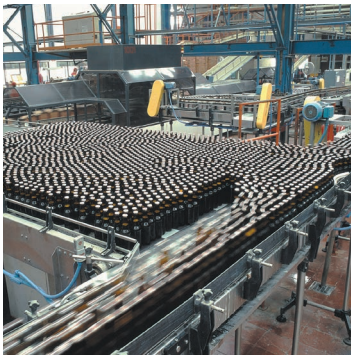

Pneumatic Cylinders

P1P Series
According to ISO 21287

Catalog 0963

Parker

ENGINEERING YOUR SUCCESS.

5-Year Extended Warranty, Warning, Offer of Sale

The Parker 5-Year Extended Warranty

Parker Hannifin Corporation will extend its warranty on all pneumatic components to sixty (60) months providing they are correctly installed and protected by Parker pneumatic filters which are properly maintained. Components covered by this warranty include all cylinders, valves, and pneumatic automation components manufactured by Parker in any of our global facilities. This warranty covers our components anywhere in the world you may ship your equipment.

Parker's obligation under this warranty is limited to the replacement or repair of any failed components. The buyer understands that the seller will not be liable for any other costs or damages.

The buyers of quality Parker components and filters benefit by having ONE source for all pneumatic needs - **Parker.**

Jennifer Parmentier
President
Motion Systems Group

Parker

⚠ 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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The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled “Offer of Sale”.

Index

Features

P1P Compact Cylinder according to ISO 21287

The P1P Series is a complete range of ISO 21287 compact cylinders developed to meet the highest requirements for quality and performance.

Features

- ISO 21287 conformity and global availability throughout the worldwide Parker Hannifin organization.
- Bore sizes 20, 25, 32, 40, 50, 63, 80 and 100mm.
- One of the widest ranges of sizes and versions for a broad range of applications.
- Long service life thanks to proven high quality materials, surfaces and seal technology.
- Compact design and many installation alternatives for flexible use in narrow spaces.
- Efficient elastic cushioning absorbing residual energy facilitates high speeds, short cycle times and reduced noise.
- Flush, drop in global P8SAG sensors on all side faces for flexible and compact assembly and mechanical protection of the sensors.
- P1P is suitable for processing, packaging and handling applications within the food industry thanks to the food approved grease used for the initial greasing.

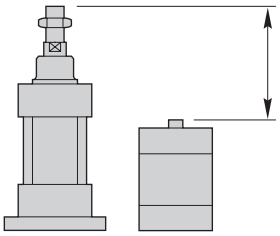
High quality

Reliability and long service life are key qualities of any pneumatic cylinder.

- Proven seal design and materials throughout the cylinder. The expertise for seal technology within Parker Hannifin is the basis for leading and proven tribology solutions for all our pneumatic actuators.
- Body extrusion in anodized aluminum with extra fine and hard internal surface for optimum operational conditions.
- End covers are sand blasted aluminum.

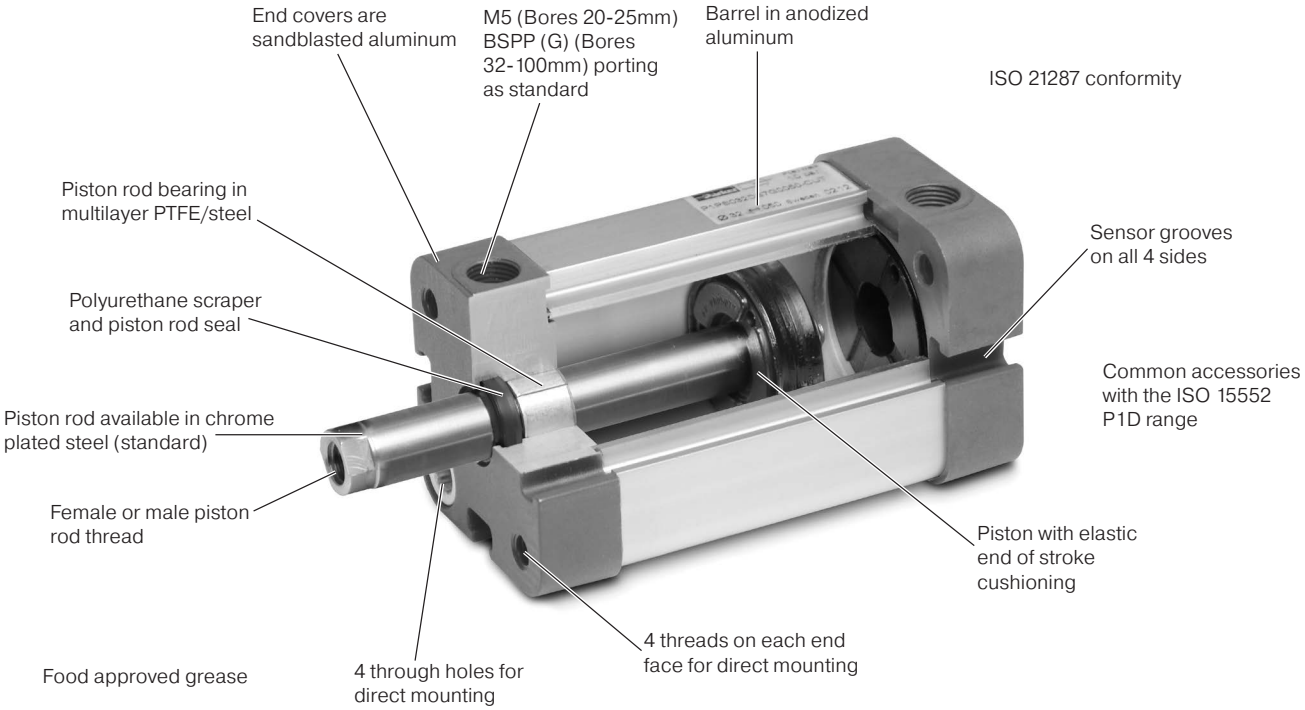
Compact dimensions for versatile use

The very compact axial dimensions makes it possible to use the P1P cylinders in a broad range of applications. Note that the P1P cylinders are up to 50% shorter than ISO 15552 cylinders for the same stroke length. This is highly valuable in narrow spaces in machines or production lines.



Up to 50% shorter than ISO 15552 cylinders for the same stroke length

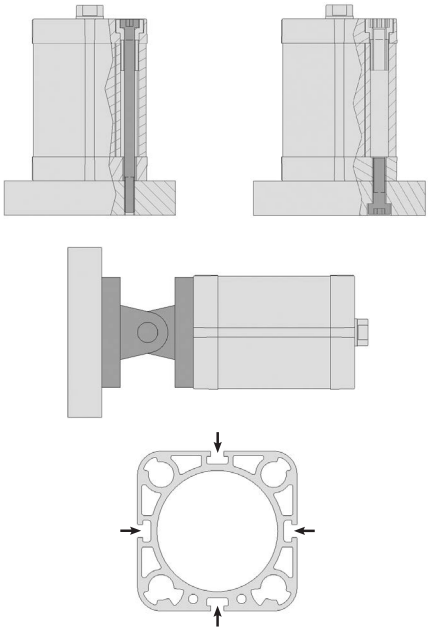
Features



Flexible installation

The new P1P compact cylinder range offers many opportunities for mechanical installation.

- There are holes through the cylinder body. Use these to fix the cylinder with through bolts into threads in the surface behind the cylinder.
- In each end of the same through holes there are female threads. These can be used for flange mounting of the actuator from the rear or front face.
- The wide range of ISO 15552 cylinder mountings are available for use with P1P cylinders bore 20-100 mm. Examples are the foot and flange mountings, as well as MP2 and MP4 mountings for articulated applications.



Global drop-in P8SAG sensor range

The global sensor range P8SAG fits P1P as well as most of our pneumatic cylinder families. This simplifies your ordering, stock and overall service of sensors.

The P8SAG sensors has a drop-in mounting into the sensor grooves facilitating the assembly and commissioning work. There are sensor grooves on all four side faces for maximum flexibility and adaptation to each application.

The wide range of P8SAG sensors includes both reed and solid state sensors, flying lead versions with 3 and 10 meter cable and pig tail versions with M8 and M12 connector.

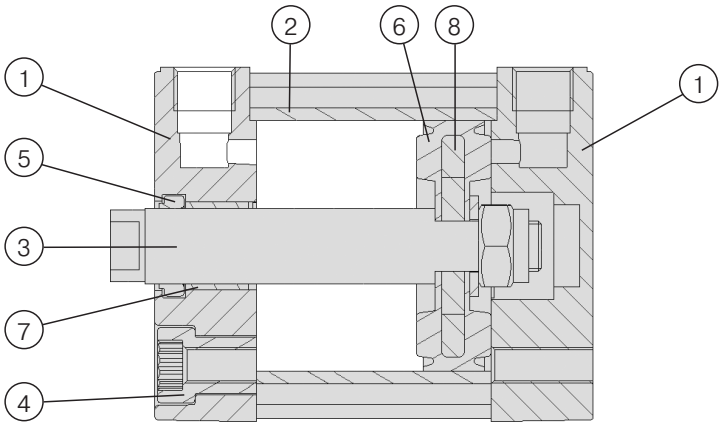
General technical data

Product Type		Compact cylinder according to ISO 21287
Bore Size		20 - 100 mm
Stroke Length		1-500 mm
Versions	P1PS...DC	Double acting
	P1PG...DC	Double acting with non rotating piston rod
	P1PS...SC	Single acting: Spring return (Bores 20 - 63mm)
	P1PS...TC	Single acting: Spring extended (Bores 20 - 63mm)
	P1PS...KC	Through piston rod
	P1PS...DG	High temperature
	P1PS...DK	Low temperature
Cushioning		Elastic cushioning
Position Sensing		Proximity sensor
Installation	Direct	Through holes Female thread on front and rear end face
	Accessories	Cylinder and piston rod mountings
Mounting position		Any

Operating and environmental data

Operating medium	For best possible service life and trouble-free operation it is recommended to use dry, filtered compressed air to ISO 8573-1:2010 quality class 3.4.3. This specifies a dew point of +30C for indoor operation (a lower dew point should be selected for minus temperature operation and we recommend the use of an inline dryer) and is aligned with the air quality from most standard compressors with a standard filter.	
Operating pressure	0.5 bar to 10 bar	
Ambient temperature	Standard version	-20ºC to +80ºC
	High temperature	-10ºC to +120ºC
	Low temperature	-40ºC to +80ºC
Pre-lubricated	Further lubrication is normally not necessary. If additional lubrication is introduced it must be continued.	
Corrosion resistance	High resistance to corrosion and chemicals. Materials and surface treatment have been selected for industrial applications where solvents and detergents are frequently used.	

