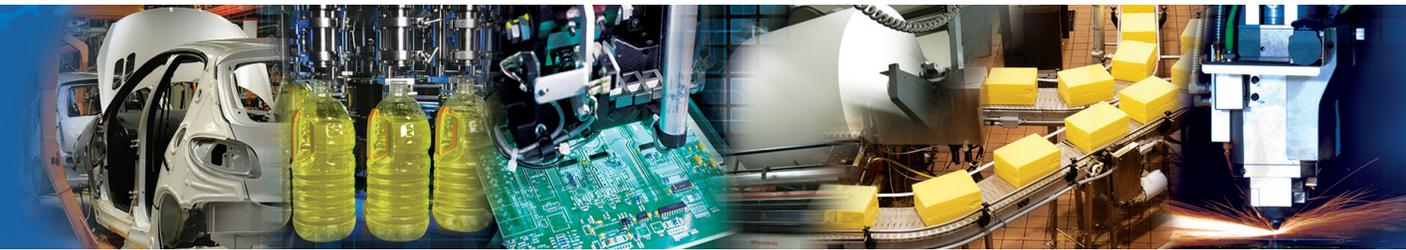
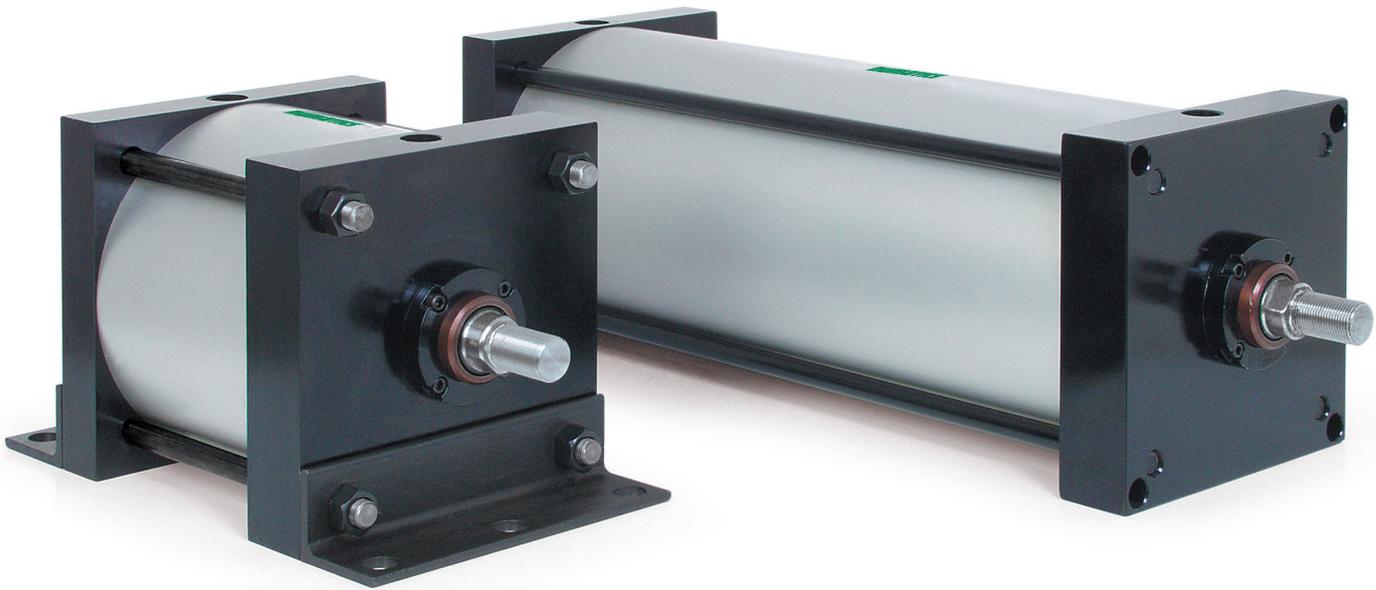


NUMATICS®

Large Bore A Series

NFPA Interchangeable Cylinder Line



www.numatics.com

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 carboxylated 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 carboxylated 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.

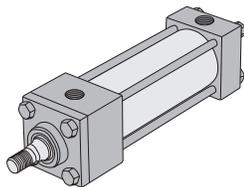
Standard Specifications:

- 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

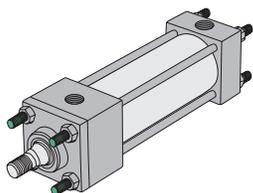
Standard Large Bore A Series Mounts

Centerline Mounts

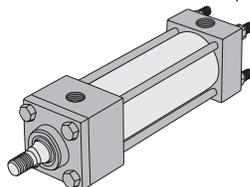
X0 Mount
Basic No Mount



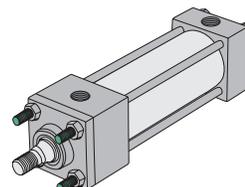
X1 Mount
Extended Tie Rods – Both Ends



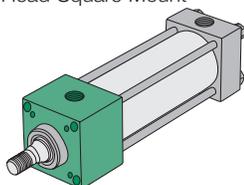
X2 Mount
Extended Tie Rods – Cap End



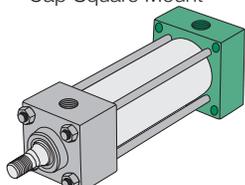
X3 Mount
Extended Tie Rods – Head End



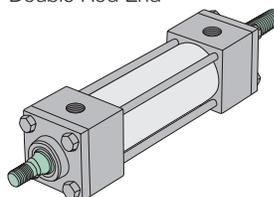
E3 Mount
Head Square Mount



E4 Mount
Cap Square Mount

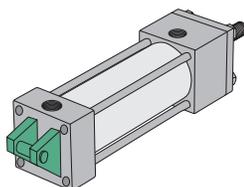


DA Mount
Double Rod End

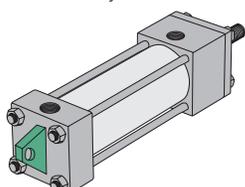


Pivot Mounts

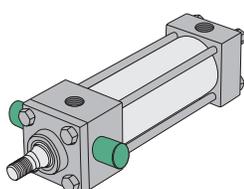
P1 Mount
Fixed Clevis



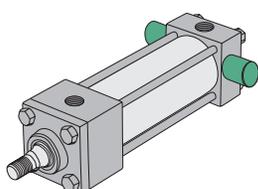
P3 Mount
Fixed Eye



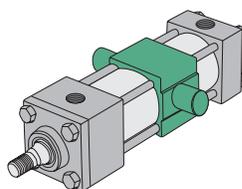
T1 Mount
Head Trunnion



T2 Mount
Cap Trunnion

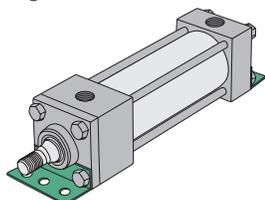


T4 Mount
Intermediate Trunnion

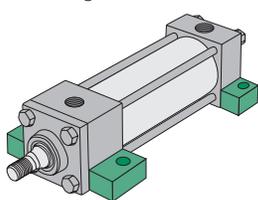


Foot Mounts

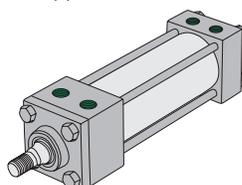
S1 Mount
Angle Mount



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
NFFPA 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 |

