Cylinder forces, double acting variants

Cyl. bore/ pist. rod mm	Stroke	Pistonarea cm²	Max theoretical force in N (bar) 1,0	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0
32/12	+	8,0	80	161	241	322	402	**483**	563	643	724	804
	-	6,9	69	138	207	276	346	**415**	484	553	622	691
40/16	+	12,6	126	251	377	503	628	**754**	880	1005	1131	1257
	-	10,6	106	212	318	424	530	**636**	742	848	954	1060
50/20	+	19,6	196	393	589	785	982	**1178**	1374	1571	1767	1963
	-	16,5	165	330	495	660	825	**990**	1155	1319	1484	1649
63/20	+	31,2	312	623	935	1247	1559	**1870**	2182	2494	2806	3117
	-	28,0	280	561	841	1121	1402	**1682**	1962	2242	2523	2803
80/25	+	50,3	503	1005	1508	2011	2513	**3016**	3519	4021	4524	5027
	-	45,4	454	907	1361	1814	2268	**2721**	3175	3629	4082	4536
100/25	+	78,5	785	1571	2356	3142	3927	**4712**	5498	6283	7069	7854
	-	73,6	736	1473	2209	2945	3682	**4418**	5154	5890	6627	7363
125/32	+	122,7	1227	2454	3682	4909	6136	**7363**	8590	9817	11045	12272
	-	114,7	1147	2294	3440	4587	5734	**6881**	8027	9174	10321	11468

+ = Outward stroke
- = Return stroke

Note!
Select a theoretical force 50-100% larger than the force required

Main data: P1D

Cylinder designation	Cylinder bore mm	Cylinder area cm²	Piston rod dia. mm	Piston rod area cm²	thread	Cushioning length mm	Air consumption[2] litre	Connection thread	Flexible Porting tubing dimension Push-in mm
P1D-•032••-XXXX[1]	32	8,0	12	1,1	M10x1,25	17	0,105	G1/8	4 or 6
P1D-•040••-XXXX[1]	40	12,6	16	2,0	M12x1,25	19	0,162	G1/4	4 or 6
P1D-•050••-XXXX[1]	50	19,6	20	3,1	M16x1,5	20	0,253	G1/4	8 or 10
P1D-•063••-XXXX[1]	63	31,2	20	3,1	M16x1,5	23	0,414	G3/8	8 or 10
P1D-•080••-XXXX[1]	80	50,3	25	4,9	M20x1,5	23	0,669	G3/8	-
P1D-•100••-XXXX[1]	100	78,5	25	4,9	M20x1,5	27	1,043	G1/2	-
P1D-•125••-XXXX[1]	125	122,7	32	8,0	M27x2	30	1,662	G1/2	

Total mass including moving parts

Cylinder designation	Total mass (kg) at 0 mm stroke Standard	Tie-Rod	Clean/Flex	Supplement mass (kg) for rod locking All variants	Total mass (kg) Supplement per 10 mm stroke Standard	Tie-Rod	Clean/Flex
P1D-•032••-X	0,55	0,54	0,60	0,31	0,023	0,022	0,047
P1D-•040••-X	0,80	0,79	0,88	0,44	0,033	0,030	0,063
P1D-•050••-X	1,20	1,20	1,32	0,61	0,048	0,048	0,094
P1D-•063••-X	1,73	1,73	1,86	1,25	0,051	0,051	0,101
P1D-•080••-X	2,45	2,47	2,63	2,45	0,075	0,079	0,142
P1D-•100••-X	4,00	4,00	4,22	3,72	0,084	0,084	0,168
P1D-•125••-X	6,87	6,73	7,01	6,07	0,138	0,129	0,248

Mass moving parts only (for cushioning calculation)

Cylinder designation	Mass moving parts(kg) at 0 mm stroke All variants	Supplement per 10 mm stroke All variants
P1D-•032••-X	0,13	0,009
P1D-•040••-X	0,24	0,016
P1D-•050••-X	0,42	0,025
P1D-•063••-X	0,50	0,025
P1D-•080••-X	0,90	0,039
P1D-•100••-X	1,10	0,039
P1D-•125••-X	2,34	0,063

1) Stroke
2) Free air consumption per 10 mm stroke for a double stroke at 6 bar

P1D cylinders with centre trunnion and cylinder mountings

There are three different types of centre trunnion in the P1D family. A centre trunnion for the P1D Standard and one for the P1D Tie-Rod placed in the centre or an optional location of the cylinder, or a flange mounted centre trunnion on the front or rear end cover that fits all P1D cylinders.

