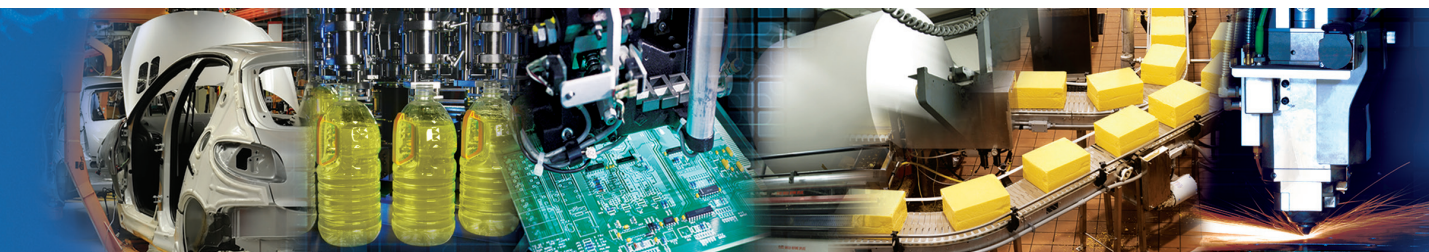


# numatics®

## EQ Series

OEM Aluminum NFPA Interchangeable Cylinder Line



[www.numatics.com](http://www.numatics.com)

  
**EMERSON**  
Industrial Automation

**BCAE**  
Automation Solutions

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**Numatics, Inc. is a leading manufacturer of pneumatic products and motion control products.** Our broad spectrum of standard, custom developed products and application components have made a significant impact on pneumatic innovation as well as pneumatic and motion control technology. Our company has an extensive history of generating innovative concepts and technological breakthroughs. Many of today's standard features in pneumatic technology were industry firsts from Numatics. We continue our innovative approach to product development by developing electric motion control solutions and enhancing our embedded Fieldbus and I/O products to continually meet and solve our customer's application requirements.



**Today Numatics is proud to be a part of the Industrial Automation Division of Emerson Electric Co.**

Emerson (NYSE:EMR), based in St. Louis, Missouri (USA), is a global leader in bringing technology and engineering together to provide innovative solutions for customers in industrial, commercial, and consumer markets through its network power, process management, industrial automation, climate technologies, and appliance and tools businesses. For more information, visit [www.Emerson.com](http://www.Emerson.com).





Numatics Express Shipping Program guarantees<sup>†</sup> product shipment in two, three or five business days. Unlike most traditional quick ship programs, the Numatics Express Shipping Program includes the most comprehensive offering in the industry. This program encompasses the range and options that you require!

Numatics is committed to offering you the highest level of customer service, quality and performance.

## 2DAY

Numatics Express 2Day shipping program guarantees<sup>†</sup> product shipment in two business days. The program includes the most popular valve, air preparation and actuator products and includes applicable switches and mounting accessories.

Numatics guarantees<sup>†</sup> to ship any order received before 3 pm EST for up to 10 2Day products\* in two business days.

## 3DAY

Numatics Express shipping program offers a 3Day shipping program that guarantees<sup>†</sup> product shipment of a fully assembled and tested valve manifold in 3 business days. The program includes the most popular manifold configurations of the 2000 and Mark series valves:

- Sub D, Terminal Strip and Fieldbus Electronic Options
- Can be configured for DIN Rail Mounting and Muffled Exhaust
- Shipped complete and 100% tested

The 3Day Express shipping program enables you to create a 2 to 8 station manifold assembly complete with any combination of valves, regulators, and blank stations that can be configured from the valve model charts in this catalog.

Numatics guarantees<sup>†</sup> to ship any order received before 3 pm EST for up to 5 manifold assemblies configured from this catalog in three business days or Numatics pays the shipping cost.

## 5DAY

We are pleased to expand Numatics Express to include a broad range of products in a 5Day shipping program. Numatics guarantees<sup>†</sup> to ship up to 10 of any 5Day product\*\* for orders received before 3 pm EST in 5 business days or Numatics pays the shipping cost.

We are committed to providing you with an unmatched level of customer service, quality, and reliability. If you cannot locate the specific product for your application or need additional product specifications, visit [www.numatics.com](http://www.numatics.com) or call 888-686-2842. Numatics Express orders cannot be canceled or adjusted once entered. Saturdays, Sundays, and Holidays are excluded.