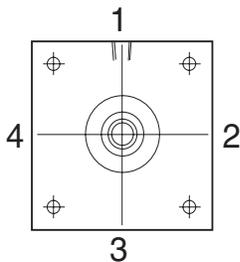
Ports

| 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.

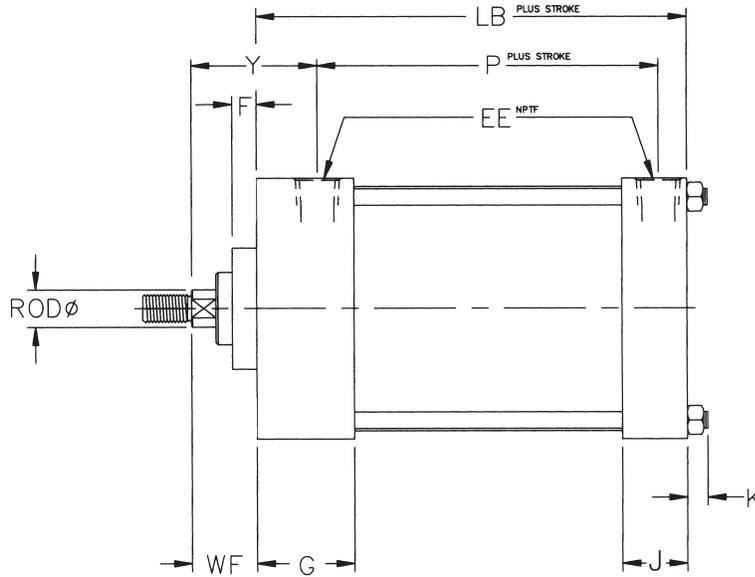
14" Bore-standard port size is 1 1/4" NPTF, smaller port sizes available.

Rod End Styles, Diameters and Threads

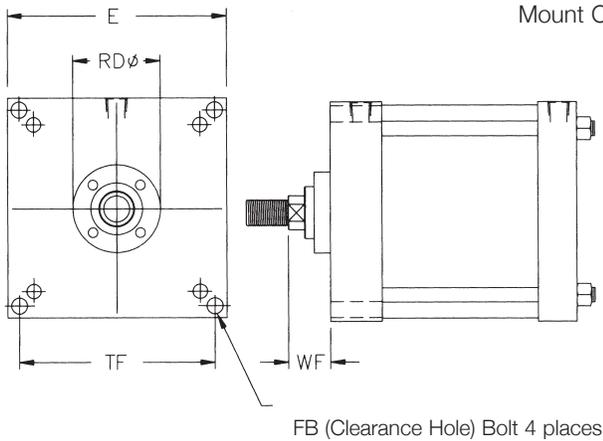
| Diameter | Style #1 Standard Male | Style #2 Optional Male | Style #3 Optional Female |
|----------|---------------------------|---------------------------|-----------------------------|
| 1.38 | 1-14 | 1 1/4-12 | 1-14 |
| 1.75 | 1 1/4-12 | 1 1/2-12 | 1 1/4-12 |
| 2.00 | 1 1/4-12 | 1 3/4-12 | 1 1/2-12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

Dimensions: Inches

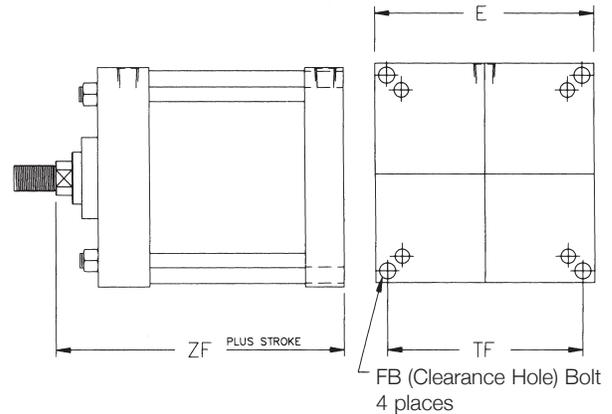
Basic No Mount Cylinder



Mount Code X0 NFPA MX0



Mount Code E3 NFPA ME3

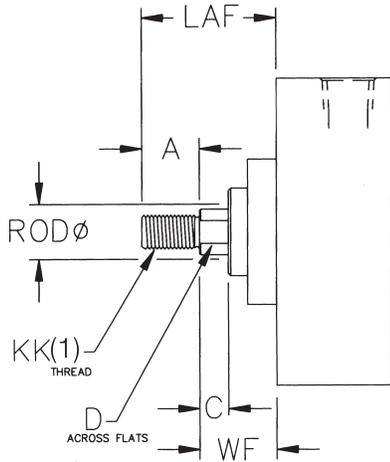


Mount Code E4 NFPA ME4

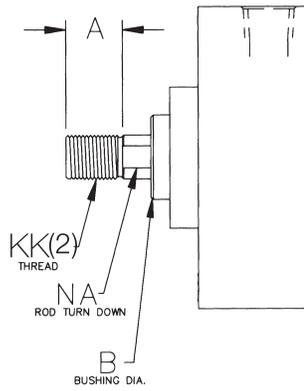
| Bore | Rod | E | EE | F | FB | G | J | K | LB | P | RD | TF | WF | Y | ZF |
|------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|--------|
| 8" | 1.375 | 8.500 | 0.750 | 0.630 | 0.630 | 2.000 | 1.500 | 0.630 | 5.125 | 3.250 | 3.130 | 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

