aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Pneumatic Cylinders

Ø160 to Ø320 mm
According to ISO 15552

Catalogue PDE2667TCEN

Parker

ENGINEERING YOUR SUCCESS.

Important

Before attempting any external or internal work on the cylinder or any connected components, make sure the cylinder is vented and disconnect the air supply in order to ensure isolation of the air supply.

Note

All technical data in this catalogue are typical data only.
Air quality is essential for maximum cylinder service life (see ISO 8573).

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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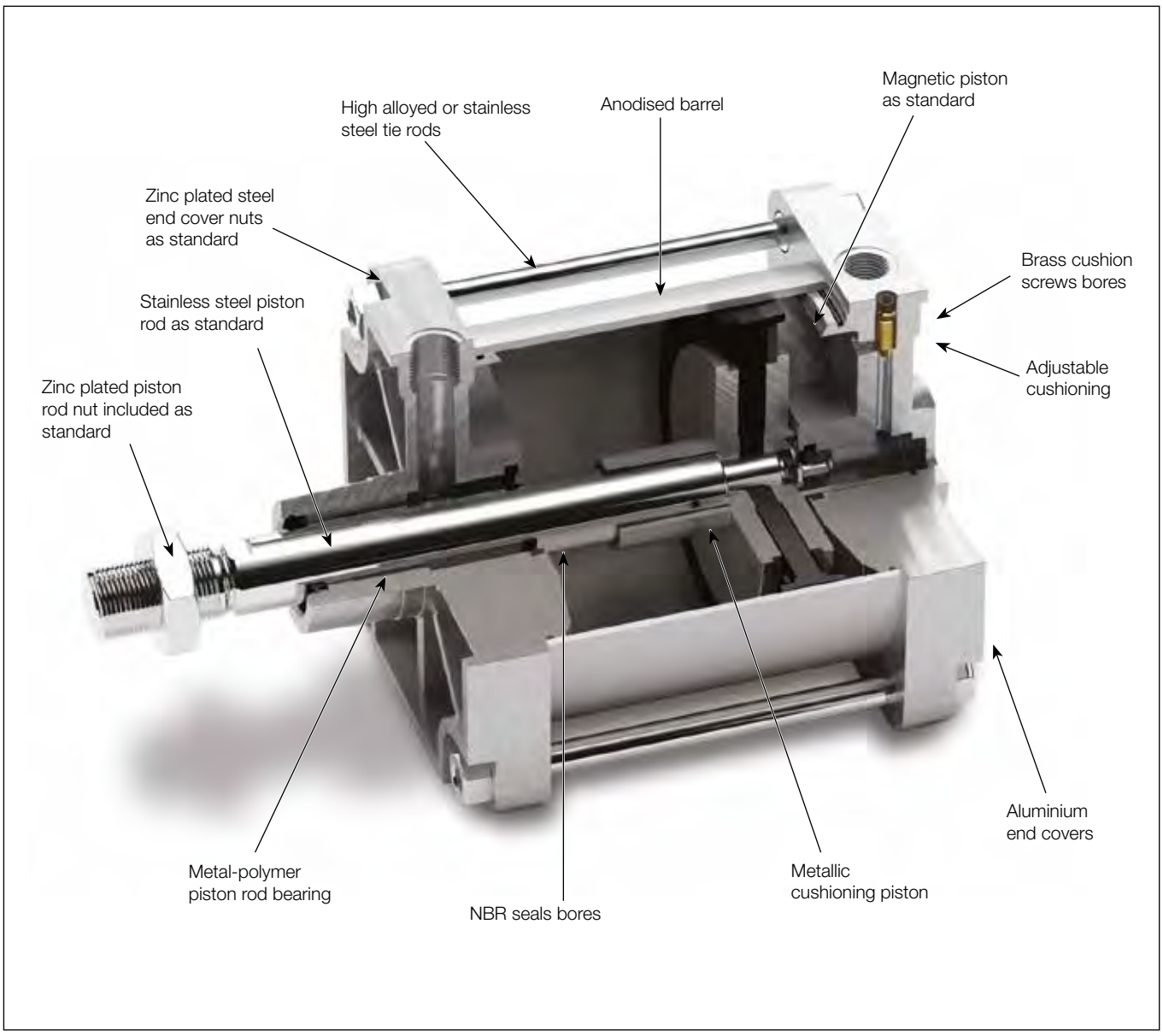


Standard cylinders P1D-T, ISO 15552 bores Ø160 - Ø320 mm

Global product range

The P1D-T range of cylinders is intended for use in a wide range of applications.
Careful design and high quality manufacture throughout ensure long service life and optimum economy.
Mounting dimensions fully in accordance with ISO 15552 greatly simplifies installation and world-wide interchange-ability.

Features

- Bore sizes Ø160 - Ø320 mm
- Stroke lengths 10 - 2000 mm.
- Stainless steel piston rod as a standard
- Magnetic piston as standard
- Adjustable cushioning as standard
- Special versions on request
- ATEX version as an option (Ø160 - Ø200 mm)

Technical Data

Cylinder forces

Bore/ piston rod	Stroke	Surface area	Max theorical force in N (under different pressure bar)									
[mm]		[cm²]	1	2	3	4	5	6	7	8	9	10
160/40	+	201.1	2011	4021	6032	8042	10053	**12064**	14074	16085	18096	20106
	-	188.5	1885	3770	5655	7540	9425	**11310**	13195	15080	16965	18850
200/40	+	314.2	3142	6283	9425	12566	15708	**18850**	21991	25133	28274	31416
	-	301.6	3016	6032	9048	12064	15080	**18096**	21112	24127	27143	30159
250/50	+	490.9	4909	9818	14726	19635	24544	**29453**	34361	39270	44179	49088
	-	471.2	4712	9425	14137	18850	23562	**28274**	32987	37699	42412	47124
320/63	+	804.2	8042	16085	24127	32170	40212	**48255**	56297	64340	72382	80425
	-	773.1	7731	15462	23192	30923	38654	**46385**	54115	61846	69577	77308

+ = outward stroke
- = return stroke

Cylinder air consumption

Bore/ piston rod [mm]	Stroke	Surface area [cm²]	Air Consumption in l/mn (under different pressure bar)									
			1	2	3	4	5	6	7	8	9	10
160/40	+	201.1	0.400	0.598	0.797	0.995	1.193	**1.392**	1.590	1.789	1.987	2.186
	-	188.5	0.375	0.561	0.747	0.933	1.119	**1.305**	1.491	1.677	1.863	2.049
200/40	+	314.2	0.624	0.934	1.245	1.555	1.865	**2.175**	2.485	2.795	3.105	3.415
	-	301.6	0.599	0.897	1.195	1.492	1.790	**2.088**	2.386	2.683	2.981	3.279
250/50	+	490.9	0.975	1.460	1.945	2.429	2.914	**3.398**	3.883	4.367	4.852	5.337
	-	471.2	0.936	1.402	1.867	2.332	2.797	**3.262**	3.728	4.193	4.658	5.123
320/63	+	804.2	1.598	2.392	3.186	3.980	4.774	**5.568**	6.362	7.156	7.950	8.744
	-	773.1	1.536	2.299	3.063	3.826	4.589	**5.352**	6.115	6.878	7.641	8.405

+ extending,
- retracting

free air consumption for 1 cycle, 10 mm inward and 10 mm outward

Weight

Cyl.-bore	P1D-T		Moving parts	
[mm]	Base 0 mm [kg]	per 100 mm [kg]	Base 0 mm [kg]	per 100 mm [kg]
Ø160	9.69	2.32	2.26	0.968
Ø200	13.73	2.49	2.40	0.968
Ø250	22.71	3.84	3.80	1.512
Ø320	39.23	6.10	6.00	2.400

General technical data

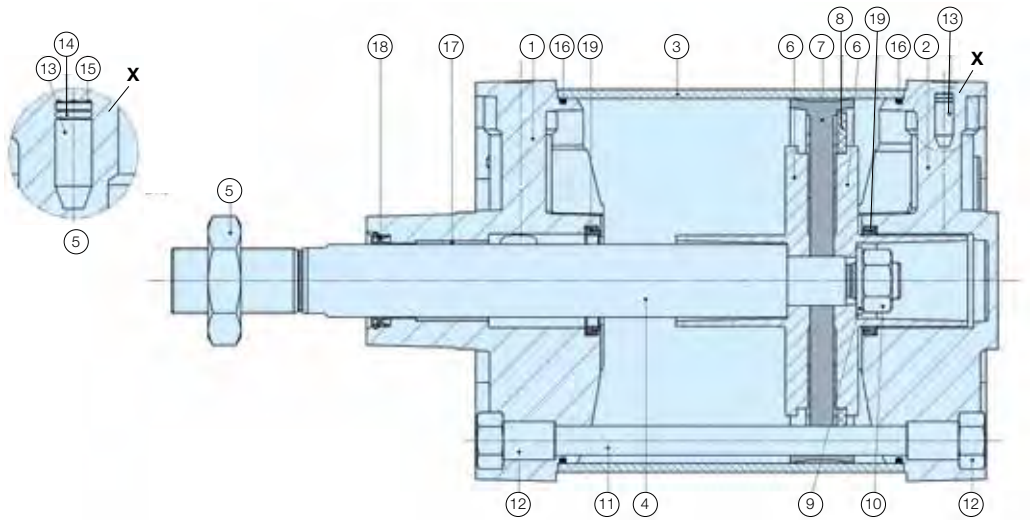
Product type	Standard cylinder according to ISO 15552
Bore size	160 - 320 mm
Stroke length	10 - 2000 mm
Versions	Double acting
Cushioning	Adjustable air cushioning
Position sensing	Proximity sensor in temperature range -25°C to +80°C
Installation	P1D cylinder and piston rod mountings
Mounting position	Any

Operating and environmental data

Operating medium:
For best possible service life and trouble-free operation dry, filtered compressed air to ISO 8573-1:2010 quality class 3.4.3 should be used. This specifies a dew point of +3oC for indoor operation (a lower dew point should be selected for outdoor operation) and is in line with the air quality from most standard compressors with a standard filter.

