numatics®

Large Bore A Series

NFPA Interchangeable Cylinder Line

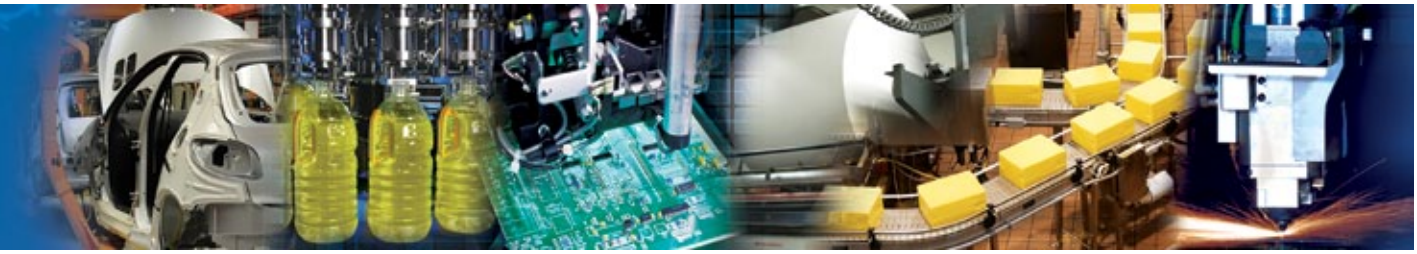

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Table of Contents

Large Bore A Series

Features and Benefits	3
Standard Mounts	4
How to Order	5
Dimensions	6-13
Base Mount	6
Rod Ends	7
Clevis and Angle Mount	8
Side Lug and Bottom Tap Mount	9
Trunnion Mounts	10
Spherical Mount	11
Extended Tie Rod Mounts	12
Double Rod End	13
Stop Tube Data	14
Accessories	15-16
World Switches	17-18
NFPA Interchangeable Cylinders	18
Sensing Part Numbers	19-21
Quick Disconnect Cables	22
How to Order - A Series Piston Rod Assembly	23
How to Order - A Series Repair Kit	24
How to Order - A Series Seal Kit	24
Piston Rod Assembly Kit Installation Instructions	25
Repair Kit and Seal Kit Removal/Installation Instructions	25
Diagrams	26
Seal Installation Guide	27

The **Large Bore A Series** is an NFPA Interchangeable cylinder line that is designed and built to excel in the most demanding applications. The Large Bore A Series encompasses many of the proven design features of the A Series.

Tube
The 8" bore **tube** is hard coat anodized aluminum. The hard coating is an electro-chemical process, which produces a very dense surface of aluminum oxide. This surface has extreme hardness (60 RC.), excellent wear and corrosion resistance, and a low coefficient of friction. The 10", 12", and 14" bores use a honed, chrome plated steel tube.

End Caps
The **end caps** are accurately machined from (6061-T6) solid aluminum bar stock. They are anodized for corrosion resistance. Additionally, a recess on the piston-mating surface (at both ends) enables the air to work on a larger piston area for effortless breakaway.

Rod Bushing
The 8" bore includes a graphite filled, cast iron **rod bushing**. The 10", 12", and 14" bores are equipped with a bronze bushing. Both bushing types are extra long in length. The added length adds superior alignment and support of the piston rod as well as provides maximum load bearing support. Both bushing materials offer an excellent bearing surface for a hard chrome plated piston rod.

Rod Seal
The carboxilated nitrile with PTFE compound **rod seal** is self-lubricating and durable. The rounded lip design ensures proper sealing and long life.

Rod Wiper
The standard **rod wiper** construction is a highly durable polyurethane.

Piston Rod
High strength steel (100,000 psi minimum yield) **piston rod** has a ground, polished, and chrome plated surface. This surface provides maximum life for both the rod bushing and the seals.

Bushing Retainer
The **bushing retainer** allows cartridge removal (cylinder repair) without complete disassembly.

Tie Rods
The **tie rods** are 100,000 psi minimum yield steel for maximum holding power. The threads are roll formed for superior strength and engagement.

Piston Seal
The **piston seal** is a carboxilated nitrile with PTFE compound making it self-lubricating. The "T" seal with back-up ring configuration is standard on the 8" bore design. A lip seal configuration is used on 10", 12", and 14" bores. Both seal types prevent rolling and are designed to seal at all pressures.

Wear Band
The **wear band** is a stable, lubricating strip located on the piston. We separated the load bearing points by locating the wear band at the rear of the piston. This maximizes column strength at full extension.

Piston
The solid aluminum alloy **piston** is strong and durable. On the 10", 12", and 14" bores we use a nylon locking insert nut to attach the piston to the piston rod. This enables piston rod disassembly if necessary.

Cushion Seal
The floating **cushion seal** design enables rapid stroke reversal by providing instantaneous full flow to the piston. Each cushion has a flush, retained adjustment needle.

Tube End Seal
The **tube end seals** are compression type and reusable.

Ports
Our enhanced **port** design enables the cylinder to work more efficiently. Through the use of precise machining depths and tool shape, we are able to smooth the flow path into and out of the cylinder.

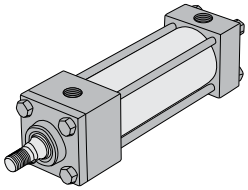
Standard Specifications:

- Meets NFPA specifications
- Bore sizes from 8" through 14"
- Piston rod diameters from 1-3/8" through 2-1/2"
- Maximum pressure rating is 250 psi air
- Standard temperature -10°F to 165°F (-23°C to 74°C)
- NPTF ports
- Flexible port and cushion location
- Multitude of mounting options

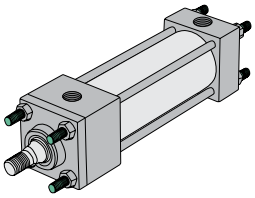
Standard Large Bore A Series Mounts

Centerline Mounts

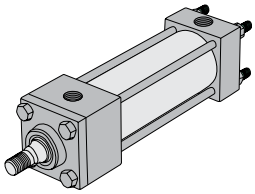
X0 Mount
Basic No Mount



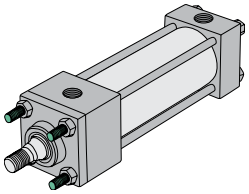
X1 Mount
Extended Tie Rods – Both Ends



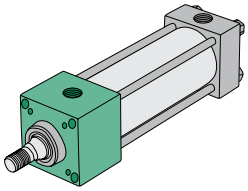
X2 Mount
Extended Tie Rods – Cap End



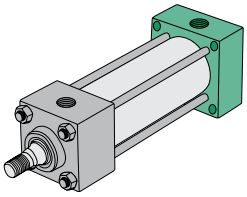
X3 Mount
Extended Tie Rods – Head End



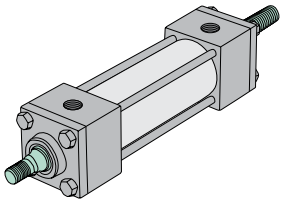
E3 Mount
Head Square Mount



E4 Mount
Cap Square Mount

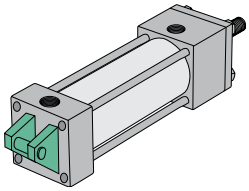


DA Mount
Double Rod End

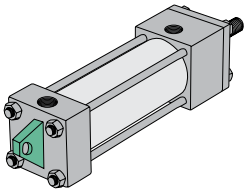


Pivot Mounts

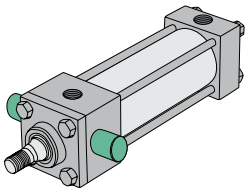
P1 Mount
Fixed Clevis



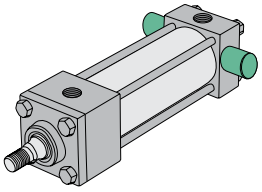
P3 Mount
Fixed Eye



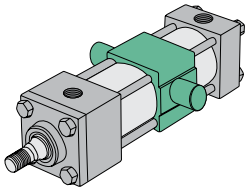
T1 Mount
Head Trunnion



T2 Mount
Cap Trunnion

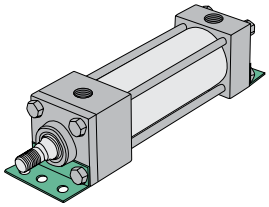


T4 Mount
Intermediate Trunnion

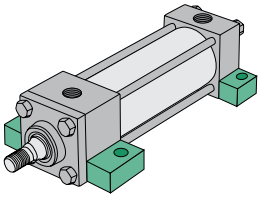


Foot Mounts

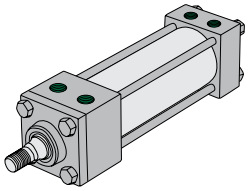
S1 Mount
Angle Mount



S2 Mount
Side Lugs



S4 Mount
Bottom Tapped



How to Order

E3 A W - 06 A 1 F - C AA 0

Mount
E3 = Head Square Mount
E4 = Cap Square Mount
P1 = Fixed Clevis
P2 = Removable Clevis (8" bore only)
P3 = Fixed Eye
S1 = Angle Mount
S2 = Side Lug Mount
S4 = Bottom Tap
X0 = Basic No Mount
X1 = Extended Tie Rods Both Ends
X2 = Extended Tie Rod Cap
X3 = Extended Tie Rod Head
T1 = Head Trunnion
T2 = Cap Trunnion
T4* = Mid Trunnion
U3 = Spherical Mount

Type
A = Large Bore A Series
NFPA Interchangeable

Bore
W = 8"
X = 10"
Y = 12"
B = 14"

Full Inches of Stroke
00 = 0" Stroke
01 = 1" Stroke
02 = 2" Stroke
03 = 3" Stroke
99 = 99" Stroke
NOTE: Consult factory for strokes greater than 99".

Fractional Inches of Stroke

A	= 0"	I	= 1/2"
B	= 1/16"	J	= 9/16"
C	= 1/8"	K	= 5/8"
D	= 3/16"	L	= 11/16"
E	= 1/4"	M	= 3/4"
F	= 5/16"	N	= 13/16"
G	= 3/8"	O	= 7/8"
H	= 7/16"	P	= 15/16"

Magnet
0 = No Magnet
2 = Magnet

Options
AA = No Option
DA = Double Rod
MA = Metallic Rod Scraper
1A* = Rod Extension
2A* = Thread Extension
3A = Studded Rod End
4A* = Stop Tube
CT = Composite Tube
AT = Aluminum Tube (Standard on 8")
SA = Stainless Steel Rod
SS = Stainless Steel Rod and Tie Rods
ST = Stainless Steel Tie Rods
*Must specify length.

