Operating manual

Spring clamping cylinder

Special versions
Type: 8.140X.8XXX

Type: 140X-010

Hilma-Römheld GmbH

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Data contained in the catalogue:
All parameters are quoted in accordance with the VDI Guidelines 3267 to 3284. Designations and symbols according to ISO 1219.
Dimensions in SI units, according to DIN 1301.
Dimensions without tolerances: DIN 7168, medium.

Clamping elements:

Constant working pressure:	see catalogue sheets
Ambient temperature:	-10°C to 70°C (other temperatures on request)
Mounting position:	any, unless otherwise stated
Piston velocity:	0.01 to 0.25 m/s
Oil leakage rate:	at 400 bar 20°C hydraulic oil HLP 32
- dynamic:	0.0001 g per double stroke (Ø = 32, stroke = 40, V = 0.1 m/s) 0.0003 g per double stroke (Ø = 40, stroke = 40, V = 0.1 m/s)
- static:	0.03 g in 24 hours

Oil recommendation:

Oil temperature (°C)	Designation acc. to DIN 51524	Viscosity acc. to DIN 51519
0 - 40	HLP 22	ISOVG 22
10 - 50	HLP 32	ISOVG 32
20 - 60	HLP 46	ISOVG 46

(Other hydraulic fluids are available on request)

Influence of temperature
Fluids expand differently under the influence of increasing temperatures. If no space is available for expansion, the change results in a pressure increase. Since the clamping system is a closed system, there will be a pressure increase. Conversely, a decrease in temperature results in a decrease in pressure.
As a rule of thumb one can say that a 10°C increase in temperature results in a 100 bar increase in pressure. In the case of a significant decrease in temperature, e.g. during the night, the pressure will decrease accordingly. It is therefore recommended that systems which are isolated from the pressure generator are fitted with a pressure accumulator, in order to reduce any decrease in pressure.

Pipe fittings:
According to DIN 2353. screwed plugs type B to DIN 3852, sheet 2 (sealing by sealing edge) should be used. Do not use additional sealing materials such as Teflon tape!

Connecting threads:
Whitworth pipe threads type X to DIN 3852, sheet 2 (for cylindrical screwed plugs).

Piping:
Seamless, plain ended steel pipes as per DIN 2391 NBK.
Preferably:

Outer Ø (mm)	Wall thickness (mm)	Hydraulic pressure (bar)	Fitting
8	1,5	400	G ¼
8	2,0	500	G ¼
12	2,5	400	G ⅜
12	3,0	500	G ⅜
16	3,0	400	G ½

Pipe runs should be as short as possible. The length of pipes for single-acting cylinders with a spring return should not exceed 5 m, pipes for doubleacting cylinders may be longer. Make sure that pipes are installed with a large bending radius.

Hose connections:
For connection of the clamping elements we recommend high-pressure hoses with 4 x safety factor at an operating pressure of 500 bar. Special designs should be used for hoses subject to constant movement, e.g. hoses for oil supply to the slide. Observe the minimum radius bends.

Starting the system, Maintenance:
Read the operating instructions before starting the system. Use clean and fresh oil. Bleed the complete system by operating the pump at low pressure (20 bar) until the oil which emerges at the highest point is free from bubbles (rinsing). Since hydraulic valves are very sensitive to dirt, make sure that no impurities are carried into the hydraulic oil. A change of oil should be carried out at least once a year.

Dynamic pressure in the hydraulic system:
Due to friction in pipes, screw fittings, valves and cylinders a pressure of 1 - 2 bar is necessary for proper oil circulation. The retracting springs in cylinders with a spring return are designed for a maximum dynamic pressure of 2 bar. If the cylinders move slowly, or if the stroke is not fully extended, the dynamic pressure must be reduced (larger pipe diameter, shorter pipes, fewer screw fittings, connection in parallel rather than in series, reduced weight on the piston). In applications with doubleacting cylinders dynamic pressure is likely to occur when pressure is applied to the rod side and the larger oil volume from the piston side must flow back to the oil reservoir through narrow pipes and valves. Normally, dynamic pressure has no negative effect. However, if in applications with swing clamps and swing sink clamps the drop is in excess of 50 bar, this may cause premature wear of the swing mechanism and result in a malfunction (see catalogue sheets).