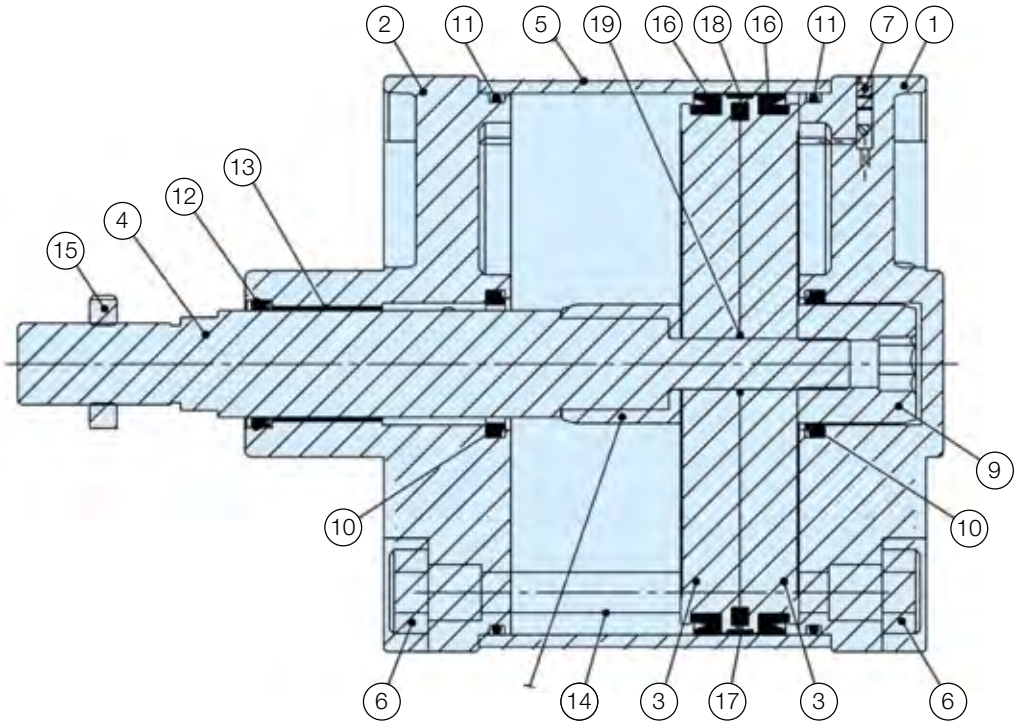
Operating pressure	1,0 bar to 10 bar
Standard temperature	-20°C to +80°C
High temperature	-10°C to +150°C
Pre-lubricated	Further lubrication is normally not necessary. If additional lubrication is introduced it must be continued.
Corrosion resistance	Resistance to corrosion and chemicals. Materials and surface treatment have been selected for industrial applications where solvents and detergents are frequently used.

Material specification - bores Ø 160, Ø 200 mm



Pos	Part		Specification
1	Front cover		Aluminium
2	Rear cover		Aluminium
3	Cylinder barrel		Anodised aluminium
4	Piston rod	Standard	Stainless steel 1.4104 (X12CrMoS17)
		Option	Chrome plated steel 1.5217 (20MnV6)
5	Piston rod nut		Zinc plated steel
6	Cushioning sleeve		Aluminium
7	Piston seal	Standard	NBR I option FKM
8	Magnet		Magnet foil
9	Washer		Zinc plated steel
10	Piston nut		Zinc plated steel
11	Tie rod		High alloyed steel 1.4104 (X12CrMoS17)
12	Tie rod nut		Zinc plated steel
13	Cushioning screw		Brass
14	Cushioning O ring	Standard	NBR I option FKM
15	Retaining clip		Spring steel
16	O ring	Standard	NBR I option FKM
17	Rod bearing		Metal-polymer material
18	Rod seal	Standard	NBR I option FKM + PTFE + Bronze
19	Cushion seal	Standard	NBR I option FKM

Material specification - bores Ø 50, Ø 320 mm



Pos.	Part		Specification
1	Rear cover		Aluminium
2	Front cover		Aluminium
3	Piston		Aluminium
4	Piston rod	Standard	Stainless steel 1.4021 (X20Cr13)
		Option	Chrome plated steel 1.5217 (20MnV6)
5	Cylinder barrel		Anodised aluminium
6	Tie rod nut		Zinc plated steel
7	Cushioning screw		Brass + stainless steel
8	Cushioning tube		Anodised aluminium
9	Cushioning female thread		Anodised aluminium
10	Cushioning seal	Standard	PU
		Option	FKM
11	O-ring	Standard	NBR
		Option	FKM
12	Rod seal	Standard	PU + HYTREL
		Option	FKM + PTFE + Bronze
13	Rod bearing		Metal + Polymer composite (CBS-40)
14	Tie rod		Stainless steel, 1.4301 (X5CrNi18-10)
15	Piston rod nut		Zinc plated steel
16	Piston seals	Standard	PU
		Option	FKM
17	Magnet		Plasto - Ferrite
18	Piston bearing		Polyacretal
19	Piston O-Ring	Standard	NBR
		Option	FKM

Guide for selecting suitable tubing

The selection of the correct size of tubing is often based on experience, with no great thought to optimising energy efficiency and cylinder velocity. This is usually acceptable, but making a rough calculation can result in worthwhile economic gains.

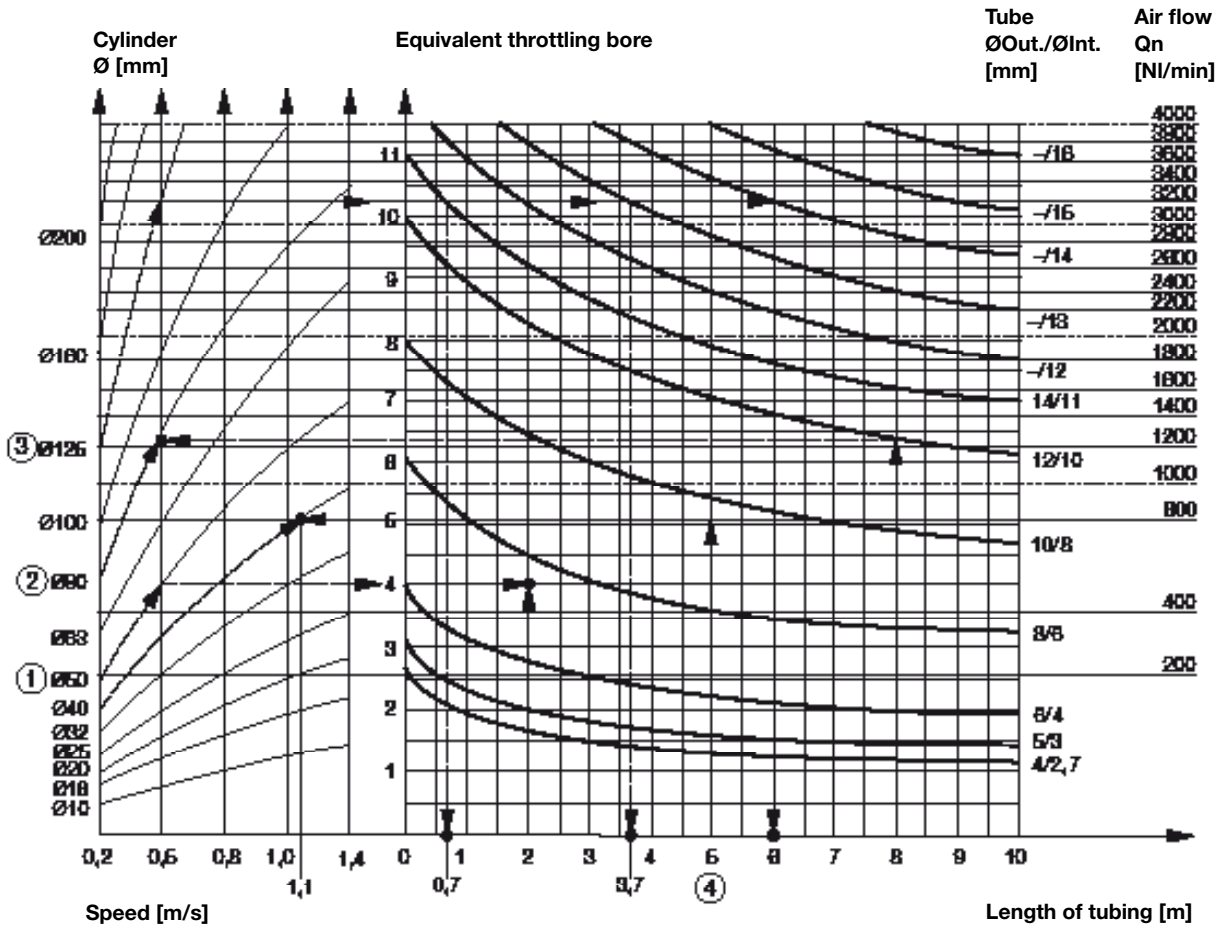
The following is the basic principle:

