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	Cushioning thread	Air con-length mm	Connection sump-tion[2] litre	Flexible Porting thread	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	Supplement mass (kg) for rod locking Clean/Flex	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

Standard stroke

Standard strokes for all P1D cylinders comply with ISO 4393. (* 40 is not an ISO standard stroke)

Special strokes up to 2800 mm.

Minimum stroke for P1D Clean is 25 mm with 0-2 sensors and 100 mm with 3-4 sensors.

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Order no XXXX = Stroke	Cylinder bore (mm)	● = Standard stroke (mm) / = Stroke to special order 25 40 50 80 100 125 160 200 250 320 400 500 600 700 800 2800
Double acting Profile cylinder		
P1D-S032MS-XXXX	32	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S040MS-XXXX	40	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S050MS-XXXX	50	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S063MS-XXXX	63	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S080MS-XXXX	80	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S100MS-XXXX	100	● ● ● ● ● ● ● ● ● ● ● ● /
P1D-S125MS-XXXX	125	● ● ● ● ● ● ● ● ● ● ● ● /

Operation data

Working pressure	Max 10 bar
Working temperature	min max
Standard	-20 °C +80 °C
High temp version	-10 °C +150 °C
Low temp version	-40 °C +80 °C

Greased for life, does not normally need additional lubrication. If extra lubrication is given, this must always be continued.

Working medium, air quality

Working medium	Dry, filtered compressed air to ISO 8573-1 class 3.4.3.

Recommended air quality for cylinders

For best possible service life and trouble-free operation, ISO 8573-1 quality class 3.4.3 should be used. This means 5 µm filter (standard filter) dew point +3 ºC for indoor operation (a lower dew point should be selected for outdoor operation) and oil concentration 1.0 mg oil/m^3, which is what a standard compressor with a standard filter gives.

ISO 8573-1 quality classes

Quality class	Pollution particle size (µm)	Pollution max con-centration (mg/m^3)	Water max. press. dew point (°C)	Oil max con-centration (mg/m^3)
1	0,1	0,1	-70	0,01
2	1	1	-40	0,1
3	5	5	-20	1,0
4	15	8	+3	5,0
5	40	10	+7	25
6	-	-	+10	-

Bores and strokes

P1D	32 - 125 mm
Standard strokes	25 - 500 mm according to ISO 4393
Max stroke	2800 mm
Min stroke, P1D Clean	25 mm (0-2 sensors) 100 mm (3-4 sensors)

P1D Clean

Protection class	Hose-proof in accordance with IP65
Chemical resistance	Tested for normally used industrial detergents, both acid and alkaline

Low pressure hydraulic

Working pressure	Max 10 bar Min 2 bar

For low pressure hydraulic systems is following oil quality to be used.

Hydraulic oil type HLP (DIN 51524, ISO 11158).
Viscosity by 40 °C: 32 mm^2/s (cSt).

For instance Shell Tellus 32 or equal.

Important!

If the cylinder is used in applications with significant lateral loads on the piston rod, an external guide must be used to achieve maximum service life.

Material specification

Standard design

Body extrusion	Natural colour, anodised aluminium
End cover	Black anodised aluminium
End cover inserts	POM
End cover nuts/screws	Zinc plated steel 8.8
Piston rod nut	Zinc plated steel
Piston rod	Stainless steel, X 10 CrNiS 18 9
Scraper ring	PUR
Piston rod bearing	POM
Piston	POM
Piston bearing	POM
Magnetic ring	Plastic bound magnetic material
Piston bolt	Zinc plated steel
Piston seal	PUR
O-rings	Nitrile rubber, NBR
End-of-stroke washers	PUR
Cushioning seals	PUR
Cushioning screws	LCP

P1D Clean

Transparent moulding	Silicone
Transparent cover	ABS
Screws, sensor system	Stainless steel, A2
Upper seal and lower seal, protective cover	Santopren
Sealing plugs	PA
Piston rod nut	Stainless steel, A2

Cushioning characteristics

The diagram below is used for dimensioning of cylinders related to the cushioning capacity. The maximum cushioning capacity shown in the diagram assumes the following:

- Low load, i.e. low pressure drop across the piston
- Equilibrium speed
- Correctly adjusted cushioning screw
- 6 bar at cylinder port

P1D Flexible Porting

Connection part Ø32-63	POM
Elbow fittings Ø32-63	PA
Straight fittings on body extrusion Ø32-63	PA
Straight fittings in ports	Nickel plated brass
Seal, connection part	Nitrile rubber NBR