For the P1D, the centre trunnion is available among the cylinder mountings in position 17. If G or 7 appears in position 17, the position of the centre trunnion should be specified as a three-digit measurement in positions 18-20. For P1D-S, 000 indicates a loose centre trunnion. If D or 6 appears in position 17, the centre trunnion is always centred on the cylinder (no measurement specified in positions 18-20). For some of our previous cylinder series, the centre trunnion is selected back in position 5, e.g. P1C-C. Remember that C in position 5 for P1D means the Clean cylinder version and nothing else!

It is possible to equip the cylinders with factory installed piston rod mountings, sensors, fittings etc. in the usual way. For the version with optional location of the centre trunnion or loose centre trunnion, no choices can be made for positions 18-20 since they are used for the XV dimension. (See page 60)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
P	1	D	–	T	0	4	0	M	S	–	0	3	2	0	N	D	N	N	N

Cylinder version

S	Standard
C	Clean[2)]
F	Flexible Porting
T	Tie-Rod

Cylinder mountings

90°	0°	90° = shaft square to, 0° = shaft in line with ports[5)]
1	**3**	Flange MF1/MF2 in front end
B	**4**	Flange MF1/MF2 in rear end
2	**K**	Flange MF1/MF2 in both ends
F	**–**	Foot brackets MS1 (both ends)
C	**U**	Clevis bracket GA
E	**V**	Clevis bracket MP4
S	**W**	Swivel eye bracket
T	**Y**	Clevis bracket MP2
L	**Z**	Clevis bracket MP2+MP4
X	**5**	Clevis bracket MP2+pivot bracket with rigid bearing
Q	**0**	Clevis bracket GA + pivot bracket with swivel bearing
M	**A**	Clevis bracket GA +swivel eye bracket
D	**6**	Centre trunnion MT4, mid position[6)]
G	**7**	Trunnion MT4, optional pos. (XV-meas. pos 18-20)[7)]
H	**P**	Trunnion flange in front end
J	**8**	Trunnion flange in rear end
	N	None

2) P1D Clean without sensor function, see page 41.
5) Shaft or pivots square to or in line with the cylinder ports.
6) For versions P1D-S and P1D-T
7) For P1D-S and P1D-T, XV-measure (from the piston rod thread according to ISO to the centre of the pivots) stated in mm in positions 18-20 (max 999, or 000 if loose centre trunnion specified). For XV measures, see page 60.

Examples of centre trunnion

P1D-S050MS-0250NDNNN	P1D Standard rod cylinder with centre trunnion installed in centre of cylinder.
P1D-T050MS-0250NG205	P1D Tie rod cylinder with centre trunnion installed on XV dimension specified in positions 18,19 and 20.
P1D-S032MS-0160NHNNN	P1D Standard cylinder with trunnion flange mounted on front end cover.
P1D-S032MS-0160NJNNN	P1D Standard cylinder with trunnion flange mounted on rear end cover.

Examples of other combinations

P1D-C050MS-02501HQN6	P1D Clean cylinder with trunnion flange mounted on front end cover, two reed sensors, 8 mm connector (1 m cable), cable connection on rear end cover, factory installed stainless steel swivel rod eye, push-in fittings (Prestolok, nickel plated brass) low elbow type for 6 mm tube, sealing plugs installed in unused end cover screws (code 1 for stainless swivel rod eye).
P1D-F080MSJ0400XJFN0	P1D Flexible Porting cylinder with trunnion flange mounted on rear end cover, two threaded connections in rear end cover, extra zinc plated steel piston rod nut (i.e. a total of two zinc plated steel nuts), two factory installed electronic sensors, 24 VDC, PNP type, 3 m cable, factory installed push-in fittings (Prestolok, nickel plated brass) low elbow type for 10 mm tube.

Factory-fitted sensors

All P1D cylinders can be supplied with up to four factory installed sensors (standard reed or electronic sensors) in specially designed grooves. Both cable and sensor are protected in the groove. Choose a sensor with 3 or 10 m cable or with 8 mm connector.

P1D Clean has a system of sensors fully integrated in the body extrusion, in specially designed grooves underneath a transparent, sealed moulding. The factory installed sensors are installed at the end positions and can then easily be moved anywhere along the entire stroke during commissioning. The sensors can be ordered with cable exit in the front end cover, rear end cover or at both end covers.

