Hydraulic cylinders

Data Sheet

Figure 1

Hydraulic cylinders are indispensable units in the hydraulic circuit for converting hydraulic energy into mechanical energy. The hydraulic cylinder is the link between the hydraulic circuit and the working machine.

The cylinders are available with a choice of bore sizes and stroke lengths for general purpose, light duty applications.

Technical Data

Standards: _____main dimensions such as piston Ø and piston rod Ø meet DIN ISO 3320 requirements.

Nominal pressure: _____160 bar

Static proof pressure:_____240 bar

Installation position: _____Arbitrary

Hydraulic fluid: _____Mineral oils DIN 51 524 (HL, HLP)

Hydraulic fluid temperature range: _____-20°C to +80°C

Viscosity range:_____2.85 to 380mm2⁄s

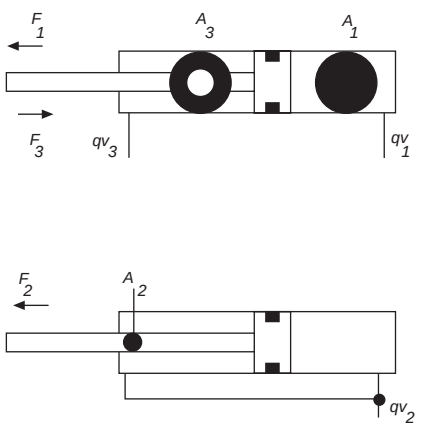
Cleanliness: ____Max. permissible degree of contamination of the hydraulic fluid to NAS 1638 class 10. We therefore recommend as filtration element a filter with a minimum retention rate of $b_{10} \geq 75$.

Stroke speed:_____0.5 m/s (depending on the connection port)

Area, force, flow

Piston	Piston rod	Area ratio	Areas			Force at 160 bar [1]			Flow at 0.1m/s[2]		
			Piston	Rod	Annulus	Push	Regen	Pull	Out	Regen	In
AL Ømm	MM Ømm	φ A_1/A_3	A_1 cm^2	A_2 cm^2	A_3 cm^2	F_1 kN	F_2 kN	F_3 kN	q_{v1} 1/min	q_{v2} 1/min	q_{v3} 1/min
32	18	1.46	8.04	2.54	5.5	12.8	4.07	8.79	4.9	1.8	3.3
40	22	1.43	12.56	3.8	8.76	20	6.08	14	7.5	2.3	5.3
50	28	1.46	19.63	6.16	13.47	31.3	9.82	21.5	11.7	3.7	8.1
63	36	1.48	31.17	10.18	20.99	49.8	25.4	24.4	18.7	9.5	9.2

Figure 2



Notes:

[1] Theoretical force (efficiency not taken into account)

[2] Stroke speed.

Cylinder weight

Piston	Piston rod	Cylinder weight at 0mm stoke	Cylinder weight per 100mm stroke
AL Ø	MM Ø	kg	
32	18	0.95	0.55
40	22	1.68	0.85
50	28	2.67	1.18
63	36	4.73	1.80

Dimensional data

Figure 3

32mm dia. bore

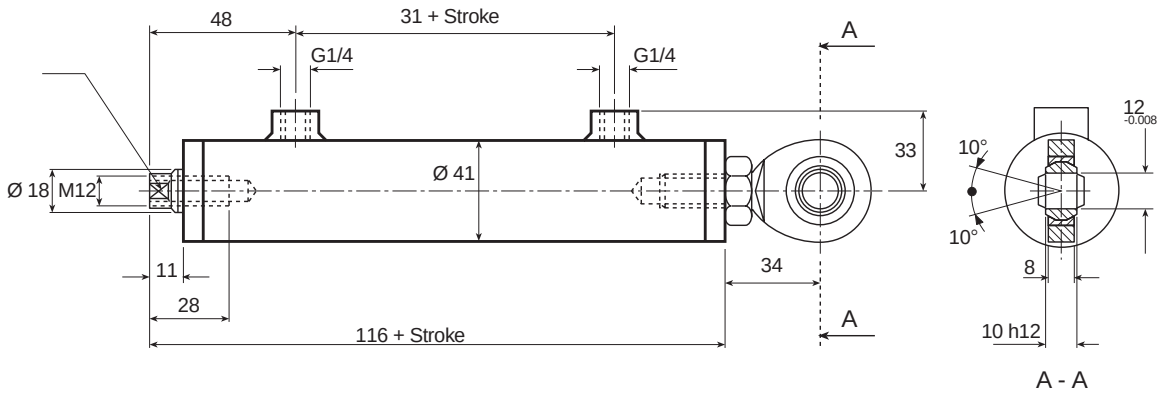
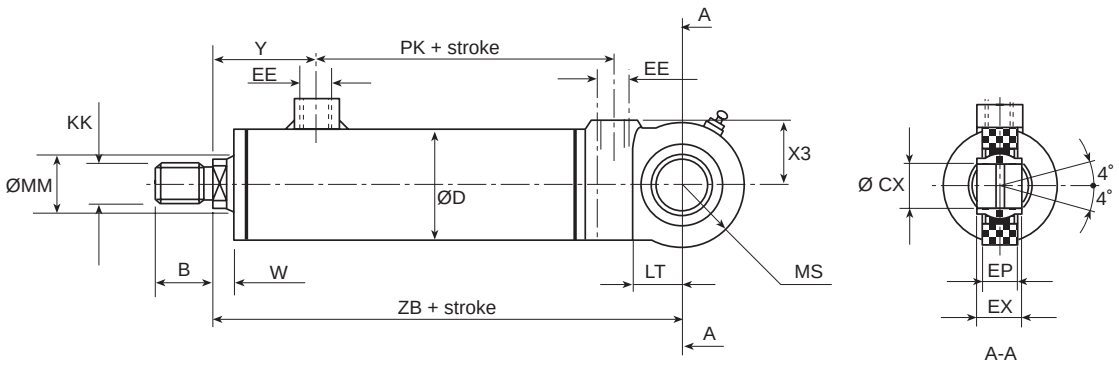