1. The primary line to the working valve could be over sized (this does not cause any extra air consumption and consequently does not create any extra costs in operation).
2. The tubes between the valve and the cylinder should, however, be optimised according to the principle that an insufficient bore throttles the flow and thus limits the cylinder speed, while an oversized pipe creates a dead volume which increases the air consumption and filling time.

The following prerequisites apply

The cylinder load should be about 50 % of the theoretical force (= normal load). A lower load gives a higher velocity and vice versa. The tube size is selected as a function of the cylinder bore, the desired cylinder velocity and the tube length between the valve and the cylinder. If you want to use the capacity of the valve to its maximum, and obtain maximum speed, the tubing should be chosen so that they at least correspond with the equivalent restriction diameter (see description below), so that the tubing does not restrict the total flow. This means that a short tubing must have at least the equivalent restriction diameter. If the tubing is longer, choose it from the table below. Straight fittings should be chosen highest flow rates. Rates as elbow and banjo fittings cause restriction.

The chart below is intended to help when selecting the correct size of tube to use between the valve and the cylinder.



The equivalent throttling bore is a long throttle (for example a tube) or a series of throttles (for example, through a valve) converted to a short throttle which gives a corresponding flow rate. This should not be confused with the orifice which is sometimes specified for valves. The value for the orifice does not normally take account of the fact that the valve contains a number of throttles.

Qn is a measure of the valve flow capacity, with flow measured in liter per minute (l/min) at 6 bar(e) supply pressure and 1 bar pressure drop across the valve.

Example ①:
Which tube diameter should be used?
A 50 mm bore cylinder is to be operated at 0.5 m/s. The tube length between the valve and cylinder is 2 m. In the diagram we follow the line from 50 mm bore to 0.5 m/s and get an "equivalent throttling bore" of approximately 4 mm. We continue out to the right in the chart and intersect the line for a 2 m tube between the curves for 4 mm (6/4 tube) and 6 mm (8/6 tube). This means that a 6/4 tube throttles the velocity somewhat, while an 8/6 tube is a little too large. We select the 8/6 tube to obtain full cylinder velocity.

Example ②:
What cylinder velocity will be obtained?
A 80 mm bore cylinder will be used, connected by 8 m 12/10 tube to a valve with Qn 1200 Nl/min. What cylinder velocity will we get? We refer to the diagram and follow the line from 8 mm tube length up to the curve for 12/10 tube. From there, we go horizontally to the curve for the Ø80 cylinder. We find that the velocity will be about 0.5 m/s.

Example ③:
What is the minimum inner diameter and maximum lenght of tube?
For a application a 125 mm bore cylinder will be used.
Maximum velocity of piston rod is 0.5 m/s. The cylinder will be controlled by a valve with Qn 3200 Nl/min. What diameter of tube can be used and what is maximum lenght of tube.
We refer to the diagram. We start at the left side of the diagram cylinder Ø125. We follow the line until the intersection with the velocity line of 0.5 m/s. From here we draw a horizontal line in the diagram. This line shows us we need an equivalent throttling bore of approximately 10 mm.
Following this line horizontally we cross a few intersections. These intersections shows us the minimum inner diameter (rightside diagram) in combination with the maximum length of tube (bottomside diagram).

For example:
Intersection one: When a tube (14/11) will be used, the maximum length of tube is 0.7 meter.
Intersection two: When a tube (—/13) will be used, the maximum length of tube is 3.7 meter.
Intersection three: When a tube (—/14) will be used, the maximum length of tube is 6 meter.

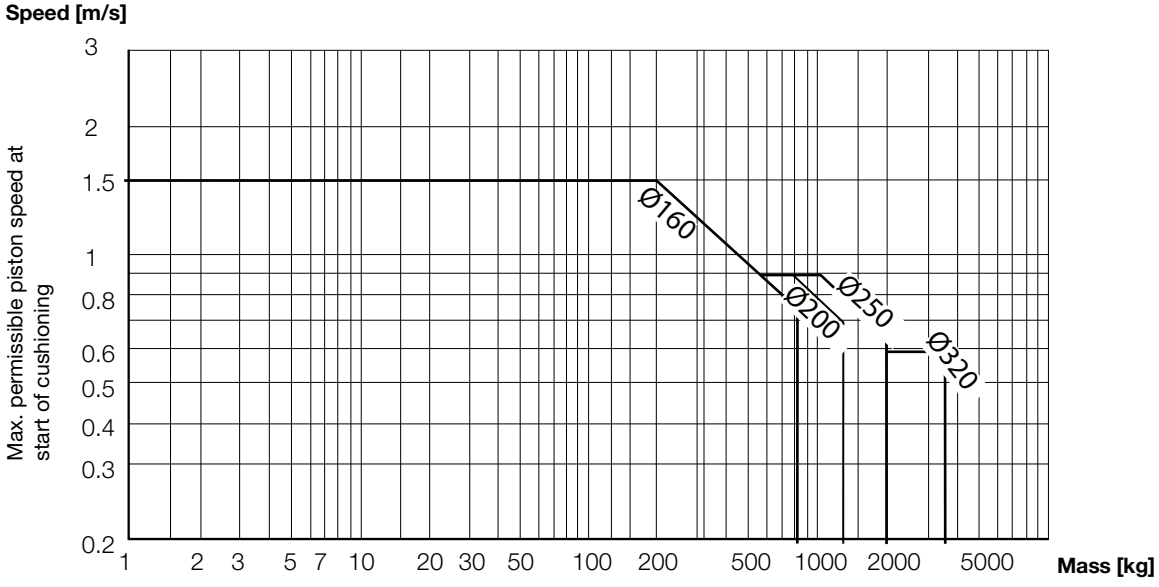
Example ④: Determining tube size and cylinder velocity with a particular cylinder and valve?
For an application using a 40 mm bore cylinder with a valve with Qn=800 Nl/min. The distance between the cylinder and valve has been set to 5 m.
Tube dimension: What tube bore should be selected to obtain the maximum cylinder velocity? Start at pipe length 5 m, follow the line up to the intersection with 800 Nl/min. Select the next largest tube diameter, in this case Ø10/8 mm.
Cylinder velocity: What maximum cylinder velocity will be obtained? Follow the line for 800 Nl/min to the left until it intersects with the line for the Ø40 mm cylinder. In this example, the speed is just above 1.1 m/s.

Cushioning Characteristics

Air cushion is used to absorb kinetic energy due to load and speed at both end of stroke.
This typically consists of a threaded needle screw that adjusts into an orifice in the cylinder end plate.
By adjusting the screw further into the orifice you lessen the amount of air that can escape in a given time.
Slowing the exhaust of air creates back pressure which slows the piston as it enters into the end cushioning seal.

