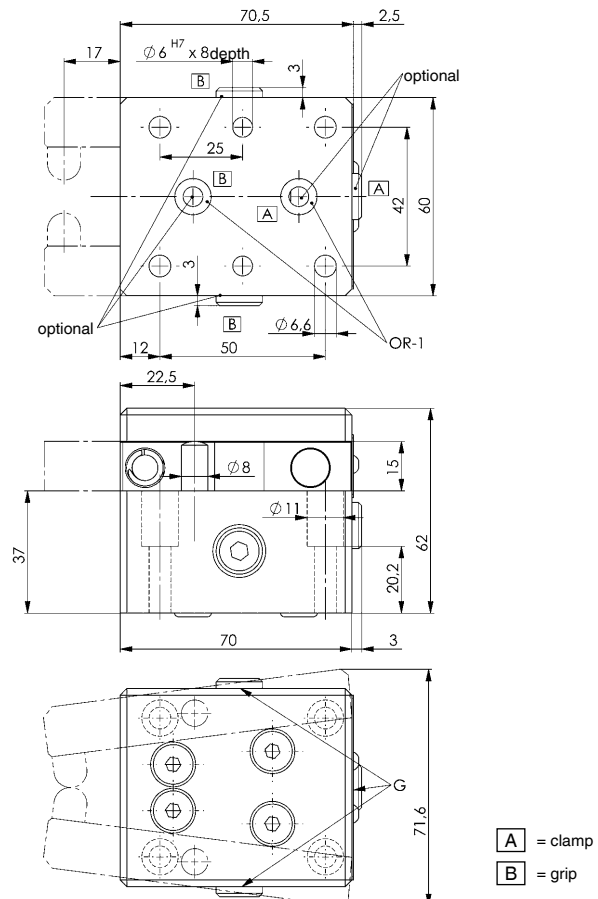
The compensating collet is used in clamping devices to clamp or hold workpieces floating and distortion-free. Several compensating collets can be used without distorting the workpiece.

#### Features:

The clamp arms mounted axially above the pivot point each have a counterbalance stroke. This allows workpieces with large deviations in shape and position to be clamped on the clamping surface in the stroke direction. The workpieces are supplied by application of pressure first at connection A „clamping“, by placing the clamping lever onto the workpiece and then to clamp the clamping lever distortion-free in position by means of connection B „clamping“. The clamping sequence can also be implemented by means of a sequence valve 6918-80-10 or sequence valve 6918-XX. The clamping levers are changeable.

#### Note:

Before operating the compensating collet, the workpiece must be clamped to prevent it from moving.



Subject to technical alterations.

No. 6965-10-00

Clamping lever, standard

**NEW!**



CAD

| Order no. | Article no. | max. operating pressure<br>[bar] | Clamping force at 100 bar<br>[kN] | B  | L  | G  | Weight<br>[g] |
|-----------|-------------|----------------------------------|-----------------------------------|----|----|----|---------------|
| 562220    | 6965-10-00  | 250                              | 0,68                              | 15 | 93 | M5 | 309           |

**Design:**

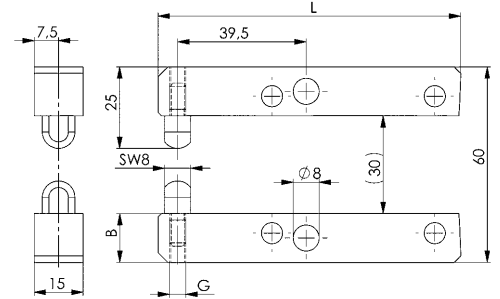
Clamping lever made of tempered steel, burnished, in two parts. Thrust piece made of tempered steel, nitrided. Thrust piece changeable.

**Application:**

Clamping lever for compensating collet 6965-10.

**Note:**

Always observe clamping pressure



No. 6965-10-03

Clamping lever, cranked

**NEW!**



CAD

| Order no. | Article no. | max. operating pressure<br>[bar] | Clamping force at 100 bar<br>[kN] | A  | B  | L  | G  | Weight<br>[g] |
|-----------|-------------|----------------------------------|-----------------------------------|----|----|----|----|---------------|
| 562221    | 6965-10-03  | 250                              | 0,68                              | 40 | 15 | 93 | M5 | 407           |

**Design:**

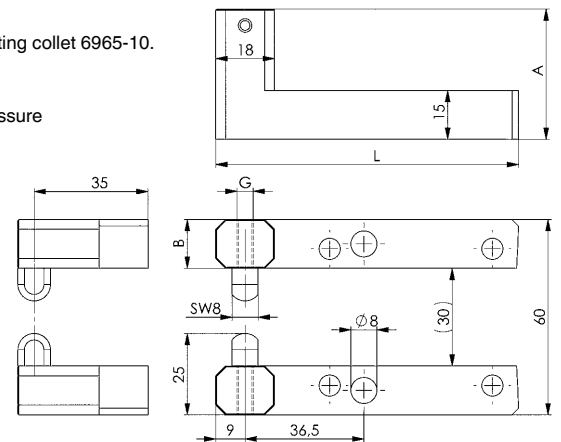
Clamping lever made of tempered steel, burnished, in two parts. Thrust piece made of tempered steel, nitrided. Thrust piece changeable.

**Application:**

Clamping lever for compensating collet 6965-10.

**Note:**

Always observe clamping pressure



No. 6965-10-09

Clamping lever blank

**NEW!**



CAD

| Order no. | Article no. | max. operating pressure<br>[bar] | Clamping force at 100 bar<br>[kN] | A    | B  | L  | Weight<br>[g] |
|-----------|-------------|----------------------------------|-----------------------------------|------|----|----|---------------|
| 562222    | 6965-10-09  | 250                              | 0,68                              | 29,5 | 15 | 95 | 377           |

**Design:**

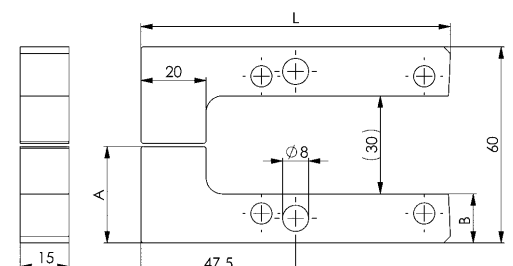
Clamping lever made of tempered steel, burnished, in two parts.

**Application:**

Clamping lever for compensating collet 6965-10.

**Note:**

Always observe clamping pressure



Subject to technical alterations.

No. 6966

## Clamping tongs

Single-acting,  
max. operating pressure 250 bar,  
min. operating pressure 30 bar.



| Order no. | Article no. | Holding force at 250 bar [kN] | Piston force at 250 bar [kN] | Stroke H min. [mm] | Stroke H max. [mm] | Clamping range S [mm] | Md [Nm] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|-------------------------------|------------------------------|--------------------|--------------------|-----------------------|---------|-----------------------|------------|
| 562215    | 6966-01     | 0,78                          | 1,25                         | 1,8                | 14                 | 2 - 10                | 10      | 466334                | 1423       |

### Design:

Housing made of steel, burnished. Steel clamping lever, case-hardened. The clamping levers are driven by two single-acting threaded cylinders. Oil supply via oil channel in fixture body. Supplied as standard with oil feed brake and four fastening bolts M6 x 70. A filter insert with an O-ring is integrated in the supply.

### Application:

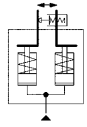
The clamping tongs prevent vibrations on the workpiece during machining. The clamping tongs are suitable for holding the workpieces but not for positioning them.

### Features:

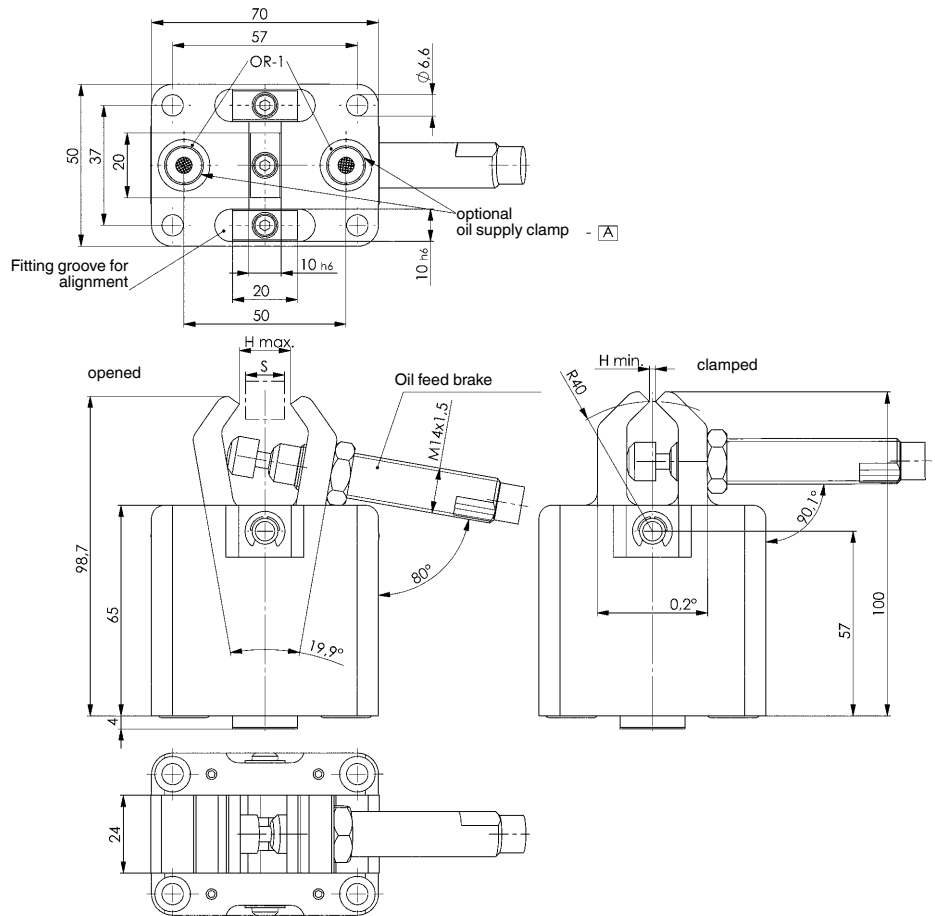
The clamping tongs hold the workpiece without clamping it. A wide range of clamping forms can be implemented with the clamping lever blank.

### Note:

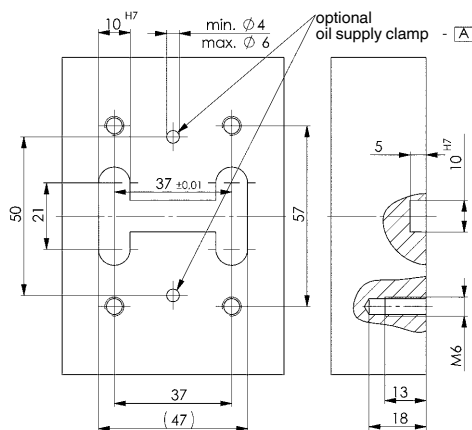
Resetting of the clamping levers by the oil feed brake. Resetting is also possible via a spring, which is not supplied as standard.



**NEW!**

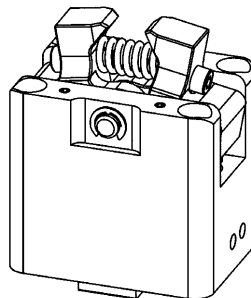


### Drilling template device:



### Application example:

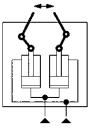
(with spring advance return)



## No. 6966D

### Clamping tongs

Double-acting,  
max. operating pressure 250 bar,  
min. operating pressure 30 bar.



**NEW!**



CAD

| Order no. | Article no. | Holding force F at 250 bar * [kN] | Piston force at 250 bar [kN] | Clamping range up to [mm] | OR-1 O-ring Order No. | Md [Nm] | Weight [g] |
|-----------|-------------|-----------------------------------|------------------------------|---------------------------|-----------------------|---------|------------|
| 562217    | 6966D-07    | 6,7                               | 7,8                          | 10                        | 298778                | 25      | 3350       |

\* Holding force specification for lever length 0

### Design:

Housing made of steel, burnished. Clamp lever holder made of case-hardened steel. The clamping lever holder is driven by two piston rods installed in the housing. Oil supply via oil channels in fixture body. Supplied as standard with four fastening bolts M8 x 80 and two Viton moulded seals for the fastening bolt holder.

### Application:

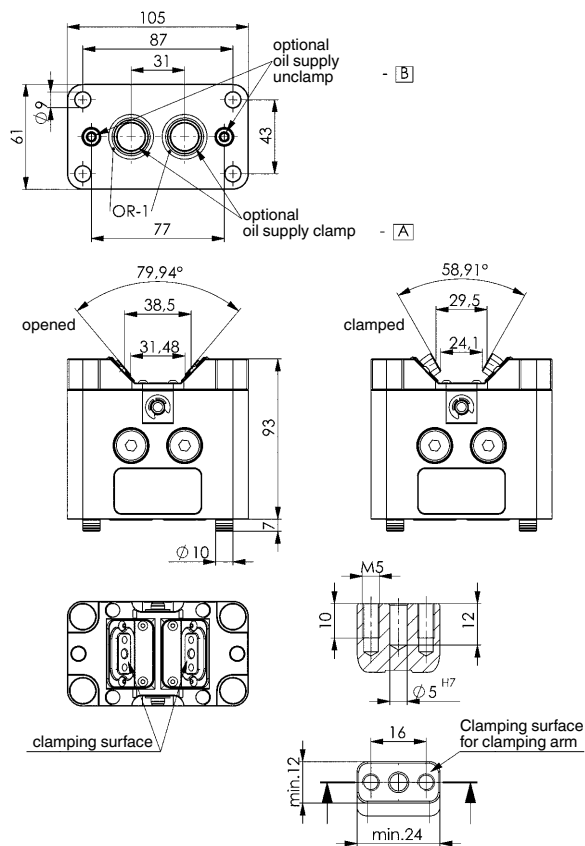
The clamping tongs prevent vibrations on the workpiece during machining. The clamping tongs are suitable for compensating and holding the workpieces but not for positioning them, with a repetition accuracy of 0.02 to 0.03 mm.

### Features:

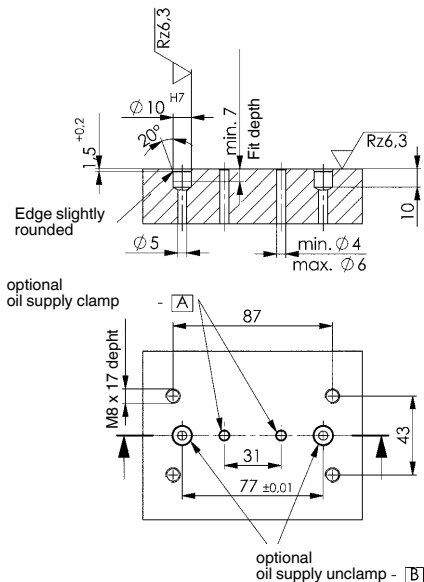
The clamping tongs hold the workpiece without clamping it.

### Note:

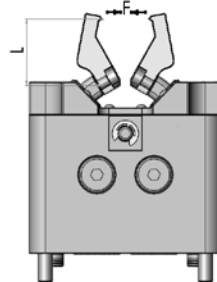
The clamping levers can be designed individually, these are not supplied as standard.



### Drilling template device:



### Application example:



### Holding force table for different lever lengths:

| Operating pressure         | bar | 100  |      |      |      |      |      |  |
|----------------------------|-----|------|------|------|------|------|------|--|
| Lever length L             | mm  | 0    | 20   | 40   | 60   | 80   | 100  |  |
| Holding force horizontal F | kN  | 2,49 | 1,49 | 1,05 | 0,82 | 0,68 | 0,57 |  |
| Operating pressure         | bar | 200  |      |      |      |      |      |  |
| Holding force horizontal F | kN  | 4,97 | 2,96 | 2,11 | 1,69 | 1,35 | 1,15 |  |

Subject to technical alterations.

No. 6966R

Clamping lever blank



CAD

| Order no. | Article no. | Span H max.<br>[mm] | A  | B  | C  | E  | Weight<br>[g] |
|-----------|-------------|---------------------|----|----|----|----|---------------|
| 562216    | 6966R-01-00 | 8                   | 61 | 24 | 15 | 52 | 559           |



**Design:**

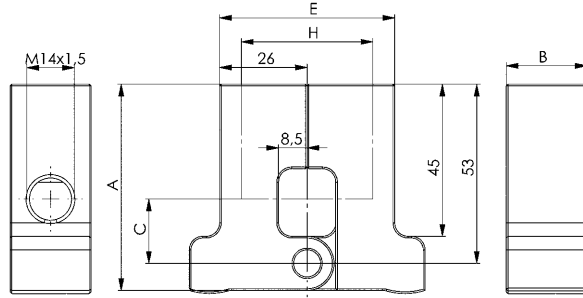
Case-hardened steel, burnished.

**Application:**

For clamping tongs 6966-01. The clamping lever blank can be adjusted according to the shape of the workpiece.

**Note:**

The span H can be increased as required, but it must be noted that shear forces of more than 8 mm can occur!



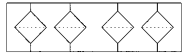
No. 6966DF

Filter plate



CAD

| Order no. | Article no.   | max. pressure range<br>[bar] | Filtration<br>[µm] | OR-1<br>O-ring<br>Order No. | Weight<br>[g] |
|-----------|---------------|------------------------------|--------------------|-----------------------------|---------------|
| 562218    | 6966DF-07-100 | 250                          | 100                | 466334                      | 320           |



**NEW!**



**Design:**

Filter plate and filter sleeve made of aluminium, black anodised. Filter plates made of metal mesh.

**Application:**

Used to protect the 6966D-07 clamp from contamination in clamping devices

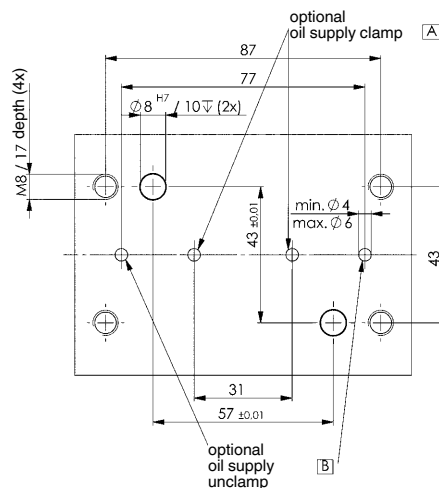
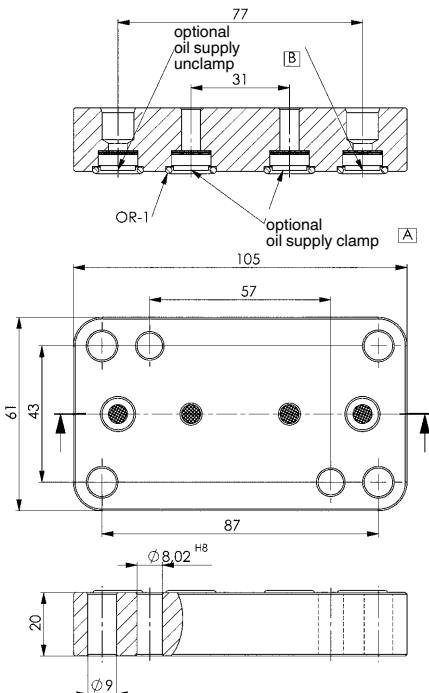
**Note:**

If a finer strainer is required, this can be easily replaced. The finer the filter selected, the greater the flow resistance.

**Replacement filter:**

- Filter, plug-in design 25 µm, order no. 562203
- Filter, plug-in design 40 µm, order no. 562204
- Filter, plug-in design 100 µm, order no. 562205

**Drilling template device:**



Subject to technical alterations.

## LOW-PRESSURE CLAMPING TECHNOLOGY

## LOW-PRESSURE SWING CLAMPS LINK CLAMPS VERTICAL CLAMPS WITH LINEAR STROKE FOR DEMANDING TASKS

### SWING CLAMP

- > piston force up to 13,2 kN
- > operating pressure 100 bar
- > position-repeatable clamping arm mounting
- > oil supply via threaded port and/or O-ring-sealed ports

### LINK CLAMP

- > piston force up to 25,5 kN
- > operating pressure 100 bar
- > oil supply via threaded port and/or O-ring-sealed ports

### VERTICAL CLAMP WITH LINEAR STROKE

- > hydraulic force up to 4,8 kN
- > operating pressure 100 bar
- > oil supply via oil channel in fixture body

### PRODUCT OVERVIEW:

| Type       | Hydraulic force, piston force [kN] | Stroke [mm] | Max. operating pressure [bar] | No. of models | Operating mode |
|------------|------------------------------------|-------------|-------------------------------|---------------|----------------|
| 6941KP     | 4,1 - 13,2                         | 10,7 - 16,5 | 100                           | 5             | double acting  |
| 6942KK-**  | 4,9 - 25,5                         | -           | 100                           | 5             | double acting  |
| 6942KK-**L | 4,9 - 25,5                         | -           | 100                           | 5             | double acting  |
| 6942KK-**R | 4,9 - 25,5                         | -           | 100                           | 5             | double acting  |
| 6943C      | 2,8 - 4,8                          | 6           | 100                           | 2             | double acting  |

### PRODUCT EXAMPLES:

NO. 6941KP



> piston force: 4,1 - 13,2 kN

NO. 6942KK



> piston force: 4,9 - 25,5 kN

NO. 6943C

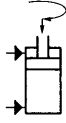


> hydraulic force: 2,8 - 4,8 kN

No. 6941KP

## Swing clamp, top-flange-mounting

Double-acting,  
max. operating pressure 100 bar,  
min. operating pressure 20 bar.



| Order no. | Article no.  | Clamping force at 100 bar Sp* [kN] | Clamping stroke M [mm] | Total stroke N [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | min. permitted clamping time* [s] | Q max.* [l/min] | Piston mass moment of inertia JK [kgm <sup>2</sup> ] | Weight [g] |
|-----------|--------------|------------------------------------|------------------------|---------------------|----------------------------|----------------------------|--|--|-----------------------------------|-----------------|--|------------|
| 556960    | 6941KP-03-21 | 3,3                                | 5,4                    | 10,7                | 4,8                        | 6,4                        | 4,1                                    | 6,2                                    | 0,44                              | 0,65            | 0,000006146  | 642        |
| 556961    | 6941KP-03-22 | 3,3                                | 5,4                    | 10,7                | 4,8                        | 6,4                        | 4,1                                    | 6,2                                    | 0,44                              | 0,65            | 0,000006146  | 642        |
| 556962    | 6941KP-04-21 | 4,5                                | 5,4                    | 13,0                | 7,3                        | 10,6                       | 5,5                                    | 8,0                                    | 0,36                              | 1,2             | 0,000011573  | 830        |
| 556963    | 6941KP-04-22 | 4,5                                | 5,4                    | 13,0                | 7,3                        | 10,6                       | 5,5                                    | 8,0                                    | 0,36                              | 1,2             | 0,000011573  | 830        |
| 556964    | 6941KP-05-21 | 5,5                                | 6,2                    | 13,7                | 9,3                        | 13,8                       | 6,8                                    | 11,9                                   | 0,34                              | 1,6             | 0,000029315  | 1284       |
| 556965    | 6941KP-05-22 | 5,5                                | 6,2                    | 13,7                | 9,3                        | 13,8                       | 6,8                                    | 11,9                                   | 0,34                              | 1,6             | 0,000029315  | 1284       |
| 556966    | 6941KP-09-21 | 9,4                                | 5,5                    | 15,4                | 16,9                       | 24,5                       | 11,0                                   | 16,0                                   | 0,34                              | 2,9             | 0,000055671  | 1778       |
| 556967    | 6941KP-09-22 | 9,4                                | 5,5                    | 15,4                | 16,9                       | 24,5                       | 11,0                                   | 16,0                                   | 0,34                              | 2,9             | 0,000055671  | 1778       |
| 556968    | 6941KP-11-21 | 11,0                               | 7,5                    | 16,5                | 21,8                       | 35,0                       | 13,2                                   | 21,3                                   | 0,32                              | 4,0             | 0,000137759  | 2805       |
| 556969    | 6941KP-11-22 | 11,0                               | 7,5                    | 16,5                | 21,8                       | 35,0                       | 13,2                                   | 21,3                                   | 0,32                              | 4,0             | 0,000137759  | 2805       |

Cl = clamping, Uncl = unclamp

\* Specifications with clamping arm, standard (6951)

### Design:

Cylinder barrel made of steel, hardened and burnished. Piston rod nitrided. Piston rod with internal thread. O-ring for flange seal. Wiper at the piston rod. Clamp arm not supplied as standard. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The swivel clamp is used in fixtures in which the workpiece must be freely accessible and inserted from above. Even workpieces with difficult shapes can be clamped using special clamp arms (available on request).

### Features:

The swing motion is executed via three ball guides, thereby increasing positioning accuracy, repeat accuracy and service life.

### Note:

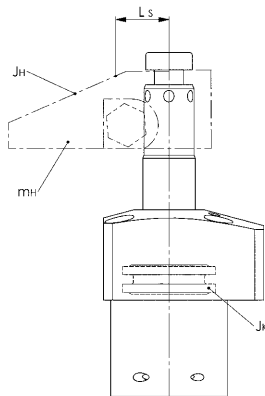
The piston stroke is executed with spheres, so volume flow Q max. must be complied with. Clamping arm length and clamping arm weight must be strictly observed. No force may be applied to the piston when mounting accessories to it. To equalise height differences on the workpiece, the vertical clamping path must be 50% of the clamping stroke. When placing into operation, ensure that all air is bled from the system. To throttle the oil feed, the throttle/check valve no. 6916-12-01 for G1/8 can optionally be used. Other swivel angles are available on request.

Formula to determine the total mass moment of inertia and the volume flow:

total mass moment of inertia Jges. [kgm<sup>2</sup>]  
Clamp arm mass moment of inertia JH [kgm<sup>2</sup>]  
Piston mass moment of inertia JK [kgm<sup>2</sup>]  
Clamp arm load mH [kg]  
Centre of gravity distance Ls [m]  
**Jges. = JK + JH + mH x Ls<sup>2</sup> [kgm<sup>2</sup>]**

Volume flow Qmax. [cm<sup>3</sup>/s]  
Volume clamp Vol.sp [cm<sup>3</sup>]  
Minimum permitted clamp time tmin. [s]  
**Qmax. = Vol.sp / tmin. [cm<sup>3</sup>/s]**

Suitable clamp arms are 6951-XX.



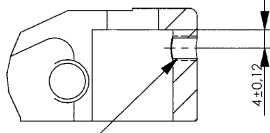


## Code of types:

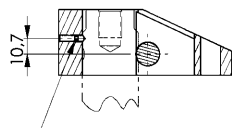
Type 21 = double acting, right swinging  
 Type 22 = double acting, left swinging

## Positioning:

Positioning hole for clamp arm:

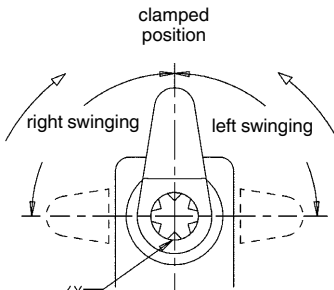


threaded stud  
 Size 03 - 09

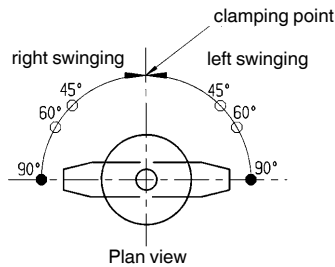


threaded stud  
 Size 11

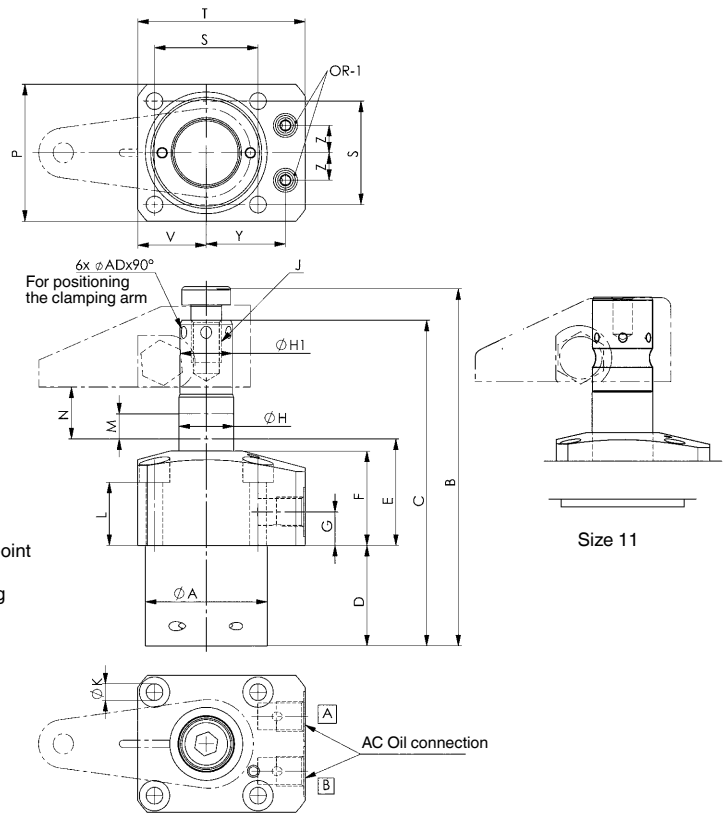
## Swing directions:



Positioning hole for clamp arm (6x60°)



● = Standard type  
 ○ = Special type

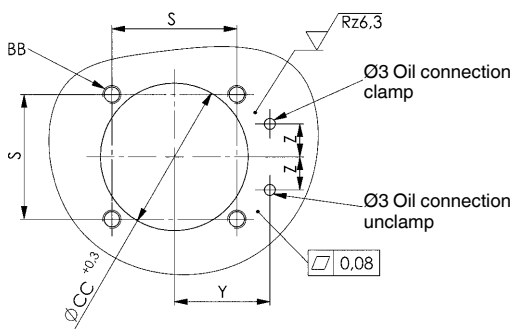


A = clamp  
 B = unclamp

## Dimensions:

| Order no. | Article no.  | dia. A | B     | C     | D    | E    | F    | G    | dia. H | dia. H1 | J x depth | dia. K | L    | M   | N    | P  | S    | T    | V    | Y    | Z    | AC   | ØAD | OR-1 O-ring Order No. |
|-----------|--------------|--------|-------|-------|------|------|------|------|--------|---------|-----------|--------|------|-----|------|----|------|------|------|------|------|------|-----|-----------------------|
| 556960    | 6941KP-03-21 | 36     | 104,5 | 95,2  | 28   | 38,5 | 29,5 | 11,5 | 16     | 15,88   | M10 x 14  | 4,5    | 20,5 | 5,4 | 10,7 | 40 | 31,4 | 52,5 | 22,0 | 23,5 | 8,5  | G1/8 | 4,8 | 457499                |
| 556961    | 6941KP-03-22 | 36     | 104,5 | 95,2  | 28   | 38,5 | 29,5 | 11,5 | 16     | 15,88   | M10 x 14  | 4,5    | 20,5 | 5,4 | 10,7 | 40 | 31,4 | 52,5 | 22,0 | 23,5 | 8,5  | G1/8 | 4,8 | 457499                |
| 556962    | 6941KP-04-21 | 40     | 117,5 | 107,0 | 33   | 39,0 | 31,0 | 11,0 | 18     | -       | M10 x 14  | 5,5    | 20,7 | 5,4 | 13,0 | 45 | 34,0 | 55,0 | 22,5 | 26,0 | 9,0  | G1/8 | 4,8 | 457499                |
| 556963    | 6941KP-04-22 | 40     | 117,5 | 107,0 | 33   | 39,0 | 31,0 | 11,0 | 18     | -       | M10 x 14  | 5,5    | 20,7 | 5,4 | 13,0 | 45 | 34,0 | 55,0 | 22,5 | 26,0 | 9,0  | G1/8 | 4,8 | 457499                |
| 556964    | 6941KP-05-21 | 48     | 130,0 | 117,0 | 33   | 45,0 | 36,5 | 13,0 | 24     | 22,23   | M12 x 14  | 5,5    | 26,5 | 5,3 | 13,7 | 51 | 40,0 | 61,0 | 25,5 | 30,0 | 11,0 | G1/8 | 4,8 | 457499                |
| 556965    | 6941KP-05-22 | 48     | 130,0 | 117,0 | 33   | 45,0 | 36,5 | 13,0 | 24     | 22,23   | M12 x 14  | 5,5    | 26,5 | 5,3 | 13,7 | 51 | 40,0 | 61,0 | 25,5 | 30,0 | 11,0 | G1/8 | 4,8 | 457499                |
| 556966    | 6941KP-09-21 | 55     | 149,4 | 134,4 | 39,5 | 49,0 | 36,0 | 12,0 | 25     | -       | M12 x 14  | 6,6    | 24,2 | 5,5 | 15,4 | 60 | 47,0 | 69,0 | 30,0 | 33,5 | 12,0 | G1/8 | 4,8 | 457499                |
| 556967    | 6941KP-09-22 | 55     | 149,4 | 134,4 | 39,5 | 49,0 | 36,0 | 12,0 | 25     | -       | M12 x 14  | 6,6    | 24,2 | 5,5 | 15,4 | 60 | 47,0 | 69,0 | 30,0 | 33,5 | 12,0 | G1/8 | 4,8 | 457499                |
| 556968    | 6941KP-11-21 | 65     | 155,0 | 155,0 | 44,5 | 49,3 | 39,0 | 13,0 | 32     | 31,79   | M12 x 14  | 6,6    | 25,6 | 5,5 | 16,5 | 70 | 55,0 | 81,0 | 35,0 | 39,5 | 15,0 | G1/4 | 4,8 | 493478                |
| 556969    | 6941KP-11-22 | 65     | 155,0 | 155,0 | 44,5 | 49,3 | 39,0 | 13,0 | 32     | 31,79   | M12 x 14  | 6,6    | 25,6 | 5,5 | 16,5 | 70 | 55,0 | 81,0 | 35,0 | 39,5 | 15,0 | G1/4 | 4,8 | 493478                |

## Drilling template device:

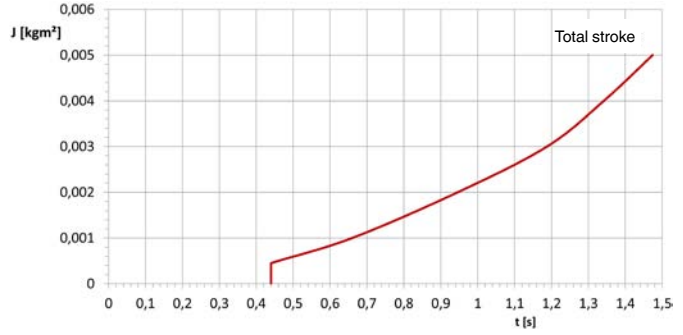
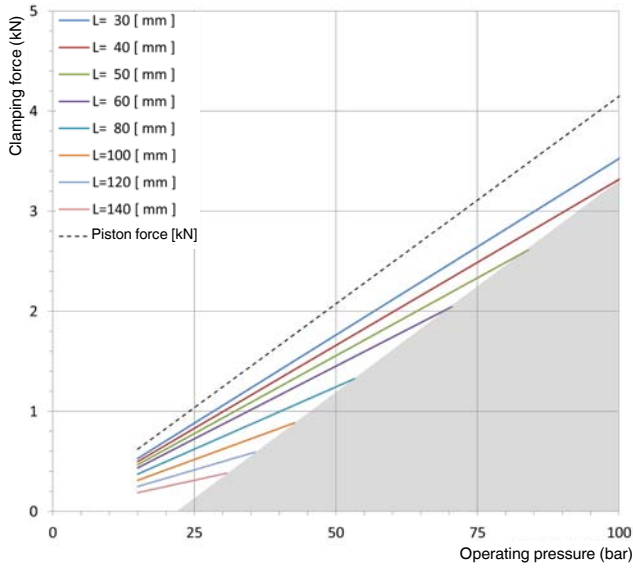


| Order no. | Article no.  | S    | Z    | BB | ØCC +0.3 | Y    |
|-----------|--------------|------|------|----|----------|------|
| 556960    | 6941KP-03-21 | 31,4 | 8,5  | M4 | 36,5     | 23,5 |
| 556961    | 6941KP-03-22 | 31,4 | 8,5  | M4 | 36,5     | 23,5 |
| 556962    | 6941KP-04-21 | 34,0 | 9,0  | M5 | 40,5     | 26,0 |
| 556963    | 6941KP-04-22 | 34,0 | 9,0  | M5 | 40,5     | 26,0 |
| 556964    | 6941KP-05-21 | 40,0 | 11,0 | M5 | 48,5     | 30,0 |
| 556965    | 6941KP-05-22 | 40,0 | 11,0 | M5 | 48,5     | 30,0 |
| 556966    | 6941KP-09-21 | 47,0 | 12,0 | M6 | 55,5     | 33,5 |
| 556967    | 6941KP-09-22 | 47,0 | 12,0 | M6 | 55,5     | 33,5 |
| 556968    | 6941KP-11-21 | 55,0 | 15,0 | M6 | 65,5     | 39,5 |
| 556969    | 6941KP-11-22 | 55,0 | 15,0 | M6 | 65,5     | 39,5 |

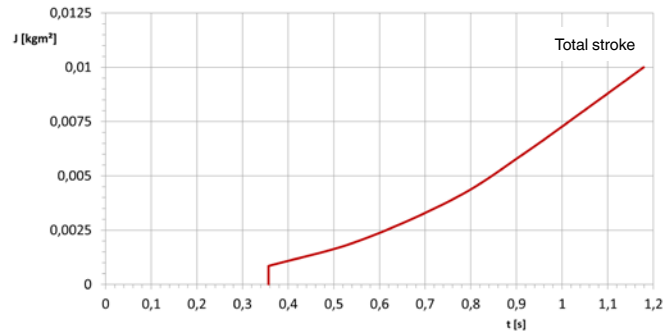
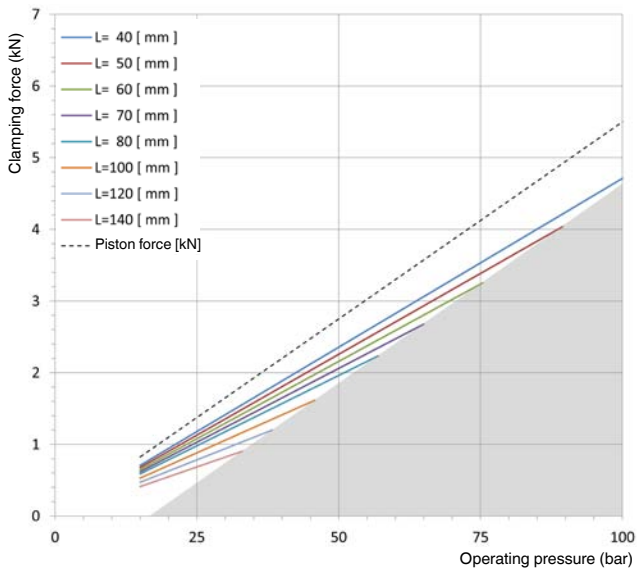
Subject to technical alterations.

## Diagrams:

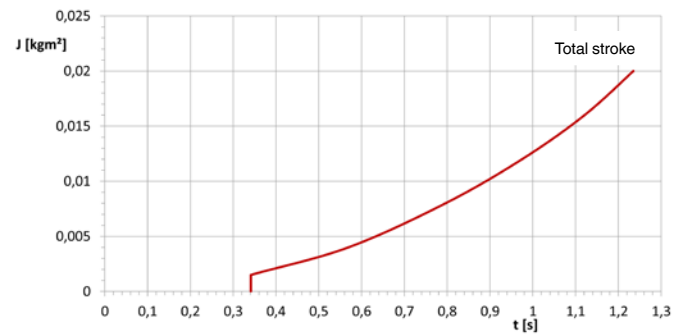
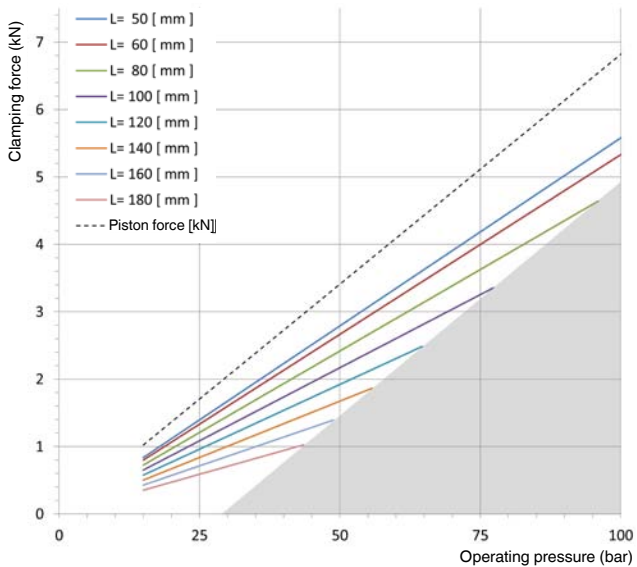
### 6941KP-03



### 6941KP-04

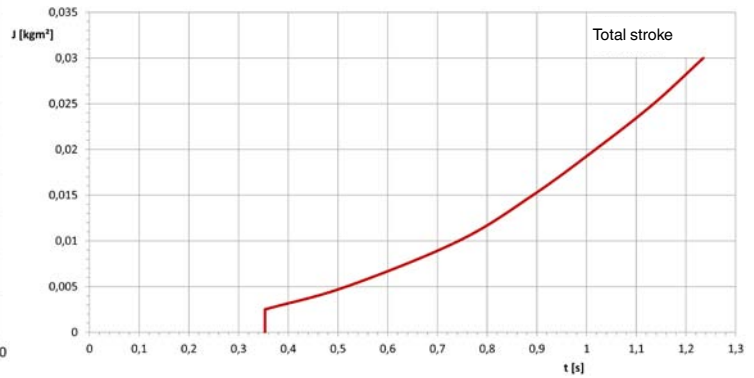
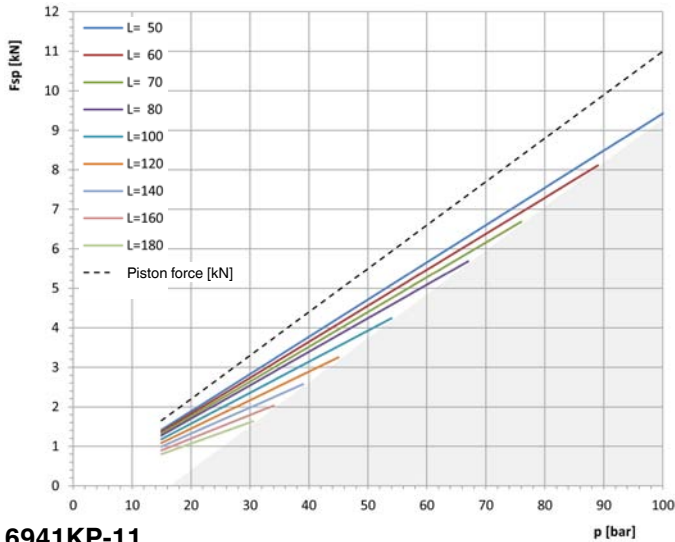


### 6941KP-05

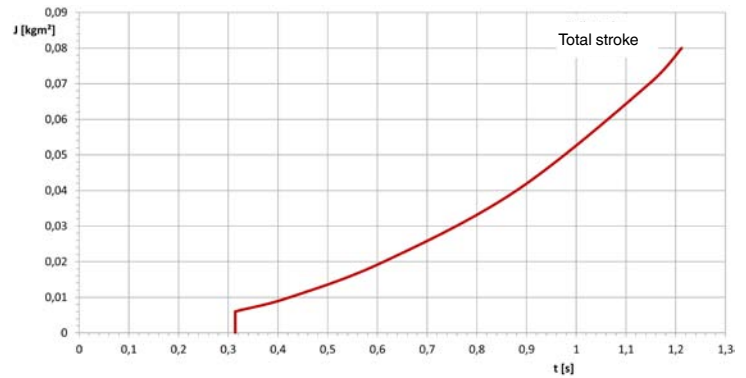
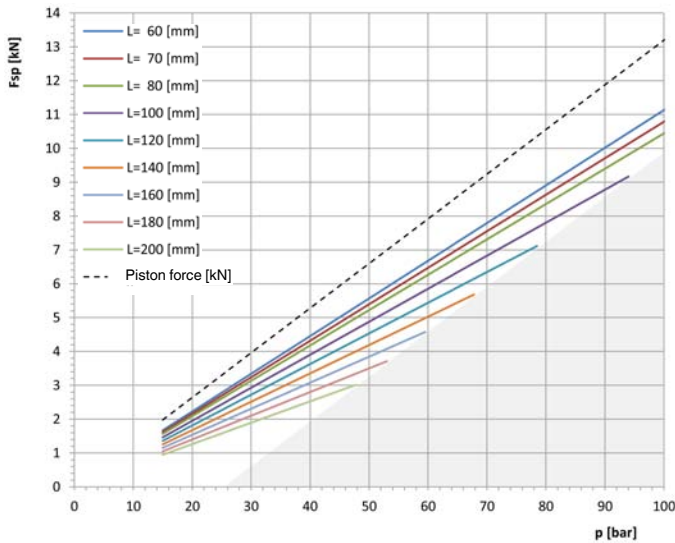


Subject to technical alterations.

## 6941KP-09



## 6941KP-11



## No. 6941

### Dimensions for proprietary manufacturing of clamping arms

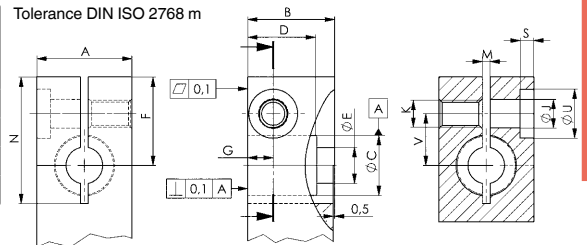
#### Important note:

Lever lengths and lever weights must be observed!

#### Dimensions table (proprietary manufacture):

| for size  | A    | B    | ØC           | D     | ØE   | F    | G    | ØJ   | K   | M   | N    | S | ØU | V    |
|-----------|------|------|--------------|-------|------|------|------|------|-----|-----|------|---|----|------|
| 6941KP-04 | 29,0 | 27,0 | 18,000 +0,02 | 22,00 | 11,0 | 31,5 | 8,0  | 8,5  | M8  | 2,9 | 43,5 | 5 | 15 | 18,2 |
| 6941KP-03 | 25,5 | 22,0 | 15,913 +0,05 | 18,03 | 11,0 | 27,5 | 8,8  | 8,5  | M8  | 2,9 | 38,5 | 5 | 15 | 17,0 |
| 6941KP-05 | 35,0 | 32,0 | 22,263 +0,05 | 25,40 | 13,5 | 32,5 | 12,0 | 10,5 | M10 | 2,9 | 46,5 | 5 | 18 | 19,0 |
| 6941KP-09 | 35,0 | 38,5 | 25,000 +0,02 | 30,50 | 12,5 | 42,5 | 11,0 | 12,5 | M12 | 2,9 | 52,5 | 4 | 18 | 23,2 |

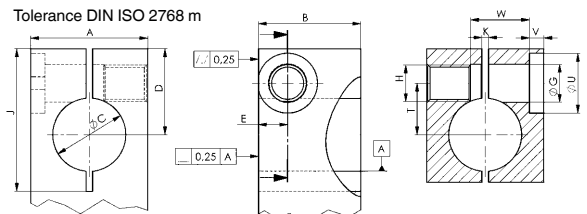
Tolerance DIN ISO 2768 m



#### Dimensions table (proprietary manufacture):

| for size  | A    | B    | ØC +0,0025 | D    | E    | ØG   | H             | J  | K    | T    | U  | V   | W    |
|-----------|------|------|------------|------|------|------|---------------|----|------|------|----|-----|------|
| 6941KP-11 | 51,0 | 44,5 | 31,775     | 37,4 | 12,5 | 16,5 | M16 x 1,50-6H | 59 | 2,93 | 22,4 | 26 | 6,2 | 25,7 |

Tolerance DIN ISO 2768 m

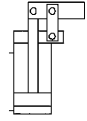


Subject to technical alterations.

## No. 6942KK

### Link clamp

double acting,  
max. operating pressure 100 bar,  
min. operating pressure 15 bar.



| Order no. | Article no. | Clamping force at 100 bar [kN] | Piston force at 100 bar [kN] | Clamping stroke [mm] | Total stroke [mm] | Extra stroke [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|--------------------------------|------------------------------|----------------------|-------------------|-------------------|----------------------------|----------------------------|--|--|--------------|------------|
| 327486    | 6942KK-25   | 3,2                            | 4,9                          | 17,5                 | 19,0              | 1,5               | 8,6                        | 6,6                        | 4,9                                    | 3,8                                    | 6,0          | 752        |
| 328484    | 6942KK-32   | 5,3                            | 8,0                          | 22,5                 | 24,0              | 1,5               | 16,5                       | 13,3                       | 8,0                                    | 6,5                                    | 7,6          | 1098       |
| 328492    | 6942KK-38   | 7,5                            | 11,3                         | 24,5                 | 26,0              | 1,5               | 27,8                       | 22,9                       | 11,3                                   | 9,3                                    | 11,0         | 1549       |
| 328583    | 6942KK-45   | 10,5                           | 15,9                         | 28,0                 | 29,5              | 1,5               | 44,5                       | 35,8                       | 15,9                                   | 12,8                                   | 13,0         | 2362       |
| 552012    | 6942KK-56   | 17,0                           | 25,5                         | 33,0                 | 34,5              | 1,5               | 84,2                       | 71,7                       | 25,5                                   | 21,7                                   | 28,0         | 3565       |

Sp = clamp, Lo = unclamp

### Design:

Cylinder housing from steel. Piston and hinge pins from hardened, tempered and nitrided steel. Metal wiper to protect the dirt wiper integrated into the housing. Supply scope includes hinge pins, tension plates, fastening screws but not clamping levers. The threaded connections are suitable for restrictor check valves no. 6916-12-XX. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Link clamps are used in clamping fixtures in which workpieces must be freely accessible and loaded from above. Particularly suitable for clamping in clamping pockets.

### Features:

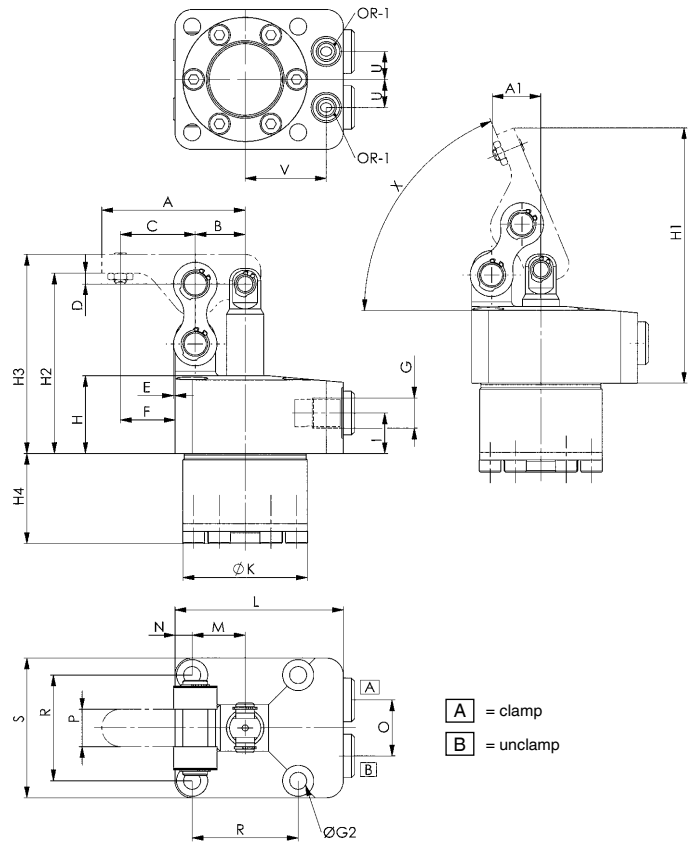
Top flange version, the horizontal centre axis at the standard lever and the pressure point on the workpiece lie in one plane. This prevents relative movement on the workpiece.

### Note:

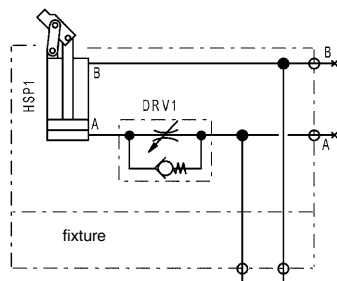
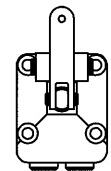
Maximum travel speed 0.5 m/s. The volumetric flow can be regulated via a restrictor check valve

The B to C leverage on the clamping levers is 1 to 1.5!

In the design of blank levers, deviations which lead to higher clamping forces are permitted only in exceptional cases. For sizes 32 and 45, screws with strength class 12.9 must be used.



### Installation direction of the clamping arm:



### Dimensions:

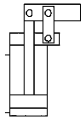
| Order no. | Article no. | A     | A1   | B    | C    | D   | E   | F    | G    | H  | H1  | H2   | H3    | H4   | I  | dia. K | L    | M    | N    | P    | O  | R  | S  | U  | V    | X    | ØG2 | OR-1 O-ring Order No. |
|-----------|-------------|-------|------|------|------|-----|-----|------|------|----|-----|------|-------|------|----|--------|------|------|------|------|----|----|----|----|------|------|-----|-----------------------|
| 327486    | 6942KK-25   | 46,00 | 15,8 | 16,0 | 24,0 | 3,5 | 0,5 | 17,5 | G1/8 | 25 | 83  | 58,0 | 64,0  | 29,0 | 13 | 39,9   | 54   | 17,0 | 5,5  | 12,0 | 18 | 34 | 45 | 9  | 26,0 | 67,5 | 5,5 | 161810                |
| 328484    | 6942KK-32   | 53,25 | 13,7 | 18,5 | 28,0 | 3,5 | 2,0 | 21,0 | G1/8 | 28 | 95  | 66,5 | 74,5  | 32,0 | 13 | 47,9   | 61   | 20,0 | 5,5  | 13,5 | 22 | 40 | 51 | 11 | 30,0 | 76,8 | 5,5 | 161810                |
| 328492    | 6942KK-38   | 60,50 | 16,0 | 21,0 | 31,5 | 3,0 | 1,5 | 22,5 | G1/8 | 28 | 106 | 72,0 | 81,0  | 37,0 | 13 | 54,9   | 69   | 23,5 | 6,5  | 16,0 | 24 | 47 | 60 | 12 | 33,5 | 72,9 | 6,8 | 161810                |
| 328583    | 6942KK-45   | 71,00 | 18,7 | 24,5 | 37,0 | 3,0 | 2,5 | 26,5 | G1/4 | 30 | 124 | 82,0 | 96,0  | 43,5 | 14 | 64,9   | 81   | 27,5 | 7,5  | 19,0 | 30 | 55 | 70 | 15 | 39,5 | 72,9 | 6,8 | 161810                |
| 552012    | 6942KK-56   | 86,00 | 30,2 | 30,0 | 45,0 | 3,0 | 2,5 | 32,5 | G1/4 | 35 | 140 | 89,0 | 105,0 | 47,0 | 14 | 74,9   | 94,5 | 31,5 | 11,0 | 22,0 | 32 | 63 | 85 | 16 | 45,0 | 67,5 | 8,7 | 161810                |

Subject to technical alterations.

## No. 6942KK-\*\*L

### Link clamp

double acting, clamp arm left,  
max. operating pressure 100 bar,  
min. operating pressure 15 bar.



| Order no. | Article no. | Clamping force at 100 bar [kN] | Piston force at 100 bar [kN] | Clamping stroke [mm] | Total stroke [mm] | Extra stroke [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|--------------------------------|------------------------------|----------------------|-------------------|-------------------|----------------------------|----------------------------|--|--|--------------|------------|
| 327569    | 6942KK-25L  | 3,2                            | 4,9                          | 17,5                 | 19,0              | 1,5               | 8,6                        | 6,6                        | 4,9                                    | 3,8                                    | 6,0          | 752        |
| 328500    | 6942KK-32L  | 5,3                            | 8,0                          | 22,5                 | 24,0              | 1,5               | 16,5                       | 13,3                       | 8,0                                    | 6,5                                    | 7,6          | 1098       |
| 328518    | 6942KK-38L  | 7,5                            | 11,3                         | 24,5                 | 26,0              | 1,5               | 27,8                       | 22,9                       | 11,3                                   | 9,3                                    | 11,0         | 1549       |
| 328609    | 6942KK-45L  | 10,5                           | 15,9                         | 28,0                 | 29,5              | 1,5               | 44,5                       | 35,8                       | 15,9                                   | 12,8                                   | 13,0         | 2362       |
| 552014    | 6942KK-56L  | 17,0                           | 25,5                         | 33,0                 | 34,5              | 1,5               | 84,2                       | 71,7                       | 25,5                                   | 21,7                                   | 28,0         | 3565       |

Sp = clamp, Lo = unclamp

### Design:

Cylinder housing from steel. Piston and hinge pins from hardened steel, tempered and nitrided. Metal wiper to protect the dirt wiper integrated into the housing. Supply scope includes hinge pins, tension plates, fastening screws but not clamping levers. The threaded connections are suitable for restrictor check valves no. 6916-12-XX. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Link clamps are used in clamping fixtures in which workpieces must be freely accessible and loaded from above. Particularly suitable for clamping in clamping pockets.

### Features:

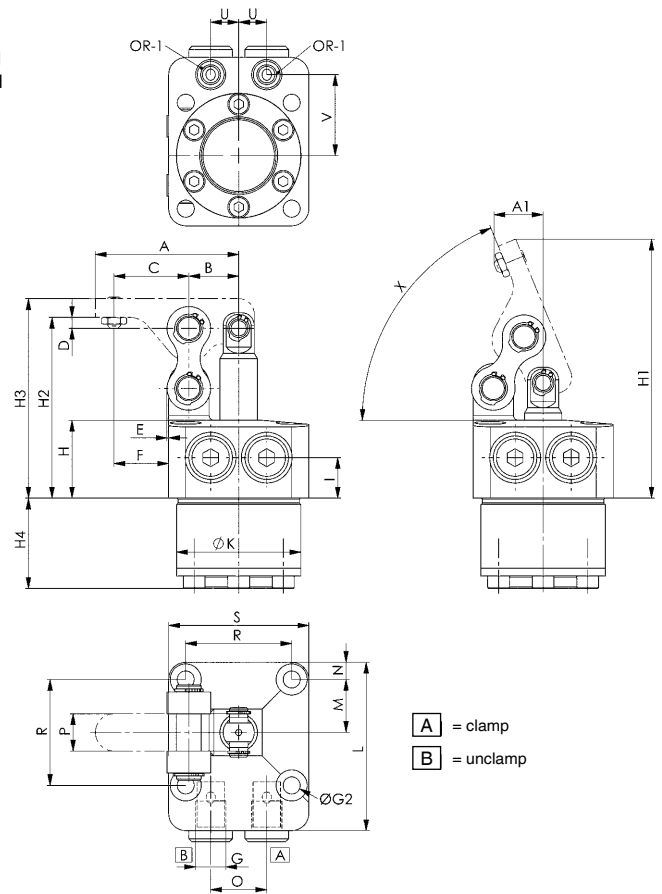
Top flange version, the horizontal centre axis at the standard lever and the pressure point on the workpiece lie in one plane. This prevents relative movement on the workpiece.

### Note:

Maximum travel speed 0.5 m/s. The volumetric flow can be regulated via the restrictor check valve

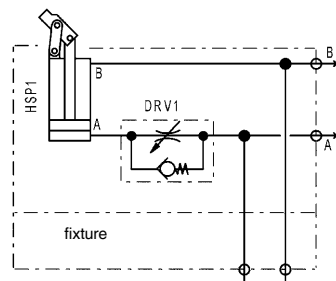
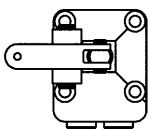
The B to C leverage on the clamping levers is 1 to 1.5!

In the design of blank levers, deviations which lead to higher clamping forces are permitted only in exceptional cases. For sizes 32 and 45, screws with strength class 12.9 must be used.



A = clamp  
B = unclamp

### Installation direction of the clamping arm:



### Dimensions:

| Order no. | Article no. | A     | A1   | B    | C    | D   | E   | F    | G    | H  | H1  | H2   | H3    | H4   | I  | dia. K | L    | M    | N    | P    | O  | R  | S  | U  | V    | X    | ØG2 | OR-1 O-ring Order No. |
|-----------|-------------|-------|------|------|------|-----|-----|------|------|----|-----|------|-------|------|----|--------|------|------|------|------|----|----|----|----|------|------|-----|-----------------------|
| 327569    | 6942KK-25L  | 46,00 | 15,8 | 16,0 | 24,0 | 3,5 | 0,5 | 17,5 | G1/8 | 25 | 83  | 58,0 | 64,0  | 29,0 | 13 | 39,9   | 54   | 17,0 | 5,5  | 12,0 | 18 | 34 | 45 | 9  | 26,0 | 67,5 | 5,5 | 161810                |
| 328500    | 6942KK-32L  | 60,50 | 16,0 | 21,0 | 31,5 | 3,0 | 1,5 | 22,5 | G1/8 | 28 | 95  | 66,5 | 74,5  | 32,0 | 13 | 47,9   | 61   | 20,0 | 5,5  | 13,5 | 22 | 40 | 51 | 11 | 30,0 | 76,8 | 5,5 | 161810                |
| 328518    | 6942KK-38L  | 60,50 | 16,0 | 21,0 | 31,5 | 3,0 | 1,5 | 22,5 | G1/8 | 28 | 106 | 72,0 | 81,0  | 37,0 | 13 | 54,9   | 69   | 23,5 | 6,5  | 16,0 | 24 | 47 | 60 | 12 | 33,5 | 72,9 | 6,8 | 161810                |
| 328609    | 6942KK-45L  | 71,00 | 18,7 | 24,5 | 37,0 | 3,0 | 2,5 | 26,5 | G1/4 | 30 | 124 | 82,0 | 96,0  | 43,5 | 14 | 64,9   | 81   | 27,5 | 7,5  | 19,0 | 30 | 55 | 70 | 15 | 39,5 | 72,9 | 6,8 | 161810                |
| 552014    | 6942KK-56L  | 86,00 | 30,2 | 30,0 | 45,0 | 3,0 | 2,5 | 32,5 | G1/4 | 35 | 140 | 89,0 | 105,0 | 47,0 | 14 | 74,9   | 94,5 | 31,5 | 11,0 | 22,0 | 32 | 63 | 85 | 16 | 45,0 | 67,5 | 8,7 | 161810                |

Subject to technical alterations.

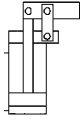
## No. 6942KK-\*\*R

### Link clamp

double acting, clamp arm right,  
max. operating pressure 100 bar,  
min. operating pressure 15 bar.



CAD



| Order no. | Article no. | Clamping force at 100 bar [kN] | Piston force at 100 bar [kN] | Clamping stroke [mm] | Total stroke [mm] | Extra stroke [mm] | Vol. Sp [cm <sup>3</sup> ] | Vol. Lo [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | eff. piston area Lo [cm <sup>2</sup> ] | Md max. [Nm] | Weight [g] |
|-----------|-------------|--------------------------------|------------------------------|----------------------|-------------------|-------------------|----------------------------|----------------------------|--|--|--------------|------------|
| 327585    | 6942KK-25R  | 3,2                            | 4,9                          | 17,5                 | 19,0              | 1,5               | 8,6                        | 6,6                        | 4,9                                    | 3,8                                    | 6,0          | 752        |
| 328526    | 6942KK-32R  | 5,3                            | 8,0                          | 22,5                 | 24,0              | 1,5               | 16,5                       | 13,3                       | 8,0                                    | 6,5                                    | 7,6          | 1098       |
| 328534    | 6942KK-38R  | 7,5                            | 11,3                         | 24,5                 | 26,0              | 1,5               | 27,8                       | 22,9                       | 11,3                                   | 9,3                                    | 11,0         | 1549       |
| 328625    | 6942KK-45R  | 10,5                           | 15,9                         | 28,0                 | 29,5              | 1,5               | 44,5                       | 35,8                       | 15,9                                   | 12,8                                   | 13,0         | 2362       |
| 552013    | 6942KK-56R  | 17,0                           | 25,5                         | 33,0                 | 34,5              | 1,5               | 84,2                       | 71,7                       | 25,5                                   | 21,7                                   | 28,0         | 3565       |

Sp = clamp, Lo = unclamp

### Design:

Cylinder housing from steel. Piston and hinge pins from hardened steel, tempered and nitrided. Metal wiper to protect the dirt wiper integrated into the housing. Supply scope includes hinge pins, tension plates, fastening screws but not clamping levers. The threaded connections are suitable for restrictor check valves no. 6916-12-XX. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

Link clamps are used in clamping fixtures in which workpieces must be freely accessible and loaded from above. Particularly suitable for clamping in clamping pockets.

### Features:

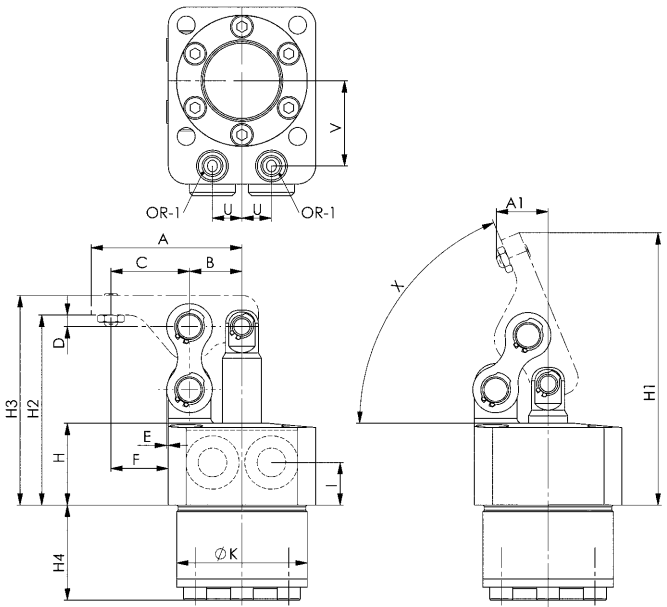
Top flange version, the horizontal centre axis at the standard lever and the pressure point on the workpiece lie in one plane. This prevents relative movement on the workpiece.

### Note:

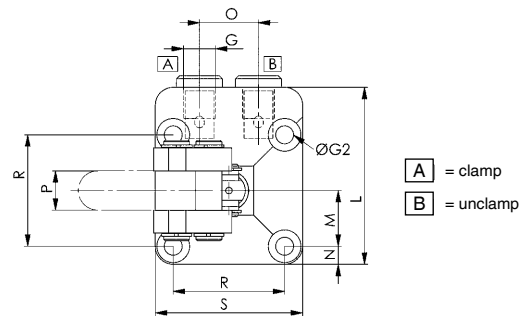
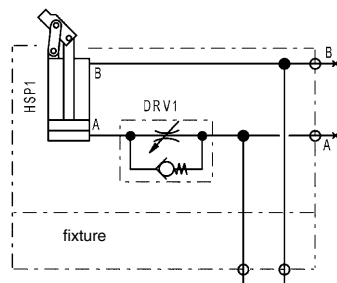
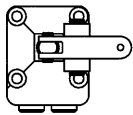
Maximum travel speed 0.5 m/s. The volumetric flow can be regulated via the restrictor check valve

The B to C leverage on the clamping levers is 1 to 1.5!

In the design of blank levers, deviations which lead to higher clamping forces are permitted only in exceptional cases. For sizes 32 and 45, screws with strength class 12.9 must be used.



### Installation direction of the clamping arm:

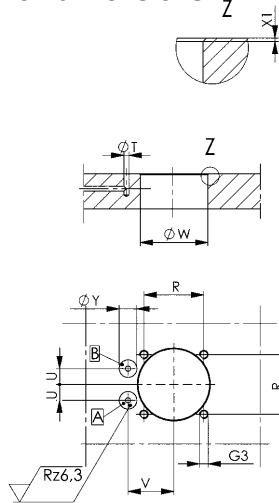


### Dimensions:

| Order no. | Article no. | A     | A1   | B    | C    | D   | E   | F    | G    | H  | H1  | H2   | H3    | H4   | I  | dia. K | L    | M    | N    | P    | O  | R  | S  | U  | V    | X    | ØG2 | OR-1 O-ring Order No. |
|-----------|-------------|-------|------|------|------|-----|-----|------|------|----|-----|------|-------|------|----|--------|------|------|------|------|----|----|----|----|------|------|-----|-----------------------|
| 327585    | 6942KK-25R  | 46,00 | 15,8 | 16,0 | 24,0 | 3,5 | 0,5 | 17,5 | G1/8 | 25 | 83  | 58,0 | 64,0  | 29,0 | 13 | 39,9   | 54   | 17,0 | 5,5  | 12,0 | 18 | 34 | 45 | 9  | 26,0 | 67,5 | 5,5 | 161810                |
| 328526    | 6942KK-32R  | 53,25 | 13,7 | 18,5 | 28,0 | 3,5 | 2,0 | 21,0 | G1/8 | 28 | 95  | 66,5 | 74,5  | 32,0 | 13 | 47,9   | 61   | 20,0 | 5,5  | 13,5 | 22 | 40 | 51 | 11 | 30,0 | 76,8 | 5,5 | 161810                |
| 328534    | 6942KK-38R  | 60,50 | 16,0 | 21,0 | 31,5 | 3,0 | 1,5 | 22,5 | G1/8 | 28 | 106 | 72,0 | 81,0  | 37,0 | 13 | 54,9   | 69   | 23,5 | 6,5  | 16,0 | 24 | 47 | 60 | 12 | 33,5 | 72,9 | 6,8 | 161810                |
| 328625    | 6942KK-45R  | 71,00 | 18,7 | 24,5 | 37,0 | 3,0 | 2,5 | 26,5 | G1/4 | 30 | 124 | 82,0 | 96,0  | 43,5 | 14 | 64,9   | 81   | 27,5 | 7,5  | 19,0 | 30 | 55 | 70 | 15 | 39,5 | 72,9 | 6,8 | 161810                |
| 552013    | 6942KK-56R  | 86,00 | 30,2 | 30,0 | 45,0 | 3,0 | 2,5 | 32,5 | G1/4 | 35 | 140 | 89,0 | 105,0 | 47,0 | 14 | 74,9   | 94,5 | 31,5 | 11,0 | 22,0 | 32 | 63 | 85 | 16 | 45,0 | 67,5 | 8,7 | 161810                |

Subject to technical alterations.

## Installation dimensions:



| Order no. | Article no. | G3 x depth | R ±0,2 | dia. T | U  | V    | dia. W | X1        | dia. Y x max. depth |
|-----------|-------------|------------|--------|--------|----|------|--------|-----------|---------------------|
| 327486    | 6942KK-25   | M5 x 13    | 34     | 3      | 9  | 26,0 | 40,5   | 0,5 x 45° | 10 x 0,1            |
| 328484    | 6942KK-32   | M5 x 13    | 40     | 3      | 11 | 30,0 | 48,5   | 0,5 x 45° | 10 x 0,1            |
| 328492    | 6942KK-38   | M6 x 14    | 47     | 3      | 12 | 33,5 | 55,5   | 0,5 x 45° | 10 x 0,1            |
| 328583    | 6942KK-45   | M6 x 13    | 55     | 3      | 15 | 39,5 | 65,5   | 0,5 x 45° | 10 x 0,1            |
| 552012    | 6942KK-56   | M8 x 17    | 63     | 3      | 16 | 45,0 | 75,5   | 0,5 x 45° | 10 x 0,1            |
| 327569    | 6942KK-25L  | M5 x 13    | 34     | 3      | 9  | 26,0 | 40,5   | 0,5 x 45° | 10 x 0,1            |
| 328500    | 6942KK-32L  | M5 x 13    | 40     | 3      | 11 | 30,0 | 48,5   | 0,5 x 45° | 10 x 0,1            |
| 328518    | 6942KK-38L  | M6 x 14    | 47     | 3      | 12 | 33,5 | 55,5   | 0,5 x 45° | 10 x 0,1            |
| 328609    | 6942KK-45L  | M6 x 13    | 55     | 3      | 15 | 39,5 | 65,5   | 0,5 x 45° | 10 x 0,1            |
| 552014    | 6942KK-56L  | M8 x 17    | 63     | 3      | 16 | 45,0 | 75,5   | 0,5 x 45° | 10 x 0,1            |
| 327585    | 6942KK-25R  | M5 x 13    | 34     | 3      | 9  | 26,0 | 40,5   | 0,5 x 45° | 10 x 0,1            |
| 328526    | 6942KK-32R  | M5 x 13    | 40     | 3      | 11 | 30,0 | 48,5   | 0,5 x 45° | 10 x 0,1            |
| 328534    | 6942KK-38R  | M6 x 13    | 55     | 3      | 12 | 33,5 | 55,5   | 0,5 x 45° | 10 x 0,1            |
| 328625    | 6942KK-45R  | M6 x 13    | 55     | 3      | 15 | 39,5 | 65,5   | 0,5 x 45° | 10 x 0,1            |
| 552013    | 6942KK-56R  | M8 x 17    | 63     | 3      | 16 | 45,0 | 75,5   | 0,5 x 45° | 10 x 0,1            |

## No. 6942KL-xx-04

### Clamping arm



CAD

| Order no. | Article no.  | Piston force F5 at 100 bar [kN] | Clamping force F1 at 100 bar [kN] | B    | C    | dia. D | dia. E | G    | H  | H7  | K    | L     | N    | O  | P    | R    | SW  | SW1 | Weight [g] |
|-----------|--------------|---------------------------------|-----------------------------------|------|------|--------|--------|------|----|-----|------|-------|------|----|------|------|-----|-----|------------|
| 326850    | 6942KL-25-04 | 4,9                             | 3,2                               | 16,0 | 24,0 | 8      | 6      | 50,0 | 6  | 0,5 | 9,5  | 51,00 | 26,2 | M4 | 12,0 | 6,00 | 2,0 | 7   | 46         |
| 328542    | 6942KL-32-04 | 8,0                             | 5,3                               | 18,5 | 28,0 | 10     | 8      | 50,0 | 8  | 0,5 | 11,5 | 59,25 | 30,2 | M4 | 13,5 | 6,75 | 2,0 | 7   | 76         |
| 328559    | 6942KL-38-04 | 11,3                            | 7,5                               | 21,0 | 31,5 | 12     | 10     | 47,5 | 9  | 0,0 | 12,0 | 67,50 | 34,9 | M5 | 16,0 | 8,00 | 2,5 | 8   | 99         |
| 328641    | 6942KL-45-04 | 15,9                            | 10,5                              | 24,5 | 37,0 | 16     | 12     | 52,5 | 14 | 1,0 | 17,0 | 80,00 | 39,6 | M6 | 19,0 | 9,50 | 3,0 | 10  | 195        |
| 552015    | 6942KL-56-04 | 25,5                            | 17,0                              | 30,0 | 45,0 | 16     | 12     | 52,5 | 16 | 1,0 | 19,0 | 96,00 | 48,6 | M8 | 22,0 | 9,50 | 4,0 | 13  | 311        |

### Design:

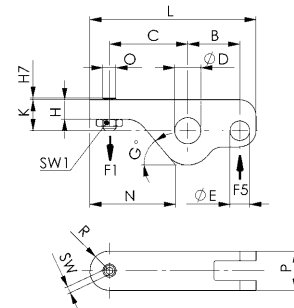
Hardened, tempered and burnished steel. Supplied with compression screw.