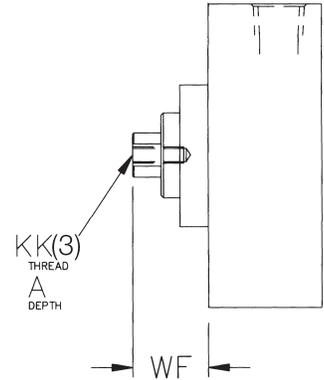
Standard and Optional Rod Ends



Style #1 (Standard Male)



Style #2 (Optional Male)



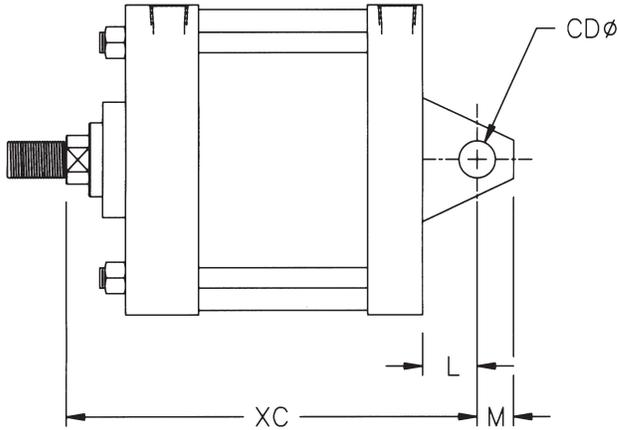
Style #3 (Optional Female)

| 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 |
| 12" | 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 |
| | 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 |
| 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 |

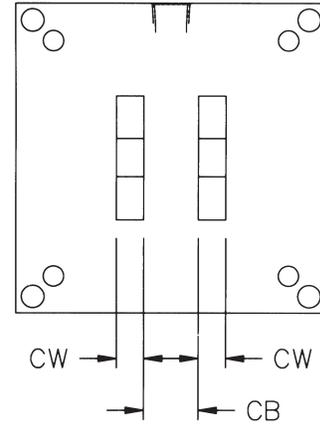
*Other rod sizes available. Consult factory for details.

Dimensions: Inches

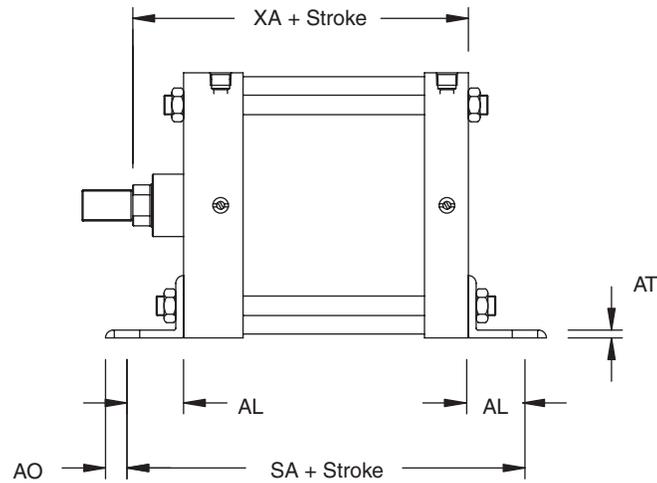
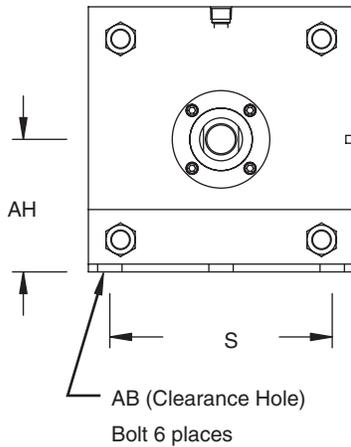
Clevis and Angle Mount



Mount Code P1



NFPA MP1



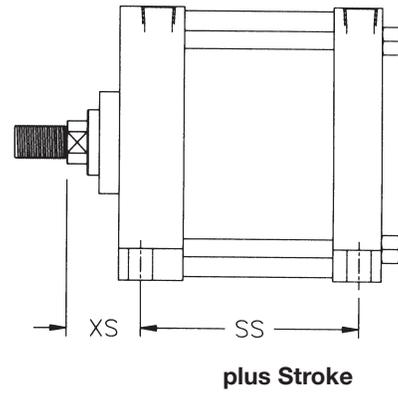
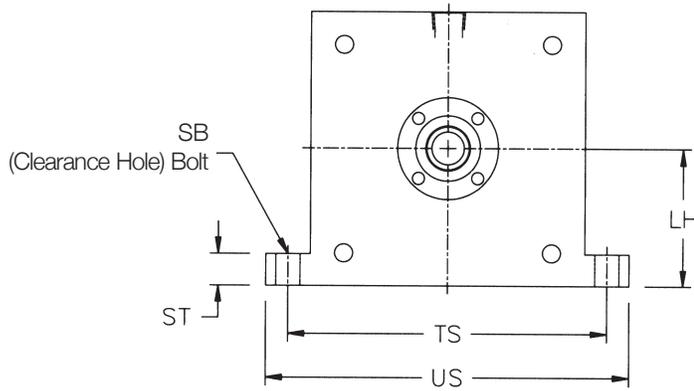
Mount Code S1

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

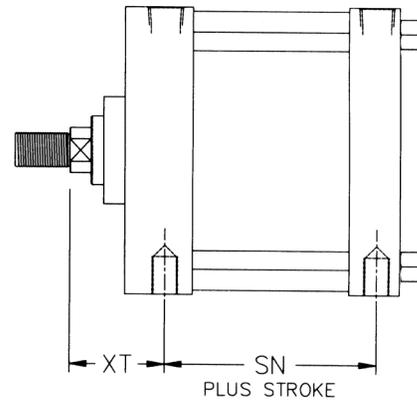
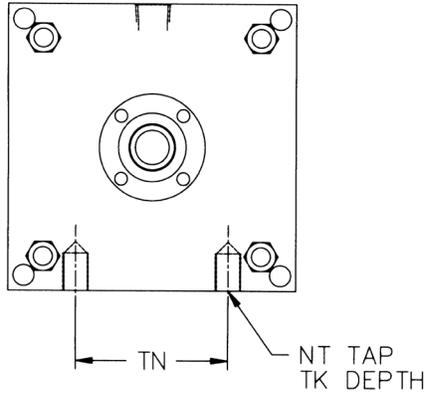
Side Lug and Bottom Tap Mount