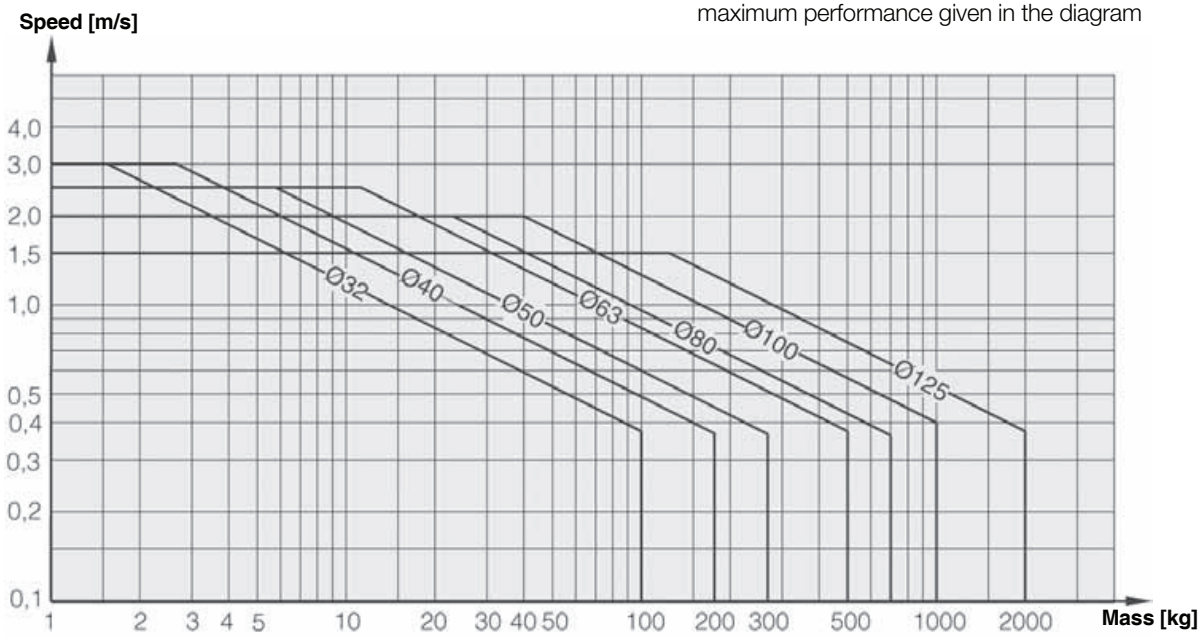
P1D Tie-Rod

Tie-rods	Stainless steel, X 10 CrNiS 18 9

Design variants

Low temperature design	
Seals/scraper ring	Polyurethane PUR/Nitrile rubber NBR
Piston	Anodised aluminium
Piston/piston rod bearing	UHMWPE plastic
High temperature design	
Seals/scraper ring	Fluorocarbon rubber, FPM
Piston	Anodised aluminium
Piston/piston rod bearing	Bronze filled PTFE
Low pressure hydraulics	
Seals/scraper ring	Nitrile rubber, NBR
Piston	Anodised aluminium
Piston/piston rod bearing	UHMWPE plastic
Cylinders for dry rod operation	
Seals/scraper ring	FPM/HDPE
Cylinder with metal scraper ring	
Scraper ring	Stainless steel/brass/NBR
Option	
Piston rod material	Hard-chromium plated steel, Fe 490-2 FN Acid-proof steel, X 5 CrNiMo 17 13 3 Hard-chromium plated stainless steel, X 10 CrNiS 18 9

The load is the sum of internal and external friction, plus any gravitational forces. At high relative load (pressure drop exceeding 1 bar), we recommend that for any given speed, the mass should be reduced by a factor of 2.5, or for a given mass, the speed should be reduced by a factor of 1.5. This is in relation to the maximum performance given in the diagram



Guide for selecting suitable tubing

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

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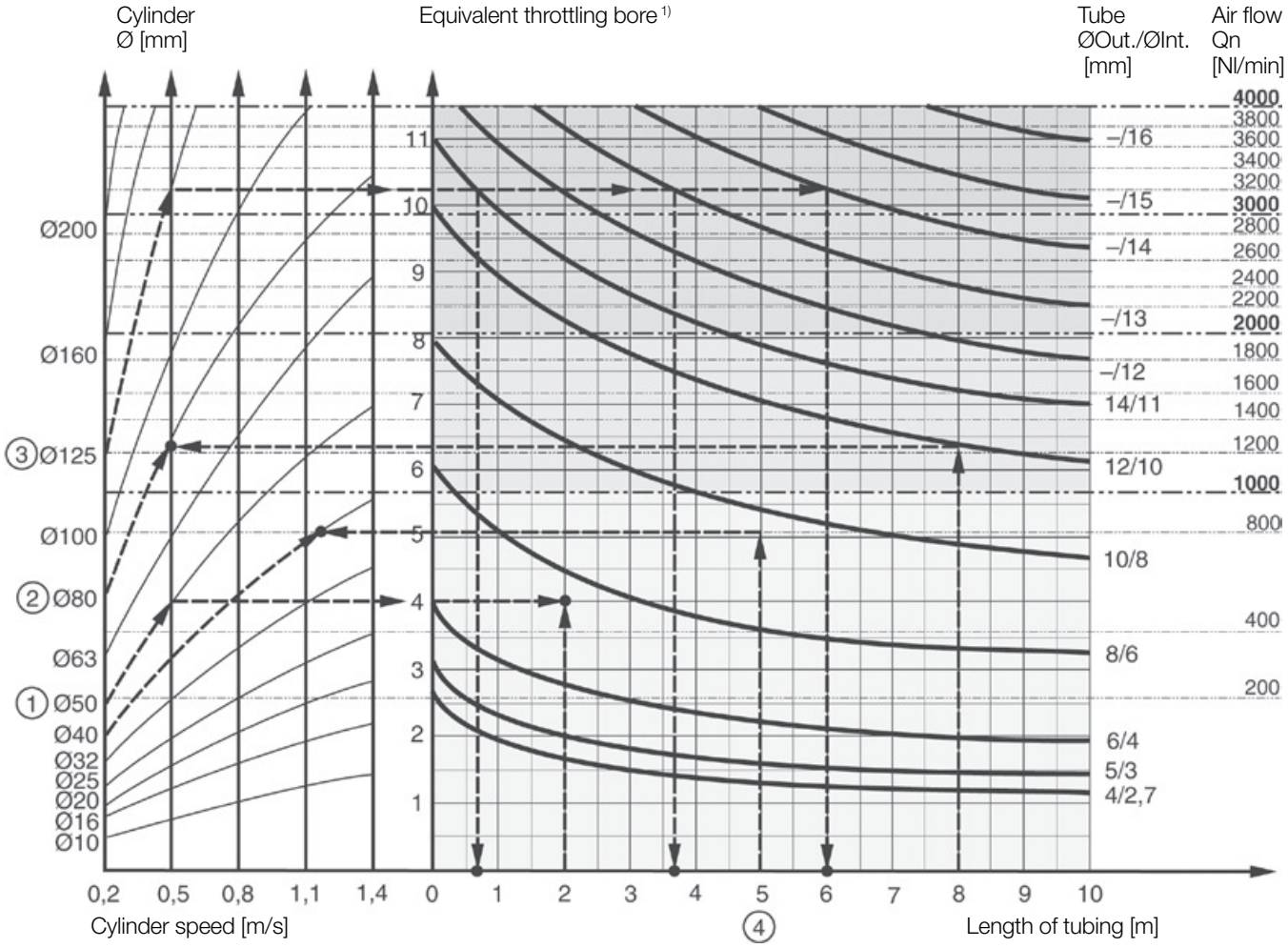
The following is the basic principle:

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

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 for highest flow rates. (Elbow and banjo fittings cause restriction.)



1) 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.

2) Qn is a measure of the valve flow capacity, with flow measured in litre 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.

Valve series with respective flows in Nl/minute

Valve series	Qn in Nl/Min
Valvetronic Solstar	33
Interface PS1	100
Adex A05	173
Moduflex size 1, (2 x 3/2)	220
Valvetronic PVL-B 5/3 closed centre, 6 mm push in	290
Moduflex size 1, (4/2)	320
B43 Manual and mechanical	340
Valvetronic PVL-B 2 x 2/3, 6 mm push in	350
Valvetronic PVL-B 5/3 closed centre, G1/8	370
Compact Isomax DX02	385
Valvetronic PVL-B 2 x 3/2 G1/8	440
Valvetronic PVL-B 5/2, 6 mm push in	450
Valvetronic PVL-B 5/3 vented centre, 6 mm push in	450
Moduflex size 2, (2 x 3/2)	450
Flowstar P2V-A	520
Valvetronic PVL-B 5/3 vented centre, G1/8	540
Valvetronic PVL-B 5/2, G1/8	540
Valvetronic PVL-C 2 x 3/2, 8 mm push in	540
Adex A12	560
Valvetronic PVL-C 2 x 3/2 G1/8	570
Compact Isomax DX01	585
VIKING Xtreme P2LAX	660
Valvetronic PVL-C 5/3 closed centre, 8 mm push in	700
Valvetronic PVL-C 5/3 vented centre, G1/4	700
B3-Series	780
Valvetronic PVL-C 5/3 closed centre, G1/4	780
Moduflex size 2, (4/2)	800
Valvetronic PVL-C 5/2, 8 mm push in	840
Valvetronic PVL-C 5/3 vented centre, 8 mm push in	840
Valvetronic PVL-C 5/2, G1/4	840
Flowstar P2V-B	1090
ISOMAX DX1	1150
B53 Manual and mechanical	1160
B4-Series	1170
VIKING Xtreme P2LBX	1290
B5-Series, G1/4	1440
Airline Isolator Valve VE22/23	1470
ISOMAX DX2	2330
VIKING Xtreme P2LCX, G3/8	2460
VIKING Xtreme P2LDX, G1/2	2660
ISOMAX DX3	4050
Airline Isolator Valve VE42/43	5520
Airline Isolator Valve VE82/83	13680