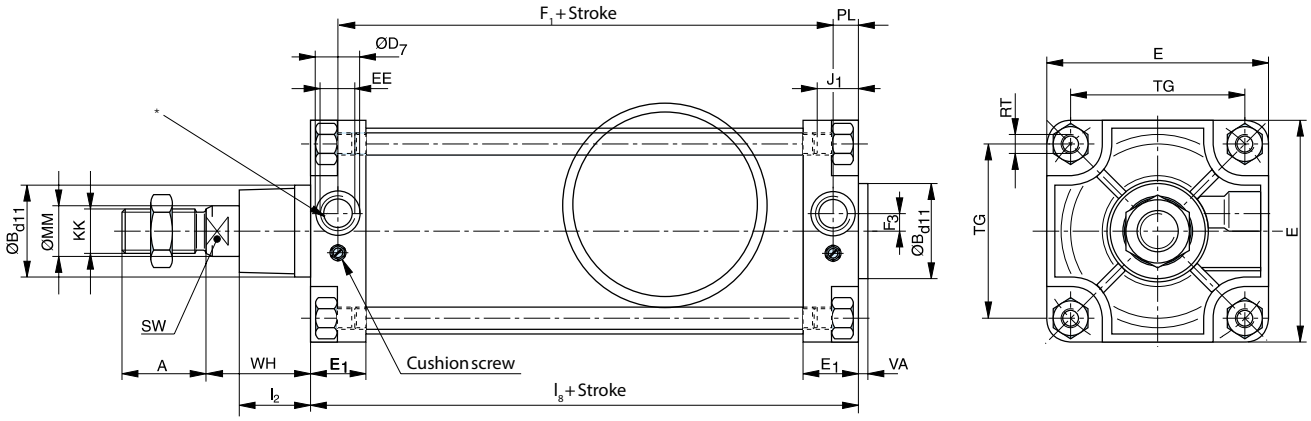
The graph is valid for an horizontal movement and the pressure of 6 bar.

The mass is the sum of internal and external friction, plus any gravitational forces.
Work out your expected moving mass and read off the maximum permissible speed at start of cushioning.
Alternatively, take your desired speed an expected mass and find the cylinder bore size required.
Please note that piston speed at start of cushioning is typically approx. 50 % higher than the average speed and that it is this higher speed which determines the choice of cylinder.



Dimensions

Tie rods with round profile design



Note *: for bore size 320mm, front air port is on the bottom of the axis of the cylinder and the cushioning screw on the top

Dimensions [mm] standard temperature

Cyl.-bore	A	$ØB_{d11}$	$ØD_7$	E	E_1	F_1 + Stroke	F_3	$J_{1\ max.}$	I_2	I_8 + Stroke	EE	KK	MM	PL	RT	SW	TG	VA	WH
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Ø160	72	65	33	180	45	130	11	23	50	180	G3/4	M36x2	40	25	M16	36	140	6	80
Ø200	72	75	33	220	45	130	15	23	60	180	G3/4	M36x2	40	25	M16	36	175	6	95
Ø250	84	90	-	270	51	149	21	27	69	200	G1	M42x2	50	25.5	M20	46	220	10	107
Ø320	96	110	-	340	56	164	–20*/20	28	82	220	G1	M48x2	63	28	M24	55	270	10	120

Dimensions [mm] high temperature

Cyl.-bore	A	$ØB_{d11}$	$ØD_7$	E	E_1	F_1 + Stroke	F_3	$J_{1\ max.}$	I_2	I_8 + stroke	EE	KK	MM	PL	RT	SW	TG	VA	WH
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Ø160	72	65	-	186	47	133	13.5	23	55	180	G3/4	M36x2	40	23.5	M16	36	140	6	80
Ø200	72	75	-	220	47	133	13.5	23	65	180	G3/4	M36x2	40	23.5	M16	36	175	6	95
Ø250	84	90	-	270	51	149	14	27	69	200	G1	M42x2	50	25.5	M20	46	220	10	107
Ø320	96	110	-	340	56	164	–20*/20	28	82	220	G1	M48x2	63	28	M24	55	270	10	120

Tolerances [mm]

Cyl.-bore	I_8	TG	stroke tolerance	stroke tolerance
[mm]	[mm]	[mm]	<= 500 mm	> 500 mm
Ø160	± 1.1	± 1.1	+ 0.3 / + 2.0	+ 0.3 / + 3.0
Ø200	± 1.6	± 1.1	+ 0.3 / + 2.0	+ 0.3 / + 3.0
Ø250	± 1.6	± 1.5	+ 0.3 / + 2.0	+ 0.3 / + 3.0
Ø320	± 2.2	± 1.5	+ 0.3 / + 2.0	+ 0.3 / + 3.0

Tie rods with through piston rod on request.

Order Key Code (Model code with 20 digits used only for the trunnion option or for the ATEX version)

Standard temperature with magnet, stainless steel piston rod piston rod
P1D-T160MS-stroke [1]
P1D-T200MS-stroke [1]
P1D-T250/G50116-stroke [1]
P1D-T320MS-stroke [1]
Standard temperature with magnet, chromium plated steel piston rod
P1D-T160MC-stroke [1]
P1D-T200MC-stroke [1]
P1D-T250/G50120-stroke [1]
P1D-T320MC-stroke [1]
Standard temperature with magnet, metallic scraper option, chromium plated steel piston rod
P1D-T160QC-stroke [1]
P1D-T200QC-stroke [1]
P1D-T250/G50121-stroke [1]
P1D-T320QC-stroke [1]
[1] without magnet replace P1D- by P1DF

Note:
For ATEX version add -EXNN at the end of the part number. Temperature -20°C to +60°C, MS version without trunnion option only for bores 160 & 200 mm.

High temperature without magnet, stainless steel piston rod piston rod
P1D-T160/G50079-stroke
P1D-T200/G50080-stroke
P1D-T250/G50053-stroke
P1D-T320MF-stroke
High temperature with magnet, stainless steel piston rod piston rod
P1DWT160/G50081-stroke
P1DWT200/G50082-stroke
P1DWT250/G50083-stroke
P1DWT320MF-stroke

Note for all bore sizes:
With trunnion option add NGxxx where xxx represents XV measure in mm at the end of the part number. Trunnion pivots at 90° Vs Air ports.
With trunnion option add N7xxx where xxx represents XV measure in mm at the end of the part number. Trunnion pivots at 0° Vs Air ports.

Through piston rod option on request.

Standard strokes

Standard strokes for all P1D-T cylinders comply with ISO 4393. Non standard strokes up to 2000 mm.

Order no XXXX = Stroke	**Cylinder-bore** (mm)	● = Standard stroke (mm) 50	80	100	125	160	200	250	320	400	500	800	1000	2000	▭ = Stroke to special order
P1D-T															
P1D-T160MS-XXXX	**160**	●	●	●	●	●	●	●	●	●	●	//	//		
P1D-T200MS-XXXX	**200**	●	●	●	●	●	●	●	●	●	●	//	//		
P1D-T250/-G...	**250**	●	●	●	●	●	●	●	●	●	●	//	//		
P1D-T320MS-XXXX	**320**	●	●	●	●	●	●	●	●	●	●	//	//		

Mountings

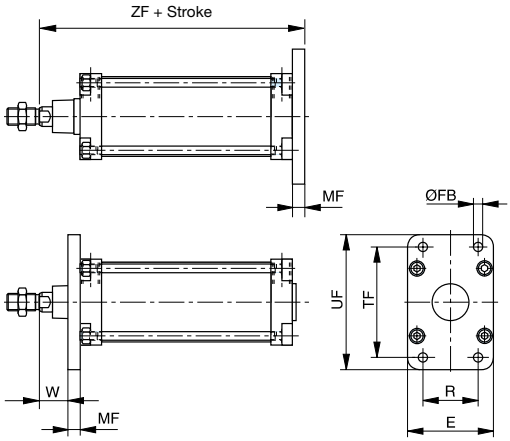
	Flange MF1 / MF2 ①	Foot brackets MS1 ②	Pivot bracket with rigid bearing AB7 ③	Swivel eye bracket MP6 ④	Clevis bracket MP2 ⑤
					
Ø160	P1C-4SMB	P1C-4SMF	P1C-4SMDB	P1C-4SMSB	P1C-4SMTB
Ø200	P1C-4TMB	P1C-4TMF	P1C-4TMDB	P1C-4TMSB	P1C-4TMTB
Ø250	P1C-4VMB	P1C-4VMF	P1C-4VMDB	P1C-4VMSB	P1C-4VMTB
Ø320	P1C-4WMB	P1C-4WMF	P1C-4WMDC	P1C-4WMSB	P1C-4WMTB

	Clevis bracket MP4 ⑥	Swivel rod eye AP6 ⑫	Clevis AP2 ⑬	Flexo coupling PM5 ⑭
				
Ø160	P1C-4SMEB	P1C-4SRS	P1C-4SRC	P1C-4SRF
Ø200	P1C-4TMEB	P1C-4SRS	P1C-4SRC	P1C-4SRF
Ø250	P1C-4VMEB	P1C-4VRS	P1C-4VRC	P1C-4VRF
Ø320	P1C-4WMEB	P1C-4WRS	P1C-4WRC	P1C-4WRF

Flange MF1/MF2 ①

Intended for fixed mounting of cylinder.
Flange can be fitted to front or rear end cover of cylinder.

Materials:
Flange: Surface-treated steel
Mounting screws acc. to DIN 6912:
Zinc-plated steel 8.8
Supplied complete with mounting screws for attachment to the cylinder.