<sup>†</sup>As industry requirements change, Numatics reserves the right to modify the contents of this catalog and program without notification. Updates on this program can be obtained from the Numatics website [www.numatics.com](http://www.numatics.com) or by calling 888-686-2842, or by contacting your local Numatics representative or distributor and referencing the Numatics Express program.

**\*Sentronic<sup>D</sup> Proportional Valves, CGT Compact Slides, NR Series Rodless and Air Bellows are limited to orders up to 5.**

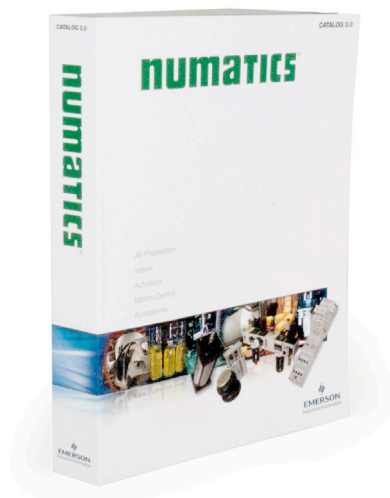
**\*\*A Series Large Bore NFPA, ASP Series Steel Body NFPA and G Series Guide Rail Rodless are limited to orders up to 5.**



# ***Welcome to the World of Fluid Automation...***

Since 1945, Numatics has emerged as the prominent specialist in developing and manufacturing pneumatic and fluid power components for a widely diverse field of automated industry. From idea to implementation, leading engineers choose Numatics as their single source for:

- Quality Fluid Power components
- Technologically advanced design resources
- Quick response time in delivery and service from around the world



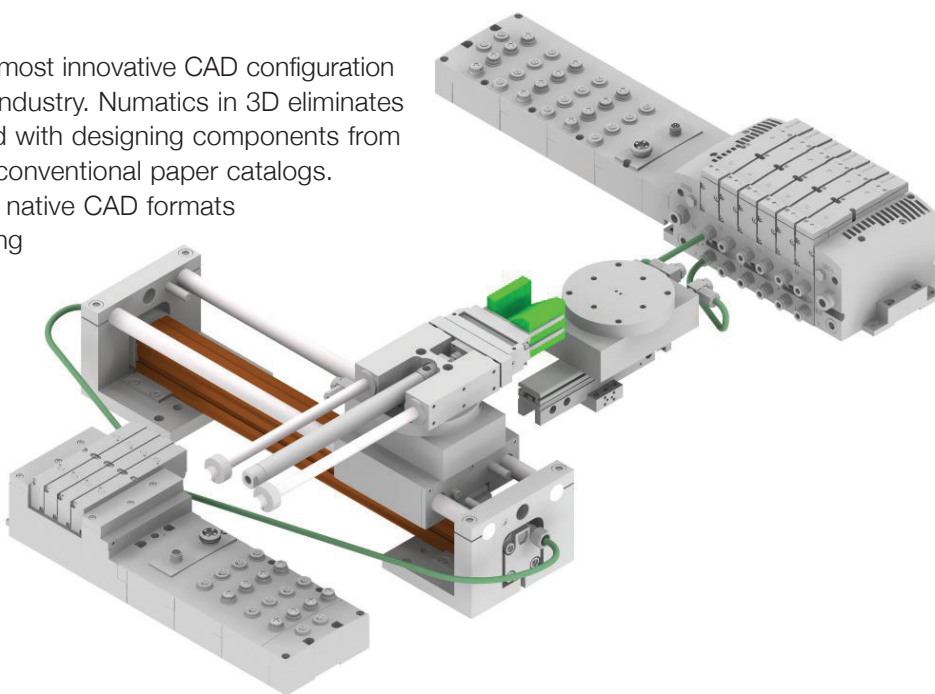
**Numasizing®**

Developed by Numatics, Numasizing® offers a whole new level of fluid power system optimization. Compare large amounts of component and process data against user objectives and industry benchmarks for the best possible size, pneumatic pressure, actuator stroke velocities and other part and process variable determinations.

## CAD Modeling

Save critical development time with the most innovative CAD configuration program in the pneumatic component industry. Numatics in 3D eliminates the time consuming process associated with designing components from scratch based on information found in conventional paper catalogs.

The models are available in 85 different native CAD formats in 2D drawings and 3D models, including all the popular formats including Catia, I-DEAS, Pro/Engineer, SolidWorks, Unigraphics and more.



