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The innovative P1D is a future-proof generation of ISO/VDMA cylinders. The cylinders are double acting, with a new design of air cushioning.

The P1D complies with the current ISO 6431, ISO 15552, VDMA 24562 and AFNOR installation dimension standards

- Available in 32 to 200mm bores
- PUR seals for long service life
- Drop-in sensors
- Corrosion resistant design
- Magnetic piston as standard
- Lubricated with food grade grease



Operating information

Operating pressure:	145 PSIG (10 bar) maximum
Temperature range:	Standard: -4°F to 176°F (-20°C to 80°C) High temperature: 14°F to 250°F (-10°C to 121°C)
Cylinders for low pressure hydraulic operation:	Ø32 - 125mm
ATEX approval:	CE Ex IIGD c T4 248°F (120°C)
Filtration requirements:	40 micron, dry filtered air
For technical information see CD	

P1D Standard - Double acting

Ø32mm - (G¹/₈)

Stroke (mm)	Order Code
25	P1D-S032MC-0025NNNNN
40	P1D-S032MC-0040NNNNN
50	P1D-S032MC-0050NNNNN
80	P1D-S032MC-0080NNNNN
100	P1D-S032MC-0100NNNNN
125	P1D-S032MC-0125NNNNN
160	P1D-S032MC-0160NNNNN
200	P1D-S032MC-0200NNNNN
250	P1D-S032MC-0250NNNNN
320	P1D-S032MC-0320NNNNN
400	P1D-S032MC-0400NNNNN
500	P1D-S032MC-0500NNNNN

Ø40mm - (G¹/₄)

25	P1D-S040MC-0025NNNNN
40	P1D-S040MC-0040NNNNN
50	P1D-S040MC-0050NNNNN
80	P1D-S040MC-0080NNNNN
100	P1D-S040MC-0100NNNNN
125	P1D-S040MC-0125NNNNN
160	P1D-S040MC-0160NNNNN
200	P1D-S040MC-0200NNNNN
250	P1D-S040MC-0250NNNNN
320	P1D-S040MC-0320NNNNN
400	P1D-S040MC-0400NNNNN
500	P1D-S040MC-0500NNNNN

Ø50mm - (G¹/₄)

25	P1D-S050MC-0025NNNNN
40	P1D-S050MC-0040NNNNN
50	P1D-S050MC-0050NNNNN
80	P1D-S050MC-0080NNNNN
100	P1D-S050MC-0100NNNNN
125	P1D-S050MC-0125NNNNN
160	P1D-S050MC-0160NNNNN
200	P1D-S050MC-0200NNNNN
250	P1D-S050MC-0250NNNNN
320	P1D-S050MC-0320NNNNN
400	P1D-S050MC-0400NNNNN
500	P1D-S050MC-0500NNNNN

Ø63mm - (G³/₈)

Stroke (mm)	Order Code
25	P1D-S063MC-0025NNNNN
40	P1D-S063MC-0040NNNNN
50	P1D-S063MC-0050NNNNN
80	P1D-S063MC-0080NNNNN
100	P1D-S063MC-0100NNNNN
125	P1D-S063MC-0125NNNNN
160	P1D-S063MC-0160NNNNN
200	P1D-S063MC-0200NNNNN
250	P1D-S063MC-0250NNNNN
320	P1D-S063MC-0320NNNNN
400	P1D-S063MC-0400NNNNN
500	P1D-S063MC-0500NNNNN

Ø80mm - (G³/₈)

25	P1D-S080MC-0025NNNNN
40	P1D-S080MC-0040NNNNN
50	P1D-S080MC-0050NNNNN
80	P1D-S080MC-0080NNNNN
100	P1D-S080MC-0100NNNNN
125	P1D-S080MC-0125NNNNN
160	P1D-S080MC-0160NNNNN
200	P1D-S080MC-0200NNNNN
250	P1D-S080MC-0250NNNNN
320	P1D-S080MC-0320NNNNN
400	P1D-S080MC-0400NNNNN
500	P1D-S080MC-0500NNNNN

Ø100mm - (G¹/₂)

Stroke (mm)	Order Code
25	P1D-S100MC-0025NNNNN
40	P1D-S100MC-0040NNNNN
50	P1D-S100MC-0050NNNNN
80	P1D-S100MC-0080NNNNN
100	P1D-S100MC-0100NNNNN
125	P1D-S100MC-0125NNNNN
160	P1D-S100MC-0160NNNNN
200	P1D-S100MC-0200NNNNN
250	P1D-S100MC-0250NNNNN
320	P1D-S100MC-0320NNNNN
400	P1D-S100MC-0400NNNNN
500	P1D-S100MC-0500NNNNN

Ø125mm - (G¹/₂)

25	P1D-S125MC-0025NNNNN
40	P1D-S125MC-0040NNNNN
50	P1D-S125MC-0050NNNNN
80	P1D-S125MC-0080NNNNN
100	P1D-S125MC-0100NNNNN
125	P1D-S125MC-0125NNNNN
160	P1D-S125MC-0160NNNNN
200	P1D-S125MC-0200NNNNN
250	P1D-S125MC-0250NNNNN
320	P1D-S125MC-0320NNNNN
400	P1D-S125MC-0400NNNNN
500	P1D-S125MC-0500NNNNN

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

Sensors

For sensors see page B296.



Most popular.

Design Versions

P1D Standard Version

P1D Standard Version cylinders are available in 32-125mm bores and utilize internal composite technology to save weight, while assuring the high performance and functionality expected of ISO cylinders. Cushions and bumpers at both ends and a magnetic piston are included as standard. The Standard Version serves all markets where performance at an affordable price is desired.



P1D Removable Gland Version

P1D Removable Gland Version cylinders are available in 32-200mm bores and utilize bar stock endcaps and a removable high-strength bronze bearing for traditional and custom applications. The bronze bearing assembly is externally removable for quick and easy maintenance. No other ISO cylinder manufacturer in the world produces a Removable Gland Version and meets these demands. This version covers all applications which require performance and customization at all bore sizes.



P1D Series Rod Lock Cylinder

The P1D Series Rod Lock Cylinder incorporates a powerful piston rod locking device, which clamps the piston rod and locks it in position. The locking device is a spring lock with an air pressure release and is integrated into the front (head) cover of the cylinder.



P1D Clean Version

The P1D Clean Version is completely designed for the food industry. The stringent requirements for hygiene regarding choice of material and corrosion resistance have guided the development of this cylinder version. Available with BSPP ports (ISO 1179-1 with ISO 228-1 threads).



P1D Tie-Rod Version

The P1D Tie-Rod Version cylinders are based on the same high level technology as the Standard Version. They accept either Standard Version or Removable Gland Version heads and caps. This cylinder is the perfect choice wherever a true tie-rod cylinder is needed.



Guided Cylinders

For guided versions of the P1D, see the P5E Series and HB Series.



P5E Series

B
Tie Rod Cylinders
Actuator Products

Ordering information

P1D **-** **S** **032** **M** **C** **-** **0500** **N** **N** **N** **N** **N**

Piston Style		
Cushions	Piston material	
	Composite ¹	Aluminum ²
None	M	Y
Cush B/E	- ³	4
Cush head	J	5
Cush cap	K	6

Bore size	
032	32mm
040	40mm
050	50mm
063	63mm
080	80mm
100	100mm
125	125mm
160	160mm ⁸
200	200mm ⁸

Stroke ¹⁴
Specify whole mm using 4 digits, i.e. 0500

Rod end	
N	Metric male
6	Metric female
3	Special*

* Please provide desired dimensions for KK, AM and WH or W. If otherwise, please provide dimensioned sketch.

Cylinder ports front & rear	
-	BSPP Ports (G Threads)**
E	NPTF Ports*
Q	BSPT Ports (RC Threads)*†

* Not available on clean version.
 † Not available on die cast version.
 **ISO 1179-1 with ISO 228-1 threads.