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Symbols and designations used in hydraulic clamping systems

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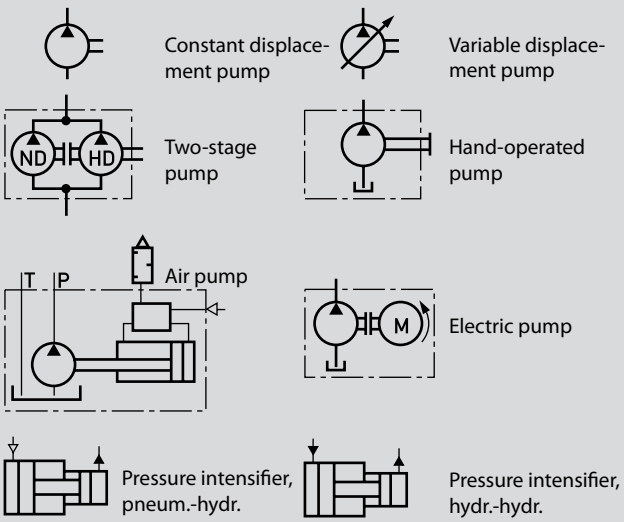
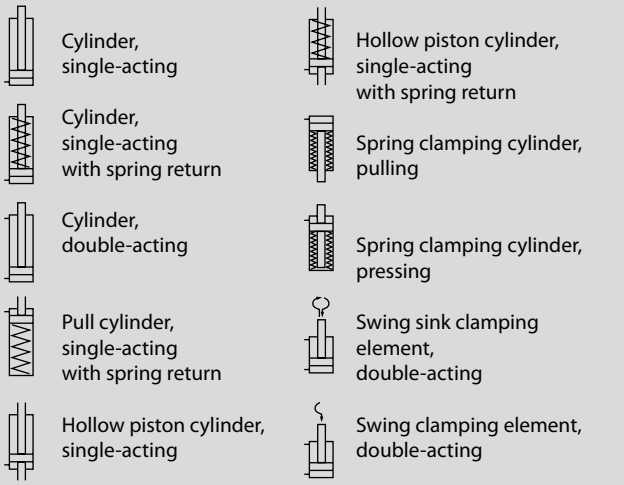
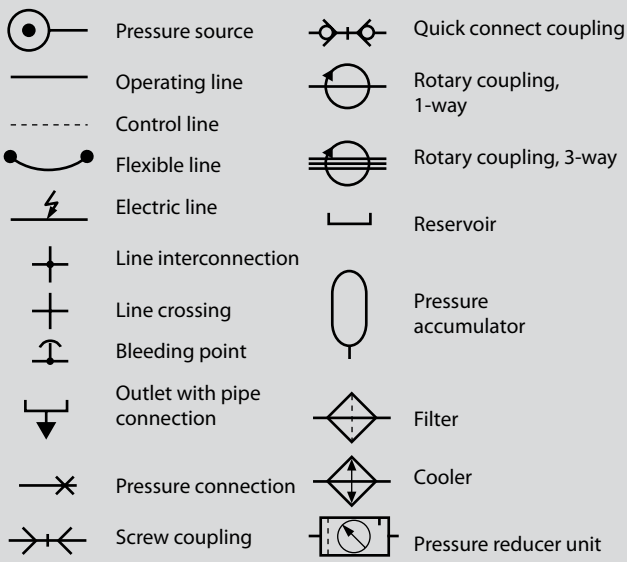
Pressure generators