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The **EQ Series** combines cost-effectiveness with proven dependability. It is a repairable OEM NFFA Interchangeable cylinder line that was specially designed to give our customers an economical alternative. This Non-Lube air cylinder offers elasticity to tight design budgets without sacrificing quality.

#### Tube

The **tube** is hard coat anodized. 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 low coefficient of friction.

#### 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 EQ Series includes a graphite filled, cast iron **rod bushing** that is extra long in length. Graphite filled offers the best bearing surface when using a hard chrome plated piston rod. Cast iron provides maximum resistance against wear. The added length adds superior alignment and support of the piston rod as well as provides maximum load bearing support.

#### Rod Seal

The nitrile, 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. They are roll formed for superior strength and engagement.

#### Piston Seal

The **piston seal** is a nitrile over-sized o-ring seal.

#### 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.

Reference the EQ Series section for drawings and dimensional information.



#### Piston

The solid aluminum alloy **piston** is strong and durable.

#### 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.

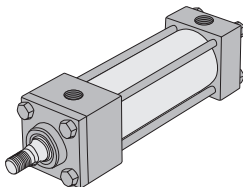
### Standard Specifications:

- Meets NFFA specifications
- Bore sizes from 1-1/2" through 6"
- Piston rod diameters from 5/8" to 1-3/4"
- Maximum pressure rating is 250 psi air
- Standard temperature -10°F to 165°F (-23°C to 74°C)
- NPTF ports
- Multitude of mounting options

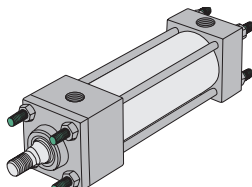
## Standard EQ Series Mounts

### Centerline Mounts

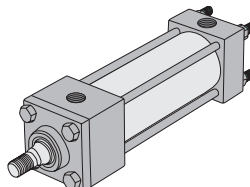
X0 Mount  
Basic No Mount



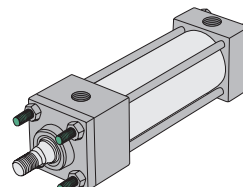
X1 Mount  
Extended Tie Rods – Both Ends