Sensors ¹⁷			
Prepared for factory-fitted sensors	Cable location		
	Front or left	Rear or right	Front & rear
P1D clean version	6	7	8
P1D all versions (except Clean) prepared for sensors or clean version without sensor capability ¹⁸	N		

Version				
Die cast end caps ⁴	Cylinder body profile	Rod lock		
		None	Fitted w/ standard rod lock ⁷	Fitted w/ manual override rod lock ⁷
Removable gland ⁵ (machined end caps)	Standard	S	L	N/A
	Tie Rod ¹³	T	M	N/A
	Clean	C	D	N/A
Special ⁶	Standard	G	R	J
	Tie Rod ¹³	E	7⁴	Consult Factory
Any Special	/			

Rod mountings & plugs ¹⁵		
Rod mounting	No plugs ¹⁶	With plugs ¹
Swivel rod eye	S	A
Swivel rod eye SS	T	1
Swivel rod eye with clevis bracket GA ¹⁹	V	E
Swivel rod eye SS with clevis bracket GA	W	2
Clevis	C	B
Clevis SS	D	3
Flexco coupling	F	G
One additional piston rod nut	X	P
Stainless steel piston rod nut	Y	4
Acid-resistant nut	Z	5
None (piston rod nut only)	N	R

Function				
Fastener type	Rod wiper style	Double acting	Double rod	Tandem ¹³
Standard end cover screws	Std scraper	M	F	C
	Metal scraper	Q	R	J
Stainless steel end cover screws ⁹	Std scraper	A	G	N/A
	Metal scraper	S	T	N/A

Piston rod & seal material			
Piston rod material	Seal material		
	Standard	Fluorocarbon ¹⁰	Hydraulic ¹¹
Chrome plated carbon steel ²	C	G	J
Chrome plated stainless steel ^{2, 19}	R	D	Z
316 Stainless steel ¹³	S	N/A	N/A
Acid-resistant stainless steel	M	N²	N/A

Mounting style		
	Standard	Rotated 90°
Flange MF1 at head (front) end	1	3
Flange MF2 at cap (rear) end	B	4
Flanges MF1 and MF2 at both ends	2	K
Foot brackets MS1	F	R
Clevis bracket GA aluminum	C	U
Rear eye MP4 aluminum	E	V
Rear swivel eye MP6 aluminum	S	W
Clevis bracket MP2 aluminum	T	Y
Rear eye + clevis (MP4 + MP2) aluminum	L	Z
Clevis bracket MP2 + pivot hinge aluminum	X	5
Clevis bracket GA aluminum + steel swivel hinge	Q	0
Rear swivel eye + clevis bracket GA aluminum	M	A
Intermediate trunnion MT4 (requires XV dimension)	G	7
Trunnion flange at head (front) end ⁴	H	P
Trunnion flange at cap (rear) end ⁴	J	8
None (MX0)	N	9

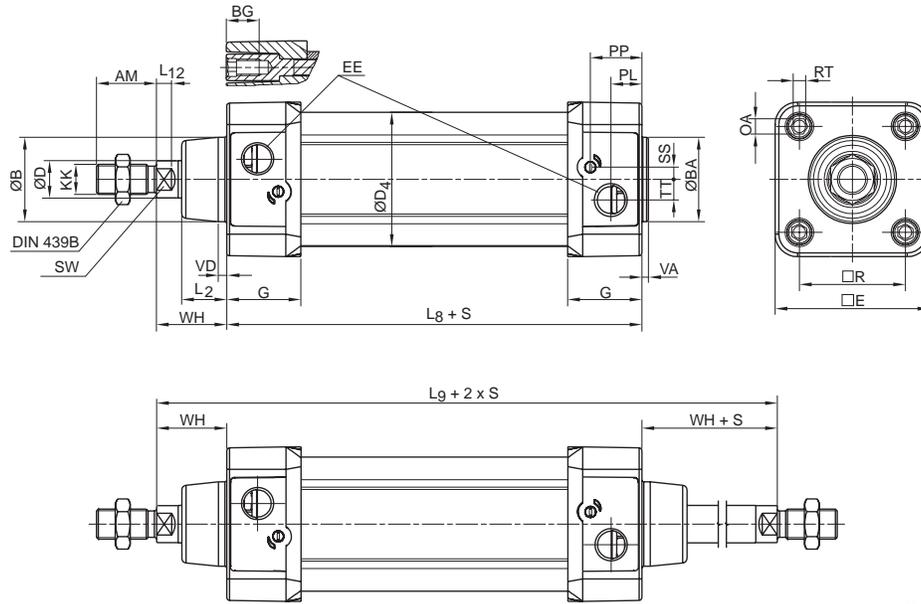
Notes:

- Not available for 160-200mm bores.
 - Not available on Clean Version.
 - Must be placed in model code.
 - Not available for 160-200mm bores or with fluorocarbon seals.
 - When Removable Gland Version is fitted with rod lock, gland cannot be replaced without disassembling cylinder.
 - If special cylinder is ordered (other than rod end), End Cap Style, Cylinder Body Profile and Rod Lock option must be given in addition to the special request.
 - Cylinders fitted with rod locks must be cushioned on both ends.
 - Tie Rod Version E must be specified for these bores.
 - Applies only to end cover screws for 32-125mm bores. For stainless steel tie rods and nuts (all bore sizes), change Version to special and request stainless steel tie rods and nuts.
 - If used for temperature above 80°C (176°F), aluminum piston required. Not available with die cast end caps.
 - Hydraulic seal option valid for Removable Gland Version only. Adjustable cushion options and Rod Lock Versions not available.
 - Only available on Clean Version.
 - Tie Rod Version is required for Tandem Function.
 - When specifying a stop tube, place a "P" in the version field. Then specify the version, amount of stop tube and amount of net stroke. The stroke used in the model code should be gross stroke (net stroke plus stop tube).
 - Please review Piston Rod Selection Chart in the Engineering Section to check for a rod buckling condition.
 - Clean Version comes standard with plugs. Use this column when ordering Clean Version.
 - For sensor part numbers and specifications, please refer to Electronic Sensors section.
 - P1D Clean Version ordered without sensors cannot be retrofitted with sensor capability.
 - Consult factory for this option.
- Double Rod Cylinders**
 Double rod option is available with Mounting Styles MX0, MS1, MF1, MF2 and MT4.
 For double rod cylinders, it is assumed that the rod number and rod end are the same for both piston rods. On a double rod cylinder where the two rod ends are different, use a rod end of '3' and be sure to clearly state which rod end is to be assembled at which end.

B

Tie Rod Cylinders
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P1D Standard Version