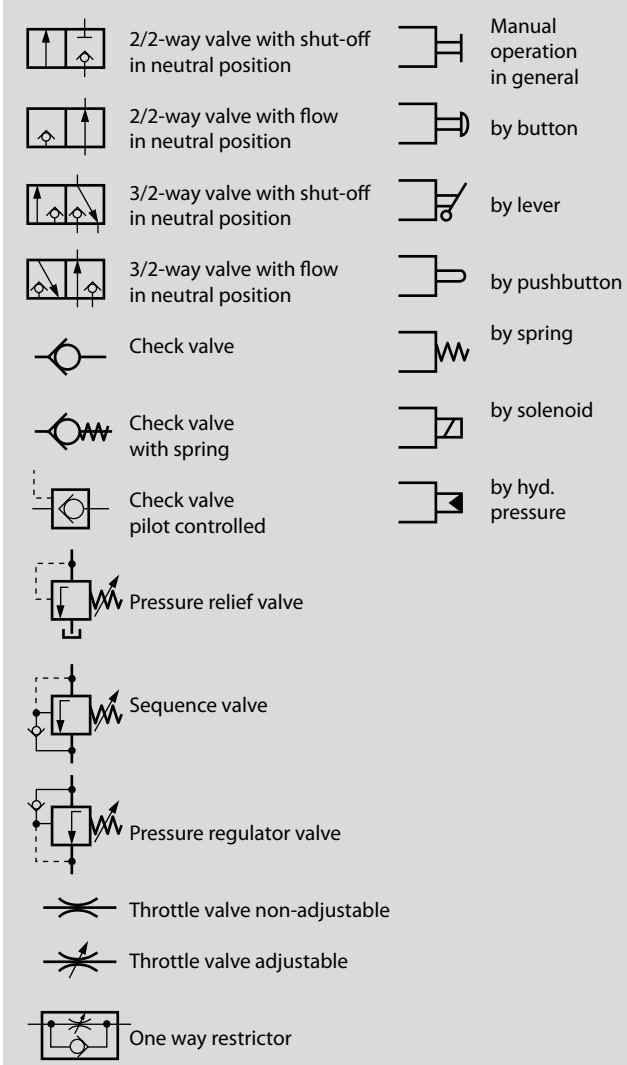
Hydraulic cylinders



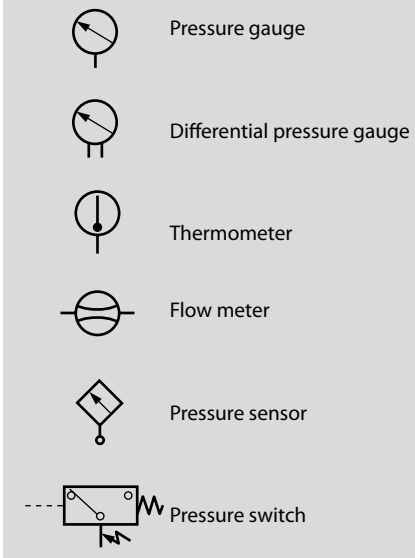
Energy transmission Hydraulic oil supply and accessories



Valves



Other equipment



Excerpt from ISO 1219, DIN 24300

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Safety levels are determined by different safety requirements and manufacturing technology.
Based on the state of technical development, hydraulic die clamping systems can be classified into one of three safety levels.

Safety level no. 1:

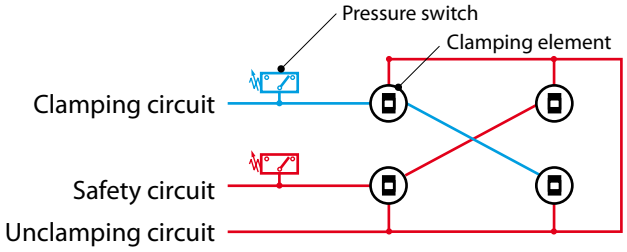
Preferably for presses with column-guided dies:

Pressure switches in every clamping circuit for controlling the clamping force, used for machine safety.

Two independent hydraulic circuits.