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

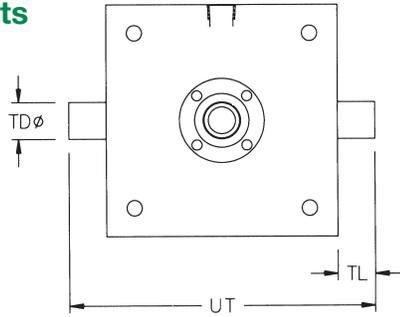
NFPA MS4

| 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 |

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

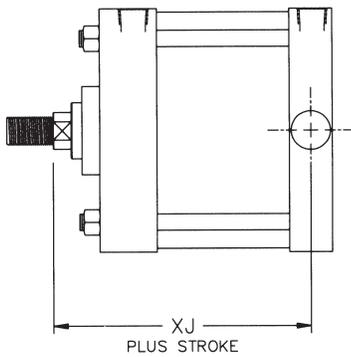
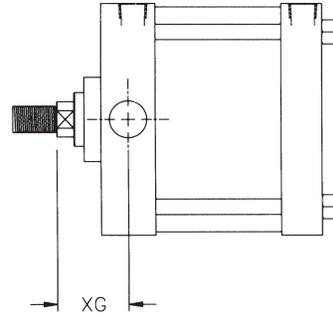
Dimensions: Inches

Trunnion Mounts



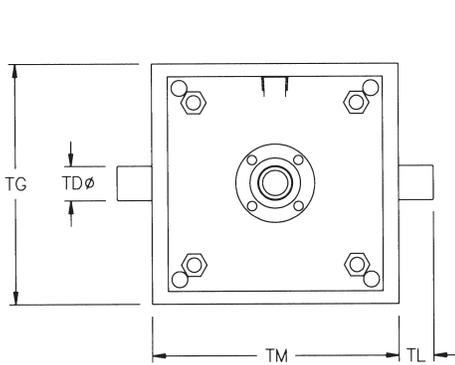
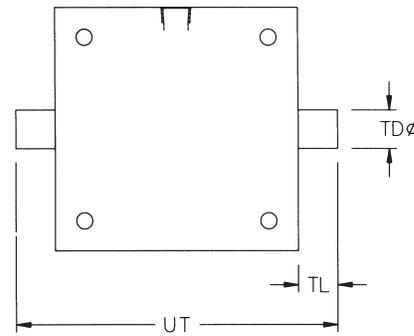
Mount Code T1

NFPA MT1



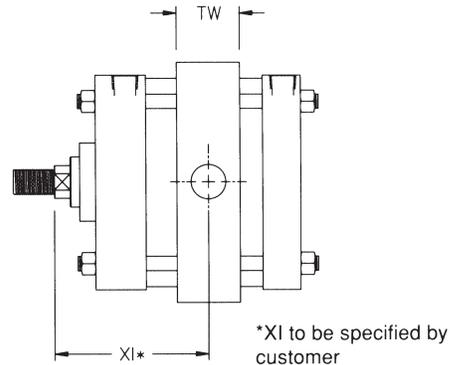
Mount Code T2

NFPA MT2



Mount Code T4

NFPA MT4



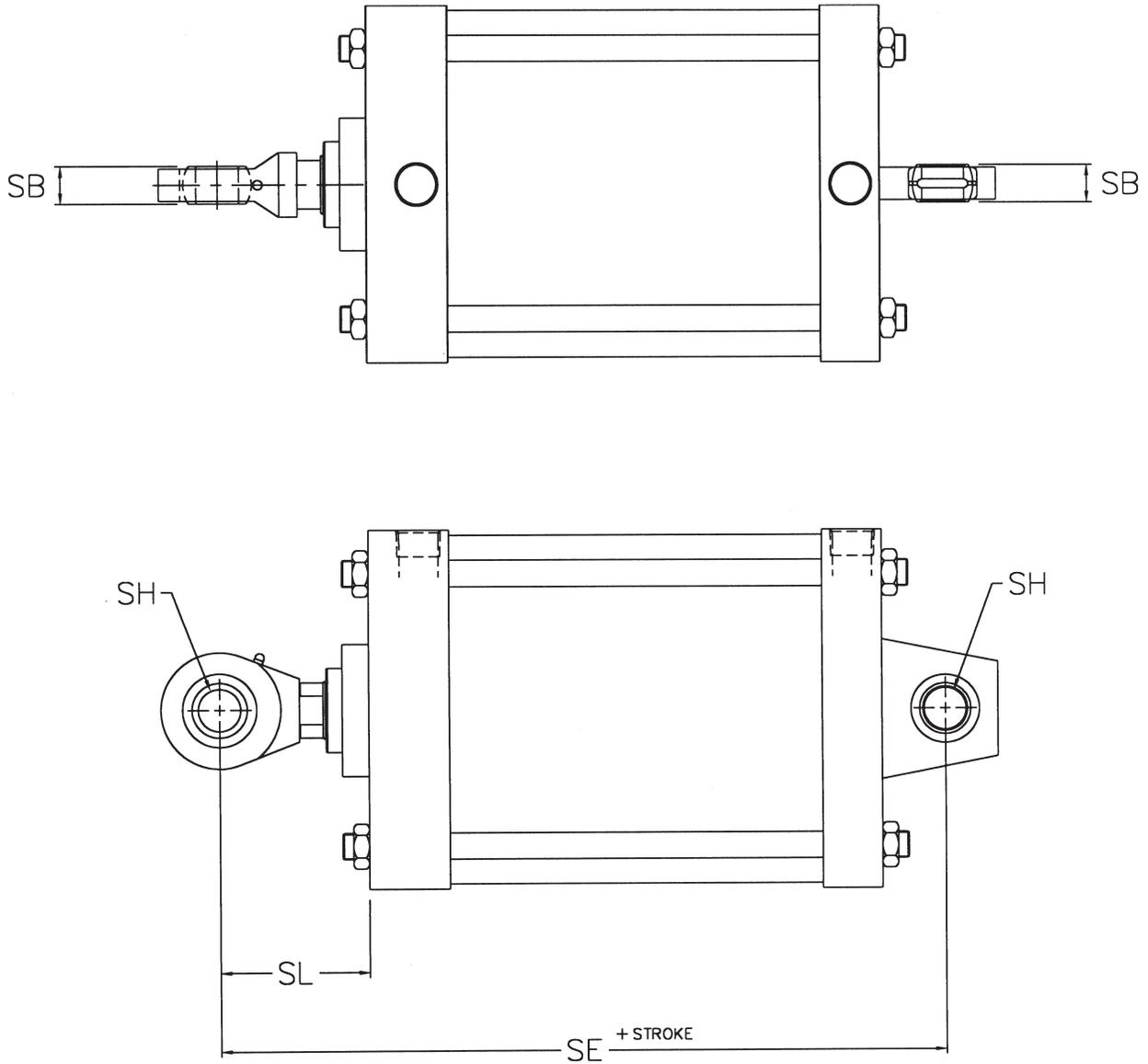
NOTE: All Large Bore A Series trunnion mounts are one piece machined steel.