Figure 4

40mm to 63mm dia bore



Dimensions in mm

Bore (mm)	MM Rod dia.	KK	D	EE	Y	PK	B
40	22	M16x1.5	52	G1/4	60	50	22
50	28	M20x1.5	62	3/8	62	57	28
63	36	M27x2	77	G1/2	68	69	36

Bore (mm)	W	XO	LT	X3	MS	EX	EP	CX
40	13	140	24	29	28	20H7	16	20h12
50	13	157	31	33	33	25H7	20	25h12
63	14	182	38	40	42	32H7	22	32h12

32mm Dia. Piston bore

Stroke length (mm)	Manufacturers Part no.	**RS** Stock no.
50	CDL1MOO/32/18/50/C1X/B1CHUMWW	263-8540
100	CDL1MOO/32/18/100/C1X/B1CHUMWW	263-8556
150	CDL1MOO/32/18/150/C1X/B1CHUMWW	263-8562
200	CDL1MOO/32/18/200/C1X/B1CHUMWW	263-8584

40mm Dia. Piston bore

Stroke length (mm)	Manufacturers Part no.	**RS** Stock no.
50	CDL1MP5/40/22/50/D1X/B1CHUMWW	263-8607
100	CDL1MP5/40/22/100/D1X/B1CHUMWW	263-8613
150	CDL1MP5/40/22/150/D1X/B1CHUMWW	263-8629
200	CDL1MP5/40/22/200/D1X/B1CHUMWW	263-8641
300	CDL1MP5/40/22/300/D1X/B1CHUMWW	263-8657

50mm Dia. Piston bore

Stroke length (mm)	Manufacturers Part no.	**RS** Stock no.
100	CDL1MP5/50/28/100/D1X/B1CHUMWW	263-8685
200	CDL1MP5/50/28/200/D1X/B1CHUMWW	263-8691
300	CDL1MP5/50/28/300/D1X/B1CHUMWW	263-8708
400	CDL1MP5/50/28/400/D1X/B1CHUMWW	263-8714

63mm Dia. Piston bore

Stroke length (mm)	Manufacturers Part no.	**RS** Stock no.
400	CDL1MP5/63/36/400/D1X/B1CHUMWW	263-8770

Buckling

Calculations for buckling are carried out using the following formulas:

1. Calculation according to Euler

$$F = \frac{\pi^2 \cdot E \cdot I}{v \cdot L_K^2} \quad \text{if } \lambda > \lambda g$$

2. Calculation according to Tetmajer

$$F = \frac{d^2 \cdot \pi(315 - \lambda)}{4 \cdot v} \quad \text{if } \lambda \leq \lambda g$$

Explanation:

E = Modulus of elasticity in N/mm^2
= 2.1 x 10^5 for steel

I = Moment of inertia in mm^4 for circular cross-sectional area

$$= \frac{d^4 \cdot \pi}{64} \quad 0.0491 \cdot d^4$$

v = 3.5 (safety factor)

L_K = Free buckling length in mm (depending on mounting type)