### Application:

For link clamp 6942KK.

### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6942KR-xx-14

### Clamping arm blank



CAD

| Order no. | Article no.  | B    | C  | dia. D | dia. E | G    | K    | L     | N    | P    | Weight [g] |
|-----------|--------------|------|----|--------|--------|------|------|-------|------|------|------------|
| 326975    | 6942KR-25-14 | 16,0 | 44 | 8      | 6      | 50,0 | 9,5  | 65,0  | 40,3 | 12,0 | 64         |
| 328567    | 6942KR-32-14 | 18,5 | 50 | 10     | 8      | 50,0 | 12,5 | 74,5  | 46,3 | 13,5 | 101        |
| 328575    | 6942KR-38-14 | 21,0 | 58 | 12     | 10     | 47,5 | 12,0 | 86,0  | 53,4 | 16,0 | 130        |
| 328666    | 6942KR-45-14 | 24,5 | 68 | 16     | 12     | 52,5 | 14,0 | 101,5 | 61,1 | 19,0 | 222        |
| 552016    | 6942KR-56-14 | 30,0 | 70 | 16     | 12     | 52,5 | 19,0 | 110,0 | 62,6 | 22,0 | 377        |

### Design:

Hardened, tempered and burnished steel.

### Application:

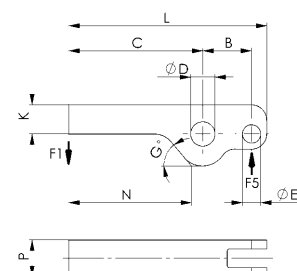
For link clamp 6942KK.

### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.

Formula to determine the clamping force F1:

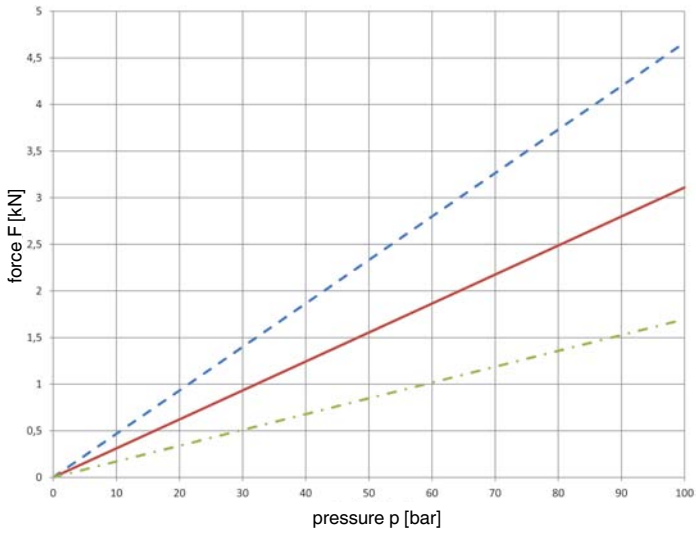
Clamping force = F1 [kN], piston force = F5 [kN], operating lever = B [mm], load lever = C [mm]  
 $F1 = F5 \times B / C$



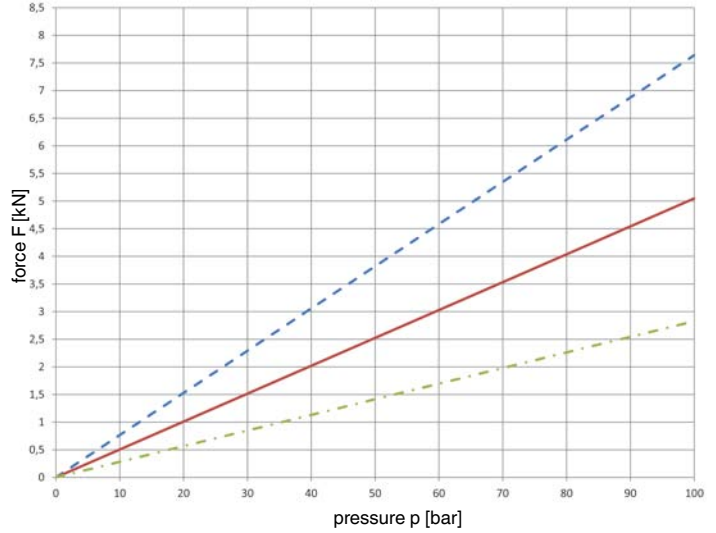
Subject to technical alterations.

## Diagrams:

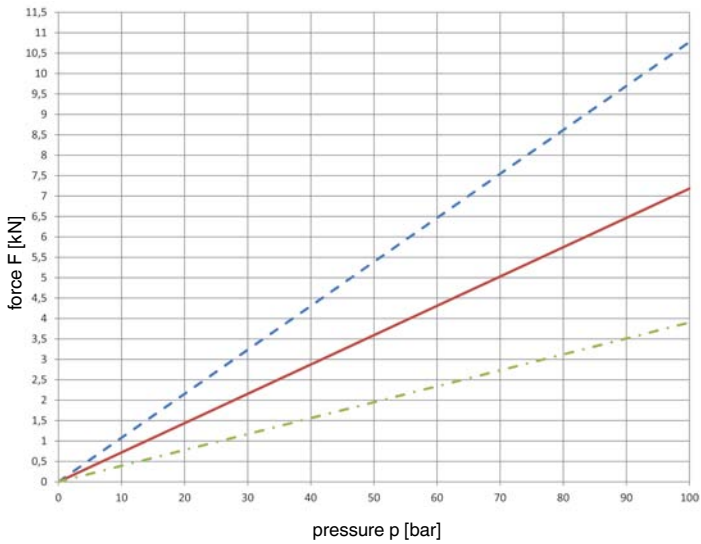
### 6942KK-25, -25R, -25L



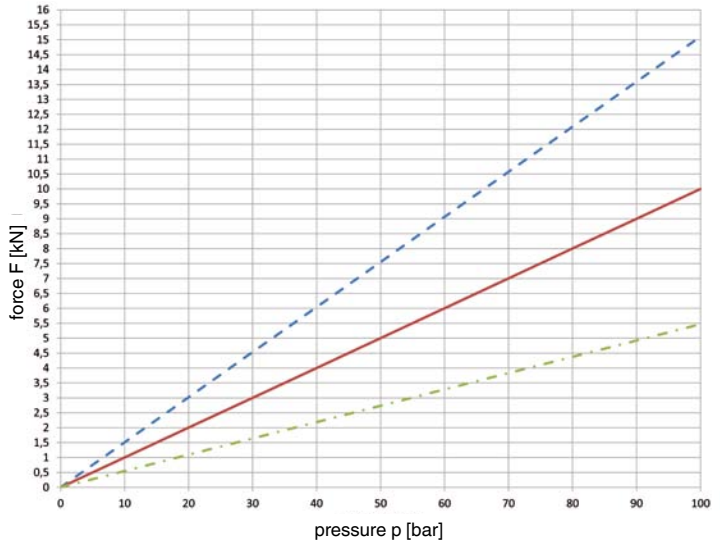
### 6942KK-32, -32R, -32L



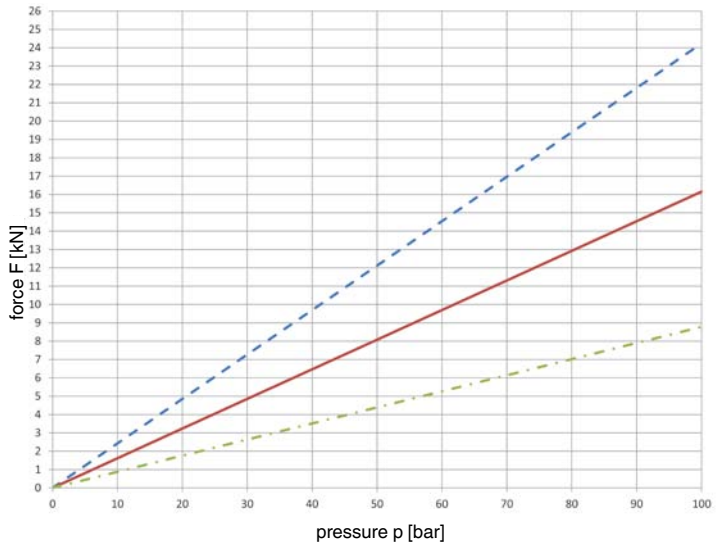
### 6942KK-38, -38R, -38L



### 6942KK-45, -45R, -45L



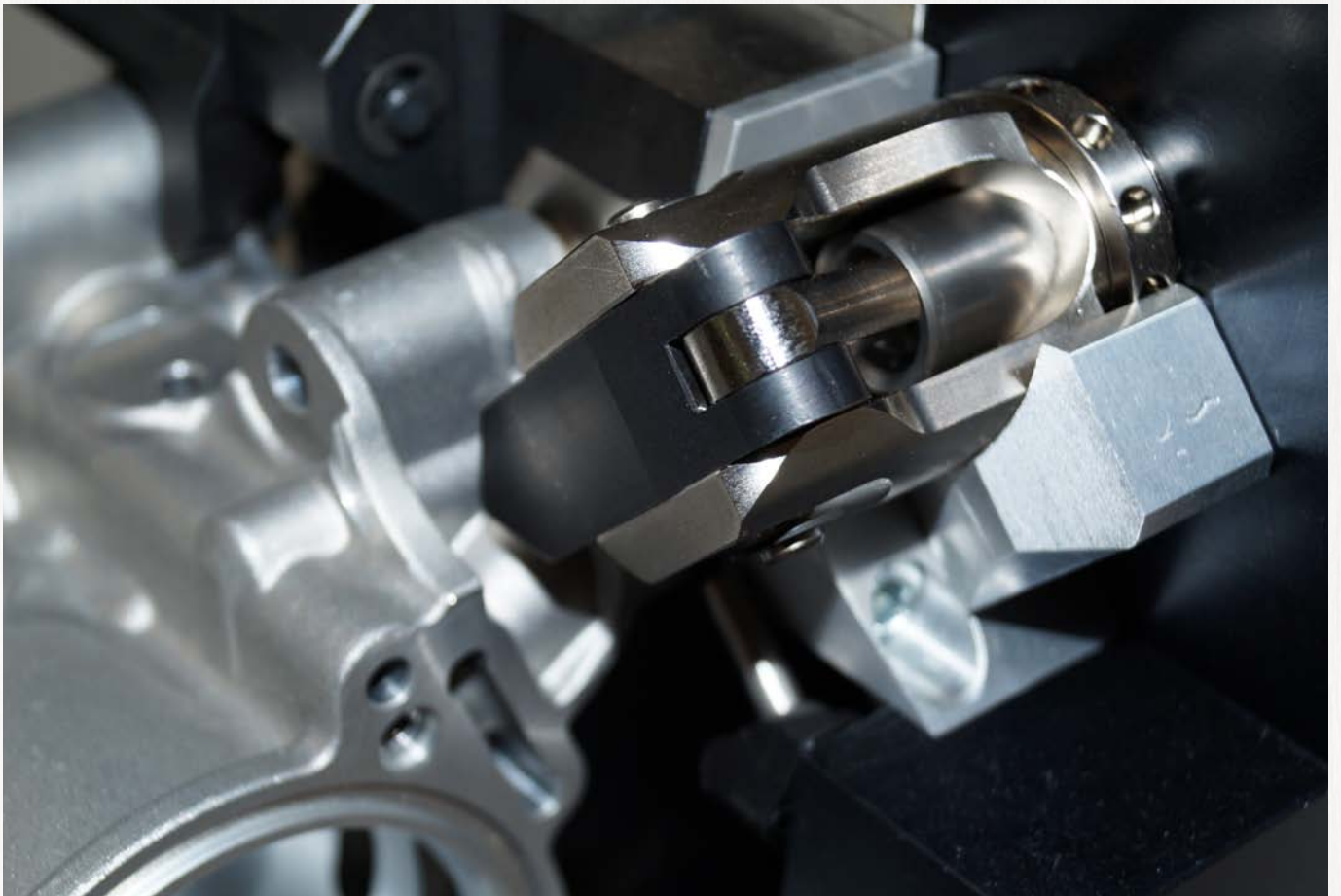
### 6942KK-56, -56R, -56L



- hydraulic force
- clamping arm clamping force
- clamping arm blank clamping force

Subject to technical alterations.





Subject to technical alterations.

## No. 6943C-XX-1

### Vertical clamp with linear stroke

Double-acting,  
max. operating pressure 100 bar,  
min. operating pressure 30 bar.



| Order no. | Article no. | Clamping force at 100 bar Sp* [kN] | Clamping stroke H [mm] | Vol. Sp [cm <sup>3</sup> ] | eff. piston area Sp [cm <sup>2</sup> ] | Md [Nm] | Q max.* [l/min] | Weight [g] |
|-----------|-------------|------------------------------------|------------------------|----------------------------|--|---------|-----------------|------------|
| 561252    | 6943C-03-1  | 2,4                                | 6                      | 1,9                        | 2,8                                    | 7,0     | 1,1             | 532        |
| 561253    | 6943C-04-1  | 4,2                                | 6                      | 3,4                        | 4,8                                    | 13,0    | 1,9             | 841        |

Cl = clamping, Uncl = unclamp  
\* Specifications with clamping arm, standard

### Design:

Hydraulic clamp as drop-in cartridge with hardened running socket, which can be screwed into the fixture. Top mounting with four cylinder screws (resistance min. 12.9); these are supplied as standard. All components are made of hardened steel, tempered and burnished. Piston and pivot bolts are made from tempered steel, hardened and nitrided. Metal wiper to protect the dirt wiper is integrated into the housing. Compressed air nozzle for pneumatic clamping control. Pivot bolts, tensioning straps and compressed air nozzle are supplied as standard, but not clamping arms. Oil supply via oil channel in fixture body.

### Application:

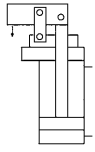
The double-acting vertical clamp is preferred for use in hydraulic fixtures in which there is very little installation space for a hydraulic clamping element. For complex workpieces, a small area is sufficient to clamp the workpiece. Through the oil supply in the fixture body, a very close array of the clamping elements is possible. Pneumatic release control permits monitoring of the clamp arm. Workpieces can be installed or removed automatically with handling devices.

### Features:

The double-acting vertical clamp permits a clearly defined movement of the clamp arm. After the rotary movement of the clamping arm, there follows a linear clamping stroke on the workpiece, which can compensate for large workpiece tolerances. There is no relative movement on the workpiece during its clamping. Very small dimensions, so workpieces can be installed closely spaced side-by-side. Due to the pneumatic release control, the clamp is used optimally in automated sequences.

### Note:

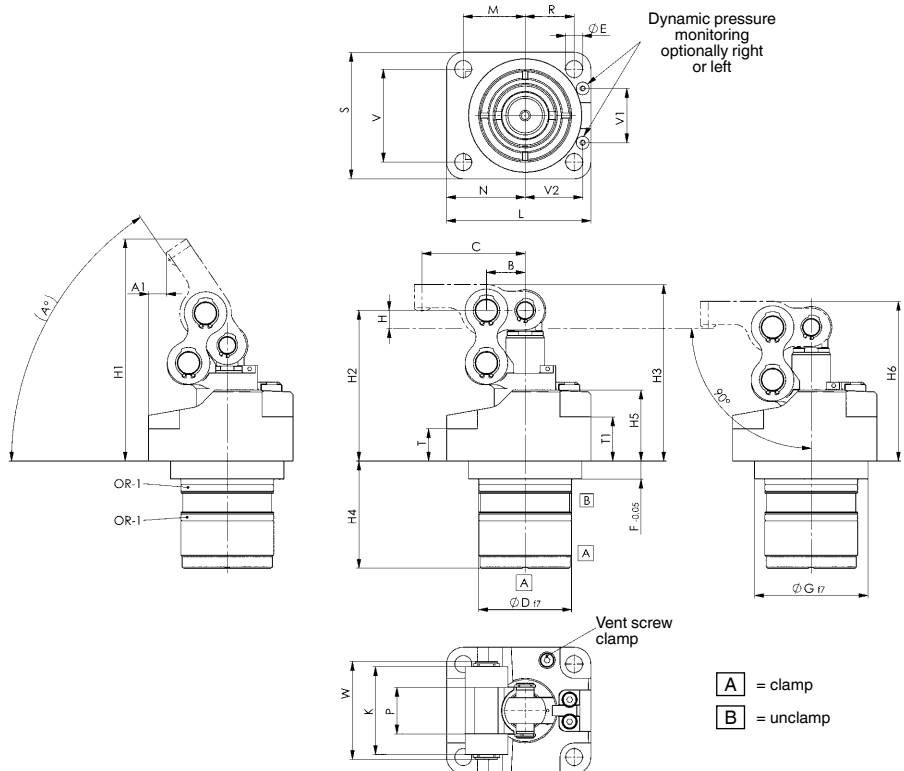
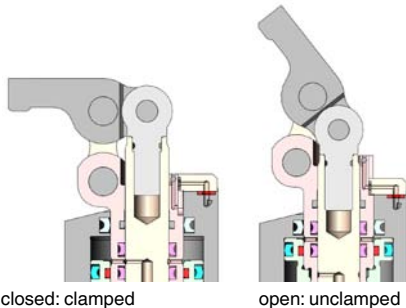
Collision of the workpiece with the clamping arm must be avoided during loading and unloading of the clamping fixture. When designing the clamping fixture, the clamping position must be laid approximately in the middle of the clamping stroke in order to have enough reserve for workpiece tolerances. Soiling at the vertical clamp must be considered or avoided through inclusion in the cleaning process. The signal converter is not supplied as standard. The lever ratio must be observed when using special clamping levers.



**NEW!**



### Dynamic pressure monitoring:



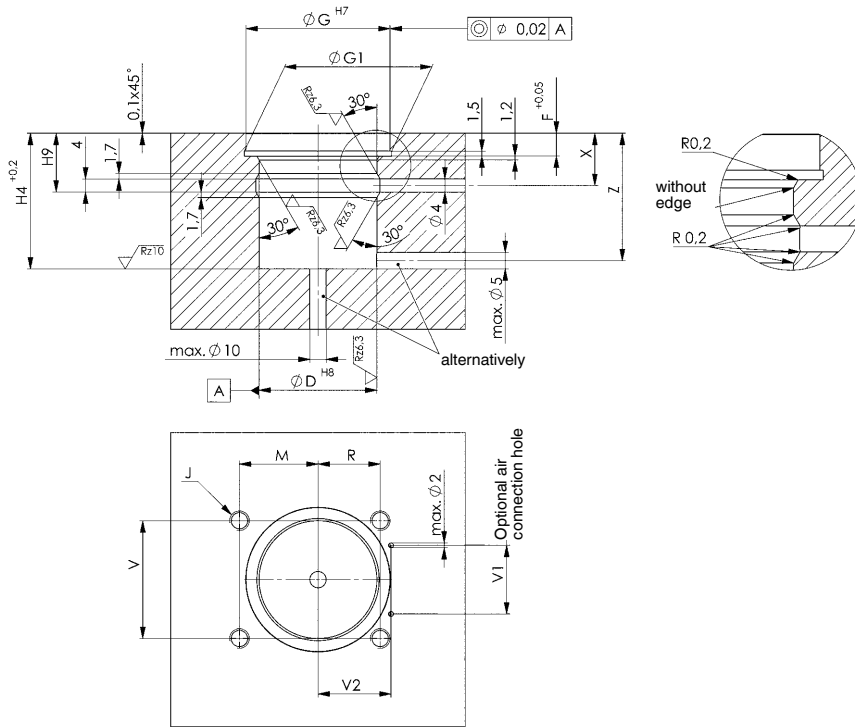
### Dimensions:

| Order no. | Article no. | A° | A1  | B  | C  | Ø D f7 | dia. E | F -0.05 | dia. G | H | H1 | H2   | H3   | H4   | H5   | H6   | K  | L  | M    | N    | P  | R    | S  | T    | T1   | V    | V1   | V2   | W  | OR-1 O-ring Order No. |
|-----------|-------------|----|-----|----|----|--------|--------|---------|--------|---|----|------|------|------|------|------|----|----|------|------|----|------|----|------|------|------|------|------|----|-----------------------|
| 561252    | 6943C-03-1  | 52 | 2,1 | 12 | 35 | 29     | 5,3    | 7       | 33     | 6 | 80 | 54,3 | 63,3 | 36,0 | 27,5 | 57,3 | 29 | 46 | 17,4 | 25,0 | 15 | 14,4 | 41 | 10,0 | 18,0 | 28,5 | 18,4 | 16,6 | 33 | 321265                |
| 561253    | 6943C-04-1  | 56 | 6,9 | 15 | 40 | 36     | 6,4    | 7       | 44     | 6 | 86 | 58,3 | 68,3 | 41,5 | 27,5 | 62,3 | 34 | 56 | 24,0 | 30,5 | 18 | 19,0 | 49 | 12,5 | 17,1 | 36,0 | 21,0 | 22,3 | 38 | 555899                |

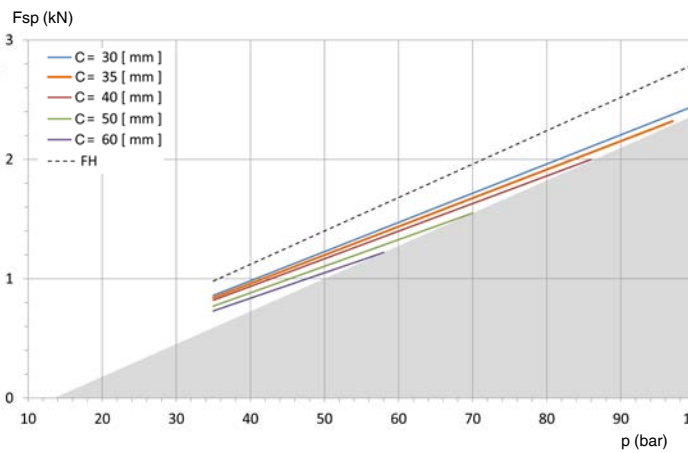
Subject to technical alterations.

## Installation dimensions:

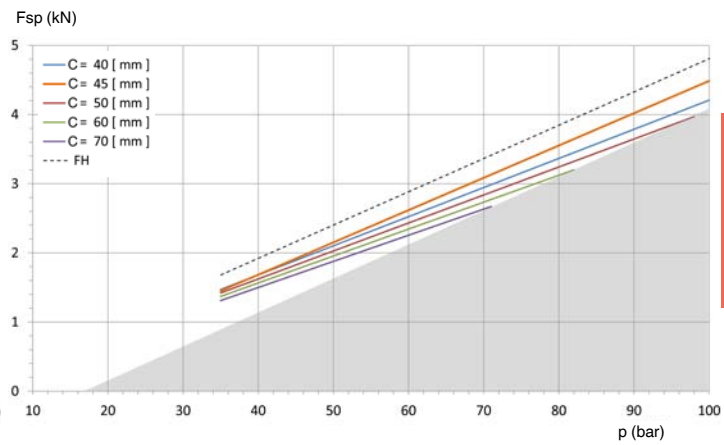
| Order no. | Article no. | dia. D H8 | dia. G | ØG1 | H4   | H9 | J x depth | M    | R    | V    | V1   | V2   | F +0.05 | X  | Z    |
|-----------|-------------|-----------|--------|-----|------|----|-----------|------|------|------|------|------|---------|----|------|
| 561252    | 6943C-03-1  | 29        | 33     | 34  | 36,0 | 18 | M5 x 12   | 17,4 | 14,4 | 28,5 | 18,4 | 16,6 | 7       | 16 | 33,5 |
| 561253    | 6943C-04-1  | 36        | 44     | 45  | 41,5 | 18 | M6 x 12   | 24,0 | 19,0 | 36,0 | 21,0 | 22,3 | 7       | 16 | 39,0 |



### 6943C-03-1



### 6943C-04-1



## No. 6958C-XX-04

### Clamping arm



CAD



| Order no. | Article no. | B  | C  | G° | K  | L    | N    | P  | R | R1 | Weight [g] |
|-----------|-------------|----|----|----|----|------|------|----|---|----|------------|
| 556980    | 6958C-03-04 | 12 | 35 | 80 | 9  | 44,5 | 9,5  | 15 | 3 | 5  | 42         |
| 556981    | 6958C-04-04 | 15 | 40 | 80 | 10 | 50,5 | 10,5 | 18 | 3 | 5  | 64         |

#### Design:

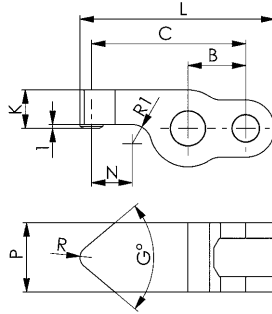
Hardened, tempered and burnished steel.

#### Application:

For vertical clamps 6958C and 6943C.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



## No. 6958CR-XX-04

### Clamping arm, blank



CAD



| Order no. | Article no.  | B  | C  | G  | J  | L    | P  | Weight [g] |
|-----------|--------------|----|----|----|----|------|----|------------|
| 556984    | 6958CR-03-04 | 12 | 50 | 18 | 9  | 56,5 | 15 | 92         |
| 556985    | 6958CR-04-04 | 15 | 60 | 20 | 10 | 67,5 | 18 | 147        |

#### Design:

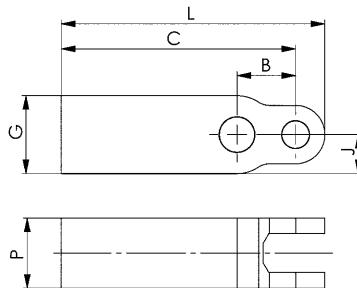
Hardened, tempered and burnished steel.

#### Application:

For vertical clamps 6958C and 6943C.

#### Note:

Clamping pressure, leverage, flow volume and clamp arm weight must always be observed.



# LOW PRESSURE SUPPORT ELEMENTS FOR STRESS-FREE CLAMPING AND LOW-VIBRATION MACHINING

- > supporting force up to 10 kN
- > observe safety factor for supporting force
- > operating pressure up to 70 bar
- > pistons with internal thread
- > wipers to protect against contamination
- > oil supply via threaded port or oil channel in the fixture body
- > various design variants:
  - screw-in version
  - top flange version

## PRODUCT OVERVIEW:

| Type   | Supporting force [kN] | Supporting stroke [mm] | Contact force spring | No. of models | Operating mode |
|--------|-----------------------|------------------------|----------------------|---------------|----------------|
| 6944KH | 3,0 - 10,0            | 6,5 - 10,0             | 2,2 - 6,7 N          | 4             | single acting  |
| 6944KH | 3,0 - 10,0            | 6,5 - 10,0             | 3,7 - 13,6 N         | 4             | single acting  |
| 6944EH | 3,0 - 10,0            | 6,5 - 10,0             | 2,2 - 6,7 N          | 4             | single acting  |
| 6944EH | 3,0 - 10,0            | 6,5 - 10,0             | 3,7 - 13,6 N         | 4             | single acting  |

## PRODUCT EXAMPLES:

NO. 6944KH



> supporting force: 3 - 10 kN

NO. 6944EH



> supporting force: 3 - 10 kN

# LOW PRESSURE SUPPORT ELEMENTS - TECHNICAL INFORMATION

## OPERATING PRESSURE:

To achieve a guaranteed clamping function, the min. operating pressure must not be fallen below. The highest clamping force is achieved at max. operating pressure.

## CONTACT FORCE:

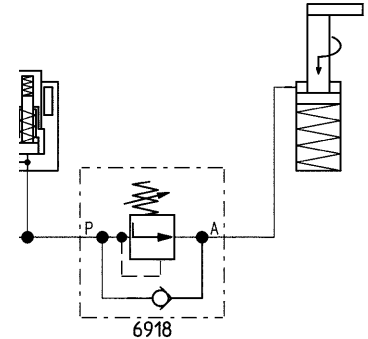
The spring-loaded contact force is at its greatest at a min. distance between the installation position and workpiece.

## SHEAR FORCES:

Support elements only absorb forces in axial direction of the piston. If shear forces occur, the support element is damaged. The function of the support element can no longer be guaranteed.

## VOLUME FLOW:

The permissible volume flow must not be exceeded. The permitted volume flow can be controlled with a throttle/check valve. If the volume flow is too high, the oil pressure increases so quickly that the anchor is clamped before it is on the workpiece. If several support elements are used, the permissible volume flow is the total of the individually permissible volume flows.

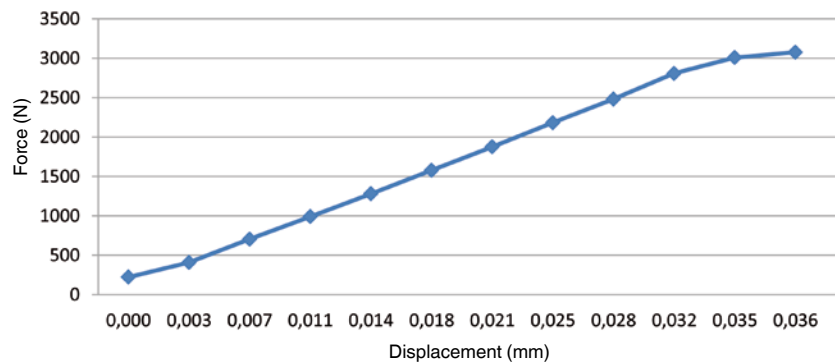


## ELASTIC CHANGE IN LENGTH:

Just like any steel component, the support elements also have an elastic behaviour. During heavy loading, a setting behaviour occurs.

## VENTING:

Support elements only need a very small oil volume. Since the hydraulic oil in the connection line hardly moves, careful venting is necessary. Air in the oil can prolong the clamping time considerably. If venting is not carried out properly, a diesel effect may occur and destroy the support element. Always vent at low pressure.



## DIESEL EFFECT:

If petroleum containing air bubbles is compressed very quickly, the bubbles will be heated so strongly that a self-ignition of the air/gas mixture could occur. As a result, a very high pressure and temperature increase occurs locally, which could also damage seals as well as cause accelerated ageing of the oil.

## SPRING SPACE VENTILATION:

The free loading and venting of the spring spaces must be ensured. The pressure connection must be protected or arrayed properly so no coolant is taken in. Failure to observe this can lead to malfunctions.

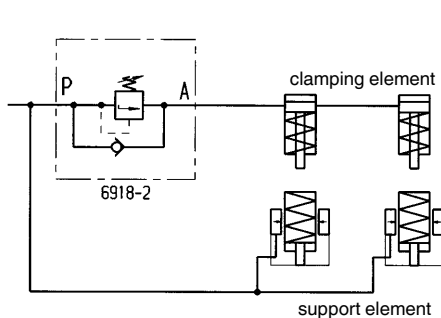
## COOLANT AND SHAVINGS:

Support elements should normally be protected against shavings and cooling water.



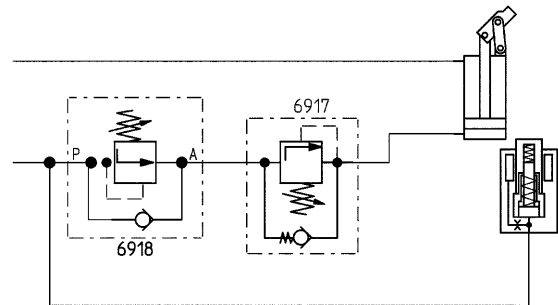
### CONTROLLING THE CLAMPING SEQUENCE:

The sequence of supports and clamps must be controlled time-dependent or pressure-dependent. This can be done using a sequence valve 6918 or supply valve 6918-80-10.



### PRESSURE REDUCTION OF THE CLAMPING ELEMENTS:

The pressure in the clamping circuit is reduced with a pressure control seat valve 6917.



### SUPPORTING FORCE:

The permissible loading force of support elements must always be regulated so that the clamping force of the clamping elements used and the static and dynamic machining forces can be absorbed safely. Permissible loading force minus clamping force minus safety reserve results in the possible machining force.

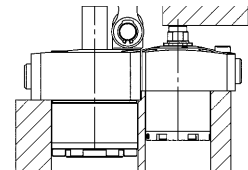
If the total number of occurring forces exceeds the permissible loading force, the anchor of the support element will be pressed backwards thereby damaging the support element.

**The supporting force should always be at least twice as high as the clamping force.**

### COMBINATIONS OF SUPPORT ELEMENT WITH LINK CLAMP

Example of support element 6944KH-04-2 and link clamp 6942KK-32 with standard clamping arm

|                 | min. operating pressure [bar] | max. operating pressure [bar] | max. supporting force [kN] | Clamping force at 70 bar [kN] | Clamping force at 38 bar [kN] |
|-----------------|-------------------------------|-------------------------------|----------------------------|-------------------------------|-------------------------------|
| support element | 25                            | 70                            | 4,0                        | -                             | -                             |
| link clamp      | 15                            | 100                           | -                          | 3,71                          | 2,0                           |



### POSSIBLE MACHINING FORCE AT 70 BAR:

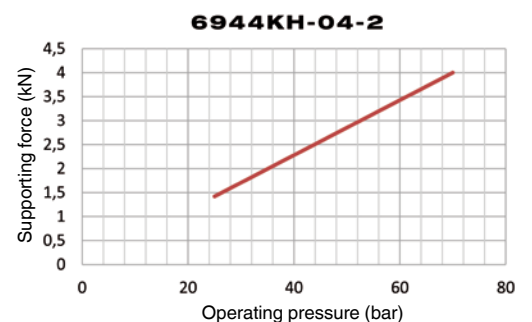
perm. loading force = 4,0 kN  
 minus clamping force = 2,0 kN  


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 arithmetic machining force ≤ 2,0 kN  
 perm. machining force max. ≤ 2,0 kN

### NOTE:

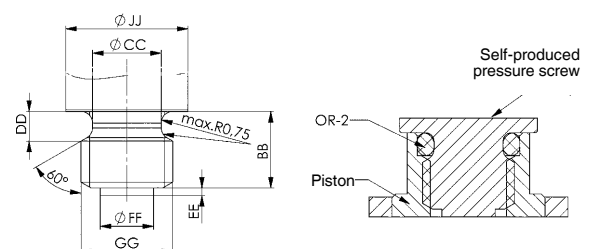
The clamping pressure for the link clamp 6942KK must be reduced to approx. 38 bar. The permissible supporting forces in the diagram are static. Vibrations occurring during the machining could be far higher. For these cases, a large reserve must be included.



### SET SCREWS:

Support elements must never be operated without set screws, since penetrating dirt and cooling water impair the function. Most support elements are fitted with a set screw as standard.

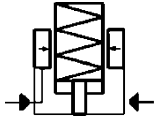
When using special set screws, make sure that the set screws are tempered and designed slightly ball-shaped. Set screws with a tip or fluting should not be used. Special set screws can jeopardise the function of return stroke of the support pin and the spring-loaded system. During in-house production, please manufacture according to our specifications.



## No. 6944KH

### Support Element, top-flange-mounting

Normally retracted. Hydraulic advanced. Spring force for contact, max. operating pressure 70 bar, min. operating pressure 25 bar.



| Order no. | Article no. | Contact force F1 [N] | Support force at 70 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | Md 1 max. [Nm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|----------------------|------------------------------|---------------|-------------------------|----------------|----------------|------------|
| 552204    | 6944KH-03-2 | 2,8 - 3,8            | 3,0                          | 6,5           | 0,8                     | 5,4            | 2,5            | 430        |
| 559180    | 6944KH-03-5 | 3,7 - 5,5            | 3,0                          | 6,5           | 0,8                     | 5,4            | 2,5            | 430        |
| 552205    | 6944KH-04-2 | 3,6 - 5,6            | 4,0                          | 8,0           | 1,4                     | 10,0           | 2,5            | 545        |
| 559181    | 6944KH-04-5 | 4,7 - 7,8            | 4,0                          | 8,0           | 1,4                     | 10,0           | 2,5            | 545        |
| 552206    | 6944KH-05-2 | 4,7 - 7,8            | 5,5                          | 8,0           | 1,5                     | 16,5           | 2,5            | 708        |
| 559182    | 6944KH-05-5 | 6,2 - 11,0           | 5,5                          | 8,0           | 1,5                     | 16,5           | 2,5            | 708        |
| 552207    | 6944KH-10-2 | 5,8 - 9,7            | 10,0                         | 10,0          | 1,8                     | 30,0           | 2,5            | 1029       |
| 559183    | 6944KH-10-5 | 7,9 - 13,6           | 10,0                         | 10,0          | 1,8                     | 30,0           | 2,5            | 1029       |

### Design:

Body made from steel, tempered and burnished. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Oil supply via threaded connection or oil channel in the fixture body.

### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

### Features:

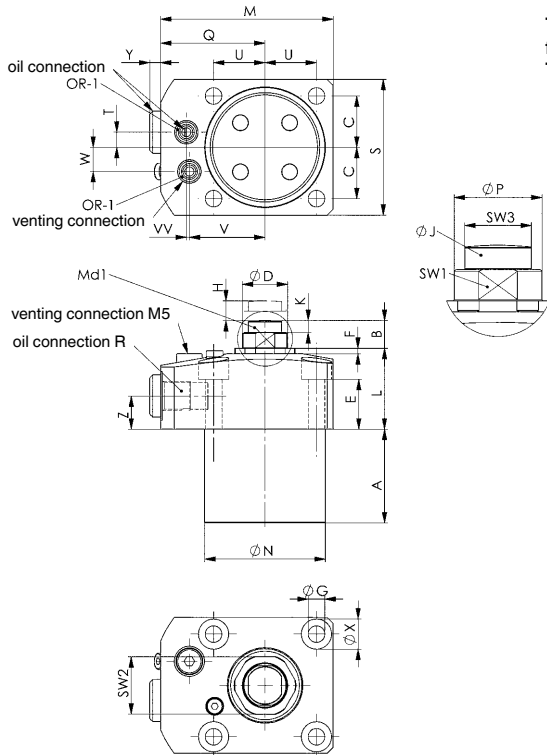
Element with high load capacity and low height. Oil pressure: The plunger is retracted in the normal position. When pressure is applied, the support pin advances with a weak spring-applied force against the inserted workpiece. The spring force varies with the pin stroke. As the hydraulic pressure rises, the support pin is hydraulically clamped. When the pressure is released, the support pin returns to the normal position. Very high support force ensures optimum manufacturing quality.

### Note:

The support pin must be protected against the entry of dirt and splash water by a set screw. When putting into operation, make sure that the hydraulic system is vented perfectly. Failure to do so can cause destruction of the clamping element by the escaping diesel effect. The vent hole must be connected. No coolant must be sucked through this.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



### Dimensions:

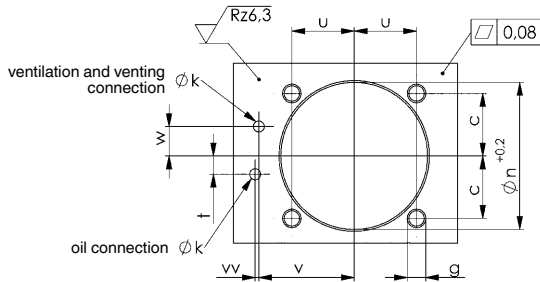
| Order no. | Article no. | A    | B    | C    | dia. D | E    | F   | dia. G | dia. J | K   | L  | M    | dia. N | dia. P | Q    | R    | S  | T | U    | V    | W  | dia. X | Y   | Z  | SW1 | SW2 | SW3 | VV | OR-1 O-ring Order No. |
|-----------|-------------|------|------|------|--------|------|-----|--------|--------|-----|----|------|--------|--------|------|------|----|---|------|------|----|--------|-----|----|-----|-----|-----|----|-----------------------|
| 552204    | 6944KH-03-2 | 21,0 | 9,0  | 11,5 | 10     | 19,0 | 1,7 | 4,5    | 9,0    | 3,0 | 28 | 50,0 | 29,9   | 9,5    | 30,5 | G1/8 | 34 | 3 | 15,0 | 20,5 | 7  | 8      | 3,6 | 11 | 8   | 13  | 8   | -  | 161802                |
| 559180    | 6944KH-03-5 | 21,0 | 9,0  | 11,5 | 10     | 19,0 | 1,7 | 4,5    | 9,0    | 3,0 | 28 | 50,0 | 29,9   | 9,5    | 30,5 | G1/8 | 34 | 3 | 15,0 | 20,5 | 7  | 8      | 3,6 | 11 | 8   | 13  | 8   | -  | 161802                |
| 552205    | 6944KH-04-2 | 27,5 | 10,5 | 15,7 | 12     | 18,0 | 1,7 | 4,5    | 11,5   | 3,5 | 25 | 52,0 | 35,9   | 11,5   | 32,0 | G1/8 | 40 | 5 | 15,7 | 23,5 | 8  | 8      | 3,6 | 11 | 10  | 15  | 10  | -  | 161802                |
| 559181    | 6944KH-04-5 | 27,5 | 10,5 | 15,7 | 12     | 18,0 | 1,7 | 4,5    | 11,5   | 3,5 | 25 | 52,0 | 35,9   | 11,5   | 32,0 | G1/8 | 40 | 5 | 15,7 | 23,5 | 8  | 8      | 3,6 | 11 | 10  | 15  | 10  | -  | 161802                |
| 552206    | 6944KH-05-2 | 31,0 | 11,0 | 17,0 | 15     | 16,5 | 1,8 | 5,5    | 12,5   | 4,0 | 25 | 57,0 | 39,9   | 14,5   | 34,5 | G1/8 | 45 | 5 | 17,0 | 26,0 | 8  | 10     | 3,6 | 11 | 13  | 19  | 11  | 1  | 161802                |
| 559182    | 6944KH-05-5 | 31,0 | 11,0 | 17,0 | 15     | 16,5 | 1,8 | 5,5    | 12,5   | 4,0 | 25 | 57,0 | 39,9   | 14,5   | 34,5 | G1/8 | 45 | 5 | 17,0 | 26,0 | 8  | 10     | 3,6 | 11 | 13  | 19  | 11  | 1  | 161802                |
| 552207    | 6944KH-10-2 | 39,0 | 11,0 | 20,0 | 16     | 16,5 | 1,8 | 5,5    | 12,5   | 4,0 | 25 | 64,5 | 47,9   | 15,5   | 39,0 | G1/8 | 51 | - | 20,0 | 30,0 | 11 | 10     | 3,6 | 11 | 13  | 21  | 11  | 2  | 161802                |
| 559183    | 6944KH-10-5 | 39,0 | 11,0 | 20,0 | 16     | 16,5 | 1,8 | 5,5    | 12,5   | 4,0 | 25 | 64,5 | 47,9   | 15,5   | 39,0 | G1/8 | 51 | - | 20,0 | 30,0 | 11 | 10     | 3,6 | 11 | 13  | 21  | 11  | 2  | 161802                |

Subject to technical alterations.



## Installation dimensions:

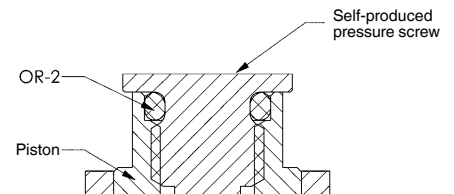
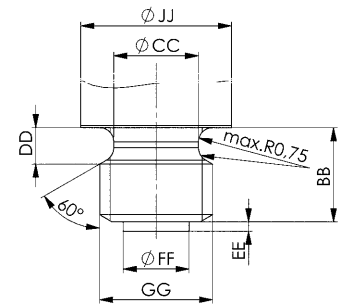
| Order no. | Article no. | c    | g  | dia. k | dia. n | t | u    | v    | w  | vv |
|-----------|-------------|------|----|--------|--------|---|------|------|----|----|
| 552204    | 6944KH-03-2 | 11,5 | M4 | 3      | 30     | 3 | 15,0 | 20,5 | 7  | -  |
| 559180    | 6944KH-03-5 | 11,5 | M4 | 3      | 30     | 3 | 15,0 | 20,5 | 7  | -  |
| 552205    | 6944KH-04-2 | 15,7 | M4 | 3      | 36     | 5 | 15,7 | 23,5 | 8  | -  |
| 559181    | 6944KH-04-5 | 15,7 | M4 | 3      | 36     | 5 | 15,7 | 23,5 | 8  | -  |
| 552206    | 6944KH-05-2 | 17,0 | M5 | 3      | 40     | 5 | 17,0 | 26,0 | 8  | 1  |
| 559182    | 6944KH-05-5 | 17,0 | M5 | 3      | 40     | 5 | 17,0 | 26,0 | 8  | 1  |
| 552207    | 6944KH-10-2 | 17,5 | M5 | 3      | 48     | - | 20,0 | 30,0 | 11 | 2  |
| 559183    | 6944KH-10-5 | 17,5 | M5 | 3      | 48     | - | 20,0 | 30,0 | 11 | 2  |



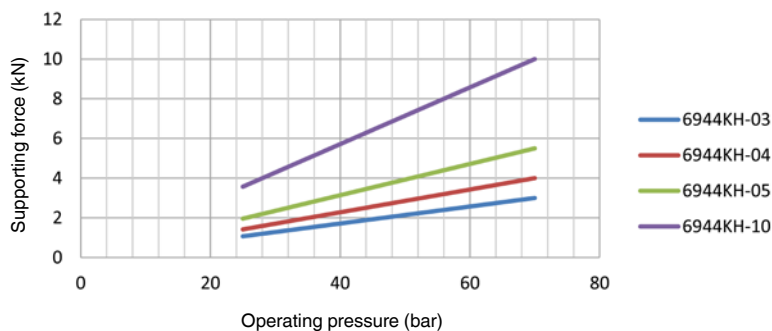
## Production dimensions with self-production of the clamping screw:

| Order no. | Article no. | BB  | dia. CC | DD   | EE  | dia. FF | GG  | dia. JJ | OR-2 O-ring Order No. | max. permitted weight of the set screw [g] |
|-----------|-------------|-----|---------|------|-----|---------|-----|---------|-----------------------|--|
| 552204    | 6944KH-03-2 | 5,0 | 4,5     | 1,93 | 0,5 | 3,5     | M6  | 9,0     | 552155                | 85   |
| 559180    | 6944KH-03-5 | 5,0 | 4,5     | 1,93 | 0,5 | 3,5     | M6  | 9,0     | 552155                | 110  |
| 552205    | 6944KH-04-2 | 4,8 | 6,2     | 1,8  | 0,7 | 4,9     | M8  | 11,5    | 552245                | 110  |
| 559181    | 6944KH-04-5 | 4,8 | 6,2     | 1,8  | 0,7 | 4,9     | M8  | 11,5    | 552245                | 140  |
| 552206    | 6944KH-05-2 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 140  |
| 559182    | 6944KH-05-5 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 185  |
| 552207    | 6944KH-10-2 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 175  |
| 559183    | 6944KH-10-5 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 235  |

Always consider the permitted total weight of the set screw for in-house production.



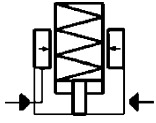
## Diagram:



## No. 6944EH

### Support Element, cartridge flange

Normally retracted. Hydraulic advanced. Spring force for contact, max. operating pressure 70 bar, min. operating pressure 25 bar.



| Order no. | Article no. | Contact force F1 [N] | Support force at 70 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | Md max. [Nm] | Md 1 max. [Nm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|----------------------|------------------------------|---------------|-------------------------|--------------|----------------|----------------|------------|
| 552200    | 6944EH-03-2 | 2,8 - 3,8            | 3,0                          | 6,5           | 0,8                     | 32           | 5,4            | 2,5            | 198        |
| 559184    | 6944EH-03-5 | 3,7 - 5,5            | 3,0                          | 6,5           | 0,8                     | 32           | 5,4            | 2,5            | 198        |
| 552201    | 6944EH-04-2 | 3,6 - 5,6            | 4,0                          | 8,0           | 1,4                     | 50           | 10,0           | 2,5            | 280        |
| 559185    | 6944EH-04-5 | 4,7 - 7,8            | 4,0                          | 8,0           | 1,4                     | 50           | 10,0           | 2,5            | 280        |
| 552202    | 6944EH-05-2 | 4,7 - 7,8            | 5,5                          | 8,0           | 1,5                     | 63           | 16,5           | 2,5            | 378        |
| 559186    | 6944EH-05-5 | 6,2 - 11,0           | 5,5                          | 8,0           | 1,5                     | 63           | 16,5           | 2,5            | 378        |
| 552203    | 6944EH-10-2 | 5,8 - 9,7            | 10,0                         | 10,0          | 1,8                     | 80           | 30,0           | 2,5            | 719        |
| 559187    | 6944EH-10-5 | 7,9 - 13,6           | 10,0                         | 10,0          | 1,8                     | 80           | 30,0           | 2,5            | 719        |

#### Design:

Body made from steel, tempered and burnished. Support pin with internal thread case hardened and ground. Wiper to protect against dirt and cooling water. Oil supply via oil channel in fixture body.

#### Application:

The support element is used as an extra support to prevent sagging and vibration of a workpiece.

#### Features:

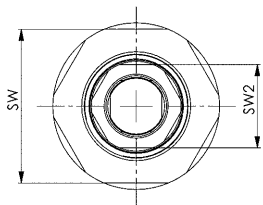
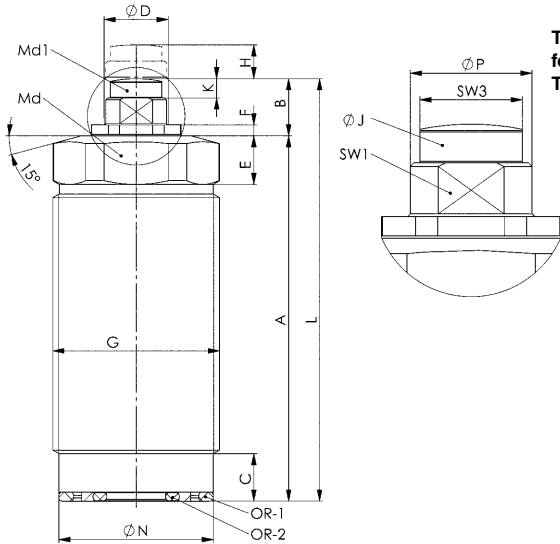
Element with high load capacity and low height. Oil pressure: The plunger is retracted in the normal position. When pressure is applied, the support pin advances with a weak spring-applied force against the inserted workpiece. The spring force varies with the pin stroke. As the hydraulic pressure rises, the support pin is hydraulically clamped. When the pressure is released, the support pin returns to the normal position. Very high support force ensures optimum manufacturing quality.

#### Note:

The support pin must be protected against the entry of dirt and splash water by a set screw. When putting into operation, make sure that the hydraulic system is vented perfectly. Failure to do so can cause destruction of the clamping element by the escaping diesel effect. The vent hole must be connected. No coolant must be sucked through this.

**The supporting force should be matched to the clamping force in order to absorb machining forces.**

**The supporting force should always be at least twice as high as the clamping force.**



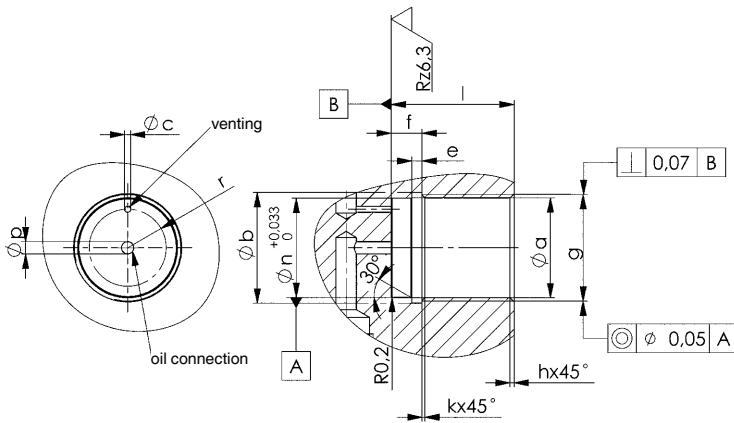
#### Dimensions:

| Order no. | Article no. | A  | B    | C   | dia. D | E    | F   | G         | dia. J | K   | L    | dia. N | dia. P | SW | SW1 | SW2 | SW3 | OR-1 O-ring Order No. | OR-2 O-ring Order No. |
|-----------|-------------|----|------|-----|--------|------|-----|-----------|--------|-----|------|--------|--------|----|-----|-----|-----|-----------------------|-----------------------|
| 552200    | 6944EH-03-2 | 57 | 9,0  | 7,4 | 10     | 7,6  | 1,7 | M26 x 1,5 | 9,0    | 3,0 | 66,0 | 24,1   | 9,5    | 24 | 8   | 13  | 8   | 552156                | 552153                |
| 559184    | 6944EH-03-5 | 57 | 9,0  | 7,4 | 10     | 7,6  | 1,7 | M26 x 1,5 | 9,0    | 3,0 | 66,0 | 24,1   | 9,5    | 24 | 8   | 13  | 8   | 552156                | 552153                |
| 552201    | 6944EH-04-2 | 62 | 10,5 | 9,4 | 12     | 10,3 | 1,7 | M30 x 1,5 | 11,5   | 3,5 | 72,5 | 28,2   | 11,5   | 27 | 10  | 15  | 10  | 159400                | 128660                |
| 559185    | 6944EH-04-5 | 62 | 10,5 | 9,4 | 12     | 10,3 | 1,7 | M30 x 1,5 | 11,5   | 3,5 | 72,5 | 28,2   | 11,5   | 27 | 10  | 15  | 10  | 159400                | 128660                |
| 552202    | 6944EH-05-2 | 58 | 11,0 | 8,4 | 15     | 8,3  | 1,8 | M36 x 1,5 | 12,5   | 4,0 | 69,0 | 34,2   | 14,5   | 32 | 13  | 19  | 11  | 552469                | 175216                |
| 559186    | 6944EH-05-5 | 58 | 11,0 | 8,4 | 15     | 8,3  | 1,8 | M36 x 1,5 | 12,5   | 4,0 | 69,0 | 34,2   | 14,5   | 32 | 13  | 19  | 11  | 552469                | 175216                |
| 552203    | 6944EH-10-2 | 71 | 11,0 | 9,0 | 16     | 11,0 | 1,8 | M45 x 1,5 | 12,5   | 4,0 | 82,0 | 43,1   | 15,5   | 41 | 13  | 21  | 11  | 552612                | 240309                |
| 559187    | 6944EH-10-5 | 71 | 11,0 | 9,0 | 16     | 11,0 | 1,8 | M45 x 1,5 | 12,5   | 4,0 | 82,0 | 43,1   | 15,5   | 41 | 13  | 21  | 11  | 552612                | 240309                |

Subject to technical alterations.

## Installation dimensions:

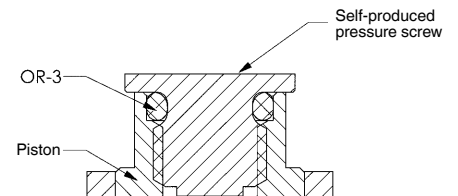
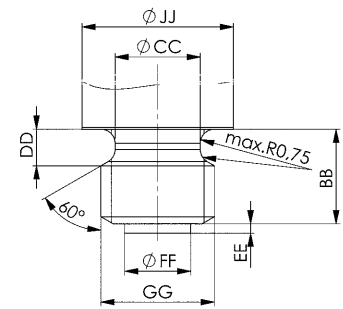
| Order no. | Article no. | dia. a | dia. b | Øc max. | e | f    | g         | h | k   | l     | dia. n | Øp max. | r    |
|-----------|-------------|--------|--------|---------|---|------|-----------|---|-----|-------|--------|---------|------|
| 552200    | 6944EH-03-2 | 24,5   | 27     | 2,5     | 3 | 8,5  | M26 x 1,5 | 1 | 0,7 | 16-47 | 24,2   | 8       | 9,4  |
| 559184    | 6944EH-03-5 | 24,5   | 27     | 2,5     | 3 | 8,5  | M26 x 1,5 | 1 | 0,7 | 16-47 | 24,2   | 8       | 9,4  |
| 552201    | 6944EH-04-2 | 28,5   | 31     | 2,5     | 3 | 11,0 | M30 x 1,5 | 1 | 0,7 | 17-50 | 28,3   | 10      | 10,9 |
| 559185    | 6944EH-04-5 | 28,5   | 31     | 2,5     | 3 | 11,0 | M30 x 1,5 | 1 | 0,7 | 17-50 | 28,3   | 10      | 10,9 |
| 552202    | 6944EH-05-2 | 34,5   | 37     | 4,5     | 3 | 10,5 | M36 x 1,5 | 1 | 0,7 | 18-48 | 34,3   | 10      | 13,5 |
| 559186    | 6944EH-05-5 | 34,5   | 37     | 4,5     | 3 | 10,5 | M36 x 1,5 | 1 | 0,7 | 18-48 | 34,3   | 10      | 13,5 |
| 552203    | 6944EH-10-2 | 43,5   | 46     | 5,0     | 3 | 10,5 | M45 x 1,5 | 1 | 0,7 | 21-58 | 43,2   | 12      | 17,0 |
| 559187    | 6944EH-10-5 | 43,5   | 46     | 5,0     | 3 | 10,5 | M45 x 1,5 | 1 | 0,7 | 21-58 | 43,2   | 12      | 17,0 |



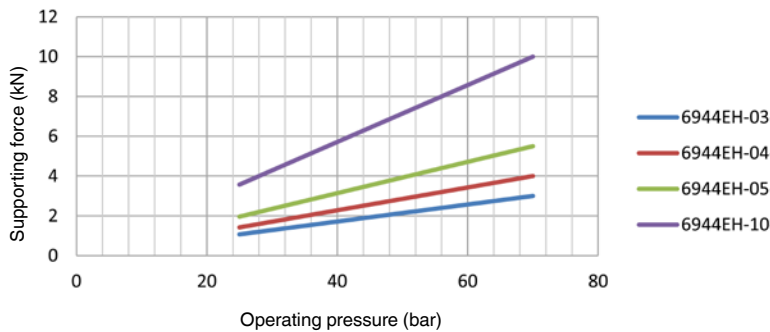
## Production dimensions with self-production of the clamping screw:

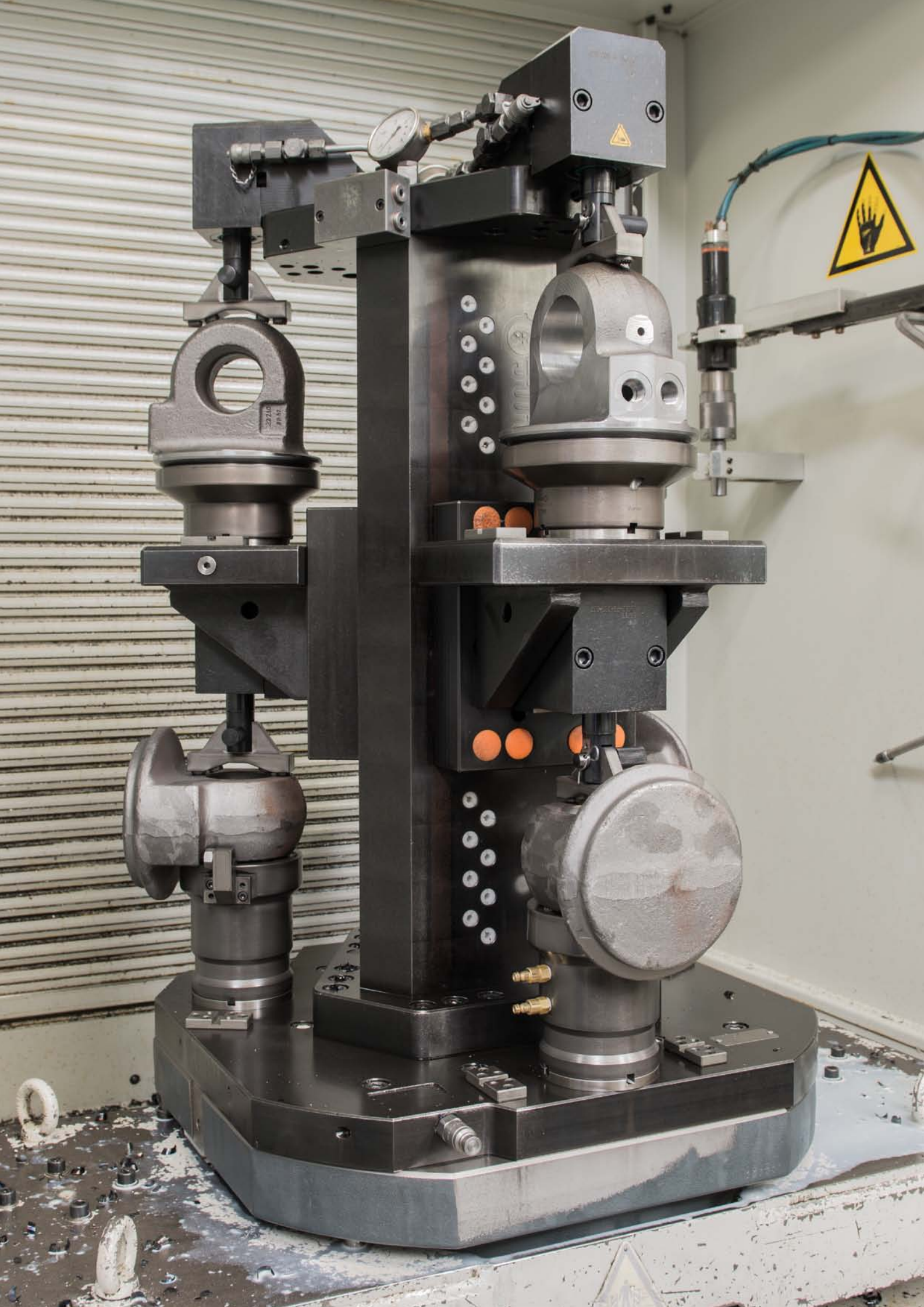
| Order no. | Article no. | BB  | dia. CC | DD   | EE  | dia. FF | GG  | dia. JJ | OR-3 O-ring Order No. | max. permitted weight of the set screw [g] |
|-----------|-------------|-----|---------|------|-----|---------|-----|---------|-----------------------|--|
| 552200    | 6944EH-03-2 | 5,0 | 4,5     | 1,93 | 0,5 | 3,5     | M6  | 9,0     | 552155                | 85   |
| 559184    | 6944EH-03-5 | 5,0 | 4,5     | 1,93 | 0,5 | 3,5     | M6  | 9,0     | 552155                | 110  |
| 552201    | 6944EH-04-2 | 4,8 | 6,2     | 1,8  | 0,7 | 4,9     | M8  | 11,5    | 552245                | 110  |
| 559185    | 6944EH-04-5 | 4,8 | 6,2     | 1,8  | 0,7 | 4,9     | M8  | 11,5    | 552245                | 140  |
| 552202    | 6944EH-05-2 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 140  |
| 559186    | 6944EH-05-5 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 185  |
| 552203    | 6944EH-10-2 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 175  |
| 559187    | 6944EH-10-5 | 9,0 | 8,2     | 2,5  | 1,0 | 5,9     | M10 | 12,5    | 552174                | 235  |

Always consider the permitted total weight of the set screw for in-house production.



## Diagram:





## ACCESSORIES - VALVES FOR PRESSURE REGULATION AND SEQUENCE CONTROL

- > **PRESSURE CONTROL SEAT VALVES**
- > **SEQUENCE VALVES**
- > **PRESSURE RELIEF VALVES**
- > **SUPPLY VALVES**
- > **DELAY VALVES**

### PRODUCT OVERVIEW:

| Type          | Designation                 | Operating pressure<br>min. - max.<br>[bar] | Setting pressure<br>min. - max.<br>[bar] | Setting<br>range<br>[s] | No. of<br>models | Oil connection  |
|---------------|-----------------------------|--|--|-------------------------|------------------|-----------------|
| 6917-1        | Pressure reducing valve     | 40 - 400                                   | 20 - 370                                 | -                       | 1                | o-ring          |
| 6917R/F       | Pressure control seat valve | 40 - 500                                   | 8 - 380                                  | -                       | 4                | thread / o-ring |
| 6917E         | Pressure control seat valve | 40 - 500                                   | 8 - 380                                  | -                       | 4                | screw-in thread |
| 6918          | Sequence valve              | 500  | 8 - 500                                  | -                       | 10               | thread / o-ring |
| 6918-30/-40   | Sequence valve              | 350  | 20 - 270                                 | -                       | 6                | screw-in thread |
| 6918-10       | Pressure relief valve       | 30 - 500                                   | 30 - 500                                 | -                       | 2                | thread          |
| 6918-80-10    | Sequence valve              | 40 - 250                                   | -  | 1-10                    | 1                | o-ring          |
| 6918-100/-110 | Delay valve                 | 35 - 350                                   | -  | 3-7                     | 2                | o-ring / thread |

### PRODUCT EXAMPLES:

NO. 6917-1 AND 6917E



- > holding force: 0,5 kN
- > clamping stroke: 12,0 mm

NO. 6918 AND 6918-3



- > holding force: 0,3 kN
- > clamping stroke: 7,5 mm

NO. 6918-80-10 AND 6918-100



- > holding force: 0,78 kN
- > clamping range: 2 - 10 mm

## No. 6917-1

### Pressure Reducing Valve

for O-ring connection,  
max. operating pressure 400 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | NG | Input pressure at P max. [bar] | Adjust. pressure at A min. [bar] | Adjust. pressure at A max. [bar] | Q [l/min] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|----|--------------------------------|----------------------------------|----------------------------------|-----------|-----------------------|------------|
| 69179     | 6917-1      | 6  | 400                            | 20                               | 370                              | 5         | 161810                | 1085       |

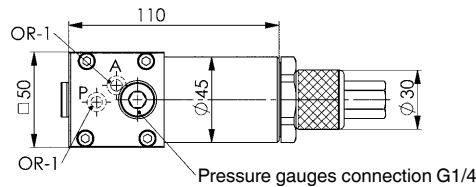
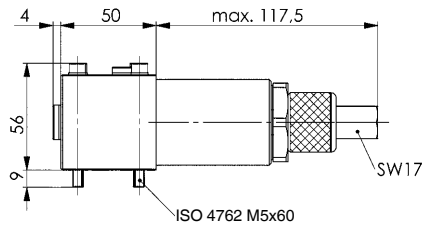
#### Design:

Cylinder body made of steel, phosphatized. Remaining parts made of tempering steel. Valve seat and piston are hardened and ground. This valve is leak free.

#### Application:

The stop valve shuts the flow from P to A when the pressure set A is reached. It opens when the pressure at A falls below the set value (e.g. through leakage).

1. Single-circuit system: The pressure reducing valve is used in a hydraulic circuit, where part of the cylinders are only to receive a reduced pressure (e.g. to prevent distortion of the workpieces or for positioning).
2. Dual-circuit system: If two working circuits are to be operated with different pressures from a single pump unit, the pressure of one circuit must be reduced by inserting a pressure reducing valve.



See hole pattern below!



## No. 6917A-1

### Connecting Plate

for pressure reducing valve.



| Order no. | Article no. | L x W x H    | Connection | Weight [g] |
|-----------|-------------|--------------|------------|------------|
| 69211     | 6917A-1     | 50 x 50 x 25 | G1/4       | 450        |

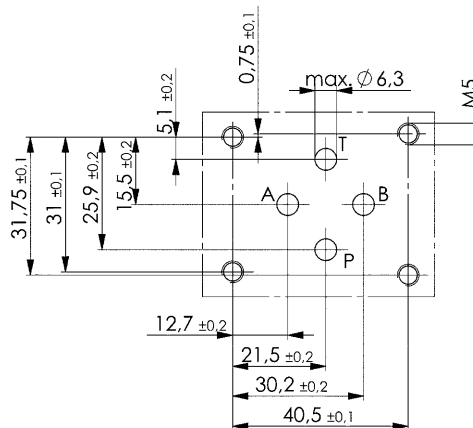
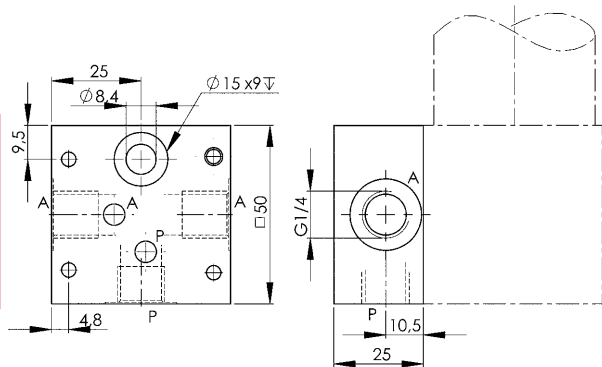
#### Design:

Tempering steel, phosphatized.

#### Application:

For pipe connection of pressure reducing valve No. 6917-1.

#### Hole pattern shape A nominal size 6 according to DIN 24340 T2:

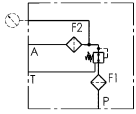


Subject to technical alterations.

## No. 6917R

### Pressure control seat valve

for pipe fitting G1/4,  
max. operating pressure 500 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | Input pressure at P max. [bar] | Adjust. pressure at A min. [bar] | Adjust. pressure at A max. [bar] | Q [l/min] | DI-1 Seal Order No. | Return line press. at T [bar] | Weight [g] |
|-----------|-------------|--------------------------------|----------------------------------|----------------------------------|-----------|---------------------|-------------------------------|------------|
| 326405    | 6917R-5-130 | 500                            | 8                                | 130                              | 5         | 407205              | ≤ 20                          | 1860       |
| 326421    | 6917R-5-380 | 500                            | 30                               | 380                              | 5         | 407205              | ≤ 20                          | 1860       |

### Design:

Leak-oil-free 3-way pressure regulating valve as piping valve in seat design, directly actuated. With additional oversteer compensation (integrated pressure-limitation function).

The valve mainly consists of three parts:

the valve accommodating body with the P, T and A connections in G ¼, the clamp-in valve with inlet filtering and the additional filter element in the A-channel.

P is the inlet and A is the outlet of the valve. T is the tank connection and must be discharged to the tank separately or in a common line.

### Application:

The pressure regulating valve is normally open.

With changing, higher input pressure, it maintains the output pressure largely constant. As soon as the set pressure is reached at the consumer, the valve closes and is leak-proof.

If the pressure between the valve output and the consumer rises above the set overload value, the excess pressure is reduced over the third connection (T-connection).

The valve can be used in front of a directional control valve in the P-channel or behind a directional control valve in the A and/or B-channel.

### Features:

The controlled pressure and overload pressure are set simultaneously with an adjusting screw. The overload pressure is always about 10 bar above the regulation pressure.

Protection against outside force and puncturing of the valve.

The valve flow regulates P to A.

The inlet P and outlet A are each protected against coarse contamination by a filter element with the nominal filter mesh of 100 µm.

The pressure regulating function is avoided in the opposite direction (from A to P).

Pressure is adjusted with an adjusting screw.

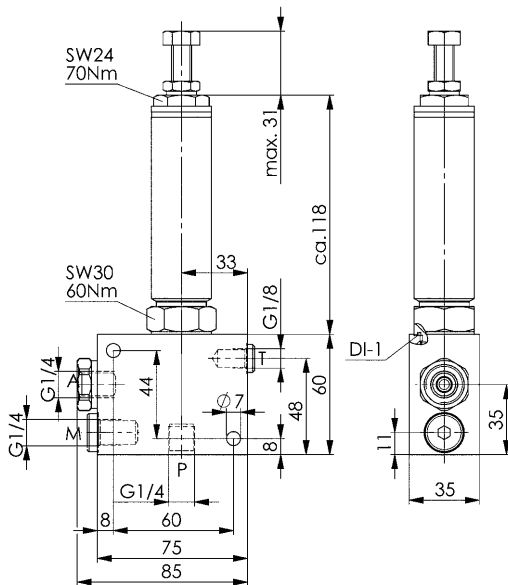
To set and read the pressure, a pressure display device must be installed at the valve outlet.

The pressure setting can be sealed.

### Note:

Observe mounting instructions.

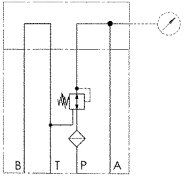
Replacement part: filter insert, Order No. 326678



## No. 6917F

### Pressure control seat valve

for O-ring connection,  
max. operating pressure 500 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | NG | Input pressure at P max. [bar] | Adjust. pressure at A min. [bar] | Adjust. pressure at A max. [bar] | Q [l/min] | Return line press. at T [bar] | DI-1 Seal Order No. | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|----|--------------------------------|----------------------------------|----------------------------------|-----------|-------------------------------|---------------------|-----------------------|------------|
| 326504    | 6917F-3-130 | 6  | 500                            | 8                                | 130                              | 6         | ≤ 20                          | 407205              | 493478                | 2100       |
| 326785    | 6917F-3-380 | 6  | 500                            | 30                               | 380                              | 12        | ≤ 20                          | 407205              | 493478                | 2100       |

### Design:

Leak-oil-free 3-way pressure regulating valve as flange valve in seat design, directly actuated.

With additional oversteer compensation (integrated pressure-limitation function).

The valve mainly consists of three parts:

the spacer plate with the standard hole pattern of NG 6, CETOP 3, the reversing plate and the clamp-in valve. The clamp-in valve is seated in the reversing plate in the P-channel. The oil flow is redirected from the valve inlet P1 to the valve outlet P2 to A.

The channels P, T and A must always be present on the opposite flange surface.

The dimensions are recorded in the standards DIN 24340-Form A, CETOP R 35 H and ISO 4401.

### Application:

The pressure regulating valve is normally open.

With changing, higher input pressure, it maintains the output pressure largely constant. As soon as the set pressure is reached at the consumer, the valve closes and is sealed leak-proof.

If the pressure between the valve output and the consumer rises above the set overload value, the excess pressure is reduced over the third connection (T-connection).

The valve can be used in front of a directional control valve in the P-channel or behind a directional control valve in the A and/or B-channel.

### Features:

The controlled pressure and overload pressure are set simultaneously with an adjusting screw. The overload pressure is always about 10 bar above the regulation pressure.

Protection against outside force and puncturing of the valve.

The valve flow regulates P1 to P2.

The inlet P1 is protected against coarse contamination by a filter element with the nominal filter mesh of 100 µm.

In the opposite direction (from P2 to P1), the valve can be flowed through freely.

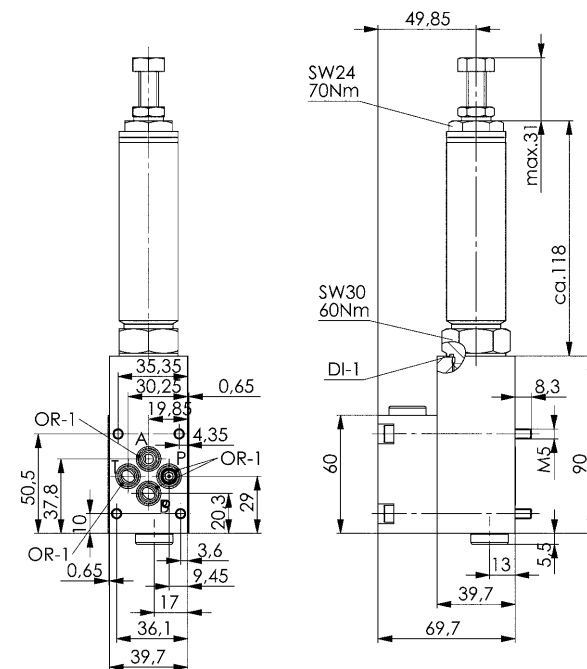
To set and read the pressure, a pressure display device must be installed at the valve outlet.

Pressure is adjusted with an adjusting screw.

The pressure setting can be sealed.

### Note:

Observe mounting instructions.



CAD

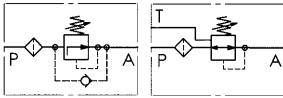
Subject to technical alterations.