| 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 |
| 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 |

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

Dimensions: Inches

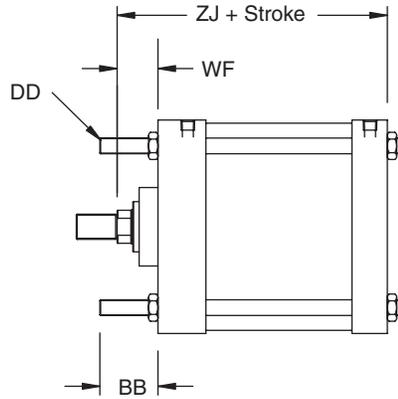
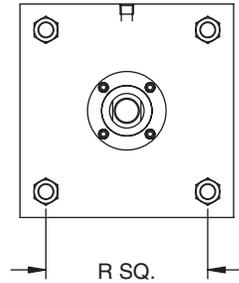
Spherical Mount



| 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 |

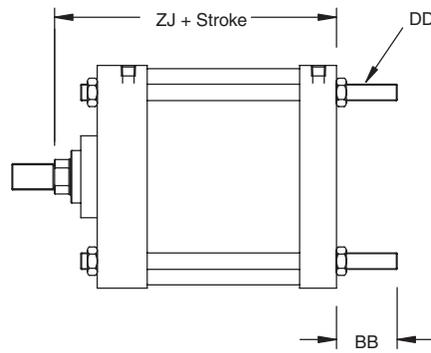
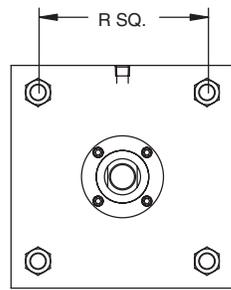
Dimensions: Inches

Extended Tie Rod Mounts



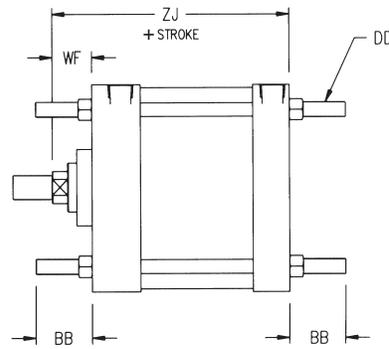
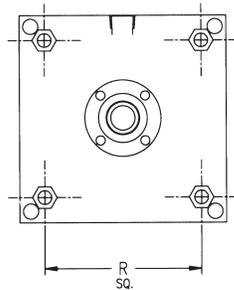
Mount Code X3

NFPA MX3



Mount Code X2

NFPA MX2



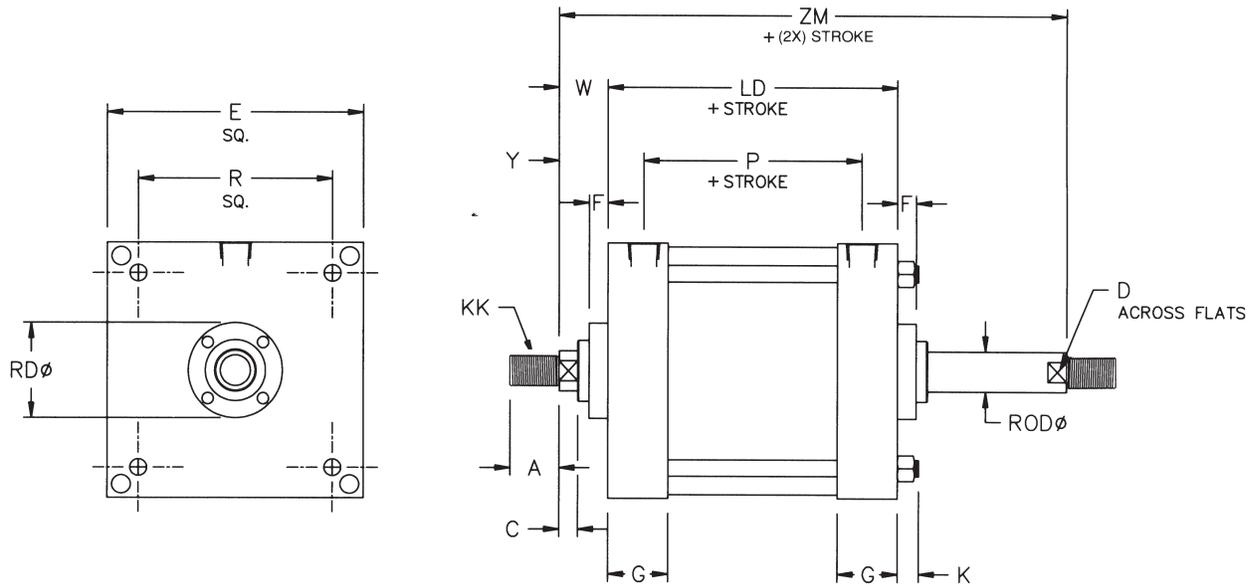
Mount Code X1

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 |

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

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 = (2 x Stroke)

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.

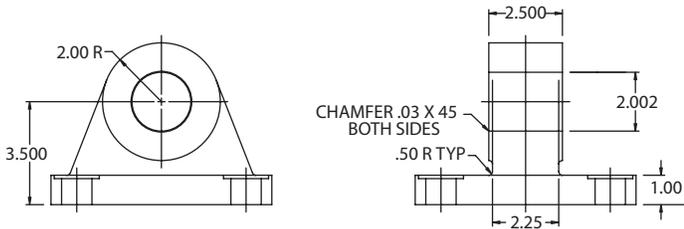
For P1 mount, "L" assumes that the rod extends and the cylinder pivots with the rod. Multiply "L" by four so the rod extends and the cylinder does not pivot with the rod.