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Introduction to the ATEX directive

Explosive atmospheres

Directive 94/9/EC defines an explosive atmosphere as a mixture of:

a) flammable substances – gases, vapours, mists or dusts

b) with air

c) under specific atmospheric conditions

d) in which, after ignition has occurred, combustion spreads to the entire flammable mixture

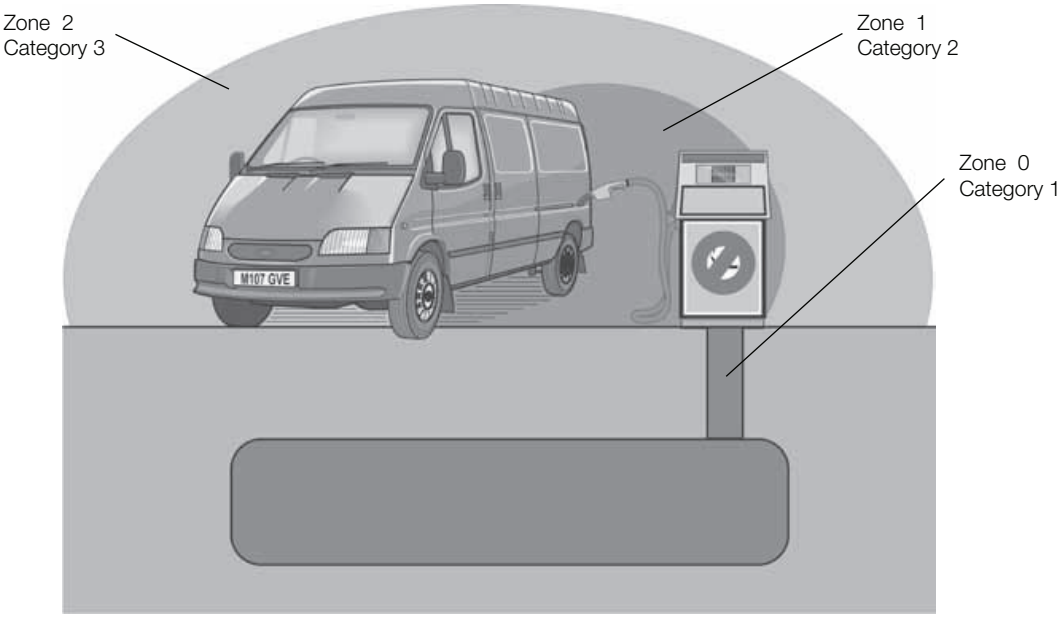
(NB: with regard to dust, it may be that not all dust is combusted after ignition has occurred)

An atmosphere with the potential to become an explosive atmosphere during operating conditions and/or under the influence of the surroundings is defined as a potentially explosive atmosphere. Products covered by directive 94/9/EC are defined as intended for use in potentially explosive atmospheres.

Harmonised European ATEX standard

The European Union has adopted two harmonised directives in the field of health and safety. The directives are known as ATEX 100a and ATEX 137.

Directive ATEX 100a (94/9/EC) lays down minimum safety requirements for products intended for use in potentially explosive atmospheres in European Union member states. Directive ATEX 137 (99/92/EC) defines minimum requirements for health and safety at the workplace, for working conditions and for the handling of products and materials in potentially explosive atmospheres. This directive also divides the workplace into zones and defines criteria by which products are categorised within these zones.
The table below describes the zones in an installation where there is a potential for explosive atmospheres. The owner of the installation must analyse and assess the area in which the explosive gas/dust mixture may occur, and if necessary must divide it into zones. This process of zoning then allows the correct plant and equipment to be selected for use in the area.



Zones Gas G	Zones Dust D	Presence of potentially explosive atmosphere	Type of risk
0	20	Present continuously or for long periods	Permanent
1	21	Likely to occur in normal operation occasionally	Potential
2	22	Not likely to occur in normal operation but, if it does occur, will persist for a short period only	Minimal

The ATEX directive has been in force throughout the European Union since 1 July 2003, replacing the existing divergent national and European legislation relating to explosive atmospheres.
Please note that for the first time, the directive covers mechanical, hydraulic and pneumatic equipment and not just electrical equipment as before.

With regard to the Machinery directive 98/37/EC, note that a number of external requirements in 94/9/EC refer to hazards arising from potentially explosive atmospheres, where the Machinery directive only contains general requirements relating to explosion safety (Annex I 1.5.7).
As a result, directive 94/9/EC (ATEX 100a) takes precedence over the Machinery directive with regard to explosion protection in potentially explosive atmospheres. The requirements in the Machinery directive are applicable to all other risks relating to machinery.

Levels of protection for the various equipment categories

The various equipment categories must be capable of operating in accordance with the manufacturer's operating specifications at defined levels of protection.