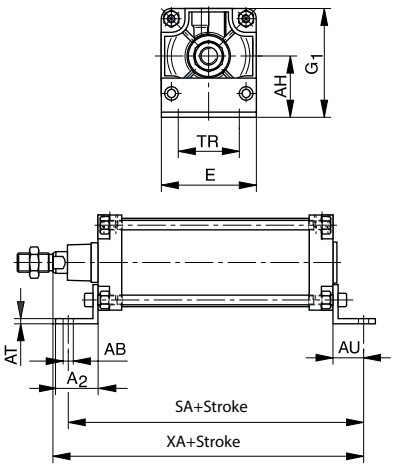
Cyl.-bore [mm]	ZF [mm]	MF [mm]	W [mm]	UF [mm]	E [mm]	TF [mm]	R [mm]	ØFB [mm]	Weight [kg]	Order code
Ø160	280	20	60	260	180	230	115	18	6.69	**P1C-4SMB**
Ø200	300	25	70	300	220	270	135	22	11.55	**P1C-4TMB**
Ø250	330	25	80	400	285	330	165	26	20.15	**P1C-4VMB**
Ø320	370	30	90	470	350	400	200	33	34.55	**P1C-4WMB**

Foot brackets MS1 ②

Intended for fixed mounting of cylinder.
Foot bracket can be fitted to front or rear end cover of the cylinder.

Materials:
Flange: Surface-treated steel
Mounting screws acc. to DIN 6912:
Zinc-plated steel 8.8:
Intended for fixed mounting of the cylinder.
Foot brackets can be fitted to the front or rear end cover of the cylinder.

Supplied complete with mounting screws for attachement to the cylinder.

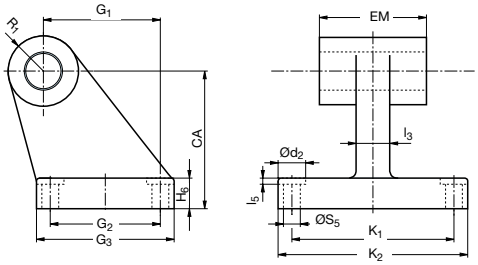


Cyl.-bore [mm]	E [mm]	TR [mm]	AH [mm]	G1 [mm]	AT [mm]	A2 [mm]	ØAB [mm]	SA [mm]	XA [mm]	AU [mm]	Weight [mm]	Order code
Ø160	180	115	115	208	10	75	18,5	300	320	60	2.24	**P1C-4SMF**
Ø200	220	135	135	245	12	100	24	320	345	70	3.72	**P1C-4TMF**
Ø250	270	165	165	300	14	100	26	350	382	75	6.60	**P1C-4VMF**
Ø320	340	200	200	370	23	120	33	390	425	85	17.00	**P1C-4WMF**

Pivot bracket with rigid bearing AB7 ③

Intended for flexible mounting of cylinder.
The pivot bracket can be combined with clevis bracket MP2.

Materials:
Pivot bracket: Aluminium
Bush: Steel and PTFE



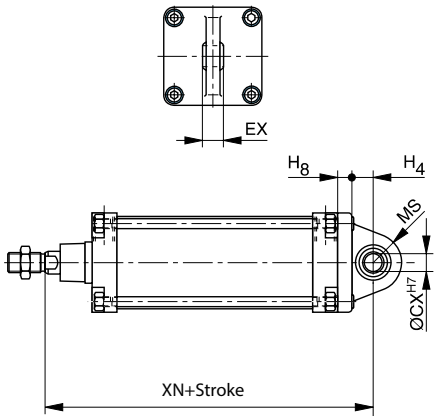
Cyl.-bore [mm]	R1 [mm]	ØCX H7 [mm]	G1 [mm]	CA [mm]	H6 [mm]	G2 [mm]	G3 [mm]	EM [mm]	I3 [mm]	Ød2 [mm]	I5 [mm]	ØS5 [mm]	K1 [mm]	K2 [mm]	Weight [mm]	Order code
Ø160	31.5	30	97	115	25	88	126	90	36	20	4	14	118	156	2.58	**P1C-4SMDB**
Ø200	31.5	30	105	135	30	90	130	90	40	26	4	18	122	162	3.30	**P1C-4TMDB**
Ø250	40	40	128	165	35	110	160	110	45	33	4.5	22	150	200	5.70	**P1C-4VMDB**
Ø320	45	45	150	200	40	122	186	120	55	-	-	26	170	234	21.90	**P1C-4WMDC**

Swivel eye bracket MP6 ④

Intended for use togehter with clevis bracket AB6.

Materials:
Bracket: Aluminium
Swivel bearing acc. to DIN 648K:
Hardened steel

Supplied complete with mounting screws for attachment to cylinder.



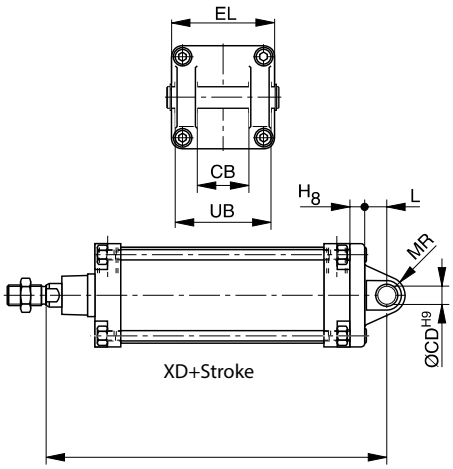
Cyl.-bore [mm]	EX [mm]	XN [mm]	H8 [mm]	H4 [mm]	MS [mm]	ØCX H7 [mm]	Weight [kg]	Order code Not anodised
Ø160	43	315	20	35	44	35	4.36	**P1C-4SMSB**
Ø200	43	335	25	35	47	35	3.72	**P1C-4TMSB**
Ø250	49	377	25	45	52	40	5.85	**P1C-4VMSB**
Ø320	60	420	30	50	63	45	30.30	**P1C-4WMSB**

Clevis bracket MP2 ⑤

Intended for flexible mounting of the cylinder. Clevis bracket MP4 can be combined with pivot bracket and swivel rod eye.

Materials:
Clevis bracket: Aluminium
Pin: Surface hardened steel
Locking pin: Spring steel
Circlips according to DIN 471:
Spring steel
Mounting screws acc. to DIN 912:
Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to the cylinder.



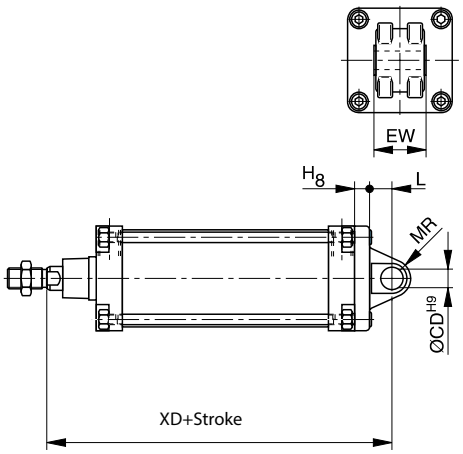
Cyl.-bore [mm]	EL [mm]	XD [mm]	ØCD H9 [mm]	CB H14 [mm]	UB [mm]	H8 [mm]	L [mm]	MR [mm]	Weight [kg]	Order code
Ø160	180	315	30	90	170	20	35	25	2.20	**P1C-4SMTB**
Ø200	220	335	30	90	170	25	35	25	3.47	**P1C-4TMTB**
Ø250	270	377	40	110	200	25	45	40	5.80	**P1C-4VMTB**
Ø320	340	420	45	120	220	30	50	54	31.00	**P1C-4WMTB**

Clevis bracket MP4 ⑥

Intended for flexible mounting of cylinder. Clevis bracket MP4 can be combined with clevis bracket MP2.

Materials:
Clevis bracket: Aluminium
Bush: PTFE
Mounting screws acc. to DIN 912:
Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to the cylinder.