S = Stroke

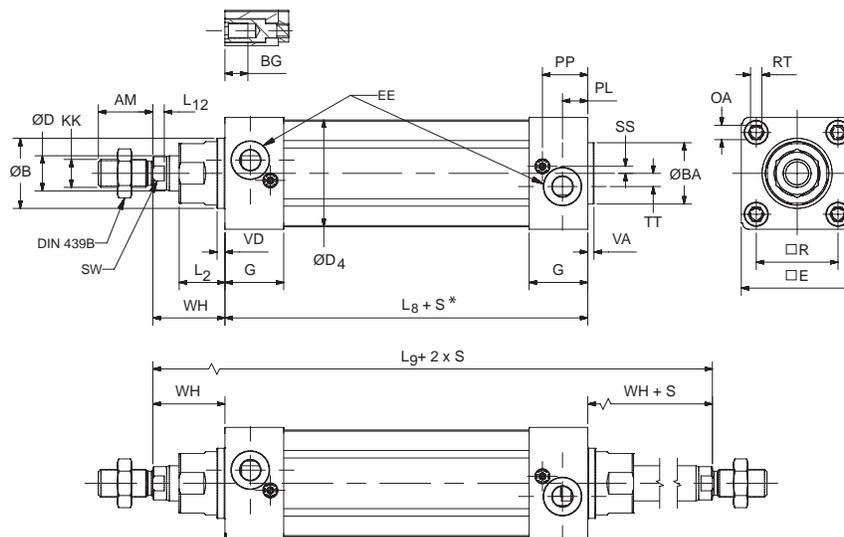
Bore size	AM mm	B mm	BA mm	BG mm	D mm	D4 mm	E	EE		G mm	KK	L2 mm	L8 mm	L9 mm	L12 mm
								BSPP*	NPTF/BSPT						
32	22	30	30	16	12	45.0	50.0	G1/8	1/8	28.5	M10x1.25	16.0	94	146	6.0
40	24	35	35	16	16	52.0	57.4	G1/4	1/4	33.0	M12x1.25	19.0	105	165	6.5
50	32	40	40	16	20	60.7	69.4	G1/4	1/4	33.5	M16x1.5	24.0	106	180	8.0
63	32	45	45	16	20	71.5	82.4	G3/8	3/8	39.5	M16x1.5	24.0	121	195	8.0
80	40	45	45	17	25	86.7	99.4	G3/8	3/8	39.5	M20x1.5	30.0	128	220	10.0
100	40	55	55	17	25	106.7	116.0	G1/2	1/2	44.5	M20x1.5	32.4	138	240	10.0
125	54	60	60	20	32	134.0	139.0	G1/2	1/2	51.0	M27x2	45.0	160	290	13.0

Bore size	OA mm	PL mm	PP mm	R mm	RT	SS mm	SW mm	TT mm	VA mm	VD mm	WH mm
40	6	14	21.9	38.0	M6	8.0	13	5.5	3.5	4.5	30
50	8	14	25.9	46.5	M8	4.0	17	7.5	3.5	4.5	37
63	8	16	27.4	56.5	M8	6.5	17	11.0	3.5	4.5	37
80	6	16	30.5	72.0	M10	0	22	15.0	3.5	4.5	46
100	6	18	35.8	89.0	M10	0	22	20.0	3.5	4.5	51
125	8	23	40.5	110.0	M12	0	27	17.5	3.5	6.5	65

* ISO 1179-1 with ISO 228-1 threads

B
Tie Rod Cylinders
Actuator Products

P1D Removable Gland Version



S = Stroke

Bore size	AM mm	B mm	BA mm	BG mm	D mm	D4 mm	E mm	EE		G mm	KK	L2 mm	L8 mm	L9 mm	L12 mm
								BSPP *	NPTF/BSPT						
32	22	30	30	16	12	45.0	46.5	G1/8	1/8	28.5	M10x1.25	18	94	146	6.0
40	24	35	35	16	16	52.0	52.0	G1/4	1/4	33.0	M12x1.25	20	105	165	6.5
50	32	40	40	16	20	60.7	63.5	G1/4	1/4	33.5	M16x1.5	26	106	180	6.5
63	32	45	45	16	20	71.5	76.0	G3/8	3/8	39.5	M16x1.5	26	121	195	6.5
80	40	45	45	17	25	86.7	95.5	G3/8	3/8	39.5	M20x1.5	33	128	220	10.0
100	40	55	55	17	25	106.7	114.5	G1/2	1/2	44.5	M20x1.5	33	138	240	10.0
125	54	60	60	20	32	134.0	140.0	G1/2	1/2	51.0	M27x2	41	160	290	13.0

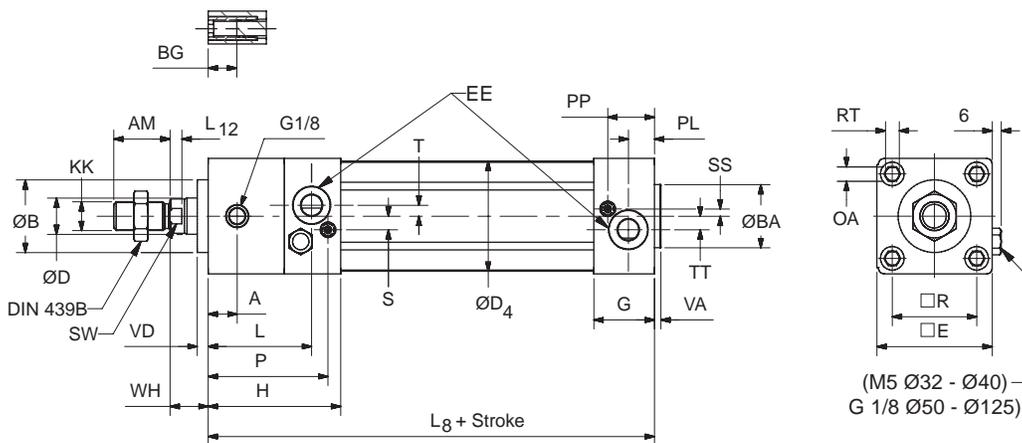
Bore size	OA mm	PL mm	PP mm	R mm	RT	SS mm	SW mm	TT mm	VA mm	VD mm	WH mm
32	6	13	21.8	32.5	M6	6.5	10	4.5	3.5	4.5	26
40	6	14	21.9	38.0	M6	8.0	13	5.5	3.5	4.5	30
50	8	14	25.9	46.5	M8	4.0	17	7.5	3.5	4.5	37
63	8	16	27.4	56.5	M8	6.5	17	11.0	3.5	4.5	37
80	6	16	30.5	72.0	M10	0	22	15.0	3.5	4.5	46
100	6	18	35.8	89.0	M10	0	22	20.0	3.5	4.5	51
125	8	23	40.5	110.0	M12	0	27	17.5	5.5	6.5	65

* ISO 1179-1 with ISO 228-1 threads

B

Tie Rod Cylinders
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P1D Rod Lock Version
 (Version R or L)



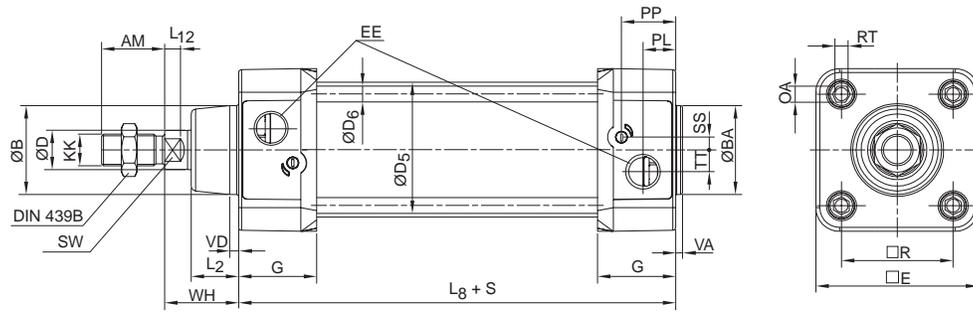
Bore size	A mm	AM mm	B mm	BA mm	BG mm	D mm	D4 mm	E mm	EE *	G mm	H mm	KK	L mm	L8 mm	L12 mm
32	16	22	30	30	16	12	45.0	46.5	G1/8	28.5	71.5	M10x1.25	56.0	137	6.0
40	16	24	35	35	16	16	52.0	52.0	G1/4	33.0	77.0	M12x1.25	56.0	149	6.5
50	18	32	40	40	16	20	60.7	63.5	G1/4	33.5	80.5	M16x1.5	62.5	153	6.5
63	26	32	45	45	16	20	71.5	76.0	G3/8	39.5	96.5	M16x1.5	74.5	178	6.5
80	35	40	45	45	17	25	86.7	95.5	G3/8	39.5	110.5	M20x1.5	87.0	199	10.0
100	50	40	55	55	17	25	106.7	114.5	G1/2	44.5	132.5	M20x1.5	106.0	226	10.0
125	60	54	60	60	20	32	134.0	140.0	G1/2	51.0	145.0	M27x2	117.0	254	13.0