Definition of groups (EN 1127-1)

Level of protection	Category Group I	Category Group II	Type of protection	Operating specifications
Very high	M1		Two independent means of protection or safety, ensuring that the equipment remains functional even in the event of two faults occurring independently of each other	The equipment remains energised and and functional even with an explosive atmosphere present
Very high		1	Two independent means of protection or safety, ensuring that the equipment remains functional even in the event of two faults occurring independently of each other	The equipment remains energised and functional in zones 0, 1, 2 (G) and/or zones 20, 21, 22 (D)
High	M2		Protection suitable for normal operation and severe operating conditions	The equipment is de-energised in the event of an explosive atmosphere
High		2	Protection suitable for normal operation and frequent faults, or equipment in which faults normally have to be taken into account	The equipment remains energised and functional in zones 1, 2 (G) and/or zones 21, 22 (D)
Normal		3	Protection suitable for normal operation	The equipment remains energised and functional in zones 2 (G) and/or zones 22 (D)

Group I Equipment intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by flammable vapours and/or flammable dusts.
Group II Equipment intended for use in other places exposed to explosive atmospheres.
G = gas and D = dust

Group	I mines, combustible vapours		II other potentially explosive atmospheres (gases, dust)					
Category	**M1**	**M2**	**1**		**2**		**3**	
Atmosphere*			G	D	G	D	G	D
Zone			0	20	1	21	2	22

Temperature classes

Classification of flammable gases and vapours on the basis of ignition temperature

Temperature class	Ignition temperature °C
T1	Over 450
T2	(300) – 450
T3	(200) – 300
T4	(135) – 200
T5	(100) – 135
T6	(85) - 100

Declaration of conformity

The product catalogues contain copies of the declaration of conformity demonstrating that the product meets the requirements of directive 94/9/EC.
The declaration is only valid in conjunction with the instructions contained in the installation manual relating to the safe use of the product throughout its service life.
The instructions relating to the conditions in the surrounding area are particularly important, as the certificate is invalidated if the instructions are found not to have been adhered to during operation of the product.
If there is any doubt as to the validity of the certificate of conformity, contact Parker Hannifin customer service.

Operation, installation and maintenance

The installation manual of the product contains instructions relating to the safe storage, handling, operation and servicing of the product.
The manual is available in different languages, and can be downloaded from www.parker.com/euro_pneumatic.
This document must be made accessible in a suitable place near where the product is installed. It is used as a reference for all personnel authorised to work with the product throughout its service life.
We, the manufacturer, reserve the right to modify, extend or improve the installation manual in the interests of the users.

For more information about ATEX see EUs homepage: http://europa.eu.int/comm/enterprise/atex/

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Safety instructions for the P1D-S cylinder with accessories

Supplementary safety instructions for P1D-S cylinders installed in Ex-areas

Serious, even fatal, damage or injury may be caused by the hot moving parts of the P1D cylinders in the presence of explosive gas mixtures and concentrations of dust.

All installation, connection, commissioning, servicing and repair work on P1D cylinders must be carried out by qualified personnel taking account of the following

- These instructions
- Markings on the cylinder
- All other planning documents, commissioning instructions and connection diagrams associated with the application.
- Provisions and requirements specific to the application
- National/international regulations (explosion protection, safety and accident prevention)

Real life applications

P1D cylinders are designed to provide linear movement in industrial applications, and should only be used in accordance with the instructions in the technical specifications in the catalogue, and within the operating range indicated on the rating plate. The cylinders meet the applicable standards and requirements of directive 94/9/EC (ATEX)

The cylinders must not be used underground in mines susceptible to firedamp and/or flammable dusts. The cylinders are intended for use in areas in which explosive atmospheres caused by gases, vapours or mists of flammable liquids, or air/dust mixtures may be expected to occur during normal use (infrequently)

Checklist

Before using the cylinders in an Ex-area, you should check the following:
Do the specifications of the P1D-S cylinder match the Ex-classification of the area of use in accordance with directive 94/9/EC (previously ATEX 100a)

- Equipment group
- Ex-equipment category
- Ex-zone
- Temperature class
- Max. surface temperature

1. When installing the P1D-S cylinder, is it certain that there is no potentially explosive atmosphere, oil, acids, gases, vapours or radiation?
2. Is the ambient temperature as specified in the technical data in the catalogue at all times?
3. Is it certain that the P1D-S cylinder is adequately ventilated and that no forbidden additional heat is added?
4. Are all the driven mechanical components ATEX certified?
5. Check that the P1D-S cylinder is safely earthed.
6. Check that the P1D-S cylinder is supplied with compressed air. Explosive gas mixtures must not be used for driving the cylinder.
7. Check that the P1D-S cylinder is not equipped with a metal scraper ring (special version).

Installation requirements in Ex-areas

- The temperature of the supply air must not exceed the ambient temperature.
- The P1D-S cylinder may be installed in any position.
- An air treatment unit must be attached to the inlet of the P1D-S cylinder.
- The P1D-S cylinder must be connected to earth at all times, through its support, a metallic tube or separate conductor.
- The outlet of the P1D-S cylinder must not be open within an Ex-area, but must be connected to the silencer or, preferably, piped and released outside the Ex-area.
- The P1D-S cylinder may only drive units that are ATEX certified.
- Ensure that the P1D-S cylinder is not exposed to forces greater than those permitted in accordance with the catalogue
- The P1D-S cylinder must be supplied with compressed air. Explosive gas mixtures must not be used
- P1D-S cylinders with metal scraper rings must not be used in Ex-areas

Inspecting cylinders during operation

The P1D cylinder must be kept clean on the outside, and a layer of dust/dirt thicker than 1 mm must never be allowed to form.
Strong solvents should not be used for cleaning, because they can cause the seal (material PUR) around the piston rod to swell, potentially increasing the temperature. Inspect and verify that the cylinder, with attachments, compressed air fittings, hoses, tubes, etc. meet the standards of ”safe” installation.

Marking of cylinder P1D-S Standard (P1D-S***MS-****)

II 2GD c T4 120 °C

CE on the product shows that Parker Hannifin products meet one or more EU directives.

Ex means that this product is intended for use in potentially explosive atmospheres.

II Stands for the equipment group (I = mines and II = other hazardous areas).

2GD Stands for equipment category 2G means the equipment can be used in zones 1 and 2 where there is a risk involving gases, vapours or mists of combustible liquids and 2D in zones 21 and 22 where there is a risk involving dusts. 2GD Means the equipment can be used in zones 1, 2, 21 and 22.

c Safe design (prEN 13463-5)

T4 If equipment is in temperature class T4, the maximum surface temperature must not exceed 135 °C. (To guarantee this, the product has been tested to ensure that the maximum is 130 °C. This provides a safety margin of 5 °K).

120 °C Maximum permitted surface temperature on P1D-S cylinder in atmospheres containing potentially explosive dusts.

Supplementary safety instructions for P8S- GPFLX/EX sensors installed in Ex-areas

Serious, even fatal, damage or injury may be caused by the hot moving parts of the P1D cylinders in the presence of explosive gas mixtures and concentrations of dust.

Instructions for use

Safety instructions

- Cylinder sensor ATEX classed for category II3G and II3D
- Ambient temperature Ta = -20 °C to +45 °C
- Temperature class T4, or max. surface temperature of T = 135 °C
- Protection class IP67
- Read installation instructions before startup
- Installation, connection and commissioning must be carried out by trained personnel

Applications

- This sensor is designed for use in the T-groove of cylinders, and detects the magnetic field in potentially explosive areas. The sensor can only be installed in the T-groove of these cylinders.
- The sensor may also be installed on round cylinders by means of the following attachments:

  P8S-TMC01 Suitable for P1S and P1A diameter 10 - 25 mm

  P8S-TMC02 Suitable for P1S diameter 32 - 63 mm

  P8S-TMC03 Suitable for P1S diameter 80 - 125 mm

The following data applies to these attachments:

- Ambient temperature Ta = 0 °C to 45 °C
- Low energy absorption to EN 50 021

- The sensor may also be installed on tie-rod cylinders or profile cylinders by means of this attachment:

  P8S-TMA0X Suitable for P1D-T diameter 32 - 125 mm, P1E-T diameter 160 – 200 mm and C41 diameter 160 – 200 mm

Installation

General: The sensor must be protected from UV radiation. The cable must be installed such that it is protected from external influences, for example it may be necessary to attach an external strain relief to the cable.