Cyl.-bore [mm]	EW [mm]	XD [mm]	H8 [mm]	L [mm]	MR [mm]	ØCD [mm]	Weight [kg]	Order code
Ø160	90	315	20	35	30	30	2.31	**P1C-4SMEB**
Ø200	90	335	25	35	31	30	2.50	**P1C-4TMEB**
Ø250	110	375	25	45	41	40	6.20	**P1C-4VMEB**
Ø320	120	420	30	50	46	45	33.00	**P1C-4WMEB**

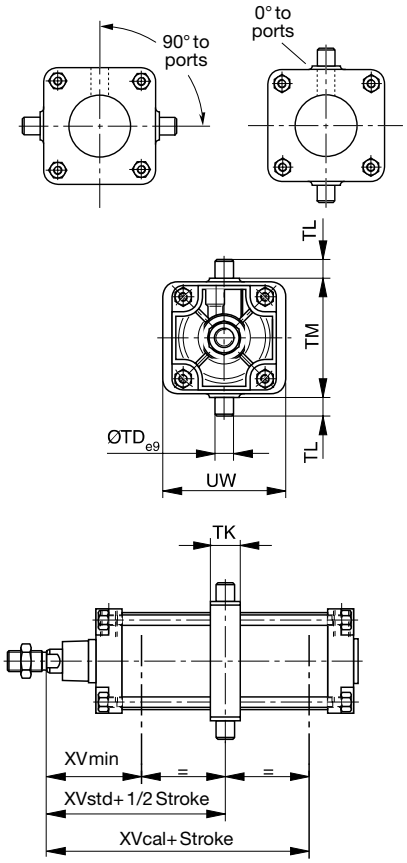
Intermediate trunnion MT4

The trunnion is MT4 for P1D-T factory-fitted at an optional MT4 location specified by the XV-measure:

Material:

Trunnion: Zinc plated steel

The trunnion for the P1D-T is ordered with letter G or 7 in position 17 and desired XV-measure (3-digit measure in mm) in positions 18-20. e.g. P1D-T160MS-0500NG300



Standard temp version

Cyl.-bore	TK h14	TL h14	TM	ØTD e9	UW	XV min	XV std	XV cal	Weight
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
Ø160	40	32	200	32	190	145	170	195	6.10
Ø200	40	32	250	32	240	160	185	210	8.10
Ø250	50	40	320	40	296	194	205	216	14.80
Ø320	65	50	400	50		210	230	251	16.00

High temp version

Ø160	48	32	200	32	190	151	170	189	6.10
Ø200	48	32	250	32	240	166	185	204	8.10
Ø250	60	40	320	40	296	188	207	226	14.80
Ø320	65	50	400	50		210	230	251	16.00

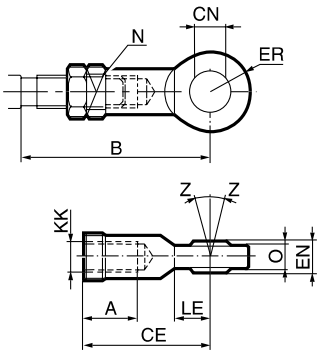
Important:

If the cylinder is ordered with a piston rod protusion (WH dimension), please add this extra length to XV_{min}, XV_{std} and XV_{max}.

Swivel rod eye AP6 ⑫

Swivel rod eye for articulated mounting of the cylinder

Materials: Swivel rod eye: Zinc-plated steel
Swivel bearing according to DIN 648K:
Hardened steel



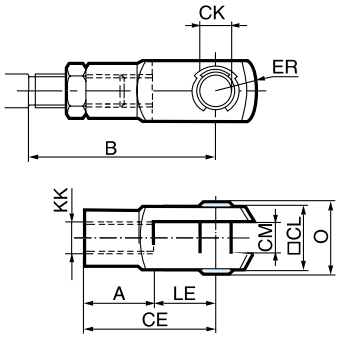
According to ISO 8139

Cyl.-bore [mm]	A [mm]	B min [mm]	CE [mm]	ØCN H9 [mm]	EN h12 [mm]	ER [mm]	KK [mm]	LE min [mm]	N [mm]	O [mm]	Weight [kg]	Order code
Ø160	56	141	125	35	43	40,5	M36x2	41	50	28	1.6	**P1C-4SRS**
Ø200	56	141	125	35	43	40,5	M36x2	41	50	28	1.6	**P1C-4SRS**
Ø250	60	164	142	40	49	45,5	M42x2	46	55	33	2.4	**P1C-4VRS**
Ø320	65	191	160	50	60	58,5	M48x2	59	65	45	5.0	**P1C-4WRS**

Clevis AP2 ⑬

Clevis for articulated mounting of the cylinder.

Materials: Clevis, clip: Galvanized steel
Pin: Hardened steel



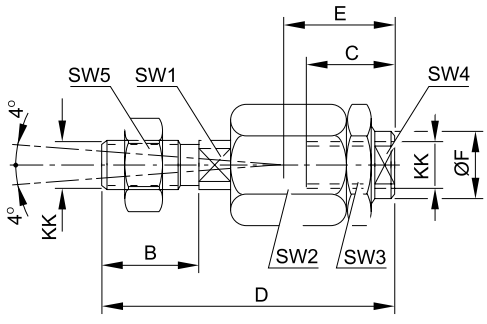
According to ISO 8140

Cyl.-bore [mm]	A [mm]	B min [mm]	CE [mm]	CK h11/e9 [mm]	CL [mm]	CM [mm]	ER [mm]	KK [mm]	LE [mm]	O [mm]	Weight [kg]	Order code
Ø160	72	144	144	35	70	35	-	M36x2	72	-	2.93	**P1C-4SRC**
Ø200	72	144	144	35	70	35	-	M36x2	72	-	2.93	**P1C-4SRC**
Ø250	84	168	168	40	85	40	-	M42x2	84	-	5.64	**P1C-4VRC**
Ø320	96	192	192	50	96	50	-	M48x2	96	-	7.86	**P1C-4WRC**

Flexo coupling PM5 ⑭

Flexo coupling for articulated mounting of piston rod.
Flexo fitting is intended to take up axial angle errors within a range of ±4°.

Material:
Flexo coupling, nut: Zinc-plated steel
Supplied complete with galvanized adjustment nut.



Cyl.-bore [mm]	KK [mm]	B [mm]	C [mm]	D [mm]	E [mm]	ØF [mm]	SW1 [mm]	SW2 [mm]	SW3 [mm]	SW4 [mm]	SW5 [mm]	Weight [kg]	Order code
Ø160	M36x2	72	50	241	110	56	36	75	75	50	55	5.1	**P1C-4SRF**
Ø200	M36x2	72	50	241	110	56	36	75	75	50	55	5.1	**P1C-4SRF**
Ø250	M42x2	82	88	271	120	64	36	85	85	60	65	9.2	**P1C-4VRF**
Ø320	M48x2	82	88	271	120	64	42	85	85	60	75	9.4	**P1C-4WRF**

Drop-in sensors

The P8S sensors can easily be installed from the side in the sensor groove, at any position along the piston stroke.
The sensors are completely recessed and thus mechanically protected. Choose between electronic or reed sensors and several cable lengths and 8 mm and M12 connectors.

Electronic sensors

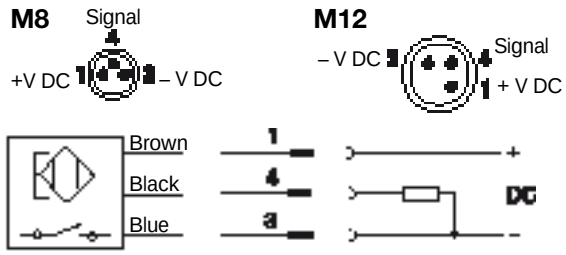
The electronic sensors are "Solid State", i.e. they have no moving parts at all. They are provided with short-circuit protection and transient protection as standard. The built-in electronics make the sensors suitable for applications with high on and off switching frequency, and where very long service life is required.

Reed sensors

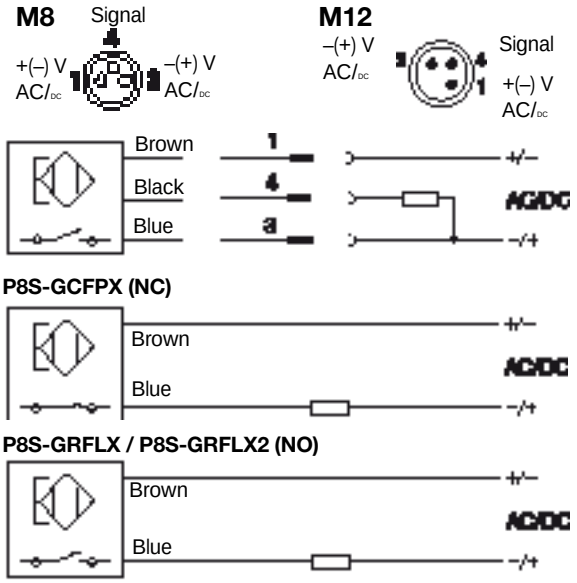
The sensors are based on proven reed switches, which offer reliable function in many applications. Simple installation, a protected position on the cylinder and clear LED indication.