Clamping circuit = 50% of the clamping elements in bed and slide
Safety circuit = 50% of the clamping elements in bed and slide

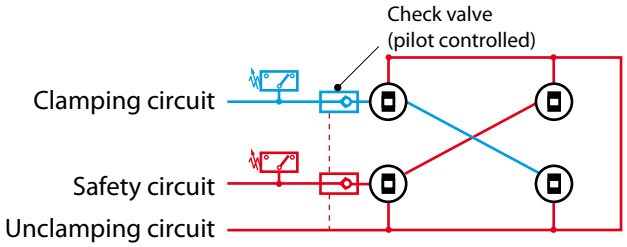
If one circuit fails, the upper or lower die is still clamped with 50% of the total clamping power.



Safety level no. 2:

For presses with dies which are not column-guided

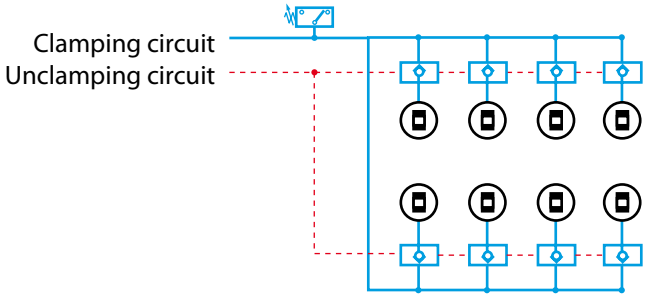
A check valve (pilot controlled) maintains pressure in the clamping and safety circuits even when the pressure drops in the remaining systems.



Safety level no. 3:

For power presses and car body presses with dies which are not column-guided.

All clamping elements are secured by pilot controlled check valves. If pressure drops by more than 20% of the operating pressure, the pressure switch stops the press. The check valves maintain the clamping force for many days.



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Spring clamping cylinder pulling, with hydraulic return

Application:

- long-term clamping of moveable machine parts, dies, fixtures, pallets and workpieces

Function:

The force of the spring clamping cylinder is mechanically transmitted to the tie rod or the clamping spindle by a pre-loaded Belleville spring assembly. Hydraulic power is only required for unclamping the clamping cylinder.

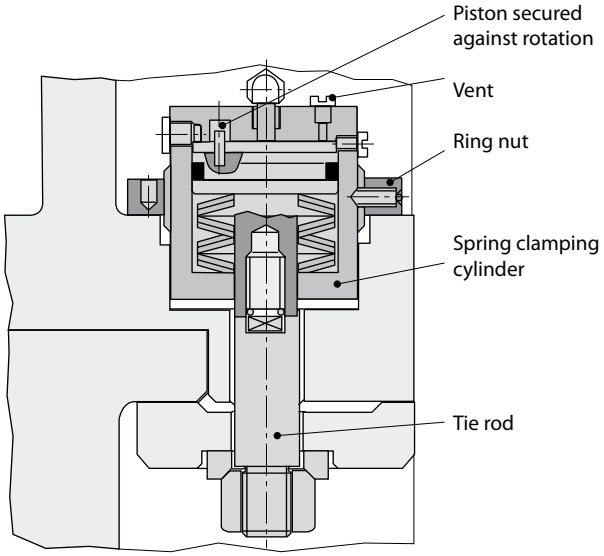
Special features:

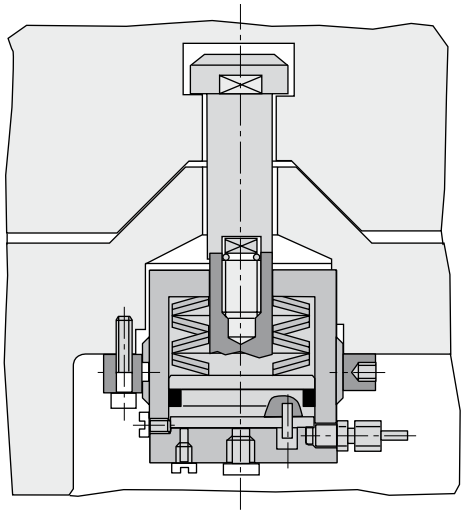
- large choice of clamping forces
- low-friction Belleville springs placed between hardened and ground thrust washers
- piston secured against rotation
- radial and axial oil ports
- rapid and easy installation