Bore size	OA mm	P mm	PL mm	PP mm	R mm	RT mm	S mm	SS mm	SW mm	T mm	TT mm	VA mm	VD mm	WH mm
32	6	64.8	13	21.8	32.5	M6	7	6.5	10	2.5	4.5	3.5	4.5	15
40	6	68.0	14	21.9	38.0	M6	9	8.0	13	2.0	5.5	3.5	4.5	16
50	8	73.5	14	25.9	46.5	M8	8	4.0	17	4.0	7.5	3.5	5.0	17
63	8	89.5	16	27.4	56.5	M8	8	6.5	17	2.0	11.0	3.5	5.0	17
80	6	101.5	16	30.5	72.0	M10	9	0	22	5.0	15.0	3.5	4.0	20
100	6	123.5	18	35.8	89.0	M10	12	0	22	6.0	20.0	3.5	4.0	20
125	8	136.0	23	40.5	110.0	M12	12	0	27	6.0	17.5	5.5	6.0	27

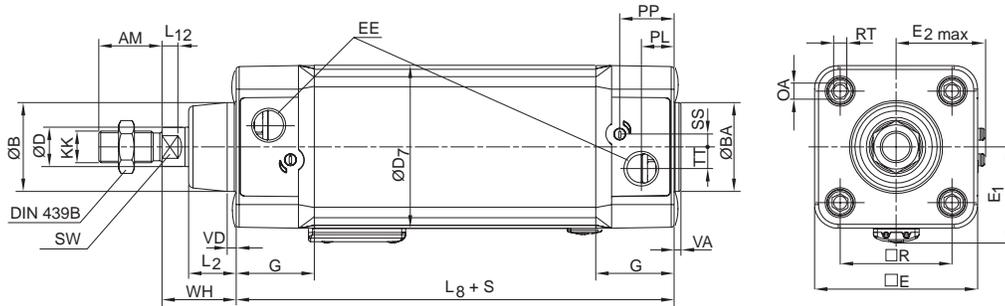
* ISO 1179-1 with ISO 228-1 threads

B
 Tie Rod Cylinders
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P1D Tie-Rod Version (32-125mm)



P1D Clean Version



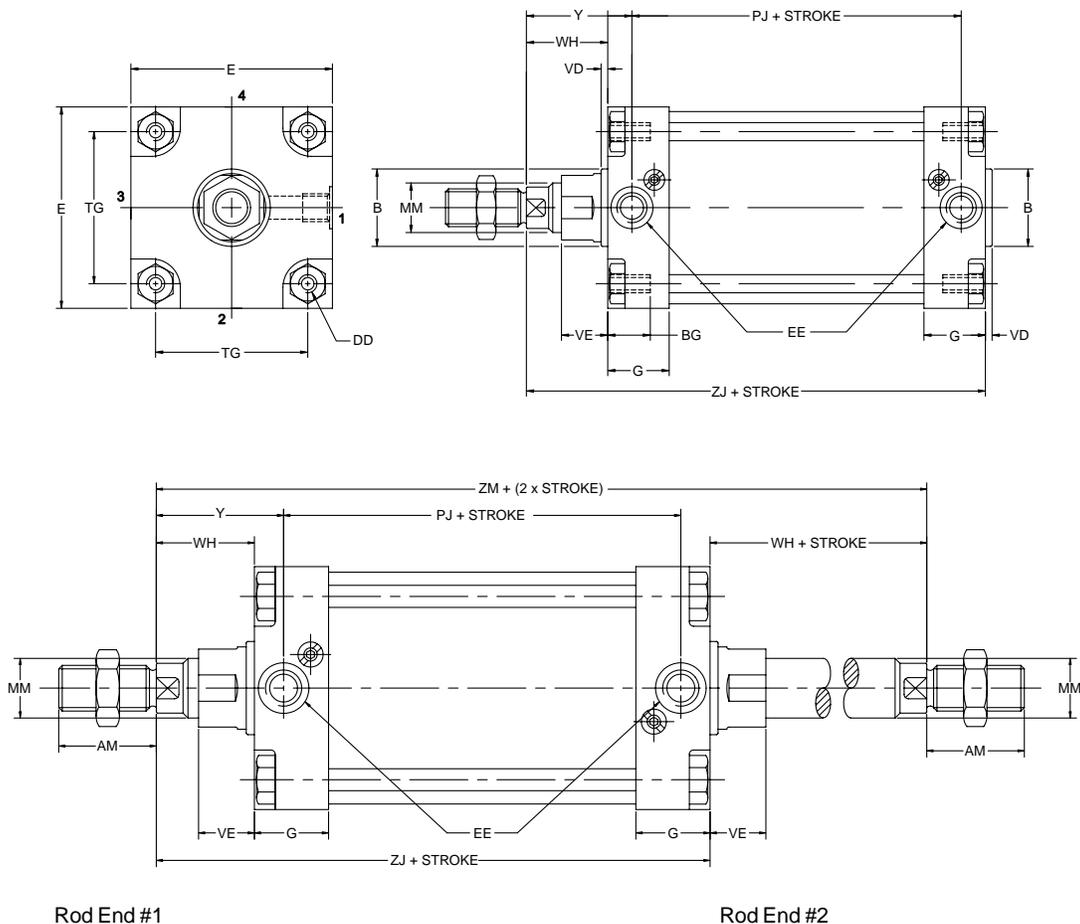
Bore size	D5 mm	D6 mm	D7 mm	E1 mm	E2 max mm
32	36	5.3	49.6	32	5
40	45	5.3	57.3	36	6
50	55	7.1	69.3	42	6
63	68	7.1	82.3	49	5
80	85	8.9	99.3	57	5
100	105	8.9	117.6	68	6
125	132	10.7	142.8	81	6

Other dimensions, see P1D removable gland version.

B

Tie Rod Cylinders
 Actuator Products

P1D Tie-Rod Version (160-200mm)



Bore size	AM mm	B d11 mm	BG mm	DD	E mm	EE		G mm	MM mm	TG mm	VD mm	VE mm	WH mm	Y mm	PJ ¹ mm	ZJ ¹ mm	ZM ² mm
						BSPP ³	NPTF/BSPT										
160	72	65	24	M16	177	G3/4	3/4	54	40	140	6	56	80	105	130	260	340
200	72	75	24	M16	214	G3/4	3/4	54	40	175	6	56	95	120	130	275	370

¹ Add stroke
² Add 2x stroke
³ ISO 1179-1 with ISO 228-1 threads

Double Rod Cylinders

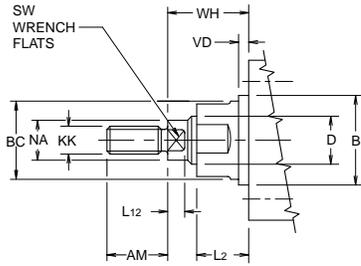
Double rod option is available on Mounting Styles MX0, MS1, MF1, MF2 and MT4.

For double rod cylinders, it is assumed that the rod number and rod end are the same for both piston rods. On a double rod cylinder where the two rod ends are different, use a rod end of '3' and be sure to clearly state which rod end is to be assembled at which end.

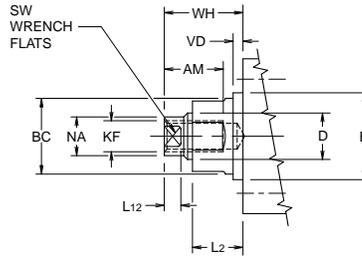
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All Mountings Except MF1

Thread Style N



Thread Style 6



**Thread Style 3 -
 "Special Thread"**

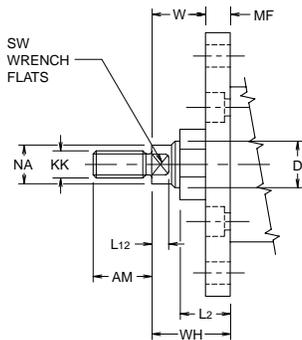
Special thread, extension, rod eye, blank, etc are also available. To order, specify "Style 3" and provide desired dimensions for KF or KK, AM and WH. If otherwise special, furnish dimensioned sketch.