Material specification



General technical data

Pos	Part		Specification
1	End covers		Sandblasted Aluminum
2	Cylinder barrel		Anodized aluminum
3	Piston rod		Chrome plated carbon steel
4	End cover screws		Zinc plated steel
5	Piston rod seal	Standard	Polyurethane (PUR)
		High temperature	Flurocarbon rubber (FPM)
		Low temperature	Polyurethane (PUR)
6	Piston / piston seal	Standard	Aluminum / Nitrile rubber (NBR)
		High temperature	Aluminum / Hydrogenated nitrile rubber (HNBR)
		Low temperature	Aluminum / Nitrile rubber (NBR)
7	Piston rod bearing		Multilayer PTFE/steel
8	Magnet		Plastic coated magnetic material
	Note on materials		RoHS compliant

Cylinder forces, double acting variants

Cylinder Bore mm		Stroke	Bore mm	Piston Rod mm	Area cm2	Max Theoretical Force in N (bar) 1.0 Bar	2.0 Bar	3.0 Bar	4.0 Bar	5.0 Bar	6.0 Bar	7.0 Bar	8.0 Bar	9.0 Bar	10.0 Bar
20	Double acting	+	20	10	3,1	31	63	94	126	157	188	220	251	283	314
		-	20	10	2,3	23	46	69	92	115	138	161	184	207	231
25	Double acting	+	25	10	4,9	49	98	147	196	245	295	344	393	442	491
		-	25	10	4,1	41	82	124	165	206	247	289	330	371	412
32	Double acting	+	32	12	8.0	80	161	241	322	402	483	563	643	724	804
		-	32	12	6.9	69	138	207	276	346	415	484	553	622	691
40	Double acting	+	40	12	12.6	126	251	377	503	628	754	880	1005	1131	1257
		-	40	12	11.4	114	229	343	457	572	686	800	915	1029	1144
50	Double acting	+	50	16	19.6	196	393	589	785	982	1178	1374	1571	1767	1963
		-	50	16	17.6	176	352	529	705	881	1057	1234	1410	1586	1762
63	Double acting	+	63	16	31.2	312	623	935	1247	1559	1870	2182	2494	2805	3117
		-	63	16	29.2	292	583	875	1166	1458	1750	2041	2333	2624	2916
80	Double acting	+	80	20	50.3	503	1005	1508	2011	2513	3016	3518	4021	4524	5026
		-	80	20	47.1	471	942	1414	1885	2356	2827	3299	3770	4241	4712
100	Double acting	+	100	25	78,5	785	1571	2356	3142	3927	4712	5498	6283	7069	7854
		-	100	25	73,6	736	1473	2209	2945	3682	4418	5154	5890	6627	7363

+ = Extend stroke
- = Return stroke

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

Technical data

Cylinder Designation	Cylinder Bore Dia. mm	Cylinder Bore Area cm²	Piston Rod Dia. mm	Piston Rod Area cm²	Piston Rod Thread	Total Mass At 0 mm Stroke kg	Total Mass Addition per 10 mm Stroke kg	Air Consumption litres (1)	Port Size
P1PS…DC7G Double acting with female piston rod thread									
P1PS020	20	3.1	10	0.78	M6 x 1.0	0.140	0.018	0.0405	M5
P1PS025	25	4.9	10	0.78	M6 x 1.0	0.170	0.022	0.0633	M5
P1PS032	32	8.0	12	1.1	M8 x 1.25	0.291	0.030	0.105	G1/8
P1PS040	40	12.6	12	1.1	M8 x 1.25	0.375	0.036	0.162	G1/8
P1PS050	50	19.6	16	2.0	M10 x 1.5	0.519	0.050	0.253	G1/8
P1PS063	63	31.2	16	2.0	M10 x 1.5	0.743	0.059	0.414	G1/8
P1PS080	80	50.3	20	3.1	M12 x 1.75	1.263	0.081	0.669	G1/8
P1PS100	100	78.5	25	4.9	M12 x 1.75	2.206	0.111	1.043	G1/8
P1PS…DC8G Double acting with male piston rod thread									
P1PS020	20	3.1	10	0.78	M8 x 1.25	0.145	0.018	0.0405	M5
P1PS025	25	4.9	10	0.78	M8 x 1.25	0.179	0.022	0.0633	M5
P1PS032	32	8.0	12	1.1	M10 x 1.25	0.308	0.030	0.105	G1/8
P1PS040	40	12.6	12	1.1	M10 x 1.25	0.392	0.036	0.162	G1/8
P1PS050	50	19.6	16	2.0	M12 x 1.25	0.548	0.050	0.253	G1/8
P1PS063	63	31.2	16	2.0	M12 x 1.25	0.772	0.059	0.414	G1/8
P1PS080	80	50.3	20	3.1	M16 x 1.5	1.322	0.081	0.669	G1/8
P1PS100	100	50.3	25	4.9	M16 x 1.5	1.267	0.111	1.043	G1/8
P1PG…DC7G Double acting with guided piston rod									
P1PG020	20	3.1	10	0.78	-	0.185	0.022	0.0405	M5
P1PG025	25	4.9	10	0.78	-	0.217	0.027	0.0633	M5
P1PG032	32	8.0	12	1.1	-	0.358	0.033	0.105	G1/8
P1PG040	40	12.6	12	1.1	-	0.455	0.039	0.162	G1/8
P1PG050	50	19.6	16	2.0	-	0.664	0.057	0.253	G1/8
P1PG063	63	31.2	16	2.0	-	0.930	0.067	0.414	G1/8

(1) Free air consumption per 10 mm stroke length for a double stroke at 6 bar

Application Guide - Valves: Moduflex, H Micro and H Series ISO

Selecting Pneumatic System Components

Cylinder to Valve: The below chart contains recommendations for selecting air valve products based on 5.5 bar with a 0.35 bar pressure drop. The values within the chart show the corresponding Cv values.

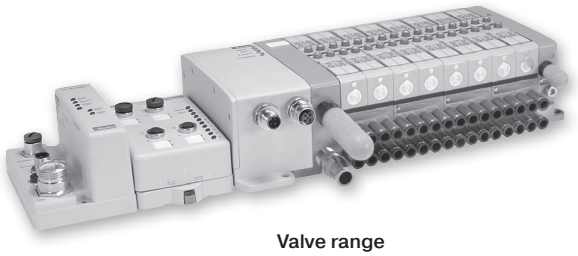
Moduflex Series

- Stand-alone valves, short-build valve manifold, or large valve manifold configurations available
- Cv range from 0.18 – 0.80
- Peripheral modules available— flow control, pressure regulation, P.O. check valves and vacuum generatorslsys

Cylinder Speed (mm/s)	20	25	32	40	50	63	80	100
50	0.01	0.02	0.03	0.04	0.06	0.10	0.16	0.26
100	0.02	0.03	0.05	0.08	0.13	0.20	0.33	0.51
150	0.03	0.05	0.08	0.12	0.19	0.30	0.49	0.77
200	0.04	0.06	0.10	0.16	0.26	0.41	0.65	1.02
250	0.05	0.08	0.13	0.20	0.32	0.51	0.82	1.28
300	0.06	0.10	0.16	0.25	0.38	0.61	0.98	1.53
350	0.07	0.11	0.18	0.29	0.45	0.71	1.15	1.79
400	0.08	0.13	0.21	0.33	0.51	0.81	1.31	2.04
450	0.09	0.14	0.24	0.37	0.58	0.91	1.47	2.30
500	0.10	0.16	0.26	0.41	0.64	1.01	1.64	2.56
				Size 2		See Larger valve system		

H Micro and H Series ISO

- H Series Micro Cv range 0.30 – 0.35
- IsysNet system fieldbus, Turck system fieldbus, 25 pin D-sub, or low cost Moduflex fieldbus options available
- H Series ISO offers 5 sizes with Cv range 0.55 – 6.0



Cylinder Speed (mm/s)	20	25	32	40	50	63	80	100
50	0.01	0.02	0.03	0.04	0.06	0.10	0.16	0.26
100	0.02	0.03	0.05	0.08	0.13	0.20	0.33	0.51
150	0.03	0.05	0.08	0.12	0.19	0.30	0.49	0.77
200	0.04	0.06	0.10	0.16	0.26	0.41	0.65	1.02
250	0.05	0.08	0.13	0.20	0.32	0.51	0.82	1.28
300	0.06	0.10	0.16	0.25	0.38	0.61	0.98	1.53
350	0.07	0.11	0.18	0.29	0.45	0.71	1.15	1.79
400	0.08	0.13	0.21	0.33	0.51	0.81	1.31	2.04
450	0.09	0.14	0.24	0.37	0.58	0.91	1.47	2.30
500	0.10	0.16	0.26	0.41	0.64	1.01	1.64	2.56

Valve range

H Series Micro
HB
HA
H1
H2

Order Key Code

Ordering Information

P1P	S	032	D	C	7	G	0	0	2	5

Cylinder Version

S	Standard
G	Guided 20-63 mm Bore

Cylinder Bore Size

020	20mm
025	25mm
032	32mm
040	40mm
050	50mm
063	63mm
080	80mm
100	100mm

Function

D	Double Acting
S	Single Acting: Spring Return (Bore 20 - 63mm)
T	Single Acting: Spring Extended (Bore 20 - 63mm)
K	Through Piston Rod

NOTE: Single acting only available as 25 mm stroke

Piston Rod Material Chrome Plated Steel

	Tempature Range
C	Standard -20°C to +80°C
G	High Temperature Version -10°C to +120°C Non Magnetic Function
K	Low Temperature Version -40°C to +80°C

Piston Rod Thread

7	Female
8	Male
3	Special rod end

Cylinder Ports & Magnetic Function

Magnet

G	20 - 25mm : M5 Threads 32 - 100mm : BSP Threads

Stroke Length

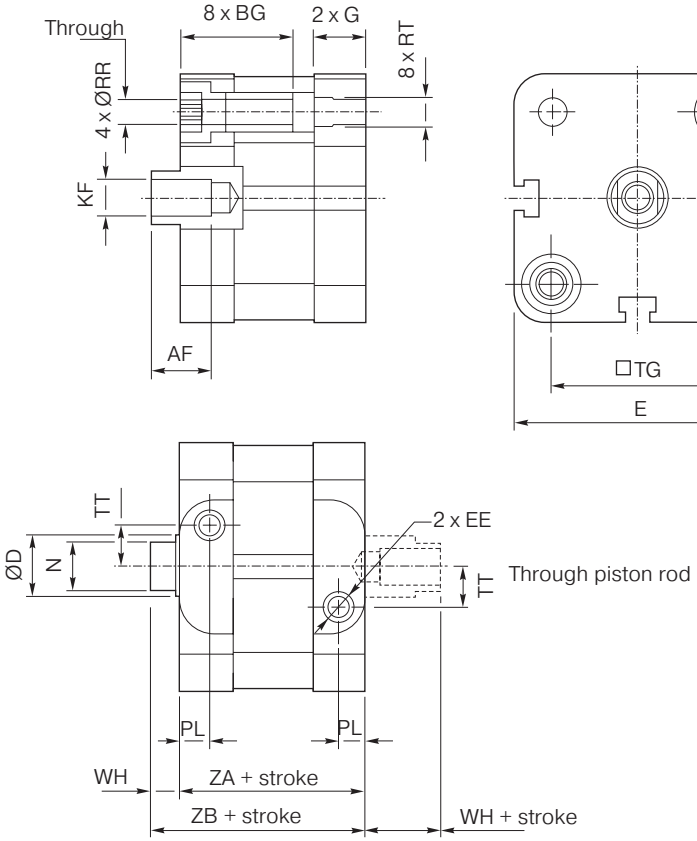
See table below for standard stroke lengths in mm.

Standard stroke length

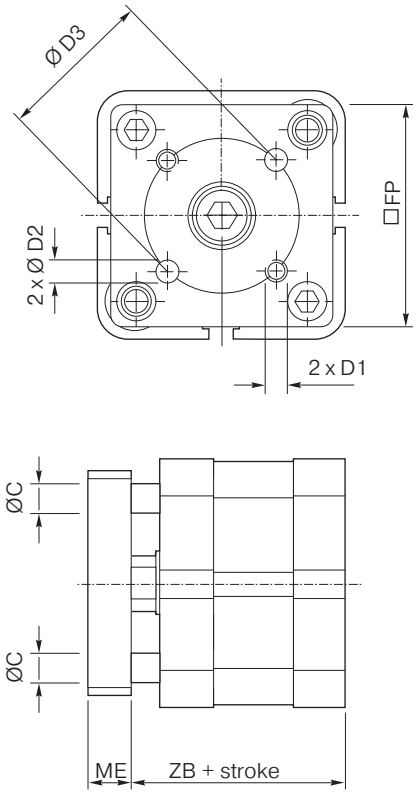
Cylinder Designation	Cylinder Bore	● Standard Stroke Length in mm							Non Standard Stroke Length **			
		5	10	15	20	25*	30	40	50*	60*	80*	100*
Double acting:												
P1PS020	20	●	●	●	●	●	●	●	●	●		
P1PS025	25	●	●	●	●	●	●	●	●	●		
P1PS032	32	●	●	●	●	●	●	●	●	●	●	
P1PS040	40	●	●	●	●	●	●	●	●	●	●	
P1PS050	50	●	●	●	●	●	●	●	●	●	●	
P1PS063	63	●	●	●	●	●	●	●	●	●	●	
P1PS080	80	●	●	●	●	●	●	●	●	●	●	●
P1PS100	100		●	●	●	●	●	●	●	●	●	●
Double Acting with Guided Piston Rod												
P1PG020	20	●	●	●	●	●	●	●	●	●		
P1PG025	25	●	●	●	●	●	●	●	●	●		
P1PG032	32	●	●	●	●	●	●	●	●	●	●	
P1PG040	40	●	●	●	●	●	●	●	●	●	●	
P1PG050	50	●	●	●	●	●	●	●	●	●	●	
P1PG063	63	●	●	●	●	●	●	●	●	●	●	