For power units,
please see product group 7

For accessories,
please see product group 11

Examples for application





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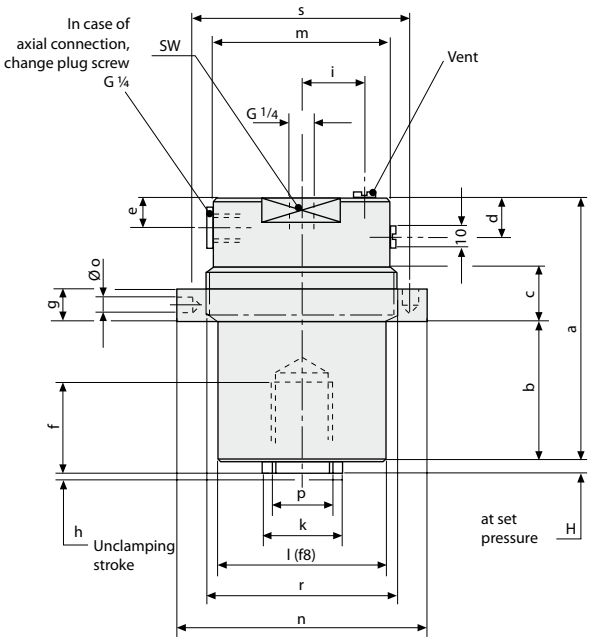
Spring clamping cylinder pulling, with hydraulic return

Adjustment of clamping force, clamping and unclamping

1. Apply set pressure to spring clamping cylinder.
2. Adjust clamping position to be free from play by means of ring nut.
3. Secure ring nut against torsion. If necessary, secure cylinder against sliding. See examples for application.
4. For clamping, reduce set pressure.
5. For unclamping, apply unclamping pressure.
6. Check play of clamping point after approx. 1000 load changes at set pressure. If necessary, retighten ring nut and secure again.

Please consult our technical sales staff
- if clamping forces have changed
- in case of an unclamping stroke > 1 mm
- in case of load cycles > 1 min.
- if aggressive fluids are used
- in case of temperatures below -15°C or above +60°C
- if the unclamping stroke must be limited
- if you require special versions



Clamping force (kN)	16	25	40	63	100	160	250	400
Set pressure (bar)	165	165	185	215	250	230	230	215
Uncl. pressure h = 0,5 mm (bar)	210	200	210	235	275	265	250	235
Uncl. pressure h = 1,0 mm (bar)	255	235	235	255	315	300	270	255
Oil consump. / 1mm stroke (cm^3)	1,3	2,0	2,9	3,9	5,0	9,5	14,3	25,4
a (mm)	95	105	120	132	147	170	230	280
b (mm)	45	50	60	70	80	75	100	130
c (mm)	20	20	25	25	30	45	55	65
d (mm)	22	22	22	23	23	33	62	65
e (mm)	11	11	11	12	12	28	57	62
f (mm)	24	30	36	45	45	50	60	65
g (mm)	13	14	14	16	16	18	20	50
i (mm)	18	20,5	27	32	36	34	38	50
k (mm)	20	25	30	40	40	50	70	90
l (f8) (mm)	55	65	75	85	95	142	170	220
m (mm)	55	65	75	89	99	137	163	212
n (mm)	85	95	110	125	140	180	220	270
o (mm)	6	8	8	8	8	10	10	15
p (mm)	M 14 x 1,5	M 18 x 1,5	M 22 x 1,5	M 30 x 1,5	M 30 x 1,5	M 38 x 1,5	M 45 x 1,5	M 58 x 2
r (mm)	M 58 x 1,5	M 68 x 1,5	M 78 x 1,5	M 92 x 1,5	M 102 x 1,5	M 140 x 2	M 168 x 3	M 218 x 4
H (mm)	4	4	4	6	6	6	6	6
SW (mm)	50	60	70	80	90	130	-	-
s (mm)	72	82	94	109	121	165	194	244
Weight (kg)	1,8	2,6	3,9	5,7	7,8	18,7	36,3	83
Part no.	**1401 010**	**1402 010**	**1403 010**	**1404 010**	**1405 010**	**1406 010**	**1407 010**	**1408 010**