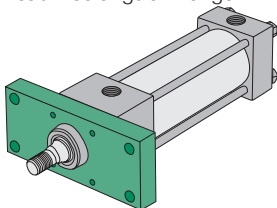
X2 Mount  
Extended Tie Rods – Cap End



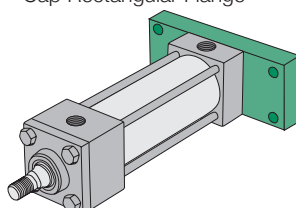
X3 Mount  
Extended Tie Rods – Head End



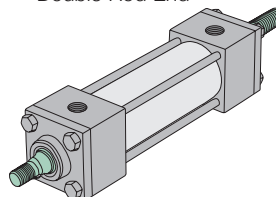
F1 Mount  
Head Rectangular Flange



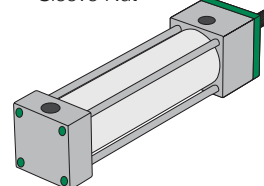
F2 Mount  
Cap Rectangular Flange



DA Mount  
Double Rod End

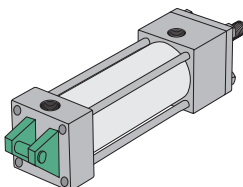


SN Mount  
Sleeve Nut

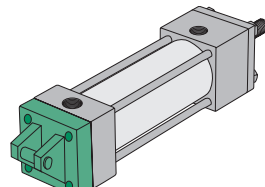


### Pivot Mounts

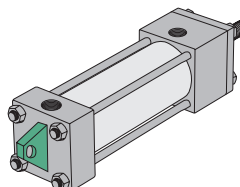
P1 Mount  
Fixed Clevis



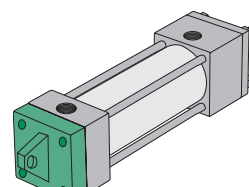
P2 Mount  
Detachable Clevis



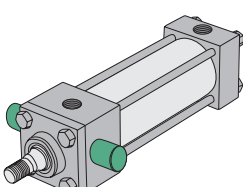
P3 Mount  
Fixed Eye



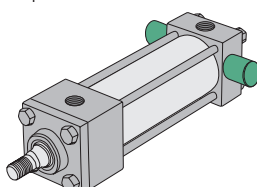
P4 Mount  
Detachable Eye



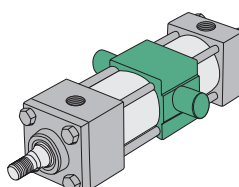
T6 Mount  
Head Trunnion



T7 Mount  
Cap Trunnion

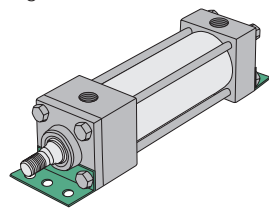


T8 Mount  
Intermediate Trunnion

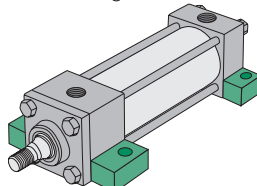


### Foot Mounts

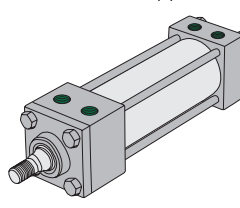
S1 Mount  
Angle Mount



S2 Mount  
Side Lugs



S4 Mount  
Bottom Tapped



## How to Order

## EQ Series Cylinder

X0 EQ L-04 A 1 D - C AA 0

## Cylinder Mounting

X0 = Basic No Mount  
 SN = Head Sleeve Nut  
 F1 = Front Flange  
 F2 = Rear Flange  
 P1 = Fixed Clevis  
 P2 = Detachable Clevis  
 P3 = Fixed Eye  
 P4 = Detachable Eye  
 S1 = Angle Mount  
 S2 = Side Lug  
 S4 = Bottom Tapped  
 T6\* = Head Trunnion  
 T7\* = Cap Trunnion  
 T8\* = Mid Trunnion  
 X1 = Extended Tie Rods  
 (Both Ends)  
 X2 = Cap Ext. Tie Rods  
 X3 = Head Ext. Tie Rods

\*Removable Trunnion Ears

## Cylinder Type

EQ = Type "EQ" Cylinder

## Cylinder Bore

K = 1-1/2" R = 4"  
 L = 2" T = 5"  
 M = 2-1/2" U = 6"  
 P = 3-1/4"

## Full Inches of Stroke

00 = 0" Stroke  
 01 = 1" Stroke  
 02 = 2" Stroke  
 03 = 3" Stroke  
 48\* = 48" Stroke (Maximum)

\*Consult factory for strokes greater than 48".

## Fractional Inches of Stroke

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

## Rod Code

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

## Magnetic Piston

0 = No Magnet  
 2 = Reed Magnet

## Options

AA = No Option  
 BA\*\* = Bumpers, Both Ends  
 BC\*\* = Bumper, Cap Only  
 BH\*\* = Bumper, Head Only  
 BZ = Bronze Bushing  
 CT = Composite Tube  
 DA = Double Rod End  
 EB = Silencer Bumpers  
 LP = Profile Tubing  
 MA = Metallic Rod Scraper  
 MB = Rear Metallic Rod Scraper  
 SA = Stainless Rod  
 SS = Stainless Rod & Tie Rods  
 ST = Stainless Tie Rods  
 VA = High Temperature Seals  
 1A\* = Rod Extension  
 1B\* = Rear Rod Extension  
 2B\* = Rear Thread Extension  
 3B = Rear Rod Stud  
 2A\* = Thread Extension  
 3A = Rod Stud

\*Specify Length

\*\*Bumpers add .062" to OAL (per bumper)

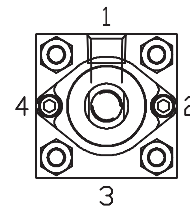
## Adjustable Cushions

Position	1	2	3	4	Fixed
No Cushions	A	A	A	A	A
Head & Cap	B	C	D	E	Y
Head Only	F	G	H	J	W
Cap Only	K	L	M	N	V

## Ports

## Size Code

Position	1/8"	1/4"	3/8"	1/2"	3/4"
1	B	C	D	E	E
2	H	I	J	K	L
3	N	O	P	Q	R
4	T	U	V	W	X

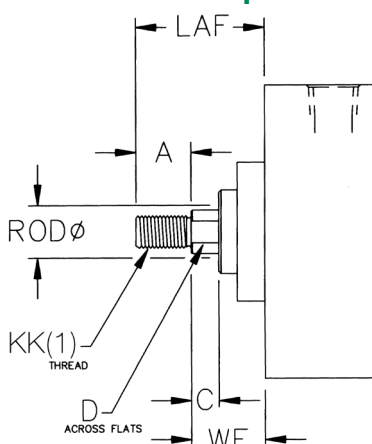


Reference the EQ Series section for drawings and dimensional information.