* Standard stroke lengths in mm according to ISO 4393
** Max stroke 500 mm
NOTE: G option only available in 020-063 bore sizes

P1PS...DC7G Double acting with female piston rod thread



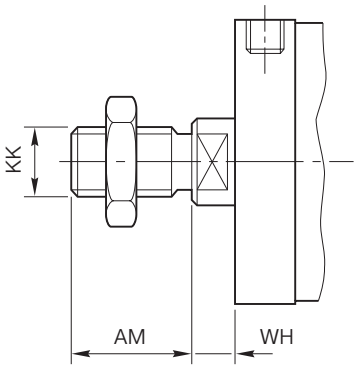
P1PG...DC Double acting with guided piston rod



Bore Size	AF min	BG min	ØC	ØD	D1	ØD2 H8	ØD3	EE	E	E1	E2	FP	G	KF	ME	N h14	PL	ØRR min	RT	TG	TT	WH	ZA ± 0.3	ZB ± 0.6
Ø20	10	15	6	10	M4	4	17	M5	38,0	19,0	19,1	35	11,60	M6	8	8	7,6	4,1	M5	22,0	4,0	6	37	43
Ø25*	10	15	6	10	M5	5	22	M5	41,0	20,5	20,6	38	11,90	M6	8	8	7,5	4,1	M5	26,0	5,5	6	39	45
Ø32	12	16	6	12	M5	5	28	G1/8	49,4	24,7	24,9	45	15,25	M8	10	10	7,8	5,1	M6	32,5	6,5	7	44	51
Ø40	12	16	6	12	M5	5	33	G1/8	56,0	28,0	28,5	50	15,25	M8	10	10	8,0	5,1	M6	38,0	8,0	7	45	52
Ø50	16	16	8	16	M6	6	42	G1/8	67,0	33,5	33,7	60	14,30	M10	12	13	7,7	6,4	M8	46,5	11,0	8	45	53
Ø63	16	16	8	16	M6	6	50	G1/8	79,0	39,5	39,8	70	16,30	M10	12	13	8,0	6,4	M8	56,5	16,0	8	49	57

* **Note:** 25mm stroke single acting cylinders have the same dimensions as 25mm stroke double acting cylinders.

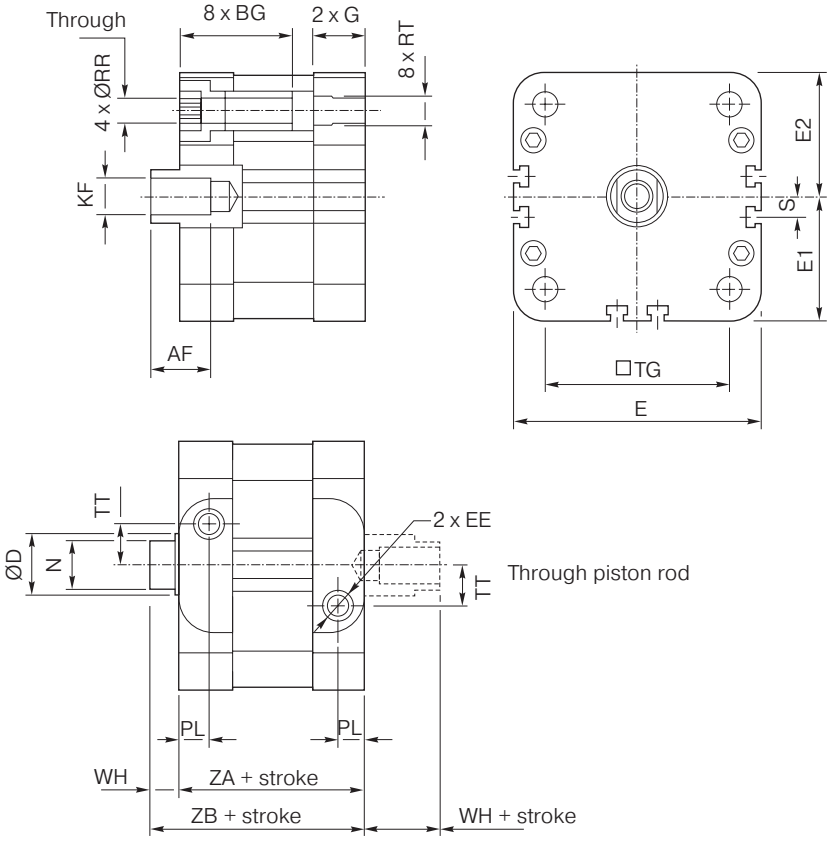
P1PS...DC8G Double acting with male piston rod thread



Bore Size	AM +0 -0.5	WH Nom.	WH Tol.	KK
Ø20	16	6	± 1,6	M8 x 1,25
Ø25	16	6	± 1,6	M8 x 1,25
Ø32	19	7	± 1,6	M10 x 1,25
Ø40	19	7	± 1,6	M10 x 1,25
Ø50	22	8	± 1,6	M12 x 1,25
Ø63	22	8	± 1,6	M12 x 1,25

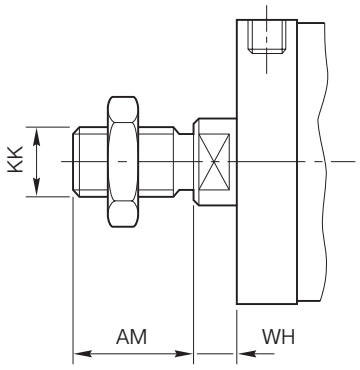
Note: Cylinders with male piston rod thread are delivered with one piston rod nut in zinc plated steel.

P1PS...DC7G Double acting with female piston rod thread



Bore Size	AF min	BG min	ØC	ØD	D1	ØD2 H8	ØD3	EE	E	E1	E2	FP	G	KF	ME	N h14	PL	ØRR min	RT	S	TG	TT	WH ± 0.3	ZA ± 0.6	ZB
Ø80	20	17	10	20	M8	8	65	G1/8	96	48,0	48,2	90	17,7	M12	14	17	10,5	8,4	M10	8	72	20	10	54	64
Ø100	20	17	10	25	M10	10	80	G1/8	115	57,5	57,7	110	23,0	M12	14	21	12,0	8,4	M10	18,5	89	24	10	67	77

P1PS...DC8G Double acting with male piston rod thread



Bore Size	AM +0 -0.5	WH Nom.	WH Tol.	KK
Ø80	28	10	± 1,6	M16 x 1,5
Ø100	28	10	± 1,6	M16 x 1,5

Note: Cylinders with male piston rod thread are delivered with one piston rod nut in zinc plated steel.

Cylinder Mountings

1 - Flange MF1 / MF2

Ø 20	**P1P-4HMB**
Ø 25	**P1P-4JMB**
Ø 32	**P1C-4KMB**
Ø 40	**P1C-4LMB**
Ø 50	**P1C-4MMB**
Ø 63	**P1C-4NMB**
Ø 80	**P1C-4PMB**
Ø 100	**P1C-4QMB**

2 - Foot brackets MS1

Ø 20	**P1P-4HMF**
Ø 25	**P1P-4JMF**
Ø 32	**P1C-4KMF**
Ø 40	**P1C-4LMF**
Ø 50	**P1C-4MMF**
Ø 63	**P1C-4NMF**
Ø 80	**P1C-4PMF**
Ø 100	**P1C-4QMF**

3 - Pivot bracket with rigid bearing AB7

Ø 20	-
Ø 25	-
Ø 32	**P1C-4KMDB**
Ø 40	**P1C-4LMDB**
Ø 50	**P1C-4MMDB**
Ø 63	**P1C-4NMDB**
Ø 80	**P1C-4PMDB**
Ø 100	**P1C-4QMDB**

4 - Clevis bracket MP2

Ø 20	**P1P-4HME**
Ø 25	**P1P-4JME**
Ø 32	**P1C-4KMTB**
Ø 40	**P1C-4LMTB**
Ø 50	**P1C-4MMTB**
Ø 63	**P1C-4NMTB**
Ø 80	**P1C-4PMTB**
Ø 100	**P1C-4QMTB**

5 - Clevis bracket MP4

Ø 20	-
Ø 25	-
Ø 32	**P1C-4KMEB**
Ø 40	**P1C-4LMEB**
Ø 50	**P1C-4MMEB**
Ø 63	**P1C-4NMEB**
Ø 80	**P1C-4PMEB**
Ø 100	**P1C-4QMEB**

6 - Clevis bracket AB6

Ø 20	-
Ø 25	-
Ø 32	**P1C-4KMCB**
Ø 40	**P1C-4LMCB**
Ø 50	**P1C-4MMCB**
Ø 63	**P1C-4NMCB**
Ø 80	**P1C-4PMCB**
Ø 100	**P1C-4QMCB**

7 - Pivot bracket w/ swivel bearing CS7

Ø 20	-
Ø 25	-
Ø 32	**P1C-4KMAF**
Ø 40	**P1C-4LMAF**
Ø 50	**P1C-4MMAF**
Ø 63	**P1C-4NMAF**
Ø 80	**P1C-4PMAF**
Ø 100	**P1C-4QMAF**

8 - Swivel eye bracket MP6

Ø 20	-
Ø 25	-
Ø 32	**P1C-4KMSB**
Ø 40	**P1C-4LMSB**
Ø 50	**P1C-4MMSB**
Ø 63	**P1C-4NMSB**
Ø 80	**P1C-4PMSB**
Ø 100	**P1C-4QMSB**

9 - 3 and 4 positions flange JP1

Ø 20	-
Ø 25	-
Ø 32	**P1E-6KB0**
Ø 40	**P1E-6LB0**
Ø 50	**P1E-6MB0**
Ø 63	**P1E-6NB0**
Ø 80	**P1E-6PB0**
Ø 100	**P1E-6QB0**

10 - Swivel rod eye AP6

Ø 20	**P1A-4HRS**
Ø 25	**P1A-4HRS**
Ø 32	**P1C-4KRS**
Ø 40	**P1C-4KRS**
Ø 50	**P1C-4LRS**
Ø 63	**P1C-4LRS**
Ø 80	**P1C-4MRS**
Ø 100	**P1C-4MRS**

11 - Clevis AP2

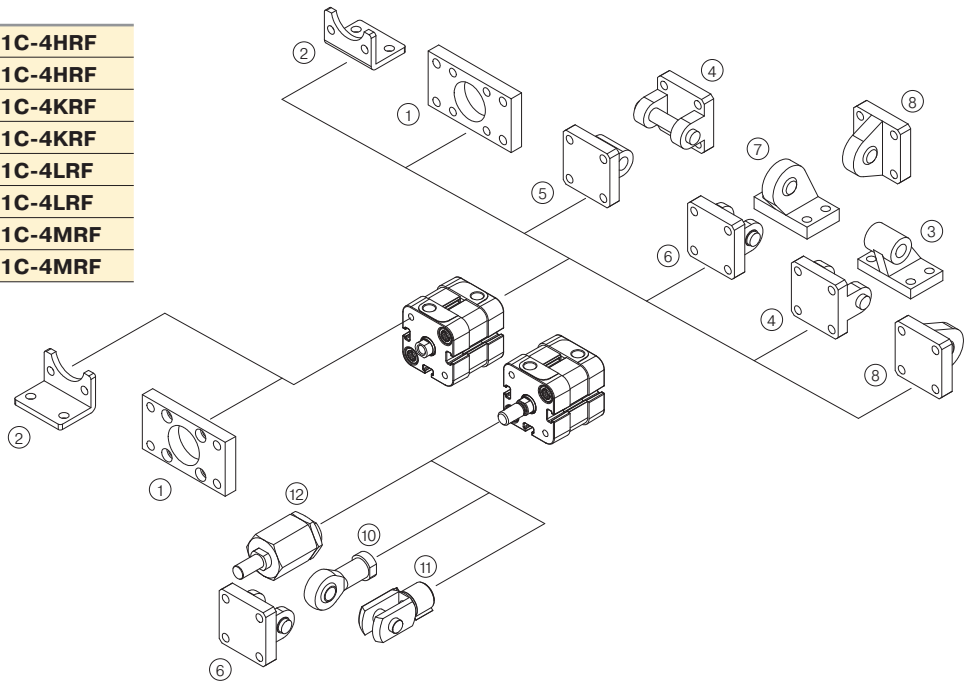
Ø 20	**P1A-4HRC**
Ø 25	**P1A-4HRC**
Ø 32	**P1C-4KRC**
Ø 40	**P1C-4KRC**
Ø 50	**P1C-4LRC**
Ø 63	**P1C-4LRC**
Ø 80	**P1C-4MRC**
Ø 100	**P1C-4MRC**