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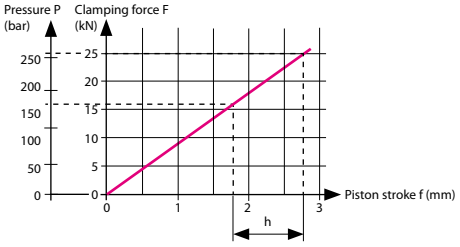
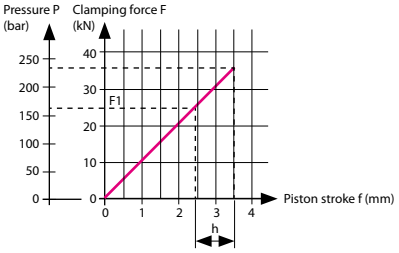
Spring clamping cylinder, pulling, with hydraulic return

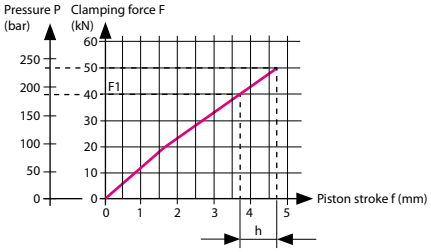
Power-stroke-pressure diagrams



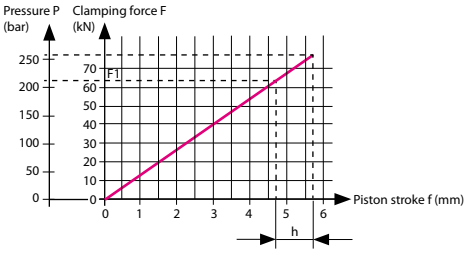
Clamping force (kN) at set pressure 165 bar	**16**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	210
Unclamping pressure (bar) at unclamping stroke h 1 mm	255
Operating pressure max. bar	270
Part no.	**1401 010**



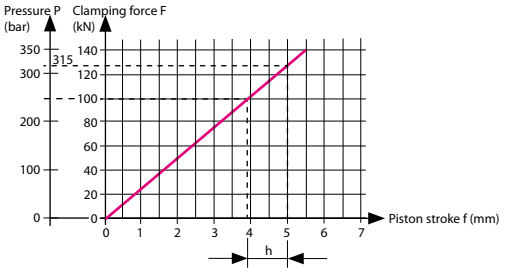
Clamping force (kN) at set pressure 165 bar	**25**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	200
Unclamping pressure (bar) at unclamping stroke h 1 mm	235
Operating pressure max. bar	250
Part no.	**1402 010**



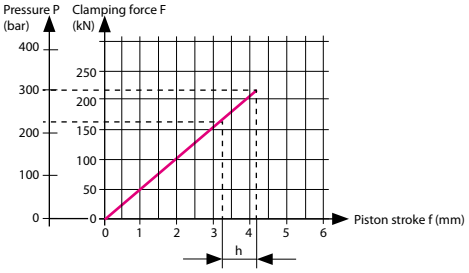
Clamping force (kN) at set pressure 185 bar	**40**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	210
Unclamping pressure (bar) at unclamping stroke h 1 mm	235
Operating pressure max. bar	250
Part no.	**1403 010**



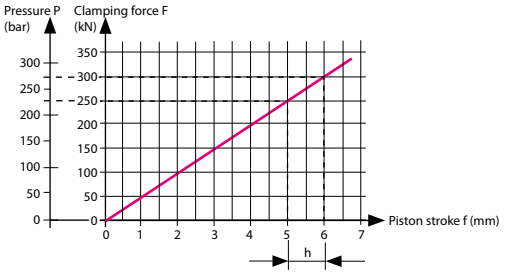
Clamping force (kN) at set pressure 215 bar	**63**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	235
Unclamping pressure (bar) at unclamping stroke h 1 mm	255
Operating pressure max. bar	270
Part no.	**1404 010**