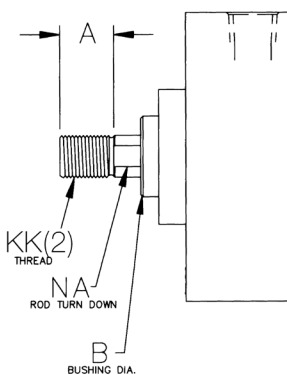


## Dimensions: Inches

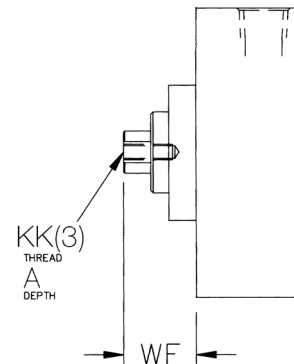
### Standard and Optional Rod Ends



Style #1 (Standard Male)



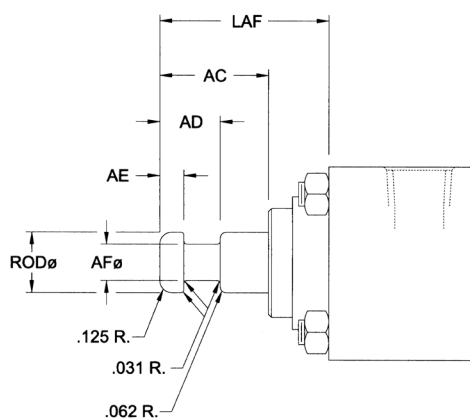
Style #2 (Optional Male)



Style #3 (Optional Female)

Bore	Rod	KK(1)	KK(2)	KK(3)	A	B	C	D	NA	LAF	WF
1-1/2"	0.625	7/16-20	1/2-20	7/16-20	0.750	1.125	0.375	0.500	0.585	1.750	1.000
	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
2"	0.625	7/16-20	1/2-20	7/16-20	0.750	1.125	0.375	0.500	0.585	1.750	1.000
	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
2-1/2"	0.625	7/16-20	1/2-20	7/16-20	0.750	1.125	0.375	0.500	0.585	1.750	1.000
	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
3-1/4"	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
	1.375	1-14	1 1/4-12	1-14	1.625	2.000	0.625	1.125	1.313	3.250	1.625
4"	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
	1.375	1-14	1 1/4-12	1-14	1.625	2.000	0.625	1.125	1.313	3.250	1.625
5"	1.000	3/4-16	7/8-14	3/4-16	1.125	1.500	0.500	0.813	0.960	2.500	1.375
	1.375	1-14	1 1/4-12	1-14	1.625	2.000	0.625	1.125	1.313	3.250	1.625
6"	1.375	1-14	1 1/4-12	1-14	1.625	2.000	0.625	1.125	1.313	3.250	1.625
	1.750	1 1/4-12	1 1/2-12	1 1/4-12	2.000	2.375	0.750	1.500	1.688	3.875	1.875

### Male Coupling Rod End



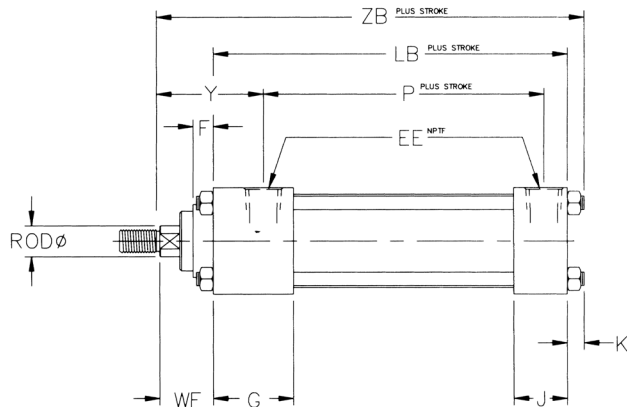
U = Male Coupling Rod End Standard Rod Diameter  
V = Male Coupling Rod End Oversized Rod Diameter