12 - Flexo coupling PM5

Ø 20	**P1C-4HRF**
Ø 25	**P1C-4HRF**
Ø 32	**P1C-4KRF**
Ø 40	**P1C-4KRF**
Ø 50	**P1C-4LRF**
Ø 63	**P1C-4LRF**
Ø 80	**P1C-4MRF**
Ø 100	**P1C-4MRF**

13 - Nut MR9 (Pack of 10 off)

Ø 20	**P14-4HRPZ**
Ø 25	**P14-4HRPZ**
Ø 32	**P14-4KRPZ**
Ø 40	**P14-4KRPZ**
Ø 50	**P14-4LRPZ**
Ø 63	**P14-4LRPZ**
Ø 80	**P14-4MRPZ**
Ø 100	**P14-4MRPZ**



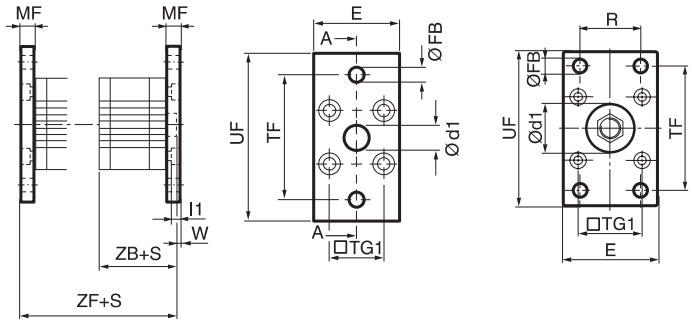
Cylinder Mountings

Flange – MF1, MF2

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

Materials:
- Flange: Surface-treated steel
- Mounting screws according to DIN 6912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.



Bore Size mm	d1 H11 mm	FB H13 mm	TG1 mm	E mm	R JS14 mm	MF JS14 mm	TF JS14 mm	UF mm	I1 -0.5 mm	W mm	ZF* mm	ZB* mm	Weight kg	Part Number
20	12,0	6,6	22,0	36	-	10,0	55,0	70	5,4	4,0	53,0	43,0	0,17	**P1P-4HMB**
25	12,0	6,6	26,0	40	-	10,0	60,0	76	5,4	4,0	55,0	45,0	0,20	**P1P-4JMB**
32	30,0	7,0	32,5	45	32	10,0	64,0	80	5,0	3,0	61,0	41,0	0,23	**P1C-4KMB**
40	35,0	9,0	38,0	52	36	10,0	72,0	90	5,0	3,0	52,0	52,0	0,28	**P1C-4LMB**
50	40,0	9,0	46,5	65	45	12,0	90,0	110	6,5	4,0	65,0	53,0	0,53	**P1C-4MMB**
63	45,0	9,0	56,5	75	50	12,0	100,0	120	6,5	4,0	69,0	57,0	0,71	**P1C-4NMB**
80	45,0	12,0	72,0	95	63	16,0	126,0	150	8,0	6,0	80,0	64,0	1,59	**P1C-4PMB**
100	55,0	14,0	89,0	115	75	16,0	150,0	170	8,0	6,0	93,0	77,0	2,19	**P1C-4QMB**

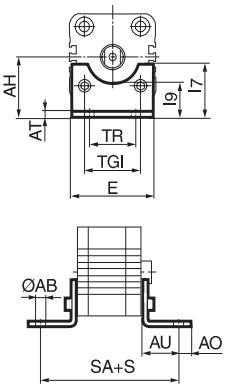
S = Stroke length

Foot Bracket – MS1

Intended for fixed mounting of cylinder. Foot bracket can be fitted to front and rear end covers of cylinder.

Materials:
- Foot bracket: Surface-treated steel, black
- Mounting screws according to DIN 912: Zinc-plated steel 8.8

Supplied in pairs with mounting screws for attachment to cylinder.



Bore Size mm	AB H14 mm	TG1 mm	E mm	TR JS14 mm	AO mm	AU mm	AH JS15 mm	I7 mm	AT mm	I9 JS14 mm	SA** mm	Weight** kg	Part Number
20	6,6	22,0	36	26	6,0	16,0	27	22,0	4,0	17,0	69,0	0,04**	**P1P-4HMF**
25	6,6	26,0	40	26	6,0	16,0	30	23,0	4,0	19,0	71,0	0,05**	**P1P-4JMF**
32	7,0	32,5	45	32	10,0	24,0	32	30,0	4,5	17,5	92,0	0,06**	**P1C-4KMF**
40	9,0	38,0	52	36	8,0	28,0	36	30,0	4,5	18,5	101,0	0,08**	**P1C-4LMF**
50	9,0	46,5	65	45	13,0	32,0	45	36,0	5,5	25,0	109,0	0,16**	**P1C-4MMF**
63	9,0	56,5	75	50	13,0	32,0	50	35,0	5,5	27,5	113,0	0,25**	**P1C-4NMF***
80	12,0	72,0	95	63	14,0	41,0	63	49,0	6,5	40,5	136,0	0,50**	**P1C-4NMF***
100	14,0	89,0	115	75	15,0	41,0	71	54,0	6,5	43,5	149,0	0,85**	**P1C-4QMF***

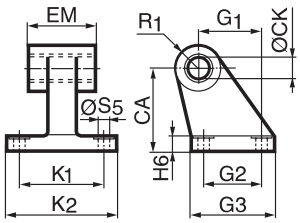
S = Stroke length

**Weight per item

Pivot bracket with rigid bearing AB7

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

Materials:
- Pivot bracket: Surface-treated aluminum, black
- Bearing: Sintered oil-bronze bushing



Bore Size mm	CK H9 mm	S5 H13 mm	K1 JS14 mm	K2 mm	G1 JS14 mm	G2 JS14 mm	EM mm	G3 mm	CA JS15 mm	H6 mm	R1 mm	Weight kg	Part Number
32	10	6,6	38	51	21	18	25,5	31	32	8	10	0,06	**P1C-4KMDB**
40	12	6,6	41	54	24	22	27,0	35	36	10	11	0,08	**P1C-4LMDB**
50	12	9,0	50	65	33	30	31,0	45	45	12	13	0,15	**P1C-4MMDB**
63	16	9,0	52	67	37	35	39,0	50	50	12	15	0,20	**P1C-4NMDB**
80	16	11,0	66	86	47	40	49,0	60	63	14	15	0,33	**P1C-4PMDB**
100	20	11,0	76	96	55	50	59,0	70	71	15	19	0,49	**P1C-4QMDB**

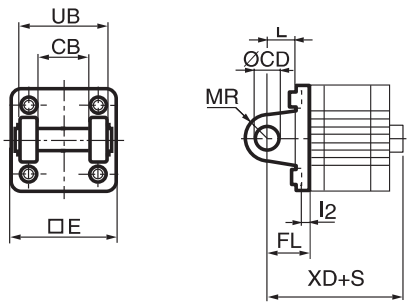
S = Stroke length

Clevis bracket MP2

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

Materials:
- Clevis bracket: Surface-treated aluminum, black
- Mounting screws according to DIN 912: Zinc-plated steel 8.8
- Pin: surface treated steel

Supplied complete with mounting screws for attachment to cylinder.



Bore Size mm	E mm	UB h14 mm	CB H14 mm	FL ±0.2 mm	L mm	l2 mm	CD H9 mm	MR mm	XD* mm	Weight** kg	Part Number
32	45,0	45	26,0	22	13	5,5	10	10	73,0	0,08	**P1C-4KMTB**
40	52,0	52	28,0	25	16	5,5	12	12	77,0	0,11	**P1C-4LMTB**
50	65,0	60	32,0	27	16	6,5	12	12	80,0	0,14	**P1C-4MMTB**
63	75,0	70	40,0	32	21	6,5	16	16	89,0	0,29	**P1C-4NMTB**
80	95,0	90	50,0	36	22	10,0	16	16	100,0	0,36	**P1C-4PMTB**
100	115,0	110	60,0	41	27	10,0	20	20	118,0	0,64	**P1C-4QMTB**

S = Stroke length

**Weight per item

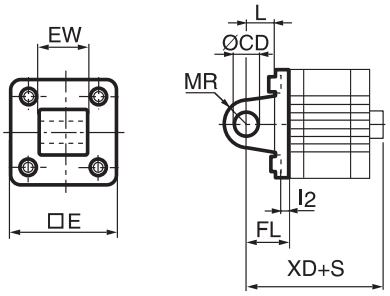
Cylinder Mountings

Clevis bracket MP4

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

Materials:
- Clevis bracket: Surface-treated aluminum, black
- Mounting screws according to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.



Bore Size mm	E mm	EW mm	FL ±0.2 mm	L mm	l2 mm	CD mm	MR mm	XD* mm	Weight kg	Part Number
20	34,0	16,0	20	14	2,6	8	8	63,0	0.04	**P1P-4HME**
25	38,0	16,0	20	14	2,6	8	8	65,0	0.05	**P1P-4JME**
32	45,0	26,0	22	13	5,5	10	10	73,0	0,09	**P1C-4KMEB**
40	52,0	28,0	25	16	5,5	12	12	77,0	0,13	**P1C-4LMEB**
50	65,0	32,0	27	16	6,5	12	12	80,0	0,17	**P1C-4MMEB**
63	75,0	40,0	32	21	6,5	16	16	89,0	0,36	**P1C-4NMEB**
80	95,0	50,0	36	22	10,0	16	16	100,0	0,46	**P1C-4PMEB**
100	115,0	60,0	41	27	10,0	20	20	118,0	0,83	**P1C-4QMEB**

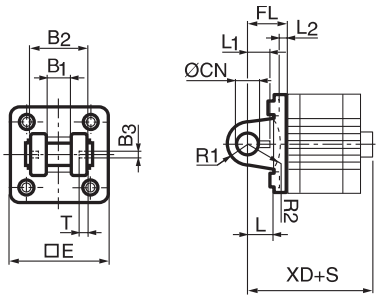
S = Stroke length

Clevis bracket AB6

Intended for flexible mounting of cylinder. Clevis bracket GA can be combined with pivot bracket with swivel bearing, swivel eye bracket and swivel rod eye.

Materials:
- Clevis bracket: Surface-treated aluminum, black
- 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 cylinder.



Bore Size mm	E mm	B2 d12 mm	B1 H14 mm	T mm	B3 mm	R2 mm	L1 mm	FL ±0.2 mm	l2 mm	L mm	CN F7 mm	R1 mm	XD* mm	Weight** kg	Part Number	Weight** kg	Part Number Stainless Steel
32	45	34	14	3	3,3	17	11,5	22	5,5	12	10	11	73,0	0,09**	**P1C-4KMCB**	0,05	**9301054311**
40	52	40	16	4	4,3	20	12,0	25	5,5	15	12	13	77,0	0,13	**P1C-4LMCB**	0,06	**9301054312**
50	65	45	21	4	4,3	22	14,0	27	6,5	17	16	18	80,0	0,17	**P1C-4MMCB**	0,07	**9301054313**
63	75	51	21	4	4,3	25	14,0	32	6,5	20	16	18	89,0	0,36	**P1C-4NMCB**	0,07	**9301054314**
80	95	65	25	4	4,3	30	16,0	36	10,0	20	20	22	100,0	0,58	**P1C-4PMCB**	0,17	**9301054315**
100	115	75	25	4	4,3	32	16,0	41	10,0	25	20	22	118,0	0,89	**P1C-4QMCB**	0,31	**9301054316**

S = Stroke length
**Weight per item

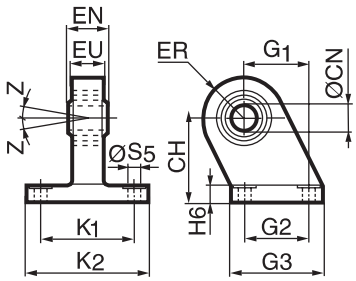
Stainless steel Pin Set AB6

Materials
- Pin: Stainless steel
- Locking pin: Stainless steel
- Circlips according to DIN 471:
- Stainless steel

Pivot bracket with swivel bearing CS7

Intended for use together with clevis bracket GA.