Technical data for sensor

Operating voltage Ub = 18 to 30 V DC
Max. load current Ia d" ¡Ü 70 mA
Ambient temperature: -20 °C to 45 °C

Commissioning

When connecting the sensor to a power source, please pay attention to the following
a) the load data (operating voltage, continuous load current)
b) the wiring diagram for the sensor

Maintenance

Our P8S-GPFLX/EX cylinder sensor is maintenance free, but the cable connections should be checked at regular intervals.
The sensor must be protected from UV radiation. The sensor must be kept clean on the outside, and a layer of dirt thicker than 1 mm must never be allowed to form. Strong solvents should not be used for cleaning as they may damage the sensor.

P8S-GPFLX/EX cylinder sensor

II3G EEx nA II T4X
II3D 135 °C IP67

Communauté Européenne = EU

CE on the product shows that Parker Hannifin products meet one or more EU directives.

Ex means that this product is intended for use in potentially explosive atmospheres.

II Stands for the equipment group (I = mines and II = other hazardous areas)

3G Stands for the equipment category 3G means the equipment can be used in zone 2 where there is a risk involving gases, vapours or mists of combustible liquids.

EEx EEx means that this is an electrical product intended for use in Ex-areas.

nA IIn Not ignitable to EN50021, A Explosion group tested with acetone, ethanol, toluene and xylene; II Not for use in the mining industry.

T4 X If equipment is in temperature class T4, the maximum surface temperature must not exceed 135 °C. (To guarantee this, the product has been tested to ensure that the maximum is 130 °C. This provides a safety margin of 5 °K.) X Must be installed in accordance with the installation manual.

3D Stands for equipment category 3D in zone 22 where there is a risk involving dusts.

135 °C Maximum permitted surface temperature on the sensor in atmospheres containing potentially explosive dusts.

IP67 Satisfies protection class IP67.

Components such as cylinder attachments, tube fittings, tubes, etc.

Components

Parker Hannifin guarantees that our cylinder attachments, tube fittings, tubes, etc. are not subject to the provisions of the ATEX directive.

A component means any item essential to the safe functioning of equipment and protective systems but with no autonomous function.

Components intended for incorporation into equipment or protective systems which are accompanied by an attestation of conformity with the ATEX directive, including a statement of their characteristics and how they must be incorporated into products, are considered to conform to the applicable provisions of directive 94/9/EC. Ex-components as defined in the European standard EN 50014 are components in the sense of the ATEX directive 94/9/EC as well. Components must not have the CE marking affixed unless otherwise required by other directives.

Examples of components:

- terminals
- push buttons assemblies
- relays
- empty flameproof enclosures
- ballasts for fluorescent lamps
- meters (e.g. moving coil)
- encapsulated relays and contactors, with terminals and/or flying leads

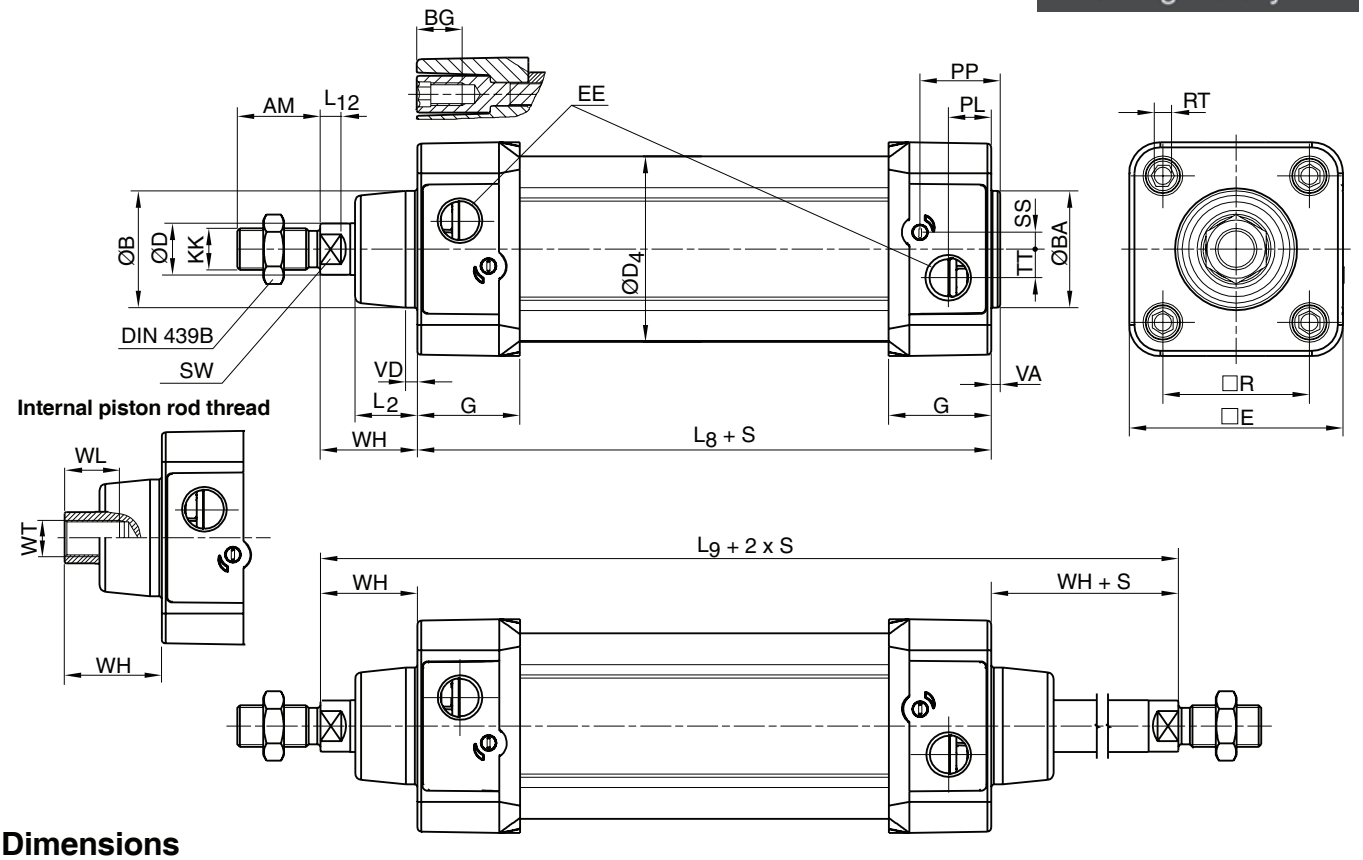
C

P1D Standard

CAD drawings on the Internet

Our home page www.parker.com/euro_pneumatic includes the AirCad Drawing Library with 2D and 3D drawings for the main versions.