Cushions

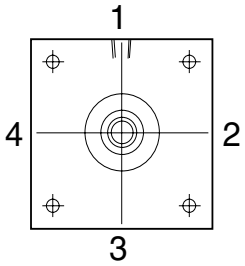
Position	1	2	3	4
No Cushion	A	A	A	A
Head and Cap	B	C	D	E
Head Only	F	G	H	J
Cap Only	K	L	M	N

Ports

Position	3/4"	1"	1 1/4"
1	F	G	1
2	L	M	2
3	R	S	3
4	X	Y	4

Rod End Codes
1 = #1 Standard Rod Diameter
2 = #2 Standard Rod Diameter
3 = #3 Standard Rod Diameter
4* = Special Standard Rod Diameter
5* = Special Oversize Rod Diameter
6 = #1 Oversize Rod Diameter
7 = #2 Oversize Rod Diameter
8 = #3 Oversize Rod Diameter
A = #1 Second Oversize Rod Diameter
B = #2 Second Oversize Rod Diameter
C = #3 Second Oversize Rod Diameter
* Must specify threads.

Cylinder Orientation



Ports Normally in Position 1

Ports are normally located in position 1.

Cushions are normally located in position 2.

NOTE: Ports -

8" Bore-standard port size is 3/4" NPTF.

10" & 12" Bore-standard port size is 1" NPTF, smaller port sizes available.

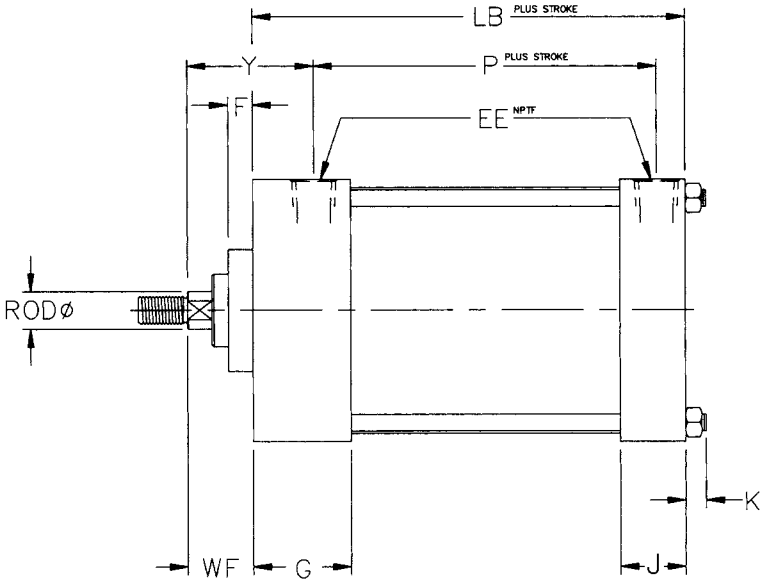
14" Bore-standard port size is 1 1/4" NPTF, smaller port sizes available.

Rod End Styles, Diameters and Threads

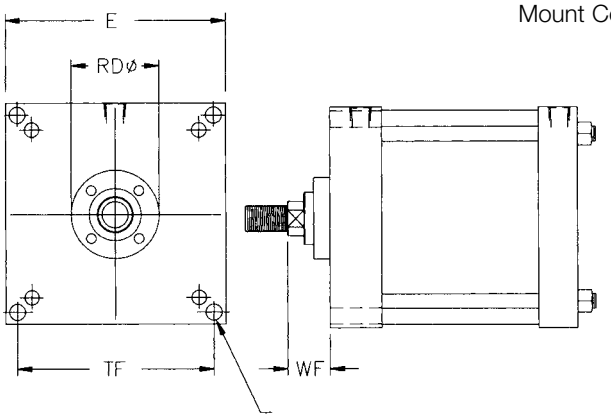
Diameter	Style #1 Standard Male	Style #2 Optional Male	Style #3 Optional Female
1.38	1-14	1 1/4-12	1-14
1.75	1 1/4-12	1 1/2-12	1 1/4-12
2.00	1 1/4-12	1 3/4-12	1 1/2-12
2.50	1 7/8-12	2 1/4-12	1 7/8-12

Dimensions: Inches

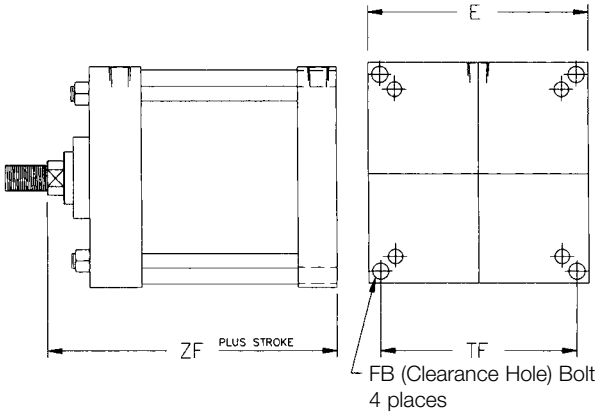
Basic No Mount Cylinder



Mount Code X0 NFPA MX0



Mount Code E3 NFPA ME3

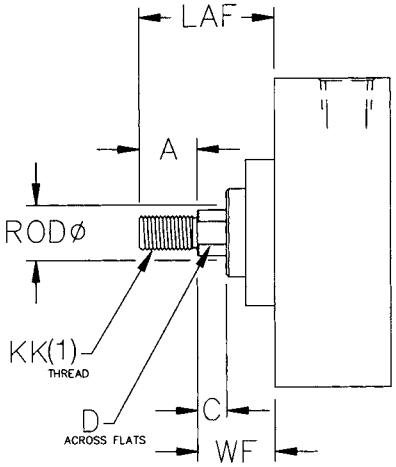


Mount Code E4 NFPA ME4

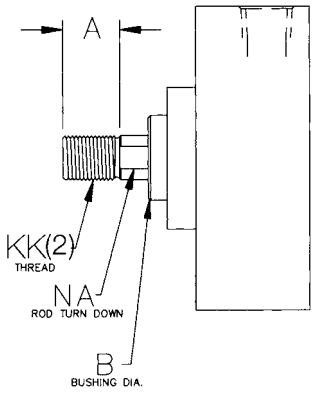
Bore	Rod	E	EE	F	FB	G	J	K	LB	P	RD	TF	WF	Y	ZF
8"	1.375	8.500	0.750	0.630	0.630	2.000	1.500	0.630	5.125	3.250	3.130	7.580	1.630	2.810	6.750
	1.750	8.500	0.750	0.750	0.630	2.000	1.500	0.630	5.125	3.250	3.790	7.580	1.880	3.060	7.000
10"	1.750	10.630	1.000	0.750	0.750	2.250	2.000	0.750	6.375	4.130	5.500	9.400	1.880	3.130	8.250
	2.000	10.630	1.000	0.750	0.750	2.250	2.000	0.750	6.375	4.130	5.500	9.400	2.000	3.250	8.380
	2.500	10.630	1.000	0.750	0.750	2.250	2.000	0.750	6.375	4.130	5.500	9.400	2.250	3.500	8.630
12"	2.000	12.750	1.000	0.750	0.750	2.250	2.000	0.750	6.875	4.630	5.500	11.100	2.000	3.250	8.880
	2.500	12.750	1.000	0.750	0.750	2.250	2.000	0.750	6.875	4.630	5.500	11.100	2.250	3.500	9.130
14"	2.500	14.750	1.250	0.750	0.880	2.750	2.250	0.880	8.125	5.500	5.500	12.870	2.250	3.810	10.380

Dimensions: Inches

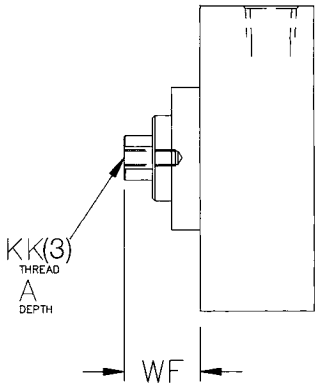
Standard and Optional Rod Ends



Style #1 (Standard Male)



Style #2 (Optional Male)



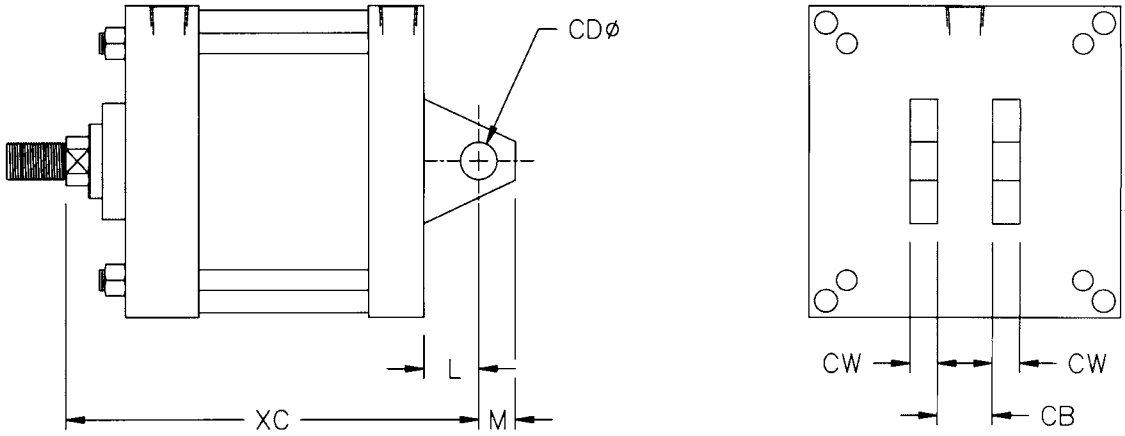
Style #3 (Optional Female)

Bore	Rod*	KK(1)	KK(2)	KK(3)	A	B	C	D	NA	LAF	WF
8"	1.375	1-14	1 1/4-12	1-14	1.625	2.000	0.630	1.130	1.310	3.250	1.630
	1.750	1 1/4-12	1 1/2-12	1 1/4-12	2.000	2.380	0.750	1.500	1.690	3.880	1.880
10"	1.750	1 1/4-12	1 1/2-12	1 1/4-12	2.000	3.120	0.750	1.500	1.690	3.880	1.880
	2.000	1 1/2-12	1 3/4-12	1 1/2-12	2.250	3.120	0.880	1.750	1.940	4.250	2.000
	2.500	1 7/8-12	2 1/4-12	1 7/8-12	3.000	3.120	1.000	2.060	2.440	5.250	2.250
12"	2.000	1 1/2-12	1 3/4-12	1 1/2-12	2.250	3.120	0.880	1.750	1.940	4.250	2.000
	2.500	1 7/8-12	2 1/4-12	1 7/8-12	3.000	3.120	1.000	2.060	2.440	5.250	2.250
14"	2.500	1 7/8-12	2 1/4-12	1 7/8-12	3.000	3.120	1.000	2.060	2.440	5.250	2.250

*Other rod sizes available. Consult factory for details.