## No. 6917E

### Pressure control seat valve

screw-in type,  
max. operating pressure 500 bar,  
min. operating pressure 40 bar.



| Order no. | Article no. | Input pressure at P max. [bar] | Adjust. pressure at A min. [bar] | Adjust. pressure at A max. [bar] | Q [l/min] | Return line press. at T [bar] | DI-1 Seal Order No. | Weight [g] |
|-----------|-------------|--------------------------------|----------------------------------|----------------------------------|-----------|-------------------------------|---------------------|------------|
| 492330    | 6917E-2-130 | 500                            | 8                                | 130                              | 6         | -                             | 407205              | 752        |
| 326462    | 6917E-3-130 | 500                            | 8                                | 130                              | 6         | ≤ 20                          | 407205              | 780        |
| 326686    | 6917E-2-380 | 500                            | 30                               | 380                              | 12        | -                             | 407205              | 752        |
| 326488    | 6917E-3-380 | 500                            | 30                               | 380                              | 12        | ≤ 20                          | 407205              | 780        |

### Design:

Leak-oil-free 3-way pressure regulating valve as clamp-in valve in seat design, directly actuated. For the 3-way pressure regulating valve, with additional oversteer compensation (integrated pressure-limitation function).  
Screw-in thread M24 x 1.5.

### Application:

The pressure regulating valve is normally open. With changing, higher input pressure, it maintains the output pressure largely constant. As soon as the set pressure is reached at the consumer, the valve closes and is sealed leak-proof. If the pressure between the valve output and the consumer rises above the set overload value, the excess pressure is reduced over the third connection (T-connection). The valve can be used in front of a directional control valve in the P-channel or behind a directional control valve in the A and/or B-channel. The additional tank connection for the 3-way valve must always be planned.

### Features:

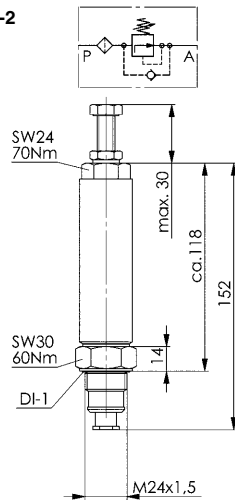
For the 3-way valve, the controlled pressure and overload pressure are set simultaneously with an adjusting screw. The overload pressure is always about 10 bar above the regulation pressure. Protection against outside force and puncturing of the valve.

The valve flow regulates P to A. The inlet P is protected against coarse contamination by a filter element with the nominal filter mesh of 100 µm. In the opposite direction at the valve (from A to P), the valve can be flowed through freely. To set and read the pressure, a pressure display device must be installed at the valve outlet. Pressure is adjusted with an adjusting screw. The pressure setting can be sealed.

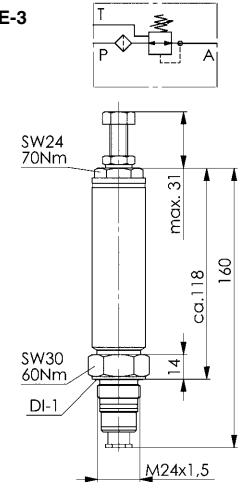
### Note:

Observe mounting instructions.

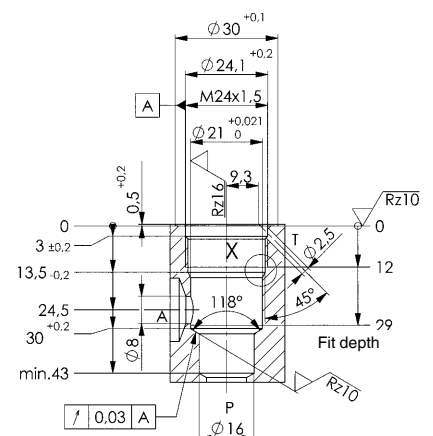
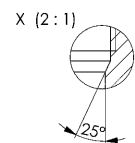
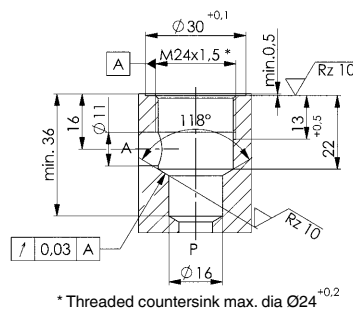
6917E-2



6917E-3



### Installation dimensions:



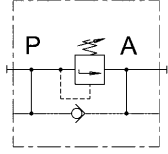
CAD

Subject to technical alterations.

## No. 6918

### Sequence Valve

6918-3 for O-ring connection,  
6918-12 for O-ring connection,  
6918-4 connection combination (pipeline),  
6918-5 connection combination (pipeline).  
Static overload capacity ~1.5xp max.



| Order no. | Article no. | min. operating pressure [bar] | max. operating pressure [bar] | Q [l/min] | Direction of flow | Ambient temp. [°C] | Viscosity [cSt] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|-------------------------------|-------------------------------|-----------|-------------------|--------------------|-----------------|-----------------------|------------|
| 66100     | 6918-3      | 30                            | 500                           | 20        | P-A               | -40 - +80          | 10-500          | 173096                | 750        |
| 326983    | 6918-12     | 16                            | 160                           | 20        | P-A               | -40 - +80          | 10-500          | 173096                | 750        |
| 320135    | 6918-4      | 30                            | 500                           | 20        | P-A               | -40 - +80          | 10-500          | 173096                | 750        |
| 320143    | 6918-5      | 30                            | 500                           | 20        | P-A               | -40 - +80          | 10-500          | 173096                | 750        |

### Design:

Steel body, nitrided. Sealing nut galvanized. All functional components hardened and ground. For sequence valve 6918-3 and 6918-12, the oil is supplied via conduits drilled in the clamping device. The following valves are required for combining several sequence valves:

- 6918-3 inlet valve
- 6918-4 series valve
- 6918-5 end-of-line valve

The oil is supplied via a threaded connection.

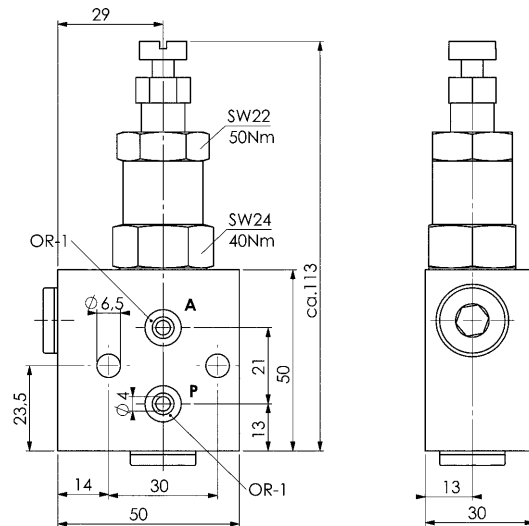
### Application:

The pressure sequence valve is used in cases where another consumer is connected to the circuit after a set pressure has been reached. If several sequence valves are employed in the circuit, please note that the pressure in this circuit always adjusts to the last pressure stage.

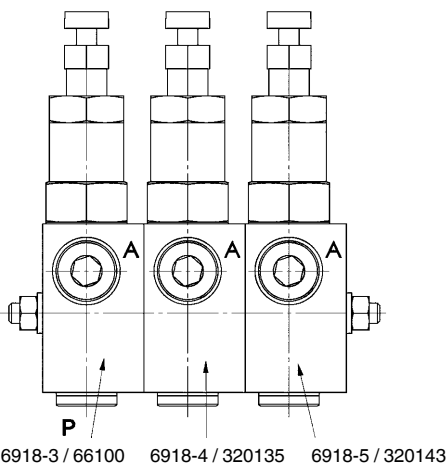
For this type, the switching pressure remains largely constant, regardless of the outflow pressure on the outlet side (cylinder side).

### Note:

During disassembly of the pressure control valve, first loosen SW 24 then SW 22. Installation is carried out in reverse order with the specified tightening torque. Increasing the preload of the compression spring by turning the slotted screw results in a greater pressure difference between P and A. The fastening bolts are not supplied as standard.

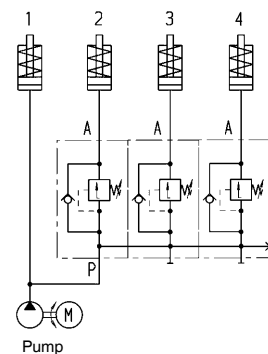


### Application example:



### Hydraulic diagram:

Preferably perform sequential control in parallel.



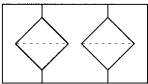
CAD

6918-3 / 66100    6918-4 / 320135    6918-5 / 320143

Subject to technical alterations.

## No. 6918F

### Filter plate



**NEW!**



CAD

| Order no. | Article no. | max. pressure range [bar] | Filtration [µm] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|---------------------------|-----------------|-----------------------|------------|
| 562093    | 6918F-100   | 400                       | 100             | 466334                | 65         |

### Design:

Filter plate and filter sleeve made of aluminium, surfaces black anodised. Filter plates made of metal mesh.

### Application:

Used to protect the sequential valve 6918-3 and 6918-12 from contamination in clamping devices.

### Note:

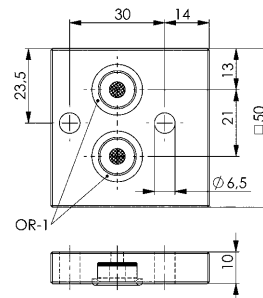
If a finer strainer is required, this can be easily replaced. The finer the filter selected, the greater the flow resistance.

### Replacement filter:

Filter, plug-in design 25 µm, order no. 562203

Filter, plug-in design 40 µm, order no. 562204

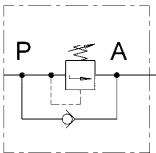
Filter, plug-in design 100 µm, order no. 562205



## No. 6918

### Sequence Valve

for pipeline connection.  
Static overload capacity ~1.5xp max.



| Order no. | Article no. | min. operating pressure [bar] | max. operating pressure [bar] | Q [l/min] | Direction of flow | Ambient temp. [°C] | Viscosity [cSt] | Weight [g] |
|-----------|-------------|-------------------------------|-------------------------------|-----------|-------------------|--------------------|-----------------|------------|
| 325068    | 6918-6      | 8                             | 80                            | 20        | P-A               | -40 - +80          | 10-500          | 750        |
| 326306    | 6918-11     | 16                            | 160                           | 20        | P-A               | -40 - +80          | 10-500          | 750        |
| 60517     | 6918-2      | 30                            | 500                           | 20        | P-A               | -40 - +80          | 10-500          | 750        |

### Design:

Steel body, nitrided. Sealing nut galvanized. All functional components hardened and ground. Oil supply via threaded port.

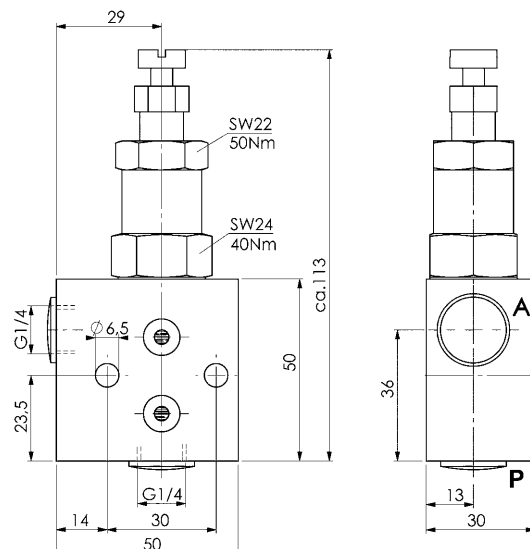
### Application:

The pressure sequence valve is used in cases where another consumer is connected to the circuit after a set pressure has been reached. If several sequence valves are employed in the circuit, please note that the pressure in this circuit always adjusts to the last pressure stage.

For this type, the switching pressure remains largely constant, regardless of the outflow pressure on the outlet side (cylinder side).

### Note:

For disassembly of the pressure valve please release first SW (AF) 24, then SW 22. For assembly please use reverse sequence and observe max. seating torque. The pressure difference between P and A depends on the preload of the adjustment spring.

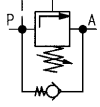


Subject to technical alterations.

No. 6918-XX-XXX

## Sequence valve, threaded design

Max. operating pressure 350 bar.



**NEW!**



| Order no. | Article no. | Setting pressure set at factory [bar] | Setting range at A [bar] | L max. | B     | C    | dia. E | F   | G    | SW | SW1 | SW2 | Md max. [Nm] | Md 1 max. [Nm] | Q max. [l/min] | Weight [g] |
|-----------|-------------|---------------------------------------|--------------------------|--------|-------|------|--------|-----|------|----|-----|-----|--------------|----------------|----------------|------------|
| 562224    | 6918-30-50  | 50                                    | 20 - 60                  | 28,0   | 15,16 | 20,3 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 37         |
| 562225    | 6918-30-100 | 100                                   | 35 - 150                 | 28,0   | 15,16 | 20,3 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 37         |
| 562226    | 6918-30-200 | 200                                   | 125 - 275                | 31,7   | 15,16 | 24,0 | 17,5   | 5,6 | G1/8 | 16 | 14  | 4   | 16           | 7              | 3,8            | 45         |
| 562227    | 6918-40-50  | 50                                    | 20 - 55                  | 34,5   | 18,72 | 27,4 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 68         |
| 562228    | 6918-40-100 | 100                                   | 35 - 150                 | 34,5   | 18,72 | 27,4 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 72         |
| 562229    | 6918-40-200 | 200                                   | 125 - 275                | 31,8   | 18,72 | 24,6 | 21,0   | 5,0 | G1/4 | 19 | 17  | 4   | 27           | 7              | 3,8            | 72         |

### Design:

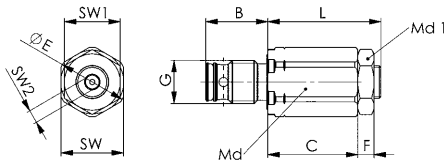
Housing from steel, hardened and burnished.

### Application:

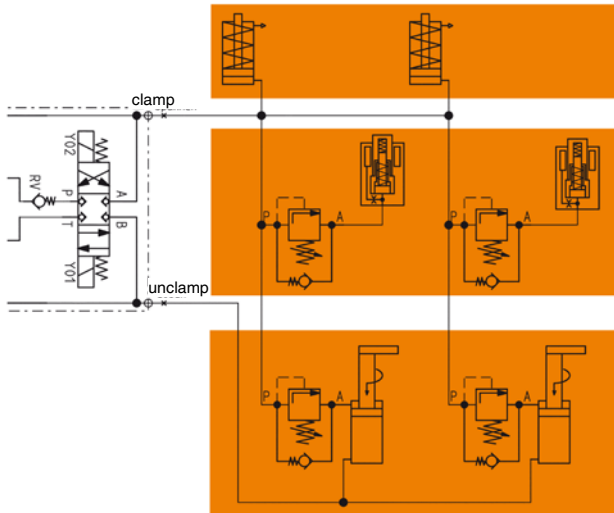
The sequence valve is used in cases where another consumer is connected to the circuit after a set pressure has been reached. The sequence valve ensures a controlled clamping sequence. Once a defined pressure is reached, another hydraulic circuit is opened.

### Note:

The sequence valve can be screwed directly into the threaded connection for the swing clamp top flange and base flange types 6951KP, 6951FP, 6941KP and link clamp 6942KK. The oil must be supplied via the O-ring connection. The sequence valve can be screwed directly into fixtures as well.



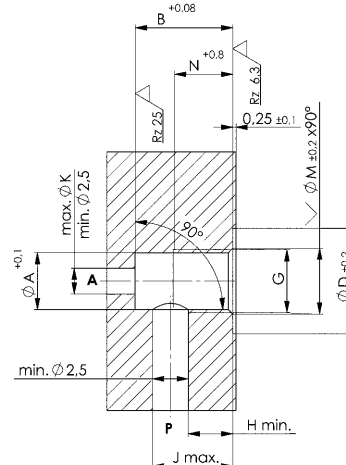
### Hydraulic diagram:



- Clamping sequence
1. Single-acting cylinder
  2. Support element
  3. Swing clamp

### Installation dimensions:

| Order no. | Article no. | dia. A | B +0.08 | dia. D | G    | H min. | J max. | K max. | dia. M | N    |
|-----------|-------------|--------|---------|--------|------|--------|--------|--------|--------|------|
| 562224    | 6918-30-50  | 8,8    | 15,16   | 16,5   | G1/8 | 6      | 12,83  | 7      | 9,9    | 8,5  |
| 562225    | 6918-30-100 | 8,8    | 15,16   | 16,5   | G1/8 | 6      | 12,83  | 7      | 9,9    | 8,5  |
| 562226    | 6918-30-200 | 8,8    | 15,16   | 16,5   | G1/8 | 6      | 12,83  | 7      | 9,9    | 8,5  |
| 562227    | 6918-40-50  | 11,9   | 18,72   | 21,5   | G1/4 | 10     | 16,39  | 10     | 13,3   | 12,5 |
| 562228    | 6918-40-100 | 11,9   | 18,72   | 21,5   | G1/4 | 10     | 16,39  | 10     | 13,3   | 12,5 |
| 562229    | 6918-40-200 | 11,9   | 18,72   | 21,5   | G1/4 | 10     | 16,39  | 10     | 13,3   | 12,5 |



Subject to technical alterations.

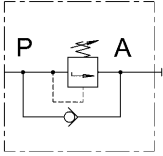
## No. 6918

### Sequence Valve

cartridge flange  
Possible statically overload ~1,5xp max.



| Order no. | Article no.  | min. operating pressure [bar] | max. operating pressure [bar] | Q [l/min] | Direction of flow | Ambient temp. [°C] | Viscosity [cSt] | Weight [g] |
|-----------|--------------|-------------------------------|-------------------------------|-----------|-------------------|--------------------|-----------------|------------|
| 408401    | 6918-2-02-03 | 8                             | 80                            | 20        | P-A               | -40 - +80          | 10-500          | 150        |
| 325118    | 6918-2-02-04 | 16                            | 160                           | 20        | P-A               | -40 - +80          | 10-500          | 150        |
| 320366    | 6918-2-02-02 | 30                            | 500                           | 20        | P-A               | -40 - +80          | 10-500          | 150        |



### Design:

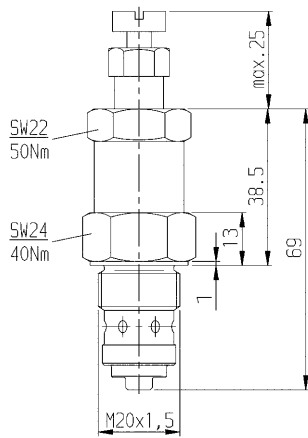
Steel housing, nitrided. Sealing nut galvanized. All functional components hardened and ground. Balls out of roller bearing steel.

### Application:

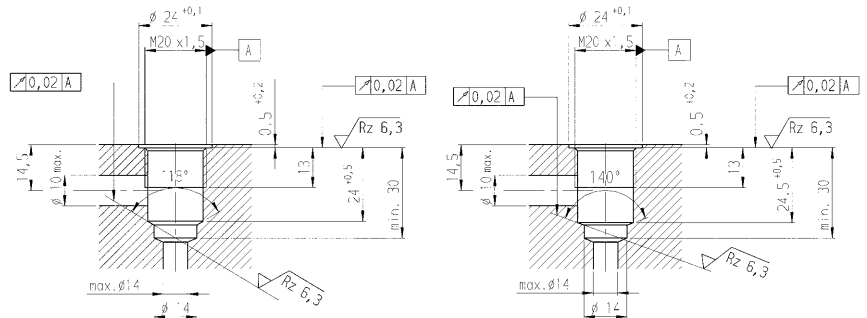
The pressure sequence valve is used where another hydraulic system or another consumer should be activated after achieving a specified pressure. If a circuit is designed with several sequence valves, it must be observed that the pressure in this circuit is always adjusted in the last respective pressure stage. The switching pressure for this type, irrespective of the pressure on the output side (consumer side) remains largely constant.

### Note:

For disassembly of the pressure valve please release first SW (AF) 24, then SW 22. For assembly please use reverse sequence and observe max. seating torque. The pressure difference between P and A depends on the preload of the adjustment spring.



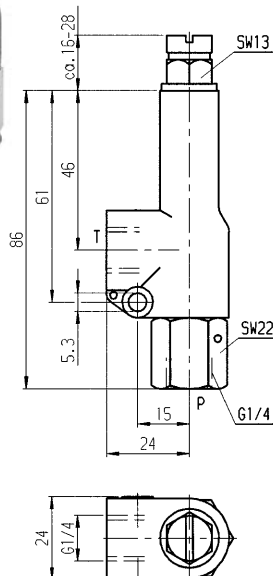
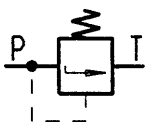
### Installation dimensions:



## No. 6918-10

### Pressure Relief Valve

for pipeline installation



| Order no. | Article no. | min. operating pressure [bar] | max. operating pressure [bar] | max. pressure in T [bar] | Q [l/min] | Ambient temp. [°C] | Viscosity [cSt] | Weight [g] |
|-----------|-------------|-------------------------------|-------------------------------|--------------------------|-----------|--------------------|-----------------|------------|
| 288225    | 6918-10-001 | 30                            | 160                           | 20                       | 20        | -40 - +80          | 10-500          | 200        |
| 65375     | 6918-10     | 100                           | 500                           | 500                      | 20        | -40 - +80          | 10-500          | 200        |

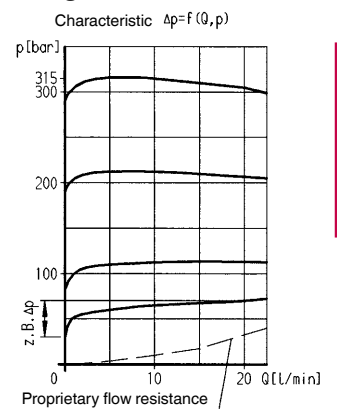
### Design:

For 6918-10-001 housing made of zinc, for 6918-10 housing made of ductile iron. Control piston made of steel, hardened. Can be sealed on setting spindle.

### Application:

The pressure relief valve is used to protect against exceeding the maximum permissible pressure for the system (safety valve) or to limit operating pressures. Once the set pressure is reached, the valve opens, the excess liquid in the system flows back into the tank via the T line of the pressure relief valve. The pressure relief valve is not suitable for the protection of pressure equipment as defined by the PED 97/23 / EC.

### Diagram:



Subject to technical alterations.

## No. 6918-100

### Delay valve

For O-ring connection, for the release clamping circuit, max. operating pressure 350 bar, min. operating pressure 35 bar.



CAD

| Order no. | Article no. | Setting range *** for the delay [s] | Q max. [l/min] | Filter mesh [μm] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|-------------------------------------|----------------|------------------|-----------------------|------------|
| 556992    | 6918-100    | 3-7                                 | 11,4           | 25               | 474429                | 1970       |

\*\*\* The duration of the delay can vary, depending on the viscosity of the oil in the application. This statement is valid with ISO 32 Oil.

### Design:

Delay valve with NG 6. The hole pattern is not standardised. Valve housing made of steel, interior parts made of stainless steel. The fastening bolts M6x60 (order no. 115634) are not supplied as standard. Oil supply via oil channel in fixture body.

### Application:

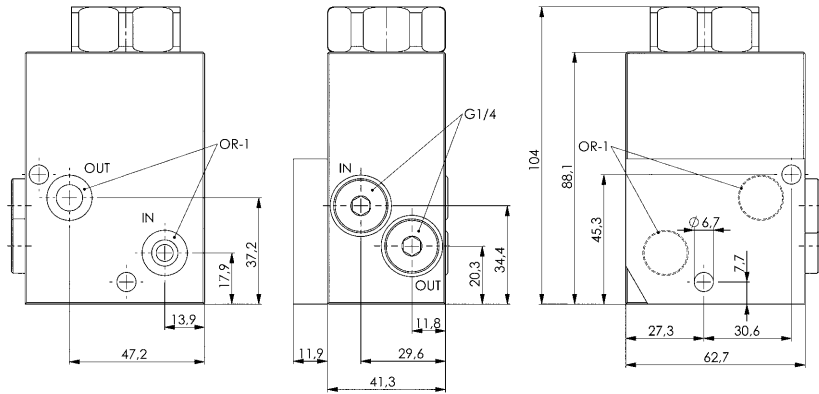
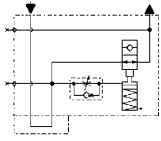
With this valve, unclamping of selected components can be delayed during the release process. The delay can be achieved within a circuit. A parallel circuit with several delay valves is possible.

### Features:

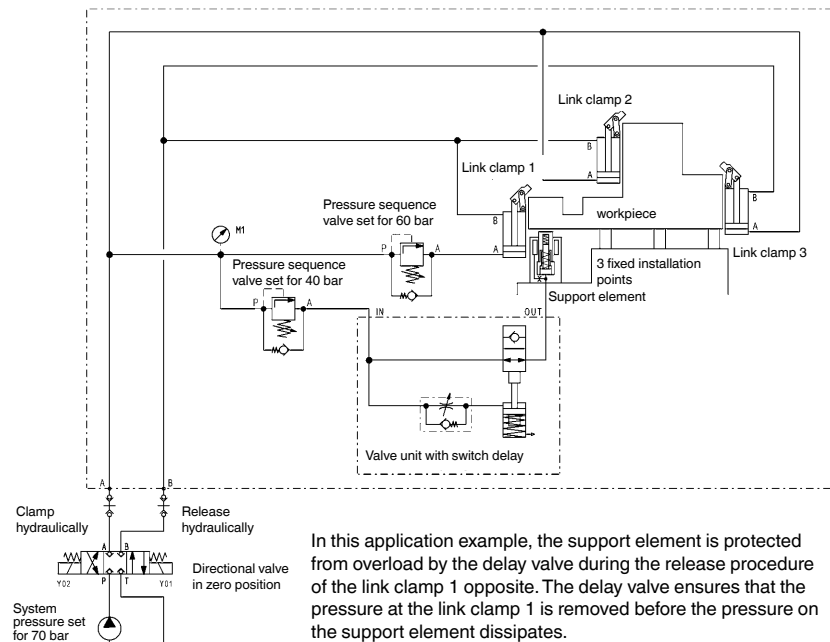
In the release process, hydraulic clamping and support elements or workpieces can be protected from overload. The consumers can be selectively controlled through a controlled sequence of the pressure reduction in the clamping circuit.

### Note:

Observe installation instructions with construction notes for the fixture manufacturer. The flange surface of the fixture must have an evenness of 0.08 and a surface quality of Rz 6.3.



### Application example:

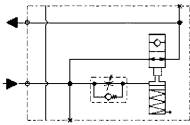


Subject to technical alterations.

## No. 6918-110

### Delay valve

For pipeline connection, for the release clamping circuit, max. operating pressure 350 bar, min. operating pressure 35 bar.



CAD

| Order no. | Article no. | Setting range *** for the delay [s] | Q max. [l/min] | Filter mesh [µm] | Weight [g] |
|-----------|-------------|-------------------------------------|----------------|------------------|------------|
| 556993    | 6918-110    | 3-7                                 | 11,4           | 25               | 1700       |

\*\*\* The duration of the delay can vary, depending on the viscosity of the oil in the application. This statement is valid with ISO 32 Oil.

### Design:

Valve housing made of steel, interior parts made of stainless steel. The fastening bolts M6x50 (order no. 448456) are not supplied as standard. Oil supply via threaded connection G 1/4.

### Application:

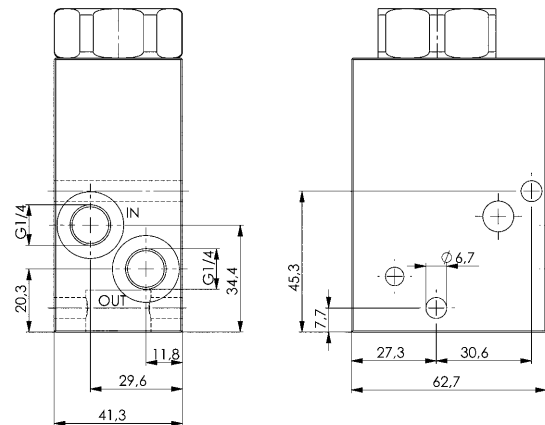
With this valve, unclamping of selected components can be delayed during the release process. The delay can be achieved within a circuit. A parallel circuit with several delay valves is possible.

### Features:

In the release process, hydraulic clamping and support elements or workpieces can be protected from overload. The consumers can be selectively controlled through a controlled sequence of the pressure reduction in the clamping circuit.

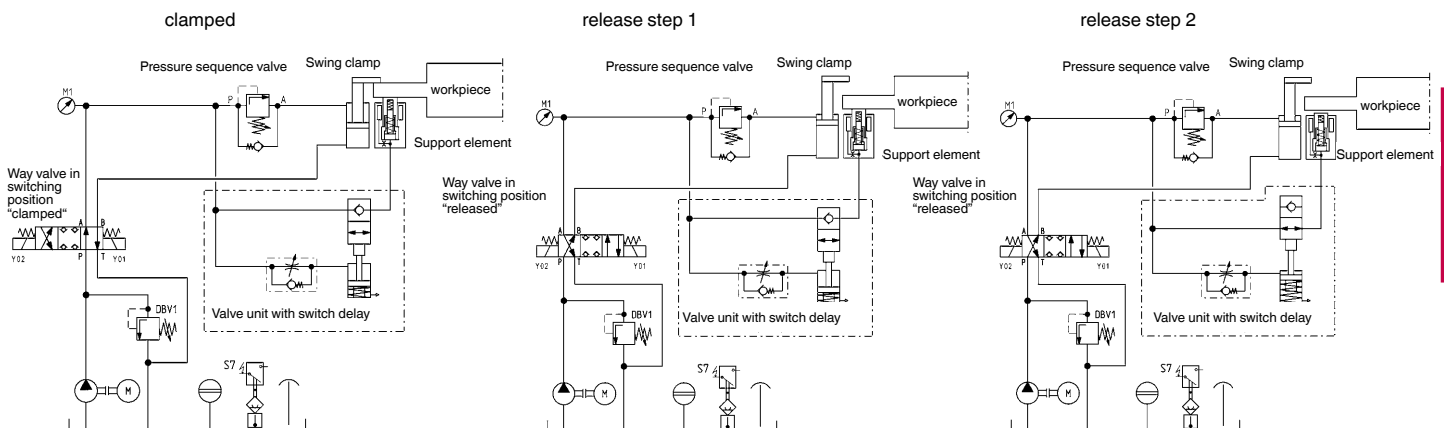
### Note:

Observe installation instructions with construction notes for the fixture manufacturer.



### Application example:

In this application example, the support element is protected from overload during release by the delay valve during the release procedure of the swing clamp opposite. The delay valve ensures that the pressure at the swing clamp is removed before the pressure on the support element dissipates.

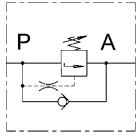


Subject to technical alterations.

## No. 6918-80-10

### Sequence valve

for O-ring joint, Pressure-time delayed, max. operating pressure 250 bar, min. operating pressure 40 bar.



| Order no. | Article no. | Q<br>[l/min] | Delay setting range<br>[s] | Direction of flow | OR-1<br>O-ring<br>Order No. | Weight<br>[g] |
|-----------|-------------|--------------|----------------------------|-------------------|-----------------------------|---------------|
| 326280    | 6918-80-10  | 8            | 1-10                       | P-A               | 161810                      | 1500          |

### Design:

Cylinder body made of steel, burnished. Connection diagram, NW 5, is not standardised. Hardened control piston and check valve. Oil supply takes place through drilled channels in the clamping device.

### Application:

The adjustable switch delay permits a time-dependent switching sequence of hydraulic elements within a hydraulic circuit, independent of the hydraulic pressure. The valve can be operated from 40 bar to max. 250 bar.

A parallel or series circuit of several valves is possible. The compact size permits the valve to be flanged directly to the clamping fixture. If the valve should be connected to a pipeline, an adapter plate is available.

### Features:

The hydraulic oil at the valve is guided in the body from the connection P through a throttle to a differential piston. At the same time, the hydraulic pressure is present at an integrated check valve, which blocks the flow to the connection A. Depending on the setting of the setting screw, the differential piston moves forward in a specific time and opens a check valve. This releases the flow from connection P to connection A, and the following hydraulic components are supplied with compressed oil.

If the hydraulic pressure is removed, a spring returns the differential piston to the initial position. The hydraulic oil flowing out is guided through a check valve to the connection P.

### Note:

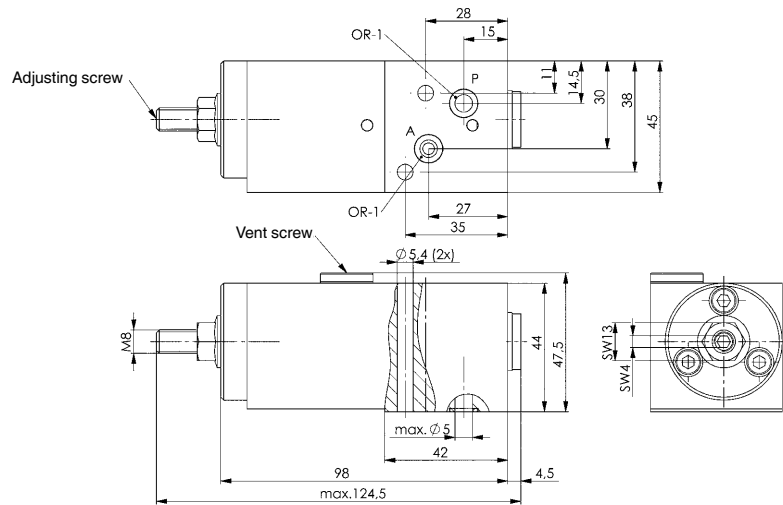
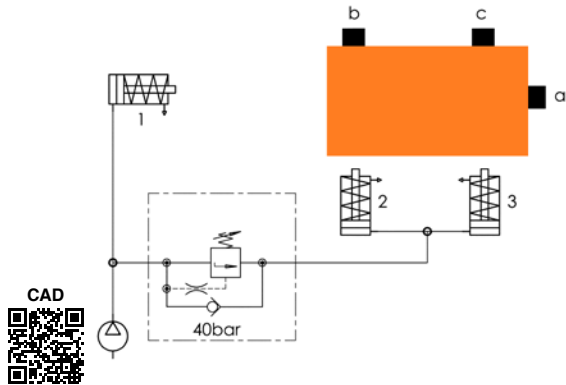
Observe installation instructions with construction notes for the fixture manufacturer. Operating pressure, volume flow, temperature and viscosity can result in changes to the switching sequence. The valve may be used up to a system pressure of maximum 250 bar. The switching intervals should be greater than 10 sec. to guarantee proper function.

### Clamping procedure:

1. Cylinder 1 presses workpiece against stop a.
2. Valve opens A-line after the set time 1-10 sec.
3. Cylinder 2 and 3 run out with a time delay and press workpiece against stops b and c.

### Hydraulic diagram:

Sequential control as parallel circuit



## No. 6918A-80-10

### Connecting plate



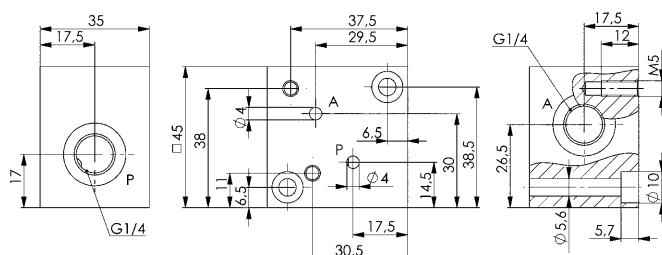
| Order no. | Article no. | L x W x H | Connection | Weight<br>[g] |
|-----------|-------------|-----------|------------|---------------|
| 327692    | 6918A-80-10 | 45x45x35  | 2 x G1/4   | 495           |

### Design:

Steel, TEM-deburred and phosphated.

### Application:

For line connection of sequence valve 6918-80-10. Reduction for M5 screw for fastening on the fixture.



Subject to technical alterations.



## ACCESSORIES -

FOR DETERMINING THE  
DIRECTION OF THE OIL FLOW  
AND PRESSURE MONITORING

- > **MANUAL SEAT VALVES**
- > **DIRECTIONAL SEAT VALVES**
- > **PRESSURE SWITCHES**

### PRODUCT OVERVIEW:

| Type                 | Designation                | max. operating pressure min. - max. [bar] | Version                                  | Actuation  | No. of models | Oil connection |
|----------------------|----------------------------|---|--|------------|---------------|----------------|
| 6910-10/-11          | Manual seat valve          | 10 - 500                                  | 2/2-way seat valve<br>3/2-way seat valve | manual     | 2             | o-ring         |
| 6910-06              | Seat valve                 | 10 - 500                                  | 3/2-way seat valve                       | electrical | 2             | o-ring         |
| 6910-06              | Seat valve                 | 10 - 450                                  | 3/2-way seat valve                       | electrical | 2             | o-ring         |
| 6910A-07<br>6911A-07 | Seat valve                 | 10 - 400                                  | 3/3-way seat valve<br>4/3-way seat valve | electrical | 1<br>1        | o-ring         |
| 6982E                | Electronic pressure switch | 0 - 400                                   | -  | electrical | 5             | thread         |
| 6982E                | Electronic pressure switch | 0 - 600                                   | -  | electrical | 2             | thread         |
| 6982                 | Piston pressure switch     | 10 - 450                                  | -  | mechanical | 2             | o-ring         |
| 6982                 | Piston pressure switch     | 12 - 630                                  | -  | mechanical | 4             | o-ring         |

### PRODUCT EXAMPLES:

NO. 6910-10 AND 6910-06-02



> max. operating pressure: 500 bar

NO. 6910A-07-01



> max. operating pressure: 400 bar

NO. 6982E AND 6982

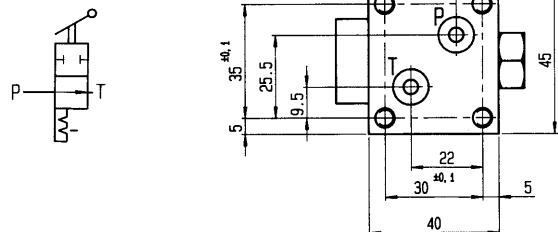


> max. operating pressure: 630 bar

## No. 6910-10

### Manual Seat Valve, 2/2-Way

for O-ring joint,  
max. operating pressure 500 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | Q [l/min] | Viscosity [cSt] | Ambient temp. [°C] | Switching torque [N cm] | Switching stroke [mm] | Switching angle | Weight [g] |
|-----------|-------------|-----------|-----------------|--------------------|-------------------------|-----------------------|-----------------|------------|
| 181214    | 6910-10     | 12        | 10-500          | -40 - +80          | 63                      | 3,5                   | 90°             | 400        |

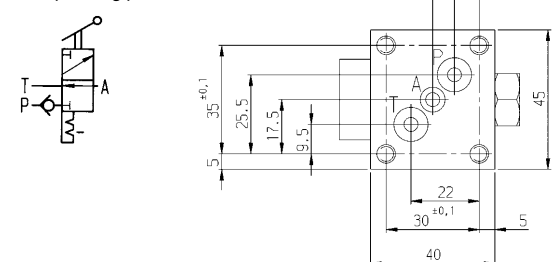
#### Application:

By means of the 2/2 manual way seat valve an oil channel can be closed or opened.

## No. 6910-11

### Manual Seat Valve, 3/2-Way

for O-ring joint,  
max. operating pressure 500 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | Q [l/min] | Viscosity [cSt] | Ambient temp. [°C] | Switching torque [N cm] | Switching stroke [mm] | Switching angle | Weight [g] |
|-----------|-------------|-----------|-----------------|--------------------|-------------------------|-----------------------|-----------------|------------|
| 114298    | 6910-11     | 12        | 10-500          | -40 - +80          | 63                      | 3,5                   | 90°             | 400        |

#### Application:

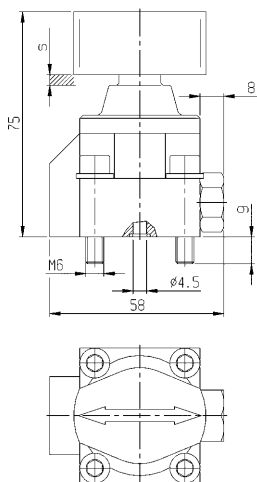
The 3/2 manual way seat valve allows to determine the direction of oil flow.

#### Features:

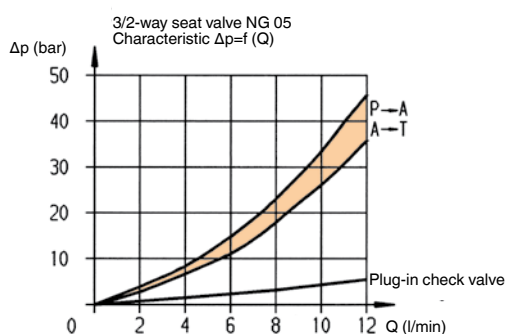
Hermetic sealing by ball seats. Sealing of the oil channels of the valve base with O-rings. The seat valve has completely hydraulic pressure compensation and negative switching.

#### Note:

The direction of flow has to be the direction of the arrow according to the symbol. The position of installation is optional. Hydraulic oil HLP or HLPD according to DIN 51524 Part 2.



#### Diagram:



## No. 6910A-05

### Connection Plate



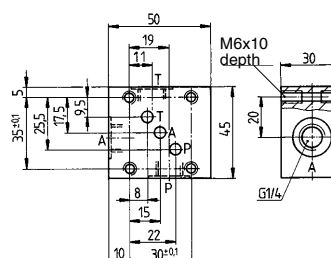
| Order no. | Article no. | L x W x H | Connection | Weight [g] |
|-----------|-------------|-----------|------------|------------|
| 60335     | 6910A-05    | 50x45x30  | 3 x G1/4   | 450        |

#### Design:

Tempering steel, TEM deburred and phosphatized.

#### Application:

For pipe connection in combination with  
- 3/2-way seat valve no. 6910-06-01  
- 2/2-way manual seat valve no. 6910-10  
- 3/2-way manual seat valve no. 6910-11.



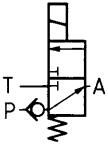
Subject to technical alterations.



## No. 6910-06-01

### Seat Valve, 3/2-Way

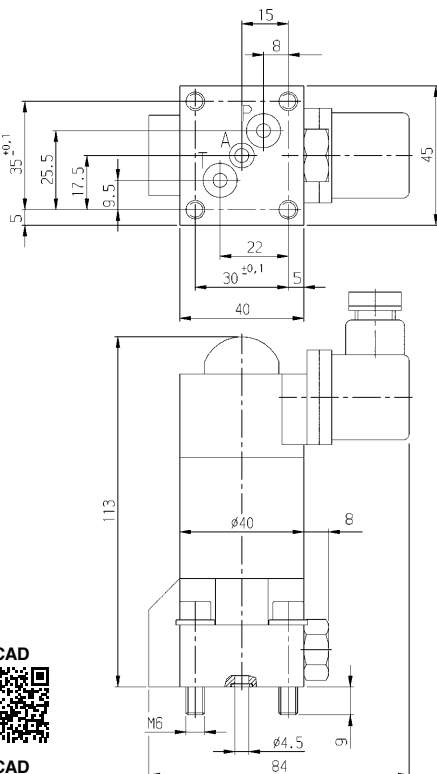
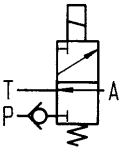
for O-ring joint,  
max. operating pressure 500 bar,  
min. operating pressure 10 bar.



## No. 6910-06-02

### Seat Valve, 3/2-Way

for O-ring joint,  
max. operating pressure 500 bar,  
min. operating pressure 10 bar.



Dimensions apply on both sides.



| Order no. | Article no. | Q<br>[l/min] | Viscosity<br>[cSt] | Weight<br>[g] |
|-----------|-------------|--------------|--------------------|---------------|
| 259168    | 6910-06-01  | 12           | 10-500             | 710           |

| Order no. | Article no. | Ambient temp.<br>[°C] | U<br>[V DC] | P<br>[W] | Switching time on/off<br>[ms] | Ed to 35°C<br>[%] | Switching frequency<br>per hour | Ingress protection |
|-----------|-------------|-----------------------|-------------|----------|-------------------------------|-------------------|---------------------------------|--------------------|
| 259168    | 6910-06-01  | -40 - +80             | 24          | 20       | 100/50                        | 100               | 2000                            | IP 54              |

| Order no. | Article no. | Q<br>[l/min] | Viscosity<br>[cSt] | Weight<br>[g] |
|-----------|-------------|--------------|--------------------|---------------|
| 259226    | 6910-06-02  | 12           | 10-500             | 710           |

| Order no. | Article no. | Ambient temp.<br>[°C] | U<br>[V DC] | P<br>[W] | Switching time on/off<br>[ms] | Ed to 35°C<br>[%] | Switching frequency<br>per hour | Ingress protection |
|-----------|-------------|-----------------------|-------------|----------|-------------------------------|-------------------|---------------------------------|--------------------|
| 259226    | 6910-06-02  | -40 - +80             | 24          | 20       | 100/50                        | 100               | 2000                            | IP 54              |

### Design:

The ball, being the essential control element, is pressed either by a solenoid or a spring onto the hardened ball seats. The blocked flow direction is thus hermetically shut off. The solenoids work with or without a shift lever and are designed and checked to VDE 0580. The seat valve has a manual emergency actuator. A check valve is incorporated in channel P.

### Application:

The 3/2-way seat valve is used to determine the direction of oil flow. These valves are mainly used for direct control of single-acting cylinders.

### Features:

Hermetic sealing by ball seats. Sealing of the oil channels of the valve base with O-rings. The seat valve has completely hydraulic pressure compensation and negative switching.

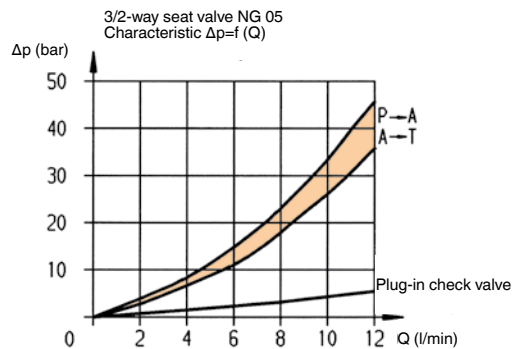
### Note:

The direction of flow must be the direction of the arrow according to the symbol. The position of installation is optional. Hydraulic oil HLP or HLPD according to DIN 51524 part 2.

### On request:

Directional seat valve with control voltage 230 V AC 50/60 Hz.

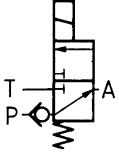
### Diagram:



## No. 6910-06-04

### Seat Valve, 3/2-Way

for O-ring joint,  
max. operating pressure 450 bar,  
min. operating pressure 10 bar.



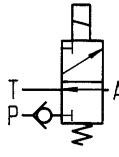
| Order no. | Article no. | NG | Q       | Viscosity | Weight |
|-----------|-------------|----|---------|-----------|--------|
| 276824    | 6910-06-04  | 4  | [l/min] | [cSt]     | [g]    |
|           |             |    | 8       | 10-200    | 600    |

| Order no. | Article no. | Ambient temp. [°C] | U [V DC] | P [W] | Switching time on/off [ms] | Ed to 40°C [%] | Switching frequency per hour | Ingress protection |
|-----------|-------------|--------------------|----------|-------|----------------------------|----------------|------------------------------|--------------------|
| 276824    | 6910-06-04  | -40 - +80          | 24       | 24    | 70/50                      | 100            | 2000                         | IP 65              |

## No. 6910-06-05

### Seat Valve, 3/2-Way

for O-ring joint,  
max. operating pressure 450 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q | Viscosity | Weight |
|-----------|-------------|----|---|-----------|--------|
| 65391     | 6910-06-05  | 4  | 8 | 10-200    | 600    |

| Order no. | Article no. | Ambient temp. [°C] | U [V DC] | P [W] | Switching time on/off [ms] | Ed to 40°C [%] | Switching frequency per hour | Ingress protection |
|-----------|-------------|--------------------|----------|-------|----------------------------|----------------|------------------------------|--------------------|
| 65391     | 6910-06-05  | -40 - +80          | 24       | 24    | 70/50                      | 100            | 2000                         | IP 65              |



### Design:

The ball, being the essential control element, is pressed either by a magnet or a spring onto the hardened ball seats. The blocked flow direction is thus hermetically shut off. The magnets work with or without a shift lever and are designed and checked to VDE 0580. The seat valve has a manual emergency actuator. A check valve is incorporated in channel P.

### Application:

The 3/2-way seat valve is used to determine the direction of oil flow. These valves are mainly used for direct control of single-acting cylinders.

### Features:

Hermetic sealing by ball seats. Sealing of the oil channels of the valve base with O-rings. The seat valve has completely hydraulic pressure compensation and negative switching.

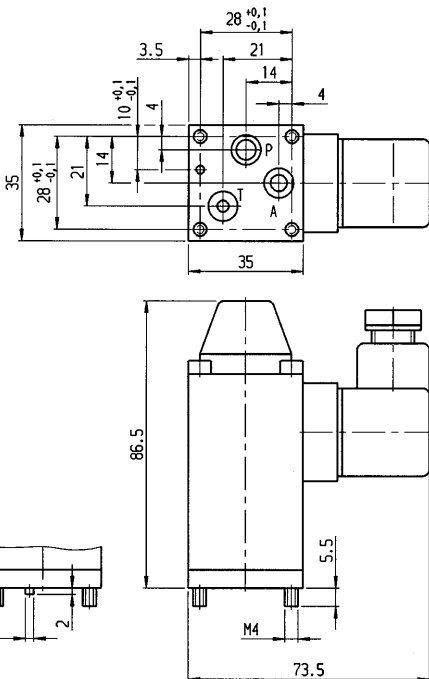
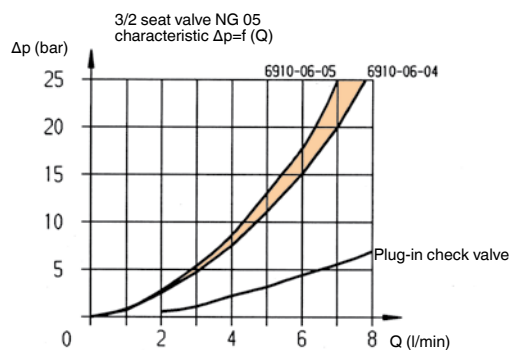
### Note:

The direction of flow must be the direction of the arrow according to the symbol. The position of installation is optional. Hydraulic oil HLP or HLPD according DIN 51524 part 2.

### On request:

Directional seat valve with control voltage 230 V AC 50/60 Hz.

### Diagram:



Dimensions apply on both sides.



CAD

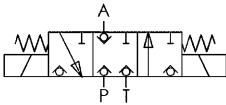


CAD

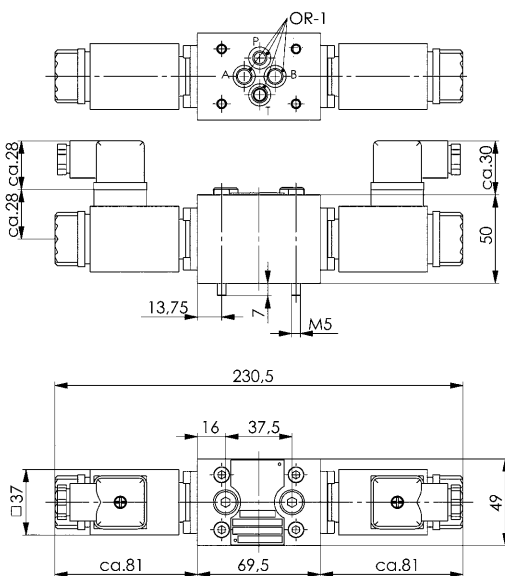
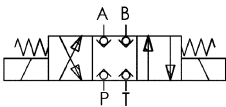
Subject to technical alterations.

**No. 6910A-07-02**
**Seat Valve, 3/3-Way**

for O-ring joint,  
max. operating pressure 400 bar,  
min. operating pressure 10 bar.


**No. 6911A-07-01**
**Seat Valve, 4/3-Way**

for O-ring joint,  
max. operating pressure 400 bar,  
min. operating pressure 10 bar.



| Order no. | Article no. | NG | Q<br>[l/min] | OR-1<br>O-ring<br>Order No. | Viscosity<br>[cSt] | U<br>[V DC] | Weight<br>[g] |
|-----------|-------------|----|--------------|-----------------------------|--------------------|-------------|---------------|
| 322073    | 6910A-07-02 | 6  | 20           | 493478                      | 10-500             | 24          | 2356          |

| Order no. | Article no. | Ambient temp.<br>[°C] | P<br>[W] | Switching time on/off<br>[ms] | Ed to 35°C<br>[%] | Switching frequency per hour | Ingress protection |
|-----------|-------------|-----------------------|----------|-------------------------------|-------------------|------------------------------|--------------------|
| 322073    | 6910A-07-02 | -40 - +80             | 27,6     | 100/50                        | 100               | 2000                         | IP67               |

| Order no. | Article no. | NG | Q<br>[l/min] | OR-1<br>O-ring<br>Order No. | Viscosity<br>[cSt] | U<br>[V DC] | Weight<br>[g] |
|-----------|-------------|----|--------------|-----------------------------|--------------------|-------------|---------------|
| 322065    | 6911A-07-01 | 6  | 20           | 493478                      | 10-500             | 24          | 2356          |

| Order no. | Article no. | Ambient temp.<br>[°C] | P<br>[W] | Switching time on/off<br>[ms] | Ed to 35°C<br>[%] | Switching frequency per hour | Ingress protection |
|-----------|-------------|-----------------------|----------|-------------------------------|-------------------|------------------------------|--------------------|
| 322065    | 6911A-07-01 | -40 - +80             | 27,6     | 100/50                        | 100               | 2000                         | IP67               |

**Design:**

Oil-leak-free, sealed directional seat valves with standard mounting face NG 6. The hole pattern is standardised at the national, European and international levels. The dimensions are recorded in the standards DIN 24340-Form A, CETOP R 35 H and ISO 4401. The valves are actuated electromagnetically. The device socket as per DIN / EN 175301-803 is included in the scope of delivery.

**Application:**

The 3/3 and 4/3 directional seat valves determine the direction of oil flow. These valves are mainly used for direct control of single-acting and double-acting consumers.

**Features:**

With electrically current-free magnets, the valves take the closed neutral position. All connections are hermetically sealed due to the seat design.

If both magnets are energised simultaneously, this creates a fourth switch position in which all connections are connected to the tank line and are thus pressure-free. In this switch position, the consumer lines can be easily coupled.

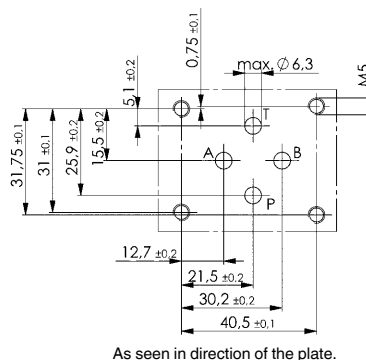
A ball check valve is also inserted in the P-channel. This check valve prevents an undesired pressure compensation in the case of circuit overlaps. The seal between the valves and the counter-flange surfaces is made with O rings.

**Note:**

Spare part: Plug-in check valve, order no. 402156

**On request:**

Directional seat valve with control voltage 230 V AC 50/60 Hz.

**Hole pattern shape A nominal size 6 according to DIN 24340 T2:**


No. 6982E

## Electronic pressure switch



| Order no. | Article no.  | Measuring range [bar] | Switchpoint [bar] | Reset point (RP) [bar] | Minimum distance between RP and SP [bar] | Md max. [Nm] | Weight [g] |
|-----------|--------------|-----------------------|-------------------|------------------------|--|--------------|------------|
| 327445    | 6982E-11-025 | 0-25                  | 0,5-25            | 0,25-24,75             | 0,25                                     | 17-20        | 70         |
| 327395    | 6982E-12-040 | 0-40                  | 0,8-40            | 0,4-39,2               | 0,40                                     | 17-20        | 70         |
| 327403    | 6982E-13-100 | 0-100                 | 2,0-100           | 1,0-99                 | 1,00                                     | 17-20        | 70         |
| 327411    | 6982E-14-250 | 0-250                 | 5,0-250           | 2,5-247,5              | 2,50                                     | 17-20        | 70         |
| 327429    | 6982E-15-400 | 0-400                 | 8,0-400           | 4,0-396                | 4,00                                     | 17-20        | 70         |

### Design:

Compact electronic pressure switch with integrated 4-digit display. With two independent switching points and reverse switching points.  
Stainless steel measuring cell with thin film DMS (expansion measuring strips).  
Screw-in thread G $\frac{1}{4}$  A – DIN 3852-E, 2 switch outputs.

### Application:

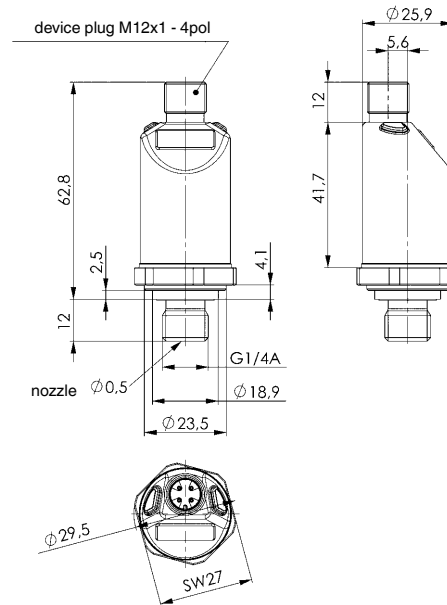
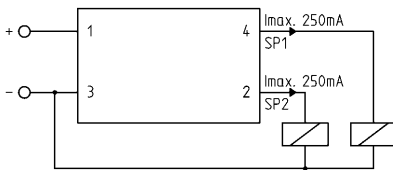
For the electronic-hydraulic pressure monitoring in pump units and in circuits of hydraulic clamping devices.

### Features:

The four-digit digital display can depict the pressure in bar, psi or MPa.  
Switching points and switch-back hystereses can be set independently. Switch-on and reset delay can be set from 0 to 99.9 seconds.  
Adjustable display: current pressure, peak pressure value or to switching point 1 or switching point 2.  
Simple handling via key programming.

### Pin assignment:

Version with 2 switch outputs  
pin plug 4-pol.M12x1



### Dimensions:

| Order no. | Article no.  | Operating temperature [°C] | Power supply [V DC] | PNP-output switching current [A] | Response time [ms] | Reproducibility [%] | Accuracy as per DIN 16086 [%] | Protection class to DIN 40050 |
|-----------|--------------|----------------------------|---------------------|----------------------------------|--------------------|---------------------|-------------------------------|-------------------------------|
| 327445    | 6982E-11-025 | -15 - +70                  | 9,6-32              | 0,25                             | 10                 | ±0,5% FS max.       | ±1,0% FS max.                 | IP 67                         |
| 327395    | 6982E-12-040 | -15 - +70                  | 9,6-32              | 0,25                             | 10                 | ±0,5% FS max.       | ±1,0% FS max.                 | IP 67                         |
| 327403    | 6982E-13-100 | -15 - +70                  | 9,6-32              | 0,25                             | 10                 | ±0,5% FS max.       | ±1,0% FS max.                 | IP 67                         |
| 327411    | 6982E-14-250 | -15 - +70                  | 9,6-32              | 0,25                             | 10                 | ±0,5% FS max.       | ±1,0% FS max.                 | IP 67                         |
| 327429    | 6982E-15-400 | -15 - +70                  | 9,6-32              | 0,25                             | 10                 | ±0,5% FS max.       | ±1,0% FS max.                 | IP 67                         |

Subject to technical alterations.

## No. 6982E

### Electronic pressure switch



| Order no. | Article no. | Measuring range [bar] | Switchpoint [bar] | Hysteresis [bar] | Operating temperature [°C] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-----------------------|-------------------|------------------|----------------------------|--------------|------------|
| 326967    | 6982E-02    | 0-250                 | 9,5-250           | 3-247,5          | -25 - +80                  | 20           | 120        |
| 326447    | 6982E-01    | 0-600                 | 9-600             | 3-594            | -25 - +80                  | 20           | 120        |

#### Design:

Compact electronic pressure switch with integrated 4-digit digital display for pressure measurement in the high-pressure range.

Stainless steel measuring cell with thin-film strain gauge. Screw-in thread G $\frac{1}{4}$  A – DIN 3852-E, 2 switch outputs.

#### Application:

For the electronic-hydraulic pressure monitoring in pump units and in circuits of hydraulic clamping devices.

#### Features:

Display rotatable in two axes. As a result, the device can be oriented optimally in almost every mounting position. The four-digit digital display can depict the pressure in bar, psi or MPa. Switching points and switch-back hystereses can be set dependently. Switch-on and reset delay can be set from 0 to 99.9 seconds.

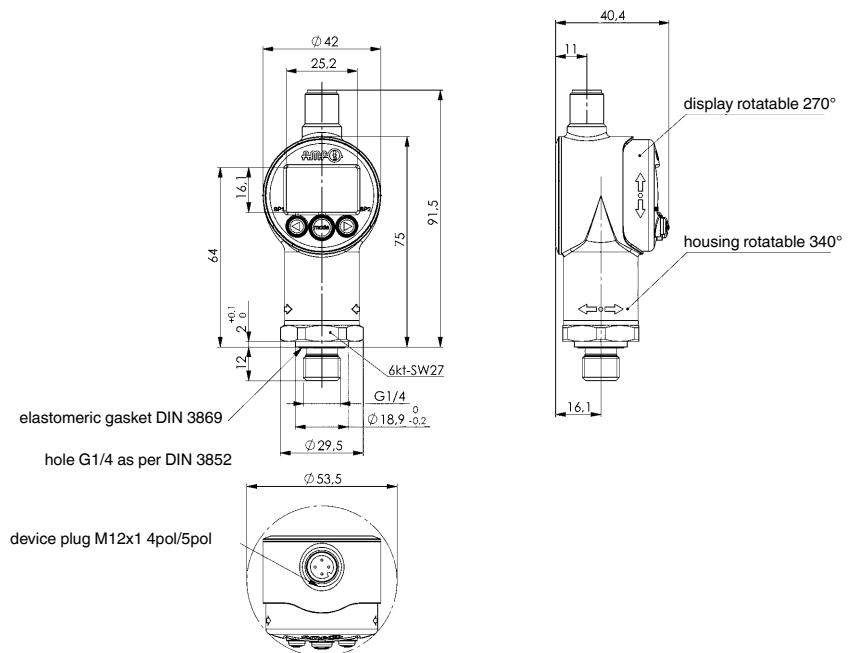
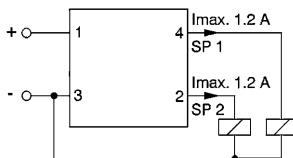
Adjustable display: current pressure, peak pressure value or to switching point 1 or switching point 2. Simple handling via key programming.

#### Dimensions:

| Order no. | Article no. | Power supply [V DC] | PNP-output switching current [A] | Response time [ms] | Reproducibility [%] | Accuracy as per DIN 16086 [%] | Protection class to DIN 40050 |
|-----------|-------------|---------------------|----------------------------------|--------------------|---------------------|-------------------------------|-------------------------------|
| 326967    | 6982E-02    | 18-35               | 1,2                              | 10                 | $\pm 0,25$ FS max.  | $\pm 0,5$ FS typ.             | IP65                          |
| 326447    | 6982E-01    | 18-35               | 1,2                              | 10                 | $\pm 0,25$ FS max.  | $\pm 0,5$ FS typ.             | IP65                          |

#### Pin assignment:

Version with 2 switch outputs  
pin plug 4-pol.M12x1



## No. 6982E-01-L

### Round connector

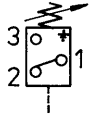


| Order no. | Article no. | Thread | Number of poles [St] | Line length [m] | Weight [g] |
|-----------|-------------|--------|----------------------|-----------------|------------|
| 498709    | 6982E-01-L  | M12x1  | 4                    | 1,5             | 100        |

## No. 6982

### Piston Pressure Switch

electric-hydraulic



| Order no. | Article no. | Operating pressure [bar] | Temp. [°C] | Ingress protection | Switching frequency [1/min] | Voltage         | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------|------------|--------------------|-----------------------------|-----------------|-----------------------|------------|
| 176040    | 6982-04     | 10-100                   | -20 - +80  | IP65               | 100                         | 30V - 250V = 5A | 457499                | 330        |
| 176214    | 6982-02     | 40-450                   | -20 - +80  | IP 65              | 100                         | 30V - 250V = 5A | 457499                | 330        |

#### Design:

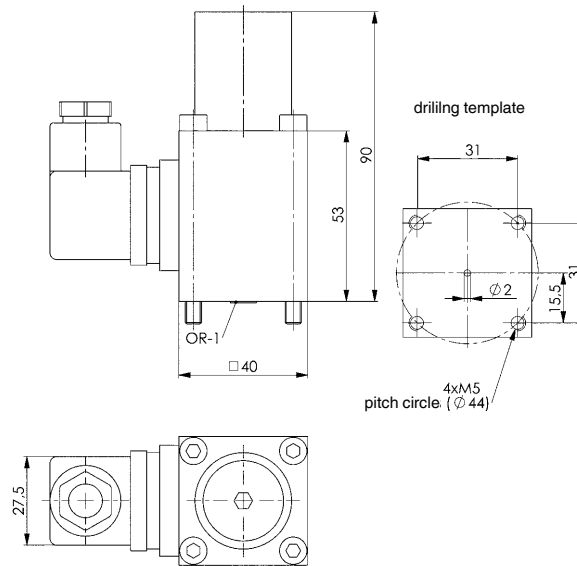
Microswitch. Design: Spring-loaded piston.

#### Application:

For electric-hydraulic pressure monitoring of a clamping circuit. The piston pressure switch can be mounted onto an adapter plate for tube connection.

#### Note:

Any built in position possible.



CAD



## No. 6982-02-01

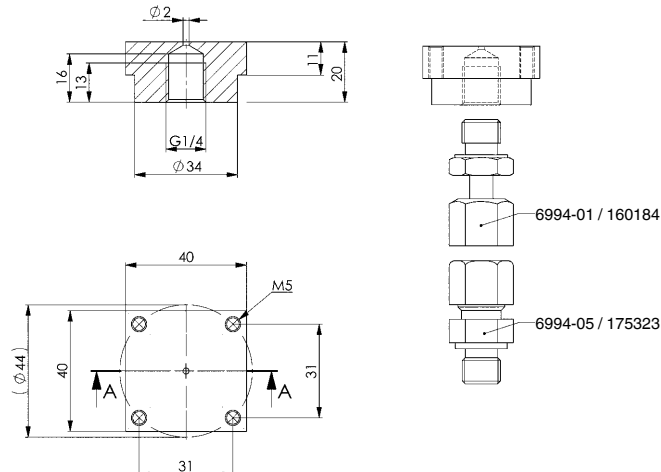
### Connection Plate



| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 60780     | 6982-02-01  | 185        |

#### Application:

For connecting pressure switch 6982-02 and 6982-04.



CAD



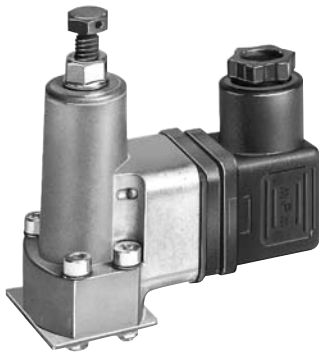
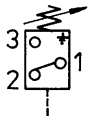
Subject to technical alterations.



## No. 6982

### Piston Pressure Switch

electric-hydraulic



| Order no. | Article no. | Operating pressure [bar] | Temp. [°C] | Ingress protection | Switching frequency [1/min] | Voltage         | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|--------------------------|------------|--------------------|-----------------------------|-----------------|-----------------------|------------|
| 492256    | 6982-07     | 12-170                   | -20 - +80  | IP65               | 30                          | 12V - 230V = 4A | 161810                | 300        |
| 136291    | 6982-06     | 20-210                   | -20 - +80  | IP 65              | 30                          | 12V - 230V = 4A | 161810                | 300        |
| 402610    | 6982-08     | 100-400                  | -20 - +80  | IP 65              | 30                          | 12V - 230V = 4A | 161810                | 300        |
| 276881    | 6982-05     | 200-630                  | -20 - +80  | IP 65              | 30                          | 12V - 230V = 4A | 161802                | 300        |

#### Design:

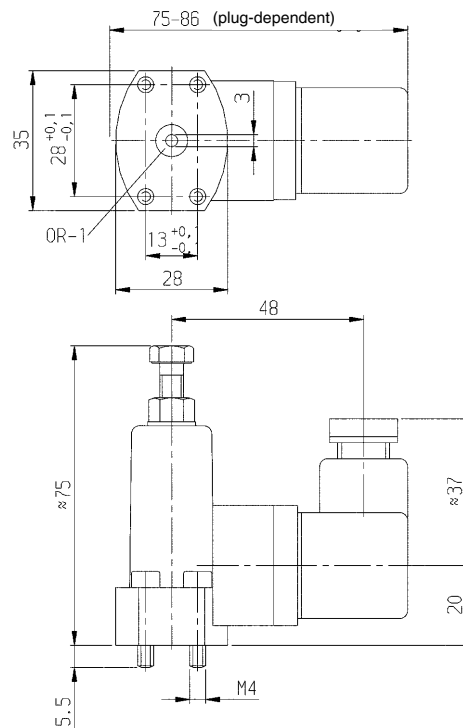
Microswitch. Design: Spring-loaded piston.

#### Application:

For electric-hydraulic pressure monitoring of a clamping circuit. The piston pressure switch can be mounted onto an adapter plate for tube connection.

#### Note:

Any built in position possible.



CAD



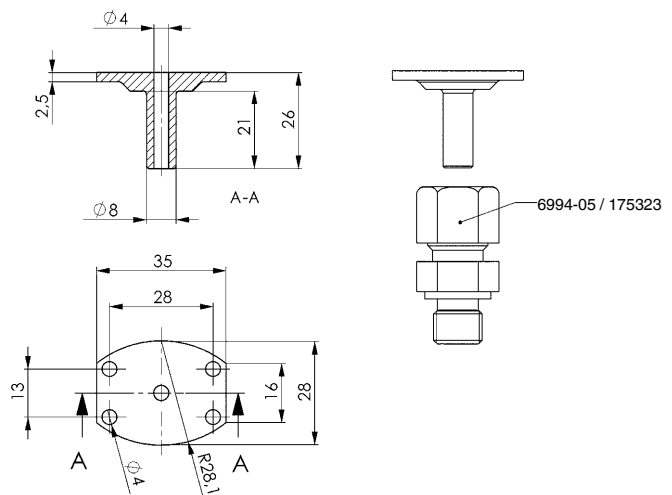
## No. 6982-05-01

### Flange with pipe socket

for piston pressure switch No. 6982-05, -06, -07 and -08.



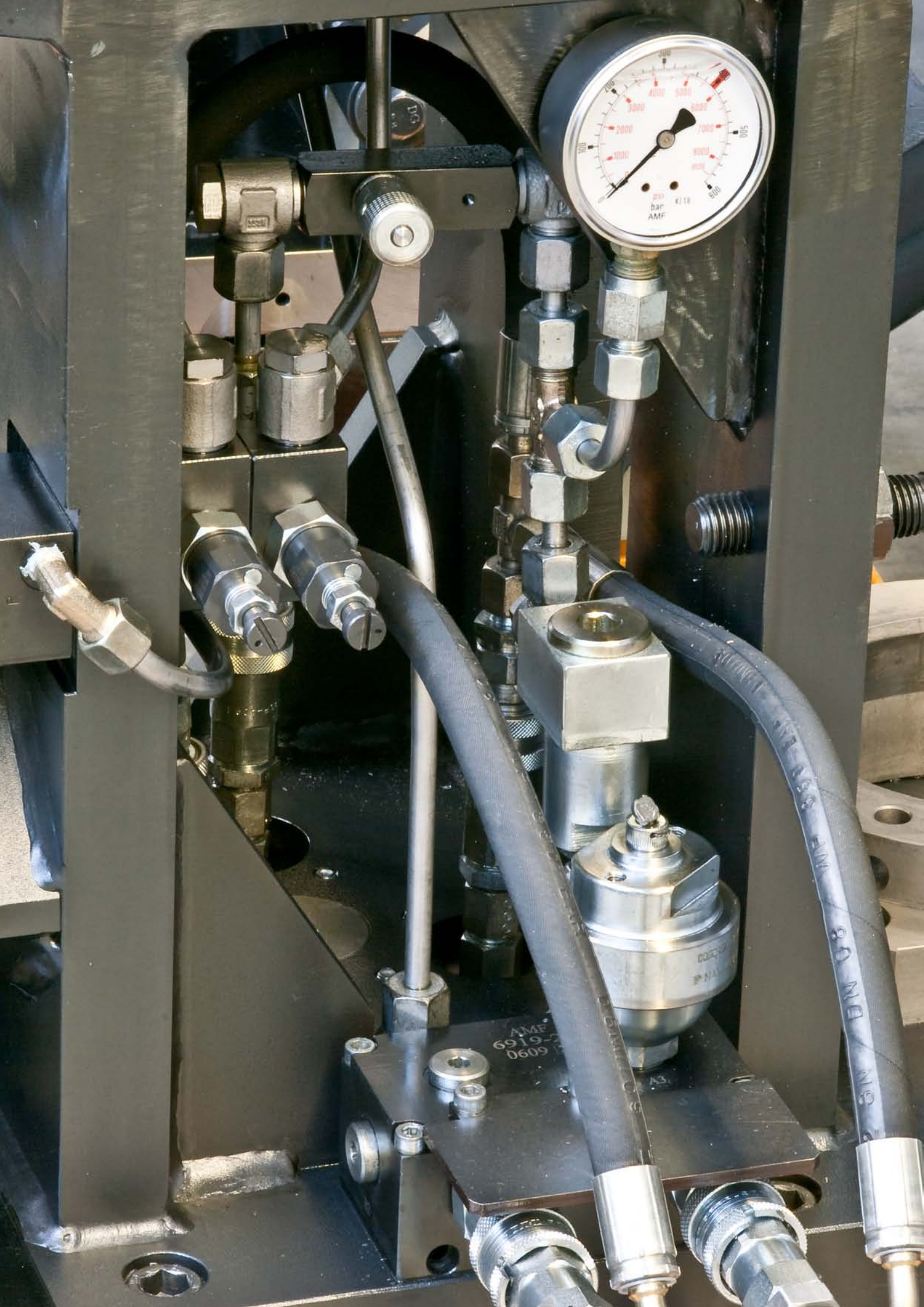
| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 497636    | 6982-05-01  | 36         |



CAD



Subject to technical alterations.



## ACCESSORIES - VALVES FOR CHANGING DIRECTION AND VOLUME FLOW CONTROL

- > CHECK VALVES (HYDR. UNLOCKABLE)
- > SHUTTLE VALVES
- > THROTTLE/CHECK VALVES
- > SHUT-OFF VALVES

### PRODUCT OVERVIEW:

| Type        | Designation          | Max. operating pressure [bar] | Q [l/min.] | Differential pressure [bar] | No. of models | Oil connection |
|-------------|----------------------|-------------------------------|------------|-----------------------------|---------------|----------------|
| 6916-04     | Line check valve     | 630                           | 12         | 3                           | 1             | pipe           |
| 6916-05/-06 | Threaded check valve | 630                           | 12         | 3                           | 2             | thread / pipe  |
| 6916-07     | Shuttle valve        | 630                           | 18         | 12                          | 1             | pipe           |
| 6916-08     | Check valve          | 700                           | 15         | 8                           | 1             | thread         |
| 6916-08-10  | Check valve          | 700                           | 20         | -                           | 1             | o-ring         |
| 6916-09     | Throttle/Check Valve | 400                           | 15         | -                           | 1             | thread         |
| 6916-10     | Throttle/Check Valve | 400                           | 18         | -                           | 1             | thread         |
| 6916-11     | Shut-off valve       | 600                           | 18         | -                           | 1             | thread         |
| 6916-12     | Throttle/Check Valve | 350                           | 5,7        | -                           | 2             | screw-in       |

### PRODUCT EXAMPLES:

NO. 6916-04 AND 6916-07



> Max. operating pressure: 630 bar

NO. 6916-08 AND 6916-08-10



> Max. operating pressure: 700 bar

NO. 6916-09 AND 6916-12



> Max. operating pressure: 400 bar

## No. 6916-04

### Line Check Valve

max. operating pressure 630 bar.