Bore size	D	KK	KF	AM	B d11	BC	SW across flats	L12	NA	VD	L2	WH*
32	12	M10x1.25	M8x1	22	30	27	10	6	11	4.5	18	26
40	16	M12x1.25	M10x1.25	24	35	32	13	6.5	15	4.5	20	30
50	20	M16x1.5	M14x1.5	32	40	36	17	6.5	19	4.5	26	37
63	20	M16x1.5	M14x1.5	32	45	36	17	6.5	19	4.5	26	37
80	25	M20x1.5	M18x1.5	40	45	41	22	10	24	4.5	33	46
100	25	M20x1.5	M18x1.5	40	55	41	22	10	24	4.5	33	51
125	32	M27x2	M24x2	54	60	50	27	13	31	6.5	41	65
160	40	M36x2	M30x2	72	65	60	36	16	39	6	56	80
200	40	M36x2	M30x2	72	75	60	36	16	39	6	56	95

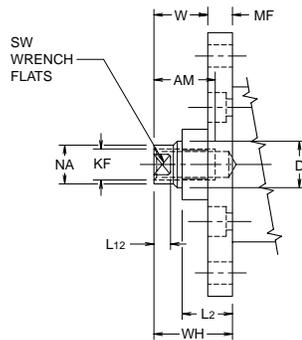
*NOTE: Dimensions do not apply to Rod Lock Versions.

With MF1 Mounting

Thread Style N



Thread Style 6



**"Special Thread"
 Style 3**

Special thread, extension, rod eye, blank, etc are also available. To order, specify "Style 3" and provide desired dimensions for KF or KK, AM and WH. If otherwise special, furnish dimensioned sketch.

Bore size	D	KK	KF	AM	SW across flats	L12	MF	NA	L2	W†	WH†
32	12	M10x1.25	M8x1	22	10	6	10	11	18	16	26
40	16	M12x1.25	M10x1.25	24	13	6.5	10	15	20	20	30
50	20	M16x1.5	M14x1.5	32	17	6.5	12	19	26	25	37
63	20	M16x1.5	M14x1.5	32	17	6.5	12	19	26	25	37
80	25	M20x1.5	M18x1.5	40	22	10	16	24	33	30	46
100	25	M20x1.5	M18x1.5	40	22	10	16	24	33	35	51
125	32	M27x2	M24x2	54	27	13	20	31	41	45	65
160	40	M36x2	M30x2	72	36	16	20	39	56	60	80
200	40	M36x2	M30x2	72	36	16	25	39	56	70	95

†NOTE: Dimensions do not apply to Rod Lock Versions.

B

Tie Rod Cylinders
 Actuator Products

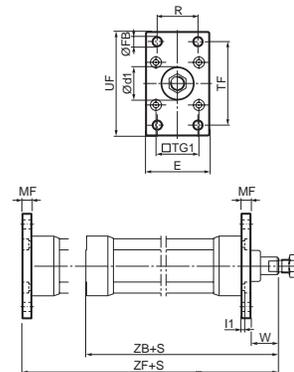
Flange – MF1, MF2



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

Materials

32-100mm bore flange: Surface-treated aluminum, black
 125-200mm bore flange: Steel, black
 Mounting screws acc. to DIN 6912: Zinc-plated steel 8.8
 Supplied complete with mounting screws for attachment to cylinder.



According to ISO MF1/MF2, VDMA 24 562, AFNOR

Bore size mm	d1 H11 mm	FB H13 mm	TG1 mm	E mm	R JS14 mm	MF JS14 mm	TF JS14 mm	UF	I1 -0.5 mm	W mm	ZF mm	ZB mm	Weight kg	Part number
32	30	7	32.5	45	32	10	64	80	5.0	16	130	123.5	0.23	P1C-4KMBA
40	35	9	38.0	52	36	10	72	90	5.0	20	145	138.5	0.28	P1C-4LMBA
50	40	9	46.5	65	45	12	90	110	6.5	25	155	146.5	0.53	P1C-4MMBA
63	45	9	56.5	75	50	12	100	120	6.5	25	170	161.5	0.71	P1C-4NMBA
80	45	12	72.0	95	63	16	126	150	8.0	30	190	177.5	1.59	P1C-4PMBA
100	55	14	89.0	112	75	16	150	185	8.0	35	205	192.5	2.19	P1C-4QMBA
125	60	16	110.0	140	90	20	180	220	10.5	45	245	230.5	3.78	P1C-4RMB
160	65	18	140.0	180	115	20	230	260	9.5	60	280	266	C.F.	L075370160
200	75	22	175.0	220	135	25	270	300	12.5	70	300	281	C.F.	L075370200

S = Stroke length C.F. = Consult Factory

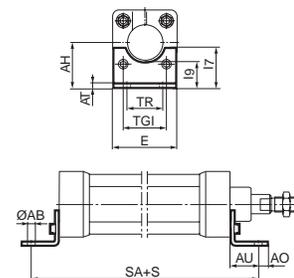
Foot Bracket – MS1



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 acc. to DIN 912: Zinc-plated steel 8.8
 Supplied in pairs with mounting screws for attachment to cylinder.



According to ISO MS1, VDMA 24 562, AFNOR

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
32	7	32.5	45	32	10	24	32	30	4.5	17.0	142	0.06	P1C-4KMF
40	9	38.0	52	36	8	28	36	30	4.5	18.5	161	0.08	P1C-4LMF
50	9	46.5	65	45	13	32	45	36	5.5	25.0	170	0.16	P1C-4MMF
63	9	56.5	75	50	13	32	50	35	5.5	27.5	185	0.25	P1C-4NMF
80	12	72.0	95	63	14	41	63	49	6.5	40.5	210	0.50	P1C-4PMF
100	14	89.0	115	75	15	41	71	54	6.5	43.5	220	0.85	P1C-4QMF
125	16	110.0	140	90	22	45	90	71	8.0	60.0	250	1.48	P1C-4RMF
160	18	140.0	180	115	15	60	115	100	9.0	63.5	300	C.F.	L075380160
200	22	175.0	220	135	30	70	135	100	12.0	65.0	320	C.F.	L075380200

S = Stroke length C.F. = Consult Factory

*Weight per item



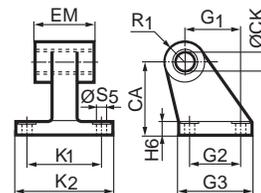
Pivot Bracket with Rigid Bearing



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

Materials

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



According to CETOP RP 107 P, VDMA 24 562, AFNOR

Bore size mm	CK H9 mm	S5 H13 mm	K1 JS14 mm	K2	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	0.06	P1C-4KMD
40	12	6.6	41	54	24	22	27.0	35	36	10	11.0	0.08	P1C-4LMD
50	12	9.0	50	65	33	30	31.0	45	45	12	13.0	0.15	P1C-4MMD
63	16	9.0	52	67	37	35	39.0	50	50	12	15.0	0.20	P1C-4NMD
80	16	11.0	66	86	47	40	49.0	60	63	14	15.0	0.33	P1C-4PMD
100	20	11.0	76	96	55	50	59.0	70	71	15	19.0	0.49	P1C-4QMD
125	25	14.0	94	124	70	60	69.0	90	90	20	22.5	1.02	P1C-4RMD
160	30	14.0	118	156	97	89	88.5	126	115	25	31.0	C.F.	L075480160
200	30	16.0	122	162	105	89	88.5	130	135	30	31.0	C.F.	L075480200

C.F. = Consult Factory

B

Tie Rod Cylinders
 Actuator Products

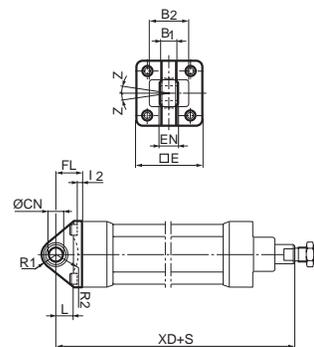
Swivel Eye Bracket – MP6



Intended for use together with clevis bracket GA

Material

Bracket: Surface-treated aluminium, black
 (Cast iron for 160-200mm bores)
 Swivel bearing acc. to DIN 648K: Hardened steel
 Supplied complete with mounting screws for attachment to cylinder.