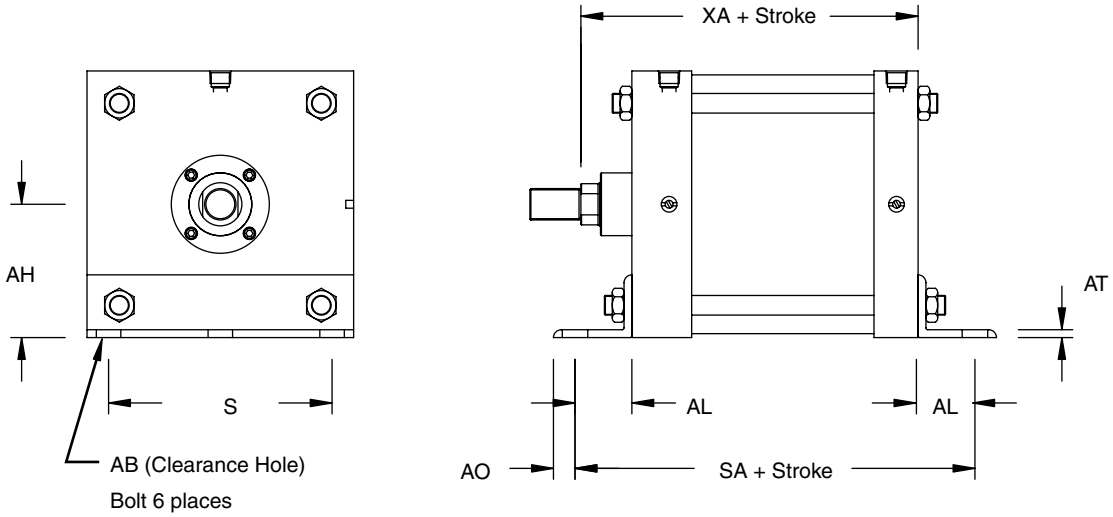
Dimensions: Inches

Clevis and Angle Mount



Mount Code P1

NFPA MP1



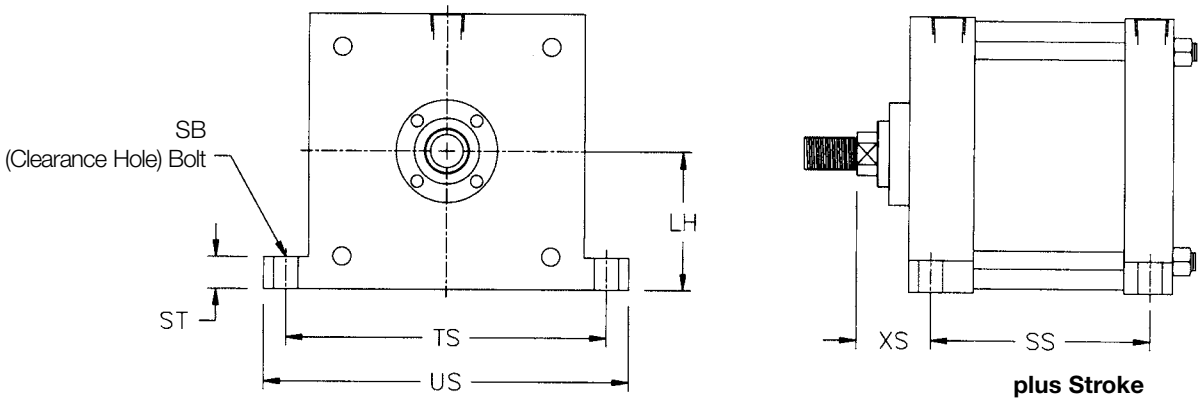
Mount Code S1

NFPA MS1

Bore	Rod	AB	AH	AL	AO	AT	CB	CD	CW	L	M	S	SA	XA	XC
8"	1.375	0.750	4.250	1.810	0.690	0.250	1.500	1.000	0.750	1.500	1.000	7.130	8.750	8.560	8.250
	1.750	0.750	4.250	1.810	0.690	0.250	1.500	1.000	0.750	1.500	1.000	7.130	8.750	8.810	8.500
10"	1.750	1.000	5.310	2.130	0.880	0.250	2.000	1.375	1.000	2.130	1.380	8.880	10.630	10.380	10.380
	2.000	1.000	5.310	2.130	0.880	0.250	2.000	1.375	1.000	2.130	1.380	8.880	10.630	10.500	10.500
	2.500	1.000	5.310	2.130	0.880	0.250	2.000	1.375	1.000	2.130	1.380	8.880	10.630	10.750	10.750
12"	2.000	1.000	6.380	2.130	0.880	0.380	2.500	1.750	1.250	2.250	1.750	11.000	11.130	11.000	11.130
	2.500	1.000	6.380	2.130	0.880	0.380	2.500	1.750	1.250	2.250	1.750	11.000	11.130	11.250	11.380
14"	2.500	1.250	7.380	2.440	1.060	0.380	2.500	2.000	1.250	2.500	2.000	12.630	13.000	12.810	12.880

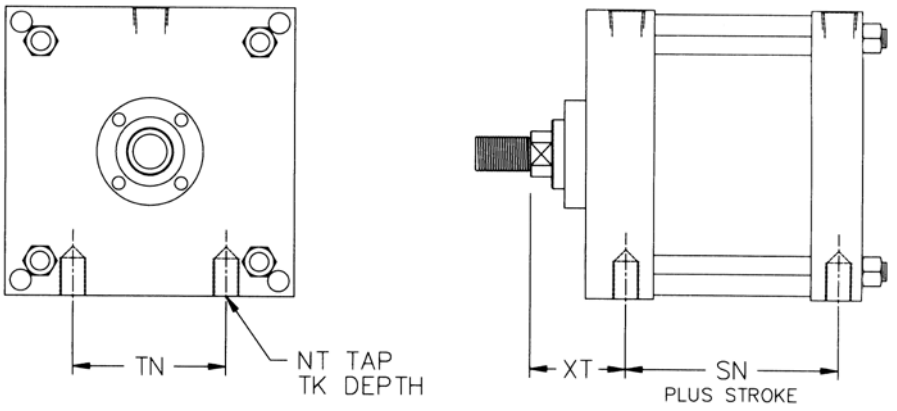
Dimensions: Inches

Side Lug and Bottom Tap Mount



Mount Code S2 NFPA MS2

NOTE: Use this “drawing” below as well. Note on the one below, the drawing is the only change the letter call outs will remain the same.

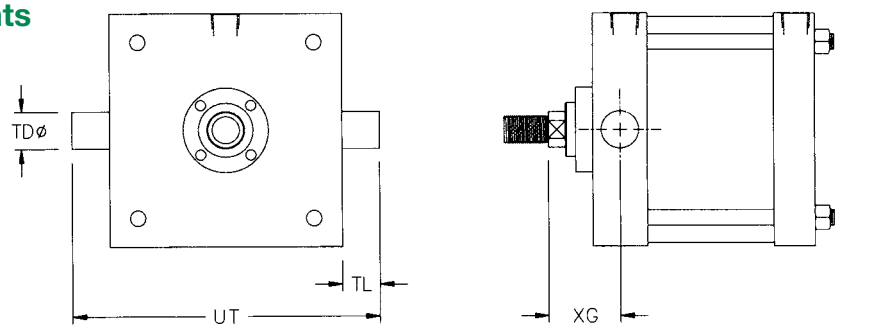


Mount Code S4 NFPA MS4

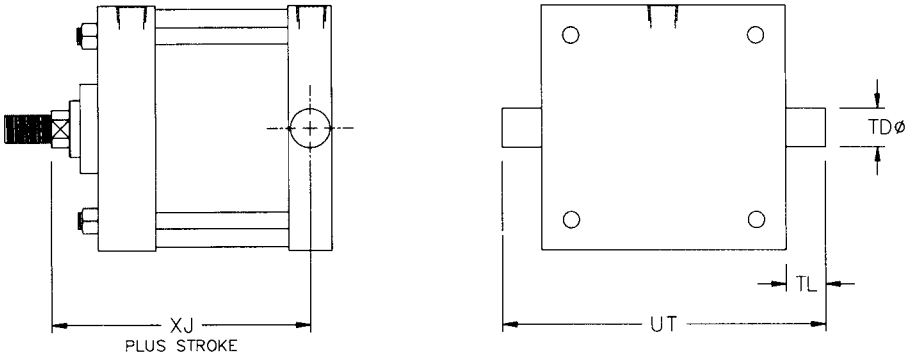
Bore	Rod	LH	NT	SB	SN	SS	ST	TK	TN	TS	US	XS	XT
8"	1.375	4.250	3/4-10	0.750	3.250	3.750	1.000	1.130	4.500	9.880	11.250	2.310	2.810
	1.750	4.250	3/4-10	0.750	3.250	3.750	1.000	1.130	4.500	9.880	11.250	2.560	3.060
10"	1.750	5.313	1-8	1.000	4.130	4.630	1.250	2.000	5.500	12.380	14.130	2.750	3.130
	2.000	5.313	1-8	1.000	4.130	4.630	1.250	2.000	5.500	12.380	14.130	2.880	3.250
	2.500	5.313	1-8	1.000	4.130	4.630	1.250	2.000	5.500	12.380	14.130	3.130	3.500
12"	2.000	6.375	1-8	1.000	4.630	5.130	1.250	2.000	7.250	14.500	16.250	2.880	3.250
	2.500	6.375	1-8	1.000	4.630	5.130	1.250	2.000	7.250	14.500	16.250	3.130	3.500
14"	2.500	7.375	1 1/4-7	1.250	5.500	5.880	1.500	2.500	8.380	17.000	19.250	3.380	3.810