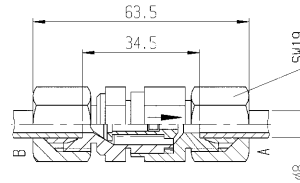
| Order no. | Article no. | Q<br>[l/min] | Differenz p at flow<br>[bar] | Ambient temp.<br>[°C] | Aperture pressure<br>[bar] | Weight<br>[g] |
|-----------|-------------|--------------|------------------------------|-----------------------|----------------------------|---------------|
| 62885     | 6916-04     | 12           | 3                            | -20 - +90             | 1                          | 110           |

#### Design:

Housing made of steel, surface galvanized. Sealing cone spring loaded with O-ring sealing. Seals made of Perbunan.

#### Note:

The direction of flow is indicated on the hex nut housing by means of an arrow. The pipe connection is sealed by means of a cutting ring.



## No. 6916-05/06

### Threaded Check Valve

max. operating pressure 630 bar.



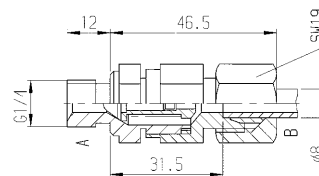
| Order no. | Article no. | Q<br>[l/min] | Direction of flow | Differenz p at flow<br>[bar] | Ambient temp.<br>[°C] | Aperture pressure<br>[bar] | Weight<br>[g] |
|-----------|-------------|--------------|-------------------|------------------------------|-----------------------|----------------------------|---------------|
| 62901     | 6916-05     | 12           | A - B             | 3                            | -20 - +90             | 1                          | 95            |
| 62968     | 6916-06     | 12           | B - A             | 3                            | -20 - +90             | 1                          | 95            |

#### Design:

Housing made of steel, surface galvanized. Sealing cone spring loaded with O-ring sealing. Sealings made of Perbunan.

#### Note:

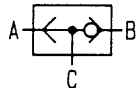
The direction of flow is indicated on the hex nut housing by means of an arrow. On the threaded side sealing is done by means of a sealing edge and on the pipe side the valve is sealed by means of a cutting ring.



## No. 6916-07

### Shuttle Valve

max. operating pressure 630 bar.



| Order no. | Article no. | Q<br>[l/min] | Direction of flow | Differenz p at flow<br>[bar] | Ambient temp.<br>[°C] | Weight<br>[g] |
|-----------|-------------|--------------|-------------------|------------------------------|-----------------------|---------------|
| 62984     | 6916-07     | 18           | A-C / B-C         | 12                           | -20 - +100            | 160           |

#### Design:

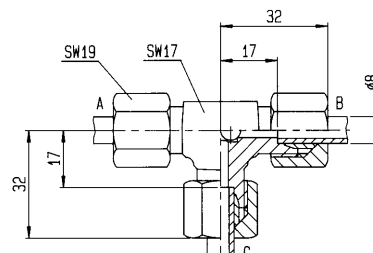
Housing made of steel, surface galvanized. Ball seat valve type.

#### Application:

By means of two input connections which can be shut and an output connection the alternating valve connects A or B with C according to the present pressurized line; the other connection is closed by means of a ball.

#### Note:

Attention: The hydraulic line empties itself when not under pressure. The pipe connection is sealed by means of a cutting ring.



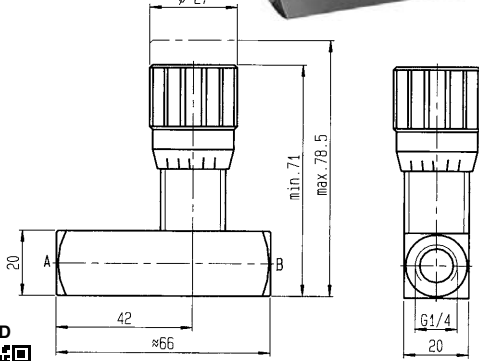
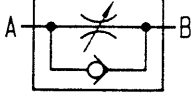
Subject to technical alterations.



## No. 6916-09

### Throttle/Check Valve

max. operating pressure 400 bar.



| Order no. | Article no. | Q [l/min] | Throttle direction | Ambient temp. [°C] | Aperture pressure [bar] | Weight [g] |
|-----------|-------------|-----------|--------------------|--------------------|-------------------------|------------|
| 62992     | 6916-09     | 15        | A - B              | -20 - +80          | 0,35                    | 250        |

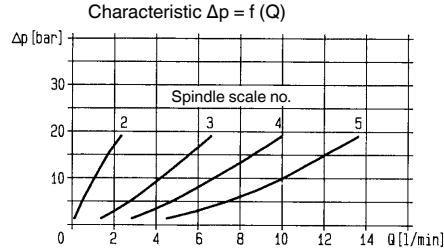
#### Design:

Housing made of steel, galvanized. Adjusting knob made of AL, ribbed. Needle throttle.

#### Note:

Easy setting by scaled spindle and adjusting knob.

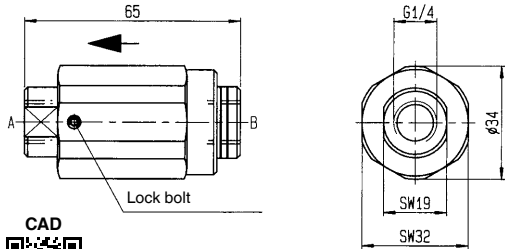
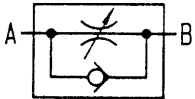
#### Diagram:



## No. 6916-10

### Throttle/Check Valve

max. operating pressure 400 bar.



| Order no. | Article no. | Q [l/min] | Throttle direction | Ambient temp. [°C] | Aperture pressure [bar] | Weight [g] |
|-----------|-------------|-----------|--------------------|--------------------|-------------------------|------------|
| 63008     | 6916-10     | 18        | A - B              | -30 - +80          | 3                       | 290        |

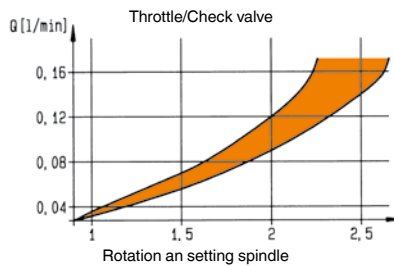
#### Design:

Housing made of steel, blued. Blued throttle socket.

#### Note:

A constant flow is achieved by means of the new oil dosing curves as from 0.04 l/min. The valve can be easily adjusted under high pressure.

#### Diagram:



## No. 6916-11

### Shut-off valve

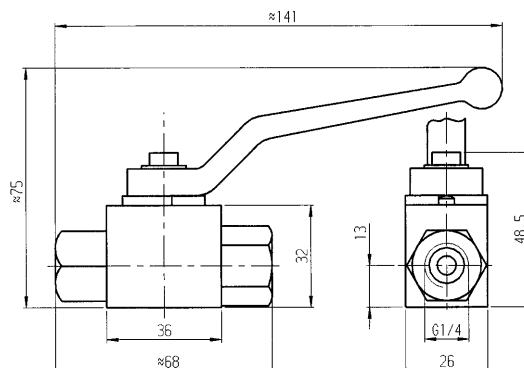
max. operating pressure 500 bar.



| Order no. | Article no. | Oilflow bore DN (dia.) | Ambient temp. [°C] | Weight [g] |
|-----------|-------------|------------------------|--------------------|------------|
| 65326     | 6916-11     | Ø 6                    | -20 - +100         | 350        |

#### Design:

Housing and functioning components made of steel. Seal of shaft made of NBR.

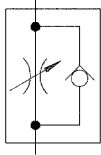


Subject to technical alterations.

## No. 6916-12

### Throttle/Check Valve

cartridge flange  
max. operating pressure 350 bar.



| Order no. | Article no. | A max. | C    | D     | dia. E | SW | Md max. [Nm] | Q max. [l/min] | G    | Weight [g] |
|-----------|-------------|--------|------|-------|--------|----|--------------|----------------|------|------------|
| 326579    | 6916-12-01  | 20,7   | 11,1 | 15,16 | 15,9   | 14 | 27           | 5,7            | G1/8 | 47         |
| 326611    | 6916-12-04  | 20,9   | 11,2 | 18,72 | 21,0   | 19 | 47           | 5,7            | G1/4 | 47         |

#### Design:

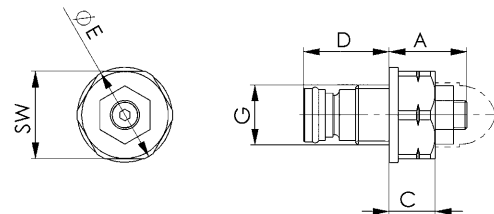
Housing made of steel, hardened and blued. Compact size.

#### Application:

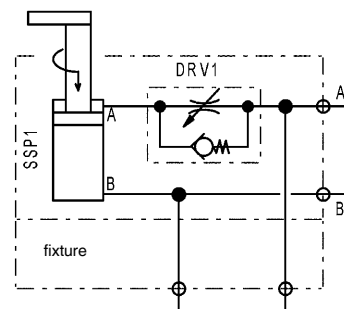
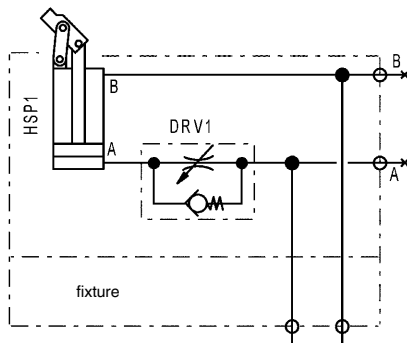
For single and double-acting loads. The traversing speed can be set by controlling the flow.

#### Note:

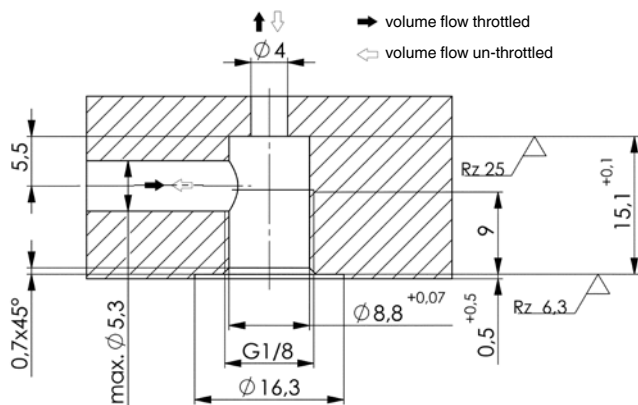
The screw-in throttle check valve is screwed into the installation bore.  
The upstream pressure relief valve in the hydraulic control guarantees to drain the surplus volume.  
The throttle check valves should preferably be used for feed control.  
Return flow control poses the risk of excess pressure.



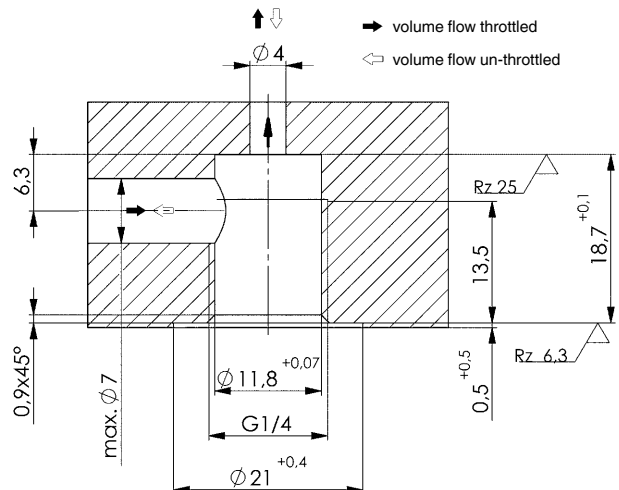
#### Application examples for feed controls:

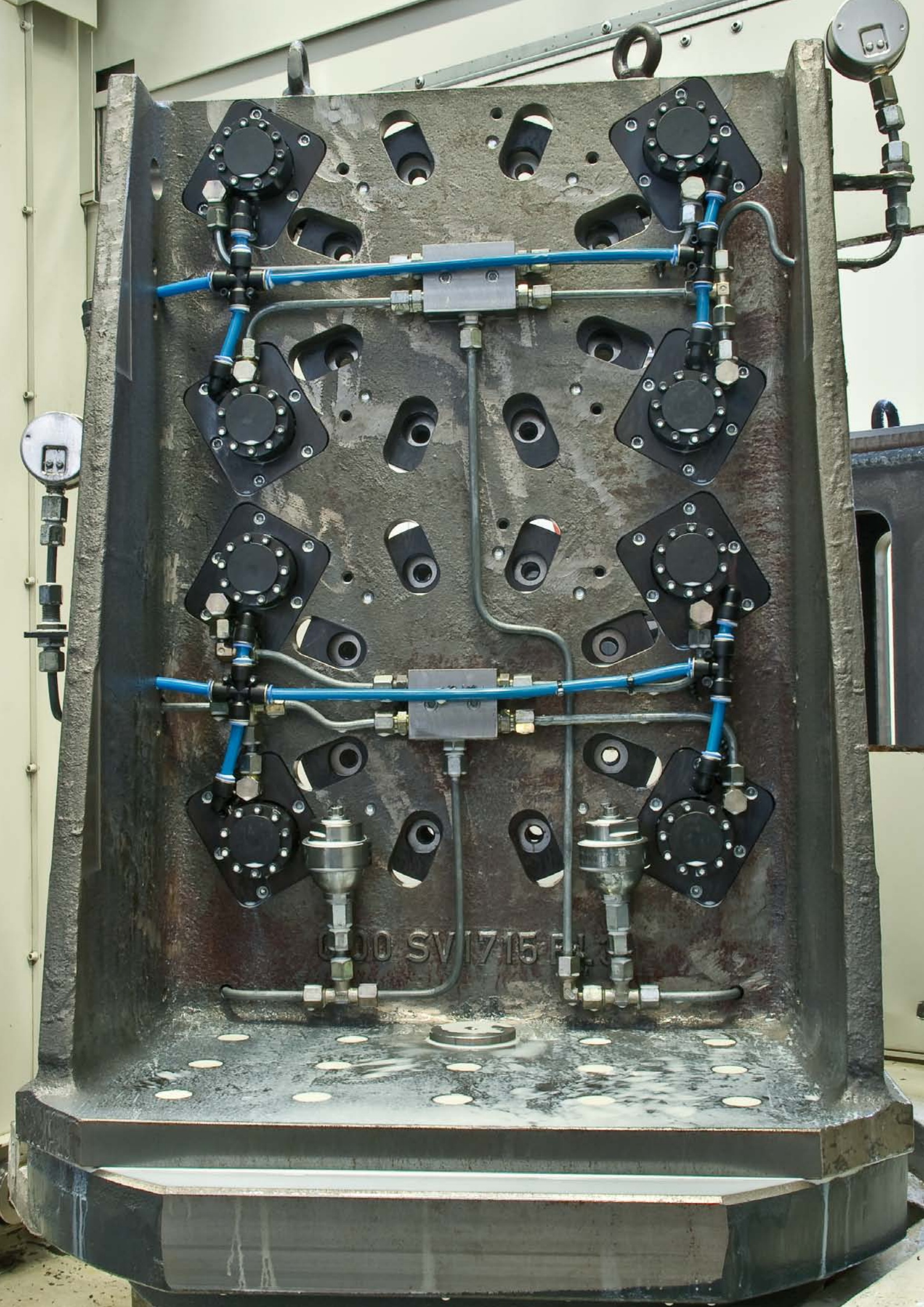


#### Installation dimensions 6916-12-01:



#### Installation dimensions 6916-12-04:





000 SV1715



## ACCESSORIES - COUPLINGS FOR LOSS-FREE MEDIA TRANSMISSION

- > **THREADED-COUPLING ELEMENTS**
- > **BUILT-IN COUPLING ELEMENTS**
- > **PLUG CONNECTIONS**

### PRODUCT OVERVIEW:

| Type   | Designation                 | Max. operating pressure [bar] | Nominal bore | detachable under pressure | detachable-pressure-free | No. of models |
|--------|-----------------------------|-------------------------------|--------------|---------------------------|--------------------------|---------------|
| 6989M  | Screw-in coupling mechanism | 350<br>500                    | 3<br>5       | ●                         | ●                        | 4             |
| 6989N  | Screw-in coupling nipple    | 350<br>500                    | 3<br>5       | ●                         | ●                        | 4             |
| 6989ME | Built-in coupling mechanism | 350<br>500<br>300             | 3<br>5<br>8  | ●                         | ●                        | 6             |
| 6989NE | Built-in coupling nipple    | 350<br>500<br>300             | 3<br>5<br>8  | ●                         | ●                        | 8             |
| 6994S  | Plug connection             | 500                           | 3 - 16       | -                         | -                        | 6             |

### PRODUCT EXAMPLES:

NO. 6989M AND 6989N



> max. operating pressure: 630 bar

NO. 6989ME AND 6989NE



> max. operating pressure: 700 bar

NO. 6994S



> max. operating pressure: 400 bar

## No. 6989M

### Screw-in coupling mechanism



| Order no. | Article no.  | for coupling under pressure | for pressure-free coupling | Thread [A] | Nominal bore [NW] | max. operating pressure [bar] | Min. coupling force * (N) | Md [Nm] | Weight [g] |
|-----------|--------------|-----------------------------|----------------------------|------------|-------------------|-------------------------------|---------------------------|---------|------------|
| 324491    | 6989M-05-001 | ●                           | -                          | M20x1,5    | 3                 | 350                           | 94                        | 15      | 40         |
| 324517    | 6989M-06-002 | -                           | ●                          | M20x1,5    | 3                 | 350                           | 94                        | 15      | 40         |
| 164970    | 6989M-10-001 | ●                           | -                          | M24x1,5    | 5                 | 500                           | 98                        | 20      | 72         |
| 164996    | 6989M-20-002 | -                           | ●                          | M24x1,5    | 5                 | 500                           | 98                        | 20      | 72         |

\* At 0 bar

#### Design:

Cylinder body and internal parts made of stainless steel. Seals from NBR, Viton, POM and PU.

#### Application:

Couplings are used for the leakage-free connection of hydraulic oil supplies. The coupling elements are installed in a body. The sealing between coupling mechanism and nipple is axial, and installed in the coupling mechanism. If the seal is worn, it can be replaced. The coupling mechanism must always be used in combination with a nipple of the same system. Depending on the version, the couplings can be connected and disconnected at the maximum working pressure. When installed in a tank line, a coupling nipple with pressure relief must be selected. This limits the pressure that can be built up in the uncoupled state (for example due to internal leakage of the clamping elements) to approx 5 bar. When the two parts of the coupling are engaged, the pressure relief is no longer active.

#### Features:

For connection, the coupling mechanism and nipple must be axially aligned. The bodies of the two parts must be guided when the axial sealing surfaces are ca. 2-3 mm apart. The radial position tolerance must not be exceeded. The separating force due to hydraulic pressure is given by the formula NW3:  $F [N] = 9,4 \times p [\text{bar}]$ , NW5:  $F [N] = 15,4 \times p [\text{bar}]$ . This separating force must be countered by some external, mechanical means. The coupling mechanism must seal at the bottom of the hole in which it is installed. The mounting hole must be machined to the specified accuracy and surface finish.

#### Note:

The axial sealing surfaces on the front must be protected from soiling. Because the coupling elements have smooth, uninterrupted sealing surfaces, the danger of them being soiled is reduced, and the ease with which the user can clean them before the coupling process is increased. Good results can be achieved by washing them off and blowing clean with compressed air.

Positioning tolerance in axial direction for all coupling elements: +0.5 mm.

Positioning tolerance in radial direction for coupling units: +/- 0.3 mm.

Permitted angle tolerance: +/- 1°.

Diagrams: coupling force and flow resistance, see under 6989N.

Installation tool for sealing ring:

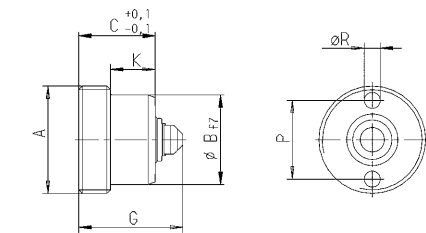
Size 05 and 06 order no. 551864 / size 10 and 20 order no. 551865

Screw-in tool:

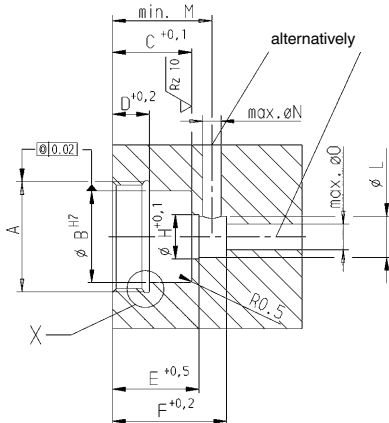
Size 05 and 06 order no. 552759 / Size 10 and 20 order no. 552760

#### On request:

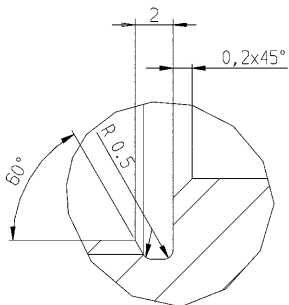
Other sizes available on request.



#### Installation dimensions:



detail X



#### Dimensions:

| Order no. | Article no.  | dia. B | C    | D  | E    | F  | G  | dia. H | K    | dia. L | M  | N | dia. O | P    | ØR      |
|-----------|--------------|--------|------|----|------|----|----|--------|------|--------|----|---|--------|------|---------|
| 324491    | 6989M-05-001 | 18     | 21,5 | 10 | 23,5 | 31 | 29 | 12     | 12,5 | 11,2   | 28 | 5 | 7      | 15,5 | 2 x 2,6 |
| 324517    | 6989M-06-002 | 18     | 21,5 | 10 | 23,5 | 31 | 29 | 12     | 12,5 | 11,2   | 28 | 5 | 7      | 15,5 | 2 x 2,6 |
| 164970    | 6989M-10-001 | 22     | 21,5 | 10 | 23,5 | 31 | 29 | 12     | 12,5 | 11,2   | 28 | 5 | 7      | 18,5 | 4 x 2,8 |
| 164996    | 6989M-20-002 | 22     | 21,5 | 10 | 23,5 | 31 | 29 | 12     | 12,5 | 11,2   | 28 | 5 | 7      | 18,5 | 4 x 2,8 |

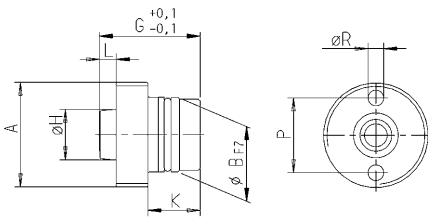


Subject to technical alterations.

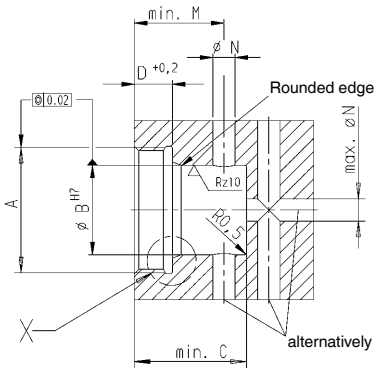


## No. 6989N

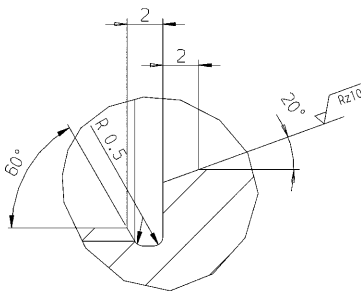
### Screw-in coupling nipple



### Installation dimensions:



detail X



| Order no. | Article no.  | for coupling under pressure | for pressure-free coupling | Thread [A] | Nominal bore [NW] | max. operating pressure [bar] | Min. coupling force* (N) | Md [Nm] | Weight [g] |
|-----------|--------------|-----------------------------|----------------------------|------------|-------------------|-------------------------------|--------------------------|---------|------------|
| 324509    | 6989N-05-001 | ●                           | -                          | M20x1,5    | 3                 | 350                           | 94                       | 15      | 30         |
| 324525    | 6989N-06-002 | -                           | ●                          | M20x1,5    | 3                 | 350                           | 94                       | 15      | 30         |
| 164962    | 6989N-10-001 | ●                           | -                          | M24x1,5    | 5                 | 500                           | 98                       | 20      | 56         |
| 164988    | 6989N-20-002 | -                           | ●                          | M24x1,5    | 5                 | 500                           | 98                       | 20      | 56         |

\* At 0 bar

### Design:

Cylinder body and internal parts made of stainless steel. Seals from NBR, Viton, POM and PU.

### Application:

Couplings are used for the leakage-free connection of hydraulic oil supplies. The coupling elements are installed in a body. The sealing between coupling mechanism and nipple is axial, and installed in the coupling mechanism. If the seal is worn, it can be replaced. The coupling mechanism must always be used in combination with a nipple of the same system. Depending on the version, the couplings can be connected and disconnected at the maximum working pressure. When installed in a tank line, a coupling nipple with pressure relief must be selected. This limits the pressure that can be built up in the uncoupled state (for example due to internal leakage of the clamping elements) to approx 5 bar. When the two parts of the coupling are engaged, the pressure relief is no longer active.

### Features:

For connection, the coupling mechanism and nipple must be axially aligned. The bodies of the two parts must be guided when the axial sealing surfaces are ca. 2-3 mm apart. The radial position tolerance must not be exceeded. The separating force due to hydraulic pressure is given by the formula NW3:  $F [N] = 9,4 \times p [\text{bar}]$ , NW5:  $F [N] = 15,4 \times p [\text{bar}]$ . This separating force must be countered by some external, mechanical means. The mounting hole must be machined to the specified accuracy and surface finish.

### Note:

The axial sealing surfaces on the front must be protected from soiling. Because the coupling elements have smooth, uninterrupted sealing surfaces, the danger of them being soiled is reduced, and the ease with which the user can clean them before the coupling process is increased. Good results can be achieved by washing them off and blowing clean with compressed air.

Positioning tolerance in axial direction for all coupling elements: +0.5 mm.

Positioning tolerance in radial direction for coupling units: +/- 0.3 mm.

Permitted angle tolerance: +/- 1°.

Screw-in tool:

Size 05 and 06 order no. 552759 / size 10 and 20 order no. 552760

### On request:

Other sizes available on request.

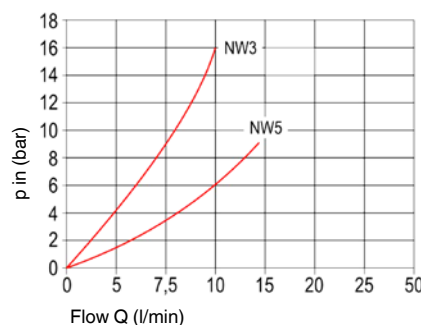
### Dimensions:

| Order no. | Article no.  | dia. B | C  | D   | G    | dia. H | K  | L   | M  | dia. N | P    | ØR      |
|-----------|--------------|--------|----|-----|------|--------|----|-----|----|--------|------|---------|
| 324509    | 6989N-05-001 | 16     | 23 | 8,4 | 25,9 | 9,8    | 13 | 4,5 | 19 | 5      | 15,5 | 2 x 2,6 |
| 324525    | 6989N-06-002 | 16     | 23 | 8,4 | 25,9 | 9,8    | 13 | 4,5 | 19 | 5      | 15,5 | 2 x 2,6 |
| 164962    | 6989N-10-001 | 20     | 25 | 8,5 | 27,0 | 13,5   | 14 | 4,5 | 19 | 5      | 18,5 | 4 x 2,8 |
| 164988    | 6989N-20-002 | 20     | 25 | 8,5 | 27,0 | 13,5   | 14 | 4,5 | 19 | 5      | 18,5 | 4 x 2,8 |

### Diagrams:

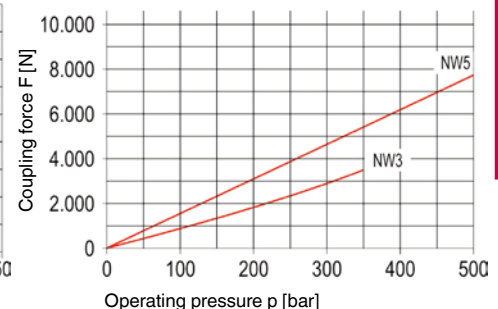
#### Flow resistance:

p-characteristic of HLP 22, viscosity 34 cst



#### Coupling force:

NW3:  $F [N] = 9,4 \times p [\text{bar}]$   
NW5:  $F [N] = 15,4 \times p [\text{bar}]$



Subject to technical alterations.

No. 6989ME

Built-in coupling mechanism



| Order no. | Article no.  | for coupling under pressure | for pressure-free coupling | Nominal bore [NW] | max. operating pressure [bar] | Coupling stroke [mm] | Weight [g] |
|-----------|--------------|-----------------------------|----------------------------|-------------------|-------------------------------|----------------------|------------|
| 328823    | 6989ME-03-01 | ●                           | -                          | 3                 | 350                           | 4,5                  | 14         |
| 327965    | 6989ME-03-02 | -                           | ●                          | 3                 | 350                           | 4,5                  | 14         |
| 328591    | 6989ME-05-01 | ●                           | -                          | 5                 | 500                           | 4,5                  | 25         |
| 328617    | 6989ME-05-02 | -                           | ●                          | 5                 | 500                           | 4,5                  | 25         |
| 328633    | 6989ME-08-01 | ●                           | -                          | 8                 | 300                           | 7,0                  | 56         |
| 328658    | 6989ME-08-02 | -                           | ●                          | 8                 | 300                           | 7,0                  | 56         |

### Design:

Cylinder body and internal parts made of stainless steel. Seals from NBR, Viton, POM and PU.

### Application:

Couplings are used for the leakage-free connection of hydraulic oil supplies. The coupling elements are installed in a body. The sealing between coupling mechanism and nipple is axial, and installed in the coupling mechanism. If the seal is worn, it can be replaced. The coupling mechanism must always be used in combination with a nipple of the same system. Depending on the version, the couplings can be connected and disconnected at the maximum working pressure. When installed in a tank line, a coupling nipple with pressure relief must be selected. This limits the pressure that can be built up in the uncoupled state (for example due to internal leakage of the clamping elements) to approx 5 bar. When the two parts of the coupling are engaged, the pressure relief is no longer active.

### Features:

For connection, the coupling mechanism and nipple must be axially aligned. The bodies of the two parts must be guided when the axial sealing surfaces are ca. 2-3 mm apart. The radial position tolerance must not be exceeded. The separating force due to hydraulic pressure is given by the formula NW3:  $F [N] = 9,4 \times p [\text{bar}]$ , NW5:  $F [N] = 15,4 \times p [\text{bar}]$ , NW8:  $F [N] = 31,4 \times p [\text{bar}]$ . This separating force must be countered by some external, mechanical means. The coupling mechanism must seal at the bottom of the hole in which it is installed. The mounting hole must be machined to the specified accuracy and surface finish.

### Note:

The axial sealing surfaces must be protected from dirt. Because the coupling elements have smooth, uninterrupted sealing surfaces, the danger of them collecting dirt is reduced, and the ease with which the user can clean them before the joint is made is increased. Good results can be achieved by washing them off and blowing clean with compressed air.

Positioning tolerance in axial direction for all coupling elements: +0.5 mm.

Positioning tolerance in radial direction for coupling elements: +/- 0.3 mm.

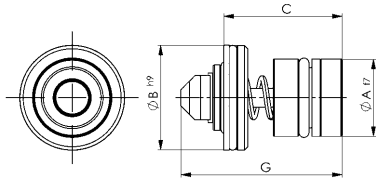
Permissible angle tolerance: +/- 1°.

Diagrams: Coupling force and flow resistance, see 6989N.

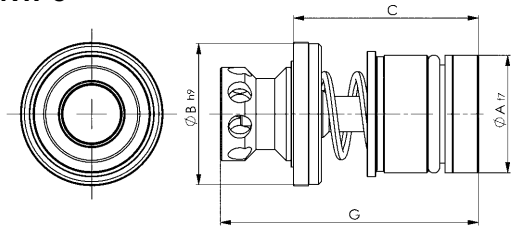
### On request:

Other sizes available on request.

### NW 3+5



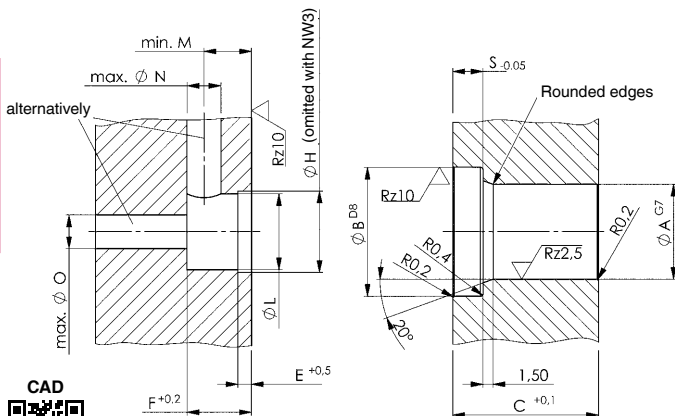
### NW 8



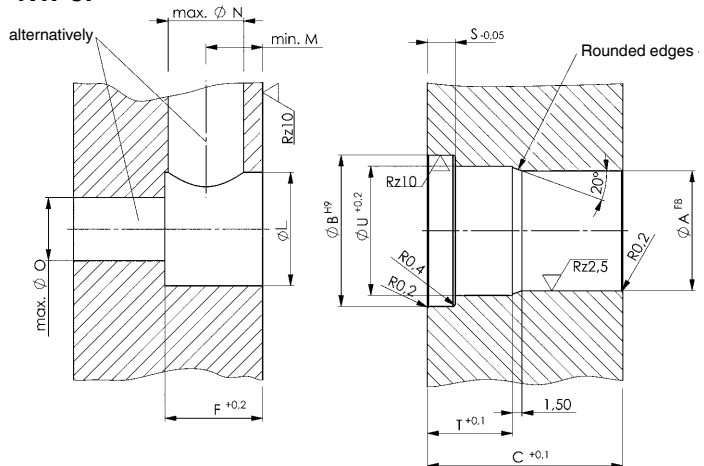
### Dimensions:

| Order no. | Article no.  | dia. A | dia. B | C    | E | F    | G  | H +0,1 | dia. L +0,1 | M | dia. N | dia. O | S   | T    | dia. U |
|-----------|--------------|--------|--------|------|---|------|----|--------|-------------|---|--------|--------|-----|------|--------|
| 328823    | 6989ME-03-01 | 11     | 14     | 21,5 | - | 9,5  | 29 | -      | 11,2        | 7 | 5      | 7      | 4,5 | -    | -      |
| 327965    | 6989ME-03-02 | 11     | 14     | 21,5 | - | 9,5  | 29 | -      | 11,2        | 7 | 5      | 7      | 4,5 | -    | -      |
| 328591    | 6989ME-05-01 | 14     | 19     | 21,5 | 2 | 9,5  | 29 | 12     | 11,2        | 7 | 5      | 7      | 4,5 | -    | -      |
| 328617    | 6989ME-05-02 | 14     | 19     | 21,5 | 2 | 9,5  | 29 | 12     | 11,2        | 7 | 5      | 7      | 4,5 | -    | -      |
| 328633    | 6989ME-08-01 | 20     | 24     | 31,0 | - | 15,5 | 44 | -      | 18,0        | 9 | 12     | 10     | 4,5 | 13,5 | 21,5   |
| 328658    | 6989ME-08-02 | 20     | 24     | 31,0 | - | 15,5 | 44 | -      | 18,0        | 9 | 12     | 10     | 4,5 | 13,5 | 21,5   |

### Installation dimensions NW 3+5:

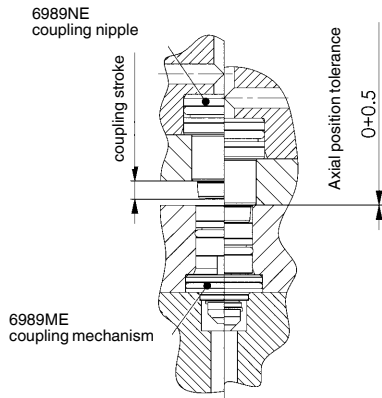


### NW 8:

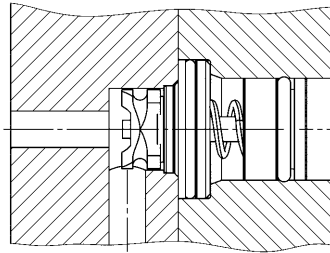


Subject to technical alterations.

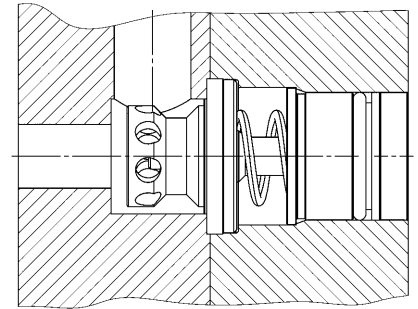




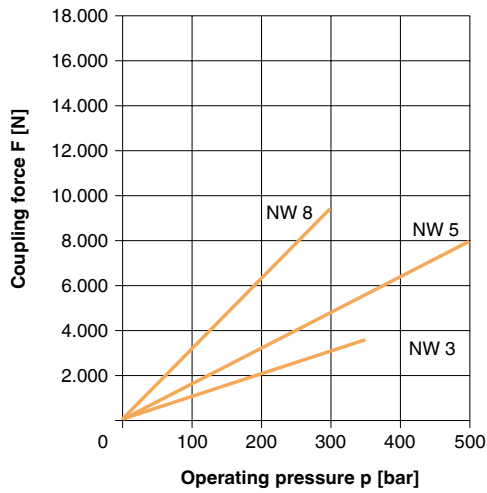
Installation example NW 3+5:



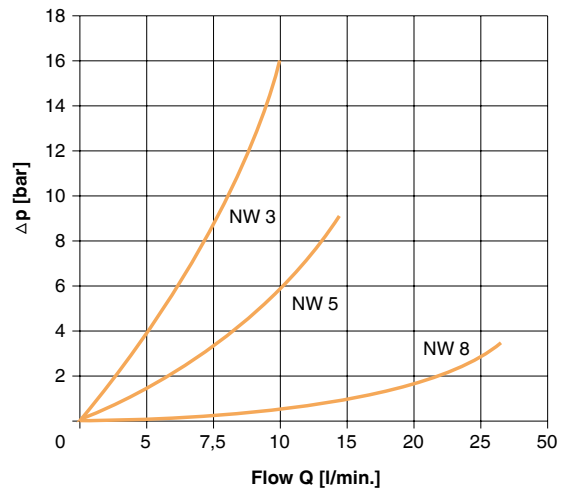
NW 8:



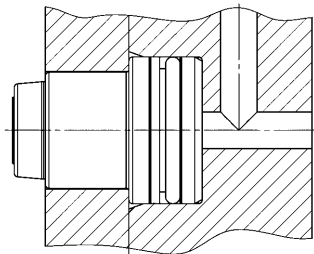
Coupling force:



Flow resistance:



Δp-characteristic with HLP 22, viscosity 34 cst



← →  
Separating force

**Separating force:**  
 NW 3 =  $F [N] = 9,4 \times p [\text{bar}]$   
 NW 5 =  $F [N] = 15,4 \times p [\text{bar}]$   
 NW 8 =  $F [N] = 31,4 \times p [\text{bar}]$



Subject to technical alterations.

## No. 6989NE

### Built-in coupling nipple



| Order no. | Article no.     | for coupling under pressure | for pressure-free coupling | Nominal bore [NW] | max. operating pressure [bar] | Coupling stroke [mm] | Weight [g] |
|-----------|-----------------|-----------------------------|----------------------------|-------------------|-------------------------------|----------------------|------------|
| 525188    | 6989NE-03-01    | ●                           | -                          | 3                 | 350                           | 4,5                  | 21         |
| 328674    | 6989NE-03-02    | -                           | ●                          | 3                 | 350                           | 4,5                  | 21         |
| 328690    | 6989NE-05-01    | ●                           | -                          | 5                 | 500                           | 4,5                  | 25         |
| 328450    | 6989NE-05-01-01 | ●                           | -                          | 5                 | 500                           | 4,5                  | 45         |
| 445049    | 6989NE-05-02    | -                           | ●                          | 5                 | 500                           | 4,5                  | 25         |
| 328757    | 6989NE-05-02-01 | -                           | ●                          | 5                 | 500                           | 4,5                  | 45         |
| 328716    | 6989NE-08-01    | ●                           | -                          | 8                 | 300                           | 7,0                  | 60         |
| 328732    | 6989NE-08-02    | -                           | ●                          | 8                 | 300                           | 7,0                  | 60         |

### Design:

Cylinder body and internal parts made of stainless steel. Seals from NBR, Viton, POM and PU.

### Application:

Couplings are used for the leakage-free connection of hydraulic oil supplies. The coupling elements are installed in a body. The sealing between coupling mechanism and nipple is axial, and installed in the coupling mechanism. If the seal is worn, it can be replaced. The coupling mechanism must always be used in combination with a nipple of the same system. Depending on the version, the couplings can be connected and disconnected at the maximum working pressure. When installed in a tank line, a coupling nipple with pressure relief must be selected. This limits the pressure that can be built up in the uncoupled state (for example due to internal leakage of the clamping elements) to approx 5 bar. When the two parts of the coupling are engaged, the pressure relief is no longer active.

### Features:

For connection, the coupling mechanism and nipple must be axially aligned. The bodies of the two parts must be guided when the axial sealing surfaces are ca. 2-3 mm apart. The radial position tolerance must not be exceeded. The separating force due to hydraulic pressure is given by the formula  $NW3: F [N] = 9,4 \times p [\text{bar}]$ ,  $NW5: F [N] = 15,4 \times p [\text{bar}]$ ,  $NW8: F [N] = 31,4 \times p [\text{bar}]$ . This separating force must be countered by some external, mechanical means. The coupling mechanism must seal at the bottom of the hole in which it is installed. The mounting hole must be machined to the specified accuracy and surface finish.

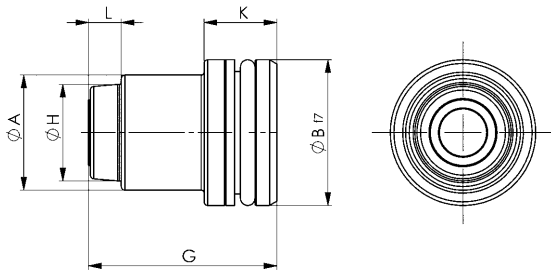
### Note:

The axial sealing surfaces must be protected from dirt. Because the coupling elements have smooth, uninterrupted sealing surfaces, the danger of them collecting dirt is reduced, and the ease with which the user can clean them before the joint is made is increased. Good results can be achieved by washing them off and blowing clean with compressed air.

Positioning tolerance in axial direction for all coupling elements:  $\pm 0.5 \text{ mm}$ .  
Positioning tolerance in radial direction for coupling elements:  $\pm 0.3 \text{ mm}$ .  
Permissible angle tolerance:  $\pm 1^\circ$ .

### On request:

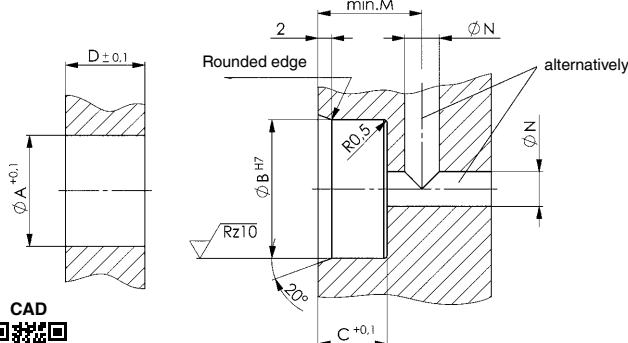
Other sizes available on request.



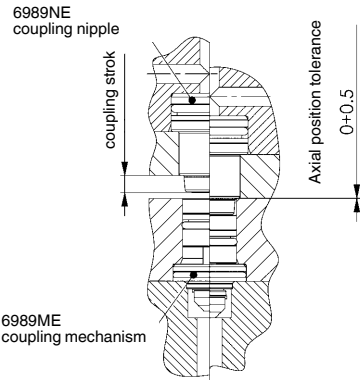
### Dimensions:

| Order no. | Article no.     | dia. A | dia. B | C    | D    | G    | dia. H | K    | L   | M  | dia. N |
|-----------|-----------------|--------|--------|------|------|------|--------|------|-----|----|--------|
| 525188    | 6989NE-03-01    | 13     | 16     | 10,0 | 11,4 | 25,9 | 9,8    | 10,0 | 4,5 | 15 | 5      |
| 328674    | 6989NE-03-02    | 13     | 16     | 10,0 | 11,4 | 25,9 | 9,8    | 10,0 | 4,5 | 15 | 5      |
| 328690    | 6989NE-05-01    | 16     | 20     | 10,0 | 11,4 | 26,0 | 13,5   | 10,0 | 4,5 | 15 | 5      |
| 328450    | 6989NE-05-01-01 | 16     | 20     | 16,5 | 17,0 | 38,1 | 13,5   | 16,5 | 4,5 | 22 | 5      |
| 445049    | 6989NE-05-02    | 16     | 20     | 10,0 | 11,4 | 26,0 | 13,5   | 10,0 | 4,5 | 15 | 5      |
| 328757    | 6989NE-05-02-01 | 16     | 20     | 16,5 | 17,0 | 38,1 | 13,5   | 16,5 | 4,5 | 22 | 5      |
| 328716    | 6989NE-08-01    | 21     | 24     | 9,0  | 15,0 | 31,4 | 18,5   | 9,0  | 7,4 | 15 | 10     |
| 328732    | 6989NE-08-02    | 21     | 24     | 9,0  | 15,0 | 31,4 | 18,5   | 9,0  | 7,4 | 15 | 10     |

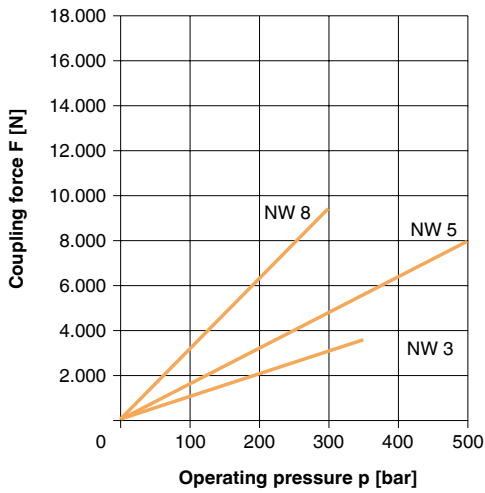
### Installation dimensions:



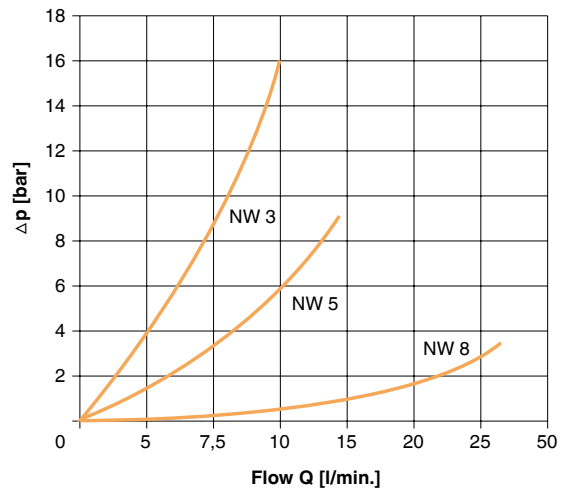
Subject to technical alterations.



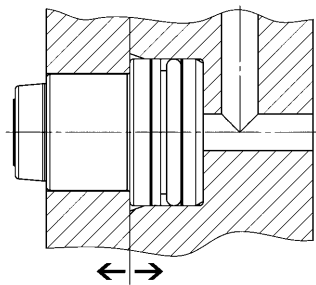
### Coupling force:



### Flow resistance:

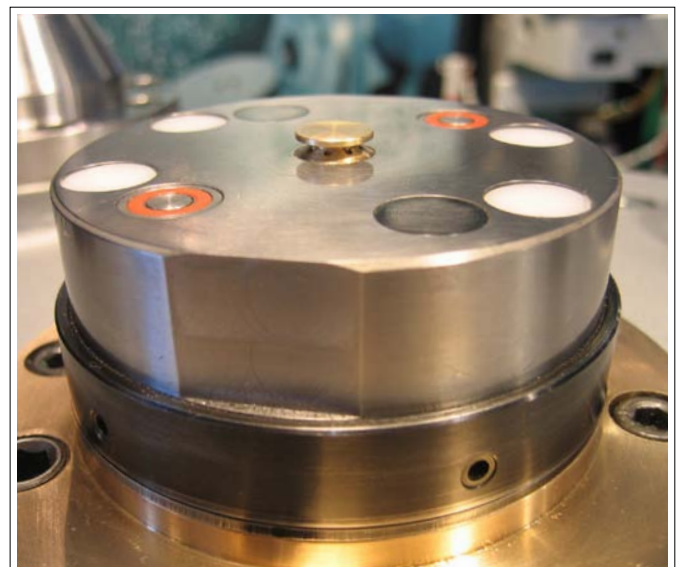
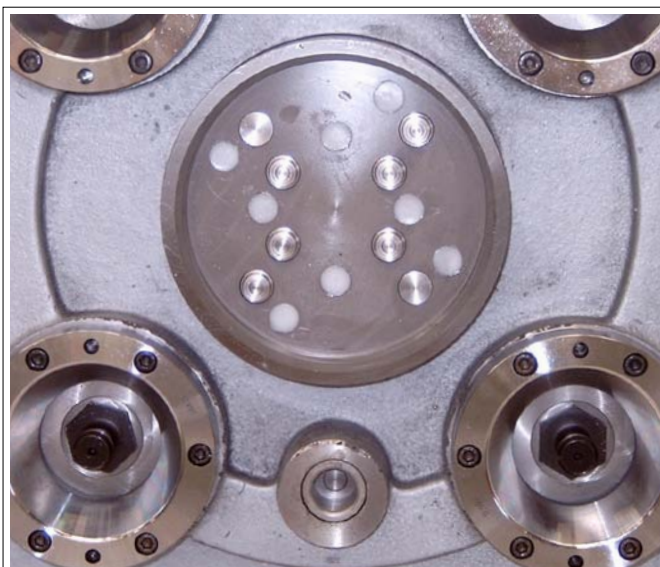


Δp-characteristic with HLP 22, viscosity 34 cst



Separating force

**Separating force:**  
 NW 3 = F [N] = 9,4 x p [bar]  
 NW 5 = F [N] = 15,4 x p [bar]  
 NW 8 = F [N] = 31,4 x p [bar]



Subject to technical alterations.

## No. 6994S

### Plug connection

max. operating pressure 500 bar.



| Order no. | Article no. | Nominal bore [NW] | Ambient temp. [°C] | Weight [g] |
|-----------|-------------|-------------------|--------------------|------------|
| 554415    | 6994S-03    | 3                 | 150                | 4          |
| 554416    | 6994S-05    | 5                 | 150                | 6          |
| 554417    | 6994S-08    | 8                 | 150                | 13         |
| 554418    | 6994S-10    | 10                | 150                | 20         |
| 554419    | 6994S-12    | 12                | 150                | 25         |
| 554420    | 6994S-16    | 16                | 150                | 30         |

### Design:

Housing made from stainless steel, seals made from FKM.

### Application:

For connecting two components at a short distance without using fittings. They are designed for pipeline and screwless pressure oil connection.

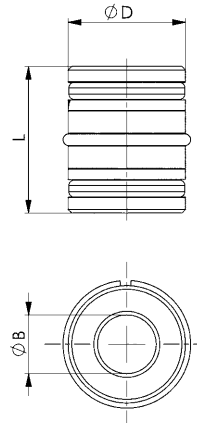
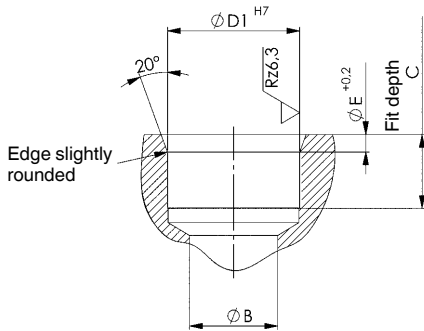
### Note:

The axially effective hydraulic force must be absorbed from the outside by force-locking or form-fit. The force must be determined using the formula  $f = \text{Factor} \times p$  [bar] (e.g. at NW3:  $F = 5 \times p$ ).

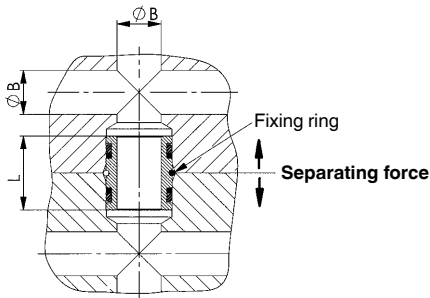
### On request:

Special sizes are available on request.

### Installation dimensions:



### Installation example:



### Separating force:

|             |                  |
|-------------|------------------|
| NW 3=F [N]  | = 5,0 x p [bar]  |
| NW 5=F [N]  | = 7,9 x p [bar]  |
| NW 8=F [N]  | = 15,4 x p [bar] |
| NW 10=F [N] | = 20,1 x p [bar] |
| NW 12=F [N] | = 25,5 x p [bar] |
| NW 16=F [N] | = 38,0 x p [bar] |

### Dimensions:

| Order no. | Article no. | dia. B | dia. D | L  | C min. | dia. D1 H7 | ØE +0.2 |
|-----------|-------------|--------|--------|----|--------|------------|---------|
| 554415    | 6994S-03    | 3      | 8      | 12 | 6      | 8          | 1,5     |
| 554416    | 6994S-05    | 5      | 10     | 14 | 7      | 10         | 1,5     |
| 554417    | 6994S-08    | 8      | 14     | 16 | 8      | 14         | 1,5     |
| 554418    | 6994S-10    | 10     | 16     | 20 | 10     | 16         | 2,4     |
| 554419    | 6994S-12    | 12     | 18     | 20 | 10     | 18         | 2,4     |
| 554420    | 6994S-16    | 16     | 22     | 22 | 11     | 22         | 3,2     |



## ACCESSORIES -

FOR MEDIA TRANSMISSION OF ROTATING CLAMPING DEVICES AND CLAMPING DEVICES THAT HAVE TO BE SEPARATED BY THE PRESSURE GENERATOR AFTER THE CLAMPING OPERATION

- > **ROTARY UNION, SINGLE PASSAGE**
- > **ROTARY COUPLING, UNCONTROLLED AND CONTROLLED**
- > **PALLET DECOUPLER BLOCK**
- > **ACCUMULATOR**

### PRODUCT OVERVIEW:

| Type        | Designation                   | Max. operating pressure [bar] | Nominal bore | Connections inputs | Connections outputs | No. of models | Oil connection |
|-------------|-------------------------------|-------------------------------|--------------|--------------------|---------------------|---------------|----------------|
| 6991-01/-02 | Swivel joint, single passage  | 400                           | 4            | 1                  | 1                   | 2             | thread / pipe  |
| 6991        | Rotary coupling, uncontrolled | 350                           | 5            | 6                  | 6                   | 6             | thread         |
| 6992H-11    | Rotary coupling, controlled   | 350                           | 5            | 1                  | 9                   | 3             | thread         |
| 6992H-21    | Rotary coupling, controlled   | 350                           | 5            | 2                  | 18                  | 3             | thread         |
| 6919-2      | Pallet decoupler block        | 400                           | 4            | 2                  | 4                   | 1             | thread         |
| 6919-20     | Pallet decoupler block        | 400                           | 4            | 3                  | 4                   | 1             | thread         |
| 6919S       | Accumulator                   | 500                           | -            | 1                  | -                   | 2             | thread         |

### PRODUCT EXAMPLES:

NO. 6991-02 AND 6991



- > max. operating pressure: 400 bar
- > max. rpm 25 [1/min.]

NO. 6919-2 AND 6919-20



- > max. operating pressure: 400 bar

NO. 6919S



- > max. operating pressure: 500 bar

## No. 6991-01

### Axial Swivel Joint, single passage

max. operating pressure 400 bar.



| Order no. | Article no. | NG | max. torque [Nm] | max. r.p.m. [1/min] | Md G1/4 [Nm] | Ambient temp. [°C] | Weight [g] |
|-----------|-------------|----|------------------|---------------------|--------------|--------------------|------------|
| 69088     | 6991-01     | 4  | 0,5              | 25                  | 40           | -30 - +80          | 140        |

#### Design:

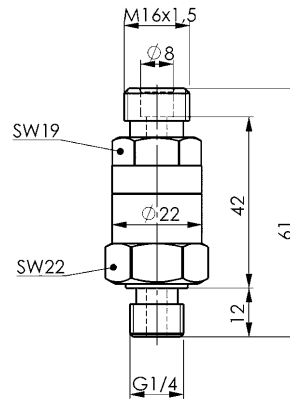
Steel galvanized and yellow passivated. With union nut and cutting ring.

#### Application:

Rotary couplings are used to supply hydraulic oil to systems which can be rotated and swivelled.

#### Note:

Please observe max. operating pressure and max. rpm. Thread G1/4 is sealed by means of a sealing edge according to DIN 3852 Part 2, form B.



## No. 6991-02

### Angle Swivel Joint, 90° single passage

max. operating pressure 400 bar.



| Order no. | Article no. | NG | max. torque [Nm] | max. r.p.m. [1/min] | Md G1/4 [Nm] | Ambient temp. [°C] | Weight [g] |
|-----------|-------------|----|------------------|---------------------|--------------|--------------------|------------|
| 69104     | 6991-02     | 4  | 0,5              | 25                  | 40           | -30 - +80          | 180        |

#### Design:

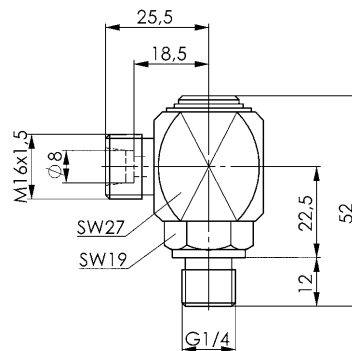
Steel galvanized. With union nut and cutting ring.

#### Application:

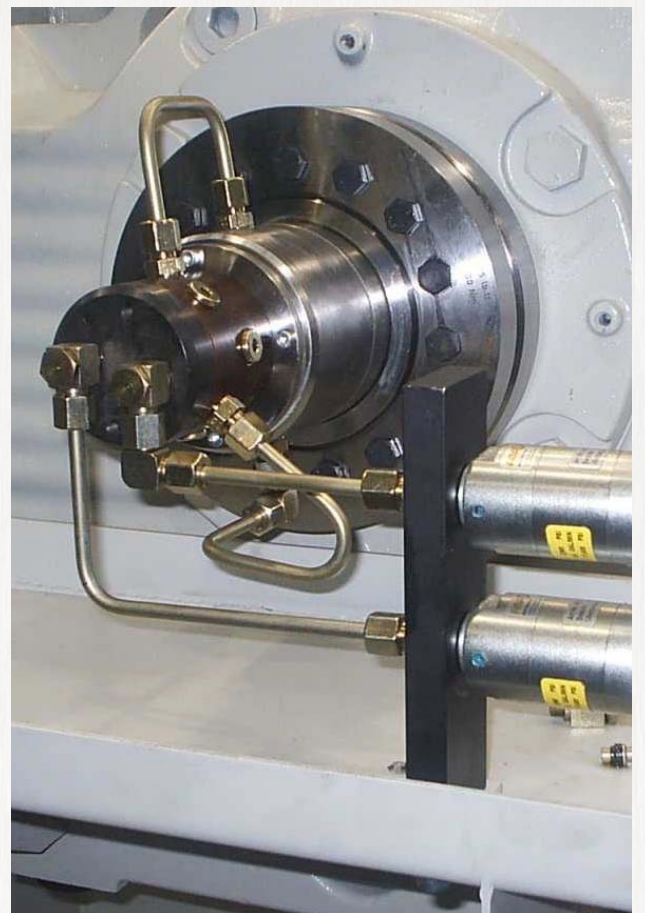
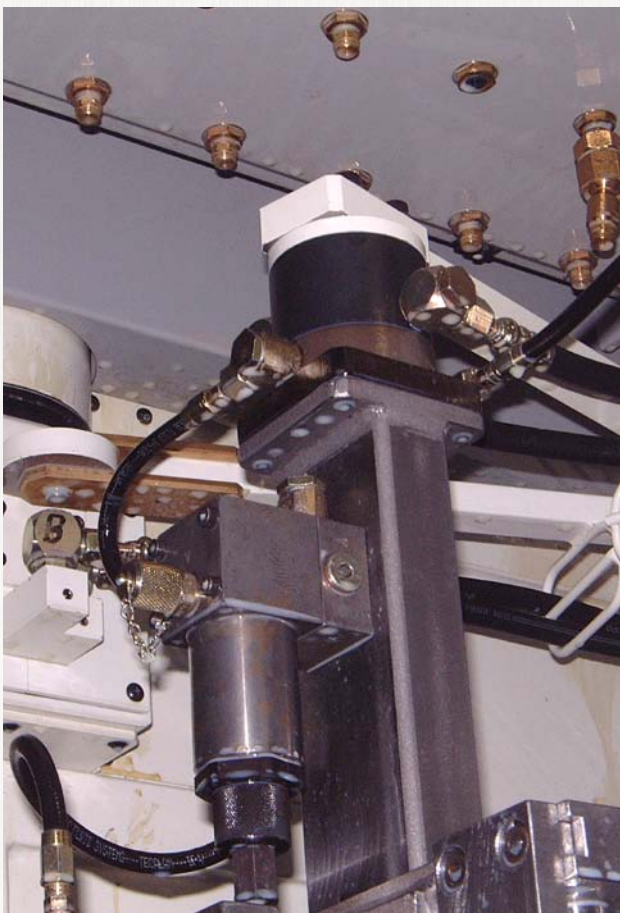
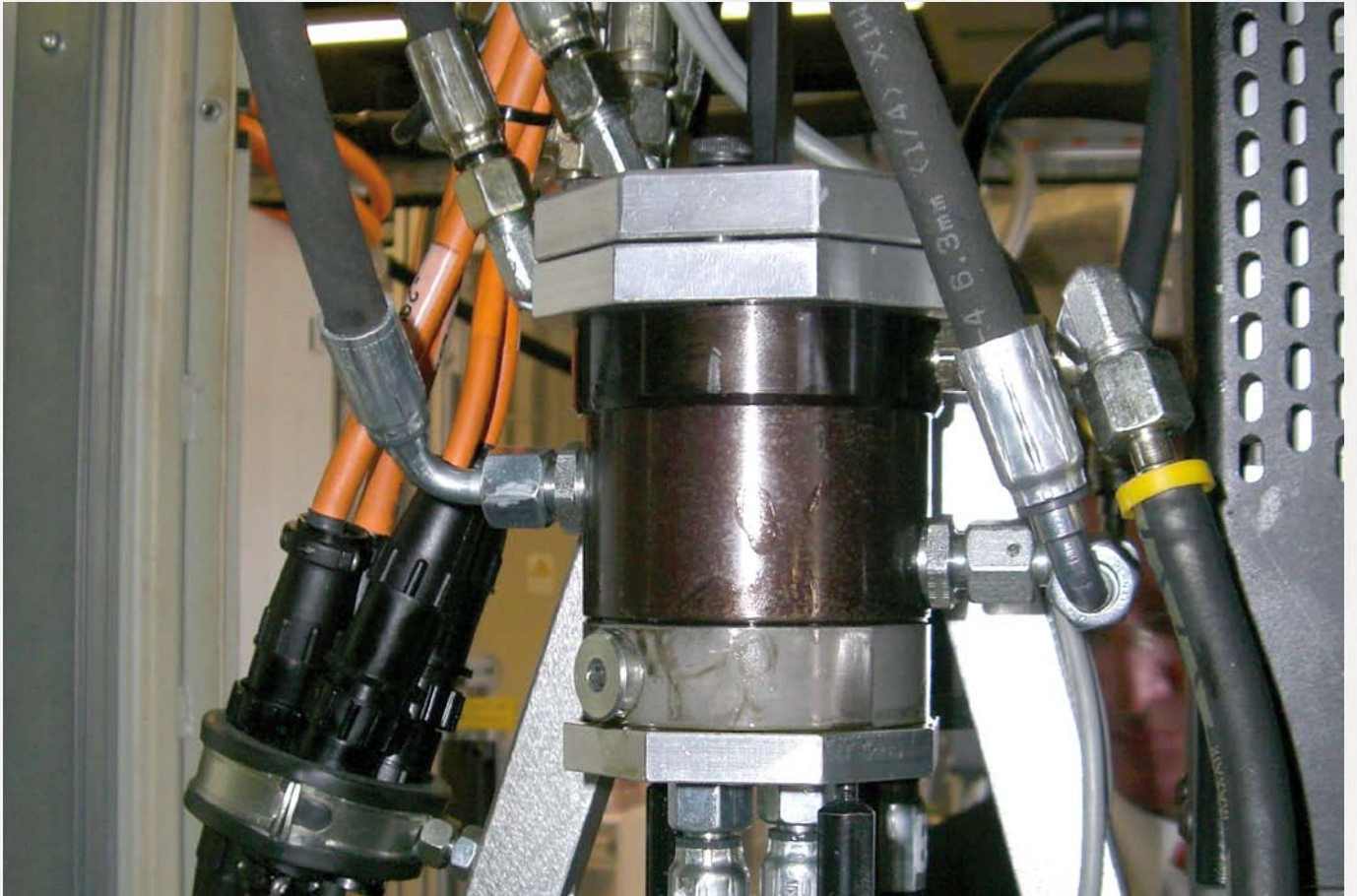
Rotary couplings are used to supply hydraulic oil to systems which can be rotated and swivelled.

#### Note:

Please observe max. operating pressure and max. rpm. Thread G1/4 is sealed by means of a sealing edge according to DIN 3852 Part 2, form B.



Subject to technical alterations.



Subject to technical alterations.

## No. 6991

### Rotary coupling

overflow oil connection not included,  
max. operating pressure 350 bar



| Order no. | Article no. | Connections inputs | Connections outputs | Ambient temp. [°C] | Md max. [Nm] | max. r.p.m. [1/min] | NG | Weight [Kg] |
|-----------|-------------|--------------------|---------------------|--------------------|--------------|---------------------|----|-------------|
| 334185    | 6991-20     | 2                  | 2                   | -10 - +60          | 5,0          | 85                  | 5  | 2,2         |
| 323451    | 6991-40     | 4                  | 4                   | -10 - +60          | 7,5          | 48                  | 5  | 3,8         |
| 323477    | 6991-60     | 6                  | 6                   | -10 - +60          | 14,0         | 40                  | 5  | 5,8         |

### Design:

Rotary feed-through housing from spheroid graphite iron with radial oil connections 1/4" thd. Rotary piston from nitrided, hardened steel with radial and face side oil connections 1/4" thd. The reductions in the face side connections can be use as O-ring connection.

### Application:

Rotary couplings transmit flows of hydraulic oil from a stationary machine component to a rotating one. They are located in the rotary axis of a rotating system. The rotary couplings are generally designed for hydraulic systems. To transmit air flows, they have to be filtered, oiled, and free of water. Single-acting and double-acting cylinders can be connected. Each cylinder channel requires a separate connection on the housing and on the rotor.

### Features:

Because of the high-grade seal packages it is possible to operate at high pressures. Multistrand rotary oil couplings. Long service life. Compact design.

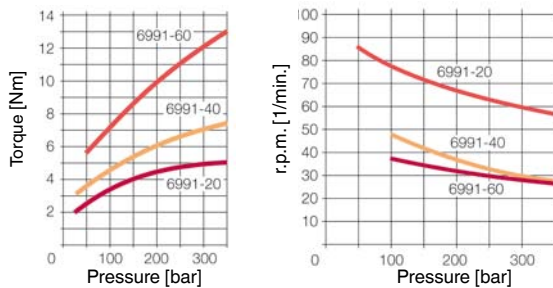
### Note:

Max. pressure and max. rpm must not occur together. See diagrams.

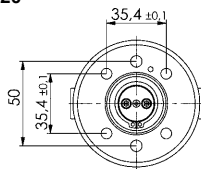
The rotary couplings must be operated without bending forces. We recommend that you screw the rotating housing with the connections to the clamping fixtures and secure the rotary piston only against twisting. Do not introduce any bearing loads! The line connections to the rotary piston must always be made with hoses. The frictional resistance on the seals is pressure-dependent. This must be taken into account when calculating the drive torque for the rotary table. The rotary couplings are fundamentally designed for intermittent operation.

Special versions available on request. See diagrams for minimum and maximum load data.

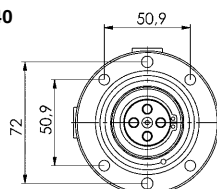
### Diagrams:



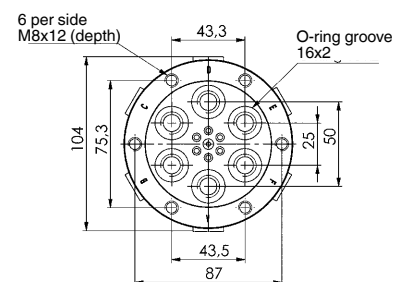
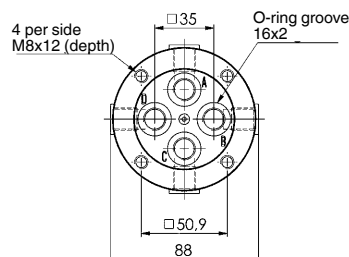
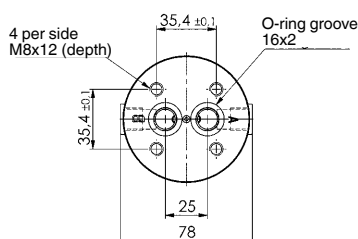
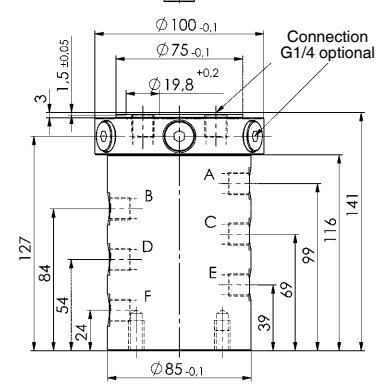
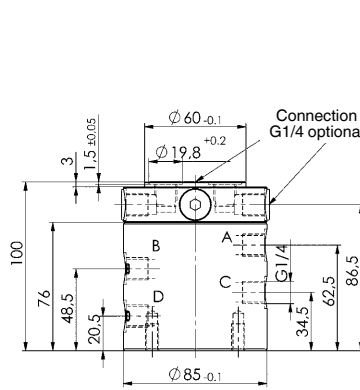
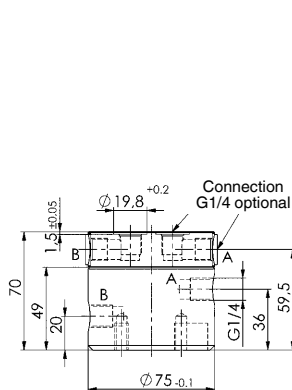
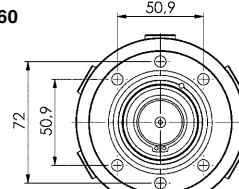
6991-20



6991-40



6991-60



Subject to technical alterations.

## No. 6991

### Rotary coupling

with overflow oil connection,  
max. operating pressure 350 bar



| Order no. | Article no. | Connections inputs | Connections outputs | Ambient temp. [°C] | Md max. [Nm] | max. r.p.m. [1/min] | NG | Weight [Kg] |
|-----------|-------------|--------------------|---------------------|--------------------|--------------|---------------------|----|-------------|
| 445536    | 6991-21     | 2                  | 2                   | -10 - +60          | 5,0          | 85                  | 5  | 2,5         |
| 323493    | 6991-41     | 4                  | 4                   | -10 - +60          | 7,5          | 48                  | 5  | 4,2         |
| 323519    | 6991-61     | 6                  | 6                   | -10 - +60          | 14,0         | 40                  | 5  | 6,2         |

### Design:

Rotary feed-through housing from spheroid graphite iron with radial oil connections 1/4" thd. Rotary piston from nitrided, hardened steel with radial and front oil connections 1/4" thd. The reductions in the face side connections can be use as O-ring connection. Cover from hardened steel with radial 1/8" thd. oil connection for leaked oil discharge.

### Application:

Rotary couplings transmit flows of hydraulic oil from a stationary machine component to a rotating one. They are located in the rotary axis of a rotating system. The rotary couplings are generally designed for hydraulic systems. To transmit air flows, they have to be filtered, oiled, and free of water. Single-acting and double-acting cylinders can be connected. Each cylinder channel requires a separate connection on the housing and on the rotor.

### Features:

Because of the high-grade seal packages it is possible to operate at high pressures. Multistrand rotary oil couplings. Long service life. Compact design.

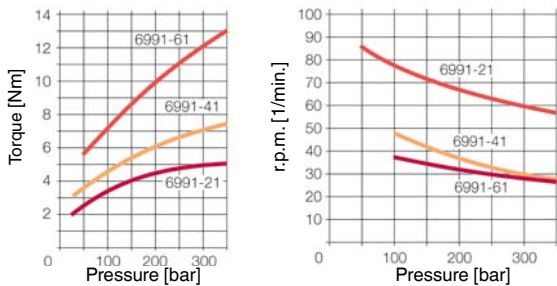
### Note:

Max. pressure and max. rpm must not occur together. See diagrams.

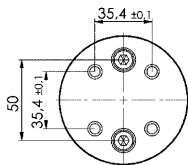
The rotary couplings must be operated without bending forces. We recommend that you screw the rotating housing with the connections to the clamping fixtures and secure the rotary piston only against twisting. Do not introduce any bearing loads! The line connections to the rotary piston must always be made with hoses. The frictional resistance on the seals is pressure-dependent. This must be taken into account when calculating the drive torque for the rotary table. The rotary couplings are fundamentally designed for intermittent operation.

Special versions available on request. See diagrams for minimum and maximum load data.