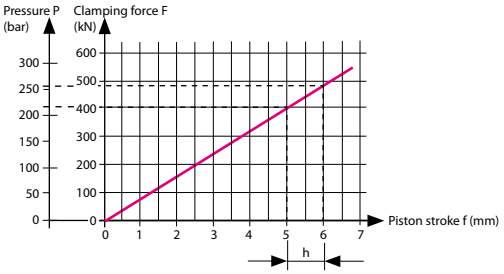
Clamping force (kN) at set pressure 250 bar	**100**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	275
Unclamping pressure (bar) at unclamping stroke h 1 mm	315
Operating pressure max. bar	320
Part no.	**1405 010**



Clamping force (kN) at set pressure 230 bar	**160**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	265
Unclamping pressure (bar) at unclamping stroke h 1 mm	300
Operating pressure max. bar	320
Part no.	**1406 010**



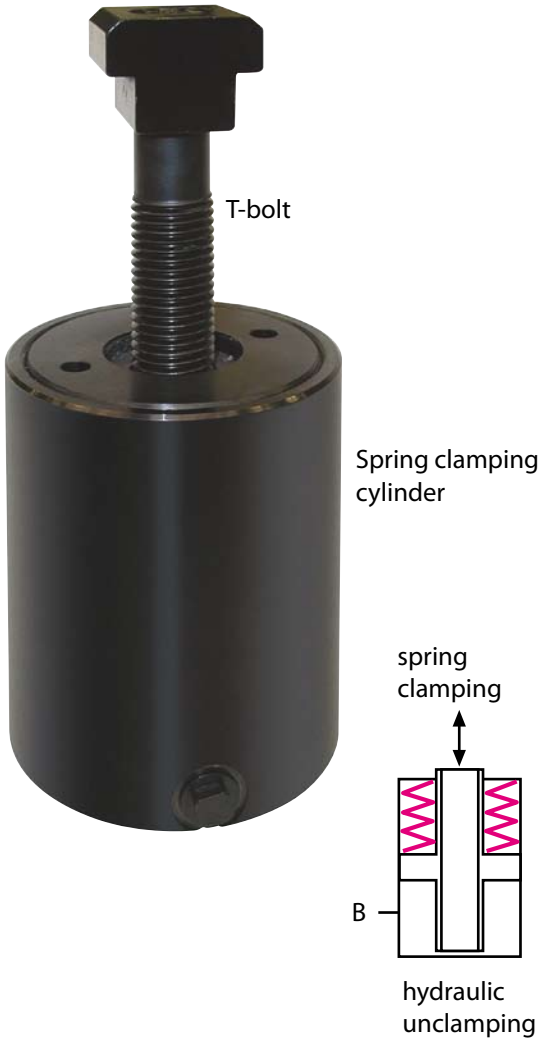
Clamping force (kN) at set pressure 230 bar	**250**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	250
Unclamping pressure (bar) at unclamping stroke h 1 mm	270
Operating pressure max. bar	285
Part no.	**1407 010**



Clamping force (kN) at set pressure 215 bar	**400**
Unclamping pressure (bar) at unclamping stroke h 0,5 mm	235
Unclamping pressure (bar) at unclamping stroke h 1 mm	255
Operating pressure max. bar	270
Part no.	**1408 010**

Hollow piston cylinder, single-acting

• spring clamping • hydraulic unclamping



Applications:

- un-pressurised long-term clamping of dies or fixtures on press beds and rams
- when the space available is limited

Function:

Manual positioning of the cylinder on the die clamping edge.
Unclamping is carried out by the application of hydraulic pressure to the piston, clamping takes place by spring power. By means of the T-bolt the die is clamped against the clamping surface of the press ram or bed.