Dimensions: Inches

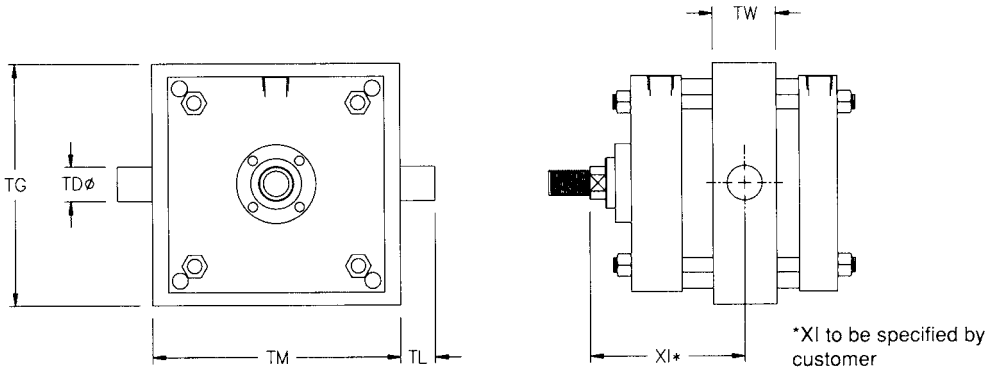
Trunnion Mounts



Mount Code T1 NFPA MT1



Mount Code T2 NFPA MT2



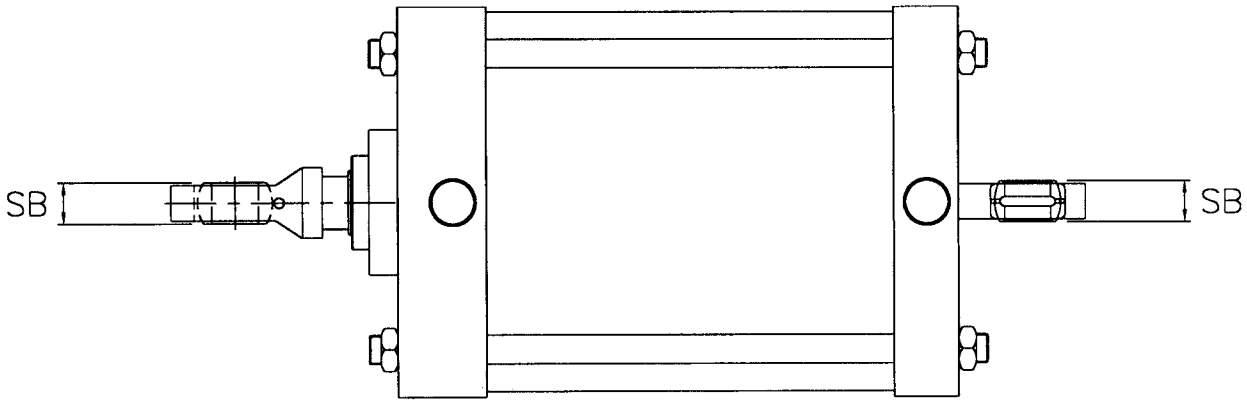
Mount Code T4 NFPA MT4

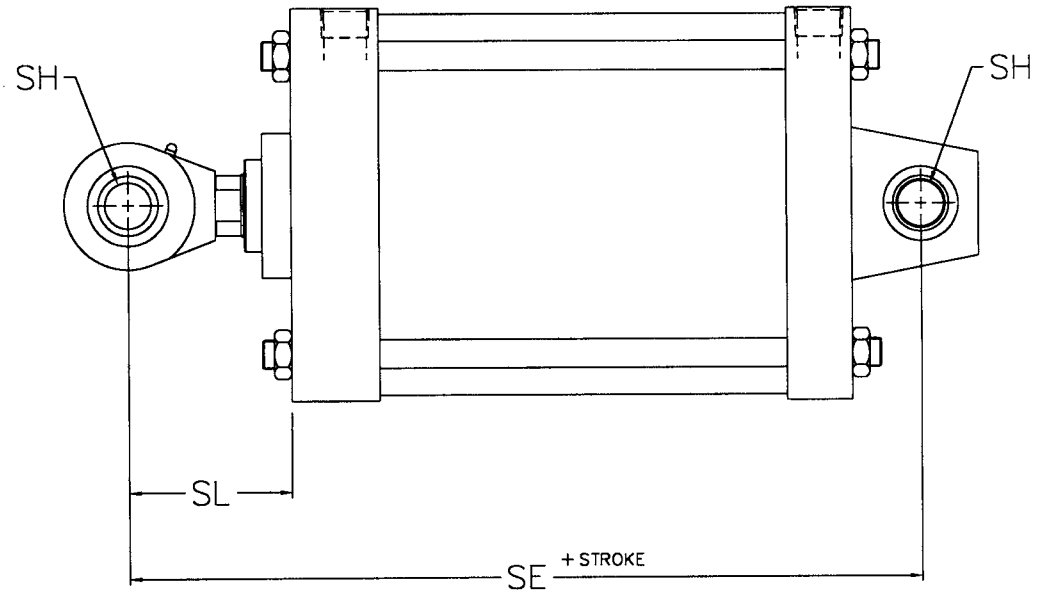
NOTE: All Large Bore A Series trunnion mounts are one piece machined steel.

Bore	Rod	TD	TG	TL	TM	TW	UT	XG	XI (Min.)	XJ
8"	1.375	1.375	9.500	1.380	9.750	2.500	11.250	2.630	4.880	6.000
	1.750	1.375	9.500	1.380	9.750	2.500	11.250	2.880	5.130	6.250
10"	1.750	1.750	11.750	1.750	12.000	3.000	14.130	3.000	5.630	7.250
	2.000	1.750	11.750	1.750	12.000	3.000	14.130	3.130	5.750	7.380
	2.500	1.750	11.750	1.750	12.000	3.000	14.130	3.380	6.000	7.630
12"	2.000	1.750	13.750	1.750	14.000	3.000	16.250	3.130	5.750	7.880
	2.500	1.750	13.750	1.750	14.000	3.000	16.250	3.380	6.000	8.130
14"	2.500	2.000	16.000	2.000	16.250	3.500	18.750	3.630	6.750	9.250

Dimensions: Inches

Spherical Mount

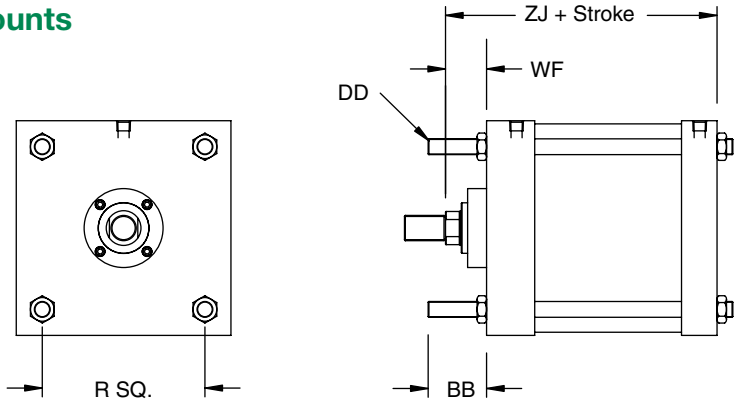




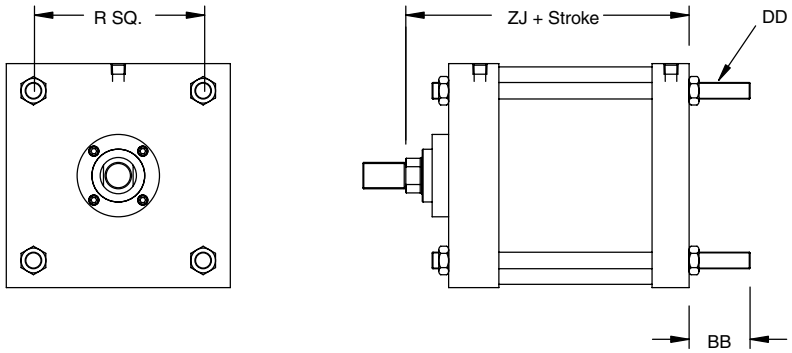
Bore	Rod	SH	SB	SL	SE
8"	1.375	1.000	0.875	3.500	10.130
	1.750	1.000	0.875	3.750	10.380
10"	1.750	1.375	1.188	4.000	12.500
	2.000	1.375	1.188	4.130	12.630
	2.500	1.375	1.188	4.380	12.880
12"	2.000	1.750	1.531	4.500	13.630
	2.500	1.750	1.531	4.750	13.880
14"	2.500	2.000	1.750	5.000	15.630

Dimensions: Inches

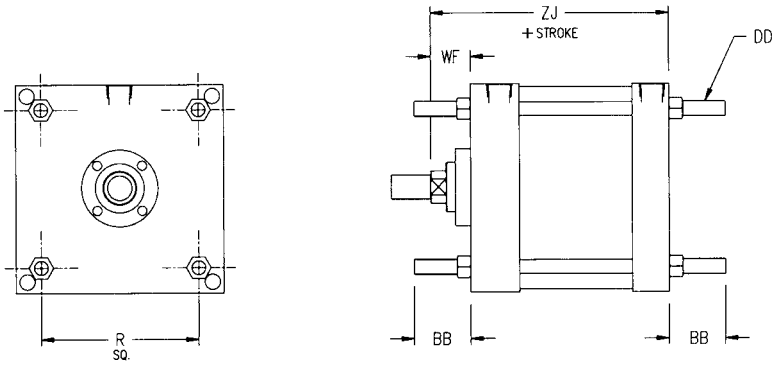
Extended Tie Rod Mounts



Mount Code X3 NFPA MX3



Mount Code X2 NFPA MX2

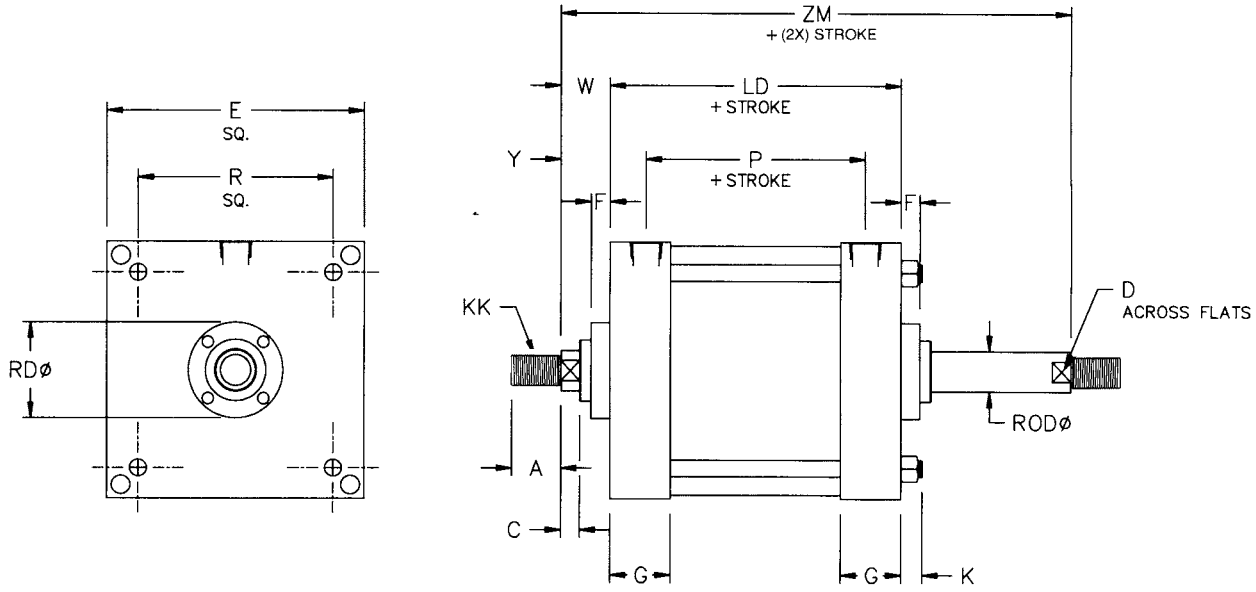


Mount Code X1 NFPA MX1

Bore	Rod	BB	DD	R	WF	ZJ
8"	1.375	2.310	5/8-18	6.440	1.630	6.750
	1.750	2.310	5/8-18	6.440	1.880	7.000
10"	1.750	2.690	3/4-16	8.060	1.880	8.250
	2.000	2.690	3/4-16	8.060	2.000	8.380
	2.500	2.690	3/4-16	8.060	2.250	8.630
12"	2.000	2.690	3/4-16	9.410	2.000	8.880
	2.500	2.690	3/4-16	9.410	2.250	9.130
14"	2.500	3.190	7/8-14	10.900	2.250	10.380

Dimensions: Inches

Double Rod End



Order as "DA" Option NFPA MDX0

Bore	Rod	A	C	D	E	F	G	K	KK	LD	P	R	RD	W	Y	ZM
8"	1.375	1.630	0.630	1.130	8.500	0.63	2.000	0.630	1-14	5.630	3.250	6.440	3.130	1.630	2.810	8.880
	1.750	2.000	0.750	1.500	8.500	0.750	2.000	0.630	1 1/4-12	5.630	3.250	6.440	3.790	1.880	3.060	9.380
10"	1.750	2.000	0.750	1.500	10.630	0.750	2.250	0.750	1 1/4-12	6.630	4.130	8.060	5.500	1.880	3.130	10.380
	2.000	2.250	0.880	1.750	10.630	0.750	2.250	0.750	1 1/2-12	6.630	4.130	8.060	5.500	2.000	3.250	10.630
	2.500	3.000	1.000	2.060	10.630	0.750	2.250	0.750	1 7/8-12	6.630	4.130	8.060	5.500	2.250	3.500	11.130
12"	2.000	2.250	0.880	1.750	12.750	0.750	2.250	0.750	1 1/2-12	7.130	4.630	9.410	5.500	2.000	3.250	11.130
	2.500	3.000	1.000	2.060	12.750	0.750	2.250	0.750	1 7/8-12	7.130	4.630	9.410	5.500	2.250	3.500	11.630
14"	2.500	3.000	1.000	2.060	14.750	0.750	2.750	0.880	1 7/8-12	8.630	5.500	10.900	5.500	2.250	3.810	13.130

Stop Tube Data

Step 1 - Determine which mount below corresponds to your application.