	Electronic	Reed
Cylinder type:	Profile with T-slot	
Cylinder type with adaptor:	Profile with S-slot (dovetail) | Tie rods | Round cylinders	
Installation:	Drop-in. Fixed by 1.5 mm stainless steel allen key or flathead screwdriver.	
Housing length:	34.7 mm | 31.5 mm (ATEX)	
Output Type / Function:	PNP, Normally Open (NO) | NPN, Normally Closed (NC)	Normally Open (NO) | Normally Closed (NC)
Switching (on/off) switching frequency:	≤1000 Hz	± 400 Hz
Degree of Protection (IP):	IP67	
Power consumption:	≤ 10 mA	-
Input Supply Voltage Range:	10 to 30 V DC | 18 to 30 V DC (ATEX)	10 to 30 | 10 to 120 | 10 to 230 V AC/DC (2-wire) | 10 to 30 V AC/DC (3-wire)
Voltage Drop:	≤ 2.2 V	≤ 3,5 V (2-wire NO) | ≤ 0,1 V (3-wire) | ≤ 0,1 V (2-wire NC)
Continuous output current:	≤ 100 mA | ≤ 70 mA (ATEX)	≤ 100 mA (2-wire NO) | ≤ 500 mA (3-wire) | ≤ 500 mA (2-wire NC)
Switching capacity:	-	≤ 10 W
Hazardous area category:	3G / 3D (ATEX)	-
Protection Class:	III	II (2-wire) | III (3-wire)
Response Sensitivity:	2.65.. 2.95 mT	2.1.. 3.4 mT
Overrun Distance:	3 mm	9 mm
Histeresis:	≤ 0.5 mT	≤ 0.2 mT
Repeatability:	≤ 0.1 mT	
Reverse Polarity Protection:	Yes	
Short-circuit Protection:	Yes	-
Power-up Pulse Protection:	Yes	-
Ambiant Operating Temperature Range:	-25 to +75 °C (PUR cable) | -20 to +70°C (PVC cable) | -20 to +45°C (ATEX)	
Shock and Vibration resistance:	30 g 11 ms / 10 … 55 Hz, 1 mm	
EMC:	According to EN 60947-5-2	
Industry Standard:	CE | C UL US | RoHs | Ex	CE | C UL US | RoHs
UL Certification:	On request	
Housing Material:	Plastic polyamid PA12 (ATEX) | PA66	Plastic polyamid PA12 (2-wire 240V) | PA66
Cable Specification:	PUR (Polyurethane) | PVC (Polyvinyl Chloride)	
Conductor Cross-Section:	0.14 mm² (3 wire)	0.14 mm² (3-wire) | 0.12 mm² (2-wire)
Colour of LED:	Yellow	
Connection Style:	M8 snap-in | M8R (knurled nuts) | M12 (knurled nuts) | None (Flying lead)	

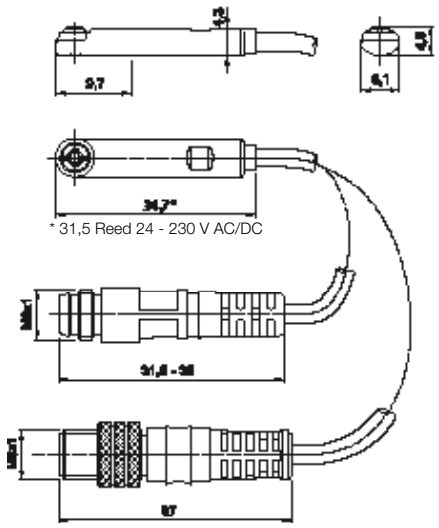
Electronic sensors



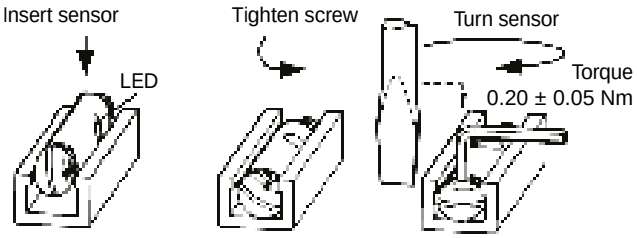
Reed sensors



Dimensions [mm]

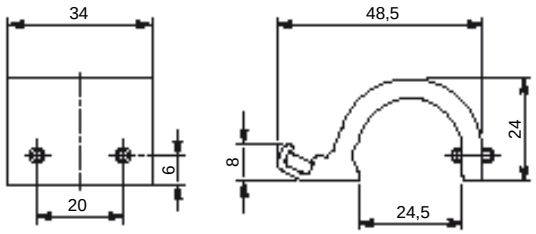


Sensor Installation



Brackets for sensors

Oder code: PD48956 - bores Ø160 - Ø320 mm



Ordering data

Output/function	Cable/connector	Weight [kg]	Order code
Electronic sensors, 10-30 V DC			
PNP type, normally open	0.27 m PUR cable and 8 mm snap-in male connector	0.007	**P8S-GPSHX**
PNP type, normally open	0.27 m PUR cable and M12 screw male connector	0.015	**P8S-GPMHX**
PNP type, normally open	3 m PVC cable without connector	0.030	**P8S-GPFLX**
PNP type, normally open	10 m PVC cable without connector	0.110	**P8S-GPFTX**
Reed sensors, 10-30 V AC/DC			
Normally open	0.27 m PUR cable and 8 mm snap-in male connector	0.007	**P8S-GSSHX**
Normally open	0.27 m PUR cable and M12 screw male connector	0.015	**P8S-GSMHX**
Normally open	3 m PVC cable without connector	0.030	**P8S-GSFLX**
Normally open	10 m PVC cable without connector	0.110	**P8S-GSFTX**
Normally closed	5 m PVC cable without connector without LED	0.050	**P8S-GCFPX**
Reed sensors, 10-120 V AC/DC			
Normally open	3 m PVC cable without connector	0.030	**P8S-GRFLX**
Reed sensors, 24-230 V AC/DC			
Normally open	3 m PVC cable without connector	0.030	**P8S-GRFLX2**

Male connectors for connecting cables

Cable connectors for producing your own connecting cables. The connectors can be quickly attached to the cable without special tools. Only the outer sheath of the cable is removed. The connectors are available for M8 screw connectors and meet protection class IP 65.

Technical data

Operating voltage:	max. 32V AC/DC
Operating current per contact:	max. 4 A
Connection cross section:	0.25.... 0.5 mm² (conductor diameter min 0.1)
Protection class:	IP65 And IP 67 when plugged and screwed down (EN 60529)
Temperature range:	- 25... +85°C

Connector	Weight [kg]	Order Code
M8 screw connector		**P8CS0803J**
M12 screw connector	0.022	**P8CS1204J**

Connecting cables

Description	Weight [g]	For Product Series	Order Code
Cable flex PVC 3 meter with 8mm snap-in connector / flying leads	70	P8S Sensors with M8	**9126344341**
Cable flex PVC 10 meter with 8mm snap-in connector / flying leads	210	P8S Sensors with M8	**9126344342**
Cable PUR 3 meter with 8mm snap-in female connector / flying leads	70	P8S Sensors with M8	**9126344345**
Cable flex PUR 10 meter with 8mm snap-in connector / flying leads	210	P8S Sensors with M8	**9126344346**
Cable PVC 2.5 meter with M8 screw connector / flying leads	60	P8S Sensors with knurled M8	**KC3102**
Cable PVC 5 meter with M8 screw female connector / flying leads	120	P8S Sensors with knurled M8	**KC3104**

Seal Kits

Complete seal kits consisting of:

- Piston complete
- Cushioning seals
- Piston rod bearing
- Scraper ring
- Piston rod seal
- O-rings

Cyl.-bore [mm]	Standard temperature	High temperature [1]
Ø160	**PD23013**	**P1D-6S/G90010**
Ø200	**PD25006**	**P1D-6T/G90011**
Ø250	**P1D-6V/G90016** [2]	**P1D-6V/G90012**

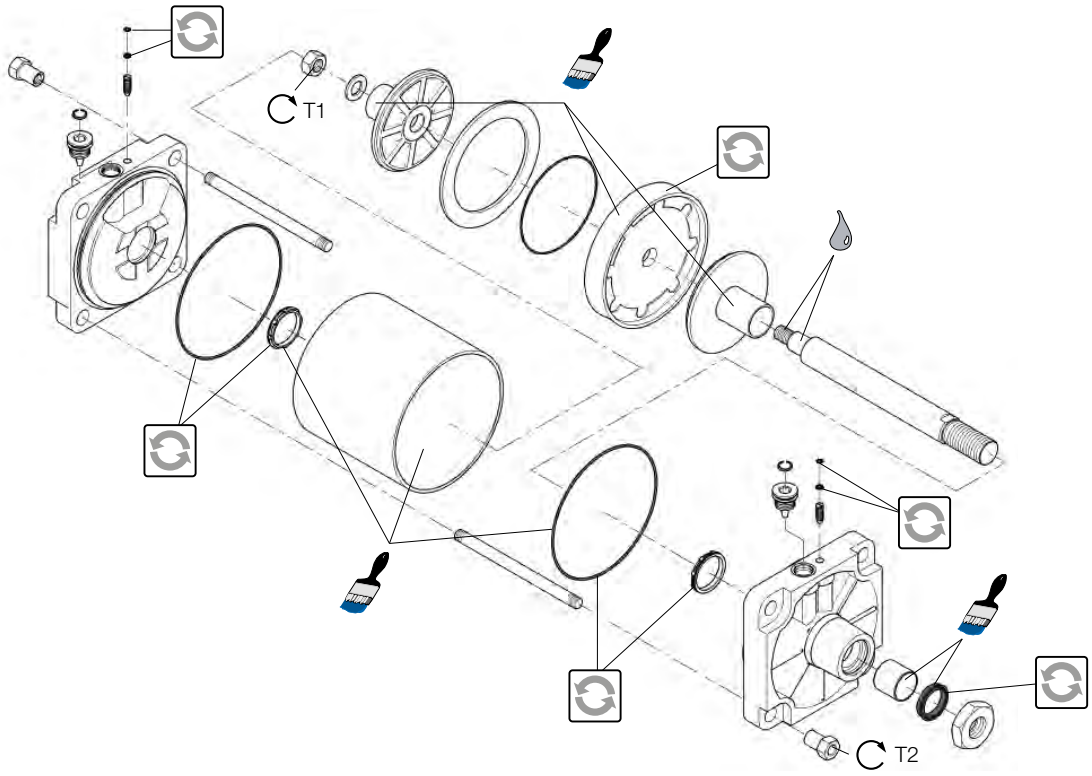
[1] seal kits for cylinder with part number P1DxTxxxMF-stroke ... are no longer available. High temp, only for cylinder with part number P1DxTxxx/G…

[2] No longer available for cylinder with part number P1DxT250xx-stroke … built before March 2018. Only for cylinder with part number P1DxT250/G… from March 2018.