AirCad™ Drawing Library



Dimensions

Cylinder bore mm	AM mm	B mm	BA mm	BG mm	D mm	D4 mm	E mm	EE mm	G mm	KK	L2 mm	L8 mm	L9 mm	L12 mm
32	22	30	30	16	12	45,0	50,0	G1/8	28,5	M10x1,25	16,0	94	146	6,0
40	24	35	35	16	16	52,0	57,4	G1/4	33,0	M12x1,25	19,0	105	165	6,5
50	32	40	40	16	20	60,7	69,4	G1/4	33,5	M16x1,5	24,0	106	180	8,0
63	32	45	45	16	20	71,5	82,4	G3/8	39,5	M16x1,5	24,0	121	195	8,0
80	40	45	45	17	25	86,7	99,4	G3/8	39,5	M20x1,5	30,0	128	220	10,0
100	40	55	55	17	25	106,7	116,0	G1/2	44,5	M20x1,5	32,4	138	240	14,0
125	54	60	60	20	32	134,0	139,0	G1/2	51,0	M27x2	45,0	160	290	18,0

Cylinder bore mm	PL mm	PP mm	R mm	RT	SS mm	SW mm	TT mm	VA mm	VD mm	WH mm	WL mm	WT
32	13,0	21,8	32,5	M6	4,0	10	4,5	3,5	4,5	26	21	M8x1
40	14,0	21,9	38,0	M6	8,0	13	5,5	3,5	4,5	30	23	M10x1,25
50	14,0	23,0	46,5	M8	4,0	17	7,5	3,5	5,0	37	31	M14x1,5
63	16,4	27,4	56,5	M8	6,5	17	11,0	3,5	5,0	37	31	M14x1,5
80	16,0	30,5	72,0	M10	0	22	15,0	3,5	4,0	46	39	M18x1,5
100	18,0	35,8	89,0	M10	0	22	20,0	3,5	4,0	51	39	M18x1,5
125	28,0	40,5	110,0	M12	0	27	17,5	5,5	6,0	65	53	M24x2

S=Stroke

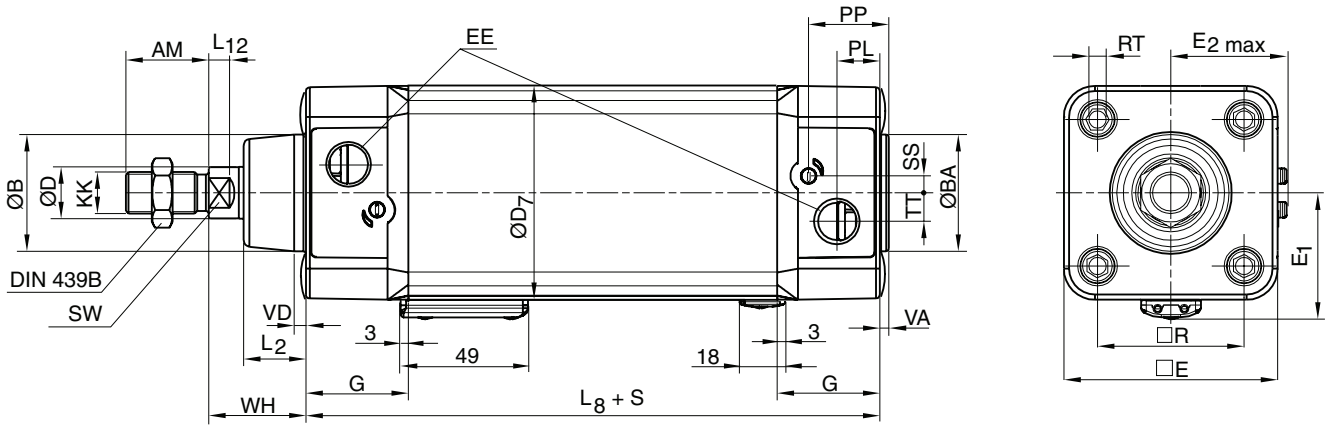
Tolerances

Cylinder bore mm	B	BA	L_8 mm	L_9 mm	R mm	Stroke tolerance up to stroke 500 mm	Stroke tolerance for stroke over 500 mm
32	d11	d11	±0,4	±2	±0,5	+0,3/+2,0	+0,3/+3,0
40	d11	d11	±0,7	±2	±0,5	+0,3/+2,0	+0,3/+3,0
50	d11	d11	±0,7	±2	±0,6	+0,3/+2,0	+0,3/+3,0
63	d11	d11	±0,8	±2	±0,7	+0,3/+2,0	+0,3/+3,0
80	d11	d11	±0,8	±3	±0,7	+0,3/+2,0	+0,3/+3,0
100	d11	d11	±1,0	±3	±0,7	+0,3/+2,0	+0,3/+3,0
125	d11	d11	±1,0	±3	±1,1	+0,3/+2,0	+0,3/+3,0