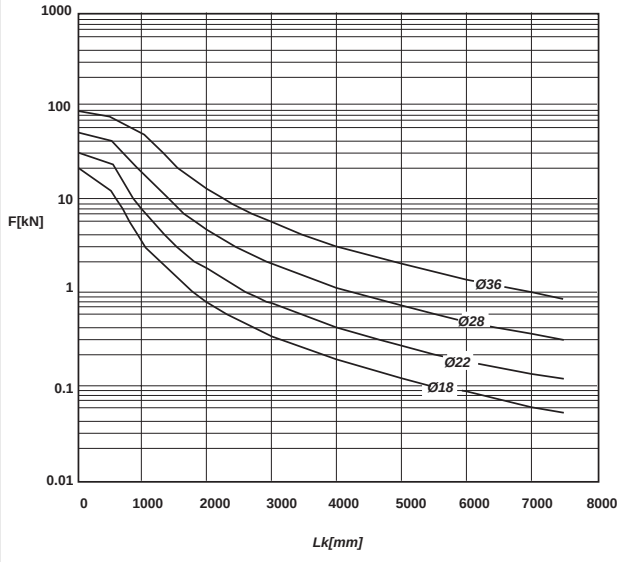
d = Piston rod Ø in mm

λ = Slenderness ratio

$$= \frac{4 \cdot L_K}{d} \qquad \lambda g = \pi \sqrt{\frac{E}{d_{0,2}}}$$

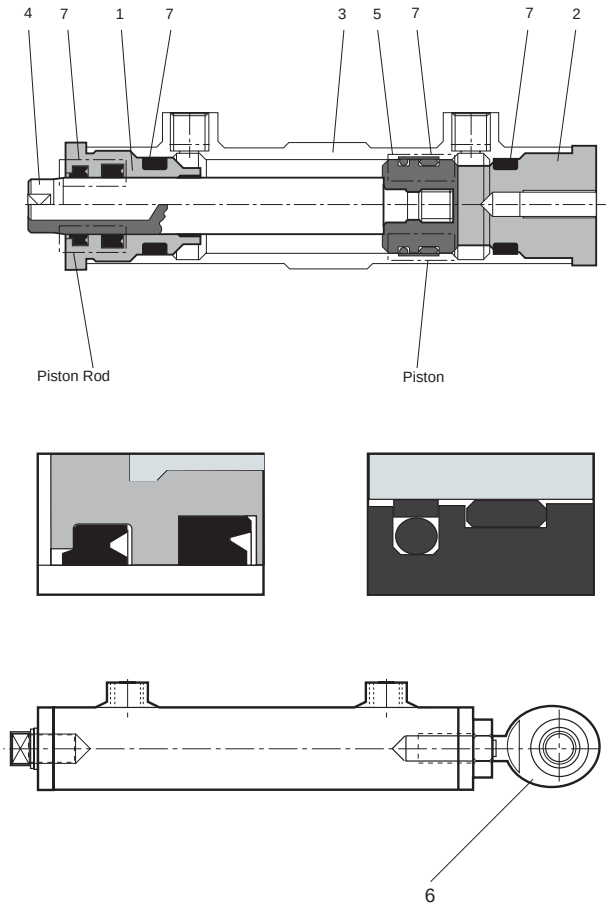
$d_{0,2}$ = yield strenght of the piston rod material

Figure 5



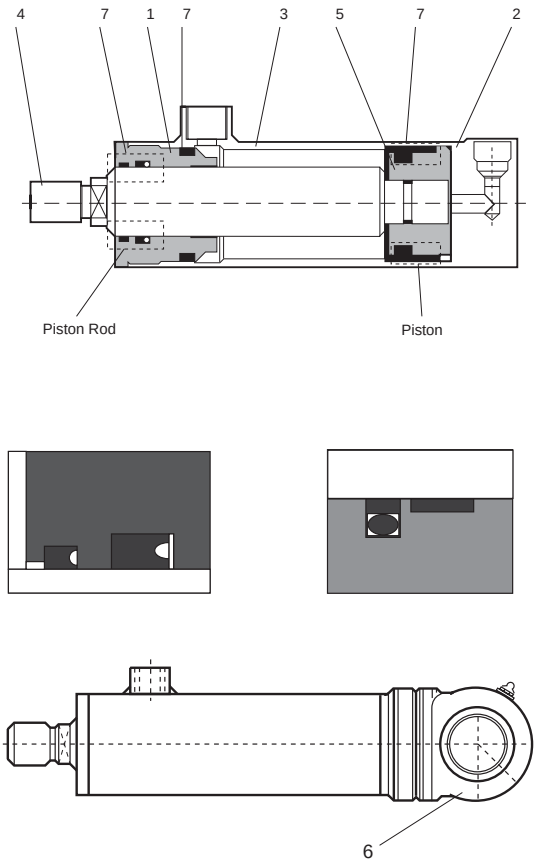
Component parts

Figure 6 32mm dia. Piston



1. Head
2. Cap
3. Barrel
4. Piston rod
5. Piston
6. Rear rod end bearing
7. Seal Kit:
   - Wiper
   - Rod seal
   - Piston seal
   - O-ring
   - Guide bush

Figure 7 40mm to 63mm dia.bore



1. Head
2. Rear
3. Barrel
4. Piston rod
5. Piston
6. Rear rod end bearing
7. Seal Kit:
   - Wiper
   - Rod seal
   - Piston seal
   - O-ring
   - Guide bush