Special features:

- Hydraulic supply is only required for unclamping, i.e. for a short time
- Ideal power transmission
- Convenient and compact design with gripping surface
- No colliding edges, smooth die positioning
- Suitable for retrofit
- Easy fastening

For suitable power units,
please refer to product group 7,

for accessories,
please refer to product group 11

Recommended accessory:
Angular rotary coupling
part no. 9208-043

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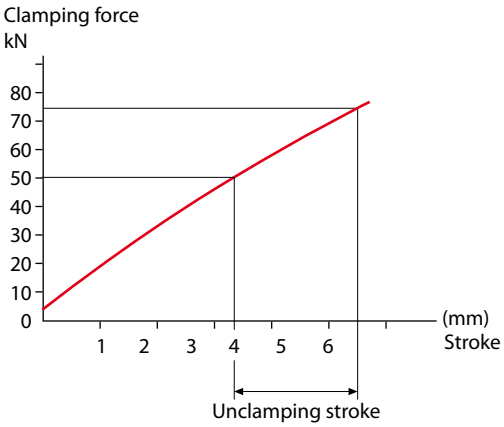
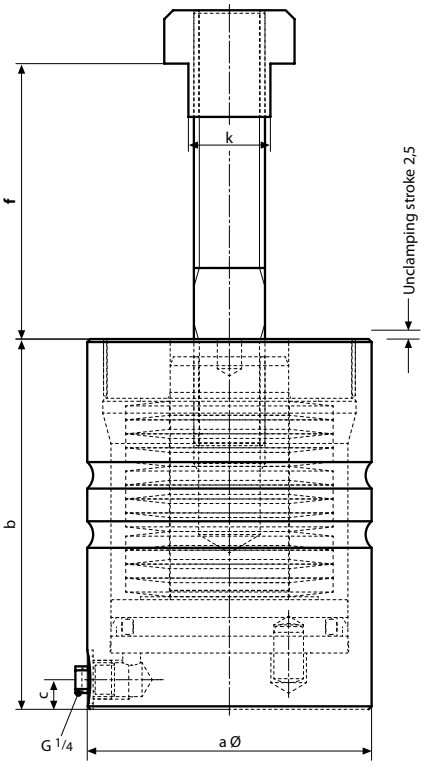
Hollow piston cylinder, single-acting

• spring clamping • hydraulic unclamping

Spring clamping cylinder, complete with adjusted and secured T-bolt Dimension ‚f' to be quoted in the order

For T-slot (mm)	22	28
Clamping force (kN)	**50**	**50**
Unclamping pressure (bar)	175	175
Unclamping stroke (mm)	2,5	2,5
Oil consumption/1 mm of stroke (cm³)	5	5
a (mm)	96	96
b (mm)	125	125
c (mm)	10	10
k (mm)	22	28
Weight (kg)	6,8	7,0
Part no.	**8.1403.2200**	**8.1403.2800**



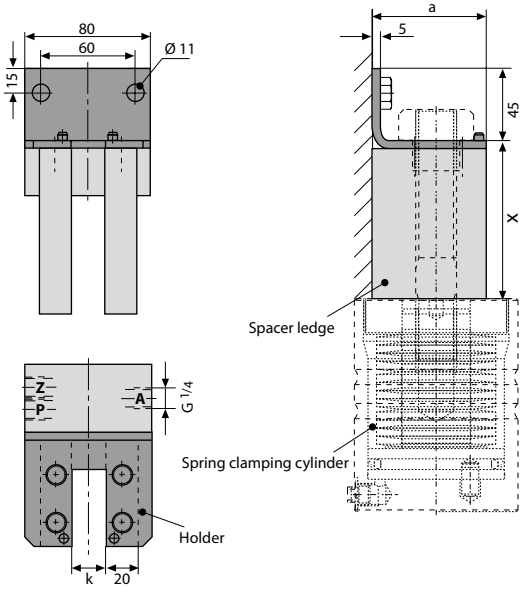


Dimension 'f' =
die clamping edge
+ web height + unclamping stroke

Parking station during die change

Holder with spacer ledges fastened (without a connector block) Part no.	8.2753.2230	8.2753.2830
Width of T-slot k (mm)	22	28
a (mm)	72	85
Separate holder Part no.	**2753-220**	**2753-280**

Special versions are available on request



Distance 'x':
x = dimension '**f**' - 4 mm
(to be quoted in the order)

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