Cyl.-bore [mm]	Through rod standard temperature
Ø160	**P1D-6SRNF**
Ø200	**P1D- 6TRNF**
Ø250	**-**

Standard	4 g tube	**KL8220**
High temperature	4 g tube	**KL8220**

Seal kit for bores Ø 160 - Ø 250 mm



= Included in seal kit

= Lubricated with grease

= Socket head

= Locking fluid

= Tightening torque

= Nut A/F

Loctite LT638 locking fluid must be used

Cyl.-bore [mm]	Plastic piston T1 [Nm]	AF [mm]	T2 [Nm]	AF [mm]
Ø160	100	30	85	27
Ø200	100	30	95	27
Ø250	120	36	140	41

Seal Kits

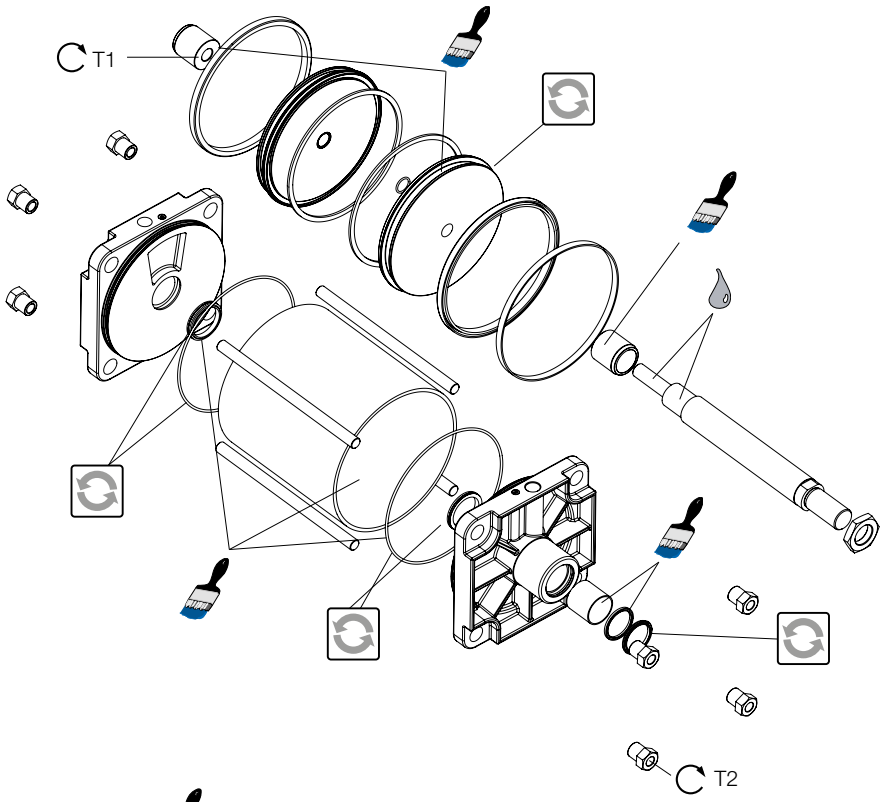
Complete seal kits consisting of:
- Piston seals
- Cushioning seals
- Piston rod bearing
- Scraper ring
- Piston rod seal
- O-rings

Cyl.-bore [mm]	Standard	High Temp.
Ø320	**KL7339**	**KL7340**

Cyl.-bore [mm]	Through rod Standard temperature
Ø320	**P1D-6WRNF**

Standard	4 g tube	**KL8220**
High temperature	4 g tube	**KL8220**

Seal kit for bore Ø 320 mm



= Included in seal kit

= Lubricated with grease

= Socket head

= Locking fluid

= Tightening torque

= Nut A/F

Loctite LT638 locking fluid must be used

Cyl.-bore [mm]	Piston T1 [Nm]	AF [mm]	T2 [Nm]	AF [mm]
Ø320	250	30	200	41

Specifying air quality (purity) in accordance with ISO8573-1:2010, the international standard for Compressed Air Quality

ISO8573-1 is the primary document used from the ISO8573 series as it is this document which specifies the amount of contamination allowed in each cubic metre of compressed air.

ISO8573-1 lists the main contaminants as Solid Particulate, Water and Oil. The purity levels for each contaminant are shown separately in tabular form, however for ease of use, this document combines all three contaminants into one easy to use table.

ISO8573-1:2010 CLASS	Solid Particulate				Water		Oil
	Maximum number of particles per m^3			Mass Concentration mg/m^3	Vapour Pressure Dewpoint	Liquid g/m^3	Total Oil (aerosol liquid and vapour)
	0,1 - 0,5 micron	0,5 - 1 micron	1 - 5 micron				mg/m^3
0	As specified by the equipment user or supplier and more stringent than Class 1						
1	≤ 20 000	≤ 400	≤ 10	-	≤ -70 °C	-	0,01
2	≤ 400 000	≤ 6 000	≤ 100	-	≤ -40 °C	-	0,1
3	-	≤ 90 000	≤ 1 000	-	≤ -20 °C	-	1
4	-	-	≤ 10 000	-	≤ +3 °C	-	5
5	-	-	≤ 100 000	-	≤ +7 °C	-	-
6	-	-	-	≤ 5	≤ +10 °C	-	-
7	-	-	-	5 - 10	-	≤ 0,5	-
8	-	-	-	-	-	0,5 - 5	-
9	-	-	-	-	-	5 - 10	-
X	-	-	-	> 10	-	> 10	> 10

Specifying air purity in accordance with ISO8573-1:2010

When specifying the purity of air required, the standard must always be referenced, followed by the purity class selected for each contaminant (a different purity class can be selected for each contamination if required).

An example of how to write an air quality specification is shown below:

ISO 8573-1:2010 Class 1.2.1

ISO 8573-1:2010 refers to the standard document and its revision, the three digits refer to the purity classifications selected for solid particulate, water and total oil. Selecting an air purity class of 1.2.1 would specify the following air quality when operating at the standard's reference conditions :

Class 1 - Particulate

In each cubic metre of compressed air, the particulate count should not exceed 20,000 particles in the 0.1 - 0.5 micron size range, 400 particles in the 0.5 - 1 micron size range and 10 particles in the 1 - 5 micron size range.

Class 2 - Water

A pressure dewpoint (PDP) of -40°C or better is required and no liquid water is allowed.

Class 1 - Oil

In each cubic metre of compressed air, not more than 0.01mg of oil is allowed. This is a total level for liquid oil, oil aerosol and oil vapour.

ISO8573-1:2010 Class zero

- **Class 0 does not mean zero contamination.**
- **Class 0 requires the user and the equipment manufacturer to agree contamination levels as part of a written specification.**
- **The agreed contamination levels for a Class 0 specification should be within the measurement capabilities of the test equipment and test methods shown in ISO8573 Pt 2 to Pt 9.**
- **The agreed Class 0 specification must be written on all documentation to be in accordance with the standard.**
- **Stating Class 0 without the agreed specification is meaningless and not in accordance with the standard.**
- **A number of compressor manufacturers claim that the delivered air from their oil-free compressors is in compliance with Class 0.**
- **If the compressor was tested in clean room conditions, the contamination detected at the outlet will be minimal. Should the same compressor now be installed in typical urban environment, the level of contamination will be dependent upon what is drawn into the compressor intake, rendering the Class 0 claim invalid.**
- **A compressor delivering air to Class 0 will still require purification equipment in both the compressor room and at the point of use for the Class 0 purity to be maintained at the application.**
- **Air for critical applications such as breathing, medical, food, etc typically only requires air quality to Class 2.2.1 or Class 2.1.1.**
- **Purification of air to meet a Class 0 specification is only cost effective if carried out at the point of use.**

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