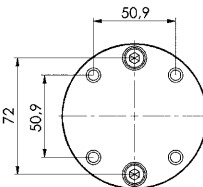
### Diagrams:



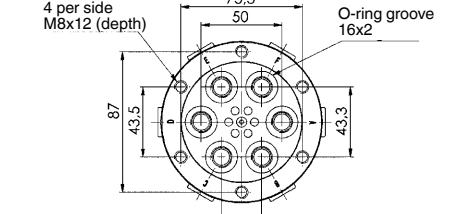
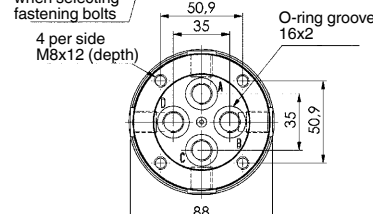
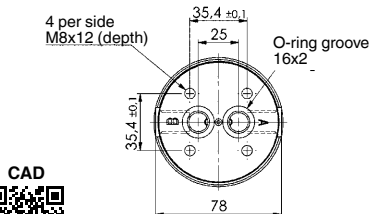
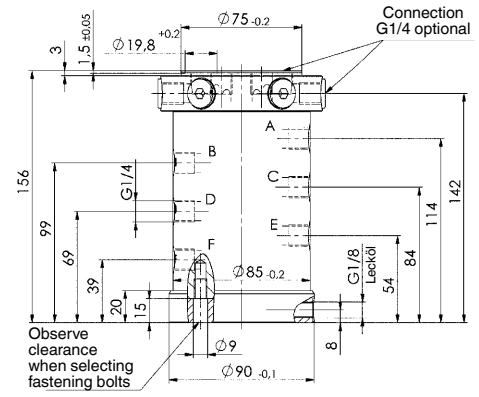
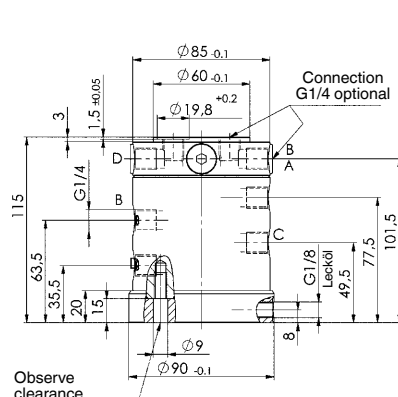
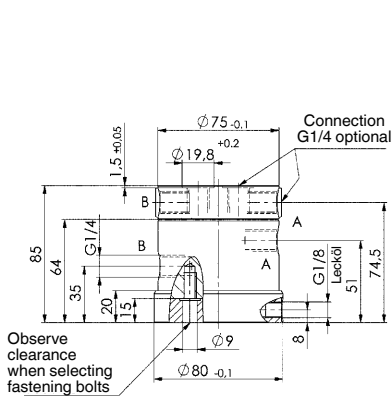
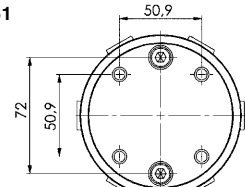
6991-21



6991-41



6991-61

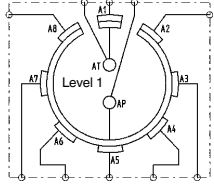


Subject to technical alterations.

## No. 6992H-11

### Rotary coupling

controlled, single-acting.  
One loading and unloading station,  
max. operating pressure 350 bar



| Order no. | Article no. | Connections inputs loading | Connections inputs processing | Connections outputs loading | Connections outputs processing | Ambient temp. [°C] | Q max. [l/min] | NG | Weight [Kg] |
|-----------|-------------|----------------------------|-------------------------------|-----------------------------|--------------------------------|--------------------|----------------|----|-------------|
| 324533    | 6992H-11-06 | 1                          | 1                             | 1                           | 5                              | -10 - +60          | 8              | 5  | 3,6         |
| 324541    | 6992H-11-08 | 1                          | 1                             | 1                           | 7                              | -10 - +60          | 8              | 5  | 3,5         |
| 324558    | 6992H-11-10 | 1                          | 1                             | 1                           | 9                              | -10 - +60          | 8              | 5  | 3,5         |

### Design:

Rotary feed-through housing from spheroid graphite iron with radial oil connections 1/4" thd. Rotary piston from nitrided, hardened steel with radial and front oil connections 1/4" thd. The reductions in the face side connections can be used as O-ring connections.

### Application:

Rotary couplings transmit flows of hydraulic oil from a stationary machine component to a rotating one. They are located in the rotary axis of a rotating system. The controlled rotary couplings may only be operated with hydraulic oil. Types 6992H-11 are designed for single-acting cylinders. One loading/unloading station and 5, 7 or 9 processing stations can be connected.

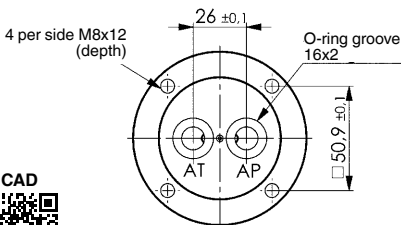
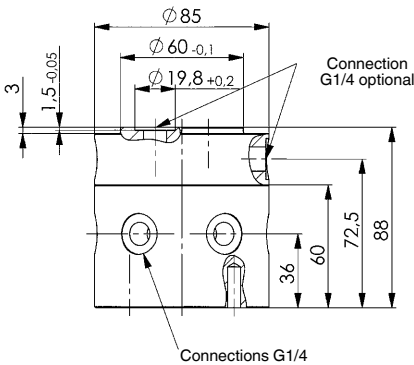
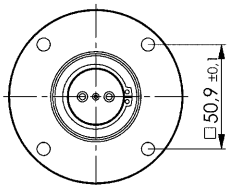
### Features:

Rotary vane construction. Multiple hydraulic cylinders are supplied with hydraulic oil simultaneously. At the same time, a loading and/or unloading station can be controlled via directional valves for clamping and/or unclamping. High operating pressures due to high-quality components and seals. Compact design. Long service life.

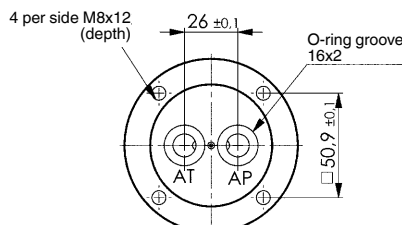
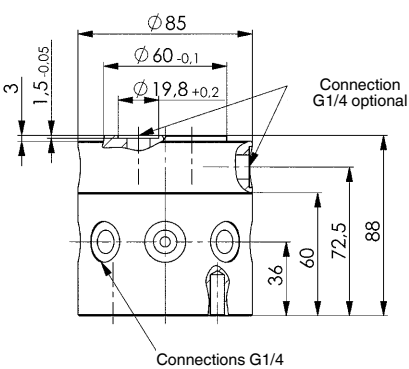
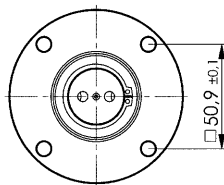
### Note:

The controlled rotary couplings can only be used for cyclic operation or at very low rpms. The rotary couplings must be operated without bending forces. We recommend that you screw the rotating housing with the connections to the clamping fixtures, and to secure the rotary pistons only against twisting. Do not introduce any bearing loads! The connections to the rotary pistons must always be via hoses. At operating pressures above 200 bar oil losses occur when the loading and unloading station are unloaded; this can be compensated for using an accumulator. The accumulator that is selected must have the appropriate safety equipment and comply with the safety regulation of the country concerned. We recommend the use of directional seat valves for controlling the rotary couplings.

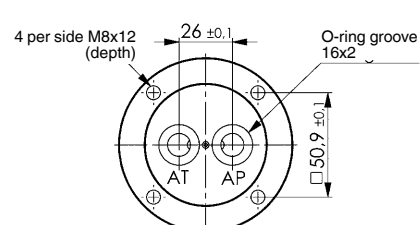
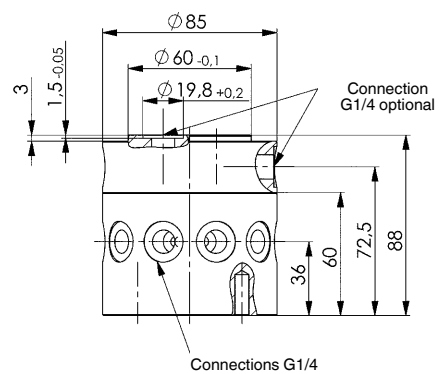
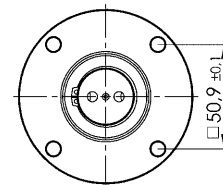
6992H-11-06



6992H-11-08



6992H-11-10

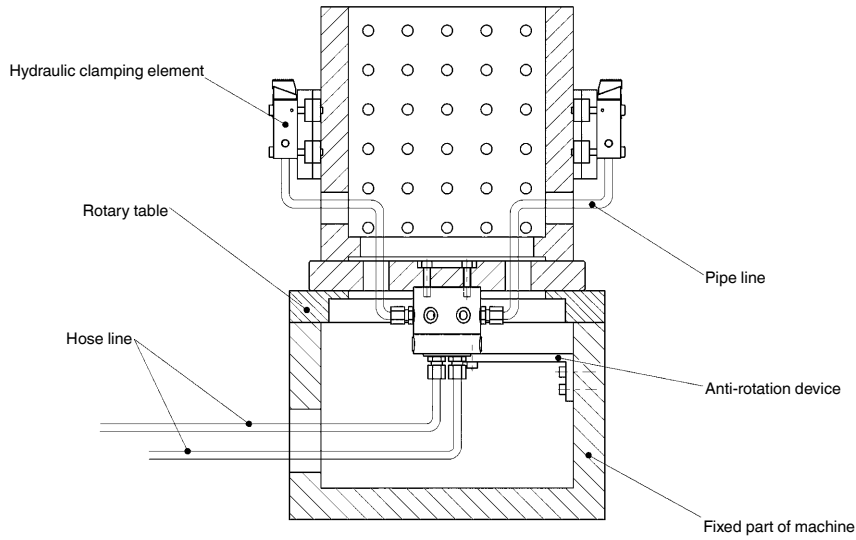


CAD



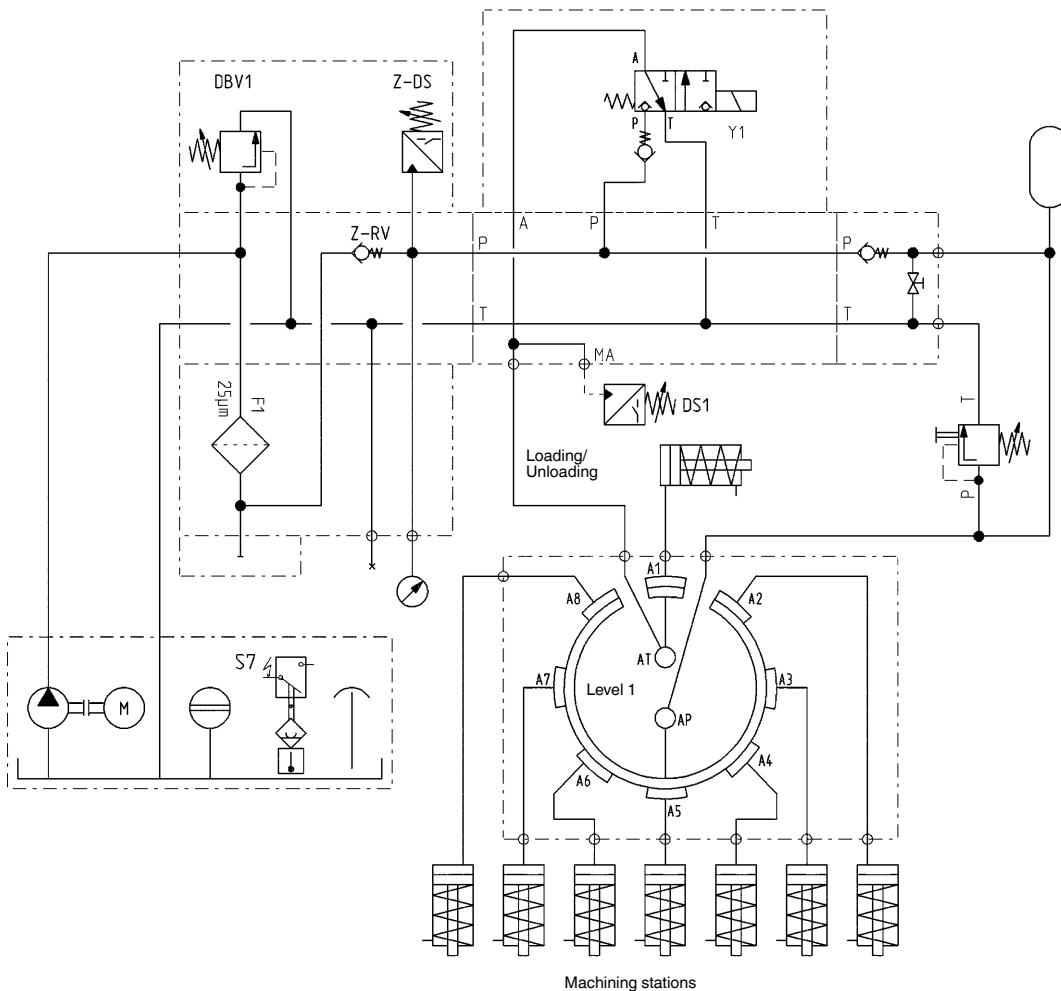
Subject to technical alterations.

## Application example:



## Example of schematic:

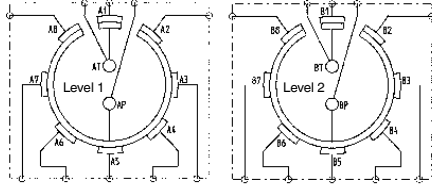
**Rotary union single acting, controlled, 1 x loading, 7 x machining**  
 The loading and unloading station is controlled by a 3/2 way valve. The machining stations are directly controlled by the pump. The separation of loading and unloading station and machining stations by the rotary union is not leakagefree. Leakage increases with pressure. A pressure accumulator can be used for leakage compensation. The next cycle must only be performed when the loading or unloading station is clamped.



## No. 6992H-21

### Rotary coupling

controlled, double-acting.  
One loading and unloading station,  
max. operating pressure 350 bar



| Order no. | Article no. | Connections inputs loading | Connections inputs processing | Connections outputs loading | Connections outputs processing | Ambient temp. [°C] | Q max. [l/min] | NG | Weight [Kg] |
|-----------|-------------|----------------------------|-------------------------------|-----------------------------|--------------------------------|--------------------|----------------|----|-------------|
| 324566    | 6992H-21-06 | 2                          | 2                             | 2                           | 10                             | -10 - +60          | 8              | 5  | 4,1         |
| 324574    | 6992H-21-08 | 2                          | 2                             | 2                           | 14                             | -10 - +60          | 8              | 5  | 4,0         |
| 324582    | 6992H-21-10 | 2                          | 2                             | 2                           | 18                             | -10 - +60          | 8              | 5  | 3,9         |

### Design:

Rotary feed-through housing from spheroid graphite iron with radial oil connections 1/4" thd. Rotary piston from nitrided, hardened steel with radial and front oil connections 1/4" thd. The reductions in the face side connections can be used as O-ring connections.

### Application:

Rotary couplings transmit flows of hydraulic oil from a stationary machine component to a rotating one. They are located in the rotary axis of a rotating system. The controlled rotary couplings may only be operated with hydraulic oil. Types 6992H-21 are designed for double-acting cylinders. One double-acting loading/unloading station and 5, 7 or 9 double-acting processing stations can be connected.

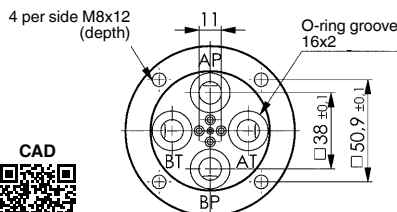
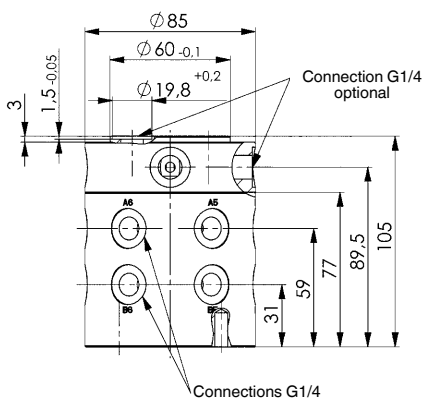
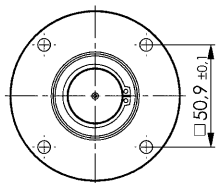
### Features:

Rotary vane construction. Multiple hydraulic cylinders are supplied with hydraulic oil simultaneously. At the same time, a loading and/or unloading station can be controlled via directional valves for clamping and/or unclamping. High operating pressures due to high-quality components and seals. Compact design. Long service life.

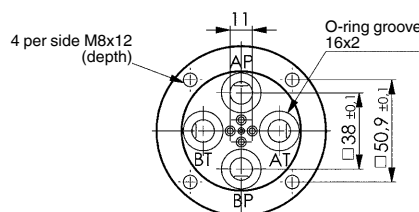
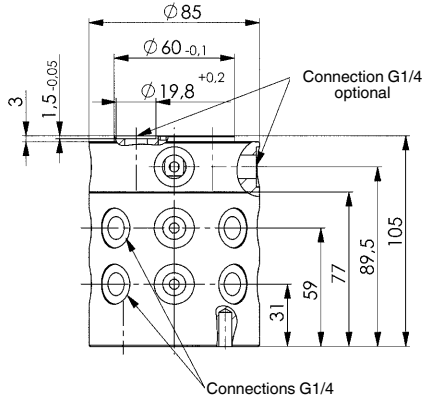
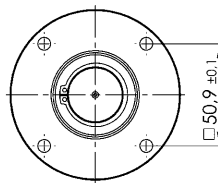
### Note:

The controlled rotary couplings can only be used for cyclic operation or at very low rpms. The rotary couplings must be operated without bending forces. In contrast to the uncontrolled versions, we recommend that you screw the rotating housing with the connections to the clamping fixtures, and to secure the rotary pistons only against twisting. Do not introduce any bearing loads! The connections to the rotary pistons must always be via hoses. At operating pressures above 200 bar oil losses occur when the loading and unloading station are unloaded; this can be compensated for using an accumulator. The accumulator that is selected must have the appropriate safety equipment and comply with the safety regulation of the country concerned. We recommend the use of directional seat valves for controlling the rotary couplings.

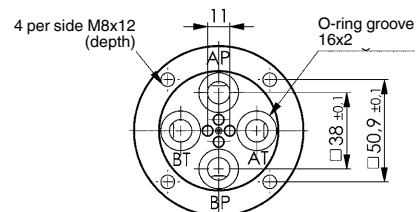
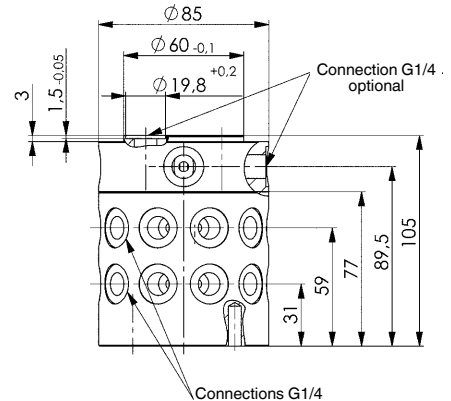
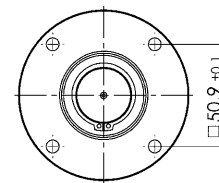
6992H-21-06



6992H-21-08



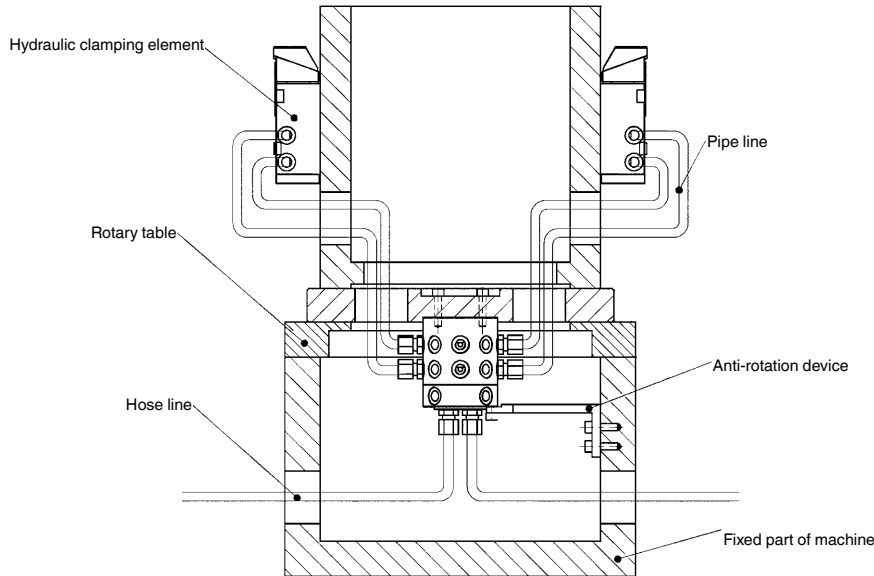
6992H-21-10



Subject to technical alterations.

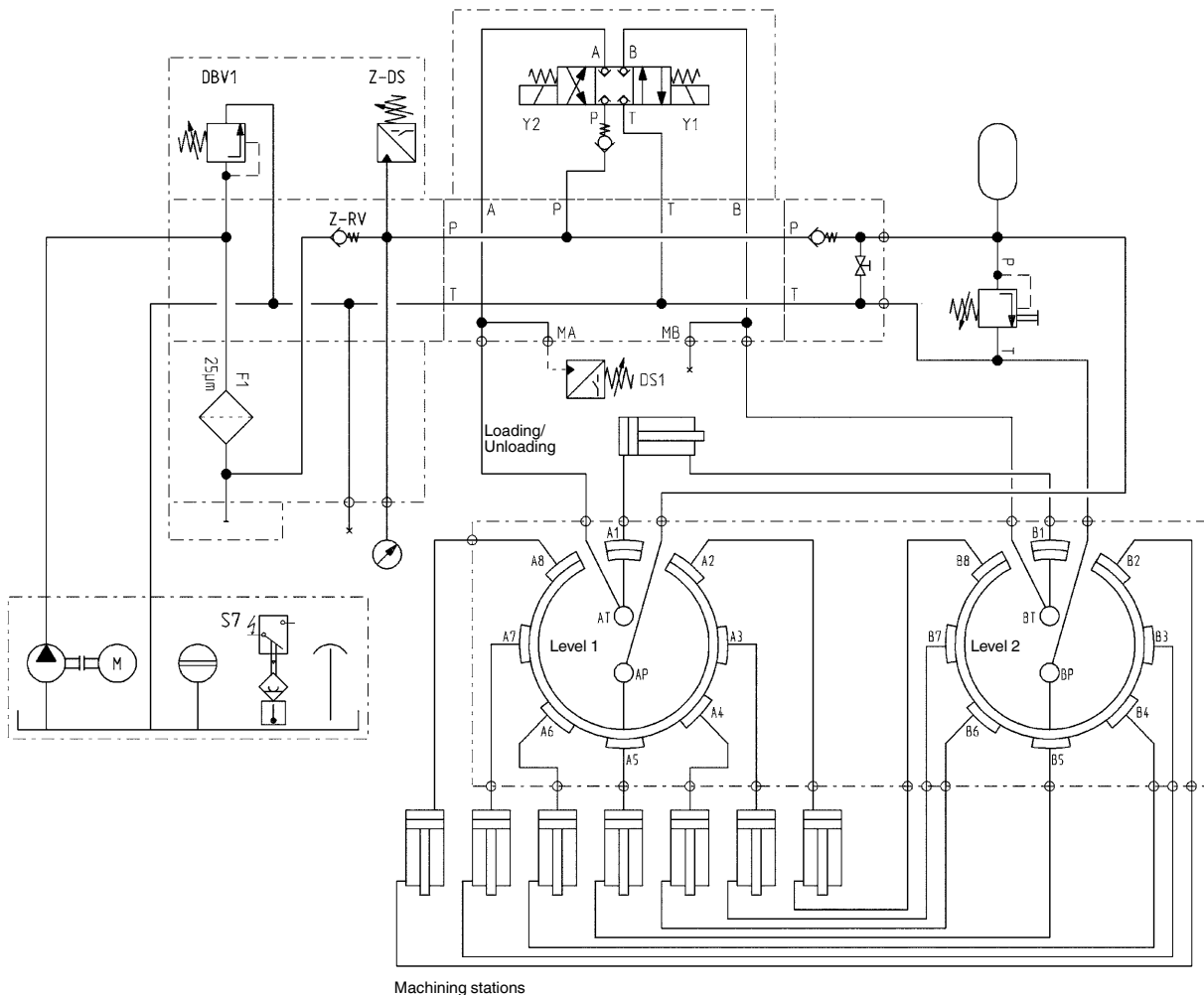


## Application example:



## Example of schematic:

**Rotary union double acting, controlled, 1 x loading, 7 x machining**  
 The loading and unloading station is controlled by a 4/3 way valve. The machining stations are directly controlled by the pump. The separation of loading and unloading station and machining stations by the rotary union is not leakagefree. Leakage increases with pressure. A pressure accumulator can be used for leakage compensation. The next cycle must only be performed when the loading or unloading station is clamped.



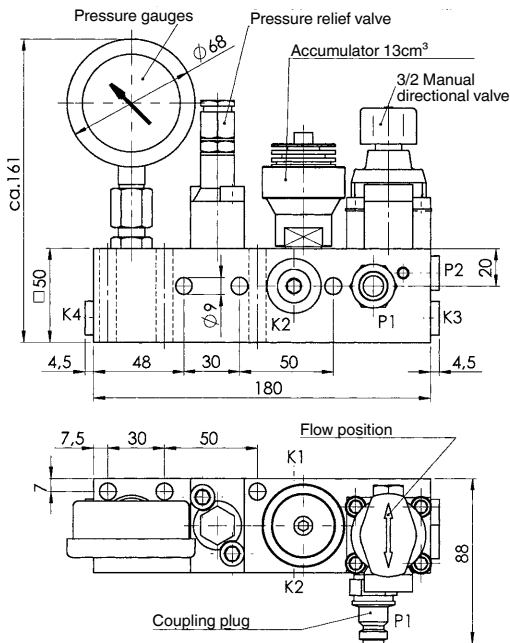
Machining stations

Subject to technical alterations.

## No. 6919-2

### Pallet Decoupler Block

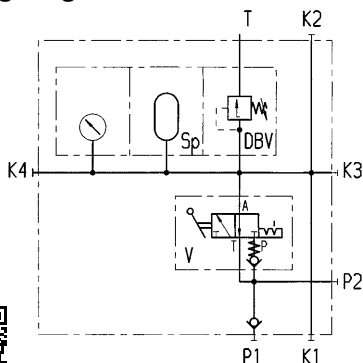
for single acting cylinders,  
max. operating pressure 400 bar.



### Wiring diagram symbols:

- = Pressure gauges, Order no. 161414
- SP = Accumulator, Order no. 67645
- DBV = Pressure relief valve, Order no. 181222
- V = 3/2 Manual directional valve, Order no. 114298
- K1-K4 = Pressure outputs (Threaded plug), Order no. 69419
- P1 = Pressure input (Coupling plug), Order no. 69039
- P2 = Pressure input (Threaded plug), Order no. 69419
- T = Release opening DBV

### Wiring diagram:



| Order no. | Article no. | Set gas preload p0 [bar] | Reservoir volume [cm³] | NG | Q max. [l/min] | Connections inputs P1+P2 | Connections outputs K1 to K4 | Weight [g] |
|-----------|-------------|--------------------------|------------------------|----|----------------|--------------------------|------------------------------|------------|
| 61168     | 6919-2      | 80*                      | 13                     | 4  | 7,5            | G1/4                     | G1/4                         | 4400       |

\* Adjustable between 20 and 250 bar at works (on request).

### Design:

- Distributor made of phosphatized steel
- 3/2-way manual seat valve
- Accumulator
- Pressure-relief valve set to 400 bar
- Pressure gauge (600 bar; nom. size 63; with glycerin damping)
- Coupling connector No. 6990 G1/4 S and fittings

### Application:

The main application for the pallet decoupler block is to maintain pressure at fixtures which are disconnected from the pump unit during the machining process. For example on flexible machining centers with pallet changing systems. With tight hydraulic elements a loss in pressure shall be limited to 2 bar/h (see diagram). The integrated accumulator can compensate for a leakage-oil quantity of approx. 6 cm³ in the range from 150 to 400 bar. The pressure input is connected to P1 or P2 and observed by the pressure gauge.

1. Couple pump unit with pallet decoupler block.
2. Switch manual seat valve to flow.
3. Remove workpiece or insert a new.
4. Operate pump unit (clamp).
5. Once pressure has been built up (check at pressure gauge), the seat valve must be set to close.
6. Operate pump unit (unclamp).
7. The pump unit is uncoupled from the pallet decoupler block.

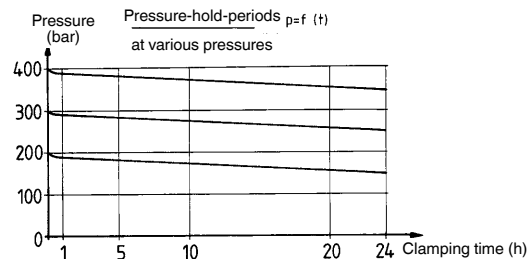
### Features:

After disconnecting the pump unit the clamping fixture cannot be depressurized even by operating the seat valve. Compact design. Load outputs (K1 to K4).

### Note:

1. If the seat valve is opened in the uncoupled condition, it cannot be coupled again. The seat valve must then be switched to close. Loosen the coupling connector SW (AF) to depressurize 22 and then tighten again.
2. The clamping point can also have pressure applied when the seat valve is set to close.

### Diagram:



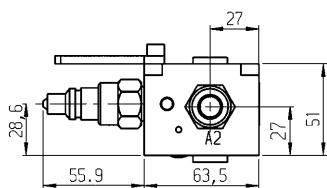
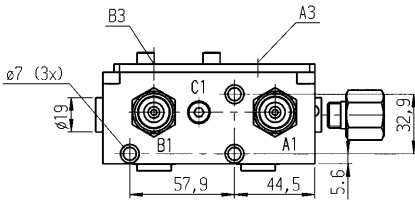
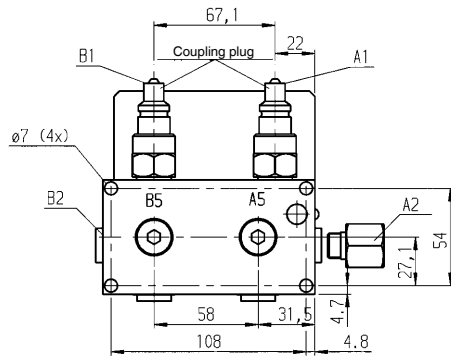
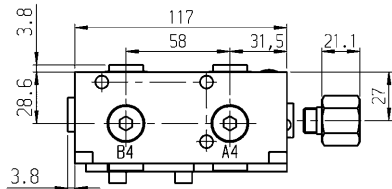
Subject to technical alterations.



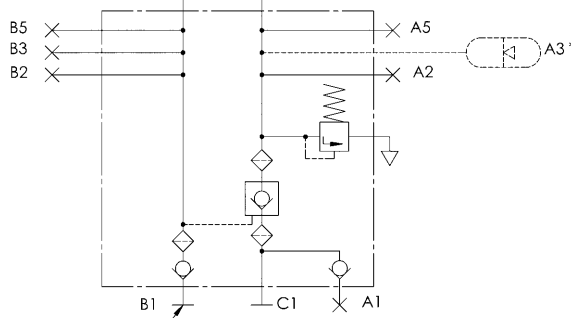
## No. 6919-20

### Pallet Decoupler Block

for double acting cylinders,  
max. operating pressure 400 bar.



### Wiring diagram:



The pressure for unclamping must be at least 20% of the clamping pressure.

A3 \* Pressure accumulator necessary for functioning.



| Order no. | Article no. | Q<br>[l/min] | Outputs clamp A2 to A5 | Outputs unclamp B2 to B5 | Weight<br>[g] |
|-----------|-------------|--------------|------------------------|--------------------------|---------------|
| 320002    | 6919-20     | 7,5          | G1/4                   | G1/4                     | 2572          |

### Design:

Manifold made of steel, blued. Integrated, fixed set pressure relief valve. 4 connections for consumers, pressure tank and manometer. Including coupling connector No. 6919-20S, order no. 320010 and G1/4 adapter for connection A2. A filter is integrated in the forward and return line.

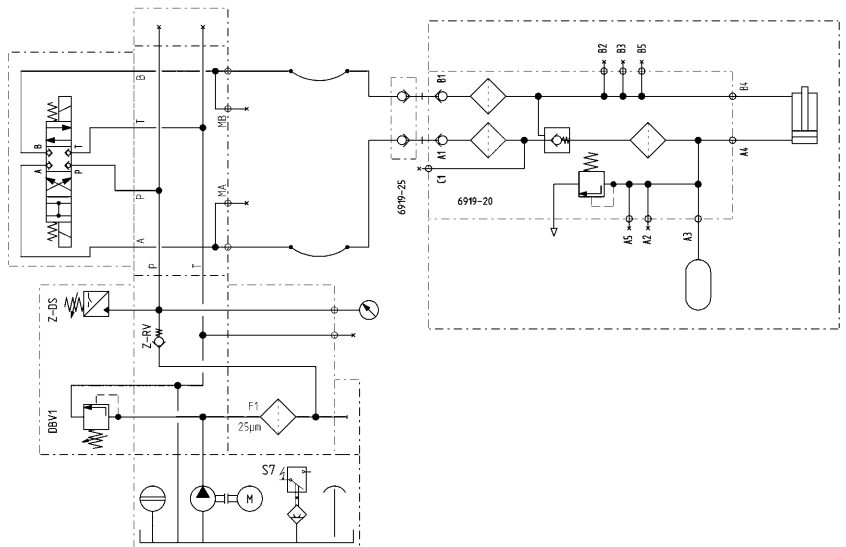
### Application:

The main application for the pallet decoupler block is to maintain hydraulic pressure at fixtures which are disconnected from the pressure generator during the machining process. For example on flexible machining centers with pallet changing system. Possible small oil leakage are compensated in a particular pressure range by the attached accumulator. Please see technical details of the used accumulator (No. 6919-13 or No. 6919-40). During coupling clamping circuit and return drive circuit must be without pressure.

### Note:

The use of an accumulator no. 6919S-013/040 in the clamping circuit is necessary. For visual pressure observation, a pressure gauge no. 6983-1 shall be attached.

### Hydraulic diagram:

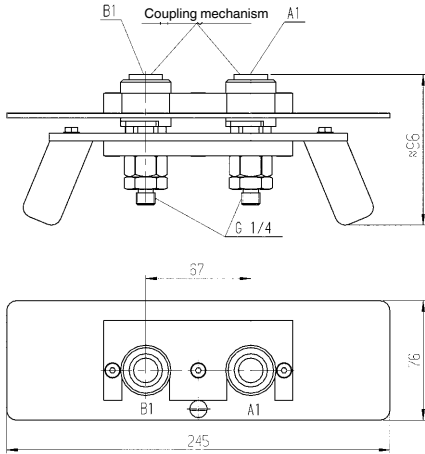


Subject to technical alterations.

## No. 6919-25

### Coupling Unit for Pallet Decoupler Block

max. operating pressure 400 bar.



| Order no. | Article no. | Q<br>[l/min] | Weight<br>[g] |
|-----------|-------------|--------------|---------------|
| 320028    | 6919-25     | 7,5          | 2200          |

#### Design:

The coupling unit consists out of two coupling mechanism No. 6919-25M, order no. 320036 for clamping and unclamping circuit. The coupling elements are mounted to an adapter with handle and disengaging mechanism.

#### Application:

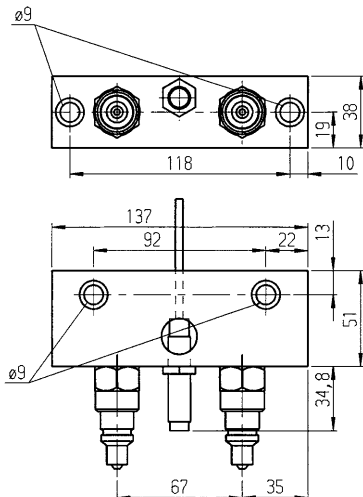
The coupling unit is used to connect the oil supply with the pallet decoupler block No. 6919-20.

#### Features:

Simple handling due two hand operation. Interchanging of connections is impossible.

## No. 6919-30

### Store Station for Coupling Unit



| Order no. | Article no. | Weight<br>[g] |
|-----------|-------------|---------------|
| 320044    | 6919-30     | 1837          |

#### Design:

Safety sensor switch integrated and coupling connector No. 6919-20S, order no. 320010.

#### Application:

The store station is used as holder for the coupling unit after decoupling from the pressure tank switch unit.

#### Features:

If used with your machine control, the signal of the safety sensor switch, can ensure that the fixture pallet cannot be moved before the coupling unit is disconnected and removed correctly from the pallet decoupler block.



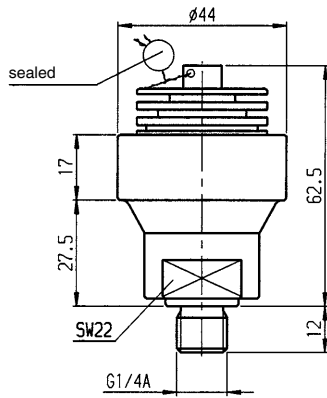
Subject to technical alterations.

## No. 6919S

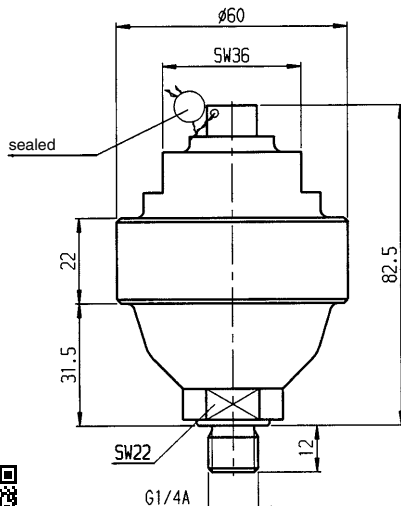
### Accumulator



6919S-013



6919S-040



| Order no. | Article no. | Reservoir volume [cm <sup>3</sup> ] | Gas preload p <sub>0</sub> max. [bar] | Set gas preload p <sub>0</sub> [bar] | max. perm. over-pressure [bar] | Ambient temp. [°C] | Weight [g] |
|-----------|-------------|-------------------------------------|---------------------------------------|--------------------------------------|--------------------------------|--------------------|------------|
| 67645     | 6919S-013   | 13                                  | 250                                   | 80                                   | 500                            | -20 - +60          | 300        |
| 67637     | 6919S-040   | 40                                  | 250                                   | 80                                   | 400                            | -20 - +60          | 650        |

### Design:

- Hydro diaphragm reservoir
- Filling gas = nitrogen, class 4.0
- Pressure fluid: hydraulic oil acc. to DIN 51524 Part 1 and 2; viscosity ISO VG 10 to ISO VG 68 acc. DIN 51519.
- Thread G1/4 A, DIN ISO 228/1 with sealing edge.

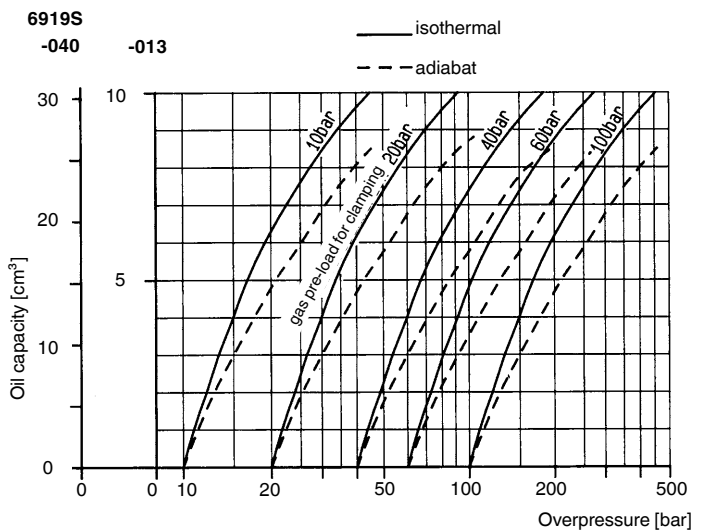
### Application:

- For short-term compensation of oil losses in stand-by operation;
- to support during switching procedures in hydraulic circuits;
- to compensate for pressure peaks when switching valves;
- for compensation of volume changes of closed circuits in case of temperature changes.

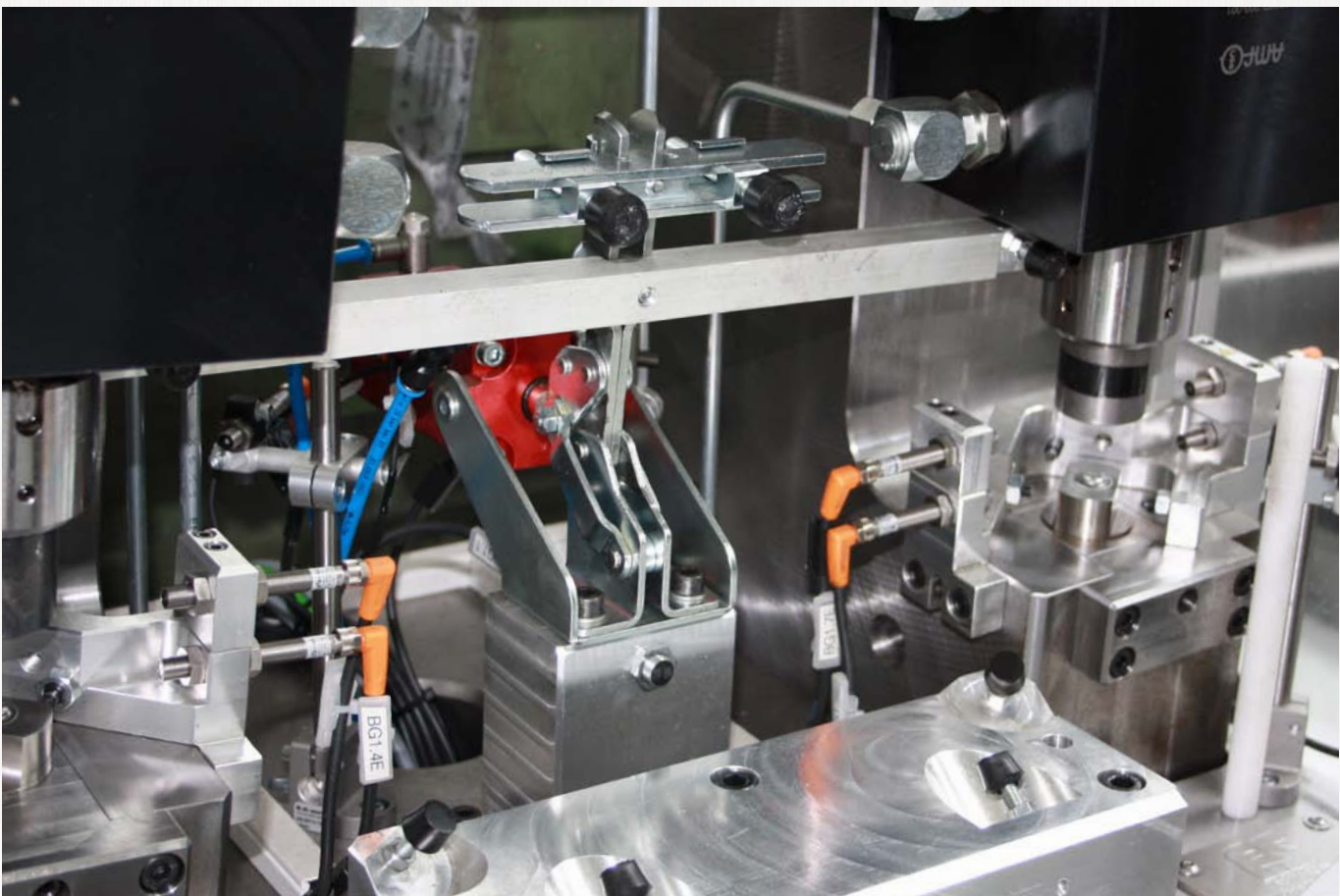
### Note:

The reservoirs are manufactured, checked and marked according to the technical rules for pressure containers (TRB). Max. permissible operating pressure ratios p<sub>2</sub> max : p<sub>1</sub> max isothermal = 4:1  
Max. permissible operating pressure ratios p<sub>2</sub> max : p<sub>1</sub> max adiabatic = 3:1.

### Diagram:



Subject to technical alterations.



Subject to technical alterations.

## ACCESSORIES -

FOR PROTECTING PRESSURE  
GENERATORS AND HYDRAULIC  
COMPONENTS

- > FILTER
- > FILTER WITH RECTIFIER CIRCUIT
- > PLUG-IN FILTER

### PRODUCT OVERVIEW:

| Type  | Designation                   | Max. operating pressure [bar] | Filtration [ $\mu\text{m}$ ] | No. of models | Oil connection   |
|-------|-------------------------------|-------------------------------|------------------------------|---------------|------------------|
| 6981  | Filter                        | 400                           | 10, 25, 40                   | 3             | thread           |
| 6981E | Filter                        | 400                           | 10, 25, 40                   | 3             | thread           |
| 6981G | Filter with rectifier circuit | 400                           | 10, 25, 40                   | 3             | thread           |
| 6981  | Filter, cartridge design      | 400                           | 10, 25, 40                   | 3             | cartridge design |
| 6981E | Filter, threaded design       | 500                           | 10, 25, 40, 100              | 4             | threaded design  |
| 6981P | Filter, cartridge design      | 250                           | 25, 40, 100                  | 3             | cartridge design |

### PRODUCT EXAMPLES:

NO. 6981 AND 6981E



> max. operating pressure: 400 bar

NO. 6981G



> max. operating pressure: 400 bar

NO. 6981, 6981E AND 6981P

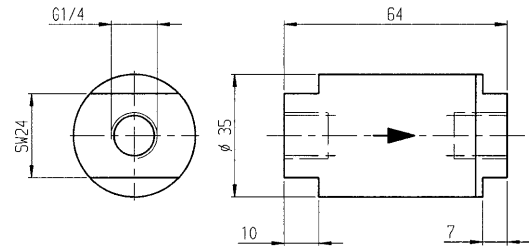
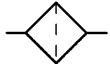


> max. operating pressure: 500 bar

## No. 6981

### Filter

max. operating pressure 400 bar



| Order no. | Article no.  | Filteration       | Weight |
|-----------|--------------|-------------------|--------|
|           |              | [ $\mu\text{m}$ ] | [g]    |
| 63966     | 6981-10-G1/4 | 10                | 380    |
| 320051    | 6981-25-G1/4 | 25                | 380    |
| 320069    | 6981-40-G1/4 | 40                | 380    |

### Design:

Housing out of steel, zinc plated. Filter insert out of stainless steel, with o-ring. Pre-filtration by filter disc. Filter insert out of wire web.

### Application:

The Filters are used as an additional safety in order to protect the hydraulic components in the oil circuit. The filter can be located direct in pipes, in front of distributors or in fittings. For example:

- 10  $\mu\text{m}$  input Intensifier
- 25  $\mu\text{m}$  input valves
- 40  $\mu\text{m}$  input pump units or hydraulic cylinder

### Note:

The smaller the filtration is chosen, as bigger the flow resistance will be.

The degree of soiling of the filter must be checked. Due to the design of the housing the exchange of the filter insert is simple. The direction of oil flow has to be considered. The installation position can be chosen freely.

Replacement part:

Filter insert 10  $\mu\text{m}$ , Order No. 320077

Filter insert 25  $\mu\text{m}$ , Order No. 320085

Filter insert 40  $\mu\text{m}$ , Order No. 320093

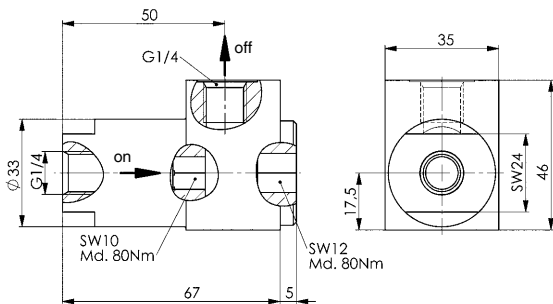
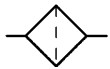
CAD



## No. 6981E

### Filter

max. operating pressure 400 bar.



| Order no. | Article no.   | Filteration       | Weight |
|-----------|---------------|-------------------|--------|
|           |               | [ $\mu\text{m}$ ] | [g]    |
| 323626    | 6981E-10-G1/4 | 10                | 540    |
| 323642    | 6981E-25-G1/4 | 25                | 540    |
| 323667    | 6981E-40-G1/4 | 40                | 540    |

### Design:

Body made of steel, zinc-plated. Filter insert of aluminium. Filter material of pleated metal fibre felt.

### Application:

The Filters are used as an additional safety in order to protect the hydraulic components in the oil circuit. The filter can be located direct in pipes, in front of distributors or in fittings.

For example:

- 10  $\mu\text{m}$  input Intensifier
- 25  $\mu\text{m}$  input valves
- 40  $\mu\text{m}$  input pump units or hydraulic cylinder.

### Note:

The smaller the filtration is chosen, as bigger the flow resistance will be.

The degree of soiling of the filter must be checked. Due to the design of the housing the exchange of the filter insert is simple. The direction of oil flow has to be considered. The installation position can be chosen freely.

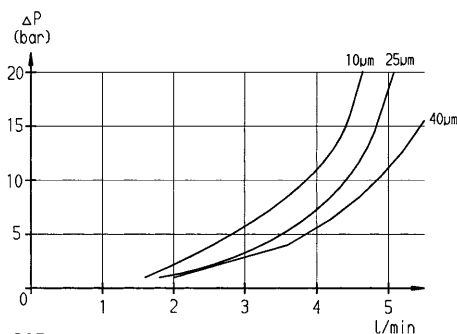
Replacement part:

Filter insert 10  $\mu\text{m}$ , Order No. 323683

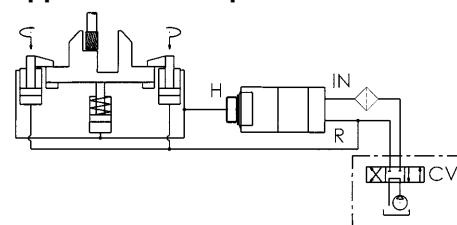
Filter insert 25  $\mu\text{m}$ , Order No. 323709

Filter insert 40  $\mu\text{m}$ , Order No. 323725

### Flow-diagram:



### Application example:



CAD

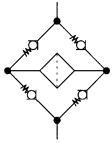


Subject to technical alterations.



**No. 6981G**
**Filter with rectifier circuit**

max. operating pressure 400 bar.



| Order no. | Article no.   | Filteration       | Weight |
|-----------|---------------|-------------------|--------|
|           |               | [ $\mu\text{m}$ ] | [g]    |
| 321901    | 6981G-10-G1/4 | 10                | 1510   |
| 321927    | 6981G-25-G1/4 | 25                | 1510   |
| 321968    | 6981G-40-G1/4 | 40                | 1510   |

**Design:**

Body from zinc-plated steel. Filter insert from aluminium. Filter material from pleated metal fibre.

**Application:**

The filters are employed as additional and safety filters for protecting hydraulic components in the oil circuit. They can be used as a pipeline or mounted element with O-ring connection. The flow through these filters is always from outside to inside, regardless of whether they are in the flow or return circuit. This prevents the whirl-up of dirt particles on the filter element.

**Note:**

The finer the filter, the greater the flow resistance.

The degree of soiling must be checked and the filter elements replaced at regular intervals. The large threaded plug on the side must be removed to replace the filter element. The filter element can then be removed.

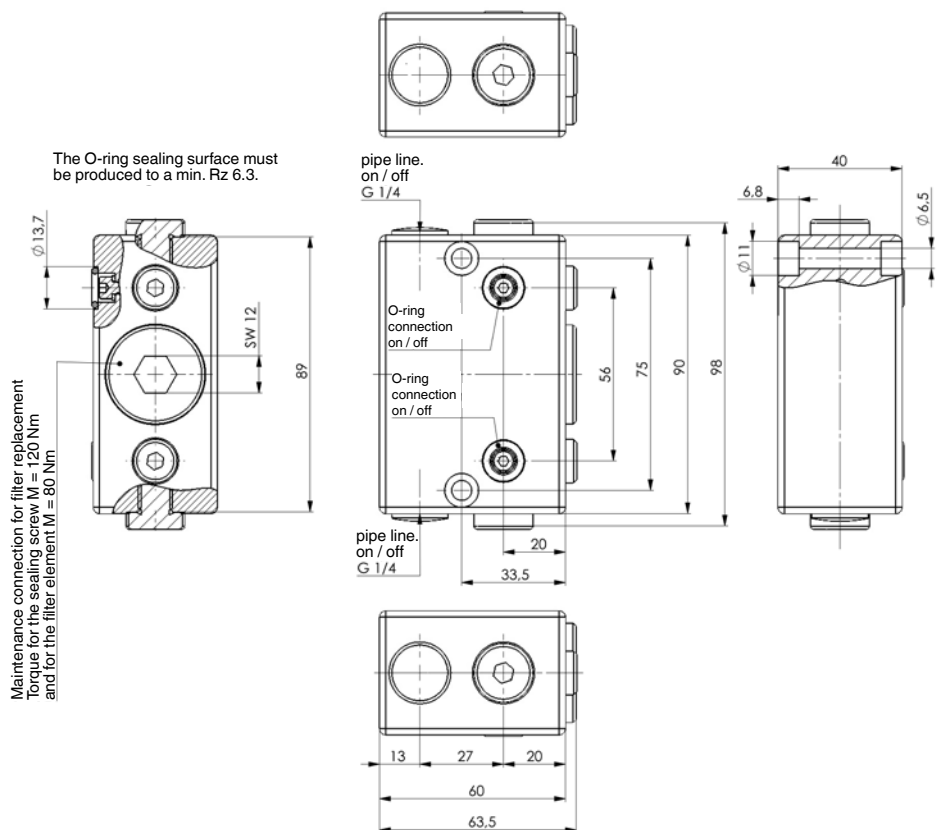
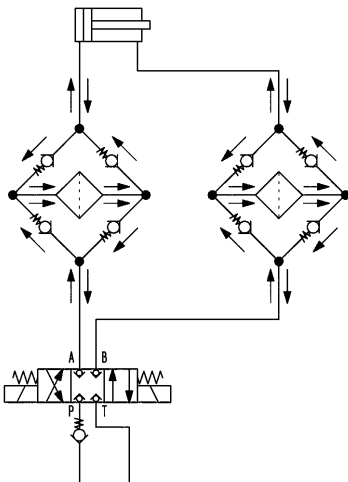
The entire installation position can be chosen freely!

Replacement part:

 Filter insert 10  $\mu\text{m}$ , Order No. 323683

 Filter insert 25  $\mu\text{m}$ , Order No. 323709

 Filter insert 40  $\mu\text{m}$ , Order No. 323725

**Hydraulic diagram:**


## No. 6981-XX

### Filter, cartridge design

max. operating pressure 400 bar.



CAD

| Order no. | Article no.    | Filteration       | Weight |
|-----------|----------------|-------------------|--------|
|           |                | [ $\mu\text{m}$ ] | [g]    |
| 320077    | 6981-10-G1/4-1 | 10                | 10     |
| 320085    | 6981-25-G1/4-1 | 25                | 10     |
| 320093    | 6981-40-G1/4-1 | 40                | 10     |

#### Note:

Replacement filter for 6981-XX-G1/4.

## No. 6981E-XX

### Filter, threaded design

max. operating pressure 400 bar.



CAD

| Order no. | Article no. | Filteration       | Weight |
|-----------|-------------|-------------------|--------|
|           |             | [ $\mu\text{m}$ ] | [g]    |
| 323683    | 6981E-10    | 10                | 15     |
| 323709    | 6981E-25    | 25                | 15     |
| 323725    | 6981E-40    | 40                | 15     |

#### Note:

Replacement filter for 6981E-XX-G1/4 and 6981G-XX-G1/4.

## No. 6981E-100

### Filter, threaded design

max. operating pressure 500 bar.



CAD

| Order no. | Article no.      | Filteration       | Weight |
|-----------|------------------|-------------------|--------|
|           |                  | [ $\mu\text{m}$ ] | [g]    |
| 326678    | 6981E-100-G1/4-1 | 100               | 14     |

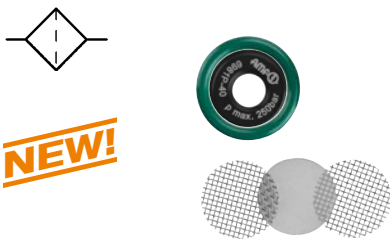
#### Note:

Replacement filter for 6917R-5-XX. Sealing ring included in scope of supply.

## No. 6981P-XX

### Filter, cartridge design

Q max. 20 l/min.



CAD

| Order no. | Article no. | Filteration<br>[ $\mu\text{m}$ ] | max. operating pressure<br>[bar] | OR-1<br>O-ring<br>Order No. | Weight |
|-----------|-------------|----------------------------------|----------------------------------|-----------------------------|--------|
|           |             |                                  |                                  | 466334                      | [g]    |
| 562203    | 6981P-25    | 25                               | 250                              | 466334                      | 5,5    |
| 562204    | 6981P-40    | 40                               | 250                              | 466334                      | 5,5    |
| 562205    | 6981P-100   | 100                              | 400                              | 466334                      | 5,5    |

#### Design:

Filter sleeve made of aluminium, surfaces black anodised. Filter plates made of metal mesh.

#### Application:

For protecting actuators and valves in clamping devices against contamination in the hydraulic fluid.

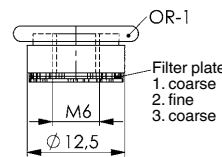
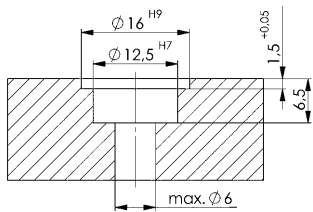
#### Note:

Always mount the fine filter plate between the two coarse filter plates. Can also be built into fixtures.

Filter is pressed in and cannot be reused.

The finer the filter selected, the greater the flow resistance.

#### Installation dimensions:

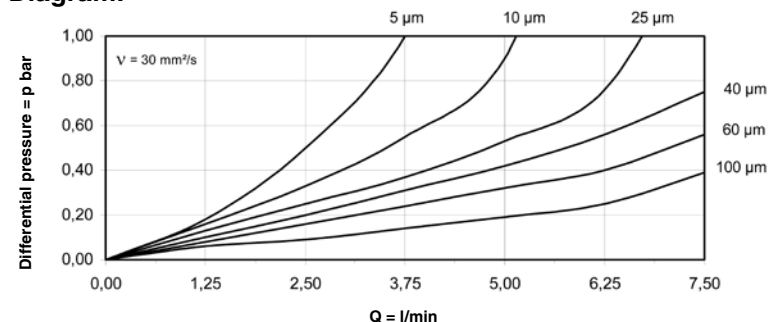


## Filter 6981

#### Note:

The filters are employed as additional and safety filters for protecting hydraulic components in the oil circuit. The direction of flow must be in the direction of the arrow. The higher the degree of soiling, the higher the flow resistance. The degree of soiling shall be checked.

#### Diagram:



Subject to technical alterations.

## ACCESSORIES -

FOR PRESSURE MONITORING  
AND VENTING OF THE  
HYDRAULIC SYSTEM AS WELL  
AS SUPPORT CONTROL

- > **MEASURING COUPLING FOR THREADED CONNECTION AND PIPE CONNECTION**
- > **MEASURING HOSE**
- > **ADAPTER FOR PRESSURE GAUGE CONNECTION**
- > **SUPPORT CONTROL, PNEUMATIC**

### PRODUCT OVERVIEW:

| Type                   | Designation                           | Max. operating pressure [bar] | Length [mm] | Thread                   | Stroke [mm] | No. of models | Oil connection |
|------------------------|---------------------------------------|-------------------------------|-------------|--------------------------|-------------|---------------|----------------|
| 6990-20-G<br>6990-20-R | Measuring coupling                    | 630                           | -           | G1/8 / G1/4<br>M16 x 1,5 | -           | 3             | thread<br>pipe |
| 6990-20-S              | Measuring hose                        | 630                           | 400 / 1000  | M16                      | -           | 2             | thread         |
| 6990-20-M/-A           | Adapter for pressure gauge connection | 630                           | -           | G1/4                     | -           | 2             | thread         |
| 6984-20                | Support control, pneumatic            | 12                            | -           | M12 x 1,25               | 6           | 1             | thread         |
| 6984-30                | Support control, pneumatic            | 2                             | -           | M16 x 1,5                | 5           | 1             | thread         |

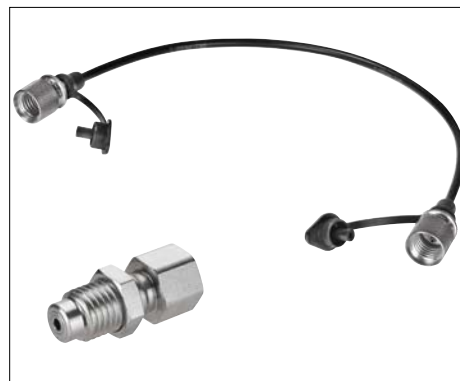
### PRODUCT EXAMPLES:

NO. 6990-20-G AND 6990-20-R



> max. operating pressure: 630 bar

NO. 6990-20-S AND 6990-20-M



> max. operating pressure: 630 bar

NO. 6984-20 AND 6984-30



> max. operating pressure: 12 bar

## No. 6990-20-G

### Measuring coupling

for threaded connection.



CAD

| Order no.     | Article no.  | Pressure max.<br>[bar] | E    | G    | L  | SW | Weight<br>[g] |
|---------------|--------------|------------------------|------|------|----|----|---------------|
| <b>321893</b> | 6990-20-G1/8 | 400                    | 8,0  | G1/8 | 39 | 17 | 70            |
| <b>321877</b> | 6990-20-G1/4 | 630                    | 12,0 | G1/4 | 37 | 19 | 70            |

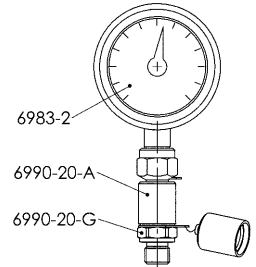
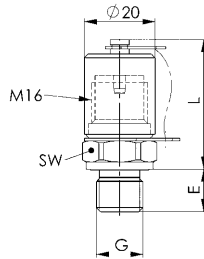


### Application:

The measuring coupling is used for pressure monitoring or venting with the measuring hose.

### Note:

Adaptation is possible under pressure up to max. 400 bar.



## No. 6990-20-R

### Measuring coupling

for pipe connection.



CAD

| Order no.     | Article no. | Pressure max.<br>[bar] | dia. D | E    | G       | L  | SW | SW1 | Weight<br>[g] |
|---------------|-------------|------------------------|--------|------|---------|----|----|-----|---------------|
| <b>321984</b> | 6990-20-R   | 630                    | 8      | 16,5 | M16x1,5 | 35 | 17 | 19  | 70            |

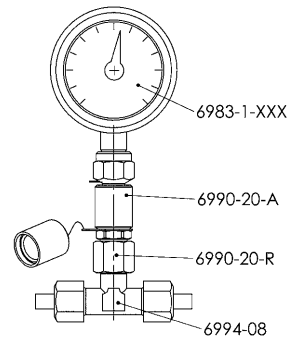
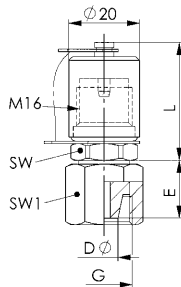


### Application:

The measuring coupling is used for pressure monitoring or venting.

### Note:

Adaptation is possible under pressure up to max. 400 bar.

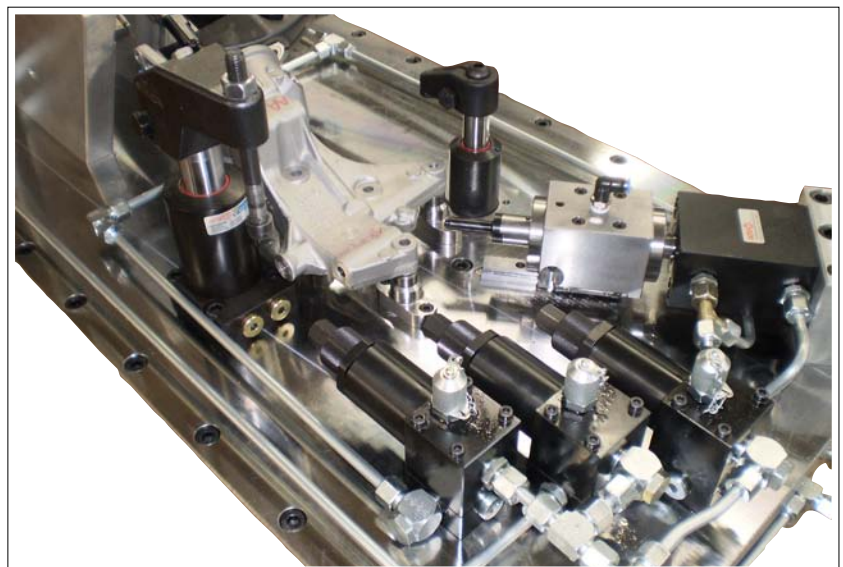


## No. 6990-20-S

### Measuring hose

max. operating pressure 630 bar,  
max. dynamic operating pressure 500 bar.  
Temperature -20 to +100 °C.

| Order no.     | Article no.   | Inside dia.<br>[mm] | Outside dia.<br>[mm] | Length<br>[mm] | Bending radius min.<br>[mm] | Connection thread | Weight<br>[g] |
|---------------|---------------|---------------------|----------------------|----------------|-----------------------------|-------------------|---------------|
| <b>321919</b> | 6990-20-S400  | 2                   | 5                    | 400            | 20                          | M16               | 75            |
| <b>321935</b> | 6990-20-S1000 | 2                   | 5                    | 1000           | 20                          | M16               | 100           |



Subject to technical alterations.

## No. 6990-20-M

### Adapter for pressure gauge connection

max. operating pressure 630 bar.



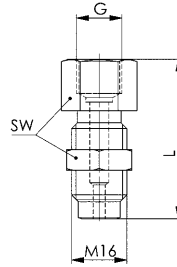
| Order no.     | Article no. | G    | L    | SW | Weight [g] |
|---------------|-------------|------|------|----|------------|
| <b>554600</b> | 6990-20-M   | G1/4 | 46,5 | 19 | 74         |

#### Application:

Adapter for pressure gauge connection G1/4 on measuring hose.

#### Note:

Adaptation is possible under pressure up to max. 400 bar.



## No. 6990-20-A

### Adapter for pressure gauge connection

max. operating pressure 630 bar.



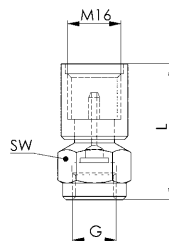
| Order no.     | Article no. | G    | L  | SW | Weight [g] |
|---------------|-------------|------|----|----|------------|
| <b>327353</b> | 6990-20-A   | G1/4 | 41 | 19 | 75         |

#### Application:

Adapter for pressure gauge connection G1/4 on measuring coupling 6990-20-G.

#### Note:

Adaptation is possible under pressure up to max. 400 bar.

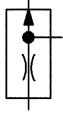


No. 6984-20

Support control, pneumatic



| Order no. | Article no. | Stroke max. [mm] | Input pressure [bar] | Md max. [Nm] | Spring force min. [N] | Spring force max. [N] | OR-1 O-ring Order No. | OR-2 O-ring Order No. | Weight [g] |
|-----------|-------------|------------------|----------------------|--------------|-----------------------|-----------------------|-----------------------|-----------------------|------------|
| 562223    | 6984-20     | 6                | 1 - 12               | 5            | 4,3                   | 20,7                  | 559533                | 552174                | 26         |



**NEW!**

### Design:

Housing made of steel, hardened and honed. Piston hardened and ground. Compression spring from stainless steel. O-rings and springs supplied as standard.

### Application:

The support control is used in fixtures where a signal indicating a correctly supported workpiece is required to enable machining. Lightweight workpieces should be clamped before being pressurised with compressed air. A precise air flow upstream of the pressure transducer is required for ensuring correct operation of the support control.

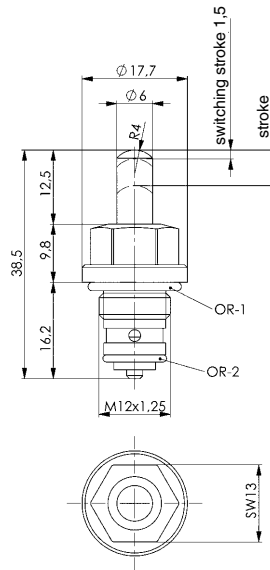
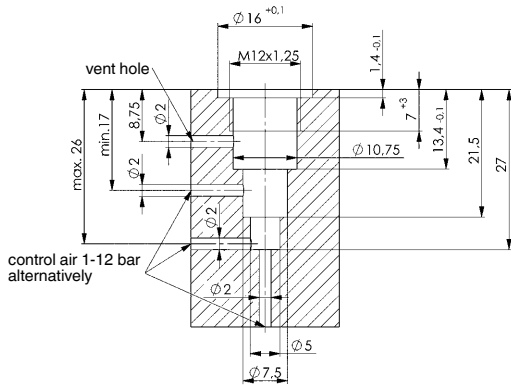
### Features:

The support control works like a pneumatic back-pressure nozzle. The position is extended from its initial position by a pressure spring. Once applied, the air jet flows through the piston and the radial vent hole on the support control housing to outside. The discharge hole is sealed as soon as a workpiece is mounted and the piston is pushed downwards by min. 1.5 mm. A clamping stroke of 2-3 mm is recommended. The air flow backs up, the internal air pressure rises. The pressure value must be transferred to the control by an appropriate pressure signal converter. The system is relatively insensitive to fine chips.

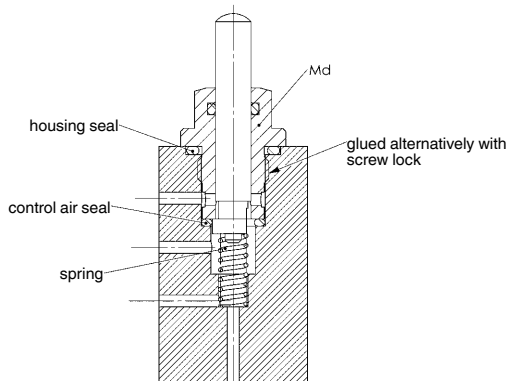
### Note:

The pressure signal converter is not included in the supply scope.  
 Effective piston surface when nozzle is closed = 0.28 cm<sup>2</sup>  
 Piston force = piston surface x air pressure + spring force  
 The release pressure at the pressure signal must be set with an upstream volume flow control valve (e.g. throttle/check valve). Control air intake 1-12 bar. Observe max. tightening torque. After tightening, check that the piston moves smoothly. Loosen if necessary. Glue in the housing with screw lock (e.g. Loctite 638).

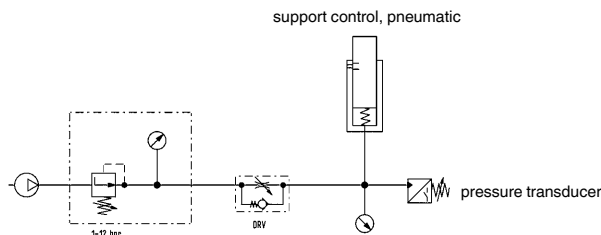
### Installation dimensions:



### Application example:



### Hydraulic diagram:



Subject to technical alterations.

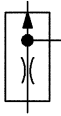
No. 6984-30

Support control, pneumatic



CAD

| Order no. | Article no. | Stroke max.<br>[mm] | Input pressure<br>[bar] | Spring force min.<br>[N] | Spring force max.<br>[N] | Weight<br>[g] |
|-----------|-------------|---------------------|-------------------------|--------------------------|--------------------------|---------------|
| 325217    | 6984-30     | 5                   | 1 - 2                   | 1,9                      | 2,6                      | 36            |



### Design:

Housing from hardened and burnished steel. Pistons are tempered, nitrided and ground. Compression spring from stainless steel.

### Application:

The support control is used in fixtures where a signal indicating a correctly supported workpiece is required to enable machining. Lightweight workpieces should be clamped before being pressurised with compressed air.

### Features:

The support control works like a pneumatic back-pressure nozzle. The position is extended from its initial position by a pressure spring. Once applied, the air jet flows through the hollow piston and the radial discharge hole on the support control housing to outside. The discharge hole is sealed as soon as a workpiece is mounted and the piston is pushed downwards by min. 1 mm. The air flow backs up, the internal air pressure rises. The pressure value must be transferred to the control by an appropriate pressure signal converter. The system is relatively insensitive to fine chips.

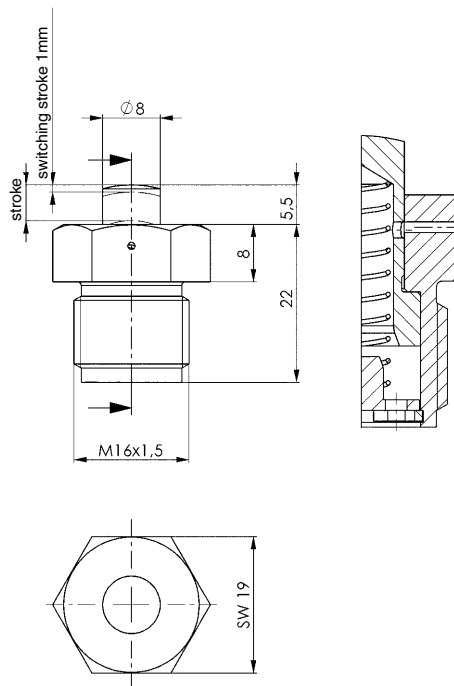
### Note:

The pressure signal converter is not included in the supply scope.