For cylinders with 3 sensors, 2 sensors are installed in the rear end position and one sensor in the front end position. Cylinders with 4 sensors are supplied with 2 sensors in each end position.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
P	1	D	–	S	0	5	0	M	S	–	0	3	2	0	N	N	C	N	N

Factory-fitted sensors

Front end or left[11]	Rear end or right[11]	Front and rear end	Cable exit
F	R	–	2 sensors 24 VDC pnp, 3 m cable
G	H	–	2 sensors 24 VDC pnp, 10 m cable
C	S	–	2 sensors 24 VDC pnp, 8 mm connector[21]
K	L	–	2 sensors Reed type, 3 m cable
T	V	–	2 sensors Reed type, 10 m cable
M	Q	–	2 sensors Reed type, 8 mm connector[21]
–	–	3	3 sensors 24 VDC pnp, 8 mm connector[21]
–	–	Z	3 sensors Reed type, 8 mm connector[21]
–	–	4	4 sensors 24 VDC pnp, 8 mm connector[21]
–	–	W	4 sensors Reed type, 8 mm connector[21]
6[12]	7[13]	8[14]	No factory-fitted sensors P1D Clean
N			No sensors P1D (excl. P1D Clean)

11) Left and right valid for P1D Standard and P1D Tie-Rod seen from behind with the ports on top. The sensors can only be mounted on the left for P1D Flexible Porting.
12) No factory-fitted sensors, but prepared for cable exit in the front end (max. 2 sensors).
13) No factory-fitted sensors, but prepared for cable exit in the rear end (max. 2 sensors).
14) No factory-fitted sensors, but prepared for cable exit in both ends (max. 4 sensors).
21) The standard cable length is 0.27 m. However, P1D Clean is supplied with 1 m cable length. Depending on the location of the sensors, the cable length (1 m) may limit the stroke of the P1D Clean cylinder

Example of sensors

P1D-S050MS-0320NNCNN P1D Standard with two factory installed sensors 24 VDC PNP, 8 mm connector
P1D-C063MS-0250NNLNN P1D Clean with two factory installed Reed sensors, 3 m cable and cable connection at rear end cover on left side
P1D-F080MS-0400NNMNN P1D Flexible Porting with two factory installed Reed sensors, 8 mm connector

Pre-assembled fittings or speed controls

All P1D cylinders can be delivered with elbow or straight push-in fittings in nickel-plated brass (Prestolok) or speed controls in brass (series PTF). P1D Clean cylinders are factory-fitted nickel-plated versions of the PTF speed controls. Please see page 42 for the order code key for P1D Flexible Porting with pre-assembled fittings.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
P	1	D	–	S	0	5	0	M	S	–	0	3	2	0	N	N	N	N	8

Speed controls or fittings for tube dimension	
Speed controls[17] Series PTF 4PB[16]	
X	in both ends for tube 4 mm
Y	in both ends for tube 6 mm
Z	in both ends for tube 8 mm
P	in both ends for tube 10 mm
R	in both ends for tube 12 mm
Push-in fitting, elbow type for:	
4	Tube dimension 4 mm
6	Tube dimension 6 mm
8	Tube dimension 8 mm
0	Tube dimension 10 mm
2	Tube dimension 12 mm
Push-in fitting, straight type for:	
1	Tube dimension 4 mm
3	Tube dimension 6 mm
5	Tube dimension 8 mm
7	Tube dimension 10 mm
9	Tube dimension 12 mm
N	None

Available fittings and speed controls for P1D Standard

Cyl. bore	Speed controls for tube	Elbow fitting for tube	Straight fitting for tube
32	4, 6, 8	4, 6, 8	4, 6, 8
40, 50	6, 8	4, 6, 8, 10, 12	4, 6, 8, 10, 12
63, 80	8, 10, 12	8, 10, 12	8, 10, 12
100, 125	12	12	10, 12

16) P1D Clean cylinders have factory fitted nickel plated versions of the PTF series.

17) Not available for P1D Flexible Porting bore 32-63 mm.

Example P1D Standard with factory-fitted fittings or speed controls

P1D-S050MS-0320NNNN8 P1D Standard cylinder with two push-in fittings, elbow type for 8 mm tube.
P1D-S125MS-0400NNNNR P1D Standard cylinder with two speed controls for 12 mm tube.