Step 2 - Determine the value of “L” from Table 1 below. Then find “L” dimension in Table 2 and read across to determine the required stop tube length.

Step 3 - Add the stop tube length to the original “L” value from Step 2. This is the corrected “L.” If the corrected “L” still falls within the same range as the original “L” then this is the required stop length. Otherwise, use this number in Table 2 to determine the second stop tube length.

Step 4 - Add the second stop length to the original “L.” If this value falls within the same range then the second stop tube length is the required length. Otherwise, repeat Step 4.

NOTE: Specify the effective stroke and the stop tube length when ordering.

Example:

Step 1: 10" bore cylinder, 1 3/4 diameter rod, P1 mount, 82 inch stroke
From catalog, XC = 10.375
From table 1, "L"=XC=(2xStroke)

Step 2: From Table 1, “L” = 10.375 + 164 = 174.375 inches
From Table 2, when “L” = 174.375, stop tube length = 14 inches

Step 3: Corrected “L” = 14 + 174.375 = 188.375 inches
From Table 2, when “L” = 188.375, stop tube length = 15 inches

Step 4: New corrected “L” = 15 + 174.375 = 189.375 inches
From Table 2, when “L” = 189.375, stop tube length = 15 inches

The stop tube length from Step 3 and 4 are the same, therefore, 15 inches is the required stop tube length.

Table 1

Rod	BB
E3*	4 x (W + Stroke)
E4*	4 x (WF + Stroke)
P1 & U3	XC + (2 x Stroke)
S1*	4 x (WF + Stroke)
S2*	4 x (WF + Stroke)
S4*	4 x (WF + Stroke)
X3*	4 x (WF + Stroke)
X2*	4 x (WF + Stroke)
X1*	4 x (WF + Stroke)
T1	XG + Stroke
T2	XJ + (2 x Stroke)
T3	XI + Stroke

* “L” given is for an unsupported rod end. If rod end is supported with a guide less than 1" in width, divide “L” by 4. If rod end is supported with a guide greater than 1" in width, divide “L” by 8.

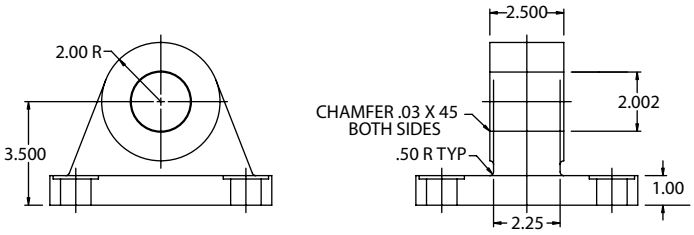
Table 2

"L" (Inches)	Stop Tube Length (Inches)
0-40	0
41-50	1
51-60	2
61-70	3
71-80	4
81-90	5
91-100	6
101-110	7
111-120	8
121-130	9
131-140	10
141-150	11
151-160	12
161-170	13
171-180	14
181-190	15
191-200	16
201-210	17
211-220	18
221-230	19
231-240	20
241-250	21
251-260	22
261-270	23
271-280	24
281-290	25
291-300	26
301-310	27

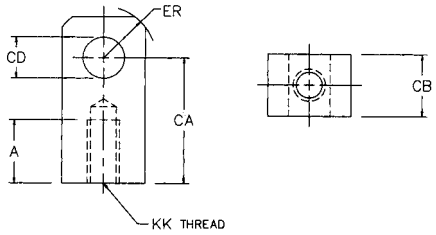
For P1 mount, “L” assumes that the rod extends and the cylinder pivots with the rod. Multiply “L” by four so the rod extends and the cylinder does not pivot with the rod.

Accessories

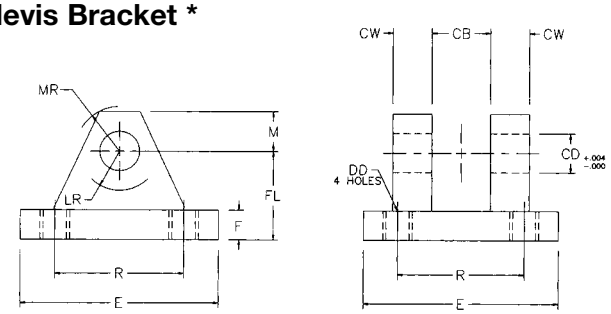
Eye Bracket *



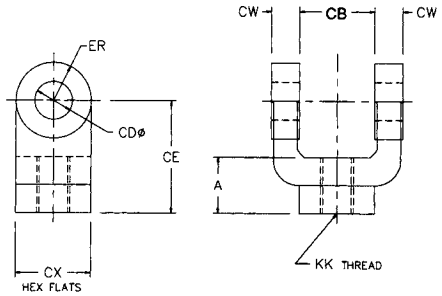
Rod Eye *



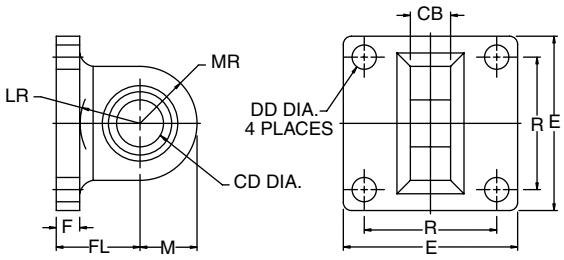
Clevis Bracket *



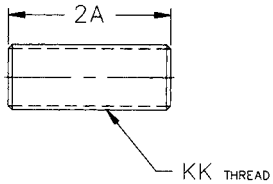
Rod Clevis *



Spherical Eye Assembly *



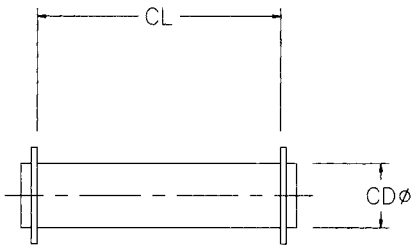
Rod Stud



NOTE: Assembly includes bracket and two spacers.

* Order pivot pin separately

Pivot Pin



Included with mount codes P1 and U3

Accessories

Clevis Bracket

Part No.	CB	CD	CW	DD	E	F	FL	LR	M	MR	R
A500-003	1.500	1.000	0.750	5/8-18	4.500	0.750	2.250	1.250	1.000	1.125	3.250
N29-1006	2.000	1.375	1.000	5/8-18	5.000	0.875	3.000	1.875	1.375	1.750	3.810
N29-1005	2.500	1.750	1.250	7/8-14	6.500	0.875	3.125	2.000	1.750	1.875	4.950
N29-1004	2.500	2.000	1.250	1-14	7.500	1.000	3.500	2.125	2.000	2.125	5.750
N29-1002	3.000	2.500	1.500	1 1/8-12	8.500	1.000	4.000	2.625	2.500	2.500	6.590

Eye Bracket

Part No.	CB	CD	DD	E	F	FL	LR	M	MR	R
A500-003	1.500	1.000	0.656	4.500	0.750	2.250	1.500	1.000	1.250	3.250
A500-104	2.000	1.375	0.656	5.000	0.875	3.000	2.125	1.375	1.625	3.810
A500-105	2.500	1.750	0.906	6.500	0.875	3.125	2.250	1.750	2.125	4.950
A500-106	2.500	2.000	1.062	7.500	1.000	3.500	2.500	2.000	2.438	5.750
N30-1004	3.000	2.500	1.188	8.500	1.000	4.000	3.000	2.500	3.000	6.590

Rod Clevis

Part No.	A	CB	CD	CE	CW	CX	ER	KK
A500-305	1.625	1.500	1.000	3.125	0.750	1.500	1.000	1-14
A500-306	2.000	2.000	1.375	4.125	1.000	2.000	1.375	1 1/4-12
A500-307	2.250	2.500	1.750	4.500	1.250	2.375	1.750	1 1/2-12
N27-1001	2.250	2.500	1.750	4.500	1.250	2.375	1.750	1 3/4-12
A500-308	3.000	2.500	2.000	5.500	1.250	2.938	2.000	1 7/8-12
A500-309	3.000	3.000	2.000	6.500	1.500	3.500	2.500	2 1/4-12

Rod Eye

Part No.	A	CA	CB	CD	ER	KK
A500-204	1.625	2.813	1.500	1.000	1.188	1-14
A500-205	2.000	3.438	2.000	1.375	1.563	1 1/4-12
A500-206	2.250	4.000	2.500	1.750	2.000	1 1/2-12
N26-1004	2.250	4.000	2.500	1.750	2.000	1 3/4-12
N26-1003	3.000	5.000	2.500	2.000	2.500	1 7/8-12
N26-1002	3.500	5.813	3.000	2.500	2.813	2 1/4-12

Spherical Eye Bracket

Part No.	CB	CD	DD	E	F	FL	LR	M	MR	R
N30-1005	1.000	1.000	0.656	4.500	0.750	2.250	1.500	1.375	1.375	3.250
N30-1006	1.375	1.375	0.656	5.000	0.875	3.000	2.125	2.000	2.000	3.810
N30-1003	1.500	1.750	0.906	6.500	0.875	3.125	2.250	2.125	2.125	4.940
N30-1007	1.750	2.000	1.032	7.500	1.000	3.500	2.500	2.375	2.375	5.750

Rod Stud

Part No.	2A	KK
A500-T01	3.250	1-14
N82-1009	4.000	1 1/4-12
N82-1010	1.500	1 1/2-12
N82-1011	6.000	1 7/8-12