## Dimensions: Inches

Bore	Rod	AC	AD	AE	AF	LAF
1-1/2", 2", 2-1/2"	5/8"	1.125	0.625	0.250	0.375	1.750
	1"	1.625	0.938	0.375	0.688	2.500
3-1/4", 4", 5"	1"	1.500	0.938	0.375	0.688	2.375
	1 3/8"	1.750	1.062	0.375	0.875	2.750
6"	1 3/8"	1.750	1.062	0.375	0.875	2.750
	1 3/4"	2.000	1.313	0.500	1.125	3.125

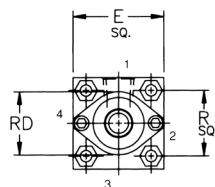
## Dimensions: Inches

## Basic No Mount Cylinder

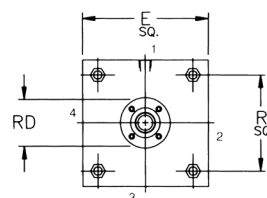


Mount Code X0

NFPA MX0



1-1/2" Through 2-1/2"



3-1/4" Through 6"

Bore	Rod	E	EE	F	G	J	K	LB	P	R	RD	WF	Y	ZB
1-1/2"	0.625	2.000	0.375	0.375	1.500	1.000	0.250	3.625	2.250	1.430	1.375	1.000	1.938	4.875
	1.000	2.000	0.375	0.375	1.500	1.000	0.250	3.625	2.103	1.430	1.397*	1.375	2.460	5.250
2"	0.625	2.500	0.375	0.375	1.500	1.000	0.313	3.625	2.250	1.840	1.375	1.000	1.938	4.938
	1.000	2.500	0.375	0.375	1.500	1.000	0.313	3.625	2.250	1.840	2.500*	1.375	2.313	5.313
2-1/2"	0.625	3.000	0.375	0.375	1.500	1.000	0.313	3.750	2.375	2.190	1.375	1.000	1.938	5.062
	1.000	3.000	0.375	0.375	1.500	1.000	0.313	3.750	2.375	2.190	3.000*	1.375	2.313	5.438
3-1/4"	1.000	3.750	0.500	0.625	1.750	1.250	0.375	4.250	2.625	2.760	2.706	1.375	2.438	6.000
	1.375	3.750	0.500	0.625	1.750	1.250	0.375	4.250	2.625	2.760	3.125	1.625	2.688	6.250
4"	1.000	4.500	0.500	0.625	1.750	1.250	0.375	4.250	2.625	3.320	2.706	1.375	2.438	6.000
	1.375	4.500	0.500	0.625	1.750	1.250	0.375	4.250	2.625	3.320	3.125	1.625	2.688	6.250
5"	1.000	5.500	0.500	0.625	1.750	1.250	0.500	4.500	2.875	4.100	2.706	1.375	2.438	6.375
	1.375	5.500	0.500	0.625	1.750	1.250	0.500	4.500	2.875	4.100	3.125	1.625	2.688	6.625
6"	1.375	6.500	0.750	0.625	2.000	1.500	0.500	5.000	3.125	4.880	3.125	1.625	2.813	7.125
	1.750	6.500	0.750	0.750	2.000	1.500	0.500	5.000	3.125	4.880	3.788	1.875	3.063	7.375

\* Uses a full-face bushing retainer.

## How to Order

### EQ Series Piston Rod Assembly

**EQ92 - K 1 N 0 - 01 A - AA**

**Type** \_\_\_\_\_  
EQ92= EQ Series Piston Rod Assembly

**Bore** \_\_\_\_\_  
K = 1-1/2"  
L = 2"  
M = 2-1/2"  
P = 3-1/4"  
R = 4"  
T = 5"  
U = 6"

**Rod Code** \_\_\_\_\_  
1 = Style # 1 Standard Rod Diameter  
2 = Style # 2 Standard Rod Diameter  
3 = Style # 3 Standard Rod Diameter  
4 = Special Rod End Standard Rod Diameter (must specify threads)  
5 = Special Rod End Oversize Rod Diameter (must specify threads)  
6 = Style # 1 Oversize Rod Diameter  
7 = Style # 2 Oversize Rod Diameter  
8 = Style # 3 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

**Option**  
AA = No Option  
BH = Bumpered Head End  
DA = Double Rod  
EB = Silencer Bumpers  
SA = Stainless Rod  
VA = FKM Seals  
1A\* = Rod Extension  
1B\* = Rear Rod Extension  
2A\* = Thread Extension  
2B\* = Rear Thread Extension  
3A = Rod Stud  
3B = Rear Rod Stud  
\* = must specify length

**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  
48 = 48" Stroke (maximum)

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.