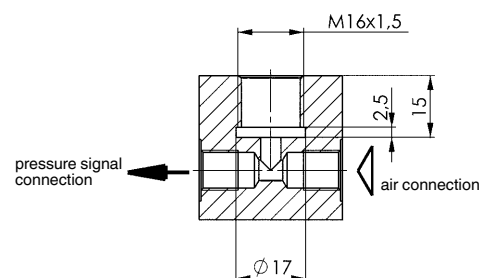
Effective piston surface with closed nozzle = 0.95 cm<sup>2</sup>

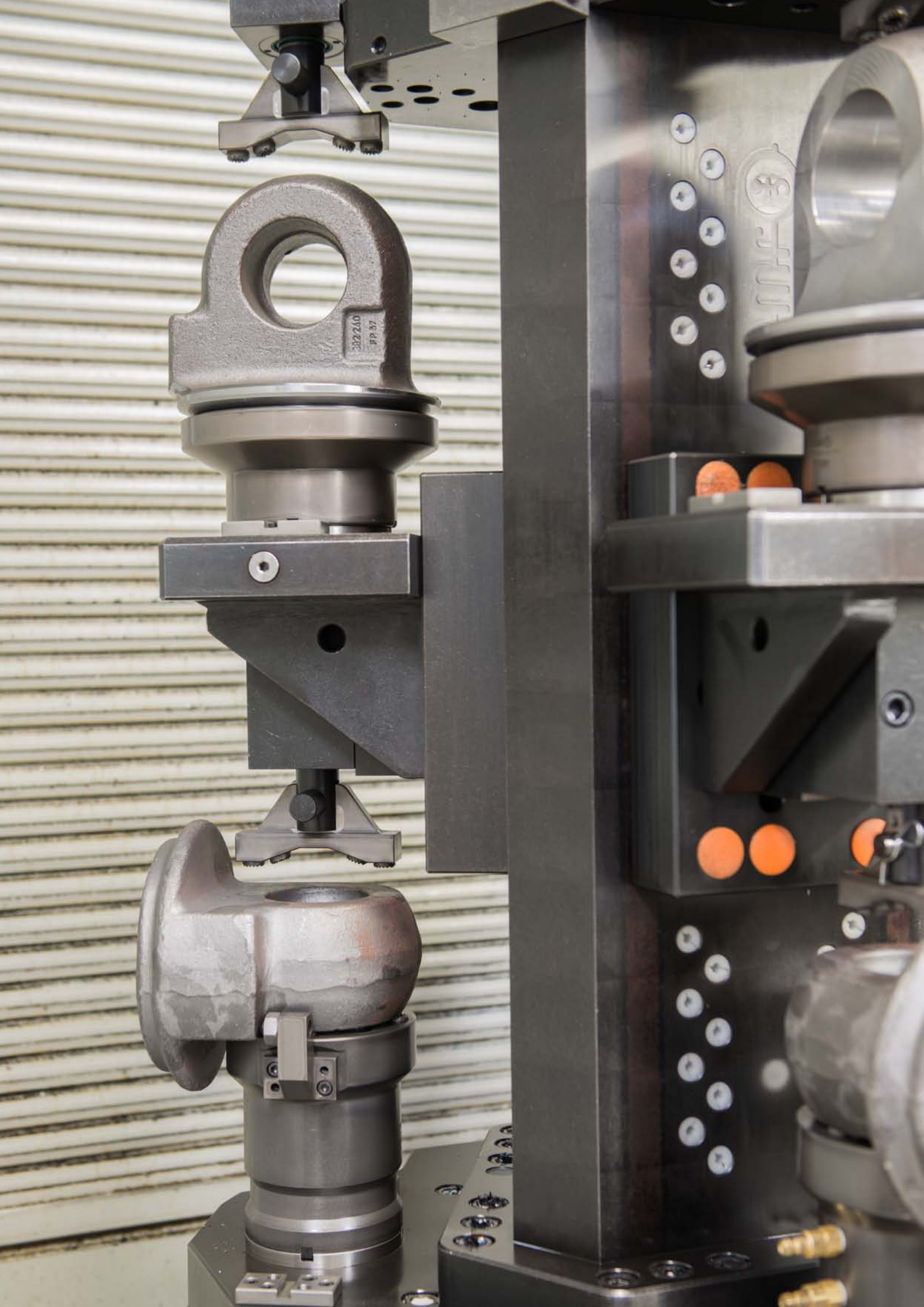
Piston force = piston surface x air pressure + spring force

Reduce the input pressure to 1 bar up to a maximum of 2 bar when the air duct is open, e.g. with a throttle check valve. When the air duct is closed, there is a dynamic pressure of approx. 3 bar.



### Installation dimensions:







## ACCESSORIES - HOSES AND PRESSURE GAUGES FOR A SECURE CONNECTION

- > **HIGH-PRESSURE HOSES**
- > **QUICK-RELEASE COUPLINGS**
- > **PROTECTIVE CAPS FOR QUICK-RELEASE COUPLINGS**
- > **HYDRAULIC OIL**
- > **PRESSURE GAUGES**
- > **MANIFOLDS WITH THREAD**

### PRODUCT OVERVIEW:

| Type       | Designation                                  | Max. operating pressure [bar] | Length min. / max. [mm] | Nominal bore NG | No. of models | Oil connection  |
|------------|--|-------------------------------|-------------------------|-----------------|---------------|-----------------|
| 6985 6985R | High pressure hose                           | 400                           | 300 / 3000              | -               | 11            | thread / pipe   |
| 6985K      | High pressure hose with steel-wire interlace | 500                           | 300 / 3000              | -               | 6             | thread          |
| 6990       | Quick disconnect coupler                     | 400                           | -                       | 4               | 6             | thread          |
| 6990MK/SK  | Al protection MK/SK                          | -                             | -                       | -               | 2             | protection      |
| 6906       | Hydraulic oil                                | -                             | -                       | 5 liters        | 1             | -               |
| 6983       | Pressure gauge                               | 600                           | -                       | -               | 8             | thread / o-ring |
| 6988       | Manifold                                     | 400                           | -                       | 6               | 3             | thread          |

### PRODUCT EXAMPLES:

NO. 6985 AND 6990-G1/4 M+S



> max. operating pressure: 400 bar

NO. 6983B AND 6983G



> max. operating pressure: 400 bar

NO. 6988

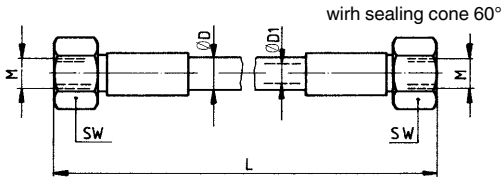


> max. operating pressure: 400 bar

## No. 6985

### High Pressure Hose

max. operating pressure 400 bar.



synthetic internal rubber  
2 woven steel-wire inserts

abrasion- and weatherresistant  
external rubber

CAD



| Order no. | Article no. | Test pressure [bar] | Bending radius min. [mm] | dia. D [mm] | dia. D1 [mm] | L [mm] | M       | SW [mm] | Weight [g] |
|-----------|-------------|---------------------|--------------------------|-------------|--------------|--------|---------|---------|------------|
| 174177    | 6985-300    | 1000                | 100                      | 15          | 6            | 300    | M12x1,5 | 17      | 100        |
| 68510     | 6985-500    | 1000                | 100                      | 15          | 6            | 500    | M12x1,5 | 17      | 300        |
| 68528     | 6985-800    | 1000                | 100                      | 15          | 6            | 800    | M12x1,5 | 17      | 405        |
| 68536     | 6985-1250   | 1000                | 100                      | 15          | 6            | 1250   | M12x1,5 | 17      | 570        |
| 68544     | 6985-2000   | 1000                | 100                      | 15          | 6            | 2000   | M12x1,5 | 17      | 855        |

#### Design:

Steel fittings, galvanized and passivated.

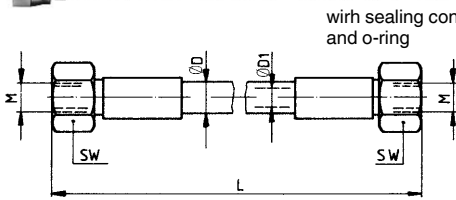
#### Note:

This high pressure hose is especially selected for clamping on machine tools. It contains two steelwire reinforcements which guarantee that there is no loss of oil even if the external rubber is damaged. The period of use of a hydraulic hose, including any storage period should not exceed six years. The serviceability must be assessed to fixed inspection criteria. See DIN 20066, Part 5 for further details.

## No. 6985K

### High Pressure Hose with steel-wire interlace

Max. operating pressure dyn. at +50°C 500 bar



Polyamide  
Polyester mesh

steel wire-mesh, zinc-plated

CAD



| Order no. | Article no. | Test pressure [bar] | Bending radius min. [mm] | dia. D [mm] | dia. D1 [mm] | L [mm] | M       | SW [mm] | Weight [g] |
|-----------|-------------|---------------------|--------------------------|-------------|--------------|--------|---------|---------|------------|
| 68551     | 6985K-300   | 960                 | 35                       | 9,4         | 4            | 300    | M16x1,5 | 19      | 100        |
| 68569     | 6985K-500   | 960                 | 35                       | 9,4         | 4            | 500    | M16x1,5 | 19      | 300        |
| 68577     | 6985K-800   | 960                 | 35                       | 9,4         | 4            | 800    | M16x1,5 | 19      | 400        |
| 68585     | 6985K-1250  | 960                 | 35                       | 9,4         | 4            | 1250   | M16x1,5 | 19      | 570        |
| 68593     | 6985K-2000  | 960                 | 35                       | 9,4         | 4            | 2000   | M16x1,5 | 19      | 850        |
| 68601     | 6985K-3000  | 960                 | 35                       | 9,4         | 4            | 3000   | M16x1,5 | 19      | 1200       |

#### Design:

Steel fittings, galvanized and passivated. Hose of synthetic material with steel-wire braid galvanized.

#### Application:

Insert hose and tighten with 1/4 turn maximum.

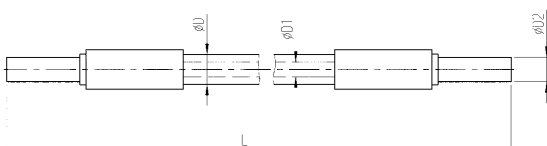
#### Note:

We recommend only using the 3-metre long high pressure hose for double-acting elements. Fitting suitable for pipe connection No. 6994. The period of use of a hydraulic hose, including any storage period, should not exceed six years. The serviceability must be assessed according to fixed inspection criteria. See DIN 20066, Section 5 for further details.

## No. 6985R

### High Pressure Hose

Max. operating pressure dyn. at +50°C 375 bar



Polyamide

St wire, brass

Polyurethan

CAD



| Order no. | Test pressure [bar] | Bending radius min. [mm] | dia. D [mm] | dia. D1 [mm] | dia. D2 [mm] | L [mm] | Weight [g] |
|-----------|---------------------|--------------------------|-------------|--------------|--------------|--------|------------|
| 63198     | 750                 | 30                       | 9,8         | 4,8          | 8            | 300    | 65         |
| 63206     | 750                 | 30                       | 9,8         | 4,8          | 8            | 500    | 90         |
| 63214     | 750                 | 30                       | 9,8         | 4,8          | 8            | 800    | 120        |
| 63222     | 750                 | 30                       | 9,8         | 4,8          | 8            | 1250   | 180        |
| 63230     | 750                 | 30                       | 9,8         | 4,8          | 8            | 2000   | 265        |
| 63248     | 750                 | 30                       | 9,8         | 4,8          | 8            | 3000   | 380        |

#### Design:

Steel fitting, galvanized and passivated. Hose of synthetic material with high tensile brass steel-wire braid.

#### Application:

Insert hose and tighten with 1/4 turn maximum.

#### Note:

We recommend only using the 3-metre long high pressure hose for double-acting elements. These high pressure hoses can be used directly in pipe connections. The period of use of a hydraulic hose, including any storage period, should not exceed six years. The serviceability must be assessed according to fixed inspection criteria. See DIN 20066, Section 5 for further details.

## No. 6990

### Quick Disconnect Coupler

galvanized.  
 6990-G1/4 Sleeve and connector  
 6990-G1/4M Sleeve with external thread  
 6990-G1/4M IG sleeve with internal thread  
 6990-G1/4S connector  
 6990-G1/4BS dummy plug



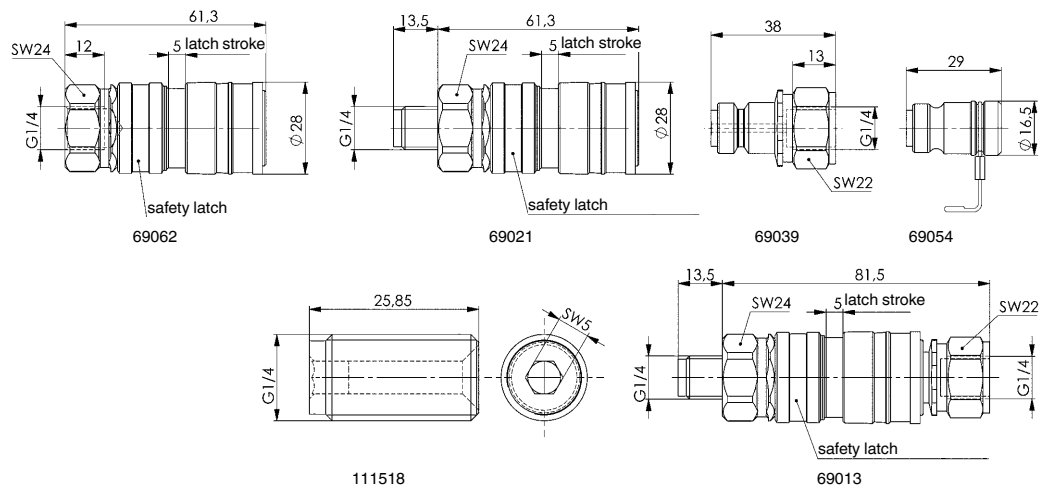
| Order no. | Article no.   | Operating pressure [bar] | NG  | Nominal flow [l/min] | SW [mm] | Md [Nm] | Weight [g] |
|-----------|---------------|--------------------------|-----|----------------------|---------|---------|------------|
| 69013     | 6990-G1/4     | 1000                     | 2,5 | 6                    | 22/24   | 40 - 50 | 250        |
| 69021     | 6990-G1/4M    | 1000                     | 2,5 | 6                    | 24      | 40 - 50 | 190        |
| 69062     | 6990-G1/4M-IG | 1000                     | 2,5 | 6                    | 24      | 40 - 50 | 190        |
| 69039     | 6990-G1/4S    | 1000                     | 2,5 | 6                    | 22      | 40 - 50 | 60         |
| 69054     | 6990-G1/4BS   | -                        | -   | -                    | -       | -       | 40         |
| 111518    | 6990-G1/4A    | -                        | 5   | -                    | 5       | -       | 19         |

#### Design:

Galvanized housing. The socket and plug are locked automatically in uncoupled state. Plastic dust caps are supplied as standard for the socket and the plug.

#### Features:

The hydraulic quick-release couplings for the high pressure area are easy to use, safe and reliable. It is a drip-free coupling that protects both the environment and the hydraulic system. The safety latch is standard and offers additional safety. It prevents accidental decoupling.



## No. 6990MK/SK

### AI Protection MK/SK

for quick-release coupling.  
 6990-G1/4MK AI protective cap for sleeve  
 6990-G1/4SK AI protective cap for connector



| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 65508     | 6990-G1/4MK | 21         |
| 65524     | 6990-G1/4SK | 14         |

#### Design:

Case from aluminium, with retainer.

#### Note:

Aluminium protective cap prevents contamination of sleeve and connector.

## No. 6906

### Hydraulic oil



| Order no. | Contents [ml] | Weight [g] |
|-----------|---------------|------------|
| 464081    | 5000          | 4300       |

#### Design:

Hydraulic oil in plastic canister.

#### Application:

For all AMF pressure generators.

## No. 6983G

### Pressure gauge, with housing

Threaded design.



**NEW!**



CAD

| Order no. | Article no.  | max. pressure range<br>[bar] | Md<br>[Nm] | Md 1<br>[Nm] | OR-1<br>O-ring<br>Order No. | Weight<br>[g] |
|-----------|--------------|------------------------------|------------|--------------|-----------------------------|---------------|
| 562211    | 6983G-10-160 | 160                          | 100        | 15           | 562534                      | 635           |
| 562212    | 6983G-10-400 | 400                          | 100        | 15           | 562534                      | 635           |

#### Design:

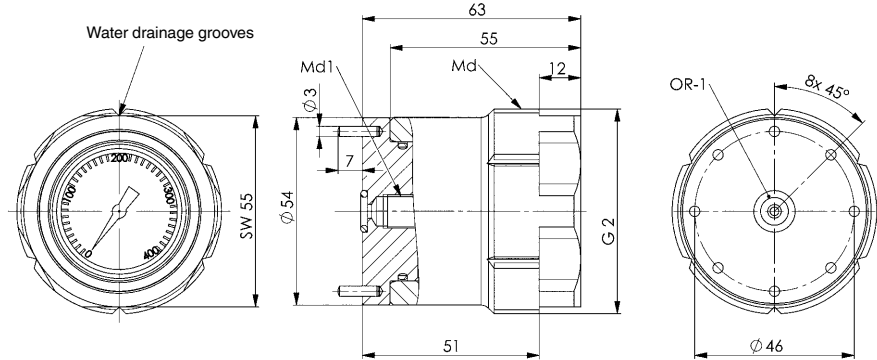
Steel housing burnished for screwing in, splash-proof by means of chip-resistant glass pane, with water drain notches.

#### Application:

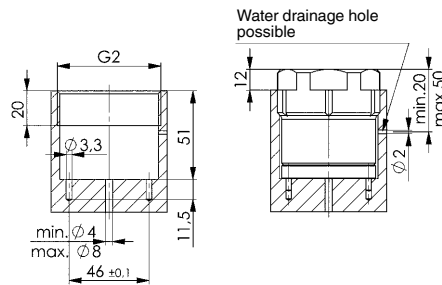
For quick, direct reading of hydraulic pressures in fixtures. Pressure gauge is protected by a chip-resistant glass pane. The structural shape prevents any accumulation of chips.

#### Note:

For screwing into the fixture with O-ring connection. Anti-rotation device by means of two pins.



#### Installation dimensions:



## No. 6983B

### Pressure gauge, with housing

Block design.



**NEW!**



CAD

| Order no. | Article no.  | max. pressure range<br>[bar] | Md 1<br>[Nm] | OR-1<br>O-ring<br>Order No. | Screw (2 pieces) | Weight<br>[g] |
|-----------|--------------|------------------------------|--------------|-----------------------------|------------------|---------------|
| 562213    | 6983B-10-160 | 160                          | 15           | 321646                      | M8 x 75          | 1887          |
| 562214    | 6983B-10-400 | 400                          | 15           | 321646                      | M8 x 75          | 1887          |

#### Design:

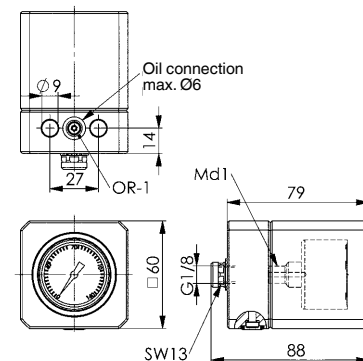
Steel housing, burnished, splash-proof by means of chip-resistant glass pane. Supplied as standard with O-ring, oil plugs and fastening bolts. Oil supply via threaded connection or oil channel in the fixture body.

#### Application:

For quick, direct reading of hydraulic pressures in fixtures. Pressure gauge is protected by a chip-resistant glass pane.

#### Note:

The bottom oil channel is plugged by a sealing washer and an M4 x 6 bolt.

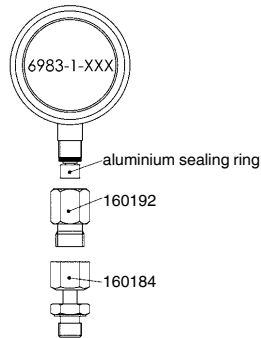


Subject to technical alterations.

## No. 6983

### Gauge

Mark represents 400 bar,  
6983-1 bottom connection,  
6983-2 rear connection.



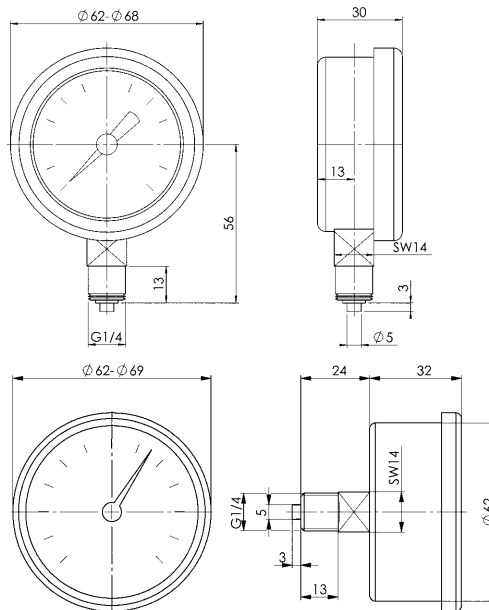
| Order no. | Article no. | max. pressure range |  | Weight [g] |
|-----------|-------------|---------------------|--|------------|
|           |             | [bar]               |  |            |
| 320648    | 6983-1-100  | 100                 |  | 300        |
| 320655    | 6983-1-250  | 250                 |  | 300        |
| 161414    | 6983-1-600  | 600                 |  | 300        |
| 168575    | 6983-2      | 600                 |  | 300        |

### Design:

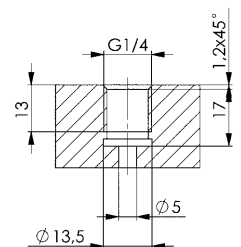
Complete with glycerin filling and aluminium sealing ring. Accuracy class 1.6. Housing made of stainless steel, rust-free.

### Note:

A combination of pipe fitting 6994-01 and 6994-02 can be used for the pipe connection.



### Installation dimensions:



## No. 6988

### Manifold

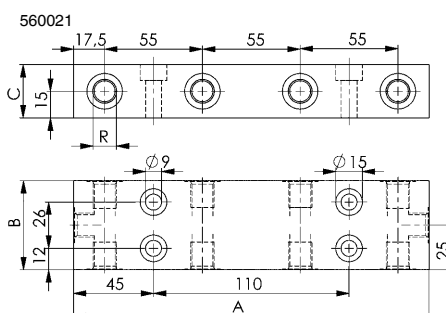
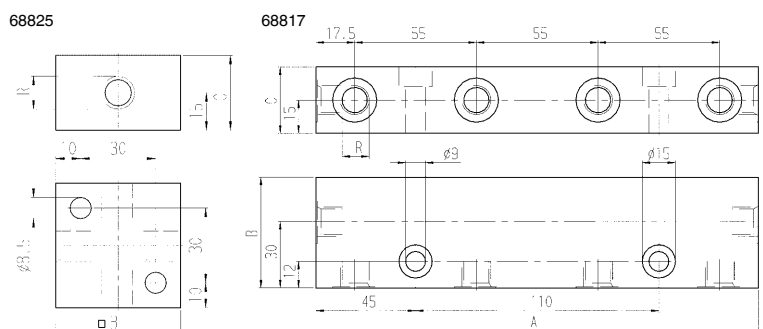


**NEW!**

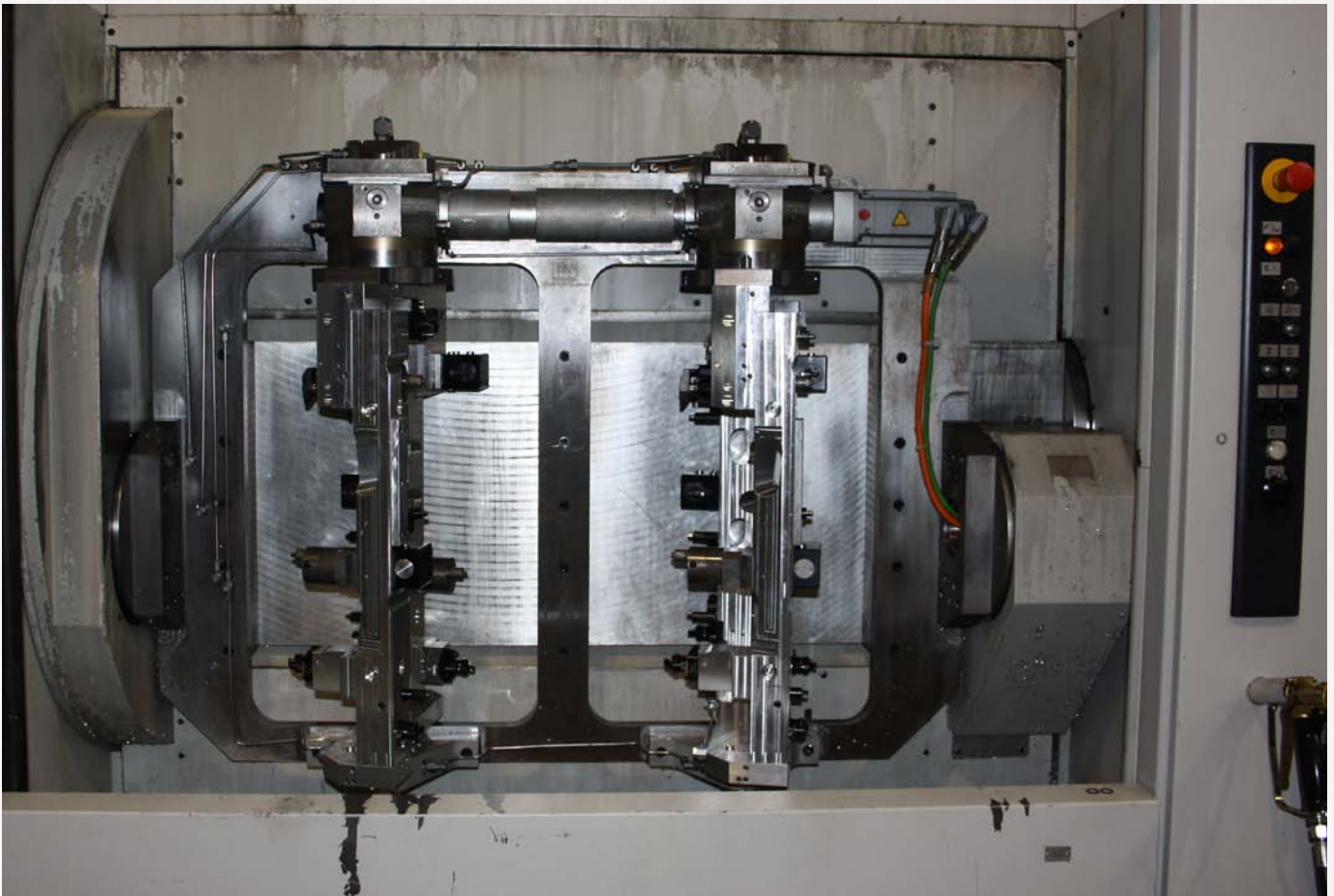
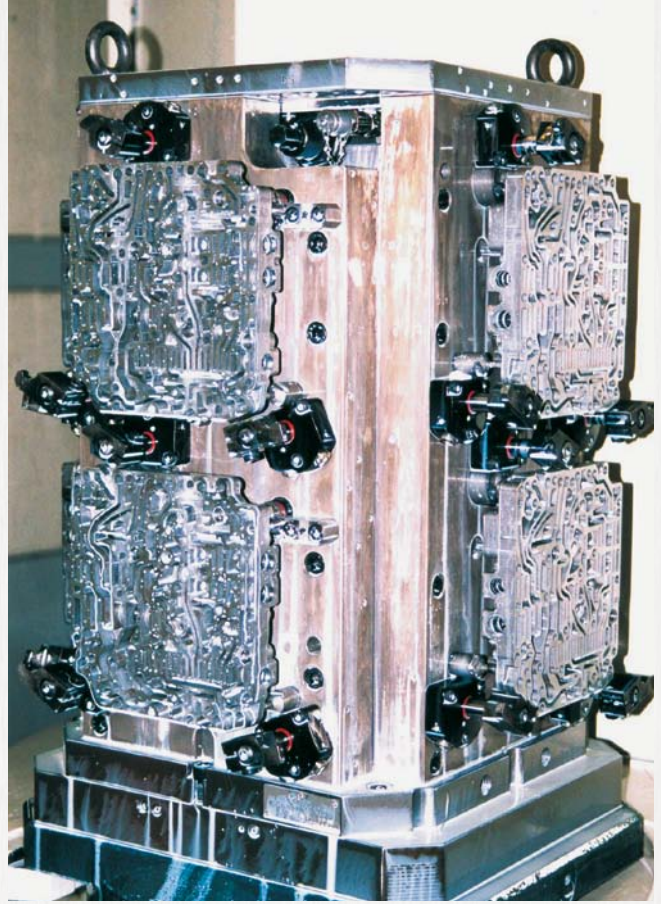
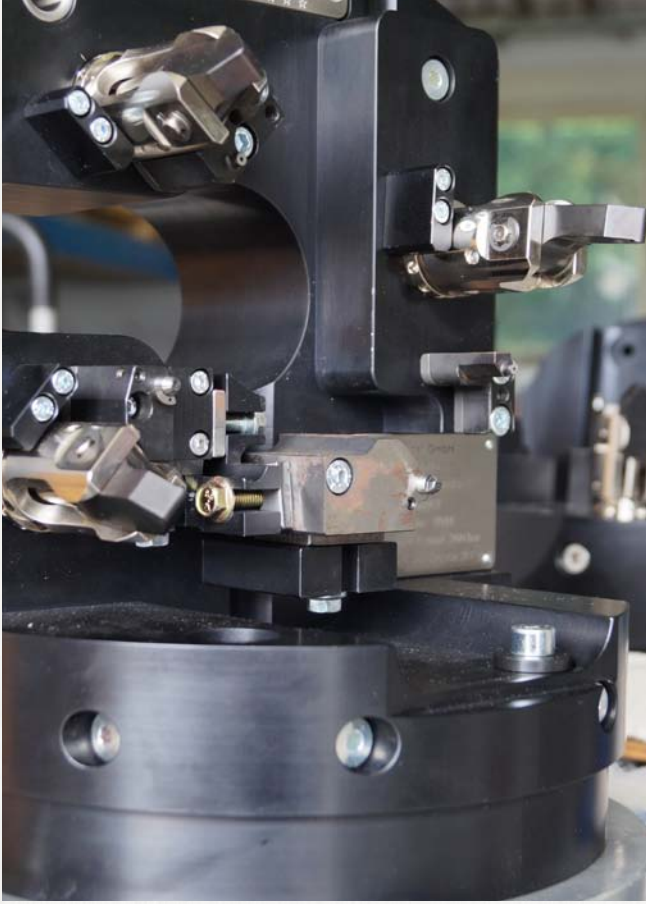
| Order no. | Article no.  | Operating pressure [bar] | NG | A   | B  | C  | R    | Oil connections | Weight [g] |
|-----------|--------------|--------------------------|----|-----|----|----|------|-----------------|------------|
| 68825     | 6988-G1/4x4  | 400                      | 6  | -   | 50 | 30 | G1/4 | 4               | 480        |
| 68817     | 6988-G1/4x6  | 400                      | 6  | 200 | 50 | 30 | G1/4 | 6               | 2025       |
| 560021    | 6988-G1/4x10 | 400                      | 6  | 200 | 50 | 30 | G1/4 | 10              | 1980       |

### Design:

Housing from steel, burnished.



Subject to technical alterations.



Subject to technical alterations.

## ACCESSORIES - SCREW CONNECTIONS FOR A SECURE FITTING

- > **SCREW-IN NIPPLES, DOUBLE NIPPLES AND TRANSITION PIECES**
- > **THREADED PLUGS AND VENT SCREWS**
- > **PIPE CONNECTIONS, HEAVY-DUTY SERIES**
- > **PIPE CONNECTIONS, LIGHTWEIGHT SERIES**

### PRODUCT OVERVIEW:

| Type    | Designation                          | Max. operating pressure [bar] | Length [mm] | Inside Ø | No. of models | Oil connection |
|---------|--------------------------------------|-------------------------------|-------------|----------|---------------|----------------|
| 6993    | Male/male adaptor                    | 400                           | -           | 4        | 3             | thread         |
| 6996    | Adaptor                              | 400                           | -           | 4        | 5             | -              |
| 6997    | Reducer                              | 400                           | -           | 5        | 1             | thread         |
| 908     | Screw plug                           | 400                           | -           | -        | 6             | thread         |
| DIN7603 | Sealing ring                         | -                             | -           | -        | 2             | sealing ring   |
| 908S    | Vent screw                           | -                             | -           | -        | 2             | thread         |
| 908S-30 | Vent screw                           | 400                           | -           | -        | 2             | thread         |
| 6994    | Pipe connections, heavy-duty series  | 630                           | -           | 4        | 14            | thread / pipe  |
| 6994    | Pipe connections, lightweight series | 315                           | -           | 3        | 9             | thread / pipe  |
| 6994    | Hydraulic pipe                       | 315 / 630                     | 2000        | 3 / 4    | 2             | pipe           |

### PRODUCT EXAMPLES:

NO. 6993 AND 6993-M12X1,5



> max. operating pressure: 400 bar

DIN 7603 AND NO. 908S



> sealing ring

NO. 6994-03 AND 6994-09

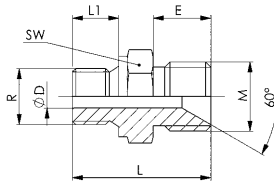


> max. operating pressure: 630 bar

## No. 6993

### Screw-in nipple

Zinc-plated.



CAD

| Order no. | Article no.       | R    | L  | L1 | E  | M         | dia. D | SW | max. operating pressure [bar] | Weight [g] |
|-----------|-------------------|------|----|----|----|-----------|--------|----|-------------------------------|------------|
| 69302     | 6993-M12x1,5-G1/8 | G1/8 | 24 | 8  | 10 | M12 x 1,5 | 4      | 14 | 400                           | 15         |
| 69328     | 6993-M12x1,5-G1/4 | G1/4 | 30 | 12 | 10 | M12 x 1,5 | 4      | 19 | 400                           | 30         |

#### Design:

Sealing according to DIN3852 form D by means of sealing ring DIN 7603 Form A and 60° sealing cone.

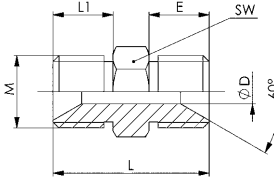
#### Note:

Warning: Do not use Teflon tape!

## No. 6993-M12x1,5

### Double connector

Zinc-plated.



CAD

| Order no. | Article no.  | L  | L1 | E  | M         | dia. D | SW | max. operating pressure [bar] | Weight [g] |
|-----------|--------------|----|----|----|-----------|--------|----|-------------------------------|------------|
| 69344     | 6993-M12x1,5 | 26 | 10 | 10 | M12 x 1,5 | 4      | 13 | 400                           | 15         |

#### Design:

Sealing according to DIN 3852 form D and 60° sealing cone.

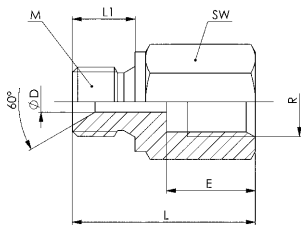
#### Note:

Warning: Do not use Teflon tape!

## No. 6996

### Adaptor

Zinc-plated.



CAD

| Order no. | Article no.       | R       | L  | L1 | E  | M       | dia. D | SW | max. operating pressure [bar] | Weight [g] |
|-----------|-------------------|---------|----|----|----|---------|--------|----|-------------------------------|------------|
| 69609     | 6996-G1/4-M12x1,5 | G1/4    | 26 | 12 | 12 | M12x1,5 | 4      | 19 | 400                           | 30         |
| 69625     | 6996-G1/4-G1/8    | G1/4    | 31 | 8  | 17 | G1/8    | 3      | 19 | 400                           | 38         |
| 69641     | 6996-G1/4-G1/4-35 | G1/4    | 35 | 12 | 17 | G1/4    | 4      | 19 | 400                           | 44         |
| 160093    | 6996-G1/4-G1/4-59 | G1/4    | 59 | 12 | 13 | G1/4    | 4      | 19 | 400                           | 100        |
| 153288    | 6996-M16/M12x1,5  | M16x1,5 | 41 | 11 | 11 | M12x1,5 | 4      | 22 | 400                           | 85         |

#### Design:

Sealing according to DIN3852 form D by means of sealing ring DIN 7603 Form A and 60° sealing cone.

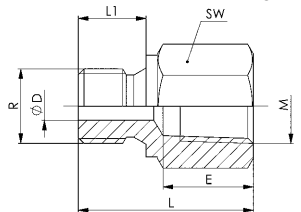
#### Note:

Warning: Do not use Teflon tape!

## No. 6997

### Reducer

Zinc-plated.



CAD

| Order no. | Article no.      | R    | L  | L1 | E  | M       | dia. D | SW | max. operating pressure [bar] | Weight [g] |
|-----------|------------------|------|----|----|----|---------|--------|----|-------------------------------|------------|
| 69666     | 6997-G1/4-1/4NPT | G1/4 | 31 | 12 | 15 | 1/4 NPT | 5      | 19 | 400                           | 38         |

#### Design:

Sealing by means of sealing ring DIN 7603 Form A.

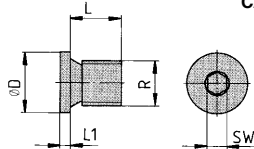
#### Note:

Warning: Do not use Teflon tape!

## No. 908G

### Threaded plug with soft seal

Zinc-plated.



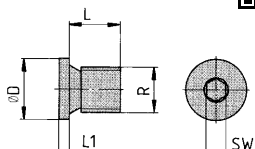
CAD

| Order no. | Article no. | R       | L  | L1 | dia. D | SW | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|---------|----|----|--------|----|-------------------------------|------------|
| 176693    | 908G-G1/8   | G1/8    | 8  | 4  | 14     | 5  | 400                           | 7          |
| 176719    | 908G-G1/4   | G1/4    | 12 | 5  | 19     | 6  | 400                           | 17         |
| 179952    | 908-M16x1,5 | M16x1,5 | 12 | 5  | 22     | 8  | 400                           | 24         |
| 176701    | 908-G3/8    | G3/8    | 12 | 5  | 24     | 8  | 400                           | 22         |

## DIN 908

### Screw plug

Zinc-plated.



CAD

| Order no. | Article no. | R    | L  | L1 | dia. D | SW | Weight [g] |
|-----------|-------------|------|----|----|--------|----|------------|
| 69393     | 908-G1/8    | G1/8 | 8  | 3  | 14     | 5  | 6          |
| 69419     | 908-G1/4    | G1/4 | 12 | 3  | 18     | 6  | 13         |

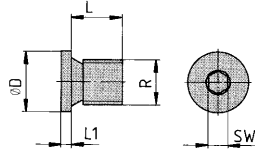
Subject to technical alterations.



## No. 908S

### Vent screw for spring space

Zinc-plated.



CAD

| Order no. | Article no. | R    | L  | L1 | dia. D | SW | Weight [g] |
|-----------|-------------|------|----|----|--------|----|------------|
| 326389    | 908S-G1/8   | G1/8 | 8  | 4  | 14     | 5  | 6          |
| 343632    | 908S-G1/4   | G1/4 | 12 | 5  | 19     | 6  | 17         |

### Design:

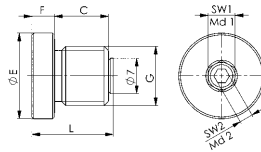
Vent screw with integrated soft seal and filter insert. For venting the spring space.

## No. 908S-30-XXX

### Vent screw

Max. operating pressure 400 bar.

**NEW!**



CAD

| Order no. | Article no.  | C  | dia. E | F | G    | L  | SW1 | SW2 | Md 1 [Nm] | Md 2 [Nm] | Weight [g] |
|-----------|--------------|----|--------|---|------|----|-----|-----|-----------|-----------|------------|
| 563491    | 908S-30-G1/8 | 9  | 14,5   | 4 | G1/8 | 14 | 6   | 3   | 20 - 22   | 5 - 7     | 8          |
| 563492    | 908S-30-G1/4 | 12 | 19,0   | 5 | G1/4 | 18 | 6   | 3   | 28        | 5 - 7     | 18         |

### Design:

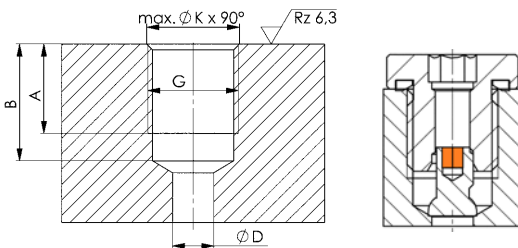
Housing, socket bolt and sealing element made of stainless steel, seal made of FKM.

### Application:

Vent screw for venting clamping devices and clamping elements. Compact and simple design or handling. Insensitive to external influences. Suitable for temperatures up to 150 °C. It is sufficient to open the vent screw by half a turn.

### Note:

Only an Allen key **SW3** is required for bleeding. The inner vent screw is opened anticlockwise. Therefore, there is no risk of loosening the outer screw when closing. Observe torque specifications.

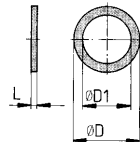


### Installation dimensions:

| Order no. | Article no.  | A  | B min. | B max. | dia. D min. | dia. D max. | G    | ØK max. |
|-----------|--------------|----|--------|--------|-------------|-------------|------|---------|
| 563491    | 908S-30-G1/8 | 11 | 12     | 15     | 1           | 6           | G1/8 | 10,0    |
| 563492    | 908S-30-G1/4 | 13 | 14     | 17     | 1           | 6           | G1/4 | 13,5    |

## DIN 7603

### Shape A sealing ring Cu



CAD

| Order no. | Article no.      | L   | dia. D | dia. D1 | Weight [g] |
|-----------|------------------|-----|--------|---------|------------|
| 69815     | 7603-Form A-G1/8 | 1,0 | 13,5   | 10,0    | 0,5        |
| 69823     | 7603-Form A-G1/4 | 1,5 | 18,0   | 13,5    | 1,0        |

### Assembly example for high pressure hose with steel-wire interlace:

- 1) Hollow-rod cylinder 6920
- 2) Sealing ring DIN 7603A
- 3) Screw-in fitting 6994-05 without union nut
- 4) High pressure hose 6985K
- 5) Connector 6990-G1/4S
- 6) Sleeve 6990-G1/4M



### Assembly example for high pressure hose:

- 1) Hollow-rod cylinder 6920
- 2) Sealing ring DIN 7603A
- 3) Screw-in nipple 6993
- 4) High pressure hose 6985
- 5) Connector 6990-G1/4S
- 6) Sleeve 6990-G1/4M



Subject to technical alterations.

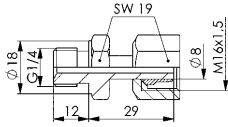
## No. 6994-01

### Screw-in fitting, straight, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 160184    | 6994-01     | 630                           | 50         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

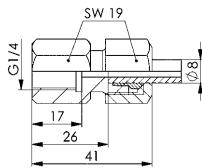
## No. 6994-02

### Screw-up fitting, straight, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 160192    | 6994-02     | 630                           | 60         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

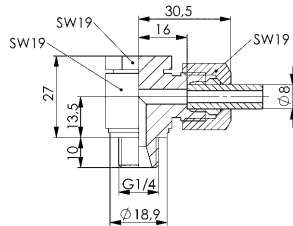
## No. 6994-03

### Pivoting fitting, angled, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



| Order no. | Article no. | max. operating pressure [bar] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|--------------|------------|
| 160358    | 6994-03     | 500                           | 50           | 103        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

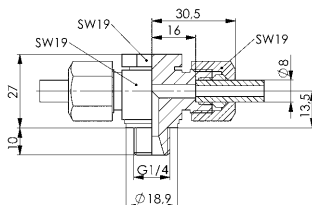
## No. 6994-04

### Pivoting T-fitting, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



| Order no. | Article no. | max. operating pressure [bar] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|--------------|------------|
| 170266    | 6994-04     | 500                           | 50           | 122        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

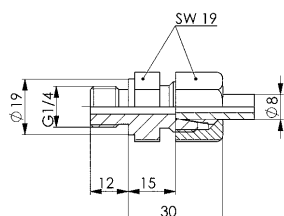
## No. 6994-05

### Screw-in fitting, straight, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 175323    | 6994-05     | 630                           | 55         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

Subject to technical alterations.

## No. 6994-06

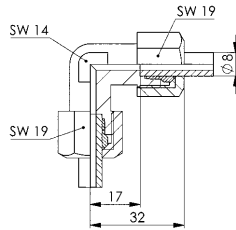
### Fitting, angled, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 160366    | 6994-06     | 800                           | 110        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-07

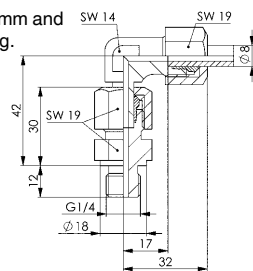
### Fitting, angled, adjustable, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 160200    | 6994-07     | 800                           | 125        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-08

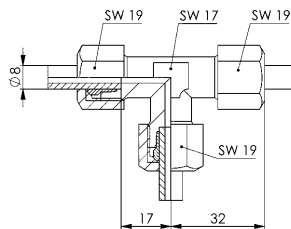
### T-fitting, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 170258    | 6994-08     | 800                           | 155        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-09

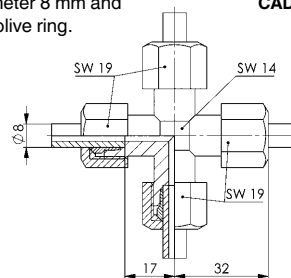
### Cross-fitting, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 170308    | 6994-09     | 630                           | 150        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-10

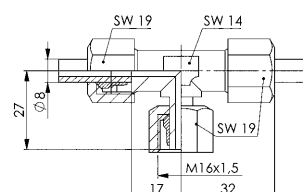
### T-fitting, adjustable, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 170316    | 6994-10     | 630                           | 120        |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

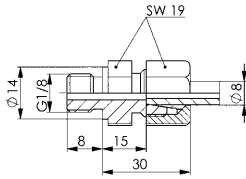
## No. 6994-11

### Screw-in fitting, straight, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|--------------|------------|
| 112714    | 6994-11     | 400                           | 40           | 55         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

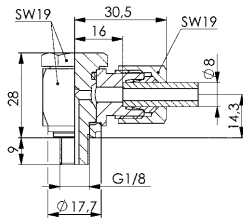
## No. 6994-12

### Pivoting fitting, angled, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|--------------|------------|
| 112961    | 6994-12     | 400                           | 40           | 125        |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

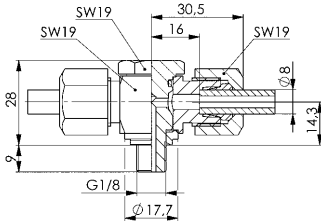
## No. 6994-13

### Pivoting T-fitting, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Md max. [Nm] | Weight [g] |
|-----------|-------------|-------------------------------|--------------|------------|
| 116418    | 6994-13     | 400                           | 40           | 150        |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

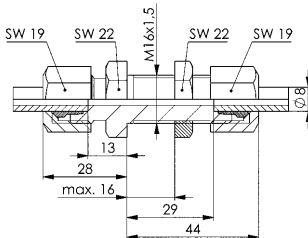
## No. 6994-14

### Bulkhead fitting, straight, heavy-duty

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 131631    | 6994-14     | 800                           | 130        |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

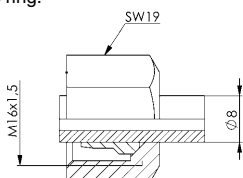
## No. 6994-17

### Union nut with cutting ring, heavy series

for steel tubes with outer diameter 8 mm and internal diameter 4 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 184150    | 6994-17     | 800                           | 23         |

#### Design:

According to DIN 3852 Form B by cutting ring.

#### Note:

Warning: Do not use Teflon tape!

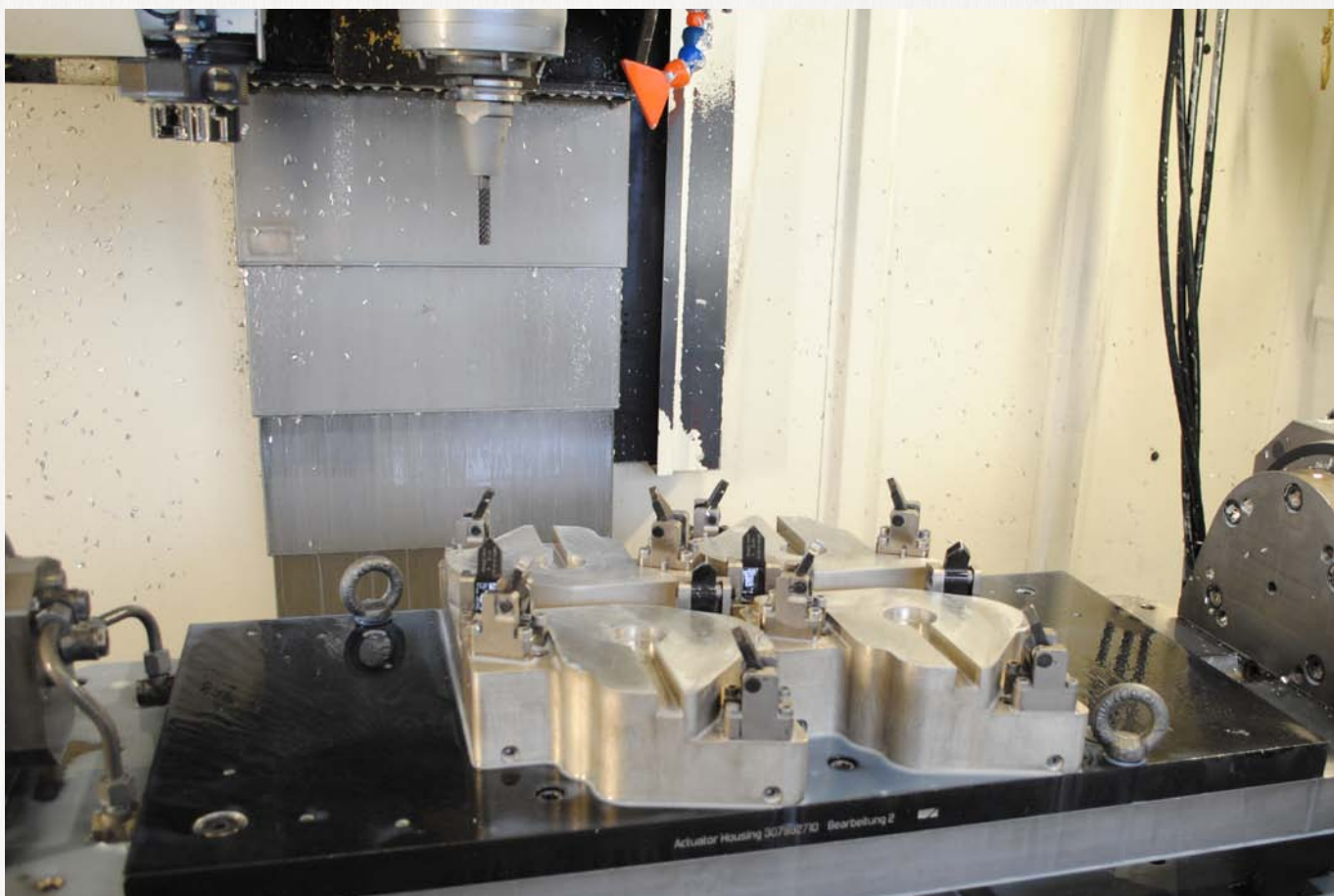
No. 6994

Hydraulic pipe

| Order no. | Article no. | dia.<br>[mm] | Length<br>[m] | max. operating pressure<br>[bar] | Weight<br>[g] |
|-----------|-------------|--------------|---------------|----------------------------------|---------------|
| 320861    | 6994-25     | 6,0 x 1,5    | 2,0           | 315                              | 335           |
| 122903    | 6994-30     | 8,0 x 2,0    | 2,0           | 500                              | 600           |

### Design:

Seamless hydraulic pipe, phosphated and oiled, from steel (fully killed) to DIN 2391 C, normalized, bright-annealed, cold-drawn.



Subject to technical alterations.

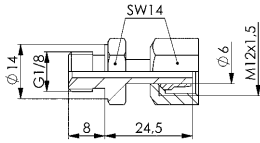
## No. 6994-010

### Screw-in fitting, straight, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320689    | 6994-010    | 315                           | 25         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

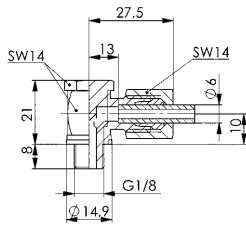
## No. 6994-030

### Pivoting fitting, angled, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320705    | 6994-030    | 315                           | 74         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

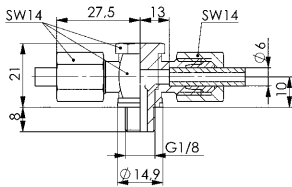
## No. 6994-040

### Pivoting T-fitting, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320721    | 6994-040    | 315                           | 85         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

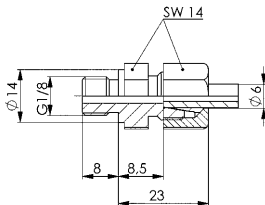
## No. 6994-050

### Screw-in fitting, straight, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320747    | 6994-050    | 315                           | 25         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

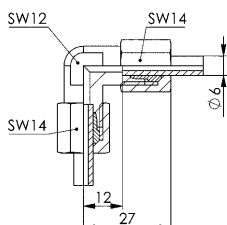
## No. 6994-060

### Fitting, angled, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD



| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320762    | 6994-060    | 315                           | 51         |

#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-080

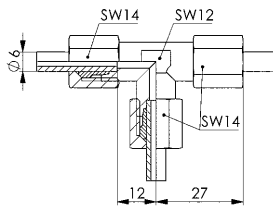
### T-fitting, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320788    | 6994-080    | 315                           | 71         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-090

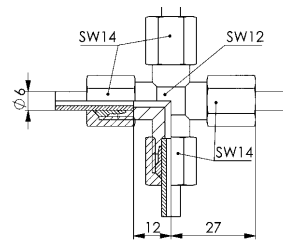
### Cross-fitting, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320804    | 6994-090    | 315                           | 77         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-140

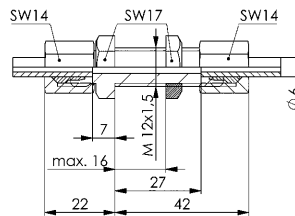
### Bulkhead fitting, straight, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320820    | 6994-140    | 315                           | 67         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-150

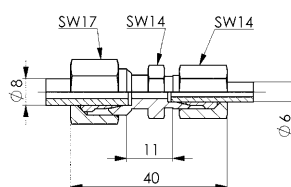
### Adapter Plate, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 320846    | 6994-150    | 315                           | 42         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!

## No. 6994-170

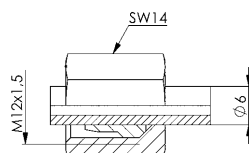
### Union nut with cutting ring, light duty

for steel tubes with outer diameter 6 mm and internal diameter 3 mm, with olive ring.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Weight [g] |
|-----------|-------------|-------------------------------|------------|
| 313361    | 6994-170    | 315                           | 12         |



#### Design:

To DIN 3852 form B by sealing edge or by sealing edge ring and olive ring or O-ring.

#### Note:

Warning: Do not use Teflon tape!



Subject to technical alterations.



## ACCESSORIES -

FOR HOLDING AND SECURING  
WORKPIECES AND SET SCREWS  
FOR SECURE CLAMPING

- > **FAILOVER WITH BALL**
- > **FAILOVER WITH ROLL**
- > **SIDE THRUST PIECES WITH AND WITHOUT SEAL**
- > **SET SCREWS**

### PRODUCT OVERVIEW:

| Type    | Designation            | Spring force [N] | Thread    | No. of models | Design variants |
|---------|------------------------|------------------|-----------|---------------|-----------------|
| 6980MK  | Failover with ball     | 52               | M22 x 1,5 | 2             | thread          |
| 6980FRX | Failover with roll     | 7 - 20           | -         | 2             | Block           |
| 6380    | Side thrust pieces     | 10 - 300         | -         | 29            | Einsteck        |
| 6940    | Set screw, ball-shaped | -                | M5 x M20  | 7             | thread          |
| 7110    | Set screw with ball    | -                | M8 - M20  | 20            | thread          |

### PRODUCT EXAMPLES:

NO. 6980MK AND 6980FRX



> Spring force: 7 - 52 N

NO. 6380



> Spring force: 10 - 300 N

NO. 6940 AND 7110DK



> Thread: M5 - M20

No. 6980FRX

Failover with roll

flanged.

**NEW!**



CAD

| Order no. | Article no. | Material roll steel | Material roll plastic | Deflection force [N] | Deflection angle max. [°] | Weight [g] |
|-----------|-------------|---------------------|-----------------------|----------------------|---------------------------|------------|
| 562208    | 6980FRS-16  | ●                   | -                     | 7-20                 | 24                        | 258        |
| 562209    | 6980FRK-16  | -                   | ●                     | 7-20                 | 24                        | 252        |

**Design:**

Housing and lever made of steel, burnished. Roller made of hardened steel or plastic

**Application:**

Workpieces are held in position before the clamping operation and prevented from falling out.

**Features:**

Countless variants are possible by combining the various mounting variants and deflection directions. Damage to the workpiece surface is prevented by using the roller.

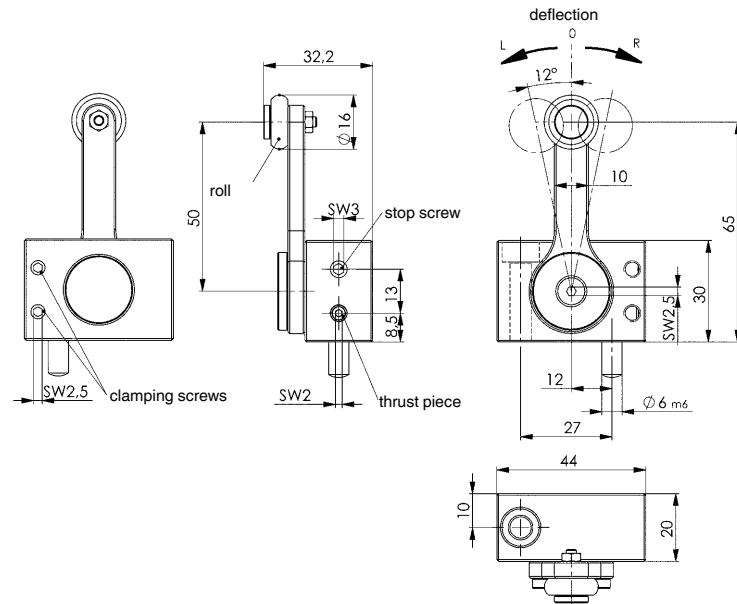
**Note:**

The deflection can be changed by altering the position of the stop screw with the thrust piece in the housing. The position is secured with the clamping screw. In the normal position, the lever is changeable by 90°.

Replacement part:

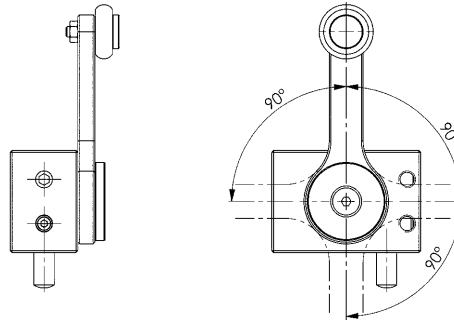
Roller made of steel 6958FRS-16-06: order no. 562538

Roller made of plastic 6980FRK-16-06: order no. 562539

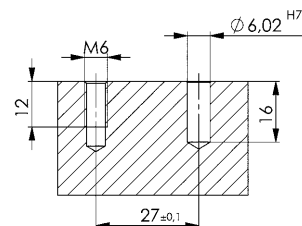


convertible: right lever

convertible: lever by 90° respectively



**Installation dimensions:**



Subject to technical alterations.

No. 6980MK

**Failover with ball**  
screwable.

**NEW!**



CAD

| Order no. | Article no. | dia. A | ~P<br>Spring force<br>[N] | Screwing depth<br>H min.<br>[mm] | Screwing depth<br>H max.<br>[mm] | L  | Weight<br>[g] |
|-----------|-------------|--------|---------------------------|----------------------------------|----------------------------------|----|---------------|
| 562206    | 6980MK-08   | 8      | 52                        | 9                                | 15                               | 64 | 66            |
| 562207    | 6980MK-10   | 10     | 52                        | 9                                | 15                               | 64 | 69            |

### Design:

Housing made of steel, burnished. Plunger hardened.

### Application:

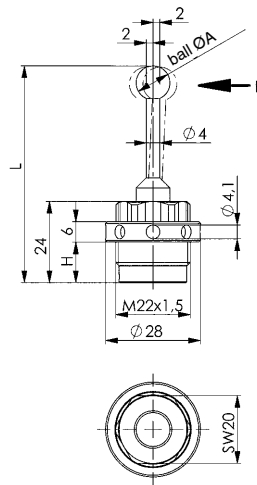
Workpieces are held in position before the clamping operation and prevented from falling out.

### Features:

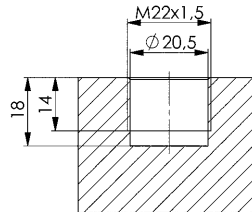
Thanks to the cylindrical shape, the screw-in failover can be used 360°. Fine adjustment by screwing in or unscrewing the failover.

### Note:

Plungers can be individually designed in length and ball diameter and are available on request. For installation, use hook spanner order no 54916.



### Installation dimensions:



# THE FIRST STEP FOR USE AND EMPLOYMENT OF SIDE THRUST PIECES:

- > What is being positioned or clamped?
- > Which side thrust pieces will be used?
- > What size corresponds to the workpiece?
- > What tolerance does the workpiece have?
- > How large is the dimension Y? (Workpiece height)
- > How large is the dimension X? (See table)
- > Should the spring deflection be completely used?
- > How is the coordinate dimension determined?

## EXAMPLE: POSITIONING OR CLAMPING A PLATE 100 X 50 X 8 MM

### Should the pin diameter be 5, 6 or 8 mm?

- > If nothing may extend over the plate 5 mm
- > If projection would not be a problem 6 or 8 mm
- > If clamping will be done additionally 6 mm
- > If drilling will be performed without additional clamping 8 mm

### Workpiece height Y?

The tolerance can be ignored

### What force should be selected?

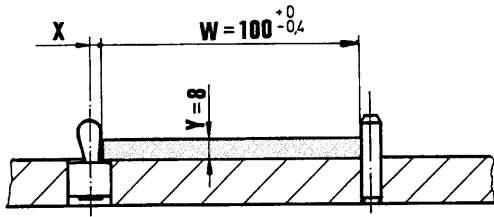
- > For positioning tasks 30 - 60 N
- > For clamping forces 90 - 150 N

### Length / width of the workpiece?

- > Length =  $100 +0/-0.4$  = medium dimension 99,8 mm
- > Width =  $50 +0,2/-0.2$  = medium dimension 50,0 mm

### Dimension X for side thrust pieces with steel spring?

- > See table or formula below



W = workpiece (+/- tolerance)  
 - F = pre-tension  
 F = (-F) + (+F)

Y = workpiece height  
 + F = clamping force (spring deflection for tolerance)  
 T = tolerance

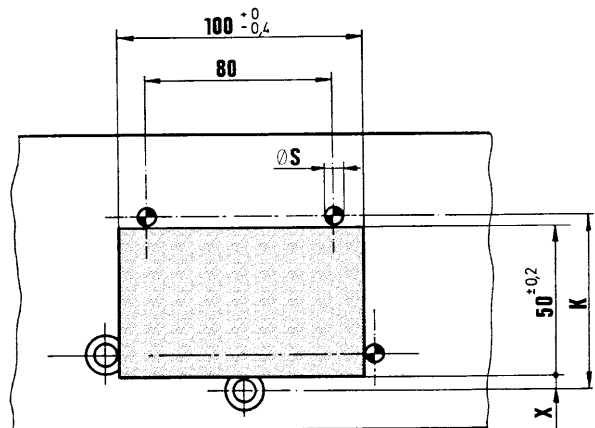
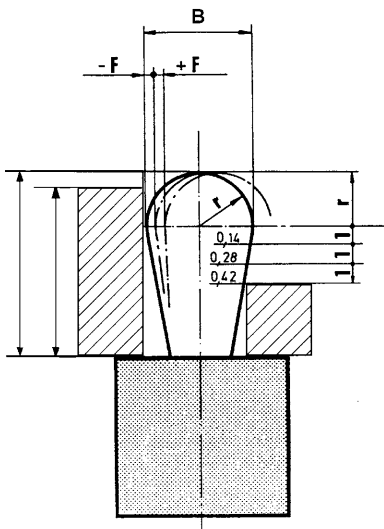
For workpieces that are higher than C minus r, the table values for dimension X or the formula  $X = B/2 - (-F)$  apply.

For workpieces that are smaller than C minus r, the table values for dimension X or the formula  $X = B/2 - (-F) - [(C - r - Y) \times 0,123]$  apply.

Formula for coordinates:

$$K = W - T/2 + x + S/2$$

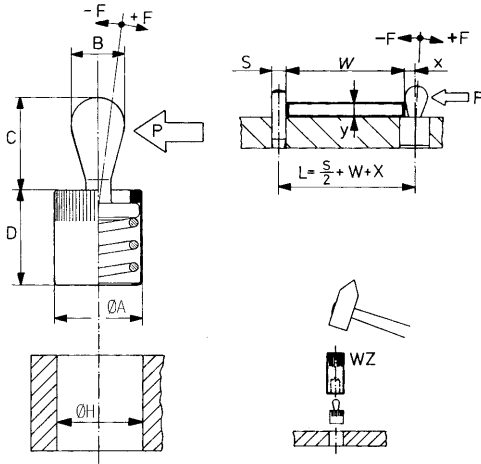
The table values are standard values that should ideally be checked using a sample clamping.



## No. 6380

### Side thrust piece, without seal

Steel pin: hardened and galvanised  
Sleeve : Aluminium



| Order no. | dia. A | B  | ~P<br>Spring force [N] | C    | D-1 | ØH H8 | F    | X   | Tool<br>6380WZ | Weight [g] |
|-----------|--------|----|------------------------|------|-----|-------|------|-----|----------------|------------|
| 373001    | 6      | 3  | 10                     | 4,0  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,6        |
| 373019    | 6      | 3  | 20                     | 4,0  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,6        |
| 373027    | 6      | 3  | 40                     | 4,0  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,7        |
| 373035    | 10     | 5  | 20                     | 6,7  | 11  | 10    | ±0,8 | 1,6 | 05             | 2,6        |
| 373043    | 10     | 5  | 50                     | 6,7  | 11  | 10    | ±0,8 | 1,6 | 05             | 2,9        |
| 373050    | 10     | 5  | 100                    | 6,7  | 11  | 10    | ±0,8 | 1,6 | 05             | 3,1        |
| 373068    | 10     | 6  | 40                     | 10,7 | 11  | 10    | ±1,0 | 1,8 | 06             | 3,6        |
| 373076    | 10     | 6  | 75                     | 10,7 | 11  | 10    | ±1,0 | 1,8 | 06             | 3,6        |
| 373084    | 10     | 6  | 150                    | 10,7 | 11  | 10    | ±1,0 | 1,8 | 06             | 3,9        |
| 373092    | 12     | 8  | 50                     | 13,9 | 13  | 12    | ±1,3 | 2,6 | 08             | 7,0        |
| 373100    | 12     | 8  | 100                    | 13,9 | 13  | 12    | ±1,3 | 2,6 | 08             | 7,2        |
| 373126    | 16     | 10 | 100                    | 16,7 | 17  | 16    | ±1,6 | 3,2 | 10             | 15,0       |
| 373134    | 16     | 10 | 200                    | 16,7 | 17  | 16    | ±1,6 | 3,2 | 10             | 15,4       |
| 373142    | 16     | 10 | 300                    | 16,7 | 17  | 16    | ±1,6 | 3,2 | 10             | 15,8       |

#### Note:

Without sealing for operations without dirt, temperature-resistant up to 250°C.  
Installation by pressing in.

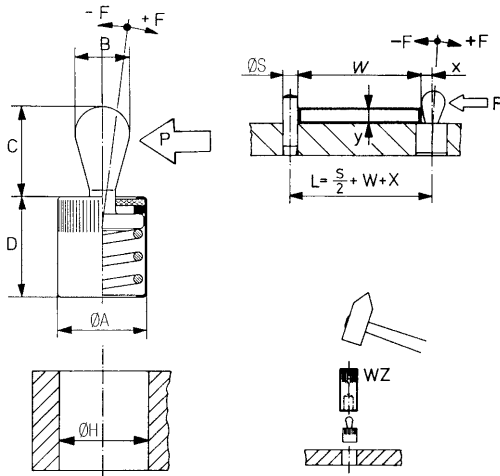
CAD



## No. 6380D

### Side thrust piece, with seal

against chips and dirt.  
Steel pin for clamping: hardened and galvanised  
Sleeve: Aluminium



| Order no. | dia. A | B  | ~P<br>Spring force [N] | C  | D-1 | ØH H8 | F    | X   | Tool<br>6380WZ | Weight [g] |
|-----------|--------|----|------------------------|----|-----|-------|------|-----|----------------|------------|
| 373159    | 6      | 3  | 10                     | 4  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,6        |
| 373167    | 6      | 3  | 20                     | 4  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,6        |
| 373175    | 6      | 3  | 40                     | 4  | 7   | 6     | ±0,5 | 0,9 | 03             | 0,7        |
| 373183    | 10     | 5  | 20                     | 6  | 12  | 10    | ±0,8 | 1,6 | 05             | 2,7        |
| 373191    | 10     | 5  | 50                     | 6  | 12  | 10    | ±0,8 | 1,6 | 05             | 2,9        |
| 373209    | 10     | 5  | 100                    | 6  | 12  | 10    | ±0,8 | 1,6 | 05             | 2,9        |
| 373217    | 10     | 6  | 40                     | 10 | 12  | 10    | ±1,0 | 1,8 | 06             | 3,1        |
| 373225    | 10     | 6  | 75                     | 10 | 12  | 10    | ±1,0 | 1,8 | 06             | 3,6        |
| 373233    | 10     | 6  | 150                    | 10 | 12  | 10    | ±1,0 | 1,8 | 06             | 3,7        |
| 373241    | 12     | 8  | 50                     | 13 | 14  | 12    | ±1,3 | 2,6 | 08             | 3,9        |
| 373258    | 12     | 8  | 100                    | 13 | 14  | 12    | ±1,3 | 2,6 | 08             | 7,1        |
| 373266    | 12     | 8  | 200                    | 13 | 14  | 12    | ±1,3 | 2,6 | 08             | 7,3        |
| 373274    | 16     | 10 | 100                    | 16 | 18  | 16    | ±1,6 | 3,2 | 10             | 7,6        |
| 373282    | 16     | 10 | 200                    | 16 | 18  | 16    | ±1,6 | 3,2 | 10             | 15         |
| 373290    | 16     | 10 | 300                    | 16 | 18  | 16    | ±1,6 | 3,2 | 10             | 15,4       |

#### Note:

With sealing for chip-producing operations with dirt, temperature-resistant up to 150°C.  
Sealing: CR, black, 60 Shore. Installation by pressing in.

CAD

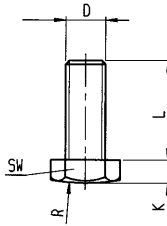


Subject to technical alterations.

## No. 6940

### Set screw, ball-shaped

Strength class 10.9

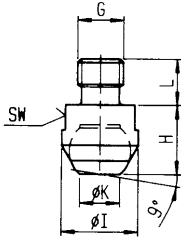


| Order no. | Article no. | D x L  | K    | R   | SW | Weight [g] |
|-----------|-------------|--------|------|-----|----|------------|
| 64014     | 6940-M5     | M5x10  | 3,5  | 25  | 8  | 2,4        |
| 64022     | 6940-M6     | M6x12  | 4,0  | 30  | 10 | 4,3        |
| 64030     | 6940-M8     | M8x16  | 5,3  | 40  | 13 | 9,9        |
| 64048     | 6940-M10    | M10x20 | 6,4  | 50  | 17 | 21,3       |
| 64055     | 6940-M12    | M12x30 | 7,0  | 60  | 19 | 36,4       |
| 64063     | 6940-M16    | M16x40 | 10,0 | 75  | 24 | 85,8       |
| 64071     | 6940-M20    | M20x50 | 12,5 | 100 | 30 | 168        |

## No. 7110DF

### Set screw

with flat-faced ball, ribbed.

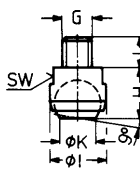


| Order no. | Article no.   | G x L    | H  | dia. I | dia. K | SW | Load [kN] | Weight [g] |
|-----------|---------------|----------|----|--------|--------|----|-----------|------------|
| 425025    | 7110DF-08xM8  | M8 x 8   | 13 | 13     | 7,2    | 11 | 18        | 13         |
| 273177    | 7110DF-10xM10 | M10 x 10 | 18 | 20     | 10,5   | 17 | 25        | 40         |
| 86637     | 7110DF-12xM12 | M12 x 12 | 18 | 20     | 10,5   | 17 | 25        | 43         |
| 86652     | 7110DF-16xM16 | M16 x 16 | 27 | 30     | 20,0   | 20 | 90        | 150        |
| 86223     | 7110DF-20xM20 | M20 x 20 | 35 | 50     | 34,5   | 41 | 165       | 486        |

## No. 7110DK

### Set screw

with flat-faced ball

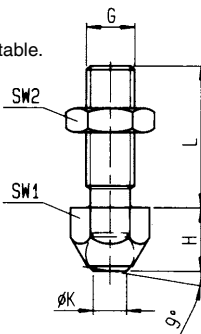


| Order no. | Article no.   | G x L    | H  | dia. I | dia. K | SW | Load [kN] | Weight [g] |
|-----------|---------------|----------|----|--------|--------|----|-----------|------------|
| 285478    | 7110DK-08xM8  | M8 x 8   | 13 | 13     | 7,2    | 11 | 10        | 13         |
| 285452    | 7110DK-10xM10 | M10 x 10 | 18 | 20     | 10,5   | 17 | 25        | 40         |
| 77446     | 7110DK-12xM12 | M12 x 12 | 18 | 20     | 10,5   | 17 | 25        | 43         |
| 77453     | 7110DK-16xM16 | M16 x 16 | 27 | 30     | 20,0   | 20 | 90        | 150        |
| 76059     | 7110DK-20xM20 | M20 x 20 | 35 | 50     | 34,5   | 41 | 165       | 486        |

## No. 7110DH

### Set screw

with flat-faced ball, ribbed, adjustable.

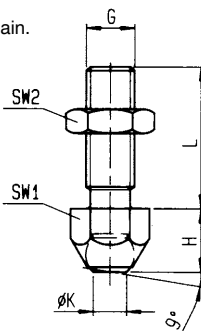


| Order no. | Article no.   | G x L    | H    | dia. K | SW1 | SW2 | Load [kN] | Weight [g] |
|-----------|---------------|----------|------|--------|-----|-----|-----------|------------|
| 87890     | 7110DH-08xM8  | M8 x 25  | 11,6 | 5,5    | 13  | 13  | 8         | 20         |
| 87916     | 7110DH-10xM10 | M10 x 30 | 15,7 | 8,6    | 17  | 17  | 8         | 44         |
| 87858     | 7110DH-12xM12 | M12 x 35 | 15,7 | 8,6    | 17  | 19  | 15        | 56         |
| 87874     | 7110DH-16xM16 | M16 x 40 | 20,7 | 10,5   | 24  | 24  | 25        | 128        |
| 83931     | 7110DH-20xM20 | M20 x 50 | 27,3 | 20,0   | 30  | 30  | 90        | 274        |

## No. 7110DI

### Set screw

with flat-faced ball, adjustable, plain.



| Order no. | Article no.   | G x L    | H    | dia. K | SW1 | SW2 | Load [kN] | Weight [g] |
|-----------|---------------|----------|------|--------|-----|-----|-----------|------------|
| 87908     | 7110DI-8xM8   | M8 x 25  | 11,6 | 5,5    | 13  | 13  | 8         | 20         |
| 87924     | 7110DI-10xM10 | M10 x 30 | 15,7 | 8,6    | 17  | 17  | 8         | 44         |
| 87866     | 7110DI-12xM12 | M12 x 35 | 15,7 | 8,6    | 17  | 19  | 15        | 56         |
| 87882     | 7110DI-16xM16 | M16 x 40 | 20,7 | 10,5   | 24  | 24  | 25        | 128        |
| 83949     | 7110DI-20xM20 | M20 x 50 | 27,3 | 20,0   | 30  | 30  | 90        | 274        |

Subject to technical alterations.

**NO. 6906P**

> Pressure generators



**NO. 6906PB\*\***

> Pressure-generator accessories



**NO. 6945-22-20**

> Clamping bars



**NO. 6945-22**

> Spacer bars



**NO. 6945-11-\*\***

> Clamping heads



**NO. 6946**

> Wedge clamp



**NO. 6945-28-\*\***

> Clamping-stud holder



**NO. 6945-15-10**

> Clamping pistons, complete



**NO. 6945-02-04**

> Clamping stud



## THE FOLLOWING SYSTEM ELEMENTS ARE USED TO MEET THE REQUIREMENTS

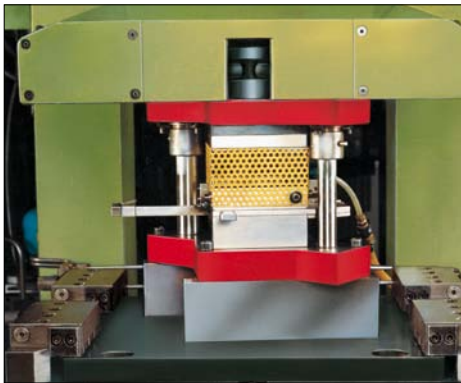
- > Fixed clamping bars for press table and piston for the clamping of tools with common clamping edge heights and tool-pallet sizes (fig. 4, right-hand side).
- > Clamping heads, sliding in T-groove, for holding tools for the press table and the piston (fig. 5, right-hand side).
- > Hydraulic clamping devices at stud for the clamping of tools equipped with a clamping pin (fig. 6, right-hand side, and 1).
- > Tool pallets (upon request) for tools
- > Fixed pallets for each tool
- > Interchangeable pallets, i.e. one pallet for several tools.
- > Pump unit with 4 or 5 separate clamping circuits.