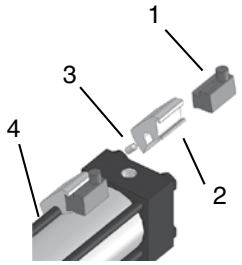
Pivot Pin

Part No.	CD	CL
A500-403	1.000	3.125
A500-404	1.375	4.125
A500-405	1.750	5.125
A500-406	2.000	6.125
N131-1003	2.500	6.188

Large Bore A Series World Switch Application Detail

Round Tube and Tie Rod Detail

1. World Switch
2. Tie Rod Bracket
3. Adjustment Screw
4. Cylinder Tie Rod



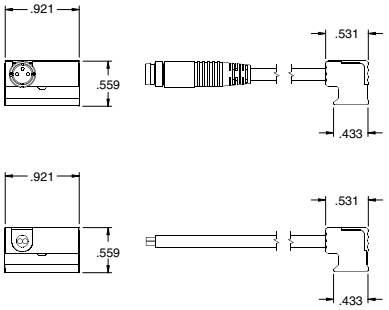
Large Bore A Series World Switch Bracket

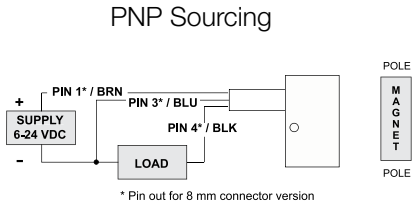
Cylinders	Bore	Part Number
A Series Tie Rod	8" Bore	SB6-W01
A Series Tie Rod	10" Bore	SB6-X01

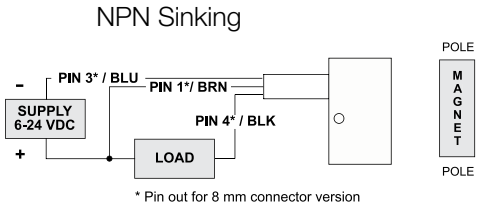
Large Bore A Series World Switch Hall Effect Part Numbers

P/N	Switch Style	Electrical Design	Output	Operating Voltage	Current Rating	Switching Power	Voltage Drop	NEMA IP Rating	Temperature Rating
SH6-031	Flying Lead	DC PNP	Normally Open	6-24 VDC	0.3 Amps Max.	7.2 Watts Max.	.5 Volts	NEMA 6	-25° to +75° C
SH6-032	Flying Lead	DC PNP	Normally Open	6-24 VDC	0.3 Amps Max.	7.2 Watts Max.	.5 Volts	NEMA 6	-25° to +75° C
SH6-021	M8 Connector	DC NPN	Normally Open	6-24 VDC	0.3 Amps Max.	7.2 Watts Max.	.5 Volts	NEMA 6	-25° to +75° C
SH6-022	M8 Connector	DC NPN	Normally Open	6-24 VDC	0.3 Amps Max.	7.2 Watts Max.	.5 Volts	NEMA 6	-25° to +75° C

Hall Effect Switch



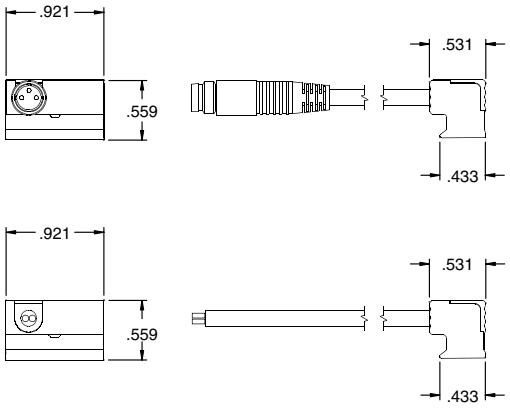


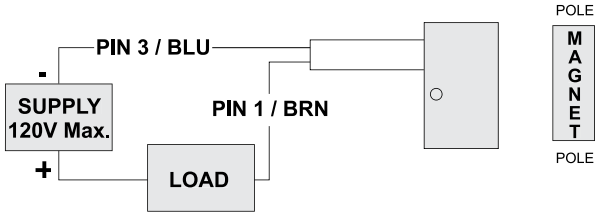


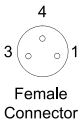
Large Bore A Series World Switch Reed Switch Part Numbers

P/N	Switch Style	Electrical Design	Output	Operating Voltage	Current Rating	Switching Power	Voltage Drop	NEMA IP Rating	Temperature Rating
SR6-002	Flying Lead	AC/DC REED	Normally Open	5-120 VAC/DC	0.025 Amps Max. 0.001 Amps Min.	3 Watts Max.	3.5 Volts	NEMA 6	-25° to +75° C
SR6-004	Flying Lead	AC/DC REED	Normally Open	5-120 VAC/DC	0.5 Amps Max. 0.005 Amps Min.	10 Watts Max.	3.0 Volts	NEMA 6	-25° to +75° C
SR6-022	M8 Connector	AC/DC REED	Normally Open	5-50 VAC 5-60 VDC	0.025 Amps Max. 0.001 Amps Min.	12 Watts Max.	.5 Volts	NEMA 6	-25° to +75° C
SR6-024	M8 Connector	AC/DC REED	Normally Open	5-50 VAC 5-60 VDC	0.5 Amps Max. 0.005 Amps Min.	10 Watts Max.	3.0 Volts	NEMA 6	-25° to +75° C

Reed Switch - Normally Open Type SR6







NFPA Interchangeable Cylinders

A Series (Tie Rod)

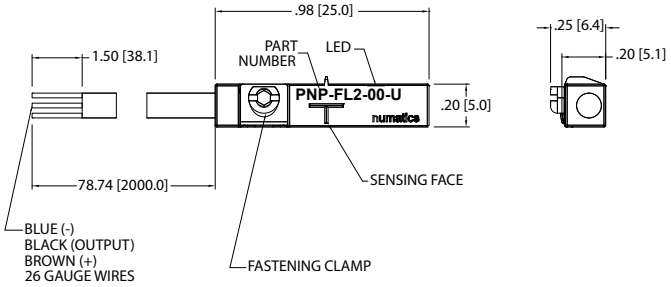
Bore	Bracket P/N
8″	N99-1184
10″	N99-1191
12″	N99-1191
14″	N99-1200

Sensor Description	Standard Cord Set	Quick Disconnect
Reed Switch	REED-FL2-00	REED-QDS-M8U
Hall PNP	PNP-FL2-00-U	PNP-QDS-M8-U
Hall NPN	NPN-FL2-00-U	NPN-QDS-M8-U

See page 19, 20, & 21 for sensor specifications

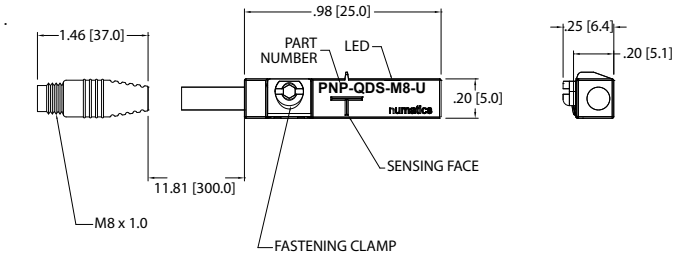
Sensing Part Numbers

PNP-FL2-00-U



ELECTRICAL DESIGN	DC PNP
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 Hz
AMBIENT TEMPERATURE	-25ºC to 85ºC
PROTECTION	IP 67, III
HYSTERESIS	1.0mm
MAGNETIC SENSITIVITY	2.0 mT
TRAVEL SPEED	> 10 m/s
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	Flying Leads, Pur Cable (2m Long, 3 x26 Gauge Wire)
REMARKS	Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5 cULus - Class 2 Source Required
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE c UL us RoHS

PNP-QDS-M8-U

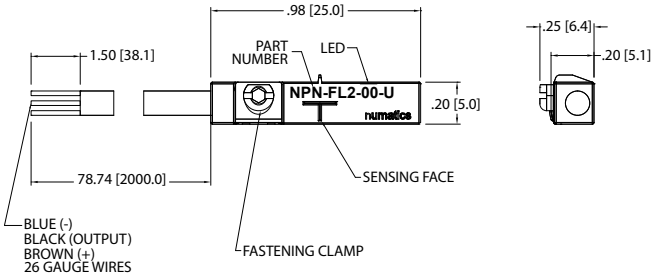


ELECTRICAL DESIGN	DC PNP
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 Hz
AMBIENT TEMPERATURE	-25ºC to 85ºC
PROTECTION	IP 67, III
HYSTERESIS	1.0mm
MAGNETIC SENSITIVITY	2.0 mT
TRAVEL SPEED	> 10 m/s
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	M8 Connector (Snap Fit) , Pur Cable (.3 m)
REMARKS	Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5 cULus - Class 2 Source Required
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE c UL us RoHS

*Switches are not designed for wet environments. Please see your distributor for additional information.

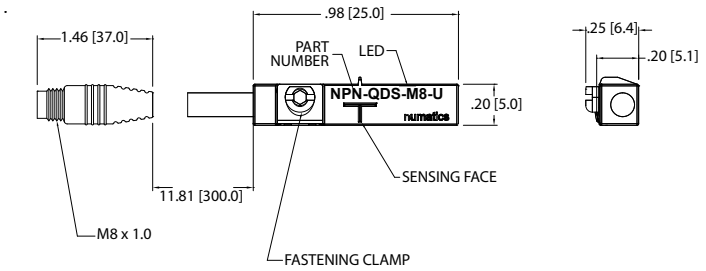
Sensing Part Numbers

NPN-FL2-00-U



ELECTRICAL DESIGN	DC NPN
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 Hz
AMBIENT TEMPERATURE	-25ºC to 85ºC
PROTECTION	IP 67, III
HYSTERESIS	1.0mm
MAGNETIC SENSITIVITY	2.0 mT
TRAVEL SPEED	> 10 m/s
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	Flying Leads, Pur Cable (2m Long, 3 x26 Gauge Wire)
REMARKS	Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5 cULus - Class 2 Source Required
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE c UL us RoHS

NPN-QDS-M8-U

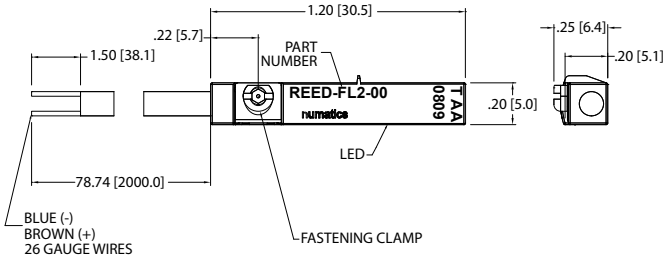


ELECTRICAL DESIGN	DC NPN
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 Hz
AMBIENT TEMPERATURE	-25ºC to 85ºC
PROTECTION	IP 67, III
HYSTERESIS	1.0mm
MAGNETIC SENSITIVITY	2.0 mT
TRAVEL SPEED	> 10 m/s
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	M8 Connector (Snap Fit) , Pur Cable (.3 m)
REMARKS	Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5 cULus - Class 2 Source Required
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE c UL us RoHS

*Switches are not designed for wet environments. Please see your distributor for additional information.