Materials:
- Pivot bracket:
- Surface-treated steel, black
- Swivel bearing according to DIN 648K: Hardened steel



Bore Size mm	CN H7 mm	S5 H13 mm	K1 JS14 mm	K2 mm	EU mm	G1 JS14 mm	G2 JS14 mm	EN mm	G3 mm	CH JS15 mm	H6 mm	ER mm	Z	Weight kg	Part Number
32	10	6,6	38	51	10,5	21	18	14	31	32	10	16	4	0,18	**P1C-4KMAF**
40	12	6,6	41	54	12,0	24	22	16	35	36	10	18	4	0,25	**P1C-4LMAF**
50	16	9,0	50	65	15,0	33	30	21	45	45	12	21	4	0,47	**P1C-4MMAF**
63	16	9,0	52	67	15,0	37	35	21	50	50	12	23	4	0,57	**P1C-4NMAF**
80	20	11,0	66	86	18,0	47	40	25	60	63	14	28	4	1,05	**P1C-4PMAF**
100	20	11,0	76	96	18,0	55	50	25	70	71	15	30	4	1,42	**P1C-4QMAF**

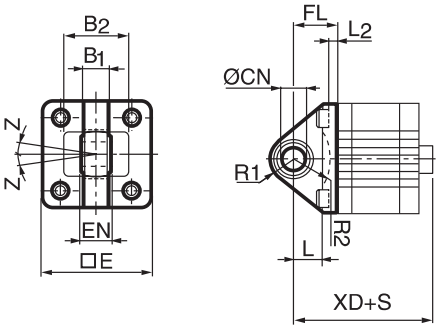
S = Stroke length

Swivel eye bracket MP6

Intended for use together with clevis bracket GA

Materials:
- Bracket: Surface-treated aluminum, black
- Swivel bearing acc. to DIN 648K: Hardened steel

Supplied complete with mounting screws for attachment to cylinder.

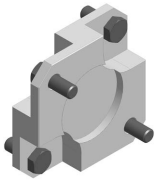


Bore Size mm	E mm	B1 mm	B2 mm	EN mm	R1 mm	R2 mm	FL mm	I2 mm	L mm	CN H7 mm	XD* mm	Z mm	Weight kg	Part Number
32	45	10,5	38	14	16	14	22	5,5	12	10	73,0	4	0,08	**P1C-4KMSB**
40	52	12,0	44	16	18	16	25	5,5	15	12	77,0	4	0,11	**P1C-4LMSB**
50	65	15,0	51	21	21	19	27	6,5	15	16	80,0	4	0,20	**P1C-4MMSB**
63	75	15,0	56	21	23	22	32	6,5	20	16	89,0	4	0,27	**P1C-4NMSB**
80	95	18,0	-	25	29	-	36	10,0	20	20	100,0	4	0,52	**P1C-4PMSB**
100	115	18,0	-	25	31	-	41	10,0	25	20	118,0	4	0,72	**P1C-4QMSB**

S = Stroke length

Cylinder Mountings

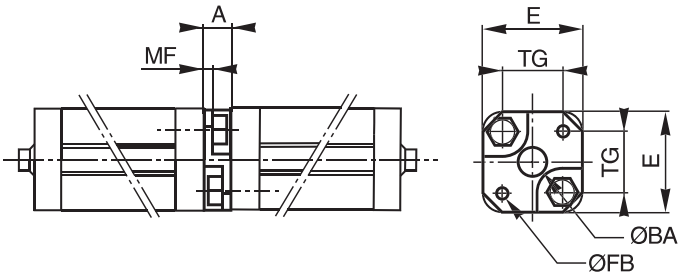
3 and 4 positions flange JP1



Mounting kit for back to back mounted cylinders, 3 and 4 position cylinders.

Materials:

- Mounting: Aluminum
- Mounting screws: Zinc-plated steel 8.8



Bore Size mm	E mm	TG mm	ØFB mm	MF mm	A mm	ØBA mm	Weight kg	Part Number
32	50	32,5	6,5	5	16	30	0,060	P1E-6KB0
40	60	38,0	6,5	5	16	35	0,078	P1E-6LB0
50	66	46,5	8,5	6	20	40	0,162	P1E-6MB0
63	80	56,5	8,5	6	20	45	0,194	P1E-6NB0
80	100	72,0	10,5	8	25	45	0,450	P1E-6PB0
100	118	89,0	10,5	8	25	55	0,672	P1E-6QB0

S = Stroke length

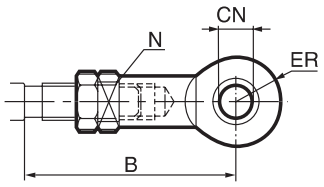
Piston rod mountings

Swivel rod eye AP6

Swivel rod eye AP6
Swivel rod eye for articulated mounting of cylinder. Swivel rod eye can be combined with clevis bracket GA.

Maintenance-free.

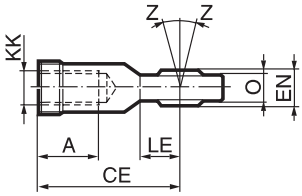
Materials:
- Swivel rod eye: Zinc-plated steel
- Swivel bearing according to DIN 648K: Hardened steel



Stainless steel swivel rod eye AP6
Stainless-steel swivel rod eye for articulated mounting of cylinder. Swivel rod eye can be combined with clevis bracket GA.

Maintenance-free.

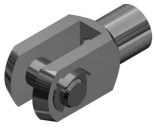
Materials:
- Swivel rod eye: Stainless steel
- Swivel bearing according to DIN 648K: Stainless steel
- Use stainless steel nut with stainless steel swivel rod eye.



Bore Size mm	A mm	B min mm	B max mm	CE mm	CN H9 mm	EN h12 mm	ER mm	KK	LE mm	N min mm	O mm	Z	Weight kg	Part Number	Weight kg	Part Number Stainless Steel
20 / 25	12	40,0	45	36	8	12	12	M8x1,25	12	13	9,0	12°	0,045	**P1A-4HRS**	0,045	**P1S-4HRT**
32 / 40	20	48,0	55	43	10	14	14	M10x1,25	15	17	10,5	12°	0,08	**P1C-4KRS**	0,08	**P1S-4JRT**
50 / 63	22	56,0	62	50	12	16	16	M12x1,25	17	19	12,0	12°	0,12	**P1C-4LRS**	0,12	**P1S-4LRT**
80 / 100	28	72,0	80	64	16	21	21	M16x1,5	22	22	15,0	15°	0,25	**P1C-4MRS**	0,25	**P1S-4MRT**

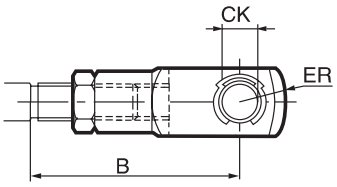
S = Stroke length

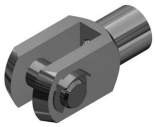
Clevis AP2



Clevis AP2
Clevis for articulated mounting of cylinder.

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



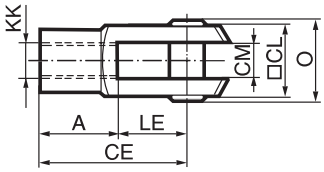


Stainless steel clevis AP2

Stainless-steel clevis for articulated mounting of cylinder.

Materials:
- Clevis: Stainless steel
- Pin: Stainless steel
- Circlips according to DIN 471: Stainless steel

Use stainless steel nut with stainless steel swivel rod eye.



Bore Size mm	A mm	B min mm	B max mm	CE mm	CK H11/ E9 mm	CL mm	CM mm	ER mm	KK	LE mm	O mm	Weight kg	Part Number	Weight kg	Part Number Stainless Steel
20 / 25	16	36,0	41	32	8	16	8	-	M8x1,25	16	24,0	0,045	**P1A-4HRC**	0,045	**P1S-4HRT**
32 / 40	20	45,0	52	40	10	20	10	16	M10x1,25	20	28,0	0,09	**P1C-4KRC**	0,08	**P1S-4JRT**
50 / 63	24	54,0	60	48	12	24	12	19	M12x1,25	24	32,0	0,15	**P1C-4LRC**	0,12	**P1S-4LRT**
80 / 100	32	72,0	80	64	16	32	16	25	M16x1,5	32	41,5	0,35	**P1C-4MRC**	0,25	**P1S-4MRT**

S = Stroke length

Piston rod mountings

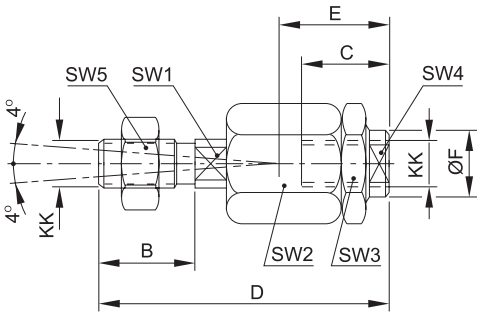
Flexo coupling PM5

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

Materials:

- Flexo coupling, nut: Zinc-plated steel

Supplied complete with galvanized adjustment nut.



Bore Size 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	Part Number
20 / 25	M8x1.25	16	14	55	20	12.4	7	17	17	10	13	0,06	**P1C-4HRF**
32 / 40	M10x1.25	20	23	73	31	21	12	30	30	19	17	0,23	**P1C-4KRF**
50 / 63	M12x1.5	24	23	77	31	21	12	30	30	19	19	0,23	**P1C-4LRF**
80 / 100	M16x1.5	32	32	108	45	33.5	19	41	41	30	24	0,65	**P1C-4MRF**

Nut MR9

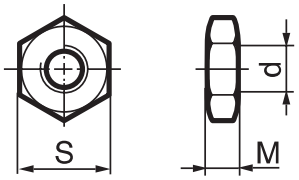
Nut MR9
Intended for fixed mounting of accessories to the piston rod.

Materials:

- Zinc-plated steel

All P1P cylinders are delivered with a zinc-plated steel piston rod nut.

Supplied as pack of 10 off



Stainless steel nut MR9
Intended for fixed mounting of accessories to the piston rod.

Materials:

- Stainless steel A2

All P1P cylinders are delivered with a zinc-plated steel piston rod nut.

Supplied as pack of 10 off

Bore Size mm	d	M mm	S mm	Weight kg	Part Number	Weight kg	Part Number Stainless Steel
20 / 25	M8x1,25	4.0	13	0,005	**P14-4HRPZ**	0,005	**P14-4HRPS**
32 / 40	M10x1,25	5.0	17	0,007	**P14-4KRPZ**	0,007	**P14-4KRPS**
50 / 63	M12x1,25	6.0	19	0,021	**P14-4LRPZ**	0,021	**P14-4LRPS**
80 / 100	M16x1,5	10.0	30	0,040	**P14-4MRPZ**	0,040	**P14-4MRPS**

Kits

P1P Repair Kits

Complete seal kits consist of:
Piston (complete)
Piston rod seal
O rings

Material specification, see page 7

Seal Kit Part Numbers

Bore Size	P1P Cylinder Version		
	Std. Temp	High Temp	Low Temp
20	**P1P-6HRN**	**P1P-6HRF**	**P1P-6HRL**
25	**P1P-6JRN**	**P1P-6JRF**	**P1P-6JRL**
32	**P1P-6KRN**	**P1P-6KRF**	**P1P-6KRL**
40	**P1P-6LRN**	**P1P-6LRF**	**P1P-6LRL**
50	**P1P-6MRN**	**P1P-6MRF**	**P1P-6MRL**
63	**P1P-6NRN**	**P1P-6NRF**	**P1P-6NRL**
80	**P1P-6PRN**	**P1P-6PRF**	**P1P-6PRL**
100	**P1P-6QRN**	**P1P-6QRF**	**P1P-6QRL**

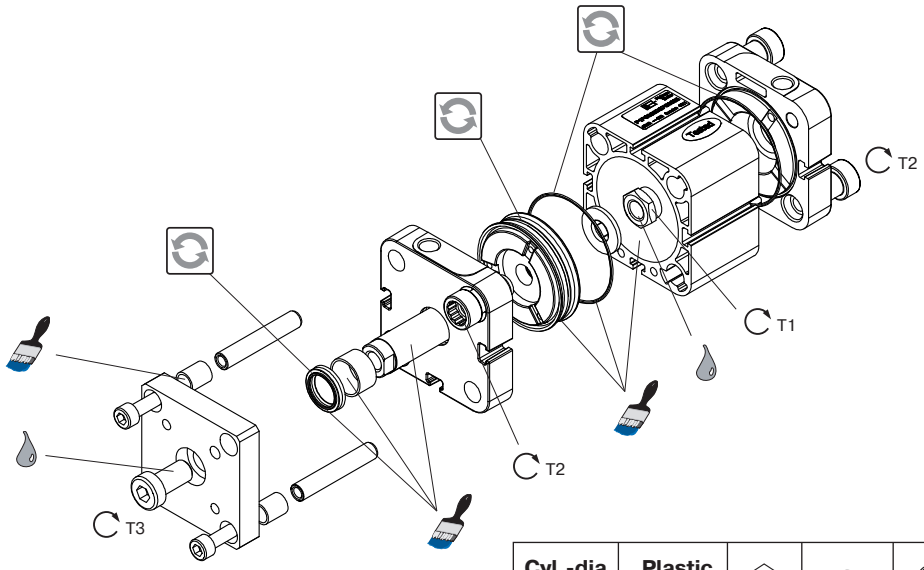
Grease Part Numbers

Standard temperature	30g	**9127394541**
High temperature	30g	**9127394521**
Low temperature	30g	**9127394541**

For through rods variants, order two seal kits.