Table 2

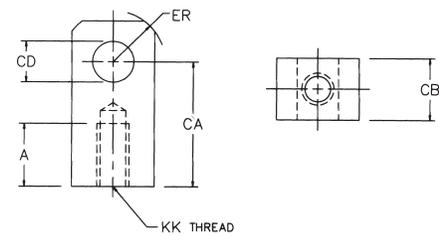
| "L" (Inches) | Stop Tube Length (Inches) |
|--------------|---------------------------|
| 0-40 | 0 |
| 41-50 | 1 |
| 51-60 | 2 |
| 61-70 | 3 |
| 71-80 | 4 |
| 81-90 | 5 |
| 91-100 | 6 |
| 101-110 | 7 |
| 111-120 | 8 |
| 121-130 | 9 |
| 131-140 | 10 |
| 141-150 | 11 |
| 151-160 | 12 |
| 161-170 | 13 |
| 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 |

Accessories

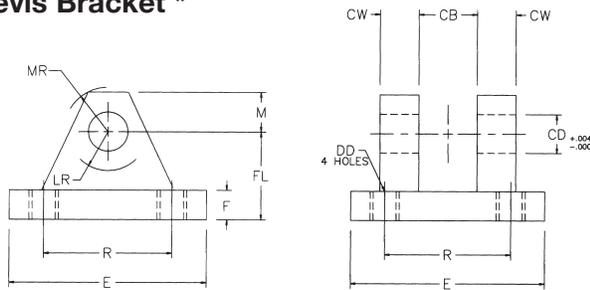
Eye Bracket *



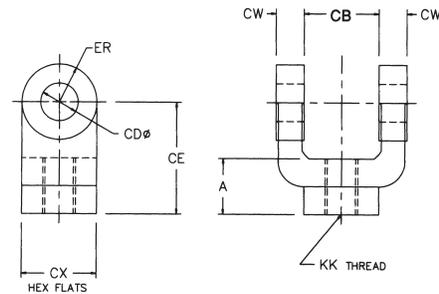
Rod Eye *



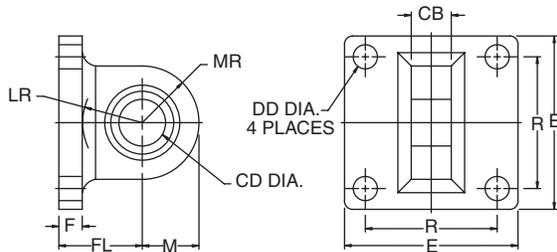
Clevis Bracket *



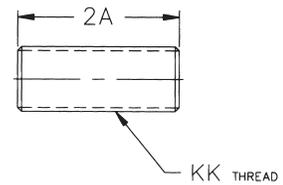
Rod Clevis *



Spherical Eye Assembly *



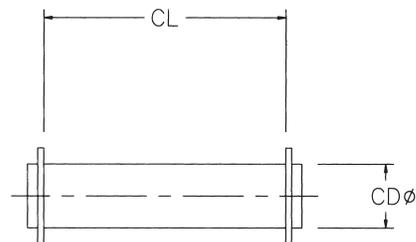
Rod Stud



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 |

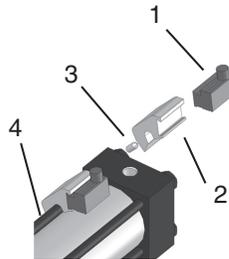
Pivot Pin

| 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



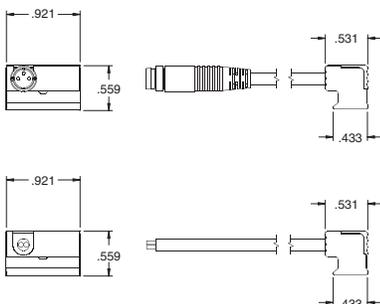
Large Bore A Series World Switch Bracket

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

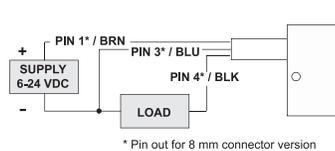
Large Bore A Series World Switch Hall Effect Part Numbers

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

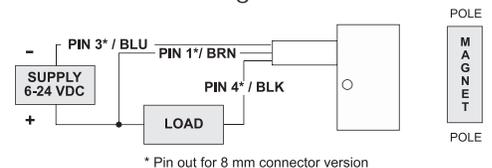
Hall Effect Switch



PNP Sourcing



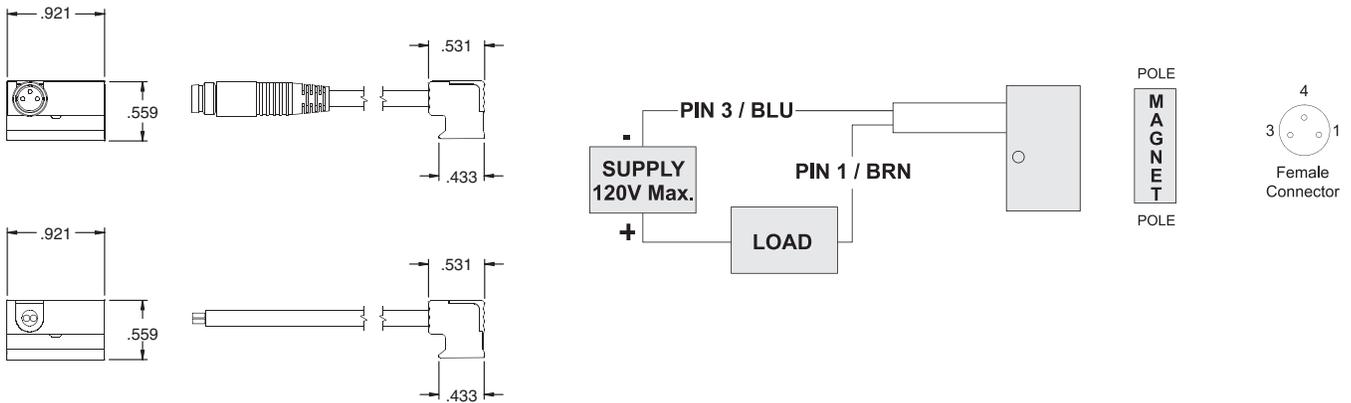
NPN Sinking



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 |

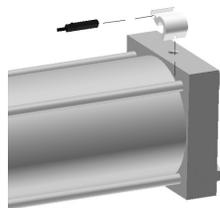
Reed Switch - Normally Open Type SR6



NFPA Interchangeable Cylinders

A Series (Tie Rod)