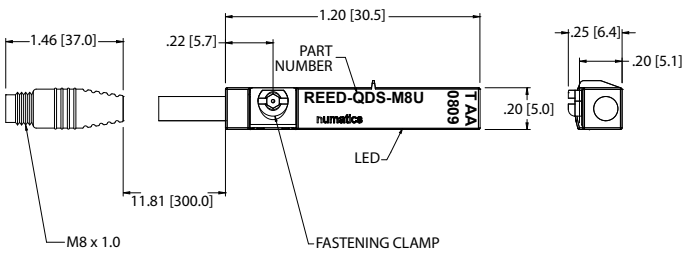
Sensing Part Numbers

REED-FL2-00



ELECTRICAL DESIGN	AC/DC REED
OUTPUT	Normally Open
OPERATING VOLTAGE	5-120 VAC/DC
CURRENT RATING	100 mA*
SHORT-CIRCUIT PROTECTION	No
OVERLOAD PROTECTION	No
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 5 V
REPEATABILITY	± .2mm
MAKETIME INCLUDING BOUNCE	< .6 ms
BREAKTIME	< .1 ms
SWITCHING POWER (MAX)	5 W
SWITCH FREQUENCY	1000 Hz
AMBIENT TEMPERATURE	-25ºC to 70ºC
PROTECTION	IP 67, II
HYSTERESIS	.9mm
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	Flying Leads, Pur Cable (2m Long, 2 x26 Gauge Wire)
REMARKS	*External Protective Circuit for Inductive Load (Valve, Contactor, Etc..) Necessary. Conforms to 2008 NEC Section 725 III, Class 2 Circuits Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5. No LED Function in case of Polarity in DC Operation
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE RoHS

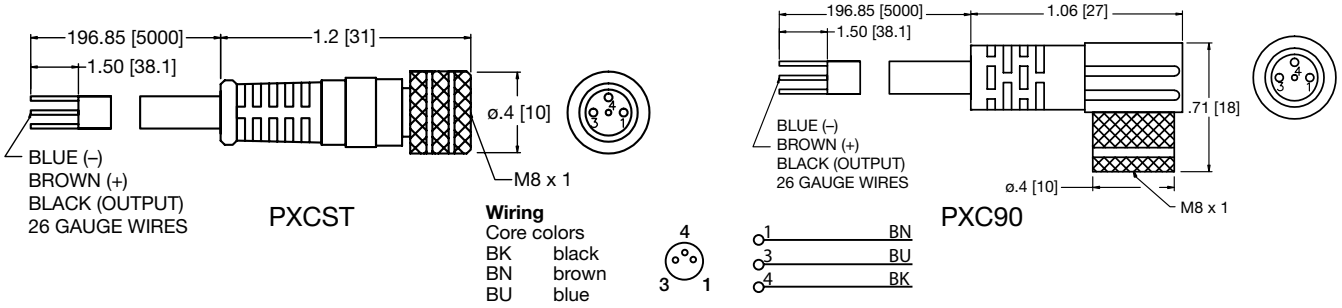
REED-QDS-M8U



ELECTRICAL DESIGN	AC/DC REED
OUTPUT	Normally Open
OPERATING VOLTAGE	*5-60 VDC / 5-50 VAC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	No
OVERLOAD PROTECTION	No
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 5 V
REPEATABILITY	± .2mm
MAKETIME INCLUDING BOUNCE	< .6 ms
BREAKTIME	< .1 ms
SWITCHING POWER (MAX)	5 W
SWITCH FREQUENCY	1000 Hz
AMBIENT TEMPERATURE	-25ºC to 70ºC
PROTECTION	IP 67, II
HYSTERESIS	.9mm
HOUSING MATERIAL	PA (Polyamide) Black; Fastening Clamp: Stainless Steel
FUNCTION DISPLAY SWITCHING STATUS	Yellow LED
CONNECTION	M8 Connector (Snap Fit), Pur Cable (.3m)
REMARKS	*External Protective Circuit for Inductive Load (Valve, Contactor, Etc..) Necessary. Conforms to 2008 NEC Section 725 III, Class 2 Circuits M8 Connector voltage limited to 5-60 vdc / 5-50 vac to conform with 2008 IEC 61076-2-104 Clamping Screw with Combined Slot/Hexagon Socket Head AF 1.5. No LED Function in case of Polarity in DC Operation
ACCESSORIES	Rubber Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE RoHS

*Switches are not designed for wet environments. Please see your distributor for additional information.

Quick Disconnect Cables



Order Code	Type	Operating Voltage	Current Rating	Cable Material	Protection	Connector
PXCST	Straight 5 m Cable (3 x 26 Gauge wire)	60 AC/75 DC	3 A	PUR	IP 68, III	M8
PXC90	90° 5 m Cable (3 x 26 Gauge wire)	60 AC/75 DC	3 A	PUR	IP 68, III	M8

How to Order - A Series Piston Rod Assembly

A92 - W 1 N 0 - 01 A - AA

Type
A92 = A Series Piston Rod Assembly

Bore
W = 8"
X = 10"
Y = 12"
B = 14"

Rod Code
1 = Style # 1 Standard Rod Diameter
2 = Style # 2 Standard Rod Diameter
3 = Style # 3 Standard Rod Diameter
4 = Special Standard Rod Diameter (must specify threads)
5 = Special Oversize Rod Diameter (must specify threads)
6 = Style # 1 Oversize Rod Diameter
7 = Style # 2 Oversize Rod Diameter
8 = Style # 3 Oversize Rod Diameter
A = Style # 1 Second Oversize Rod Diameter
B = Style # 2 Second Oversize Rod Diameter
C = Style # 3 Second Oversize Rod Diameter
U = Male Coupling Rod End Standard Rod Diameter
V = Male Coupling Rod End Oversize Rod Diameter

Cushion
N = No Cushion
B = Both Ends Cushioned
H = Head End Cushioned
C = Cap End Cushioned

Magnet
0 = No Magnet
2 = Reed Magnet (Is Included with Piston Rod Assembly)

Options (Does Not Include Seals)
AA = No Option
BH = Bumpered Head End
CR = Cylindicator Ready "Stroke to Go"
DA = Double Rod
EB = Bumper Seals
FA = No Wrench Flats, No Turn Down
FB = Four Wrench Flats
GA = High Temperature Rod Boot
JN = Jam Nut
KA = Stroke Adjust
LB = Low Breakaway
NA = Nickel Plated
NN = Nylock Nut
NS = Cylindicator Ready "No Stroke to Go"
PP = PolyPak Piston
RA = Save Air Stroke Adjuster
RB = Rod Boot
SA = Stainless Rod
TI** = "T" Seal Piston
VA = FKM Seals
1A* = Rod Extension
1B* = Rear Rod Extension
2A* = Thread Extension
2B* = Rear Thread Extension
3A = Rod Stud
3B = Rear Rod Stud
4A* = Stop Tube
4D* = Double Piston Stop Tube

* = must specify length
** For 10", 12", and 14" bores.
Consult factory for additional options.

Fractional Inches of Stroke

A = 0"	E = 1/4"	I = 1/2"	M = 3/4"
B = 1/16"	F = 5/16"	J = 9/16"	N = 13/16"
C = 1/8"	G = 3/8"	K = 5/8"	O = 7/8"
D = 3/16"	H = 7/16"	L = 11/16"	P = 15/16"

Full Inches of Stroke
00 = 0" Stroke
01 = 1" Stroke
02 = 2" Stroke
03 = 3" Stroke
04 = 4" Stroke
05 = 5" Stroke
99 = 99" Stroke

Note: Options listed are ones that apply to a piston rod assembly only.
Model number is set up to use option code supplied with original cylinder or with any above.
Note: Bumpers are not included with Piston Rod Assembly.

Rod End Styles, Diameters and Threads

Diameter	Style #1 Standard Male	Style #2 Optional Male	Style #3 Optional Female
0.625	7/16-20	1/2-20	7/16-20
1.000	3/4-16	7/8-14	3/4-16
1.375	1-14	1 1/4-12	1-14
1.750	1 1/4-12	1 1/2-12	1 1/4-12
2.000	1 1/2-12	1 3/4-12	1 1/2-12
2.500	1 7/8-12	2 1/4-12	1 7/8-12

Rod Diameter by Bore Size

Bore	Standard Dia.	Oversized Dia.
8"	1.375	1.750
10"	1.750	2.000
12"	2.000	2.500
14"	2.500	N/A

How to Order - A Series Repair Kit

A98 - W 1 N - AA

Type
A98 = A Series Repair Kit

Bore
W = 8"
X = 10"
Y = 12"
B = 14"

Rod Size
0 = Standard Rod
1 = Oversize Rod
2 = Second Oversize Rod

Cushion
N = No Cushion
B = Both Ends Cushioned
H = Head End Cushioned
C = Cap End Cushioned

Options
AA = No Option
BK = Back to Back
BZ = Bronze Bushing
CR = Cylindicator Ready “Stroke to Go”
CZ = Composite Bushing
DA = Double Rod
EB = Silencer Bumpers
GA = High Temperature Rod Boot
LB = Low Breakaway
LT = Low Temp Seals
MA = Metallic Rod Scraper
MB = Rear Metallic Rod Scraper
NA = Nickel Plated
NS = Cylindicator Ready “No Stroke to Go”
PA = Polypak Rod Seal
PB = Rear Polypak Rod Seal
PP = Polypak Piston Seals
RA = Save Air Stroke Adjust
TI** = “T” Seal Piston
VA = FKM Seals
4D = Double Piston Stop Tube
** For 8", 10", 12", and 14" bores

Note: Options listed are ones that apply to a repair kit only.
Model number is set up to use option code supplied with original cylinder or with any above.

How to Order - A Series Seal Kit

A97 - W 1 N - AA

Type
A97 = A Series Seal Kit

Bore
W = 8"
X = 10"
Y = 12"
B = 14"

Rod Size
0 = Standard Rod
1 = Oversize Rod
2 = Second Oversize Rod

Options
AA = No Option
BK = Back to Back
CR = Cylindicator Ready “Stroke to Go”
DA = Double Rod
EB = Silencer Bumpers
LB = Low Breakaway
LT = Low Temp Seals
MA = Metallic Rod Scraper
MB = Rear Metallic Rod Scraper
NS = Cylindicator Ready “No Stroke to Go”
PA = Polypak Rod Seal
PB = Rear Polypak Rod Seal
PP = Polypak Piston Seals
RA = Save Air Stroke Adjust
TI** = “T” Seal Piston
VA = FKM Seals
4D = Double Piston Stop Tube
** For 8", 10", 12", and 14" bores

Cushion
N = No Cushion
B = Both Ends Cushioned
H = Head End Cushioned
C = Cap End Cushioned

Note: Options listed are ones that apply to a seal kit only.
Model number is set up to use option code supplied with original cylinder or with any above.