Example: For a P1PS...KS Ø63 through rod, standard temperature version, order 2 x P1P-6NRN

Seal Kit



= Included in seal kit

= Lubricated with grease

= Socket head

= Locking fluid

= Tightening torque

Loctite 243 must be used for standard and low temperature versions.
Loctite 270 must be used for high temperature versions

Cyl.-dia mm	Plastic Piston T1 Nm	AF mm	T2 Nm	AF mm	T3 Nm	AF mm
20	3,5	8	14	7	8	4
25	3,5	8	14	7	8	4
32	8	10	20	7	20	5
40	12	13	20	7	20	5
50	20	17	40	10	40	7
63	20	17	40	10	40	7
80	35	19	14	5	70	8
100	80	24	28	6	70	8

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 meter 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.

	Solid Particulate				Water		Oil
	Maximum number of particles per m3			Mass Concentration mg/m3	Vapor Pressure Dewpoint	Liquid g/m3	Total Oil (aerosol liquid and vapor) mg/m3
ISO8573-1:2010 CLASS	0.1 - 0.5 micron	0.5 - 1 micron	1 - 5 micron				
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 meter 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 meter of compressed air, not more than 0.01mg of oil is allowed. This is a total level for liquid oil, oil aerosol and oil vapor.

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.

P8S Electronic and Reed Sensors

The P8S Series magnetic cylinder sensor enables quick, precise and contactless sensing of the piston's position in cylinders. It is easy to mount, can be used in numerous applications and offers an outstanding price-performance ratio.

Product Overview

As the term magnetic switch suggests, these are operated by magnetic fields; another description widely used is magnetic "SENSOR". As our eyes sense change of light, our ears sense the change of sound, magnetic sensors / switches sense the change of magnetic flux in pneumatic and hydraulic cylinders. When magnetic sensors sense a magnetic field it will give a switching signal, through a control circuit, allowing sensing or control operation to be achieved.

Because of the characteristics of magnetic sensors they can sense a change of magnetic field relative to the position of the magnet, such as in a pneumatic or hydraulic cylinder, whereby the magnet is attached to a moving piston and thus the position of the moving part (ie Piston) can be detected.

The magnet is mounted on the piston of the cylinder and thus moves with the piston.

The magnetic sensor (switch) is fixed either directly to the cylinder or with an additional mounting bracket. When the piston (magnet) moves to the position under a magnetic sensor, the switch will operate due to the change of the magnetic field and give a switching signal.

Thus the position of the piston can be identified and a resulting signal generated to continue the sequence of a circuit.

Magnetic sensors available can be classified into two different groups, they are sensors with contacts which are called mechanically operated or reed sensors and the other type is sensors without contacts and are called solid state type or electronic.

Parker P8S Series sensors are suitable for use with a large range of actuators. They can either be inserted directly into the cylinder tube extrusion or mounted using additional brackets. For direct mounting the sensor is positioned within the cylinder sensor groove, offering mechanical protection, then securely clamped into position by a simple turn of a screw. For other cylinder versions there are a number of optional sensors brackets that clamp to the cylinder and offer other mounting positions.

For easy installation there are several cable lengths available with either M8 connector or flying lead. The electronic sensors are "Solid State", i.e. they have no moving parts. 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 where long service life is required.

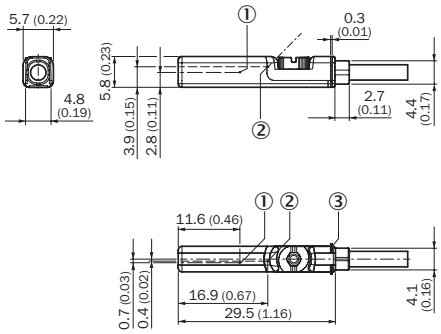
Please note that for low temperature applications sensors are normally specified for full performance down to -30°C only. High temperature cylinders do not have a magnetic piston and therefore cannot be used with sensors.

Technical Data - Square body design, insert straight in T-slot, screw 1/4 turn

	Electronic PNP | NPN	Electric Reed
Cylinder type:	Profile with T-slot	
Cylinder type with adapter:	Profile with S-slot (dovetail) | Tie rods | Round cylinders	
Installation:	Quarter turn, fixed by allen key 2.5 mm or flathead screwdriver	
Housing length:	29.5 mm	29.5 mm 5 - 30 V AC/DC
	24 mm (NAMUR ATEX)	29.5 mm 5 - 120 V AC/DC
		32.5 mm 5 - 230 V AC/DC
Output Type:	PNP | NPN	Reed
Switching (on/off) switching frequency:	± 1,000 Hz	± 400 Hz
Output Function:	Normally Open (NO) | Normally Closed (NC) 3-wire	Normally Open (NO) | Normally Closed (NC) 2-wire Normally Open (NO) 3-wire
Enclosure rating:	IP67	
	IP67 (NAMUR ATEX)	
Supply Voltage:	10 to 30 V DC	
	8.2 to 20 V DC (NAMUR 1GD)| 10 to 26 V DC (ATEX 3GD)	5 to 30 | 5 to 120 | 5 to 230 V AC/DC 2-wire, 3-wire depending on type
Power consumption:	<= 8 mA	-
	<= 10 mA (NAMUR, ATEX)	-
Voltage drop:	<= 2 V	<= 3.5 V 2-wire | <= 0.1 V 3-wire
	<= 2.2 V (NAMUR, ATEX)	-
Continuous output current Ia:	<= 100 mA	<= 100 mA 3-wire
	<= 60 mA (NAMUR) | <= 50 mA (ATEX)	<= 500 mA (DC) | <= 300 mA (AC)
Switching capacity:	-	<= 6 W
Protection class:	III	III | II 2-wire depending on type
		III 3-wire
Response sensitivity:	2.6 to 3.3 mT	2.1 to 3.4 mT
	2.8 mT (NAMUR, ATEX)	-
Overrun distance:	10 mm	
	9 mm (NAMUR, ATEX)	-
Hysteresis:	<= 0.8 mT	-
	<= 0.5 mT (NAMUR, ATEX)	-
Repeatability:	<= 0.1 mT	
Reverse polarity protection:	Yes	No 2-wire
	-	Yes 3-wire
Short circuit protection:	Yes	-
Power-up pulse protection:	Yes (NAMUR, ATEX)	-
Ambient operating temperature range:	-30 to +80 °C (PUR cable) | -30 to +70°C (PVC cable)	
	-25 to +80 °C (NAMUR 1GD) | -20 to +50°C (ATEX 3GD)	
Shock and vibration resistance:	30 g 11 ms / 10 ... 55 Hz, 1 mm	
EMC:	According to EN 60947-5-2	
International standard:	CE | C UL US | RoHs | Ex | IEC | IEC Ex	
Housing material:	Plastic polyamid PA12	
Screw material:	Stainless steel	
Cable material:	PUR (Polyurethane) | PVC (Polyvinyl Chloride)	
Conductor cross-section:	0.14 mm² | 0,12 mm² depending on type 0.14 mm² (NAMUR, ATEX)	
Indication LED color:	Yellow, no LED reed NC	
Connector:	M8R (knurled nuts) | None (Flying lead)	

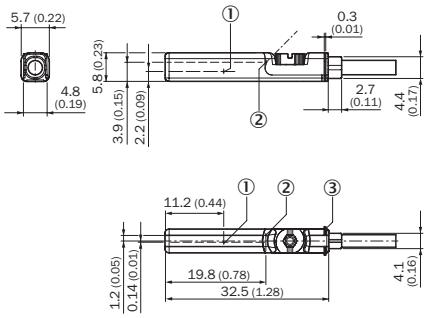
Dimensions, mm (inch)

PNP, NPN Output 10 to 30 V DC



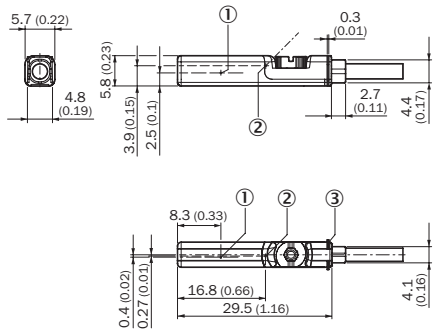
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 230 V AC/DC



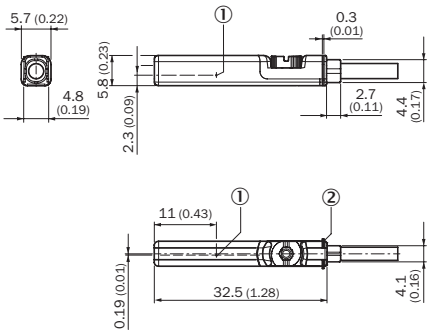
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 30 V AC/DC



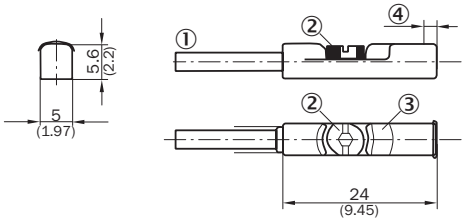
① Position sensor element
② Indication LED
③ Retaining ribs

Reed Output 5 to 120 V AC/DC



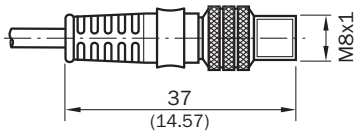
① Position sensor element
② Retaining ribs

NAMUR ATEX 1G, 1D, ATEX 3G, 3D



① Connection
② Fixing screw
③ Indication LED
④ Position of sensor element; short overrun distance: 2 mm;
long overrun distance: 1.7 mm

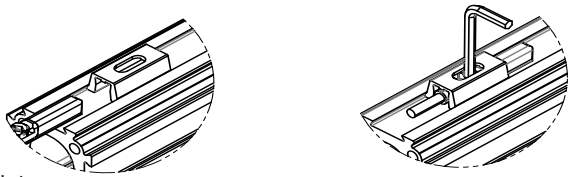
Connector M8R



Installation

Square body design, Insert straight in T-slot, screw 1/4 turn

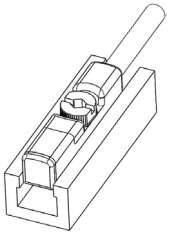
With Adapter in S-Dovetail Slot



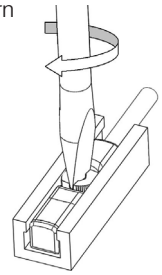
Note:
The adapter is delivered with each sensor.