According to VDMA 24 562, AFNOR

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	Weight kg	Part number
32	45	10.5	–	14	16	–	22	5.5	12	10	142	4°	0.08	P1C-4KMSA
40	52	12.0	–	16	18	–	25	5.5	15	12	160	4°	0.11	P1C-4LMSA
50	65	15.0	51	21	21	19	27	6.5	15	16	170	4°	0.20	P1C-4MMSA
63	75	15.0	–	21	23	–	32	6.5	20	16	190	4°	0.27	P1C-4NMSA
80	95	18.0	–	25	29	–	36	10.0	20	20	210	4°	0.52	P1C-4PMSA
100	115	18.0	–	25	31	–	41	10.0	25	20	230	4°	0.72	P1C-4QMSA
125	140	25.0	–	37	40	–	50	10.0	30	30	275	4°	1.53	P1C-4RMSA
160	177	30.0	–	43	44	41	55	4.0	41	35	315	16°	C.F.	L075420160
200	214	30.0	–	43	48	42	60	8.0	42	35	335	16°	C.F.	L075420200

S = Stroke length C.F. = Consult Factory

Clevis Bracket – MP2



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

Materials

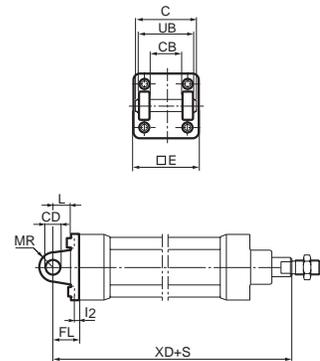
Clevis bracket: Surface-treated aluminium, black for 32-160mm bores; Cast iron for 200mm bore

Pin: Surface hardened 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.



According to ISO MP2, VDMA 24 562, AFNOR

Bore size mm	C mm	E mm	UB h14 mm	CB H14 mm	FL ±0.2 mm	L mm	I2 mm	CD H9 mm	MR mm	XD mm	Weight kg	Part number
32	53	45	45	26	22	13	5.5	10	10	142	0.08	P1C-4KMT
40	60	52	52	28	25	16	5.5	12	12	160	0.11	P1C-4LMT
50	68	65	60	32	27	16	6.5	12	12	170	0.14	P1C-4MMT
63	78	75	70	40	32	21	6.5	16	16	190	0.29	P1C-4NMT
80	98	95	90	50	36	22	10.0	16	16	210	0.36	P1C-4PMT
100	118	115	110	60	41	27	10.0	20	20	230	0.64	P1C-4QMT
125	139	140	130	70	50	30	10.0	25	25	275	1.17	P1C-4RMT
160	178	180	170	90	55	35	10.0	30	25	315	C.F.	L075390160
200	178	200	170	90	60	35	14.0	30	25	335	C.F.	L075390200

S = Stroke length C.F. = Consult Factory

Clevis Bracket – MP4



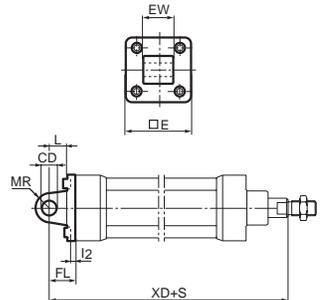
Intended for flexible mounting of cylinder. Clevis bracket MP4 can be combined with clevis bracket MP2.

Materials

Clevis bracket: Surface-treated aluminium, black for 32-125mm bores; Cast iron for 160-200mm bores

Mounting screws acc. to DIN 912: Zinc-plated steel 8.8

Supplied complete with mounting screws for attachment to cylinder.



According to ISO MP4, VDMA 24 562, AFNOR

Bore size mm	E mm	EW mm	FL mm	L ±0.2 mm	I2 mm	CD mm	MR H9 mm	XD mm	Weight kg	Part number
32	45	26	22	13	5.5	10	10	142	0.09	P1C-4KME
40	52	28	25	16	5.5	12	12	160	0.13	P1C-4LME
50	65	32	27	16	6.5	12	12	170	0.17	P1C-4MME
63	75	40	32	21	6.5	16	16	190	0.36	P1C-4NME
80	95	50	36	22	10.0	16	16	210	0.46	P1C-4PME
100	115	60	41	27	10.0	20	20	230	0.83	P1C-4QME
125	140	70	50	30	10.0	25	25	275	1.53	P1C-4RME
160	180	90	55	35	10.0	30	25	315	C.F.	L075410160
200	220	90	60	35	14.0	30	25	335	C.F.	L075410200

S = Stroke length C.F. = Consult Factory

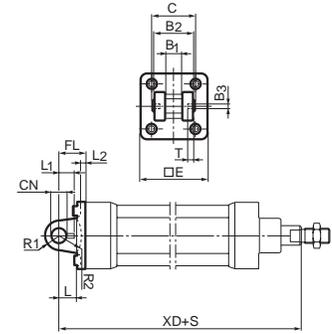
Clevis Bracket – GA



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 aluminium
- Pin: Surface hardened steel
- Locking pin: Spring steel
- Circlips according to DIN 471: Spring steel
- Mounting screws acc. to DIN 912: Zinc-plated steel 8.8
- Supplied complete with mounting screws for attachment to cylinder.

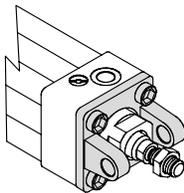


According to VDMA 24 562, AFNOR

Bore size mm	C mm	E mm	B2 d12 mm	B1 H14 mm	T mm	B3 mm	R2 mm	L1 mm	FL ±0.2 mm	I2 mm	L mm	CN F7 mm	R1 mm	XD mm	Weight kg	Part number
32	41	45	34	14	3	3.3	17	11.5	22	5.5	12	10	11	142	0.09	P1C-4KMCA
40	48	52	40	16	4	4.3	20	12.0	25	5.5	15	12	13	160	0.13	P1C-4LMCA
50	54	65	45	21	4	4.3	22	14.0	27	6.5	17	16	18	170	0.17	P1C-4MMCA
63	60	75	51	21	4	4.3	25	14.0	32	6.5	20	16	18	190	0.36	P1C-4NMCA
80	75	95	65	25	4	4.3	30	16.0	36	10.0	20	20	22	210	0.58	P1C-4PMCA
100	85	115	75	25	4	4.3	32	16.0	41	10.0	25	20	22	230	0.89	P1C-4QMCA
125	110	140	97	37	6	6.3	42	24.0	50	10.0	30	30	30	275	1.75	P1C-4RMCA
160	140	178	122	43	6	6.3	46	26.5	55	10.0	37	35 h9	36	C.F.	C.F.	L075510160
200	175	218	122	43	6	6.3	49	26.5	60	11.5	40	35 h9	38	C.F.	C.F.	L075510200

S = Stroke length C.F. = Consult Factory

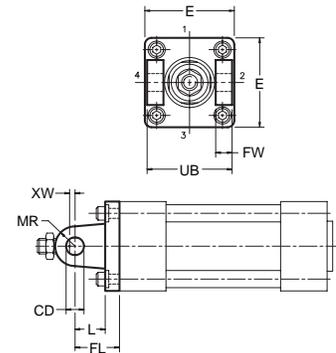
Head Detachable Clevis – MP7



Intended for flexible mounting of cylinder

Materials

- Clevis bracket: Cast iron for 32-63mm bores;
- Surface treated aluminum, black for 80-200mm bores
- Mounting screws acc. to DIN 912: Zinc-plated steel 8.8
- Supplied complete with mounting screws for attachment to cylinder.