## SAFETY WHEN USING CLAMPING HYDRAULICS

The pump device is equipped with 4 or 5 separate clamping circuits and additional pressure switches in all circuits. In addition, the oil level is monitored by a float switch (fig. 2). Pressure switch and float switch are connected in series in a terminal housing and are routed to the terminal rail of the device controller. Control and safety functions can be integrated into the machine controller via the 13-pin socket of the device controller. In case of a pressure-drop in one or more clamping circuits, or if the oil level is low, the press is shut down automatically.

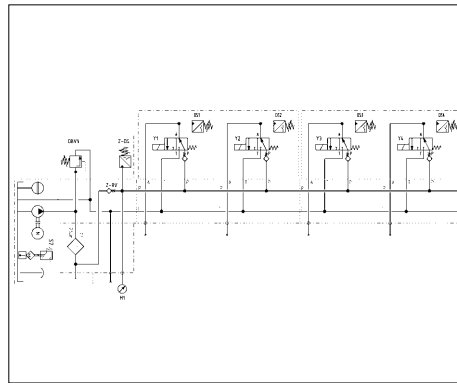
The hydraulic clamping elements are supplied diagonally at the table and at the piston by two independent and pressure-controlled clamping circuits (fig. 3).

FIGURE 1



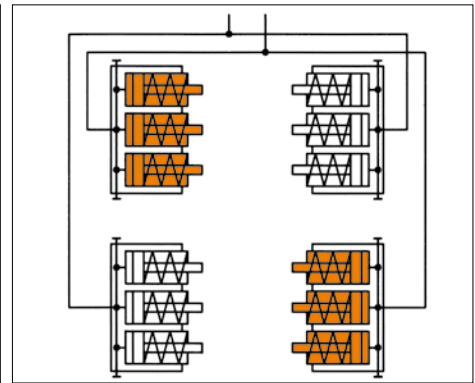
- > Clamping strip on table and stud clamping on plunger

FIGURE 2



- > Hydraulic diagram pressure generators

FIGURE 3



- > Safety circuit



AMF has developed a „Hydraulic tool-clamping system for presses“ which reduces the set-up times of the press to the absolute minimum. The system is designed for „old“ as well as „new“ presses of various manufacturers. This system also takes into account the storage, transport and frequency of use of the tools.

The developments observed in non-cutting operations shows an increasing demand for smaller machining lots, which of course requires a sound economic, cost-effective, basis. Primary machining times and secondary set-up times must be minimized. In several instances, presses have reached their stroke-cycle limits for tools or workpieces. Accordingly, development is now focussed on the minimization of set-up times.

When converting a press to another product, down-times are inevitable for the following reasons:

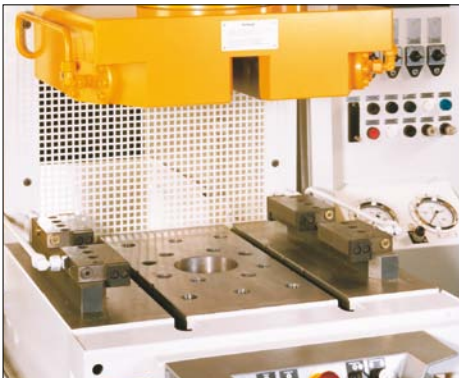
- > removal of tool
- > installation of new tool
- > adjustment of press to new tool

The set-up of the press is has been reduced to a minimum by CNC control. What remains for optimization is the tool-changing time. This is where you may benefit from our products.

## OUR „HYDRAULIC TOOL-CLAMPING SYSTEM FOR PRESSES“ MEETS THE FOLLOWING REQUIREMENTS:

- > Safety is ensured, i.e. tool storage, transport and tool clamping comply with strict requirements.
- > Various press types can be equipped.
- > Solutions are available for already present as well as new press types.
- > Set-up times are significantly reduced.
- > Tool storage is controlled.
- > The removal of tools from the rack, transport and insertion into the press are more efficient, safer and easier for the user.
- > The system can be quickly installed at any press
- > ... and is suitable for frequently used tools as well as for rarely used tools.

FIGURE 4



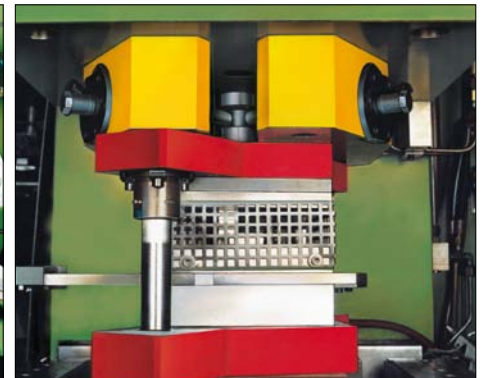
> Clamping bar

FIGURE 5



> Clamping head

FIGURE 6



> Clamping-stud holder

## No. 6906P

### Pump Unit

with 4 separate clamping circuits, single acting, max. operating pressure 400 bar.



| Order no. | Article no. | Clamping circuits | Q [l/min] | Valve type   | Matching control unit  | Weight [Kg] |
|-----------|-------------|-------------------|-----------|--------------|------------------------|-------------|
| 326702    | 6906P-64319 | 4                 | 2,5       | 4 x 3/2 + DS | 6906PB-4-4, 6906PB-4-5 | 65          |

### Design:

Compact, ready to plug in pump unit, ready for operation electrically and hydraulically. Complete with pressure control unit, electromagnetic valve, manometer, float switch, oil filling. The electrical controller is equipped with main switch, indicator lamps and flange sockets, carrying handle and two-part protective hood. Electrical connection complete with CEKON connector.

### Application:

The pump unit is designed to operate hydraulic clamping systems.

### Features:

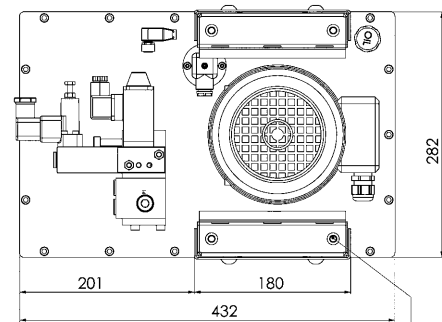
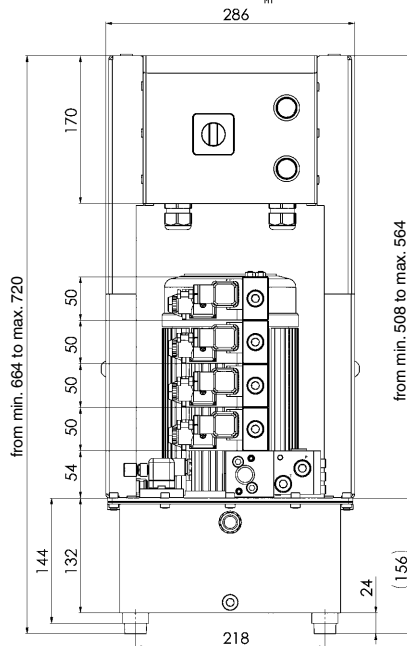
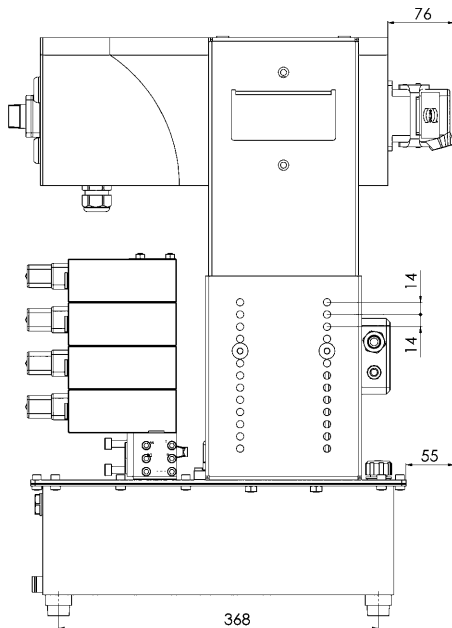
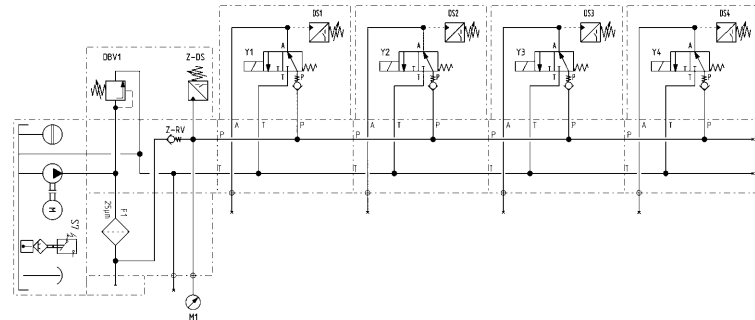
The radial piston pump is driven via an alternating current standard motor with the energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermoelement. Each of the 4 clamping circuits is equipped with a 3/2 seat valve. Four pressure switches (DS) are attached externally for the external pressure monitoring. Pressure setting and pressure monitoring are accomplished via a pressure limiting valve (DBV) and an electronic pressure switch (EDS). The value set at the pressure limiting valve is stored with the Mode button on the pressure switch. This simultaneously sets the preprogrammed switch-off and switch-back point.

The pump unit operates intermittently. In the case of a pressure drop, the pump unit is activated automatically by the pressure switch. The clamping pressure is indicated using illuminated push buttons. The installed float switch switches off the pump in the case of low oil level and outputs an optical signal.

### Note:

Pay attention to faultless venting during the connection of the elements. Pumping in the case of pressure drop must be made maximum 2x per minute. The unit must not operate continuously. To ensure safe hydraulic tool clamping, clamping at ram and table is carried out in each case by means of a separate clamping circuit. The four pressure switches DS1-DS4 are used to provide external pressure monitoring of the four clamping circuits. The machine is automatically switched off if pressure drops in one clamping circuit or in the case of lack of oil. The electrical connection between press controller and power unit must be performed by the customer.

### Hydraulic diagram:



M8 thread for lifting devices

Subject to technical alterations.

## Pump Unit No. 6906P

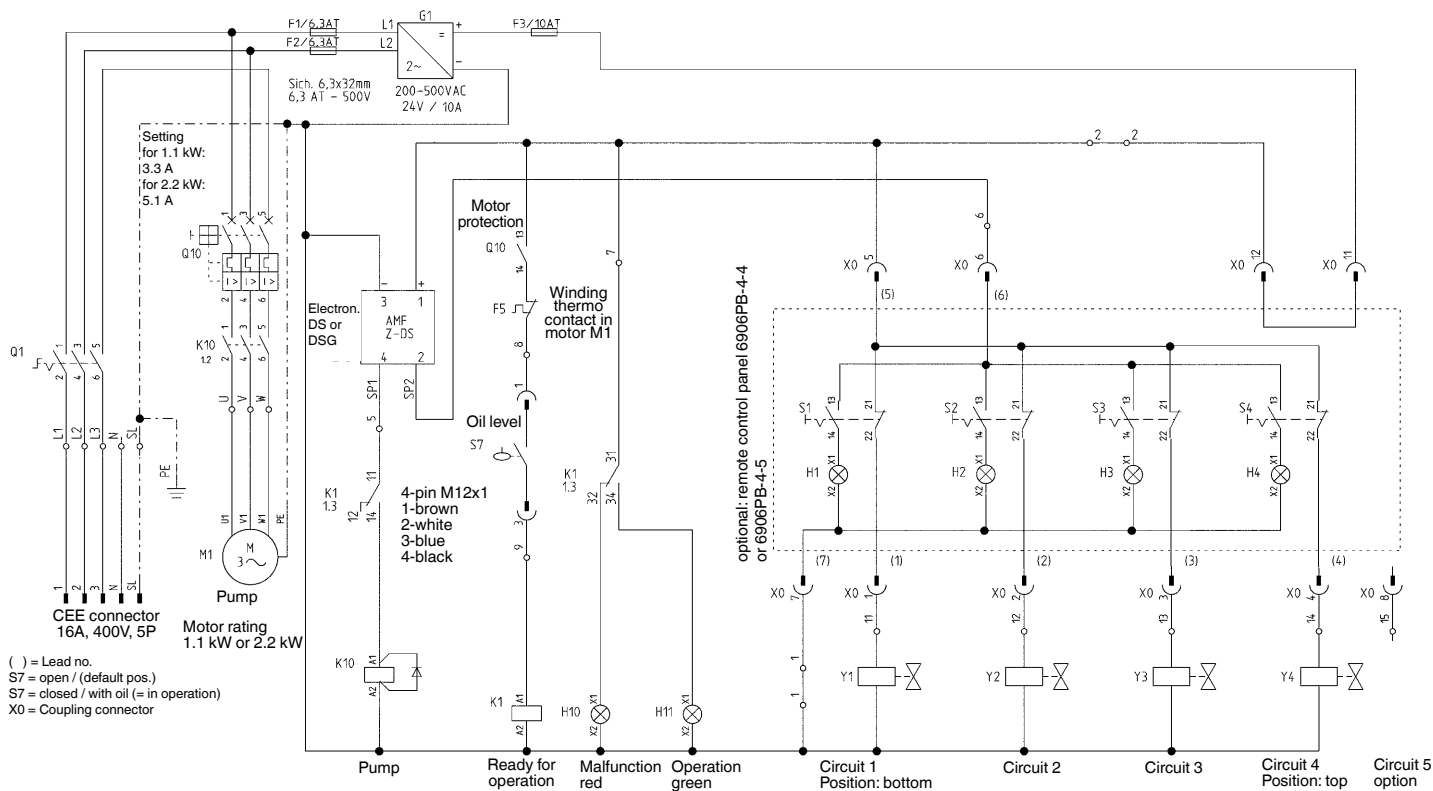
### Hydraulic specifications:

|                         |   |
|-------------------------|---|
| Max. operating pressure | 400 bar   |
| Oil capacity, reservoir | ca. 10 litres   |
| Oil capacity, usable    | ca. 4 litres  |
| Oil-flow rate           | 2,5 l/min.  |
| Valve types             | 4x 3/2 seat valve and 4x pressure switch for external pressure monitoring |
| Hydraulic connection    | thread G1/4   |
| Noise level             | max. 70 dB(A)   |
| Ambient temp. range     | -10° C to + 35° C   |
| Position of use         | upright   |
| Pump design             | radial-piston pump with 3 pistons   |
| Load cycle              | max. 500/h  |
| Fluid                   | hydraulic oils<br>HLP and HLPD according to DIN 51524 part 2              |
| Oil recommendation      | HLP 22 and HLPD 22 or<br>HLP 32 and HLPD 32                               |
| Viscosity               | ISO VG 22 and 32 DIN 51519  |

### Electrical specifications:

|                       |   |
|-----------------------|---|
| Nominal voltage       | 400 V/50 Hz three-phase   |
| Control voltage       | 24 V DC   |
| Valve voltage         | 24 V DC   |
| Motor speed           | 2900 1/min.   |
| Direction of rotation | any   |
| Motor rating          | 1,1 kW  |
| Motor type            | three-phase standard motor  |
| Nominal current       | 3 A   |
| Fuse, supply line     | 16 A slow-blow  |
| Fuse, control circuit | 1 A primary, 4 A secondary  |
| Electrical connection | Öflex 100; 5x1,5 mm <sup>2</sup><br>3 m with CEE connector 16 A 6 h |
| Protection class      | IP 54   |
| Duty cycle            | max. 50 % intermittent operation                                    |
| Operation type        | Socket for remote control   |
| Fill-level monitoring | Float switch  |

## Wiring circuit of pump unit with 4 clamping circuits, remote control



To increase safe handling of the clamped parts, the unit ready for operation and a clamping pressure query should be integrated with the processing machine.

Note: 1 to 4 circuits = directional seat valve clamped with power off

## No. 6906P

### Pump Unit

with 5 separate clamping circuits, single acting,  
max. operating pressure 400 bar



| Order no. | Article no. | Clamping circuits | Q [l/min] | Valve type                     | Matching control unit | Weight [Kg] |
|-----------|-------------|-------------------|-----------|--------------------------------|-----------------------|-------------|
| 326728    | 6906P-65319 | 5                 | 2,5       | 4 x 3/2 +DS<br>1 x 3/2 +SV +DS | 6906PB-6-4            | 71          |

### Design:

Compact, ready to plug in pump unit, ready for operation electrically and hydraulically. Complete with pressure control unit, electromagnetic valve, manometer, float switch, oil filling. The electrical controller is equipped with main switch, indicator lamps and flange sockets, carrying handle and two-part protective hood. Electrical connection complete with CEKON connector.

### Application:

The pump unit is designed to operate hydraulic clamping systems. Clamping circuits 1 to 4 are for tool clamping, circuit 5 is for raising the hydraulic ball-roller strip.

### Features:

The radial piston pump is driven via an alternating current standard motor with the energy efficiency class IE3. The motor is protected against overload by a motor protection switch and a thermoelement. Each of the 4 clamping circuits is equipped with a 3/2 seat valve. Four pressure switches (DS) are attached externally for the external pressure monitoring. In the 5th circuit, there are a 3/2-way valve, normally open, a pressure-limiting valve, and a pressure switch. Pressure setting and pressure monitoring are accomplished via a pressure limiting valve (DBV) and an electronic pressure switch (EDS). The value set at the pressure limiting valve is stored with the Mode button on the pressure switch. This simultaneously sets the preprogrammed switch-off and switch-back point.

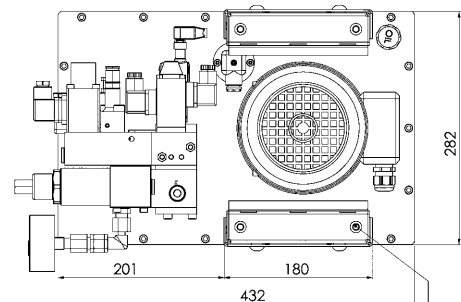
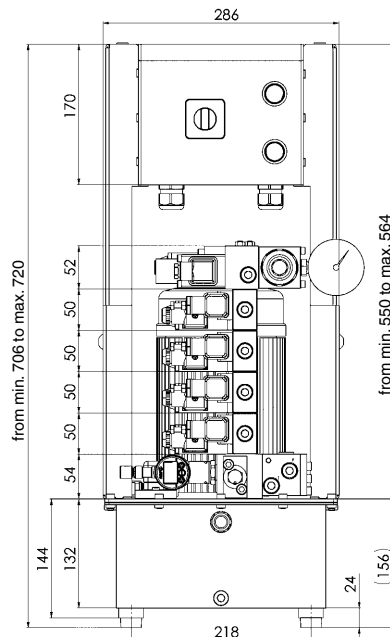
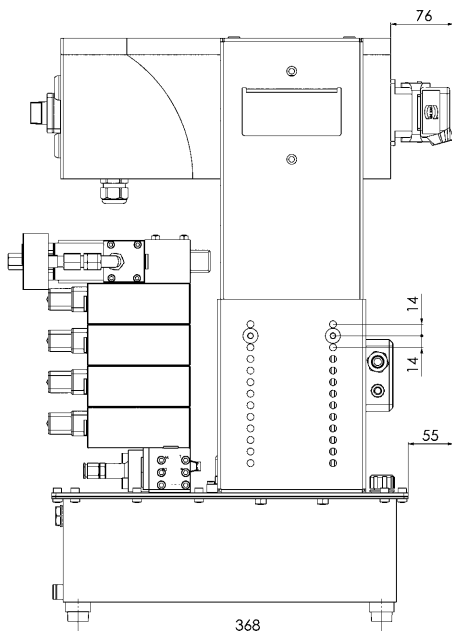
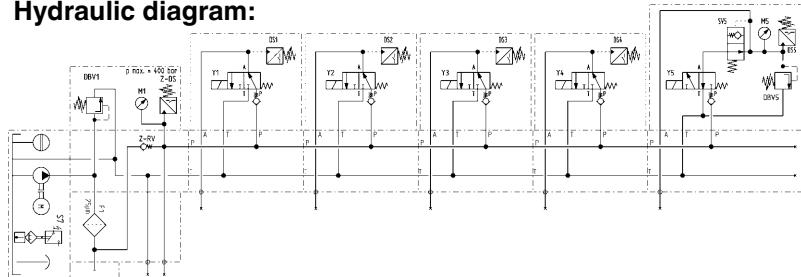
The pump unit operates intermittently. In the case of a pressure drop, the pump unit is activated automatically by the pressure switch. The clamping pressure is indicated using illuminated push buttons. The installed float switch switches off the pump in the case of low oil level and outputs an optical signal.

### Note:

Pay attention to faultless venting during the connection of the elements. Pumping in the case of pressure drop must be made maximum 2x per minute. The unit must not operate continuously. To ensure safe hydraulic tool clamping, clamping at ram and table is carried out in each case by means of a separate clamping circuit. The four pressure switches DS1-DS4 are used to provide external pressure monitoring of the four clamping circuits. The machine is automatically switched off if pressure drops in one clamping circuit or in the case of lack of oil. The electrical connection between press controller and power unit must be performed by the customer.



### Hydraulic diagram:



M8 thread for lifting devices

Subject to technical alterations.

## Pump unit No. 6906P

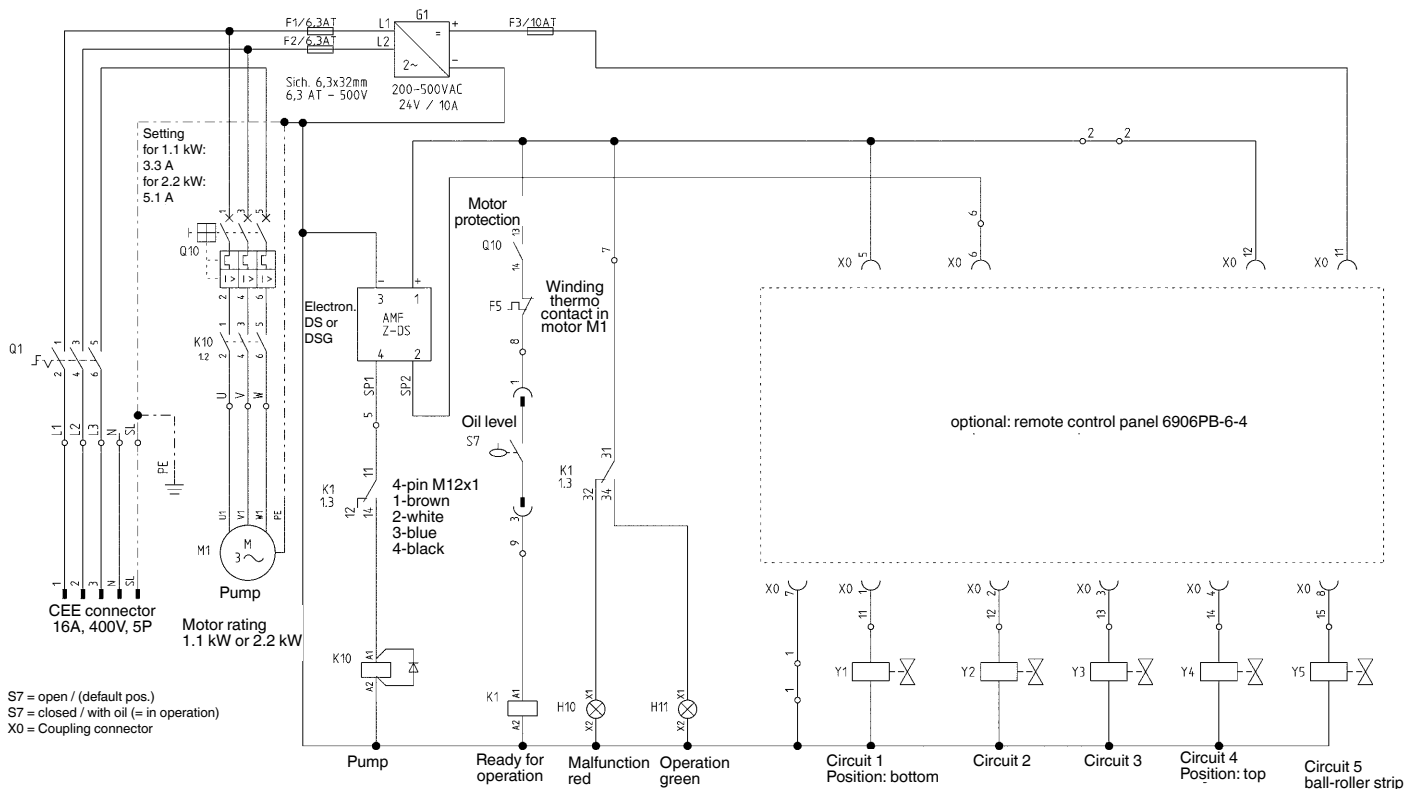
### Hydraulic specifications:

|                         |   |
|-------------------------|---|
| Max. operating pressure | 400 bar   |
| Oil capacity, reservoir | ca. 10 litres   |
| Oil capacity, usable    | ca. 4 litres  |
| Oil-flow rate           | 2,5 l/min.  |
| Valve types             | 3/2 seat valve with pressure switch for external pressure monitoring  |
| clamping circuits 1-4   |   |
| Valve types             | 3/2 seat valve, unclamped with power off, stop valve, pressure limiting valve and pressure switch for actuating the hydraulic ball-roller strips. |
| clamping circuit 5      |   |
| Hydraulic connection    | thread G1/4   |
| Noise level             | max. 70 dB(A)   |
| Ambient temp. range     | -10° C to + 35° C   |
| Position of use         | upright   |
| Pump design             | radial-piston pump with 3 pistons   |
| Load cycle              | max. 500/h  |
| Fluid                   | hydraulic oils<br>HLP and HLPD according to DIN 51524 part 2  |
| Oil recommendation      | HLP 22 and HLPD 22 or<br>HLP 32 and HLPD 32   |
| Viscosity               | ISO VG 22 and 32 DIN 51519  |

### Electrical specifications:

|                       |  |
|-----------------------|--|
| Nominal voltage       | 400 V/50 Hz three-phase  |
| Control voltage       | 24 V DC  |
| Valve voltage         | 24 V DC  |
| Motor speed           | 2900 1/min.  |
| Direction of rotation | any  |
| Motor rating          | 1,1 kW   |
| Motor type            | three-phase standard motor   |
| Nominal current       | 3 A  |
| Fuse, supply line     | 16 A slow-blow   |
| Fuse, control circuit | 1 A primary, 4 A secondary   |
| Electrical connection | Ölflex 100; 5x1,5 mm <sup>2</sup><br>3 m with CEE connector 16 A 6 h |
| Protection class      | IP 54  |
| Duty cycle            | max. 50 % intermittent operation                                     |
| Operation type        | Socket for remote control  |
| Fill-level monitoring | Float switch   |

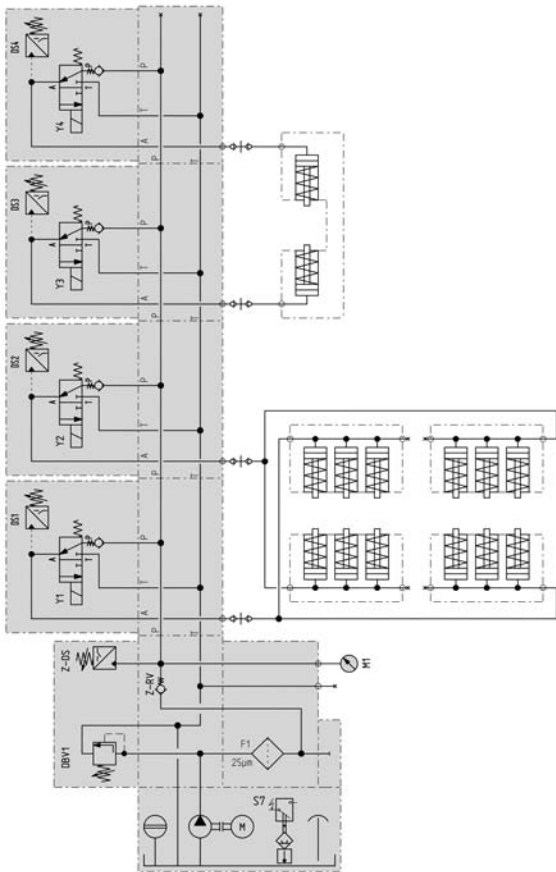
### Wiring circuit of pump unit with 5 clamping circuits, remote control



To increase safe handling of the clamped parts, the unit ready for operation and a clamping pressure query should be integrated with the processing machine.

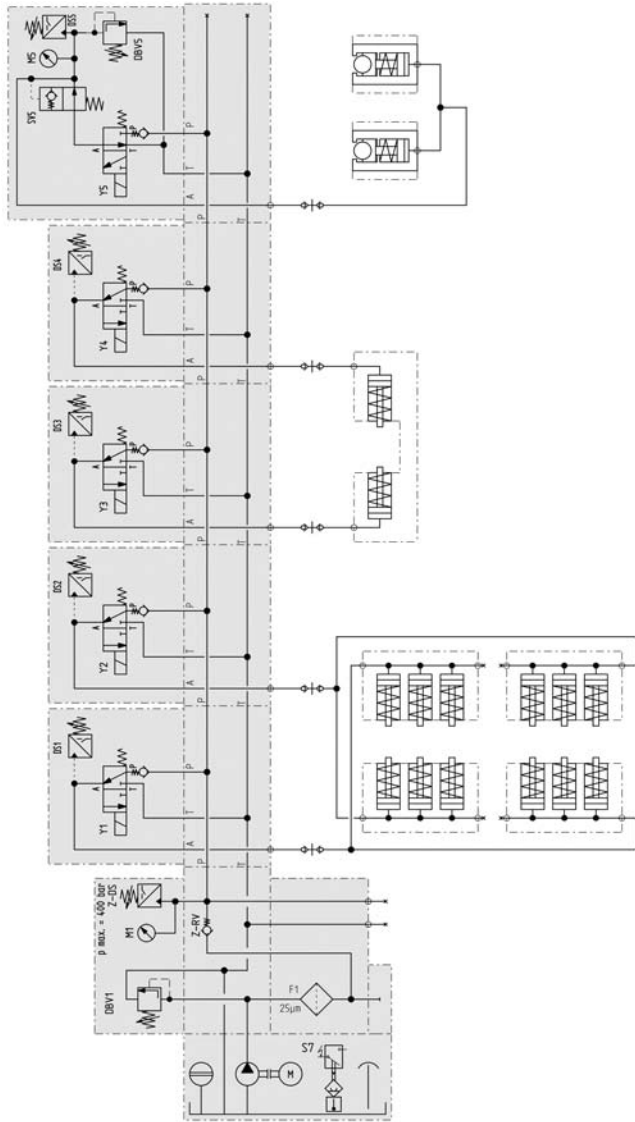
## Wiring diagram for 4 clamping circuits

Pump unit with 4 clamping circuits for tool clamping at table and piston.



## Wiring diagram for 5 clamping circuits

Pump unit with 5 clamping circuits for tool clamping at table and piston as well as additional actuation of the hydraulic ball-type roller bars.



### Note:

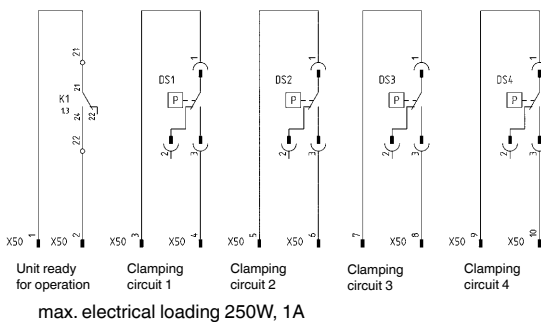
The pump unit must not start automatically when power supply is restored after a power failure. This does not apply to drive systems that may restart automatically without any risk of injury of operators or damage to the product to be processed. Note in accordance with VDE 0113-5.3: Safety in the event of power failure or pump unit failure.

### Important note:

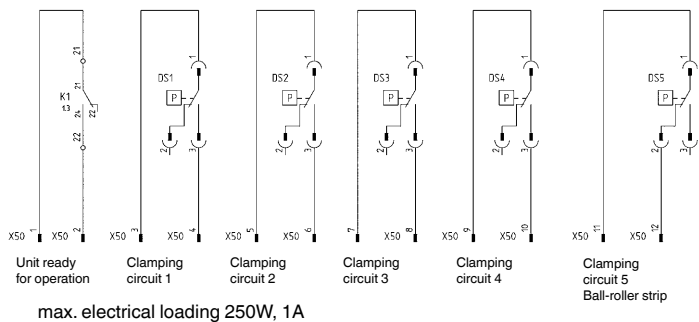
The external DS function of the pump unit can be integrated into the machine controller at the terminal housing by the operator. Ensure that the control circuit is correctly integrated into the machine controller!

## External monitoring of AMF pump unit and pressure switches by customer's machine control

Attention! External voltage of external machine control



Attention! External voltage of external machine control



Subject to technical alterations.

## No. 6906PB-4-4

### Remote Control Switch with magnetic base

for 4 clamping circuits



| Order no. | Article no. | Control voltage | Number of poles | L x W x H | Weight [g] |
|-----------|-------------|-----------------|-----------------|-----------|------------|
| 61663     | 6906PB-4-4  | 24 V =          | 13              | 160x75x75 | 2300       |

#### Design:

Compact polyester housing with magnetic base. Illuminated push buttons with screening, insert labels for clamping circuits, 1-4. 5 m cable with 13-pin coupling connector, protection class IP 65.

#### Application:

For pump unit No. 6906P-64319, Order no. 326702.

## No. 6906PB-4-5

### Remote Control Switch with magnetic base and safety cover

for 4 clamping circuits



| Order no. | Article no. | Control voltage | Number of poles | L x W x H | Weight [g] |
|-----------|-------------|-----------------|-----------------|-----------|------------|
| 60392     | 6906PB-4-5  | 24 V =          | 13              | 160x75x75 | 2500       |

#### Design:

Compact polyester housing with magnetic base, safety hood with lock. Illuminated push buttons with screening, insert labels for clamping circuits, 1-4. 5 m cable with 13-pin coupling connector, protection class IP 65.

#### Application:

For pump unit No. 6906P-64319, Order no. 326702.

## No. 6906PB-6-4

### Remote Control Switch

for 5 clamping circuits



| Order no. | Article no. | Control voltage | Number of poles | L x W x H | Weight [g] |
|-----------|-------------|-----------------|-----------------|-----------|------------|
| 253823    | 6906PB-6-4  | 24V =           | 13              | 230x75x75 | 1910       |

#### Design:

Compact polyester housing. Illuminated push-buttons with screening for clamping circuits 1-4 and insert labels. Push buttons for clamping (green) and releasing (red), without screening for clamping circuit 5. 5 m cable with 13-pin coupling connector, protection class IP 65.

#### Application:

For pump unit No. 6906P-65319, Order no. 326728.

#### Note:

Clamping circuits 1 to 4 are for operating hydraulic clamping elements, circuit 5 is for raising the hydraulic ball-roller strip. The controls are so arranged that unintentional operation of one of the clamping circuits automatically retracts the hydraulic ball-rollers.

## No. 6906PBS-1-1

### Coupling Plug, 13-pin

without plug screw, without current bridge.



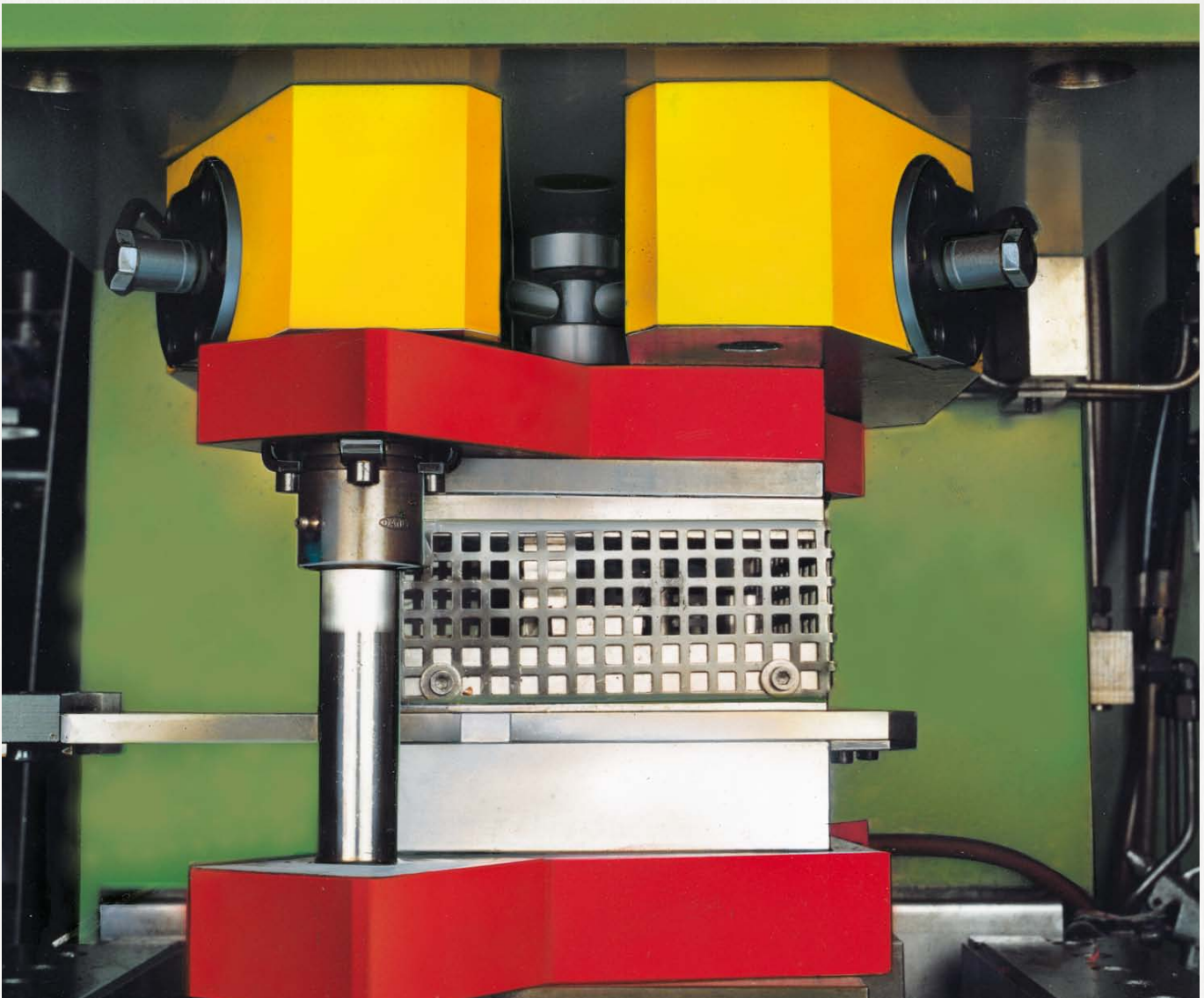
| Order no. | Article no. | Control voltage | Number of poles | Weight [g] |
|-----------|-------------|-----------------|-----------------|------------|
| 126326    | 6906PBS-1-1 | 24 V =          | 13              | 40         |

#### Design:

Glasfibre-reinforced plastic with plug screw rugged version IP 65.

#### Application:

For connection directly to the machine control system. Suitable for pump unit and special units with 13-pin flange socket.





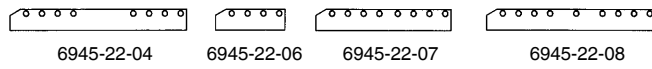
## No. 6945-22-20

### Clamping Bar, short

single acting, with spring return,  
max. operating pressure 400 bar, 1 clamping circuit.

| Order no. | Article no.    | Clamping force at 400 bar [kN] | Stroke [mm] | Vol. total [cm <sup>3</sup> ] | min. spring force per piston [N] | Weight [g] |
|-----------|----------------|--------------------------------|-------------|-------------------------------|----------------------------------|------------|
| 61085     | 6945-22-20-1x3 | 60                             | 6           | 8,7                           | 120                              | 3000       |

Suitable spacer bars:



### Design:

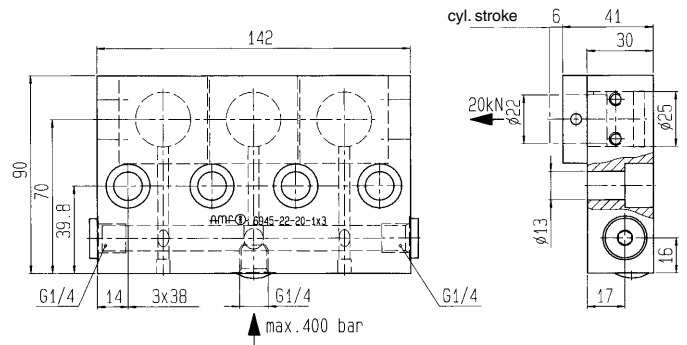
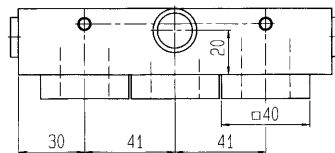
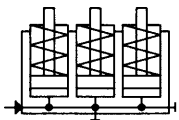
Cylinder body made of tempering steel, phosphated. Piston case-hardened and ground, built-in return spring, with stroke limitation.

### Application:

For quick clamping and unclamping on press table or ram. Suitable for workpieces with uniform clamping rim. The clamping bar is bolted with a spacer bar directly onto the press table or ram. Suitable spacer bars are No. 6945-22-04, -06, -07, -08.

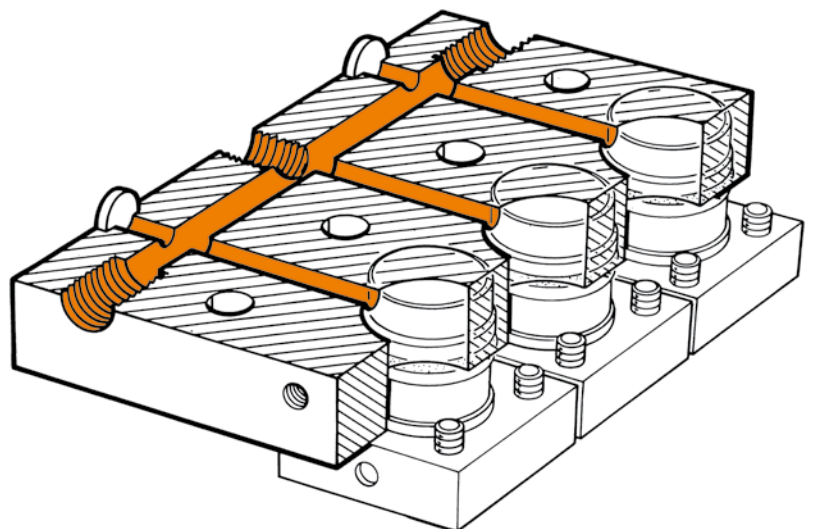
### On request:

Special sizes available on request.



### Sectional view:

Clamping strip 6945-22-20-1x3 with exchangeable clamping pistons.



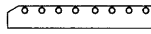
## No. 6945-22-20

### Clamping Bar, long

single acting, with spring return,  
max. operating pressure 400 bar.

| Order no. | Article no.    | Clamping force at 400 bar [kN] | Stroke [mm] | Vol. total [cm <sup>3</sup> ] | min. spring force per piston [N] | Weight [g] |
|-----------|----------------|--------------------------------|-------------|-------------------------------|----------------------------------|------------|
| 61689     | 6945-22-20-2x3 | 2 x 60                         | 6           | 17,4                          | 120                              | 6000       |
| 61630     | 6945-22-20-1x6 | 120                            | 6           | 17,4                          | 120                              | 6000       |

Suitable spacer bar:



6945-22-07

### Design:

Cylinder body made of tempering steel, phosphated. Piston case-hardened and ground, built-in return spring, with stroke limitation.

### Application:

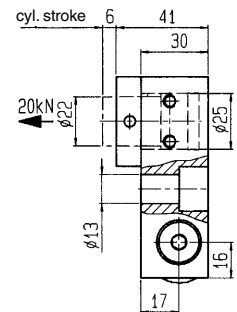
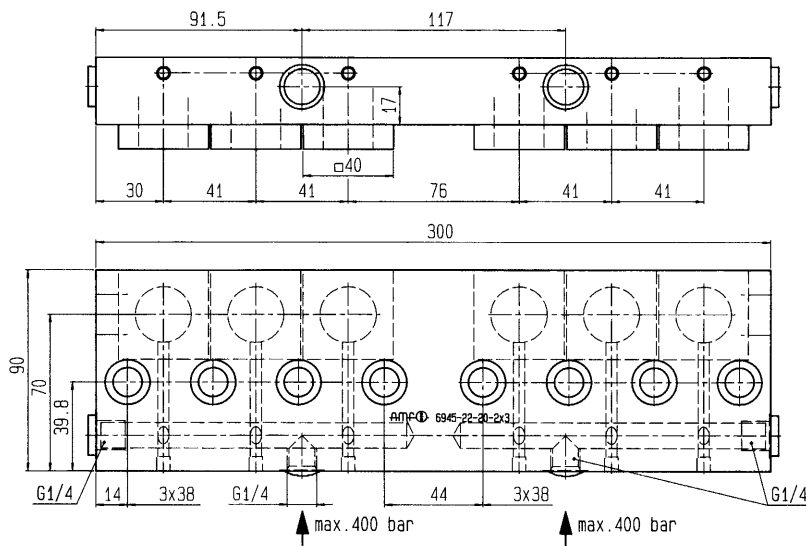
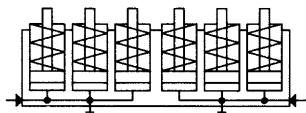
For quick clamping and unclamping on press table or ram. Suitable for workpieces with uniform clamping rim. The clamping bar is bolted with a spacer bar directly onto the press table or press ram. Suitable spacer bar is No. 6945-22-07.

### On request:

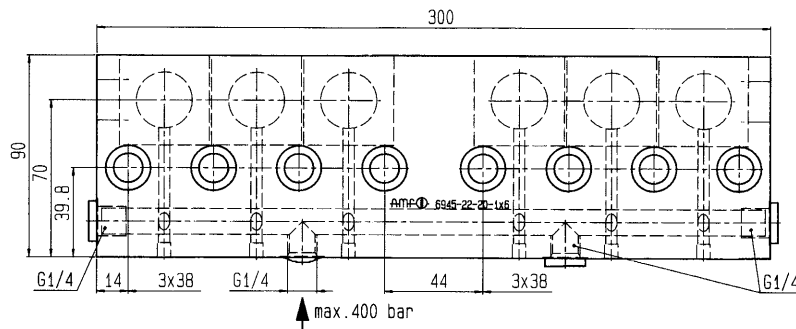
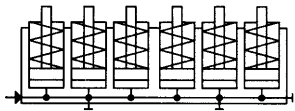
Special sizes available on request.



#### 6945-22-20-2x3



#### 6945-22-20-1x6



CAD

Subject to technical alterations.

## No. 6945-22-20

### Clamping Bar, long

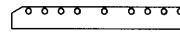
single acting, with spring return,  
max. operating pressure 400 bar.

| Order no. | Article no.    | Clamping force at 400 bar [kN] | Stroke [mm] | Vol. total [cm <sup>3</sup> ] | min. spring force per piston [N] | Weight [g] |
|-----------|----------------|--------------------------------|-------------|-------------------------------|----------------------------------|------------|
| 61622     | 6945-22-20-2x4 | 2 x 80                         | 6           | 23,2                          | 120                              | 8000       |
| 61697     | 6945-22-20-1x8 | 160                            | 6           | 23,2                          | 120                              | 7840       |

Suitable spacer bars:



6945-22-06



6945-22-08

### Design:

Cylinder body made of tempering steel, phosphated. Piston case-hardened and ground, built-in return spring, with stroke limitation.

### Application:

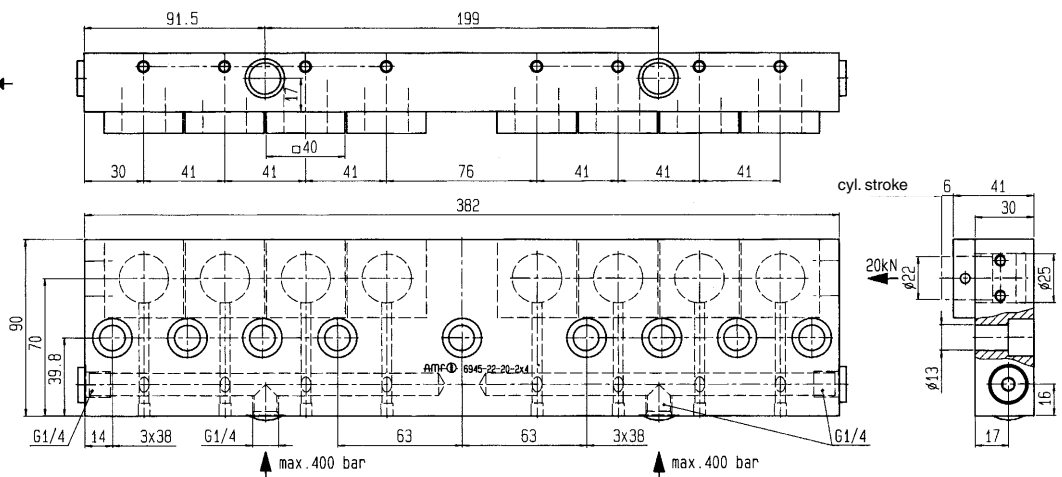
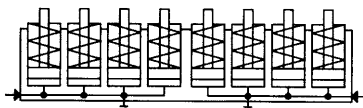
For quick clamping and unclamping on press table or ram. Suitable for workpieces with uniform clamping rim. The clamping bar is bolted with a spacer bar directly onto the press table or press ram. Suitable spacer bars are No. 6945-22-06 and 6945-22-08.

### On request:

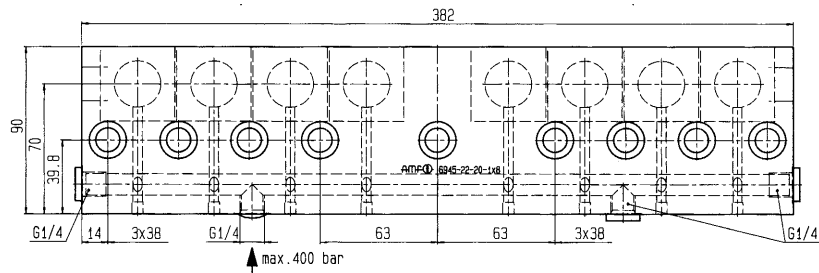
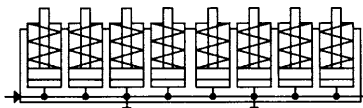
Special sizes available on request.

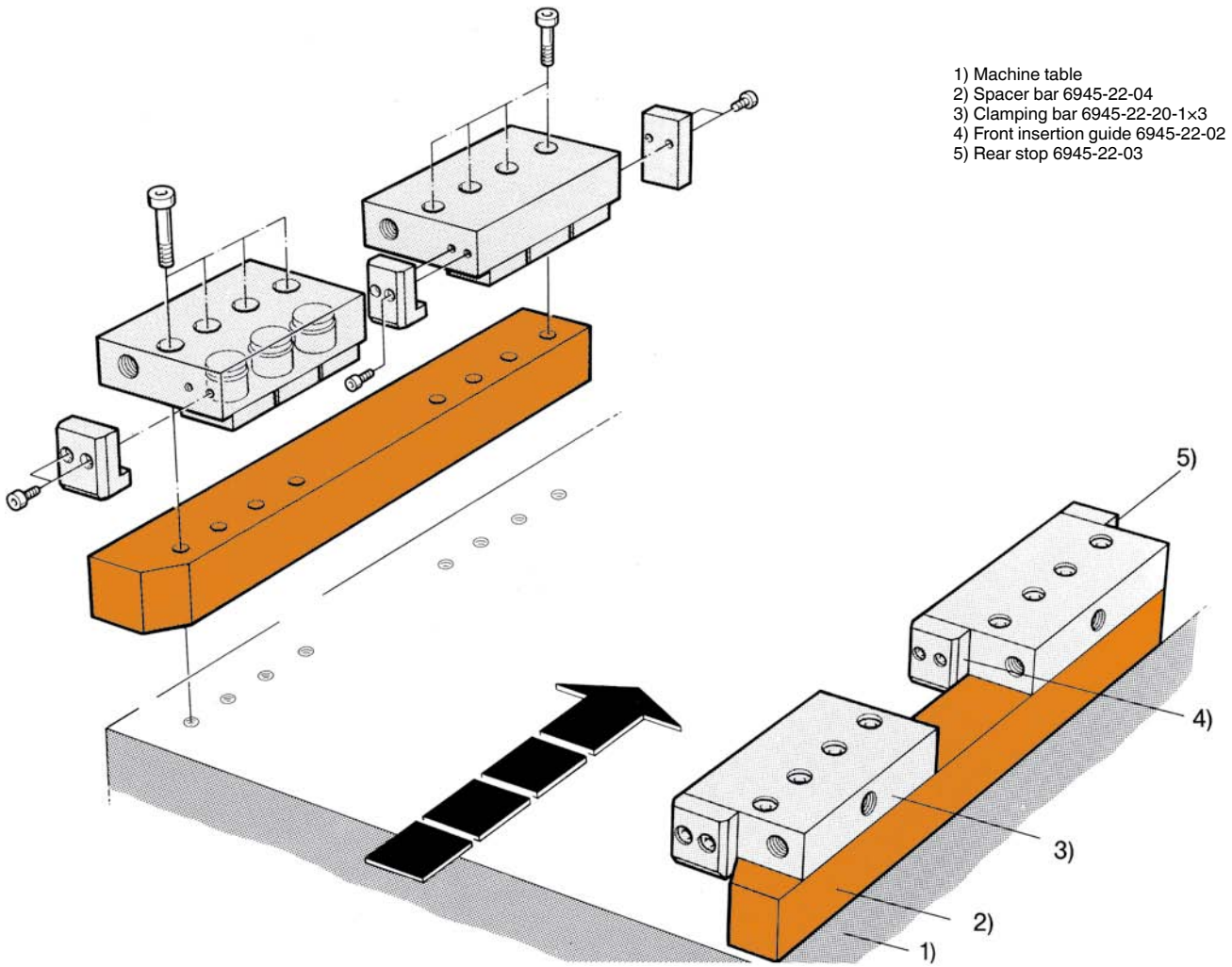


#### 6945-22-20-2x4



#### 6945-22-20-1x8





- 1) Machine table
- 2) Spacer bar 6945-22-04
- 3) Clamping bar 6945-22-20-1x3
- 4) Front insertion guide 6945-22-02
- 5) Rear stop 6945-22-03

## No. 6945-22-04

### Spacer Bar



| Order no. | Article no. | L x W x H       | Weight [g] |
|-----------|-------------|-----------------|------------|
| 61101     | 6945-22-04  | 425 x 50 x 44,5 | 7300       |

#### Design:

Tempering steel, phosphated. Tolerance of distance between holes  $\pm 0.2$ .

#### Application:

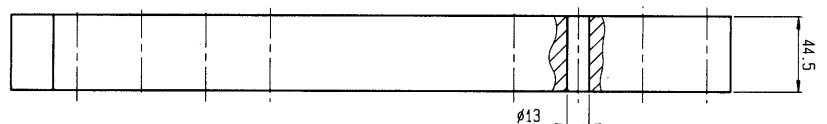
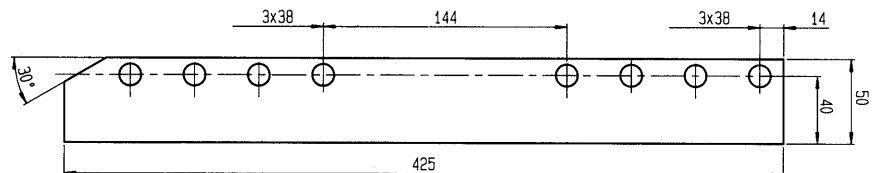
Spacer and guide bar for a clamping-rim or tool-pallet height of 30 mm.

#### Note:

For clamping bar: No. 6945-22-20-1x3.

#### On request:

Special sizes available on request.



Subject to technical alterations.



## No. 6945-22-06

### Spacer Bar



| Order no. | Article no. | L x W x H       | Weight [g] |
|-----------|-------------|-----------------|------------|
| 61408     | 6945-22-06  | 167 x 50 x 44,5 | 2670       |

#### Design:

Tempering steel, phosphated. Tolerance of distance between holes  $\pm 0.2$ .

#### Application:

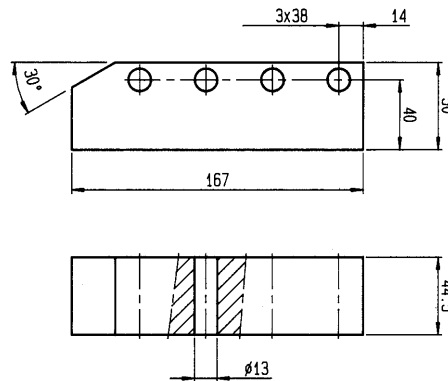
Spacer and guide bar for a clamping-rim or tool-pallet height of 30 mm.

#### Note:

For clamping bars:  
 - No. 6945-22-20-1x3  
 - No. 6945-22-20-2x4  
 - No. 6945-22-20-1x8

#### On request:

Special sizes available on request.



## No. 6945-22-07

### Spacer Bar



| Order no. | Article no. | L x W x H       | Weight [g] |
|-----------|-------------|-----------------|------------|
| 61705     | 6945-22-07  | 325 x 50 x 44,5 | 5800       |

#### Design:

Tempering steel, phosphated. Tolerance of distance between holes  $\pm 0.2$ .

#### Application:

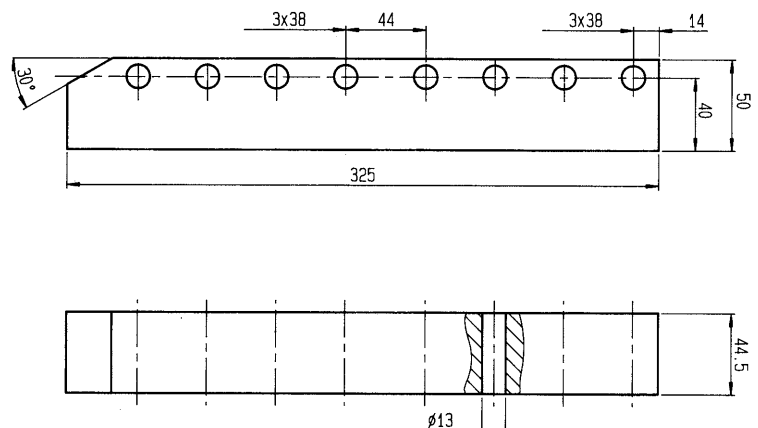
Spacer and guide bar for a clamping-rim or tool-pallet height of 30 mm.

#### Note:

For clamping bars:  
 - No. 6945-22-20-1x3  
 - No. 6945-22-20-2x3  
 - No. 6945-22-20-1x6

#### On request:

Special sizes available on request.



Subject to technical alterations.

## No. 6945-22-08

### Spacer Bar



| Order no. | Article no. | L x W x H     | Weight [g] |
|-----------|-------------|---------------|------------|
| 61713     | 6945-22-08  | 407 x 50 x 64 | 10500      |

#### Design:

Tempering steel, phosphated. Tolerance of distance between holes  $\pm 0.2$ .

#### Application:

Spacer and guide bar for a clamping-rim or tool-pallet height of 50 mm.

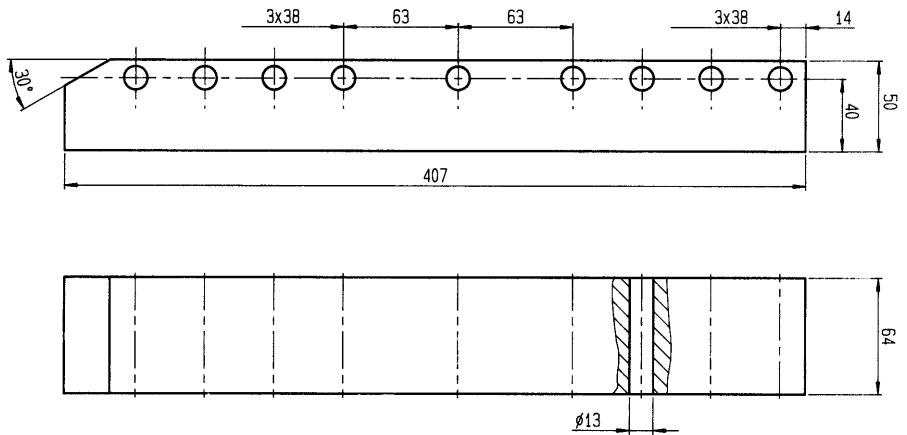
#### Note:

For clamping bars:

- No. 6945-22-20-1x3
- No. 6945-22-20-2x4
- No. 6945-22-20-1x8

#### On request:

Special sizes available on request.



CAD



## No. 6945-22-02

### Front Insertion Guide



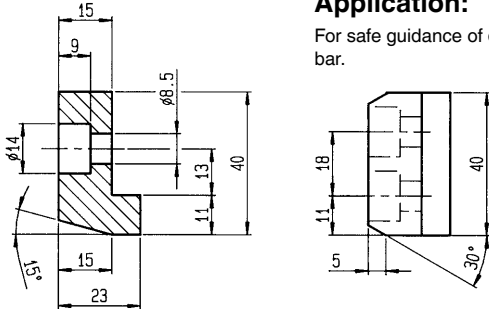
| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 61077     | 6945-22-02  | 300        |

#### Design:

Tempering steel, blued and hardened. Mounting bolts supplied.

#### Application:

For safe guidance of die pallet into press. This guide protects the clamping pistons in the clamping bar.



CAD



## No. 6945-22-03

### Rear Stop



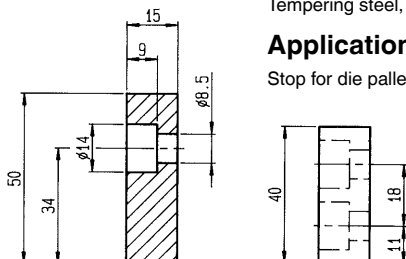
| Order no. | Article no. | Weight [g] |
|-----------|-------------|------------|
| 61093     | 6945-22-03  | 250        |

#### Design:

Tempering steel, blued and hardened. Mounting bolts supplied.

#### Application:

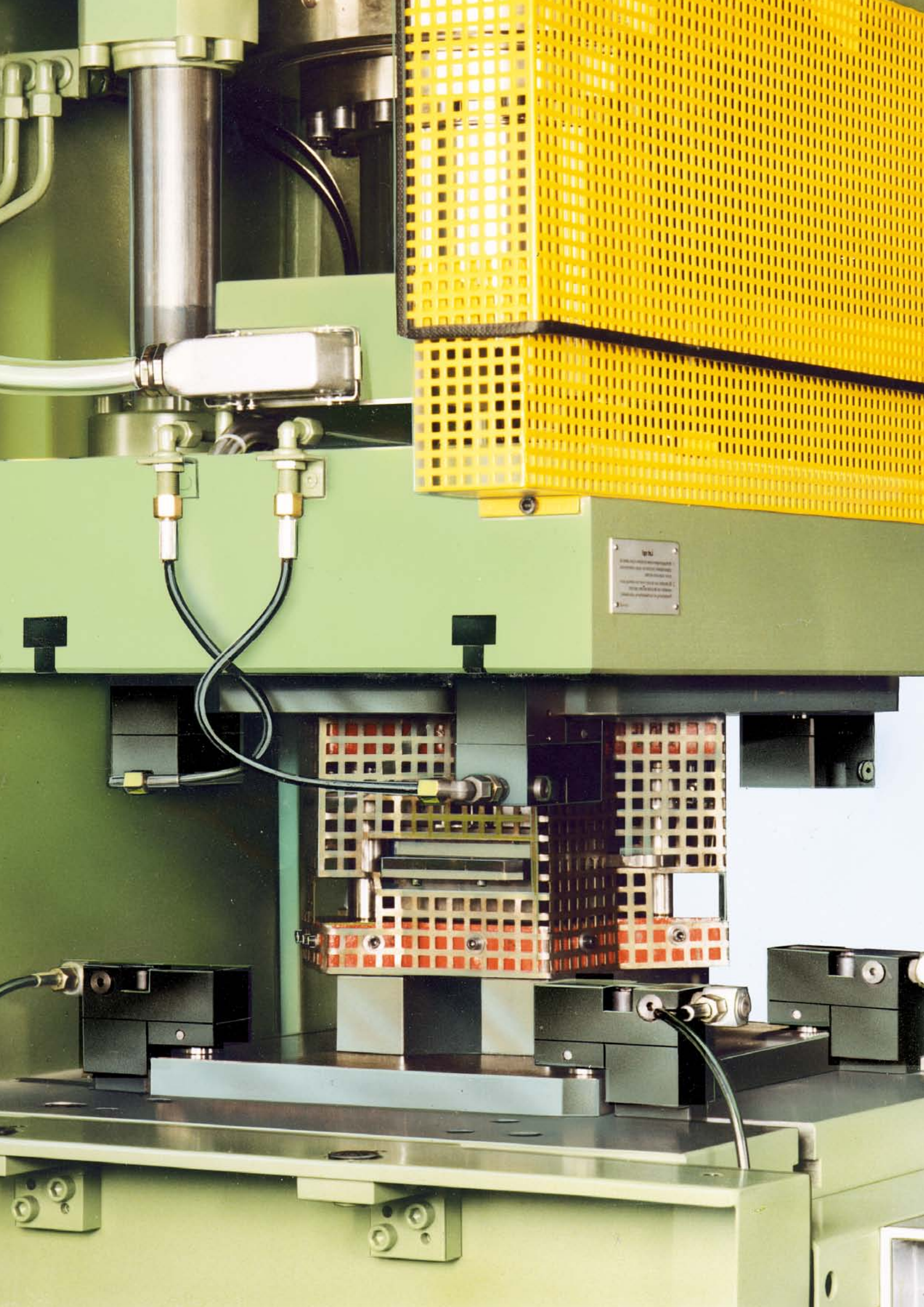
Stop for die pallet in the press.



CAD



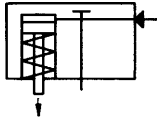
Subject to technical alterations.



## No. 6945-11

### Clamping Head, complete with base

single acting, with spring return,  
max. operating pressure 400 bar.



| Order no. | Article no.      | Clamping force at 400 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | Spring force min. [N] | Weight [g] |
|-----------|------------------|--------------------------------|---------------|-------------------------|-----------------------|------------|
| 61184     | 6945-11-20x14x30 | 20                             | 6             | 2,9                     | 120                   | 1471       |
| 61416     | 6945-11-20x18x30 | 20                             | 6             | 2,9                     | 120                   | 1581       |
| 61192     | 6945-11-32x18x30 | 32                             | 8             | 6,4                     | 260                   | 2855       |
| 61424     | 6945-11-32x22x30 | 32                             | 8             | 6,4                     | 260                   | 3095       |
| 61200     | 6945-11-63x22x30 | 63                             | 10            | 16,0                    | 580                   | 4660       |
| 61432     | 6945-11-63x28x30 | 63                             | 10            | 16,0                    | 580                   | 5080       |
| 64006     | 6945-11-94x28x50 | 94                             | 12            | 28,5                    | 920                   | 10380      |

#### Design:

Cylinder body made of tempering steel, blued. Piston case-hardened and ground. Built-in return spring, complete with locating pin.

#### Application:

The clamping head is used to clamp press tools on the press table and ram. The unit is inserted into the T-slot and moved above the clamping spot at the tool to be clamped. The clamping heads of size 20-63kN are suitable for a clamping height of 29 mm. Size 94kN suits a clamping height of 50 mm. To adjust other clamping heights, spacer plates of 10 mm and 20 mm are available.

#### Features:

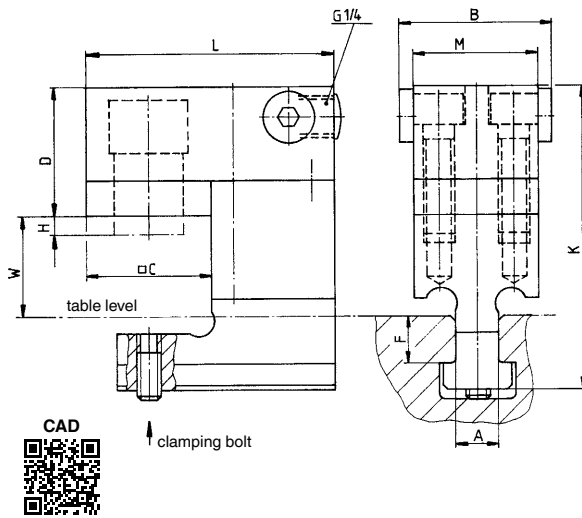
Small dimensions. The hydraulic oil supply can be connected to any of the three sides.

#### Note:

If a clamping head is retrofitted with an spacer plate, the locating pin must be removed from the lower part of clamping head. T-Slot dimension F has to be considered urgently.

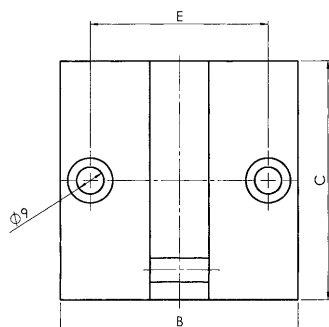
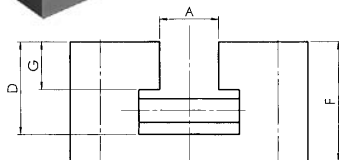
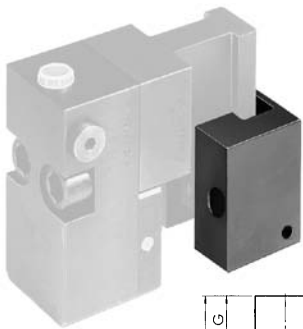
#### Dimensions:

| Order no. | Article no.      | A  | B  | C     | D    | F  | H  | K     | L   | M  | W  |
|-----------|------------------|----|----|-------|------|----|----|-------|-----|----|----|
| 61184     | 6945-11-20x14x30 | 14 | 50 | 40    | 41,0 | 15 | 6  | 95,0  | 80  | 40 | 31 |
| 61416     | 6945-11-20x18x30 | 18 | 50 | 40    | 41,0 | 20 | 6  | 102,0 | 80  | 40 | 31 |
| 61192     | 6945-11-32x18x30 | 18 | 60 | 50    | 53,0 | 20 | 8  | 114,0 | 100 | 50 | 31 |
| 61424     | 6945-11-32x22x30 | 22 | 60 | 50    | 53,0 | 25 | 8  | 123,0 | 100 | 50 | 31 |
| 61200     | 6945-11-63x22x30 | 22 | 70 | 60    | 63,0 | 25 | 10 | 133,0 | 120 | 60 | 31 |
| 61432     | 6945-11-63x28x30 | 28 | 70 | 60    | 63,0 | 30 | 10 | 142,0 | 120 | 60 | 31 |
| 64006     | 6945-11-94x28x50 | 28 | 90 | 80x70 | 79,5 | 34 | 12 | 187,5 | 150 | 80 | 55 |



## No. 6945-11

### Holder for Clamping Head



| Order no. | Article no. | A [mm] | for T-Slot | for Clamping Head   | Weight [g] |
|-----------|-------------|--------|------------|---------------------|------------|
| 110700    | 6945-11-006 | 16     | 14         | 6945-11-**-**x14x** | 1600       |
| 110692    | 6945-11-005 | 20     | 18         | 6945-11-**-**x18x** | 1550       |
| 255687    | 6945-11-003 | 24     | 22         | 6945-11-**-**x22x** | 2120       |
| 255752    | 6945-11-004 | 30     | 28         | 6945-11-**-**x28x** | 2090       |

#### Design:

Steel, blued.

#### Application:

For parking clamp head No. 6945-11-\*\*-\*\* during tool changing.

#### Note:

Untoleranced dimensions are to DIN ISO 2768 medium.

#### On request:

Special versions available on request.

#### Dimensions:

| Order no. | Article no. | B  | C  | D  | E  | F  | G  |
|-----------|-------------|----|----|----|----|----|----|
| 110700    | 6945-11-006 | 80 | 80 | 25 | 60 | 35 | 12 |
| 110692    | 6945-11-005 | 80 | 80 | 31 | 60 | 40 | 16 |
| 255687    | 6945-11-003 | 90 | 90 | 40 | 70 | 50 | 20 |
| 255752    | 6945-11-004 | 90 | 90 | 50 | 70 | 60 | 25 |



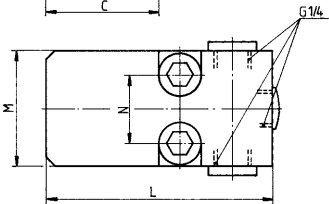
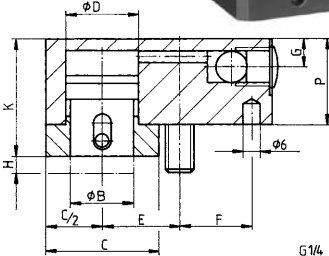
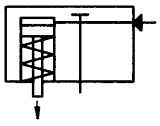
Subject to technical alterations.



## No. 6945-11

### Clamping Head

single acting, with spring return, max. operating pressure 400 bar.



| Order no. | Article no. | Clamping force at 400 bar [kN] | Stroke H [mm] | Vol. [cm <sup>3</sup> ] | Screw (2 pieces) | Md max. [Nm] | Spring force min. [N] | Weight [g] |
|-----------|-------------|--------------------------------|---------------|-------------------------|------------------|--------------|-----------------------|------------|
| 61218     | 6945-11-20  | 20                             | 6             | 2,9                     | M10x35-10.9      | 65           | 120                   | 790        |
| 61234     | 6945-11-32  | 32                             | 8             | 6,4                     | M12x45-10.9      | 120          | 260                   | 1625       |
| 60327     | 6945-11-63  | 63                             | 10            | 16,0                    | M16x50- 8.8      | 200          | 580                   | 2700       |
| 63990     | 6945-11-94  | 94                             | 12            | 28,5                    | M20x70-12.9      | 670          | 920                   | 5600       |

### Design:

Cylinder body made of tempering steel, blued. Piston case-hardened and ground. Built-in return spring.

### Application:

The upper part of the clamping head can be screwed on direct on clamping devices.

### On request:

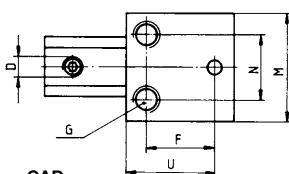
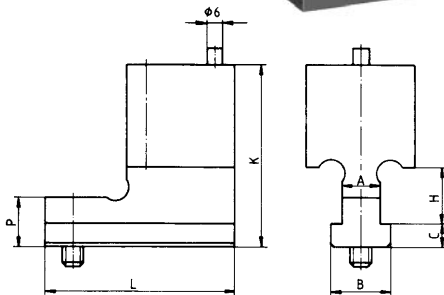
Special sizes available on request.