Without Adapter directly in T-Slot

Put-in straight

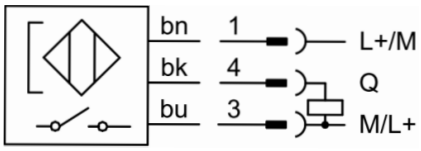


Screw 1/4 turn

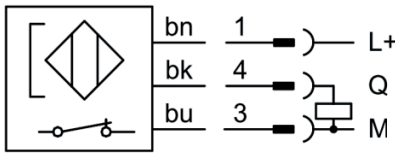


Connection Type and Diagram

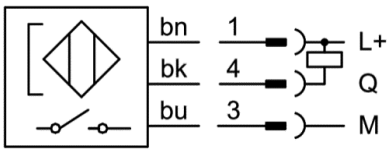
PNP NO



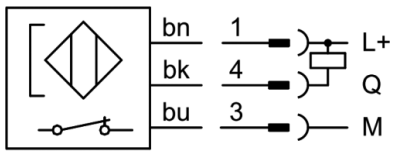
PNP NC



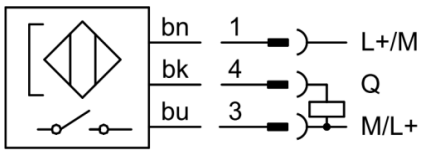
NPN NO



NPN NC



Reed NO 3-wire



bn: brown

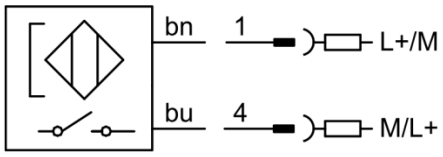
bk: black

bu: blue
Q: load

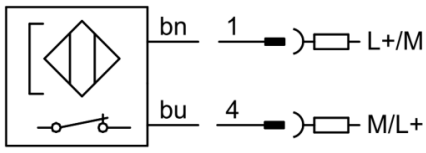
M: Mass

L+: Power

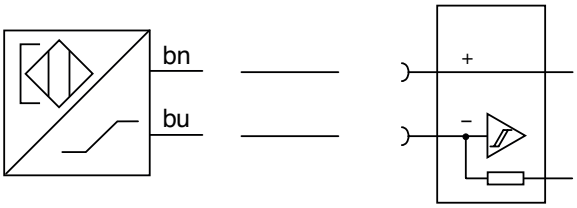
Reed NO 2-wire



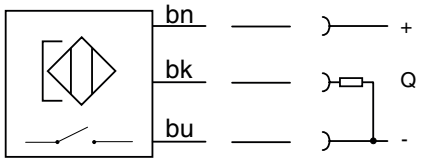
Reed NC 2-wire



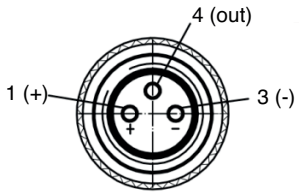
NAMUR NO ATEX 1G, 1D



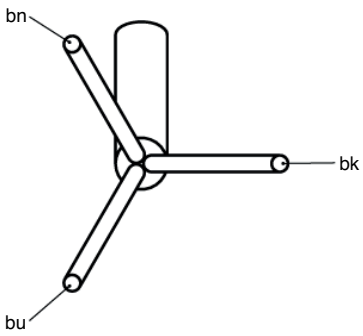
PNP NO ATEX 3G, 3D



Pin assignment, M8 with knurled nut



Flying leads



Square body design, insert straight in T-slot, screw 1/4 turn

NPN NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
NPN-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGMFAX**
NPN-NC, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGMFDX**
NPN-NC, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGMCHX**

NPN NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
NPN-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGNFAX**
NPN-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGNFDX**
NPN-NO, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGNCHX**

PNP NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
PNP-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGQFAX**
PNP-NC, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PVC IP67**	**P8SAGQFLX**
PNP-NC, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGQFDX**
PNP-NC, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGQCHX**

PNP NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
PNP-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PUR IP67**	**P8SAGPFAX**
PNP-NO, with LED, 3-wire	10-30 V DC	3 m Flying Lead	**PVC IP67**	**P8SAGPFLX**
PNP-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PUR IP67**	**P8SAGPFDX**
PNP-NO, with LED, 3-wire	10-30 V DC	10 m Flying Lead	**PVC IP67**	**P8SAGPFTX**
PNP-NO, with LED, 3-wire	10-30 V DC	0.3 m M8	**PUR IP67**	**P8SAGPCHX**

REED NORMALLY CLOSED	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NC, No LED, 2 wire	5-30 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGEFRX**
Reed-NC, No LED, 2-wire	5-120 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGEFRX1**
Reed-NC, No LED, 2-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGECNX**

REED NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NO, with LED, 2-wire	5-30 V AC/DC	3 m Flying Lead	**PUR IP67**	**P8SAGRFAX**
Reed-NO, with LED, 2-wire	5-120 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGRFLX1**
Reed-NO, with LED, 2-wire	5-230 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGRFLX2**
Reed-NO, with LED, 2-wire	5-230 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGRFDX2**
Reed-NO, with LED, 2-wire	5-120 V AC/DC	10 m Flying Lead	**PVC IP67**	**P8SAGRFTX1**
Reed-NO, with LED, 2-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGRCHX**

REED NORMALLY OPEN	VOLTAGE	CONNECTION	CABLE	Part Number
Reed-NO, with LED, 3-wire	5-30 V AC/DC	3 m Flying Lead	**PUR IP67**	**P8SAGSFAX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	3 m Flying Lead	**PVC IP67**	**P8SAGSFLX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	10 m Flying Lead	**PUR IP67**	**P8SAGSFDX**
Reed-NO, with LED, 3-wire	10-30 V AC/DC	10 m Flying Lead	**PVC IP67**	**P8SAGSFTX**
Reed-NO, with LED, 3-wire	5-30 V AC/DC	0.3 m M8	**PUR IP67**	**P8SAGSCHX**

ATEX IP67	VOLTAGE	CONNECTION	CABLE	Order Code
PNP-NO, with LED, 3-wire	10-26 V DC	3 m Flying lead	**PUR IP67**	**P8SAGPFAXS**
NAMUR-NO, with LED, 2-wire	8.2-20 V DC	5 m Flying Lead	**PVC IP67**	**P8SAGDFMXW ***
NAMUR-NO, with LED, 2-wire	8.2-20 V DC	10 m Flying Lead	**PVC IP67**	**P8SAGDFTXW ***

Note:

-30 to +80 °C (PUR cable) I -30 to + 70 °C (PVC cable) I -25 to +80 °C (NAMUR 1GD I -20 to +50 °C (ATEX 3GD)
All sensors come with an adapter for S-dovetail Parker type OSP grooves.
* with an aluminum adapter

P8S Continuous Position Sensors

Many applications require more than just end of stroke sensing of an actuator, but traditional methods of continuous sensing are expensive to implement. Parker's CPS (Continuous Position Sensor) enables quick, precise and contactless continuous position sensing of a magnetic piston.

CPS sensors continuously supply data via analog outputs or IO-Link. Analog position sensors have a voltage output of 0 V ... 10 V as well as a current output of 4 mA ... 20 mA. CPS enables flexible machine concepts, making it possible to solve tasks in areas such as quality monitoring and process control in conjunction with pneumatic cylinders. This continuous transfer of position data upgrades the functionality of the pneumatic cylinders by making them more intelligent, and as a result, more versatile. CPS settings can be adjusted during or after installation using a teach button or using IO-Link.

CPS can be mounted directly in standard T-slots without the need for additional accessories. Mounting on other cylinder types, (round, tie rod) is possible with adapters.

- Continuous position sensing
- IO-Link communication with M12 connector
- No modification to the actuator
- Analog version with M8 connector
- 5 sizes with sensing ranges from 32 mm to 256 mm
- IP67 design suitable for any industrial application
- Yellow teach button for easy set-up

Technical specification:

1 ms sampling rate
0.03% full scale resolution
0.06% full scale repeatability
0.3 mm Linearity error

How it works:

The CPS product detects the position of an actuator via the magnet on the piston. The sensor settings can easily be adjusted during installation using the yellow teach button or during operation over the IO-Link communication. This upgrades the functionality of the pneumatic actuator by making it more intelligent and versatile in support of the Industry 4.0 initiative.

How it connects:

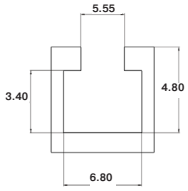
Analog version has a M8 connector and a voltage output of 0-10V as well as a current output of 4-20mA. IO-Link version has a M12 connector and transmits position via 2 bytes of process input data and also allows for parameter control of measuring range and locking of the teach button.
It can be controlled by Class A or Class B IO-Link Masters.

How it installs:

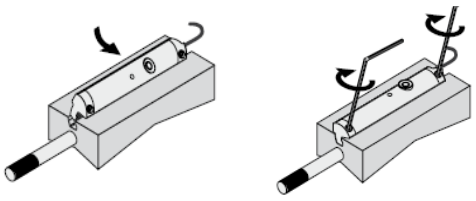
The Parker CPS requires the use of a magnetic piston. The product will ft T-slot cylinders without any additional mounting hardware.

Without Adapter:

Direct drop-in T-slot
T-slot dimensions [mm ± 0.1]



1. Pivot sensor into the slot
2. Teach the CPS unit the desired measuring range
3. Tighten set screws

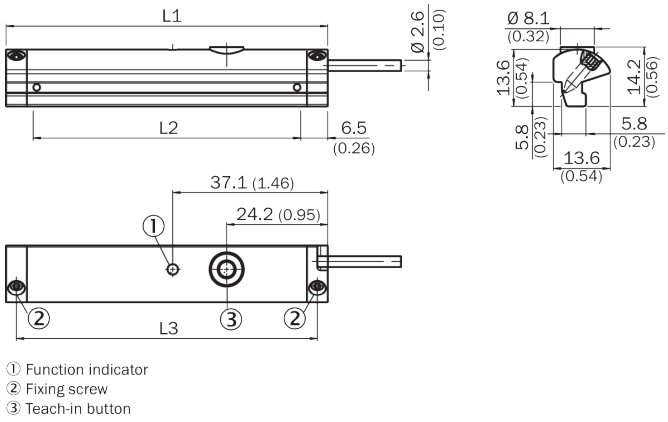


Technical Data

Cylinder type:	Profile with T-slot
Installation:	Drop in, fixed by allen key 1.5 mm
Measuring range:	32 to 256 mm depending on type [1)]
Housing length:	45 to 269 mm depending on type
Output Function:	Analog | IO-Link
Analog output (voltage):	0 to 10 V | -
Analog output (current):	4 to 20 mA | -
Teach-in:	Yes
Enclosure rating:	IP 67 (according to EN 60529)
Supply Voltage: [2)]	15 to 30 V DC
Power consumption: [3)]	<= 22 mA (analog) | <= 25 ma (IO-Link)
Max load resistance: [4)]	<= 500 Ω
Min load resistance: [5)]	<= 2 kΩ
Protection class:	III
Time delay before availability:	1.5 s
Required magnetic field sensitivity:	3 mT / 2 mT (analog) | 3 mT (IO-Link)
Resolution: [6)]	0.03% full scale range (max >=0.05 mm)
Linearity error: [7)]	0.3 mm
Repeat accuracy: [8)]	0.06% full scale range (>= 0.1 mm)
Sampling rate: [9)]	1 ms
Indication LED color:	Yellow (analog)
Reserve polarity protection:	Yes (analog)
Short circuit protection:	Yes (analog)
Ambient operating temperature range:	-20 to +70 °C (PUR cable)
Shock and vibration resistance:	30 g 11 ms / 10 ... 55 Hz, 1 mm
EMC: [10)]	According to EN 60947-5-2
International standard:	CE | C UL US | CCC (not applicable) | RoHs | IO-Link
UL file No:	On request
Housing material:	Plastic polyamid PA12
Screw material:	Stainless steel
Cable material:	PUR (Polyurethane)
Conductor cross-section:	0.08 mm²
Connector:	M12 (IO-Link) or M8 (analog)

1) ± 1 mm
2) Reverse-polarity protected, operation in short-circuit protected network: max. 8 A.
3) Without load
4) Power output, at 24 V
5) Voltage output
6) FSR: Full Scale Range; max. measuring range.
7) At 25°C, linearity error (maximum deviation)depending on response curve and minimal deviation function.
8) At 25°C, repeatability magnet movement in one direction.
9) Only in standard mode, not in IO-Link mode.
10) The analogue measured value can deviate under transient conditions.