According to ISO MP7, VDMA 24 562, AFNOR

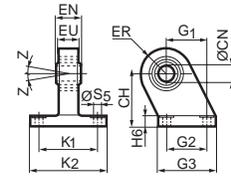
Bore size	CD mm	E mm	FL mm	FW mm	L mm	MR mm	UB mm	XW mm	Part number
32	10	46.5	22	8	12	10	45	4	L075400032
40	12	52	25	9	15	12	52	5	L075400040
50	12	63.5	27	10	15	13	60	10	L075400050
63	16	76	32	15	20	16	70	5	L075400063
80	16	95.5	36	20	20	17	90	10	L075400080
100	20	114.5	41	25	25	21	110	10	L075400100
125	25	140	50	30	35	25	130	15	L075400125
160	30	177	55	40	36	30	170	25	L075400160
200	30	214	60	40	41	30	170	35	L075400200

Pivot Bracket with Swivel Bearing



Intended for use together with clevis bracket GA.

Material
 Pivot bracket: Surface-treated steel, black
 Swivel bearing acc. to DIN 648K: Hardened steel



According to VDMA 24 562, AFNOR

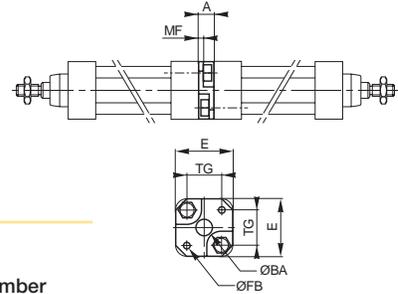
Bore size mm	CN H7 mm	S5 H13 mm	K1 JS14 mm	K2 mm	EU mm	G1 JS14 mm	G2 JS14 mm	EN mm	G3 mm	CH JS15 mm	H6 mm	ER mm	Z	Weight kg	Part number
32	10	6.6	38	51	10.5	21	18	14	31	32	10	16	4°	0.18	P1C-4KMA
40	12	6.6	41	54	12.0	24	22	16	35	36	10	18	4°	0.25	P1C-4LMA
50	16	9.0	50	65	15.0	33	30	21	45	45	12	21	4°	0.47	P1C-4MMA
63	16	9.0	52	67	15.0	37	35	21	50	50	12	23	4°	0.57	P1C-4NMA
80	20	11.0	66	86	18.0	47	40	25	60	63	14	28	4°	1.05	P1C-4PMA
100	20	11.0	76	96	18.0	55	50	25	70	71	15	30	4°	1.42	P1C-4QMA
125	30	14.0	94	124	25.0	70	60	37	90	90	20	40	4°	3.10	P1C-4RMA

Mounting kit



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

Material
 Mounting: Aluminium
 Mounting screws: Zinc-plated steel 8.8



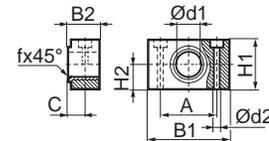
Bore size mm	E mm	TG mm	ØFB mm	MF mm	A mm	ØBA mm	Weight kg	Part number
32	50	32.5	6.5	5	16	30	0.060	P1E-6KB0
40	60	38.0	6.5	5	16	35	0.078	P1E-6LB0
50	66	46.5	8.5	6	20	40	0.162	P1E-6MB0
63	80	56.5	8.5	6	20	45	0.194	P1E-6NB0
80	100	72.0	10.5	8	25	45	0.450	P1E-6PB0
100	118	89.0	10.5	8	25	55	0.672	P1E-6QB0

Pivot Bracket – MT4



Intended for use together with central trunnion MT4.

Material
 Pivot bracket: Surface-treated aluminium
 Bearing acc. to DIN 1850 C: Sintered oil-bronze bushing
 Supplied in pairs.



According to ISO, VDMA 24 562, AFNOR

Bore size mm	B1 mm	B2 mm	A mm	C mm	d1 mm	d2 H13 mm	H1 mm	H2 mm	fx45° min mm	Weight* kg	Part number
32	46	18.0	32	10.5	12	6.6	30	15	1.0	0.04	9301054261
40	55	21.0	36	12.0	16	9.0	36	18	1.6	0.07	9301054262
50	55	21.0	36	12.0	16	9.0	36	18	1.6	0.07	9301054262
63	65	23.0	42	13.0	20	11.0	40	20	1.6	0.12	9301054264
80	65	23.0	42	13.0	20	11.0	40	20	1.6	0.12	9301054264
100	75	28.5	50	16.0	25	14.0	50	25	2.0	0.21	9301054266
125	75	28.5	50	16.0	25	14.0	50	25	2.0	0.21	9301054266

* Weight per item

Intermediate Trunnion – MT4



Standard*

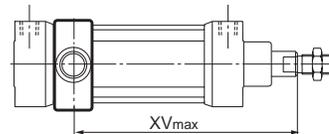
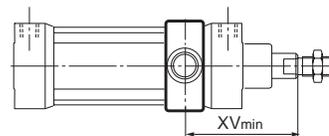
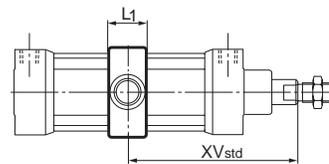
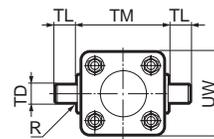


Tie Rod Version

Intended for articulated mounting of cylinder. The trunnion is factory-fitted at an optional location. Order by specifying Mounting Style G or 7 and providing the desired XV dimension (3-digit measure in mm). See page B64 for ordering information. Combined with pivot bracket for MT4 for 32-125mm bores.

Material:
 Trunnion: Zinc plated steel
 (Cast iron for 160-200mm bores)

* Standard mounting is for the Standard cylinder body and is permanently affixed by the factory.



According to ISO MT4, VDMA 24 562, AFNOR

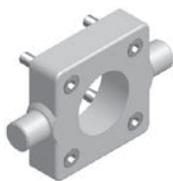
Bore size mm	TM h14 mm	TL h14 mm	TD e9 mm	R mm	UW mm	L1 mm	X1 mm	XVmin mm	X2 mm	Weight kg
32	50	12	12	1.0	46	15	73.0	62.0	84.0	0.13
40	63	16	16	1.6	59	20	82.5	73.0	92.0	0.31
50	75	16	16	1.6	69	20	90.0	80.5	99.5	0.37
63	90	20	20	1.6	84	25	97.5	89.5	106.0	0.69
80	110	20	20	1.6	102	25	110.0	98.0	122.0	0.89
100	132	25	25	2.0	125	30	120.0	110.5	129.5	1.58
125	160	25	25	2.0	155	32	145.0	132.0	158.0	2.60
160	200	32	32	2.5	190	70	C.F.	169	C.F.	C.F.
200	250	32	32	2.5	242	70	C.F.	184	C.F.	C.F.

$XVstd = X1 + \text{Stroke length}/2$

$XVmax = X2 + \text{Stroke length}$

C.F. = Consult Factory

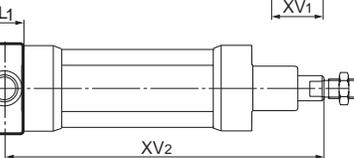
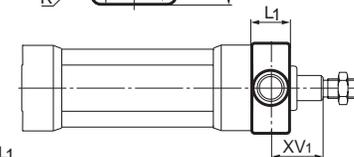
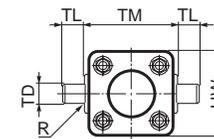
Flange Mounted Trunnion



Intended for articulated mounting of cylinder. This trunnion can be flange mounted on the front or rear end cover of all P1D cylinders. If you choose, you can order a complete cylinder with factory-fitted flange mounted trunnion – see the ordering information on page B64 Individual trunnions have part numbers as shown below.