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

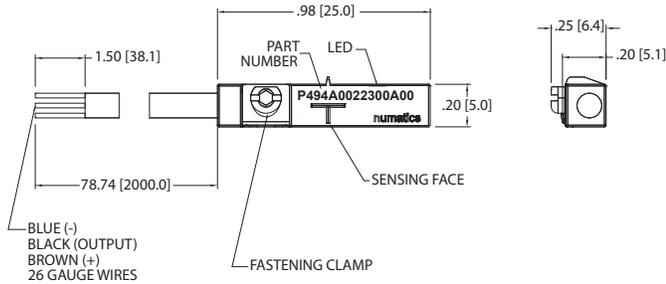


| Sensor Description | Standard Cord Set | Quick Disconnect |
|--------------------|-------------------|------------------|
| Reed Switch | REED-FL2-00 | REED-QDS-M8U |
| Hall PNP | PNP-FL2-00-U | PNP-QDS-M8-U |
| Hall NPN | NPN-FL2-00-U | NPN-QDS-M8-U |

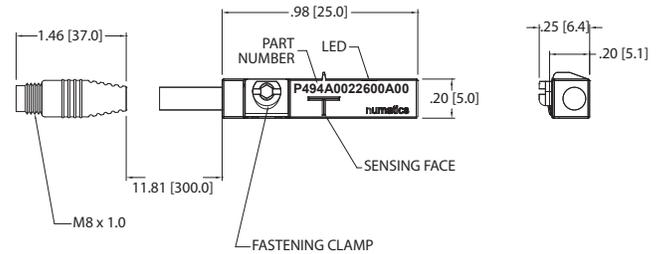
See page 19, 20, & 21 for sensor specifications

Sensing Part Numbers

PNP-FL2-00-U



PNP-QDS-M8-U

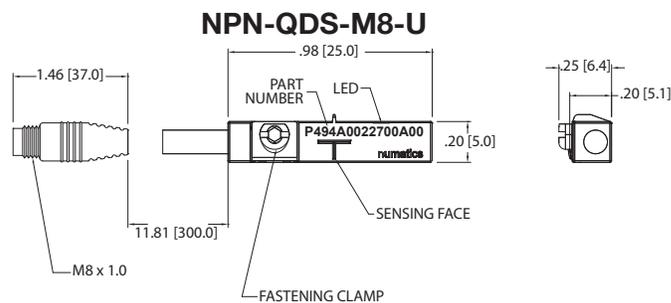
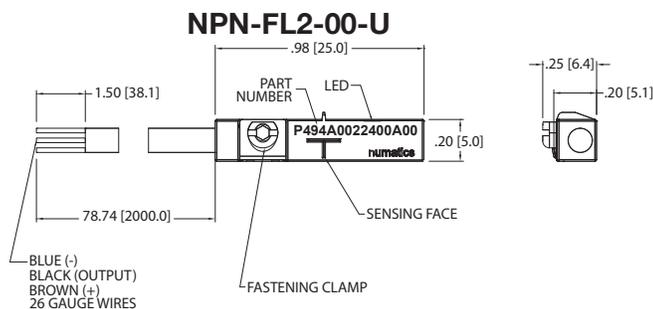


| ELECTRICAL DESIGN | DC PNP |
|-----------------------------------|-------------------------------------------------------------------------------------------------|
| OUTPUT | Normally Open |
| OPERATING VOLTAGE | 10-30 VDC |
| CURRENT RATING | 100 mA |
| SHORT-CIRCUIT PROTECTION | Yes |
| OVERLOAD 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 | -25°C to 85°C |
| 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 Placeholder, Cable Clip, and Cut Sheet To Be Provided with Every Switch |
| AGENCY APPROVALS | |

| 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 | -25°C to 85°C |
| 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 Placeholder, Cable Clip, and Cut Sheet To Be Provided with Every Switch |
| AGENCY APPROVALS | |

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

Sensing Part Numbers



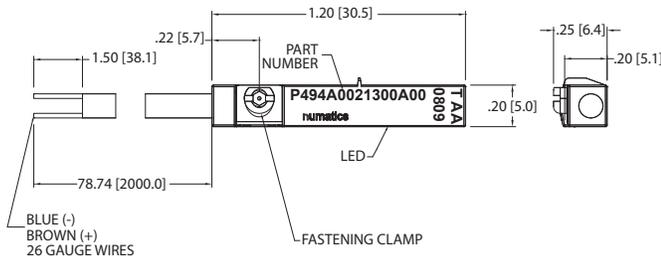
| | |
|-----------------------------------|-------------------------------------------------------------------------------------------------|
| ELECTRICAL DESIGN | DC NPN |
| OUTPUT | Normally Open |
| OPERATING VOLTAGE | 10-30 VDC |
| CURRENT RATING | 100 mA |
| SHORT-CIRCUIT PROTECTION | Yes |
| OVERLOAD 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 | -25°C to 85°C |
| 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 cUL US RoHS |

| | |
|-----------------------------------|-------------------------------------------------------------------------------------------------|
| 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 | -25°C to 85°C |
| 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 cUL US RoHS |

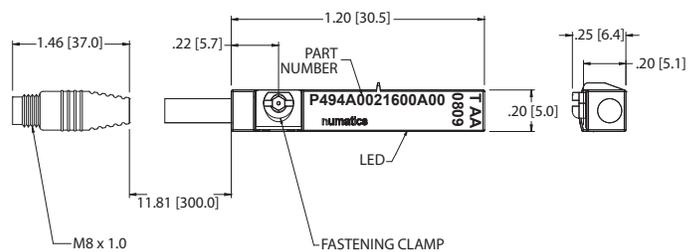
*Switches are not designed for wet environments. Please see your distributor for additional information.

Sensing Part Numbers

REED-FL2-00



REED-QDS-M8U

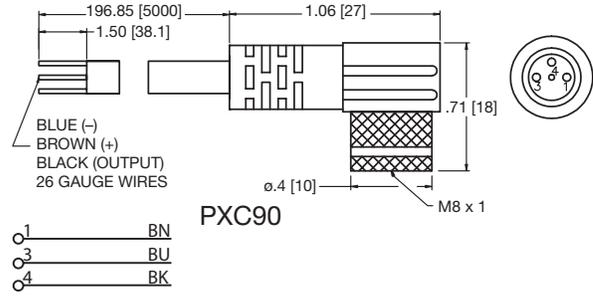
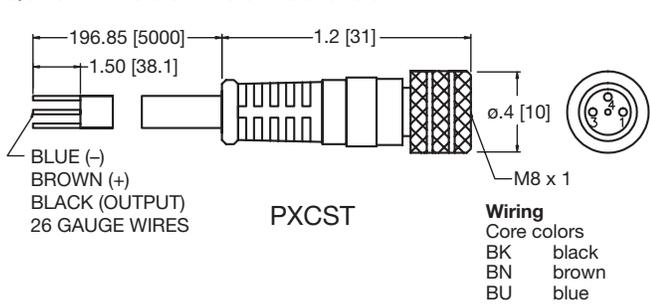


| ELECTRICAL DESIGN | AC/DC REED |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 | -25°C to 70°C |
| 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 Placeholder, Cable Clip, and Cut Sheet To Be Provided with Every Switch |
| AGENCY APPROVALS |  RoHS |

| 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 | -25°C to 70°C |
| 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 Placeholder, Cable Clip, and Cut Sheet To Be Provided with Every Switch |
| AGENCY APPROVALS |  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.