### Dimensions:

| Order no. | Article no. | dia. B | C  | dia. D | E  | F  | G  | K    | L   | M  | N  | P  |
|-----------|-------------|--------|----|--------|----|----|----|------|-----|----|----|----|
| 61218     | 6945-11-20  | 22     | 40 | 25     | 27 | 26 | 10 | 41,0 | 80  | 40 | 24 | 30 |
| 61234     | 6945-11-32  | 26     | 50 | 32     | 34 | 32 | 13 | 53,0 | 100 | 50 | 28 | 41 |
| 60327     | 6945-11-63  | 38     | 60 | 45     | 41 | 38 | 15 | 63,0 | 120 | 60 | 34 | 48 |
| 63990     | 6945-11-94  | 47     | 70 | 55     | 50 | 55 | 15 | 79,5 | 150 | 80 | 46 | 62 |

## No. 6945-11

### Base for Clamping Head



| Order no. | Article no.   | A [mm] | H [mm] | Weight [g] |
|-----------|---------------|--------|--------|------------|
| 61226     | 6945-11-20x14 | 14     | 25     | 680        |
| 61440     | 6945-11-20x18 | 18     | 25     | 790        |
| 61242     | 6945-11-32x18 | 18     | 25     | 1230       |
| 61457     | 6945-11-32x22 | 22     | 30     | 1470       |
| 60285     | 6945-11-63x22 | 22     | 30     | 1960       |
| 61465     | 6945-11-63x28 | 28     | 37     | 2380       |
| 60475     | 6945-11-94x28 | 28     | 36     | 4750       |

### Design:

Tempering steel, blued. Complete with locating pin.

### On request:

Special sizes available on request.

### Dimensions:

| Order no. | Article no.   | B  | C  | D   | F  | G   | K     | L   | M  | N  | P  | U    |
|-----------|---------------|----|----|-----|----|-----|-------|-----|----|----|----|------|
| 61226     | 6945-11-20x14 | 22 | 8  | M8  | 26 | M10 | 65,0  | 70  | 40 | 24 | 18 | 32,7 |
| 61440     | 6945-11-20x18 | 28 | 10 | M8  | 26 | M10 | 72,0  | 70  | 40 | 24 | 24 | 32,7 |
| 61242     | 6945-11-32x18 | 28 | 10 | M10 | 32 | M12 | 73,0  | 90  | 50 | 28 | 24 | 40,4 |
| 61457     | 6945-11-32x22 | 35 | 14 | M10 | 32 | M12 | 82,0  | 90  | 50 | 28 | 32 | 40,4 |
| 60285     | 6945-11-63x22 | 35 | 14 | M10 | 38 | M16 | 85,0  | 110 | 60 | 34 | 32 | 48,3 |
| 61465     | 6945-11-63x28 | 44 | 18 | M10 | 38 | M16 | 94,0  | 110 | 60 | 34 | 40 | 48,3 |
| 60475     | 6945-11-94x28 | 44 | 19 | M10 | 55 | M20 | 125,5 | 140 | 80 | 46 | 47 | 69,0 |

### Dimensions for T-slots in accordance with DIN 650:

| A                | F* min. | F* max. | P                | R                | S min. | S max. | T max. |
|------------------|---------|---------|------------------|------------------|--------|--------|--------|
| 14 <sup>H8</sup> | 12      | 19      | 23 <sup>+2</sup> | 9 <sup>+2</sup>  | 23     | 28     | 1,6    |
| 18 <sup>H8</sup> | 16      | 24      | 30 <sup>+2</sup> | 12 <sup>+2</sup> | 30     | 36     | 1,6    |
| 22 <sup>H8</sup> | 20      | 29      | 37 <sup>+2</sup> | 16 <sup>+2</sup> | 38     | 45     | 1,6    |
| 28 <sup>H8</sup> | 26      | 36      | 46 <sup>+2</sup> | 20 <sup>+2</sup> | 48     | 56     | 1,6    |

\* Please check this dimension on your machine

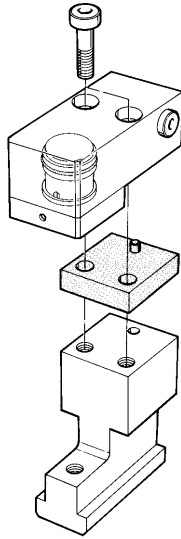
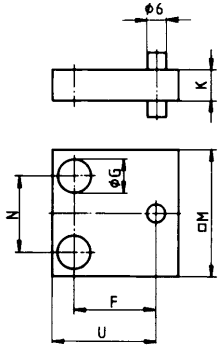
Subject to technical alterations.

## No. 6945-11

### Adaptor Plate



CAD



| Order no. | Article no.      | Screw (2 pieces) | F  | dia. G | K  | M  | N  | U    | Weight [g] |
|-----------|------------------|------------------|----|--------|----|----|----|------|------------|
| 61259     | 6945-11-20-08-10 | M10x45           | 26 | 11     | 10 | 40 | 24 | 32,7 | 190        |
| 61267     | 6945-11-20-08-20 | M10x50           | 26 | 11     | 20 | 40 | 24 | 32,7 | 300        |
| 61275     | 6945-11-32-08-10 | M12x50           | 32 | 13     | 10 | 50 | 28 | 40,4 | 290        |
| 61283     | 6945-11-32-08-20 | M12x60           | 32 | 13     | 20 | 50 | 28 | 40,4 | 485        |
| 61291     | 6945-11-63-08-10 | M16x60           | 38 | 17     | 10 | 60 | 34 | 48,3 | 500        |
| 61309     | 6945-11-63-08-20 | M16x70           | 38 | 17     | 20 | 60 | 34 | 48,3 | 770        |
| 63503     | 6945-11-94-08-20 | M20x85           | 55 | 21     | 20 | 80 | 46 | 69,0 | 1500       |

#### Design:

Tempering steel, blued, with locating pin and two mounting bolts ISO 4762.

#### Application:

The adaptor plate is fitted between of the clamping head and it's base in order to obtain a different clamping height.

#### On request:

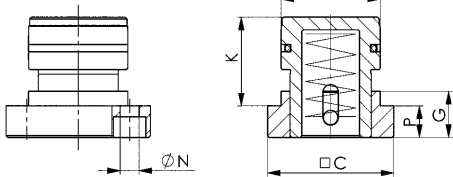
Special sizes available on request.

## No. 6945-11

### Clamping Piston, complete



CAD



| Order no. | Article no.   | Clamping force at 400 bar [kN] | Stroke [mm] | Vol. [cm <sup>3</sup> ] | Weight [g] |
|-----------|---------------|--------------------------------|-------------|-------------------------|------------|
| 61473     | 6945-11-20-10 | 20                             | 6           | 2,9                     | 220        |
| 61481     | 6945-11-32-10 | 32                             | 8           | 6,4                     | 400        |
| 61499     | 6945-11-63-10 | 63                             | 10          | 16,0                    | 730        |
| 64089     | 6945-11-94-10 | 94                             | 12          | 28,5                    | 1200       |

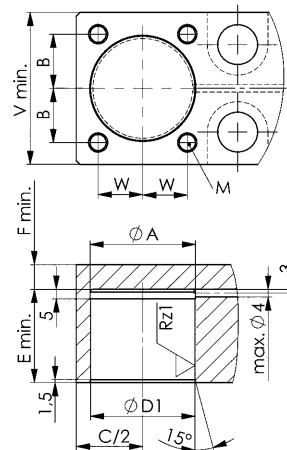
#### Design:

Hardened steel, piston case hardened and ground. Cover burnished. With mounting screws.

#### Application:

For simple retrofitting into existing fixture body. Suitable for clamping bar No. 6945-22-20-\*\* and clamping head No. 6945-11-\*\*.

#### Installation dimensions:



#### Dimensions:

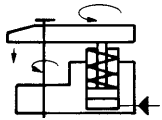
| Order no. | Article no.   | dia. A | B ±0.1 | C  | dia. D1   | dia. D2          | E  | F  | G    | K  | dia. N | P    | Screw (4 pieces) | Md max. [Nm] | M x depth | V  | W  |
|-----------|---------------|--------|--------|----|-----------|------------------|----|----|------|----|--------|------|------------------|--------------|-----------|----|----|
| 61473     | 6945-11-20-10 | 25,5   | 13,0   | 40 | 25 +0,033 | 25 -0,020/-0,041 | 26 | 4  | 14,0 | 26 | 6,6    | 11,0 | M6 x 12- 8.8     | 10           | M6 x 10   | 40 | 13 |
| 61481     | 6945-11-32-10 | 32,5   | 16,0   | 50 | 32 +0,039 | 32 -0,025/-0,050 | 33 | 7  | 15,0 | 33 | 8,4    | 12,0 | M8 x 20- 8.8     | 25           | M8 x 20   | 50 | 16 |
| 61499     | 6945-11-63-10 | 45,5   | 21,0   | 60 | 45 +0,039 | 45 -0,025/-0,050 | 39 | 9  | 20,0 | 39 | 8,4    | 15,0 | M8 x 20- 10.9    | 36           | M8 x 20   | 60 | 21 |
| 64089     | 6945-11-94-10 | 55,5   | 28,5   | 70 | 55 +0,046 | 55 -0,030/-0,060 | 49 | 13 | 25,5 | 49 | 10,4   | 17,5 | M10 x 25- 12.9   | 79           | M10 x 23  | 80 | 23 |

Subject to technical alterations.

## No. 6954

### Swivel Clamping Strap, hydraulic clamping, mechanic unclamping

Single acting, with spring return, max. operating pressure 250 bar.



CAD

| Order no. | Article no. | A  | Clamping height [mm] | Clamping stroke [mm] | Clamping force at 250 bar below [kN] | Clamping force at 250 bar centre [kN] | Clamping force at 250 bar top [kN] | Piston dia. [mm] | Vol. [cm <sup>3</sup> ] | Spring force min. [N] | Weight [g] |
|-----------|-------------|----|----------------------|----------------------|--------------------------------------|---------------------------------------|------------------------------------|------------------|-------------------------|-----------------------|------------|
| 65417     | 6954-14     | 14 | 40 - 80              | 0 - 5                | 30                                   | 26                                    | 24                                 | 32               | 4,8                     | 150                   | 3320       |
| 65433     | 6954-16     | 16 | 40 - 80              | 0 - 5                | 30                                   | 26                                    | 24                                 | 32               | 4,8                     | 150                   | 3320       |
| 65458     | 6954-18     | 18 | 40 - 80              | 0 - 5                | 30                                   | 26                                    | 24                                 | 32               | 4,8                     | 150                   | 3320       |
| 65474     | 6954-20     | 20 | 40 - 80              | 0 - 5                | 30                                   | 26                                    | 24                                 | 32               | 4,8                     | 150                   | 3320       |
| 65490     | 6954-22     | 22 | 40 - 80              | 0 - 5                | 30                                   | 26                                    | 24                                 | 32               | 4,8                     | 150                   | 3320       |

### Design:

Clamp (with swivel lock), clamping bolt and sleeve tempered and blued. Cylinder body made of tempering steel, blued. Piston and piston rod case-hardened and ground. Wiper at piston rod, venting screw and sinter metal breather. Long piston guiding and Teflon guide ring at piston.

### Application:

The swivel clamping strap is intended for the most frequently occurring tool clamping heights.

### Features:

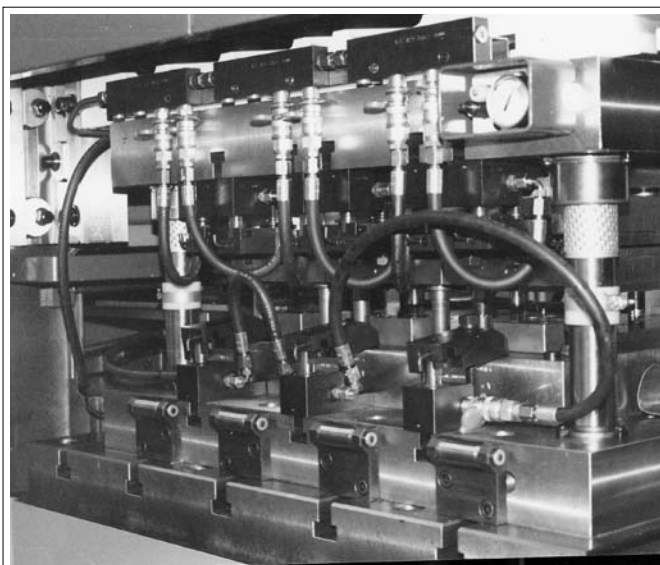
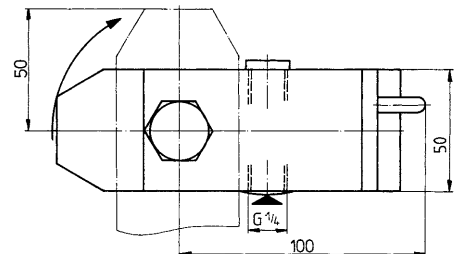
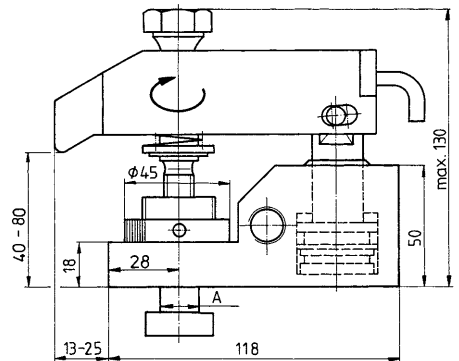
Large clamping range, fast height adjustment to the required tool clamping edge height. The swivel clamping strap is inserted directly into the T-slot of the press. The workpiece can also be removed vertically upwards as the clamping bar can be swivelled away manually. The clamping bar is mechanically locked in the clamping position.

### Note:

For single-acting cylinders, there is a risk of coolant being sucked through the breather port. In this case the cylinders have to be protected against the direct effect of coolant. The built in sinter metal breather should be protected. When placing into operation, ensure that all air is bled from the system.

### On request:

Further sizes, specially made bases for bigger clamping heights and other T-slot sizes on request.



Subject to technical alterations.

Please fill in the following form so we can use your data to prepare an offer for the right clamping system for your individual requirements. We will respond as soon as possible.

Please use a copy of this page, do not remove it from the catalogue:

Company/address:

.....  
 .....

Name/telephone:

.....

Dept.:

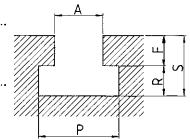
.....

**PRESS:**

- |                               |       |                     |       |
|-------------------------------|-------|---------------------|-------|
| 1. Manufacturer or press type | ..... | 4. Max. stroke rate | ..... |
| 2. Pressing force             | ..... | 5. Closing height   | ..... |
| 3. Max. stroke                | ..... | 6. Wiping force     | ..... |

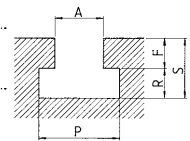
**PRESS TABLE:**

7. Table surface W x D  
 .....
8. Table thickness  
 .....
9. Table opening, if present  
 .....
10. No. of T-grooves (table)  
 .....
11. Pitch of T-grooves (table)  
 .....
12. Dimensions of T-grooves (table)    A=        F=        P=        R=        S=



**PRESS PISTON:**

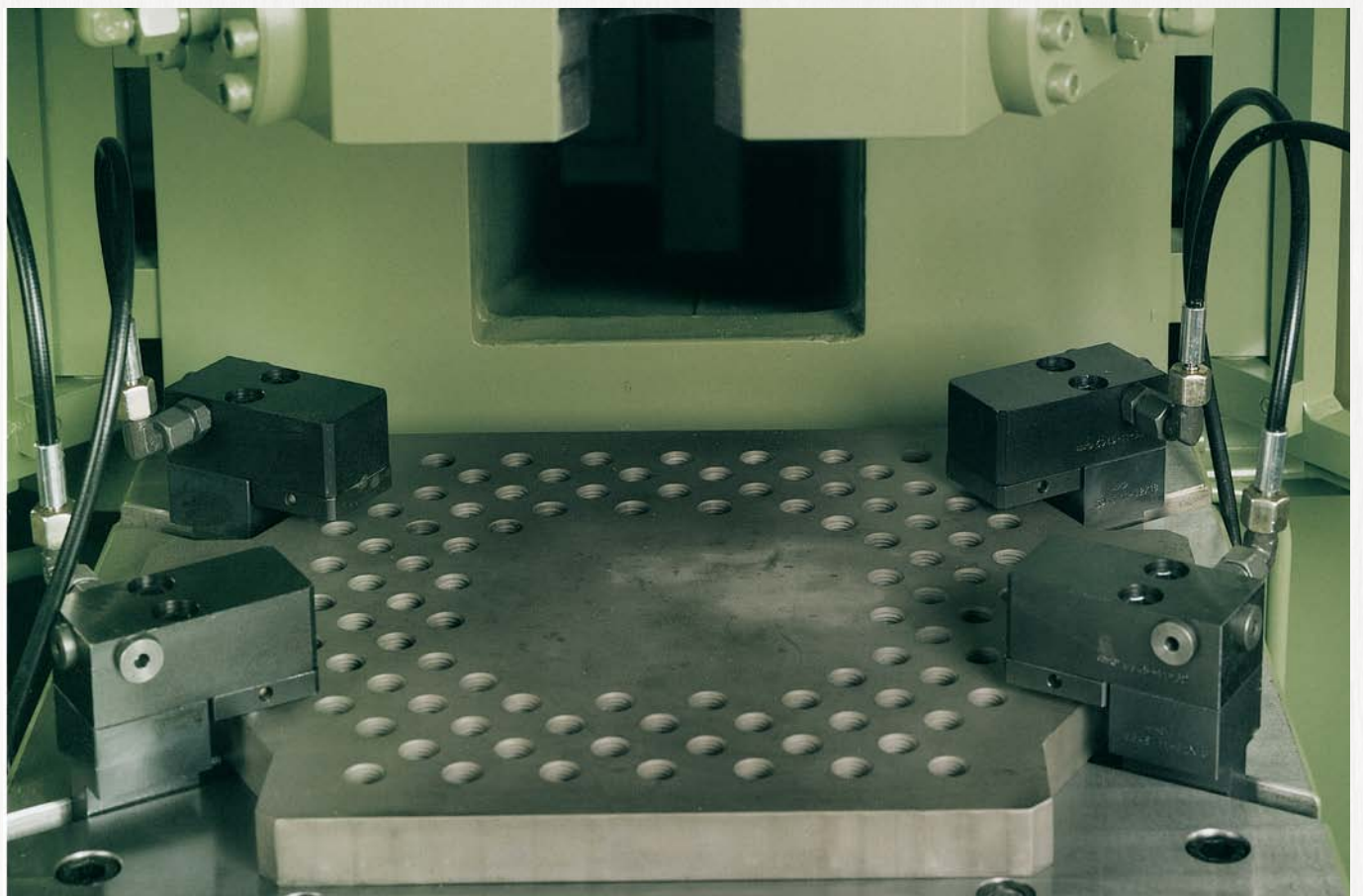
13. Piston size W x D  
 .....
14. No. of T-grooves (piston)  
 .....
15. Pitch of T-grooves (piston)  
 .....
16. Dimensions of T-grooves (piston)    A=        F=        P=        R=        S=
17. Diameter of present clamping stud  
 .....



**TOOL:**

18. Maximum weight of upper tool part  
 .....
19. Maximum weight of part  
 .....
20. Thickness of tool base plates  
 bottom/top  
 .....
21. Minimum and maximum tool  
 dimensions W x H x D  
 .....
22. Important notes  
 .....

Subject to technical alterations.



Subject to technical alterations.

No. 6946

## Wedge clamp

double-acting  
max. operating pressure 350 bar (400 bar\*)



| Order no. | Article no. | Clamping force [kN] | max. operating force [kN] | with positioning monitoring | without position monitoring | Weight [Kg] |
|-----------|-------------|---------------------|---------------------------|-----------------------------|-----------------------------|-------------|
| 325134    | 6946-25-I   | 25                  | 36                        | -                           | ●                           | 2,6         |
| 325142    | 6946-25-B   | 25                  | 36                        | ●                           | -                           | 2,6         |
| 325159    | 6946-50-L   | 50                  | 72                        | -                           | ●                           | 6,1         |
| 325167    | 6946-50-B   | 50                  | 72                        | ●                           | -                           | 6,1         |
| 325175    | 6946-100-L  | 100                 | 145                       | -                           | ●                           | 11,5        |
| 325183    | 6946-100-B  | 100                 | 145                       | ●                           | -                           | 11,5        |
| 325191    | 6946-160-L  | 160                 | 230                       | -                           | ●                           | 23,0        |
| 325209    | 6946-160-B  | 160                 | 230                       | ●                           | -                           | 23,0        |



### Design:

Block cylinder housing from steel, burnished. Housing and clamping bolt tempered. Piston rod case hardened and ground. The fastening screws are included in the supply scope resistance 12.9.

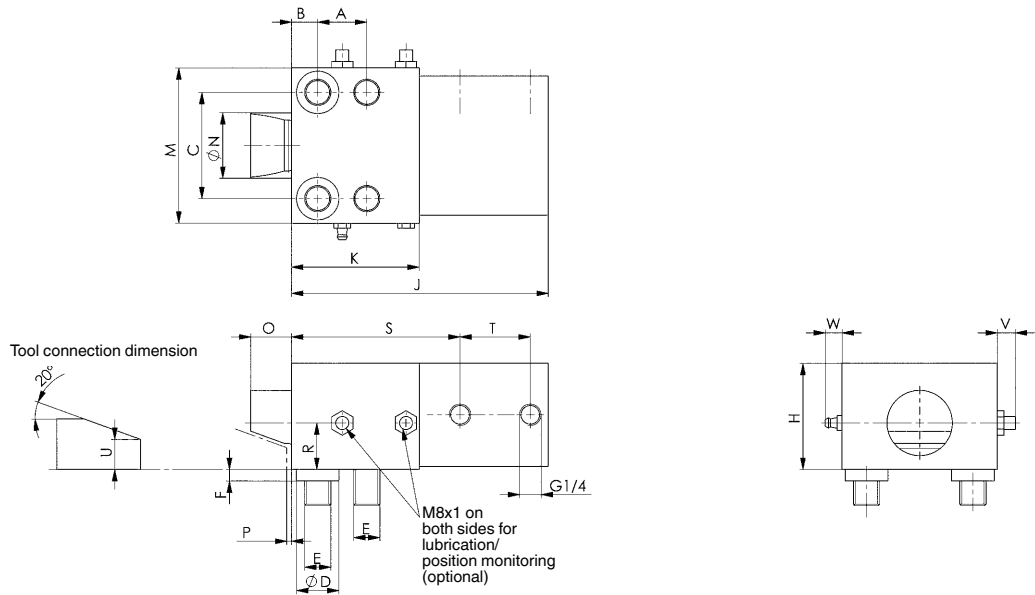
### Application:

Wedge clamps are used for clamping the tools on presses and injection moulding machines. The clamping bolt clamps at a 20° diagonal to the tool, which results in a friction connection.

### Note:

The maximum permitted load per clamp must not be exceeded. The clamping force acts vertically on the clamping point which applies very low sliding forces to the tool.

\* When using fixing screws of 10.9 quality a maximum operating force of 400 bar is permitted. A mounting surface with corresponding thread resistance (at least corresponding to St 50) is required.



### Dimensions:

| Order no. | Article no. | A  | B  | C ±0,02 | dia. D H8 | E   | F  | H   | J   | K   | M   | dia. N | O  | P | R    | S   | T  | U  | V  | W  | Screw (4 pieces) |
|-----------|-------------|----|----|---------|-----------|-----|----|-----|-----|-----|-----|--------|----|---|------|-----|----|----|----|----|------------------|
| 325134    | 6946-25-I   | 24 | 14 | 48      | 18        | M12 | 6  | 48  | 122 | 58  | 70  | 30     | 20 | 3 | 21,5 | 78  | 33 | 15 | 12 | 11 | M12x60           |
| 325142    | 6946-25-B   | 24 | 14 | 48      | 18        | M12 | 6  | 48  | 122 | 58  | 70  | 30     | 20 | 3 | 21,5 | 78  | 33 | 15 | 12 | 11 | M12x60           |
| 325159    | 6946-50-L   | 30 | 16 | 65      | 26        | M16 | 7  | 65  | 157 | 78  | 95  | 40     | 25 | 3 | 28,5 | 103 | 43 | 18 | 6  | 11 | M16x70           |
| 325167    | 6946-50-B   | 30 | 16 | 65      | 26        | M16 | 7  | 65  | 157 | 78  | 95  | 40     | 25 | 3 | 28,5 | 103 | 43 | 18 | 6  | 11 | M16x70           |
| 325175    | 6946-100-L  | 38 | 20 | 85      | 30        | M20 | 11 | 80  | 190 | 100 | 120 | 56     | 25 | 3 | 37,0 | 127 | 51 | 25 | 16 | 11 | M20x90           |
| 325183    | 6946-100-B  | 38 | 20 | 85      | 30        | M20 | 11 | 80  | 190 | 100 | 120 | 56     | 25 | 3 | 37,0 | 127 | 51 | 25 | 16 | 11 | M20x90           |
| 325191    | 6946-160-L  | 50 | 25 | 106     | 35        | M24 | 11 | 105 | 222 | 120 | 150 | 70     | 30 | 3 | 49,0 | 148 | 57 | 30 | 8  | 11 | M24x120          |
| 325209    | 6946-160-B  | 50 | 25 | 106     | 35        | M24 | 11 | 105 | 222 | 120 | 150 | 70     | 30 | 3 | 49,0 | 148 | 57 | 30 | 8  | 11 | M24x120          |

Subject to technical alterations.

No. 6945-28

## Clamping Stud Holder, hydraulic

for direct attachment to ram.



CAD

| Order no. | Article no. | max. operating pressure [bar] | Pull Force cylinder [kN] | Clamping stud dia. [mm] | Spring force min. [N] | Weight [Kg] |
|-----------|-------------|-------------------------------|--------------------------|-------------------------|-----------------------|-------------|
| 6163      | 6945-28-007 | 230                           | 54                       | 40                      | 1200                  | 47          |
| 61390     | 6945-28-010 | 400                           | 94                       | 50                      | 1200                  | 66          |



### Design:

Cylinder body made of tempering steel. External, vertical surfaces painted yellow. Complete with two clamping pistons No. 6945-15-10 and cover plates.

### Application:

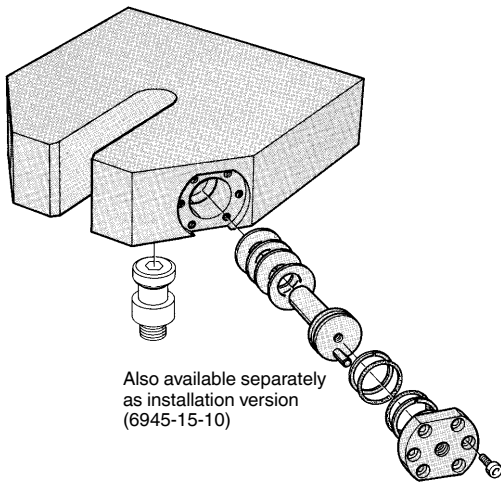
Clamping stud No. 6945-02-04-\*\*\*, which is screwed into the tool, is gripped hydraulically when it has entered the opening in the clamping-pin chuck.

### Note:

No DIN clamping studs must be used for the clamping stud holder. Mounting holes can be incorporated on request. Untoleranced dimensions are to DIN ISO 2768 medium.

### On request:

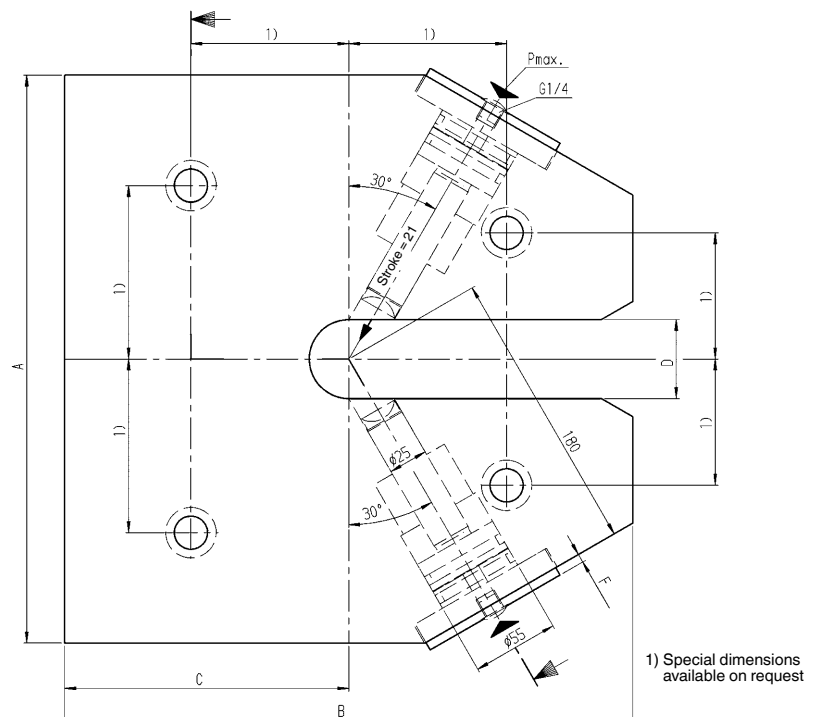
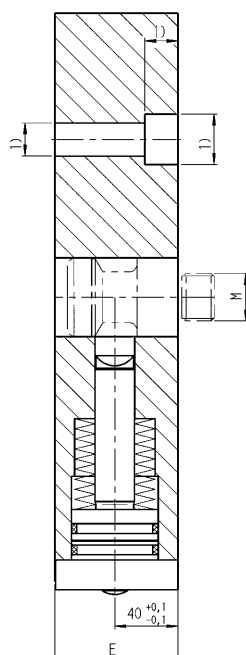
Special versions available on request.



Also available separately as installation version (6945-15-10)

### Dimensions:

| Order no. | Article no. | A   | B   | C   | D +0.1/+0.3 | E  | F   | M       |
|-----------|-------------|-----|-----|-----|-------------|----|-----|---------|
| 6163      | 6945-28-007 | 360 | 270 | 135 | 40          | 78 | 1,5 | M24x1,5 |
| 61390     | 6945-28-010 | 360 | 360 | 180 | 50          | 78 | 5,5 | M30x2,0 |



1) Special dimensions available on request

## No. 6945-15-10

### Clamping Piston, complete

for stud clamping,  
max. operating pressure 400 bar.



| Order no. | Article no. | Screw (6 items) | Md max. [Nm] | OR-1 O-ring Order No. | Weight [g] |
|-----------|-------------|-----------------|--------------|-----------------------|------------|
| 61382     | 6945-15-10  | M10 x 25        | 50           | 188300                | 1700       |

#### Design:

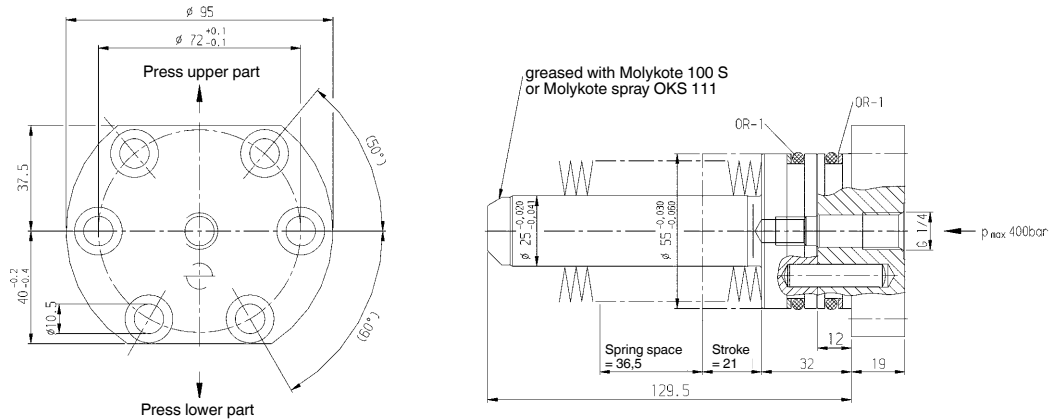
Hydraulic piston from hot workable steel, tempered and ground. Cover from hardened steel. Complete with disc springs, O-rings, support rings, dowel pin and fastening screws ISO 4762 resistance 8.8.

#### Application:

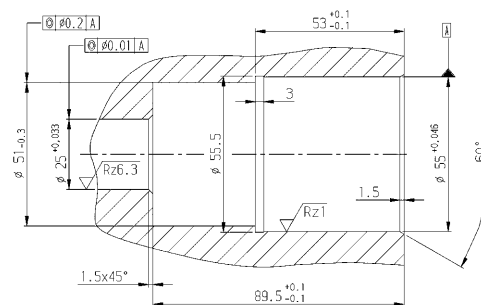
This clamping piston can be retrofitted to your original ram plate.

#### Note:

The use of clamping stud No. 6945-02-04-009 in combination with clamping piston set No. 6945-15-10 is restricted to a maximum operating pressure of 230 bar.



#### Installation dimensions:



CAD



## No. 6945-02-04

### Clamping Stud



| Order no. | Article no.    | dia. A | dia. D | M       | Weight [g] |
|-----------|----------------|--------|--------|---------|------------|
| 61671     | 6945-02-04-009 | 22     | 40     | M24x1,5 | 760        |
| 61150     | 6945-02-04     | 32     | 50     | M30x2,0 | 945        |

#### Design:

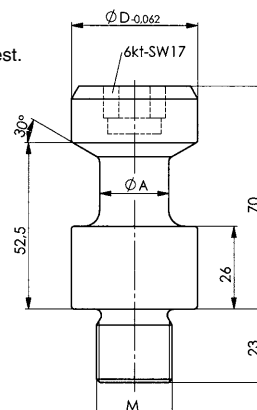
Tempering steel, tempered, inductively hardened clamping area.

#### Note:

Clamping stud does not conform to DIN, suitable only for use with our hydraulic stud clamping.

#### On request:

Special sizes available on request.



Subject to technical alterations.

CAD







## WE DEVELOP THE RIGHT SOLUTION – POTENTIAL SAVINGS BY REDUCING SET-UP TIMES

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## ... BY ITEM NO.

| Article no.     | Page            | Article no.       | Page               | Article no.        | Page               | Article no.      | Page     |
|-----------------|-----------------|-------------------|--------------------|--------------------|--------------------|------------------|----------|
| DIN 70852       | 48              | No. 6918-80-10    | 256                | No. 6958CR-XX-04   | 154, 236           | No. 6983         | 309      |
| DIN 7603        | 313             | No. 6919S         | 293                | No. 6958C-XX-04    | 154, 236           | No. 6983B        | 308      |
| DIN 908         | 312             | No. 6919-2        | 290                | No. 6958C-XX-1     | 152                | No. 6983G        | 308      |
| No. 6380        | 325             | No. 6919-20       | 291                | No. 6958DR         | 147                | No. 6984-20      | 302      |
| No. 6380D       | 325             | No. 6919-25       | 292                | No. 6958DT         | 145                | No. 6984-30      | 303      |
| No. 6540        | 74              | No. 6919-30       | 292                | No. 6958DU         | 144                | No. 6985         | 306      |
| No. 6540F       | 76              | No. 6920          | 36                 | No. 6958D-xx-04    | 147                | No. 6985K        | 306      |
| No. 6540G       | 75              | No. 6920D         | 38                 | No. 6958ER-XX-00   | 135                | No. 6985R        | 306      |
| No. 6540H       | 75              | No. 6920G         | 37                 | No. 6958E-XX       | 134                | No. 6988         | 309      |
| No. 6540K       | 76              | No. 6921          | 39                 | No. 6958E-XX-0X    | 135                | No. 6989M        | 274      |
| No. 6540KS      | 76              | No. 6924          | 44                 | No. 6958E-XX-00-00 | 135                | No. 6989ME       | 276      |
| No. 6540P       | 78              | No. 6925          | 45, 46             | No. 6958S          | 140                | No. 6989N        | 275      |
| No. 6540S       | 77              | No. 6925D         | 47                 | No. 6958Sx-16      | 136                | No. 6989NE       | 278      |
| No. 6540V       | 77              | No. 6926          | 58, 59             | No. 6958S-16       | 137                | No. 6990         | 307      |
| No. 6540VS      | 77              | No. 6926D         | 60, 62, 64, 66, 68 | No. 6959C          | 156                | No. 6990MK/SK    | 307      |
| No. 6541        | 79              | No. 6926Z         | 73                 | No. 6959CR-xx-04   | 158                | No. 6990-20-A    | 301      |
| No. 6901        | 10              | No. 6927B         | 82                 | No. 6959C-xx-15-01 | 159                | No. 6990-20-G    | 300      |
| No. 6902        | 11              | No. 6929          | 51                 | No. 6959C-xx-30    | 158                | No. 6990-20-M    | 301      |
| No. 6903        | 12, 13          | No. 6929-03       | 50                 | No. 6959KB         | 164                | No. 6990-20-R    | 300      |
| No. 6904-20     | 14              | No. 6930          | 52                 | No. 6959KB-xx-30   | 166                | No. 6990-20-S    | 300      |
| No. 6904-25     | 15              | No. 6930D         | 53                 | No. 6959KL         | 160                | No. 6991         | 284, 285 |
| No. 6904-50     | 16              | No. 6932          | 54                 | No. 6959KL-xx-30   | 162                | No. 6991-01      | 282      |
| No. 6904-52     | 16              | No. 6933          | 55                 | No. 6959KR-xx-04   | 162, 166           | No. 6991-02      | 282      |
| No. 6904-54     | 16              | No. 6934          | 56                 | No. 6960C          | 168                | No. 6992H-11     | 286      |
| No. 6904-59     | 16              | No. 6935          | 40                 | No. 6961F/L        | 202                | No. 6992H-21     | 288      |
| No. 6904-90     | 16              | No. 6935D         | 41                 | No. 6962F/L        | 204                | No. 6993         | 312      |
| No. 6906        | 18, 20, 26, 307 | No. 6936          | 70                 | No. 6964F          | 205, 208           | No. 6993-M12x1,5 | 312      |
| No. 6906BS-1    | 32              | No. 6936D         | 71                 | No. 6964H          | 207, 212           | No. 6994         | 317      |
| No. 6906BS-2    | 32              | No. 6940          | 326                | No. 6964H-xx-20    | 214                | No. 6994S        | 280      |
| No. 6906BS-3    | 32              | No. 6941KP        | 224                | No. 6964L          | 206, 210           | No. 6994-01      | 314      |
| No. 6906BS-4    | 32              | No. 6942KK        | 228                | No. 6965           | 216                | No. 6994-010     | 318      |
| No. 6906BZH-2   | 33              | No. 6942KK-**L    | 229                | No. 6965-10        | 218                | No. 6994-02      | 314      |
| No. 6906B-2-1   | 33              | No. 6942KK-**R    | 230                | No. 6965-10-00     | 219                | No. 6994-03      | 314      |
| No. 6906B-3-2   | 33              | No. 6942KL-xx-04  | 231                | No. 6965-10-03     | 219                | No. 6994-030     | 318      |
| No. 6906N       | 24              | No. 6942KR-xx-14  | 231                | No. 6965-10-09     | 219                | No. 6994-04      | 314      |
| No. 6906P       | 330, 332        | No. 6943C-XX-1    | 234                | No. 6966           | 220                | No. 6994-040     | 318      |
| No. 6906PBS-1-1 | 335             | No. 6944EH        | 242                | No. 6966D          | 221                | No. 6994-05      | 314      |
| No. 6906PB-4-4  | 335             | No. 6944KH        | 240                | No. 6966DF         | 222                | No. 6994-050     | 318      |
| No. 6906PB-4-5  | 335             | No. 6945-02-04    | 352                | No. 6966R          | 222                | No. 6994-06      | 315      |
| No. 6906PB-6-4  | 335             | No. 6945-11       | 344, 345, 346      | No. 6970           | 170, 172           | No. 6994-060     | 318      |
| No. 6906-20-33  | 17              | No. 6945-15-10    | 352                | No. 6970CD         | 178, 180           | No. 6994-07      | 315      |
| No. 6910A-05    | 258             | No. 6945-22-02    | 342                | No. 6970D          | 174, 176           | No. 6994-08      | 315      |
| No. 6910A-07-02 | 261             | No. 6945-22-03    | 342                | No. 6972D          | 185                | No. 6994-080     | 319      |
| No. 6910-06-01  | 259             | No. 6945-22-04    | 340                | No. 6972F          | 184                | No. 6994-09      | 315      |
| No. 6910-06-02  | 259             | No. 6945-22-06    | 341                | No. 6972G          | 187                | No. 6994-090     | 319      |
| No. 6910-06-04  | 260             | No. 6945-22-07    | 341                | No. 6972GR         | 187                | No. 6994-10      | 315      |
| No. 6910-06-05  | 260             | No. 6945-22-08    | 342                | No. 6972W          | 187                | No. 6994-11      | 316      |
| No. 6910-10     | 258             | No. 6945-22-20    | 337, 338, 339      | No. 6973           | 188                | No. 6994-12      | 316      |
| No. 6910-11     | 258             | No. 6945-28       | 351                | No. 6974           | 194, 195, 196, 197 | No. 6994-13      | 316      |
| No. 6911A-07-01 | 16, 261         | No. 6946          | 350                | No. 6974-XXXX-1    | 198                | No. 6994-14      | 316      |
| No. 6916-04     | 268             | No. 6951          | 116, 117           | No. 6974-XXXX-2    | 198                | No. 6994-140     | 319      |
| No. 6916-05/06  | 268             | No. 6951FP        | 112, 114, 124, 125 | No. 6977           | 186                | No. 6994-150     | 319      |
| No. 6916-07     | 268             | No. 6951FZ        | 88, 89             | No. 6978CD         | 190                | No. 6994-17      | 316      |
| No. 6916-08     | 269             | No. 6951FZP       | 91                 | No. 6978CDA        | 191                | No. 6994-170     | 319      |
| No. 6916-08-10  | 269             | No. 6951G         | 96, 97             | No. 6978CDAR-28-06 | 191                | No. 6996         | 312      |
| No. 6916-09     | 270             | No. 6951GZ        | 92, 93             | No. 6978CDA-28-06  | 191                | No. 6997         | 312      |
| No. 6916-10     | 270             | No. 6951KP        | 108, 110, 122, 123 | No. 6980FRX        | 322                | No. 7110DF       | 326      |
| No. 6916-11     | 270             | No. 6951KZ        | 84, 85             | No. 6980MK         | 323                | No. 7110DH       | 326      |
| No. 6916-12     | 129, 271        | No. 6951KZP       | 87                 | No. 6981           | 296                | No. 7110DI       | 326      |
| No. 6917A-1     | 246             | No. 6951N         | 126, 127           | No. 6981E          | 296                | No. 7110DK       | 326      |
| No. 6917E       | 249             | No. 6951WN        | 118, 128           | No. 6981E-XX       | 298                | No. 902Md        | 79       |
| No. 6917F       | 248             | No. 6952CP        | 104                | No. 6981E-100      | 298                | No. 908G         | 312      |
| No. 6917R       | 247             | No. 6952EP        | 102                | No. 6981G          | 297                | No. 908S         | 313      |
| No. 6917-1      | 246             | No. 6954          | 347                | No. 6981P-XX       | 298                | No. 908S-30-XXX  | 313      |
| No. 6918        | 250, 251, 253   | No. 6958A         | 141                | No. 6981-XX        | 298                |                  |          |
| No. 6918A-80-10 | 256             | No. 6958AT        | 139, 142           | No. 6982           | 264, 265           |                  |          |
| No. 6918F       | 251             | No. 6958AU        | 138, 142           | No. 6982E          | 262, 263           |                  |          |
| No. 6918-XX-XXX | 129, 252        | No. 6958A-16      | 137                | No. 6982E-01-L     | 263                |                  |          |
| No. 6918-10     | 253             | No. 6958CK        | 148                | No. 6982-02-01     | 264                |                  |          |
| No. 6918-100    | 254             | No. 6958CKR-XX-04 | 150                | No. 6982-05-01     | 265                |                  |          |
| No. 6918-110    | 255             | No. 6958CK-XX-04  | 150                |                    |                    |                  |          |







## ... BY ORDER NO.

| Order no.    | Page | Order no.    | Page | Order no.    | Page |
|--------------|------|--------------|------|--------------|------|
| 66985        | 184  | <b>68429</b> | 96   | 84269        | 79   |
| <b>67009</b> | 187  | 68445        | 96   | 84277        | 79   |
| 67017        | 187  | 68452        | 97   | 84285        | 79   |
| 67025        | 187  | 68460        | 97   | 84293        | 79   |
| <b>67165</b> | 187  | 68478        | 97   | <b>84343</b> | 79   |
| 67173        | 187  | 68486        | 97   | 84350        | 79   |
| 67181        | 187  | <b>68502</b> | 97   | <b>86223</b> | 326  |
| <b>67256</b> | 187  | 68510        | 306  | <b>86637</b> | 326  |
| 67264        | 187  | 68528        | 306  | 86652        | 326  |
| 67272        | 187  | 68536        | 306  | <b>87601</b> | 74   |
| <b>67322</b> | 187  | 68544        | 306  | 87627        | 74   |
| 67330        | 187  | 68551        | 306  | <b>87858</b> | 326  |
| 67348        | 187  | 68569        | 306  | 87866        | 326  |
| 67371        | 186  | 68577        | 306  | 87874        | 326  |
| <b>67421</b> | 186  | 68585        | 306  | 87882        | 326  |
| <b>67512</b> | 186  | 68593        | 306  | 87890        | 326  |
| 67520        | 186  | <b>68601</b> | 306  | <b>87908</b> | 326  |
| 67538        | 38   | 68619        | 96   | 87916        | 326  |
| 67546        | 38   | 68627        | 97   | 87924        | 326  |
| 67595        | 38   | 68635        | 96   |              |      |
| <b>67603</b> | 38   | 68650        | 97   |              |      |
| 67611        | 38   | 68676        | 97   |              |      |
| 67629        | 38   | 68692        | 96   |              |      |
| 67637        | 293  | <b>68718</b> | 96   |              |      |
| 67645        | 293  | 68734        | 97   |              |      |
| <b>67801</b> | 45   | 68759        | 97   |              |      |
| 67819        | 10   | <b>68817</b> | 309  |              |      |
| 67827        | 45   | 68825        | 309  |              |      |
| 67835        | 10   | <b>68973</b> | 116  |              |      |
| 67843        | 46   | 68999        | 116  |              |      |
| 67850        | 40   | <b>69013</b> | 307  |              |      |
| 67868        | 46   | 69021        | 307  |              |      |
| 67876        | 40   | 69039        | 307  |              |      |
| 67884        | 46   | 69054        | 307  |              |      |
| 67892        | 40   | 69062        | 307  |              |      |
| <b>67900</b> | 46   | 69070        | 116  |              |      |
| 67918        | 41   | 69088        | 282  |              |      |
| 67926        | 46   | <b>69104</b> | 282  |              |      |
| 67934        | 41   | 69112        | 116  |              |      |
| 67942        | 47   | 69138        | 116  |              |      |
| 67959        | 41   | 69146        | 126  |              |      |
| 67967        | 47   | 69153        | 116  |              |      |
| 67975        | 45   | 69161        | 127  |              |      |
| 67983        | 47   | 69179        | 246  |              |      |
| 67991        | 45   | <b>69211</b> | 246  |              |      |
| <b>68007</b> | 47   | 69229        | 117  |              |      |
| 68015        | 45   | 69245        | 117  |              |      |
| 68023        | 70   | 69252        | 117  |              |      |
| 68031        | 45   | 69260        | 117  |              |      |
| 68049        | 70   | 69278        | 117  |              |      |
| 68056        | 70   | 69294        | 117  |              |      |
| 68064        | 82   | <b>69302</b> | 312  |              |      |
| 68072        | 70   | 69328        | 312  |              |      |
| 68080        | 82   | 69344        | 312  |              |      |
| 68098        | 70   | 69393        | 312  |              |      |
| <b>68106</b> | 82   | <b>69419</b> | 312  |              |      |
| 68114        | 70   | 69435        | 14   |              |      |
| 68122        | 82   | 69450        | 15   |              |      |
| 68130        | 70   | <b>69500</b> | 126  |              |      |
| 68155        | 71   | 69526        | 127  |              |      |
| 68171        | 71   | <b>69609</b> | 312  |              |      |
| 68197        | 71   | 69625        | 312  |              |      |
| <b>68213</b> | 71   | 69641        | 312  |              |      |
| 68239        | 71   | 69666        | 312  |              |      |
| 68254        | 71   | <b>69815</b> | 313  |              |      |
| 68270        | 71   | 69823        | 313  |              |      |
| 68296        | 71   | <b>76059</b> | 326  |              |      |
| <b>68312</b> | 56   | <b>77446</b> | 326  |              |      |
| 68338        | 56   | 77453        | 326  |              |      |
| 68353        | 56   | <b>83931</b> | 326  |              |      |
| 68379        | 56   | 83949        | 326  |              |      |
| 68395        | 56   | <b>84251</b> | 79   |              |      |

**... IN ALPHABETICAL ORDER**

| Description                                       | Page                         |
|---|------------------------------|
| <b>A</b>  |                              |
| Accumulator                                       | 293                          |
| Adapter for pressure gauge connection             | 301                          |
| Adapter Plate, light duty                         | 319                          |
| Adaptor   | 312                          |
| Adaptor Plate                                     | 346                          |
| Air filter and pressure regulator                 | 16                           |
| Air-Hydraulic Pump                                | 14, 15                       |
| AI Protection MK/SK                               | 307                          |
| Angle block, 120°                                 | 78                           |
| Angle Swivel Joint, 90° single passage            | 282                          |
| Anti-rotation device                              | 135                          |
| Axial Swivel Joint, single passage                | 282                          |
| <b>B</b>  |                              |
| Base for Clamping Head                            | 345                          |
| Block Cylinder                                    | 58, 59, 60, 62, 70, 71       |
| Block cylinder with O-ring connection on base     | 66                           |
| Block cylinder with O-ring connection on rod side | 68                           |
| Block cylinder with O-ring connection on side     | 64                           |
| Bore clamp, hydraulic, centric                    | 170                          |
| Bore clamp, hydraulic, eccentric                  | 172, 174, 176                |
| Bore clamp MAXI, hydraulic, centric               | 180                          |
| Bore clamp MINI, hydraulic, centric               | 178                          |
| Built-in coupling mechanism                       | 276                          |
| Built-in coupling nipple                          | 278                          |
| Built-In Cylinder                                 | 44, 45, 46, 47               |
| Bulkhead fitting, straight, heavy-duty            | 316                          |
| Bulkhead fitting, straight, light duty            | 319                          |
| <b>C</b>  |                              |
| Centring clamp MAXI with three clamping points    | 197                          |
| Centring clamp MAXI with two clamping points      | 196                          |
| Centring clamp MINI with three clamping points    | 195                          |
| Centring clamp MINI with two clamping points      | 194                          |
| Chain clamping set                                | 74                           |
| Check valve, hydraulically pilot operated         | 269                          |
| Check valve, pilot operated                       | 269                          |
| Clamp chain protection set                        | 76                           |
| Clamping arm                                      | 147, 150, 154, 231, 236      |
| Clamping arm, blank                               | 147, 154, 158, 162, 166, 236 |
| Clamping arm blank                                | 150, 231                     |
| Clamping arm blank from aluminium                 | 141                          |
| Clamping arm blank from steel                     | 135, 140                     |
| Clamping arm out of aluminium                     | 137, 141                     |
| Clamping arm out of steel                         | 135, 137, 140                |
| Clamping arm, standard                            | 158, 162, 166                |
| Clamping Bar, long                                | 338, 339                     |
| Clamping Bar, short                               | 337                          |
| Clamping Head                                     | 345                          |
| Clamping Head, complete with base                 | 344                          |
| Clamping jaw, serrated                            | 191                          |
| Clamping jaws blank, smooth                       | 191                          |
| Clamping Jaws, serrated                           | 187                          |
| Clamping Jaws, soft                               | 187                          |
| Clamping Jaws, with clamping edge                 | 187                          |
| Clamping lever blank                              | 219, 222                     |
| Clamping lever, cranked                           | 219                          |
| Clamping lever, standard                          | 219                          |
| Clamping Piston, complete                         | 346, 352                     |
| Clamping Stud                                     | 352                          |
| Clamping Stud Holder, hydraulic                   | 351                          |
| Clamping tongs                                    | 220, 221                     |
| Compensating collet                               | 218                          |
| Connecting links with spring cotter pin           | 77                           |
| Connecting plate                                  | 256                          |
| Connecting Plate                                  | 246                          |
| Connection Plate                                  | 258, 264                     |
| Connection plate for centring clamp               | 198                          |
| Counter catch                                     | 75                           |
| Coupling Plug                                     | 32                           |
| Coupling Plug, 13-pin                             | 335                          |
| Coupling Unit for Pallet Decoupler Block          | 292                          |

| Description   | Page               |
|---|--------------------|
| Cross-fitting, heavy-duty                                     | 315                |
| Cross-fitting, light duty                                     | 319                |
| <b>D</b>  |                    |
| Delay valve   | 254, 255           |
| Directional valve 4/3   | 16                 |
| Diverter plate  | 17                 |
| Double connector  | 312                |
| <b>E</b>  |                    |
| Electronic pressure switch                                    | 262, 263           |
| <b>F</b>  |                    |
| Failover with ball  | 323                |
| Failover with roll  | 322                |
| Filter  | 296                |
| Filter, cartridge design                                      | 298                |
| Filter plate  | 222, 251           |
| Filter, threaded design                                       | 298                |
| Filter with rectifier circuit                                 | 297                |
| Fitting, angled, adjustable, heavy-duty                       | 315                |
| Fitting, angled, heavy-duty                                   | 315                |
| Fitting, angled, light duty                                   | 318                |
| Flange Nut  | 48                 |
| Flange with pipe socket                                       | 265                |
| Front Insertion Guide   | 342                |
| <b>G</b>  |                    |
| Gauge   | 309                |
| <b>H</b>  |                    |
| Hand Pump   | 11                 |
| HELI-COIL thread insert                                       | 38                 |
| High Pressure Hose  | 306                |
| High Pressure Hose with steel-wire interlace                  | 306                |
| Holder for Clamping Head                                      | 344                |
| Hollow Rod Cylinder   | 36, 38, 39         |
| Hollow Rod Cylinder with internal thread                      | 37, 40, 41         |
| Hook end, mechanical  | 75                 |
| Hook ends, hydraulic  | 73                 |
| Hydraulic Compensating Clamp                                  | 216                |
| Hydraulic intensifier   | 12                 |
| Hydraulic oil   | 307                |
| Hydraulic pipe  | 317                |
| Hydraulic pressure booster                                    | 13                 |
| <b>L</b>  |                    |
| Line Check Valve  | 268                |
| Link clamp  | 156, 228, 229, 230 |
| Link Clamp  | 160, 164           |
| <b>M</b>  |                    |
| Manifold  | 309                |
| Manual Seat Valve, 2/2-Way                                    | 258                |
| Manual Seat Valve, 3/2-Way                                    | 258                |
| Measuring coupling  | 300                |
| Measuring hose  | 300                |
| Mounting kit  | 79                 |
| <b>O</b>  |                    |
| Open-ended spanner with torque wrench socket                  | 79                 |
| <b>P</b>  |                    |
| Pallet Decoupler Block  | 290, 291           |
| Piston Pressure Switch  | 264, 265           |
| Pivoting fitting, angled, heavy-duty                          | 314, 316           |
| Pivoting fitting, angled, light duty                          | 318                |
| Pivoting T-fitting, heavy-duty                                | 314, 316           |
| Pivoting T-fitting, light duty                                | 318                |
| Plug connection   | 280                |
| Pressure control seat valve                                   | 247, 248, 249      |
| Pressure gauge, with housing                                  | 308                |
| Pressure Reducing Valve                                       | 246                |
| Pressure Relief Valve   | 253                |
| Protective elements   | 77                 |
| Pull Cylinder, base-flange-mounting, with guided piston rod   | 88                 |
| Pull Cylinder, block type                                     | 82                 |
| Pull Cylinder, thread-flange-mounting, with guided piston rod | 92                 |
| Pull Cylinder, top-flange-mounting, with guided piston rod    | 84                 |
| Pull-Down Clamp   | 188                |
| Pull-Down Clamp, hydraulic                                    | 184, 185           |
| Pull-Down Counter-Hold, mechanical                            | 186                |

**... IN ALPHABETICAL ORDER**

| Description  | Page                    |
|--|-------------------------|
| Pump unit  | 18, 20, 24, 26          |
| Pump Unit  | 330, 332                |
| Push-Pull Cylinder, base-flange-mounting, with guided piston rod   | 89, 91                  |
| Push-Pull Cylinder, thread-flange-mounting, with guided piston rod | 93                      |
| Push-Pull Cylinder, top-flange-mounting, with guided piston rod    | 85, 87                  |
| <b>Q</b>   |                         |
| Quick Disconnect Coupler   | 307                     |
| <b>R</b>   |                         |
| Rear Stop  | 342                     |
| Reducer  | 312                     |
| Remote Control Switch  | 335                     |
| Remote Control Switch with magnetic base                           | 335                     |
| Remote Control Switch with magnetic base and safety cover          | 335                     |
| Roller chain   | 76                      |
| Rotary coupling  | 284, 285, 286, 288      |
| Round connector  | 263                     |
| <b>S</b>   |                         |
| Screw plug   | 312                     |
| Screw Pump   | 10                      |
| Screw-in coupling mechanism  | 274                     |
| Screw-in coupling nipple   | 275                     |
| Screw-in fitting, straight, heavy-duty                             | 314, 316                |
| Screw-in fitting, straight, light duty                             | 318                     |
| Screw-in nipple  | 312                     |
| Screw-up fitting, straight, heavy-duty                             | 314                     |
| Seat Valve 3/2   | 16                      |
| Seat Valve, 3/2-Way  | 259, 260                |
| Seat Valve, 3/3-Way  | 261                     |
| Seat Valve, 4/3-Way  | 16, 261                 |
| Sequence valve   | 256                     |
| Sequence Valve   | 250, 251, 253           |
| Sequence valve, threaded design                                    | 129, 252                |
| Set screw  | 326                     |
| Set screw, ball-shaped   | 326                     |
| Shape A sealing ring Cu  | 313                     |
| Shut-off valve   | 270                     |
| Shuttle Valve  | 268                     |
| Side clamping element with support                                 | 191                     |
| Side clamping element without support                              | 190                     |
| Side thrust piece, with seal                                       | 325                     |
| Side thrust piece, without seal                                    | 325                     |
| Spacer Bar   | 340, 341, 342           |
| Splash protection  | 214                     |
| Spring cotter pin  | 76                      |
| Store Station for Coupling Unit                                    | 292                     |
| Support control, pneumatic   | 302, 303                |
| Support Element, base-flange-mounting                              | 205, 206, 207           |
| Support Element, block type  | 202                     |
| Support Element, cartridge flange                                  | 204, 208, 210, 212, 242 |
| Support Element, top-flange-mounting                               | 240                     |
| Surface-mounted block  | 142, 159                |
| Surface-mounted housing  | 32                      |
| Swing Clamp Arm, double ended                                      | 117, 127                |
| Swing Clamp arm, double-ended                                      | 118, 128                |
| Swing Clamp Arm, long  | 117, 127                |
| Swing Clamp Arm, standard  | 116, 126                |
| Swing Clamp Arm, upreach   | 116, 126                |
| Swing clamp, base-flange-mounting, precision design                | 112, 114, 124, 125      |
| Swing clamp, cartridge flange, precision design                    | 102                     |
| Swing clamp, plug-in mounting                                      | 104                     |
| Swing Clamp, thread-flange-mounting                                | 96, 97                  |
| Swing clamp, top-flange-mounting                                   | 224                     |
| Swing clamp, top-flange-mounting, precision design                 | 108, 110, 122, 123      |
| Swivel Clamping Strap, hydraulic clamping, mechanic unclamping     | 347                     |
| <b>T</b>   |                         |
| T-fitting, adjustable, heavy-duty                                  | 315                     |
| T-fitting, heavy-duty  | 315                     |
| T-fitting, light duty  | 319                     |
| Threaded Check Valve   | 268                     |

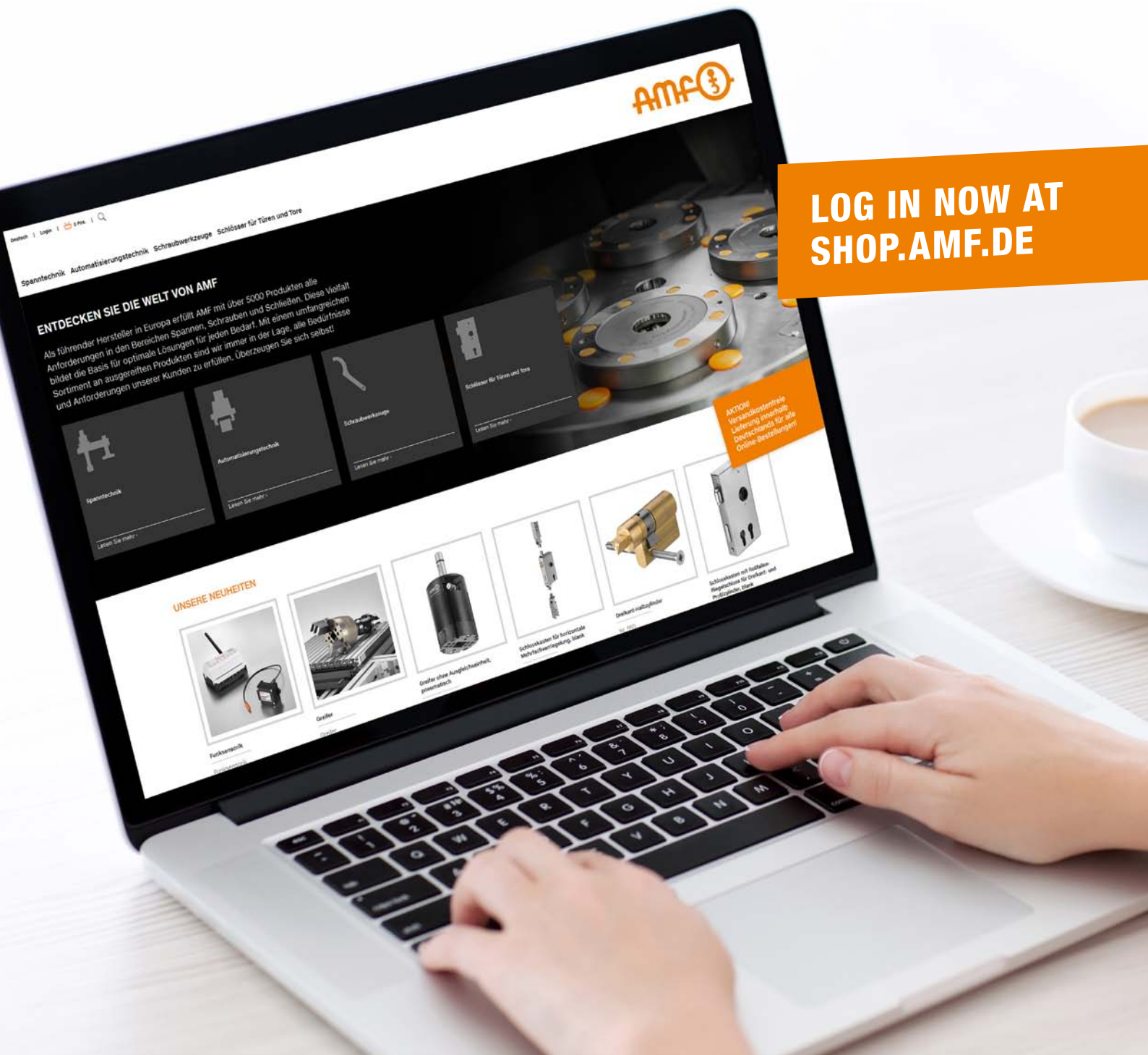
| Description   | Page                    |
|---|-------------------------|
| Threaded Cylinder   | 53                      |
| Threaded Cylinder bottom sealing                                  | 56                      |
| Threaded Cylinder bottom sealing, piston rod with internal thread | 52                      |
| Threaded Cylinder bottom sealing, with spherical piston rod       | 51                      |
| Threaded Cylinder for tube connection, with spherical piston rod  | 50                      |
| Threaded Cylinder, piston rod with internal thread                | 55                      |
| Threaded Cylinder with spherical piston rod                       | 54                      |
| Threaded plug with soft seal                                      | 312                     |
| Throttle/Check Valve  | 129, 270, 271           |
| Toggle joint clamp, hydraulic                                     | 168                     |
| Turnbuckle  | 77                      |
| Two-hand safety operator panel                                    | 33                      |
| <b>U</b>  |                         |
| Union nut with cutting ring, heavy series                         | 316                     |
| Union nut with cutting ring, light duty                           | 319                     |
| <b>V</b>  |                         |
| Vent screw  | 313                     |
| Vent screw for spring space                                       | 313                     |
| Vertical Clamp  | 136, 138, 139, 144, 145 |
| Vertical clamp, cartridge flange                                  | 134                     |
| Vertical clamp MINI   | 148                     |
| Vertical clamp with linear stroke                                 | 152, 234                |
| <b>W</b>  |                         |
| Wedge clamp   | 350                     |
| <b>1</b>  |                         |
| 1-circuit remote control (rotary switch)                          | 33                      |
| <b>2</b>  |                         |
| 2-circuit remote control (rotary switch)                          | 33                      |





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These Terms of Payment apply for companies, legal entities governed by public law and public law special funds. Our goods and services are supplied exclusively on the basis of the following conditions. Any deviating purchasing conditions of the customer not expressly recognised by us will not become part of the contract through acceptance of the order. By placing the order and accepting the goods we deliver, the customer confirms its consent to our terms and conditions.

## 1. Offer and contractual conclusion

All our offers are always subject to change without notice unless otherwise explicitly agreed. Our delivery contracts are based on the latest version of our catalogue. Dimension and weight values, as well as illustrations, drawings and data, are non-binding and can be changed by us at any time. Therefore, deviations cannot be ruled out and do not justify any compensation claims against us.

Orders are considered accepted only when confirmed by us in writing. If, for organisational reasons, the customer does not receive a separate confirmation upon the delivery of goods, the invoice shall also be deemed the order confirmation.

## 2. Prices

The prices are in EURO, ex-works, excluding VAT, packing, freight, postage and insurance. Unless otherwise agreed, our list prices valid on the day of delivery shall apply. For orders below 50 EUR goods net, we must make a minimum quantity surcharge of a 10 EURO for cost reasons.

## 3. Tool costs

Unless any other agreements have been reached, the tools fabricated for the purpose of executing the order shall remain our property in all cases, even if we have invoiced a tool cost component separately.

## 4. Payment

Unless otherwise stated on the invoice, the purchase price falls due for net payment within 30 days of the invoice date (without deduction of discount). Invoice amounts of below 50 EURO are due for payment immediately.

In case of payment default, we shall be entitled to charge default interest. The amount corresponds to our interest rate for current account credits at our main bank; the minimum however being 8 percentage points above the relevant base interest rate applied by the European Central Bank. Moreover, in case of default following written notice to the customer, we shall be entitled to cease to fulfil our obligations until payments are received.

## 5. No set-off

The customer can set-off only with legally confirmed or undisputed counterclaims.

## 6. Right of withdrawal in case of delayed acceptance or payment and insolvency

If the customer fails to accept the goods in due time, we shall be entitled to set a reasonable period of grace, after which we can dispose of the goods elsewhere and supply the customer on a reasonably longer term. Our rights to withdraw from the contract under the provisions of Section 326 BGB and demand damages for non-performance shall not be affected. If the customer fails to pay for the goods once payment is due, we shall be entitled, at the end of a reasonable period of grace we have set, to withdraw from the contract and demand the return of any goods already supplied. Section 323 BGB remains unaffected in all other cases.

If the customer applies for the opening of insolvency proceedings, we shall be entitled, prior to the ordering of security measures by the insolvency court, to withdraw from the contract and demand the immediate return of the goods.

## 7. Customer-specific fabrications/project fabrications (custom fabrications)

Customer-specific fabrications require binding information on design, quantity etc. in written form at the time of ordering. For manufacturing reasons, we reserve the right to supply up to 10% above or below the order quantity. Technical modifications or cancellations are subject to any costs incurred. The return of customer-specific fabrications is impossible.

## 8. Delivery and packaging, transfer of risk

The delivery date is non-binding; although stated to the best of our knowledge. It is subject to us receiving correct, defect-free and complete deliveries. The stated delivery dates relate to completion in the factory, starting on the day the order is accepted by us. Delivery is EXW (ex-works) in accordance with Incoterms 2010. Therefore, the costs are borne by the customer. The risk is transferred to the customer when the goods are passed to the person, company or facility nominated to execute the shipment. This applies also for partial deliveries, or if we have assumed responsibility for delivery and installation. The risk shall be transferred to the customer even in the case of delayed acceptance.

In the absence of specific shipping instructions, we shall proceed as we deem fit and without any obligation to the cheapest or most expedient method. The customer agrees that the order can also be delivered in parts, insofar as this is reasonable for the customer. We shall charge a 5 EURO processing free for shipping to third parties that we supply on behalf of the customer.

The packaging complies with the packaging ordinance. Disposable packaging shall be charged at cost price. The packaging cannot be taken back.

## 9. Performance impediment and/or impossibility

If we are hindered in the fulfilment of our obligation due to the onset of unforeseeable circumstances, which we are unable to avoid despite reasonable effort in relation to the nature of the circumstances (e.g. operational interruption, delay in the delivery of important raw materials, defects in the delivery), the delivery time shall be extended by a reasonable period, insofar as the supply of goods or services is not rendered unreasonably difficult or impossible.

If we have to accept that these circumstances are not only temporary, we shall be entitled to withdraw from the contract either in whole or in part.

If the supply of goods or services becomes impossible, the customer shall not be obliged to furnish its own contractual service. Section 275 BGB applies mutatis mutandis. If, however, the customer is solely or predominantly responsible for the

circumstances that led to impossibility, it shall remain under an obligation to render the return service. The same applies if this circumstance occurs at a time when the customer is behind schedule with acceptance.

## 10. Samples/returns

Samples shall be provided only against payment. If samples or models are provided, a credit note shall be issued with the subsequent order if the order value is 125 EURO net or more. Goods can be returned only by agreement, although custom fabrications are excluded from such return.

In the case of returns for which we are not responsible (e.g. incorrect order), we shall charge a processing fee of 10%, the minimum value, however, being 7.50 EURO.

## 11. Retention of title

The goods shall remain our property unless full payment of all claims and/or until the cheques provided for this purpose are honoured. The itemisation of claims in an ongoing invoice, as well as balancing the account and the recognition thereof does not affect the retention of title. The customer is entitled to sell on the retained goods during the ordinary course of business. However, the customer is not permitted to pledge the goods or transfer them by way of security. It shall assign its claim ensuing from the selling on of the retained goods to us in advance. The customer shall be entitled to collect the claim to the extent that it has fulfilled its obligations towards us. At our request, the customer shall be obliged to state third-party debtors and we shall be entitled to report this and the assignment.

## 12. Property rights

We reserve property rights and copyrights to all contractual documents such as drafts, drawings, calculations and cost estimates. Such documents must not be reproduced or disclosed to third parties without our consent. Any rights to patents, utility models etc. reside solely with us, insofar as such patents have not yet been filed. Our products are allowed to be replicated only with our written consent.

If objects are fabricated according to drawings or samples, the customer shall warrant that any third party property rights are not infringed by manufacture or delivery. If a third party forbids manufacture and delivery on account of property rights, we shall be entitled to stop manufacture and delivery immediately. The customer shall be obliged to reimburse us with all costs incurred and indemnify us from third party compensation claims. Compensation claims by the customer are impossible.

## 13. Warranty

If the customer agrees with us a particular quality of the goods, we shall base this agreement on our technical delivery specifications. If we have to deliver according to customer drawings, specifications, samples etc., the customer shall assume the risk for suitability for the intended purpose. If, after the contract is concluded, the scope of goods or services is changed at the customer's request and this impairs the quality or suitability of the goods, claims for defects on the part of the customer shall be ruled out, insofar as such impairments are caused by the customer's requests for change. The time at which the risk is transferred is decisive for the contractual state of the goods. Wear and tear of wearing parts caused by ordinary use does not constitute a defect. Claims for defects are ruled out in the following cases in particular: Unsuitable or improper use, incorrect installation and/or commissioning by the customer or third party, normal wear and tear, incorrect or negligent handling - in particular excessive use -, unsuitable equipment, replacement materials, chemical, electrochemical or electrical influences, unless such defects are caused by ourselves.

If the goods contain a defects, we shall provide, following a reasonable period of grace set by the customer, either a replacement or a repair as we deem fit. If such subsequent performance fails, the customer shall be entitled to either reduce the purchase price or withdraw from the contract. Any further warranty claims are ruled out. In case of negligible deviations from the agreed quality, no claims for defects shall be recognised.

The discovery of defects must be communicated to us immediately in writing. In the case of recognisable defects, however, within 10 days of acceptance, in the case of non-recognisable defects immediately after they become evident. The warranty is 12 months, starting with delivery of the goods ex-works.

## 14. Liability

With the exception of harm to life, body or health on account of a breach of duty by ourselves, our liability shall be limited to intent or gross negligence.

## 15. Place of fulfilment, place of jurisdiction and governing law

The place of fulfilment for all obligations ensuing from this contractual relationship is D-70734 Fellbach.

The place of jurisdiction for all legal disputes ensuing from the contractual relationship is the court responsible for the headquarters of Andreas Maier GmbH & Co. KG.

All disputes ensuing from the contract or regarding the validity thereof shall be finally decided by a court of arbitration in accordance with the Court of Arbitration Ordinance of the German Committee for Arbitration Court Procedures or the Conciliation and Arbitration Arrangement of the International Chamber of Commerce, recourse to ordinary courts of law being excluded. The legal dunning process, however, remains permissible.

German law shall govern (BGB and HGB). The applicability of the UN Convention on Contracts for the International Sale of Goods (CISG) is ruled out.

## 16. Severability clause

If individual provisions become legally invalid, the remaining provisions shall not be affected. The legally invalid provision shall be replaced by regulations that most closely reflect the economic purpose of the contract with reasonable consideration for the mutual interests. The publication of these Terms of Sale, Delivery and Payment renders all previous versions invalid. This does not apply for any contracts concluded prior to announcement.

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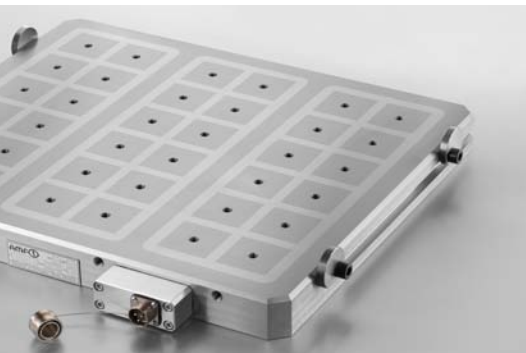
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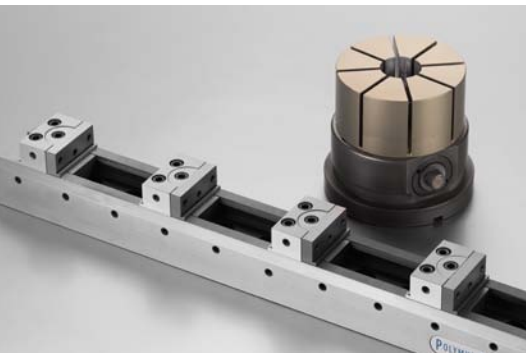
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