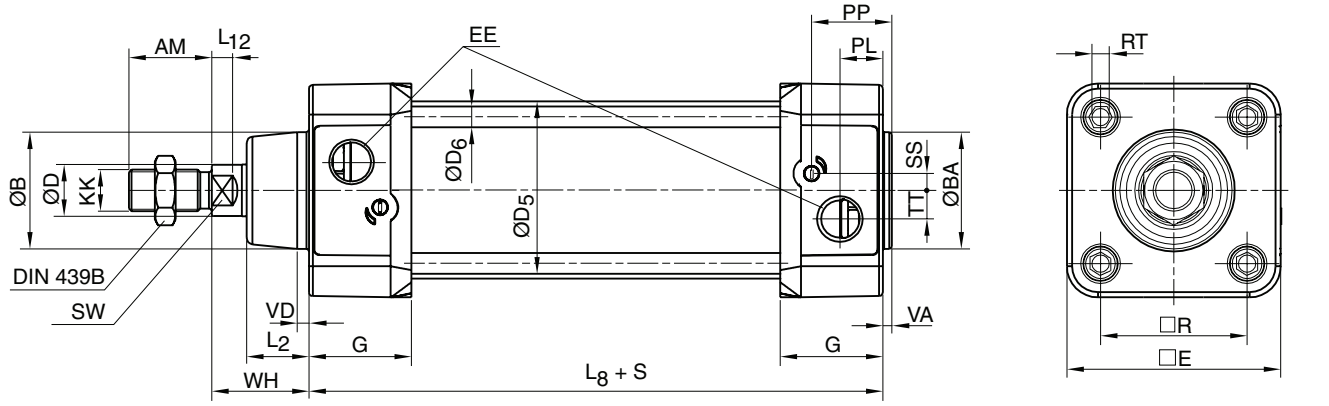
C

P1D Clean

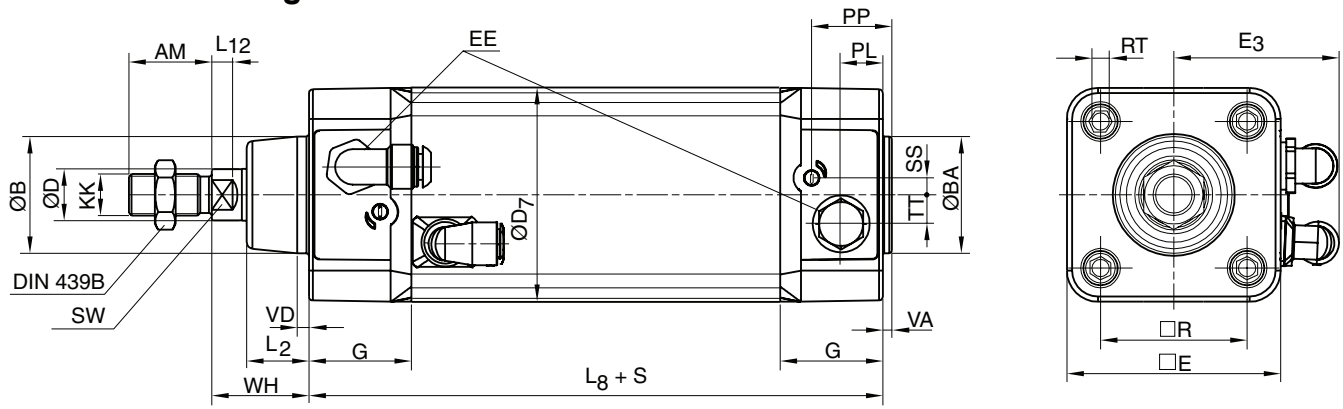
Minimum stroke for P1D Clean is 25 mm with 0-2 sensors and 100 mm with 3-4 sensors.



P1D Tie-Rod



P1D Flexible Porting



Dimensions

Cylinder bore						Elbow fittings, tubing Ømm				Straight fittings, tubing Ømm			
						4	6	8	10	4	6	8	10
	D5	D6	D7	E1	E2max	E3	E3	E3	E3	E3	E3	E3	E3
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
32	36	5,3	49,6	32	30,0	42	44	-	-	38	40	-	-
40	44	5,3	57,3	36	34,7	46	48	-	-	42	44	-	-
50	55	7,1	69,3	42	40,7	-	-	56	76	-	-	48	50
63	68	7,1	82,3	49	46,2	-	-	64	83	-	-	55	75
80	86	8,9	99,3	57	54,7	-	-	-	-	-	-	-	-
100	106	8,9	117,6	68	64,0	-	-	-	-	-	-	-	-
125	132	10,8	142,8	81	75,5	-	-	-	-	-	-	-	-

Other dimensions, see opposite page

P1D Flexible Porting Ø80 - Ø125 can be ordered with threaded ports only or with factory-fitted elbow or straight push-in fittings (see position 20 in the order code key.)

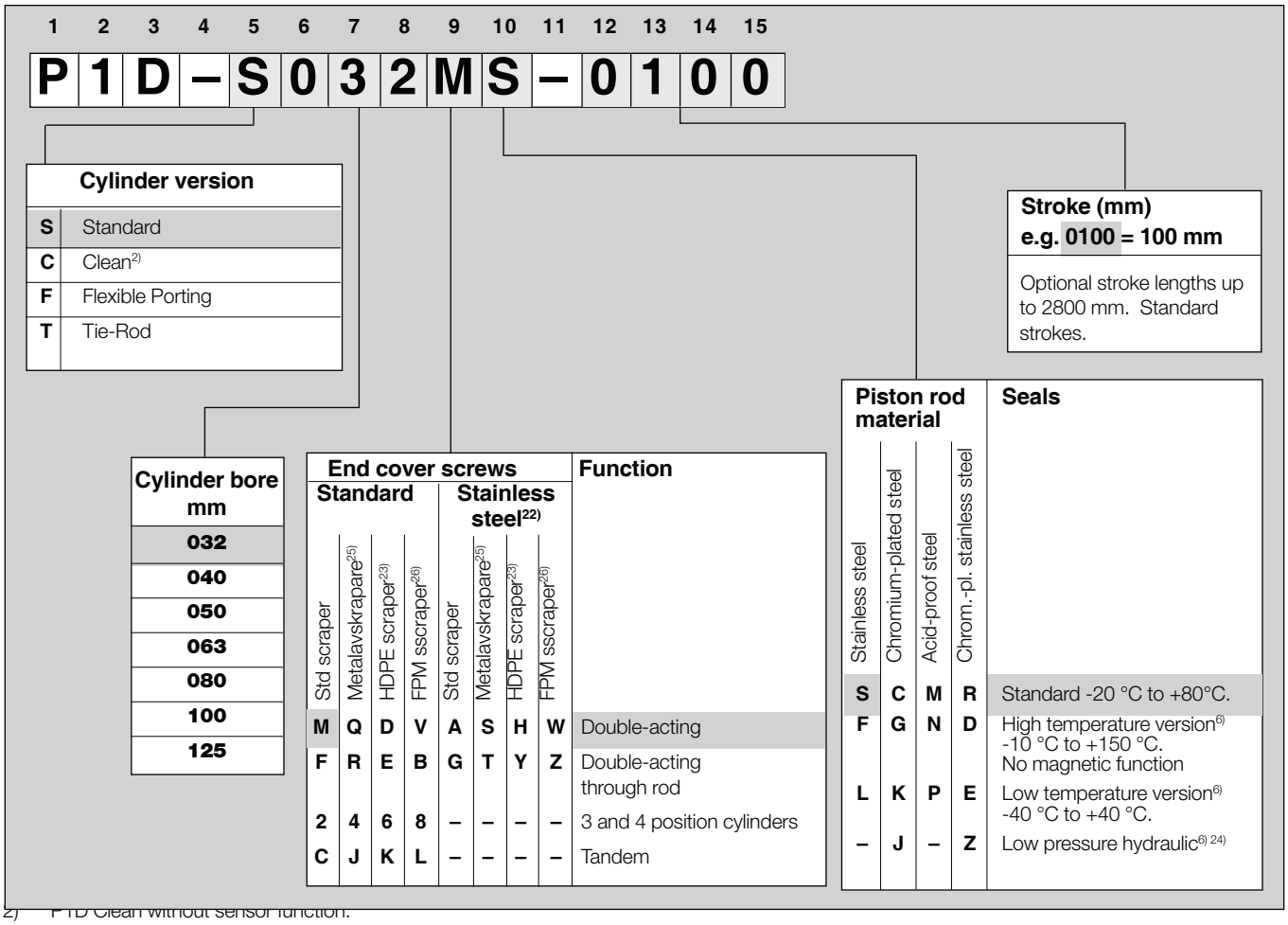
C

The simple and complete order key

The P1D order key is based on the same principles as its predecessors, the P1C and P1E. This makes it easy to identify and order all common cylinder versions. The change-over from our previous cylinder ranges to the equivalent P1D cylinders is logical and simple. As far as possible, the same symbols as for P1C and P1E have been retained for the same functions. Most of the common cylinder types in the P1D-family have a 15-digit order number.