Dimensions, mm (inch)



① Function indicator
② Fixing screw
③ Teach-in button

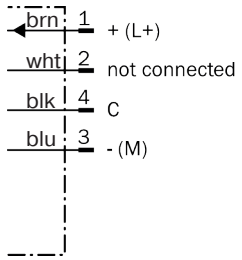
			Part number	
L1	L2 *	L3	Analog	IO-Link
45	32	40	**P8SAGACHA**	**P8SAGHMHA**
77	64	72	**P8SAGACHB**	**P8SAGHMHB**
141	128	136	**P8SAGACHD**	**P8SAGHMHD**
205	192	200	**P8SAGACHF**	**P8SAGHMHF**
269	256	264	**P8SAGACHH**	**P8SAGHMHH**

*L2 equal to the measuring range.

Note:
PUR cable with M12 (IO-Link) or M8 (Analog) male connector knurled nut, 4-pin, 0,3 meter length.
Please consult for measuring range 96, 160 & 224 mm.

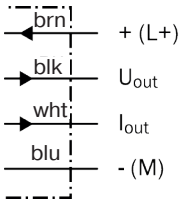
Connection Type and Diagram

IO Link version



PUR 0.3 meter length
with M12 male connec-
tor knurled nut, 4-pin

Analog version



PUR 0.3 meter length
with M8 male connector
knurled nut, 4-pin

Ordering Information, Drop-in T-slot

Output	Measuring length	Configuration option	Part number	Weight [g]	For product series
Analog	32 mm	Teach Button	**P8SAGACHA**	16	With T-slot groove *
	64 mm		**P8SAGACHB**	26	
	128 mm		**P8SAGACHD**	46	
	192 mm		**P8SAGACHF**	66	
	256 mm		**P8SAGACHH**	86	
IO-Link	32 mm	Teach Button or IO-Link parameter	**P8SAGHMHA**	20	With T-slot groove *
	64 mm		**P8SAGHMHB**	30	
	128 mm		**P8SAGHMHD**	50	
	192 mm		**P8SAGHMHF**	70	
	256 mm		**P8SAGHMHH**	90	

***** Required magnetic field sensitivity: 3mT / -2 mT (Analog) / 3mT (IO-Link)

Note:
PUR cable with M12 (IO-Link) or M8 (Analog) male connector knurled nut, 4-pin, 0,3 meter length.
Please consult for measuring range 96, 160 & 224 mm.

Male Connectors for Connecting Cables

Cable connectors for producting your own connecting cables.
The conncectors 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 connector and meet protection class IP65.

Technical Data

Operating voltage:	max. 32 V AC/DC
Opertaing current per contact:	max. 4 A
Connection cross section:	0.25... 0.5 mm² (conductor diameter min 0.1 mm)
Protection class:	IP65 and IP67 when plugged and screwed down (EN 60529)
Temperature range:	- 25... + 85°C

Connector	Weight [kg]	Part number
M8 screw connector		**P8CS0803J**
M12 screw connector	0.022	**P8CS1204J**

Cables to extend cable sensor lengths with M8*

Description	Part number	Weight [g]	For Product Series
Cable flex PVC 3 meter with 8mm snap-in connector / flying leads	**9126344341**	70	P8S Sensors with M8
Cable flex PVC 10 meter with 8mm snap-in connector / flying leads	**9126344342**	210	P8S Sensors with M8
Cable PUR 3 meter with 8mm snap-in female connector / flying leads	**9126344345**	70	P8S Sensors with M8
Cable flex PUR 10 meter with 8mm snap-in connector / flying leads	**9126344346**	210	P8S Sensors with M8
Cable PVC 5 meter with M8 screw female connector / flying leads	**4041**	120	P8S Sensors with knurled M8

*Note: not applicable for P8S CPS Sensors as no cable available

Safety Guide

Safety Guide for Selecting and Using Hydraulic, Pneumatic Cylinders and Their Accessories

WARNING: ⚠ FAILURE OF THE CYLINDER, ITS PARTS, ITS MOUNTING, ITS CONNECTIONS TO OTHER OBJECTS, OR ITS CONTROLS CAN RESULT IN:

- **Unanticipated or uncontrolled movement of the cylinder or objects connected to it.**
- **Falling of the cylinder or objects held up by it.**
- **Fluid escaping from the cylinder, potentially at high velocity.**

THESE EVENTS COULD CAUSE DEATH OR PERSONAL INJURY BY, FOR EXAMPLE, PERSONS FALLING FROM HIGH LOCATIONS, BEING CRUSHED OR STRUCK BY HEAVY OR FAST MOVING OBJECTS, BEING PUSHED INTO DANGEROUS EQUIPMENT OR SITUATIONS, OR SLIPPING ON ESCAPED FLUID.

Before selecting or using Parker (The Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using The Company's products.

1.0 General Instructions

1.1 Scope – This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

1.2 Fail Safe – Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

1.3 Distribution – Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use The Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

1.4 User Responsibility – Due to very wide variety of cylinder applications and cylinder operating conditions, The Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to The Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

1.5 Additional Questions – Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2.0 Cylinder and Accessories Selection

2.1 Seals – Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

2.2 Piston Rods – Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Follow the recommendations of the "Piston Rod Selection Chart and Data" in the publication for the series of cylinders of interest. The suggested piston rod diameter in these charts must be followed in order to avoid piston rod buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

On occasion cylinders are ordered with double rods (a piston rod extended from both ends of the cylinder). In some cases a stop is threaded on to one of the piston rods and used as an external stroke adjuster. On occasions spacers are attached to the machine member connected to the piston rod and also used as a stroke adjuster. In both cases the stops will create a pinch point and the user should consider appropriate use of guards. If these external stops are not perpendicular to the mating contact surface, or if debris is trapped between the contact surfaces, a bending moment will be placed on the piston rod, which can lead to piston rod failure. An external stop will also negate the effect of cushioning and will subject the piston rod to impact loading. Those two (2) conditions can cause piston rod failure. Internal stroke adjusters are available with and without cushions. The use of external stroke adjusters should be reviewed with our engineering department.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston to rod joint.

2.3 Cushions – Cushions should be considered for cylinder applications when the piston velocity is expected to be over 4 inches/second.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be review by our engineering department.

2.4 Cylinder Mountings – Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

2.5 Port Fittings – Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end.

The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure x effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

3.0 Cylinder and Accessories Installation and Mounting

3.1 Installation

3.1.1 – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

3.1.2 – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

3.1.3 – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

3.1.4 – Sometimes it may be necessary to rotate the piston rod in order to thread the piston rod into the machine member. This operation must always be done with zero pressure being applied to either side of the piston. Failure to follow this procedure may result in loosening the piston to rod-threaded connection. In some rare cases the turning of the piston rod may rotate a threaded piston rod gland and loosen it from the cylinder head. Confirm that this condition is not occurring. If it does, re-tighten the piston rod gland firmly against the cylinder head.

For double rod cylinders it is also important that when attaching or detaching the piston rod from the machine member that the torque be applied to the piston rod end of the cylinder that is directly attaching to the machine member with the opposite end unrestrained. If the design of the machine is such that only the rod end of the cylinder opposite to where the rod attaches to the machine member can be rotated, consult the factory for further instructions.

3.2 Mounting Recommendations

3.2.1 – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

3.2.2 – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

3.2.3 – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. The standard tie rod extension is shown as BB in dimension tables. Longer or shorter extensions can be supplied. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

3.2.4 – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

3.2.5 – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

3.2.6 – Clevis Mountings – Cylinders should be pivoted at both ends with centerline of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

4.1 Storage – At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

4.1.1 – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

4.1.2 – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

4.1.3 – Port protector plugs should be left in the cylinder until the time of installation.

4.1.4 – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

4.1.5 – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

4.2 Cylinder Trouble Shooting

4.2.1 – External Leakage

4.2.1.1 – Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to gland wear. If clearance is excessive, replace rod bushing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F. (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F. (+177°C.) and replace with fluorocarbon seals.

4.2.1.2 – Cylinder body seal leak can generally be traced to loose tie rods. Torque the tie rods to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque tie rods as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the tie rods replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

4.2.2 – Internal Leakage

4.2.2.1 – Piston seal leak (by-pass) 1 to 3 cubic inches per minute leakage is considered normal for piston ring construction. Virtually no static leak with lipseal type seals on piston should be expected. Piston seal wear is a usual cause of piston seal leakage. Replace seals as required.

4.2.2.2 – With lipseal type piston seals excessive back pressure due to over-adjustment of speed control valves could be a direct cause of rapid seal wear. Contamination in a hydraulic system can result in a scored cylinder bore, resulting in rapid seal wear. In either case, replace piston seals as required.

4.2.2.3 – What appears to be piston seal leak, evidenced by the fact that the cylinder drifts, is not always traceable to the piston. To make sure, it is suggested that one side of the cylinder piston be pressurized and the fluid line at the opposite port be disconnected. Observe leakage. If none is evident, seek the cause of cylinder drift in other component parts in the circuit.

4.2.3 – Cylinder Fails to Move the Load

4.2.3.1 – Pneumatic or hydraulic pressure is too low. Check the pressure at the cylinder to make sure it is to circuit requirements.

4.2.3.2 – Piston Seal Leak – Operate the valve to cycle the cylinder and observe fluid flow at valve exhaust ports at end of cylinder stroke. Replace piston seals if flow is excessive.

4.2.3.3 – Cylinder is undersized for the load – Replace cylinder with one of a larger bore size.

4.3 Erratic or Chatter Operation

4.3.1 – Excessive friction at rod gland or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

4.3.2 – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

4.3.3 – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

4.4 Cylinder Modifications, Repairs, or Failed Component – Cylindersas shipped from the factory are not to be disassembled and or modified. If cylinders require modifications, these modifications must be done at company locations or by The Company's certified facilities. The Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, tie rod, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

PARKER-HANNIFIN CORPORATION
OFFER OF SALE

1. Definitions. As used herein, the following terms have the meanings indicated.

Buyer:	means any customer receiving a Quote for Products.
Goods:	means any tangible part, system or component to be supplied by Seller.
Products:	means the Goods, Services and/or Software as described in a Quote.
Quote:	means the offer or proposal made by Seller to Buyer for the supply of Products.
Seller:	means Parker-Hannifin Corporation, including all divisions and businesses thereof.
Services:	means any services to be provided by Seller.
Software:	means any software related to the Goods, whether embedded or separately downloaded.
Terms:	means the terms and conditions of this Offer of Sale.

2. Terms. All sales of Products by Seller are expressly conditioned upon, and will be governed by the acceptance of, these Terms. These Terms are incorporated into any Quote provided by Seller to Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms or conditions of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

3. Price; Payment. The Products set forth in the Quote are offered for sale at the prices indicated in the Quote. Unless otherwise specifically stated in the Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2020). All sales are contingent upon credit approval and full payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

4. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate, and Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repackage any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

5. Warranty. The warranty for the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".**

6. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR**

ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

8. Confidential Information. Buyer acknowledges and agrees that any technical, commercial, or other confidential information of Seller, including, without limitation, pricing, technical drawings or prints and/or part lists, which has been or will be disclosed, delivered or made available, whether directly or indirectly, to Buyer ("Confidential Information"), has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller.

9. Loss to Buyer's Property. Any tools, patterns, materials, equipment or information furnished by Buyer or which are or become Buyer's property ("Buyer's Property"), will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property. Furthermore, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

10. Special Tooling. "Special Tooling" includes but is not limited to tools, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Goods. Seller may impose a tooling charge for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole discretion at any time.

11. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

12. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

13. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. **Unauthorized Uses**. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tools, equipment, plans, drawings, designs, specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

14. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

15. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

16. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, delays or failures in delivery from carriers or suppliers, shortages of materials, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by force majeure shall be tolled for the duration of such force majeure and rescheduled for mutually agreed dates as soon as practicable after the force majeure condition ceases to exist. Force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or sub-contractors.

17. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

18. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

19. Ownership of Software. Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

20. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

21. Governing Law. These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

22. Entire Agreement. These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

23. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Laws.

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Parker Hannifin Corporation
Pneumatic Division
Otsego, Michigan
Customer Service: pdn.support@support.parker.com
Technical Support: pdn.technical@support.parker.com
Quotes: pdn.quotes@support.parker.com
Web site: www.parker.com/pneumatics