Piston Rod Assembly Kit Installation Instructions

1. Loosen 4 Tie Rod Nuts (Part #20) to remove Piston/Rod Assembly (Part #18 & #19).
2. Carefully remove seals. (Part #12, #14, & #15). Any damage to the seals may result in leakage.
3. Lubricate piston seal(s) and wearband (Part #12) with supplied Numatics' Lube. Examine seals before installing for any contamination. Contamination may cause leakage.
4. Install Piston Seal (Part #15). Make sure the piston seal is not twisted inside groove. Next install back-up rings if piston seal is a T-seal.
5. Install lubricated wearband onto piston. Sink piston/rod assembly into sinker tube.
6. Apply lube inside the cylinder tube (Part #17).
7. Sink piston/rod assembly into cylinder tube.
8. Press piston/rod assembly flush with the cylinder tube. Wipe off any lube from the face of the piston.
9. Examine all seals before reassembling cylinder for any contamination. Contamination may cause leakage.
10. Lightly grease Rod Seal (Part #3) of Loaded Bushing before installing. This will ease the installation of the rod bushing over the rod.
11. Reassemble cylinder. Loosely torque Tie Rod Nuts (Part #20) to allow head and cap to rotate slightly.
12. Before final torque, place cylinder on level surface. This will ensure that the cylinder head and cap are square. Torque Tie Rod Nuts (Part #20) in a crisscross pattern. Use torque tolerances chart for Tie Rod Nuts and Retainer Screws.
13. Stroke cylinder by hand. This will enable detection of any binding. If binding does occur, repeat steps 11-13.

See Seal Installation Guide on page 27 for additional (visual) instructions.

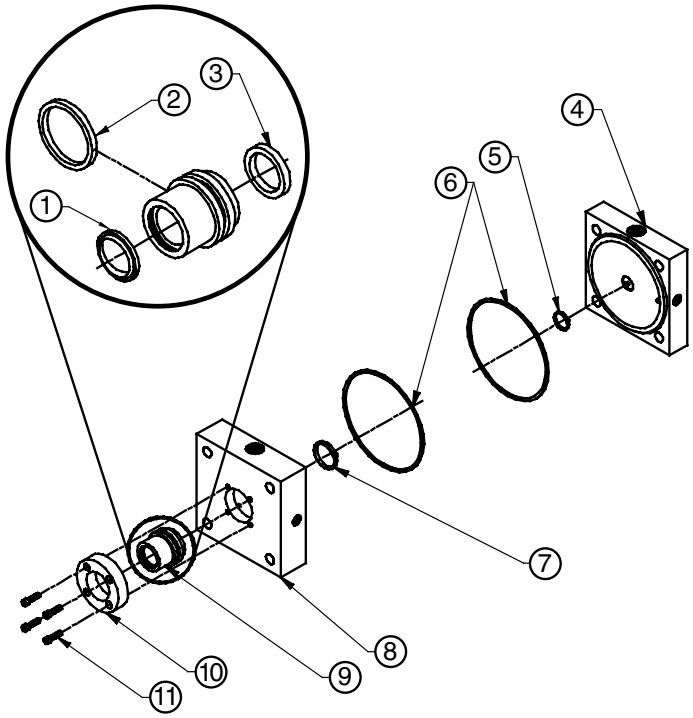
Repair Kit and Seal Kit Removal/Installation Instructions

1. Loosen 2 or 4 Retainer Screws (Part #11) to remove Loaded Bushing (Part # 9)
2. Loosen 4 Tie Rod Nuts (Part #20) to remove Piston/Rod Assembly (Part #18 & #19)
3. Carefully remove old seals. (Part [#1, #2, #3 Seal kit only], #5, #6, #7, #12, #14, & #15) Any damage to the seal grooves may result in leakage.
4. Lubricate new seals with supplied Numatics' Lube. Examine seals before installing for any contamination. Contamination may cause leakage.
5. Install Piston Seal (Part #15). Make sure the piston seal is not twisted inside groove. Next install back-up rings (Part #14) if piston seal is a T-seal.
6. Install lubricated Wearband (Part #12) onto piston. Sink piston/rod assembly into sinker tube.
7. Apply lube inside the cylinder tube.
8. Sink piston/rod assembly into cylinder tube.
9. Press piston/rod assembly flush with the cylinder tube. Wipe off any lube from the face of the piston.
10. Place Tube End Seals (Part #6) into head and cap seal grooves. Examine seals after installing for any contamination. Contamination may cause leakage.
11. Install Rod Wiper (Part #1), Bushing O-ring (Part #2), and Rod Seal (Part #3) into bushing (Seal Kit only). Lightly grease Rod Seal and Bushing O-ring after installation. This will ease the installation of the rod bushing over the rod and into the head.
12. Reassemble cylinder except for loaded rod bushing (Part #9). First, loosely torque Tie Rod Nuts to allow head and cap to rotate slightly. Carefully place bushing over the rod until getting interference. With a twisting motion, slide the bushing down onto the rod and into the bushing pocket on the head.
13. Place Bushing Retainer (Part #10). Lightly tighten Retainer Screws (Part #11).
14. Before final torque, place cylinder on level surface to square head and cap. Torque Tie Rod Nuts in a crisscross pattern. Use the following charts for torque tolerances for Tie Rod Nuts and Retainer Screws.
15. Stroke cylinder by hand. This will enable detection of any binding. If binding does occur, repeat steps 12-14.

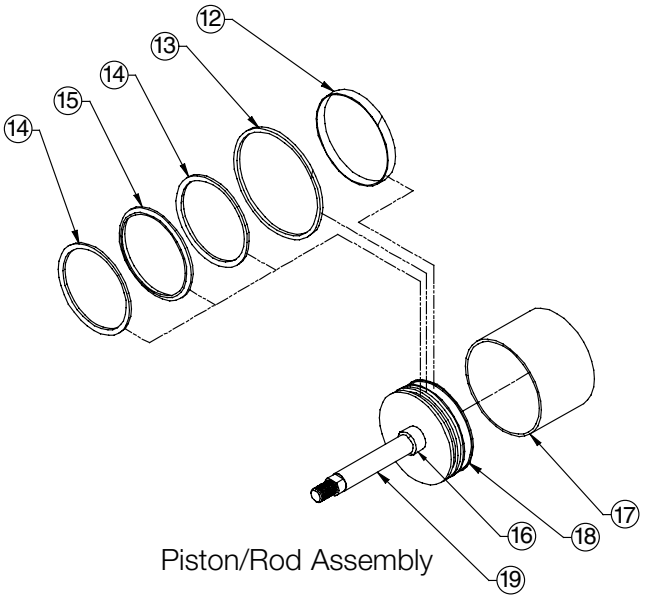
See Seal Installation Guide on page 27 for additional (visual) instructions.

Diagrams

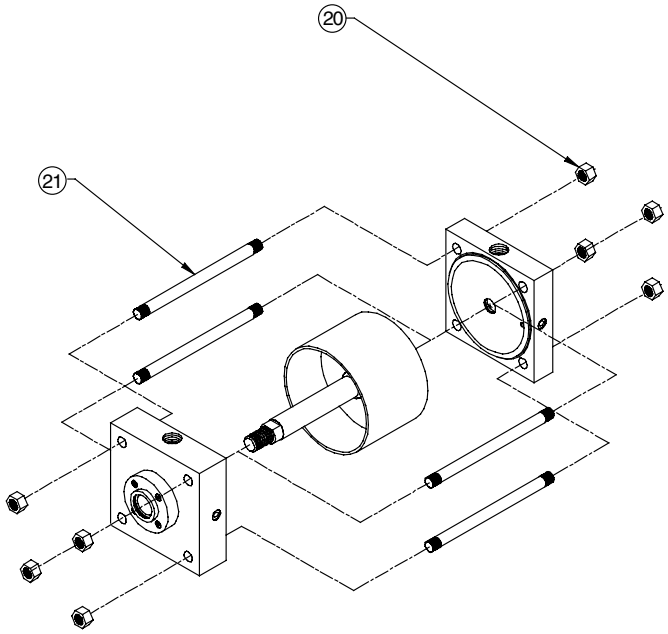
Pneumatic Service Temperatures:
Nitrile Seals: -10˚F (-23˚C) to 165˚F (74˚C)
FKM Seals: 0˚F (-17˚C) to 400˚F (204˚C)



Head, Cap, and Bushing Assembly



Piston/Rod Assembly

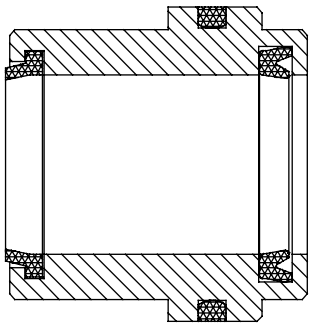


Cylinder Assembly and Tie Rod Torque

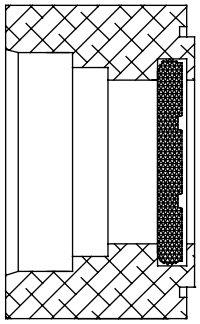
A Series

Part #	Description	Parts included in:		
		Seal Kit	Repair Kit	Piston/Rod Assembly
1	Rod Wiper	X		
2	Bushing O-ring	X		
3	Rod Seal	X		
4	Cap			
5	Cap Cushion Seal	X	X	
6	Tube End Seals	X	X	
7	Head Cushion Seal	X	X	
8	Head			
9	Loaded Bushing Assembly		X	
10	Bushing Retainer			
11	Retainer Screws			
12	Wearband	X	X	
13	Magnet			X
14	Back-up Rings	X	X	
15	Piston Seal	X	X	
16	Cushion Spear			X
17	Tube			
18	Piston			X
19	Rod			X
20	Hex Nuts			
21	Tie Rods			

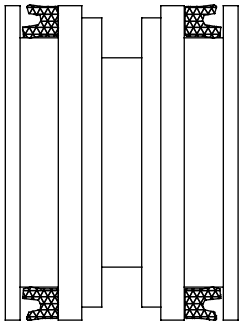
Seal Installation Guide



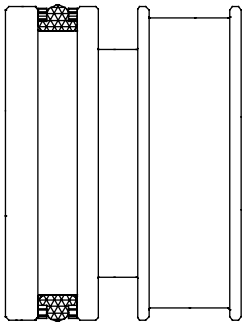
Loaded Bushing



Cushioned Head or Cap



Low Breakaway Piston



T-Seal Piston

Torque Tolerances (LBS-FT) Tie Rod Nut Part #20

Bore	Min.	Max.
8"	80	90
10"	200	220
12"	200	220
14"	300	330

Retainer Screws Torque Tolerances (lbs-ft) Part #11

Size	Min.	Max.
#10-32	1	1.5
1/4-28	5	7
5/16-24	10	12

Note: Sinker Tubes are not included in kits. They can be ordered using the part numbers from the provided chart.

Sinker Tube Part Numbers

Bore	Part #
8"	A06-W91
10"	A06-X91
12"	A06-Y91
14"	A06-B91

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