Many of our new cylinder versions, e.g. P1D Clean and P1D Flexible Porting, and complete working units (with factory-fitted cylinder mountings, sensors etc.) are defined by a 20-digit order number. There is only one single order key for P1D, which thus contains the 15-digit order numbers for the most common cylinder types and 20-digit order numbers for cylinders with more functions. Remember that there are always 15 or 20 positions in the order number – never any figure in between.

CE Ex II 2GD c T4 120 °C



2) P1D Clean without sensor function.

6) For P1D-S and P1D-T.

22) If stainless steel end cover screws are selected, the piston rod nuts are also supplied in stainless steel.

23) For dry rod operation.

24) The seal system for low pressure hydraulics demands a hard chromed surface for proper function.

25) The metal scraper ring requires a hard-chromium plated piston rod

26) FPM scraper should be chosen for higher chemical resistance on standard temperature versions only.

Example 1 Standard, double acting cylinder

Standard cylinder with standard scraper ring (PUR), standard piston rod material (stainless steel) and standard temperature range.

P1D	Compare P1C and P1E
P1D-S032MS-0160	P1C-S032MS-0160
P1E-S032MS-0160	
P1D-S100MS-0400	P1C-S100MS-0400
	P1E-S100MS-0400

Example 2 Tie-Rod design, double acting cylinder

Tie-rod cylinder with standard scraper ring (PUR), hard chromed steel piston rod and standard temperature range.

P1D	Compare P1E
P1D-T040MC-0125	P1E-T040MC-0125

P1D Standard

The order numbers on this page refer to P1D Standard without sensors. The cylinders can be ordered with sensors, fittings, piston rod and cylinder mountings, speed controls etc. for efficient logistics. Please refer to the order key to select cylinders with factory-fitted accessories.

CE Ex II 2GD c T4 120 °C

C

P1D Standard

Double-acting

Cyl. bore mm	Stroke mm	Order code
32 Conn. G1/8	25	**P1D-S032MS-0025**
	40	**P1D-S032MS-0040**
	50	**P1D-S032MS-0050**
	80	**P1D-S032MS-0080**
	100	**P1D-S032MS-0100**
	125	**P1D-S032MS-0125**
	160	**P1D-S032MS-0160**
	200	**P1D-S032MS-0200**
	250	**P1D-S032MS-0250**
	320	**P1D-S032MS-0320**
	400	**P1D-S032MS-0400**
	500	**P1D-S032MS-0500**
40 Conn. G1/4	25	**P1D-S040MS-0025**
	40	**P1D-S040MS-0040**
	50	**P1D-S040MS-0050**
	80	**P1D-S040MS-0080**
	100	**P1D-S040MS-0100**
	125	**P1D-S040MS-0125**
	160	**P1D-S040MS-0160**
	200	**P1D-S040MS-0200**
	250	**P1D-S040MS-0250**
	320	**P1D-S040MS-0320**
	400	**P1D-S040MS-0400**
	500	**P1D-S040MS-0500**
50 Conn. G1/4	25	**P1D-S050MS-0025**
	40	**P1D-S050MS-0040**
	50	**P1D-S050MS-0050**
	80	**P1D-S050MS-0080**
	100	**P1D-S050MS-0100**
	125	**P1D-S050MS-0125**
	160	**P1D-S050MS-0160**
	200	**P1D-S050MS-0200**
	250	**P1D-S050MS-0250**
	320	**P1D-S050MS-0320**
	400	**P1D-S050MS-0400**
	500	**P1D-S050MS-0500**
63 Conn. G3/8	25	**P1D-S063MS-0025**
	40	**P1D-S063MS-0040**
	50	**P1D-S063MS-0050**
	80	**P1D-S063MS-0080**
	100	**P1D-S063MS-0100**
	125	**P1D-S063MS-0125**
	160	**P1D-S063MS-0160**
	200	**P1D-S063MS-0200**
	250	**P1D-S063MS-0250**
	320	**P1D-S063MS-0320**
	400	**P1D-S063MS-0400**
	500	**P1D-S063MS-0500**

P1D Standard

Double-acting

Cyl. bore mm	Stroke mm	Order code
80 Conn. G3/8	25	**P1D-S080MS-0025**
	40	**P1D-S080MS-0040**
	50	**P1D-S080MS-0050**
	80	**P1D-S080MS-0080**
	100	**P1D-S080MS-0100**
	125	**P1D-S080MS-0125**
	160	**P1D-S080MS-0160**
	200	**P1D-S080MS-0200**
	250	**P1D-S080MS-0250**
	320	**P1D-S080MS-0320**
	400	**P1D-S080MS-0400**
	500	**P1D-S080MS-0500**
100 Conn. G1/2	25	**P1D-S100MS-0025**
	40	**P1D-S100MS-0040**
	50	**P1D-S100MS-0050**
	80	**P1D-S100MS-0080**
	100	**P1D-S100MS-0100**
	125	**P1D-S100MS-0125**
	160	**P1D-S100MS-0160**
	200	**P1D-S100MS-0200**
	250	**P1D-S100MS-0250**
	320	**P1D-S100MS-0320**
	400	**P1D-S100MS-0400**
	500	**P1D-S100MS-0500**
125 Conn. G1/2	25	**P1D-S125MS-0025**
	40	**P1D-S125MS-0040**
	50	**P1D-S125MS-0050**
	80	**P1D-S125MS-0080**
	100	**P1D-S125MS-0100**
	125	**P1D-S125MS-0125**
	160	**P1D-S125MS-0160**
	200	**P1D-S125MS-0200**
	250	**P1D-S125MS-0250**
	320	**P1D-S125MS-0320**
	400	**P1D-S125MS-0400**
	500	**P1D-S125MS-0500**

The cylinders are supplied complete with one zinc plated steel piston rod nut.