Material
 Trunnion: zinc plated steel
 Screws: zinc plated steel, 8.8

Delivered complete with mounting screws for attachment to the cylinder



According to ISO MT4, VDMA 24 562, AFNOR

Bore size mm	TM h14 mm	TL h14 mm	TD e9 mm	R mm	UW mm	L1 mm	XV1 mm	X mm	Weight kg	Part number
32	50	12	12	1.0	46	14	19.0	127.0	0.17	P1D-4KMYF
40	63	16	16	1.6	59	19	20.5	144.5	0.43	P1D-4LMYF
50	75	16	16	1.6	69	19	27.5	152.5	0.55	P1D-4MMYF
63	90	20	20	1.6	84	24	25.0	170.0	1.10	P1D-4NMYF
80	110	20	20	1.6	102	24	34.0	186.0	1.66	P1D-4PMYF
100	132	25	25	2.0	155	29	36.5	203.5	3.00	P1D-4QMYF

$XV2 = X + \text{Stroke length}$

Swivel Rod Eye



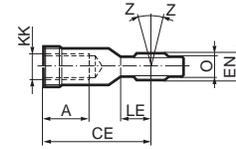
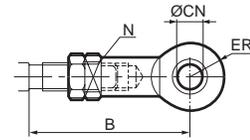
Stainless Steel Swivel Rod Eye

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

Swivel rod eye: Stainless steel
 Swivel bearing according to DIN 648K: Stainless steel
 Use stainless steel nut (see next page) with stainless steel swivel rod eye.



According to ISO 8139

Bore size mm	A mm	B min mm	B max mm	CE mm	CN H9 mm	EN h12 mm	ER mm	KK	LE min mm	N mm	O mm	Z	Weight kg	Part number	Stainless steel part number
32	20	48.0	55	3	10	14	14	M10x1.25	15	17	10.5	12°	0.08	P1C-4KRS	P1S-4JRT
40	22	56.0	62	50	12	16	16	M12x1.25	17	19	12.0	12°	0.12	P1C-4LRS	P1S-4LRT
50	28	72.0	80	64	16	21	21	M16x1.5	22	22	15.0	15°	0.25	P1C-4MRS	P1S-4MRT
63	28	72.0	80	64	16	21	21	M16x1.5	22	22	15.0	15°	0.25	P1C-4PRS	P1S-4PRT
80	33	87.0	97	77	20	25	25	M20x1.5	26	32	18.0	15°	0.46	P1C-4RRS	P1S-4RRT
100	33	87.0	97	77	20	25	25	M20x1.5	26	32	18.0	15°	0.46	P1C-4RRS	P1S-4RRT
125	51	123.5	137	110	30	37	35	M27x2	36	41	25.0	15°	1.28	P1C-4RRS	P1S-4RRT
160/200	56	C.F.	C.F.	125	35*	43	40	M36x2	40	50	28.0	15°	C.F.	L075470036	C.F.

*H7 C.F. = Consult Factory

Clevis



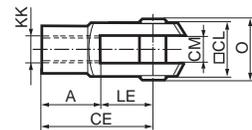
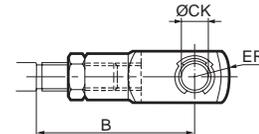
Stainless Steel Clevis

Clevis for articulated mounting of cylinder.

Material

Clevis, clip: Galvanized steel
 Pin: Hardened steel

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



According to ISO 8140

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	Stainless steel part number
32	20	45.0	52	40	10	20	10	16	M10x1.25	20	28.0	0.09	P1C-4KRC	P1S-4JRD
40	24	54.0	60	48	12	24	12	19	M12x1.25	24	32.0	0.15	P1C-4LRC	P1S-4LRD
50	32	72.0	80	64	16	32	16	25	M16x1.5	32	41.5	0.35	P1C-4MRC	P1S-4MRD
63	32	72.0	80	64	16	32	16	25	M16x1.5	32	41.5	0.35	P1C-4MRC	P1S-4MRD
80	40	90.0	100	80	20	40	20	32	M20x1.5	40	50.0	0.75	P1C-4PRC	P1S-4PRD
100	40	90.0	100	80	20	40	20	32	M20x1.5	40	50.0	0.75	P1C-4PRC	P1S-4PRD
125	56	123.5	137	110	30	55	30	45	M27x2	54	72.0	2.10	P1C-4RRC	P1S-4RRD
160/200	71	C.F.	C.F.	144	35	70	35	57	M36x2	72	95	C.F.	L075490036	C.F.

C.F. = Consult Factory



Flexo Coupling

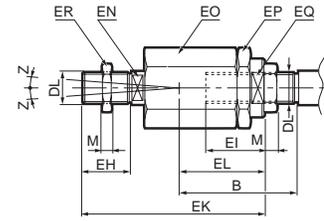


Flexo coupling for articulated mounting of piston rod. Flexo fitting is intended to take up axial angle errors within a range of $\pm 4^\circ$.

Material

Flexo coupling, nut: Zinc-plated steel
 Socket: Hardened steel

Supplied complete with galvanized adjustment nut.



Bore size mm	B min mm	B max mm	DL	EH mm	EI mm	EK mm	EL mm	EN mm	EO mm	EP mm	EQ mm	ER mm	M mm	Z	Weight kg	Part number
32	36.0	43	M10x1.25	20	23	70	31	12	30	30	19	30	5.0	4°	0.21	P1C-4KRF
40	37.0	43	M12x1.25	23	23	67	31	12	30	30	19	30	6.0	4°	0.22	P1C-4LRF
50	53.0	61	M16x1.5	40	32	112	45	19	41	41	30	41	8.0	4°	0.67	P1C-4MRP
63	53.0	61	M16x1.5	40	32	112	45	19	41	41	30	41	8.0	4°	0.67	P1C-4PRP
80	57.0	67	M20x1.5	39	42	122	56	19	41	41	30	41	10.0	4°	0.72	P1C-4RRP
100	57.0	67	M20x1.5	39	42	122	56	19	41	41	30	41	10.0	4°	0.72	P1C-4RRF
125	75.5	89	M27x2	48	48	145	60	24	55	55	32	55	13.5	4°	1.80	L075530036
160/200	C.F.	C.F.	M36x2	72	78	251	C.F.	36	75	75	50	55	18.0	4°	C.F.	L075530036

C.F. = Consult Factory

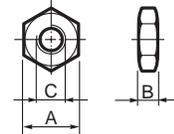
Nuts



Intended for fixed mounting of accessories to the piston rod.

Material: Zinc-plated steel

All P1D cylinders are delivered with a zinc-plated steel piston rod nut, except P1D Clean, which is delivered with a stainless steel piston rod nut instead.



Stainless Steel Nut

Material: Stainless steel A2

All P1D cylinders are delivered with a zinc-plated steel piston rod nut, except P1D Clean, which is delivered with a stainless steel piston rod nut instead.

Acid-proof nut

Material: Acid-proof steel A4

Cylinders with acid-proof piston rod are supplied with nut of acid-proof steel

According to DIN 439 B

Bore size mm	A mm	B mm	C	Weight kg	Part numbers		
					Steel	Stainless steel	Acid-proof
32	17	5.0	M10x1.25	0.007	9128985601	9126725404	0261109919
40	19	6.0	M12x1.25	0.010	0261109910	9126725405	0261109920
50	24	8.0	M16x1.5	0.021	9128985603	9126725406	0261109917
63	24	8.0	M16x1.5	0.021			
80	30	10.0	M20x1.5	0.040	0261109911	0261109921	0261109916
100	30	10.0	M20x1.5	0.040			
125	41	13.5	M27x2	0.100	0261109912	0261109922	0261109918
160/200	55	18.0	M36x2	C.F.	L075540036	C.F.	C.F.

C.F. = Consult Factory

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 reviewed 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:

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

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 – Cylinders as 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.