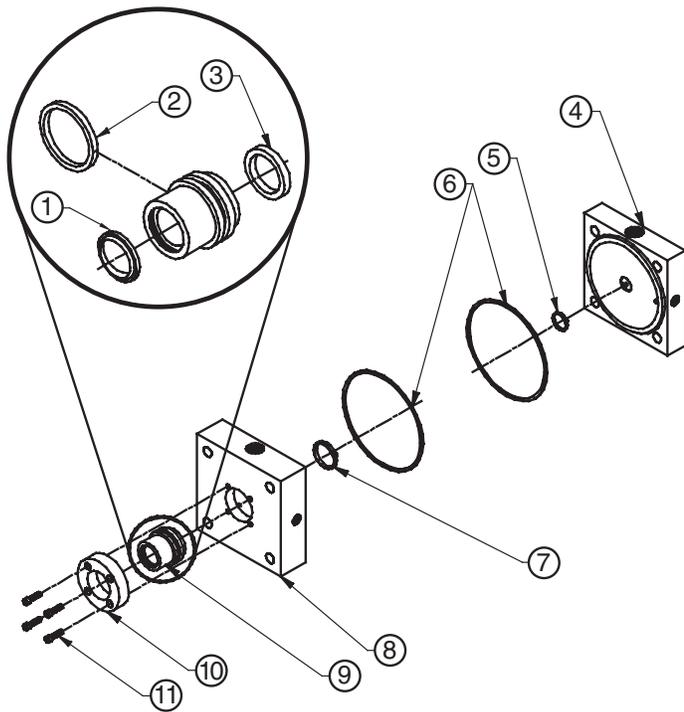
Repair Kit and Seal Kit Removal/Installation Instructions

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.

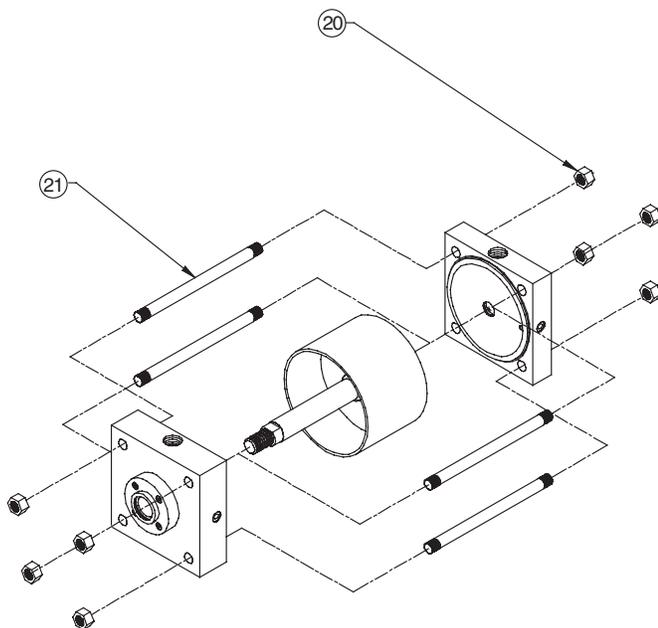
See Seal Installation Guide on page 27 for additional (visual) instructions.

Diagrams

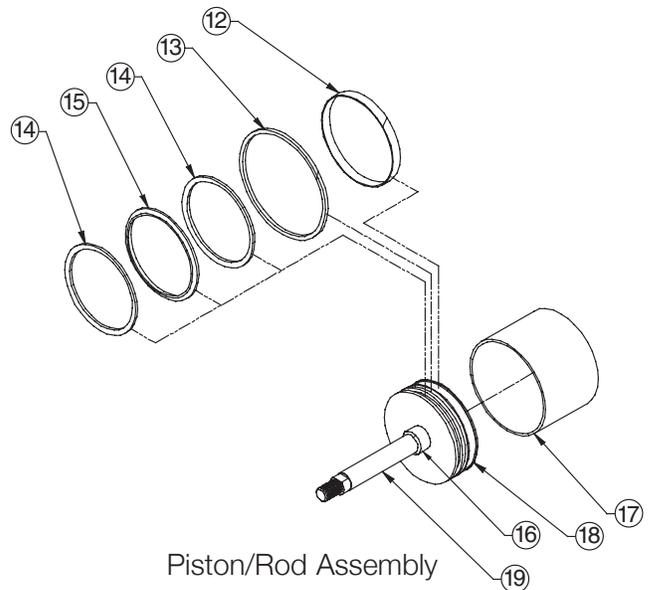
Pneumatic Service Temperatures:
Nitrile Seals: -10°F (-23°C) to 165°F (74°C)
FKM Seals: 0°F (-17°C) to 400°F (204°C)



Head, Cap, and Bushing Assembly



Cylinder Assembly and Tie Rod Torque

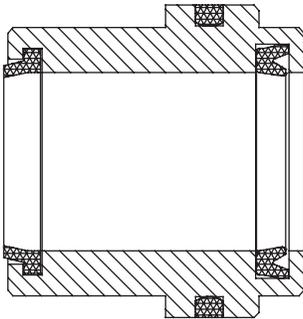


Piston/Rod Assembly

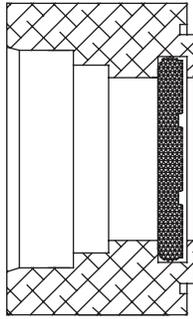
A Series

| 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 | | | |

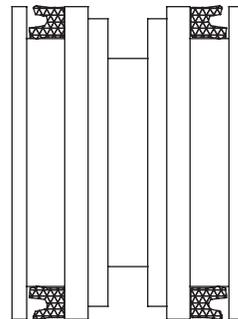
Seal Installation Guide



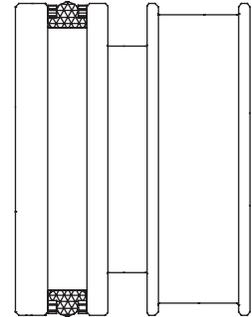
Loaded Bushing



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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