### Rod End Styles, Diameters and Threads

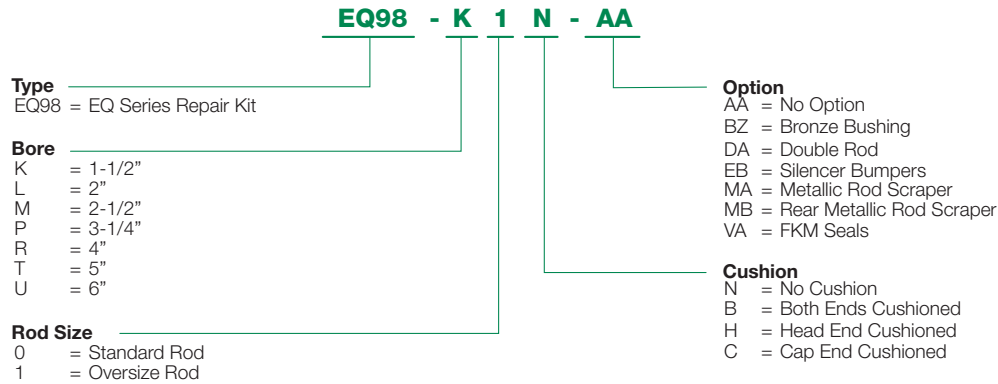
Diameter	Style #1 Standard Male	Style #2 Optional Male	Style #3 Optional Female
0.625	7/16-20	1/2-20	7/16-20
1.000	3/4-16	7/8-14	3/4-16
1.375	1-14	1 1/4-12	1-14
1.750	1 1/4-12	1 1/2-12	1 1/4-12

### Rod Diameters by Bore Size

Bore	Standard Dia.	Oversize Dia.
1-1/2"	0.625	1.000
2"	0.625	1.000
2-1/2"	0.625	1.000
3-1/4"	1.000	1.375
4"	1.000	1.375
5"	1.000	1.375
6"	1.375	1.750

## How to Order

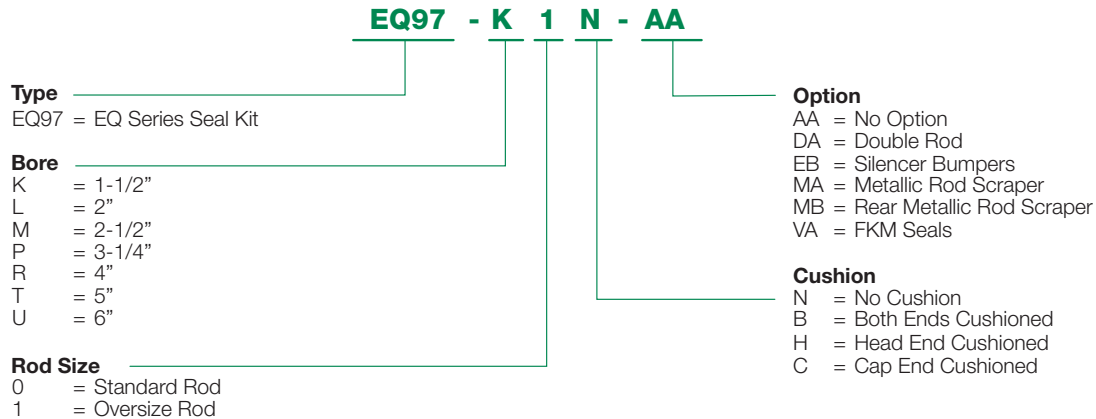
### EQ Series Repair Kit



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

### EQ Series Seal Kit



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 Removal/Installation Instructions

1. Loosen 4 Tie Rod Nuts (Part #18) to remove Piston/Rod Assembly (Part #15 & #16).
2. Carefully remove old seals and Wear Band. (Part #12 & #14). Any damage to the seals may result in leakage.
3. Lubricate Piston Seal(s) and Wear Band (Part #12) with supplied Numatics Lube. Examine seals before installing for any contamination. Contamination may cause leakage.
4. Install Piston Seal (Part #14). Make sure the Piston Seal is not twisted inside groove.
5. Install lubricated Wear Band onto piston. Sink piston/rod assembly into sinker tube. See Sinker Tube Part Numbers Chart.
6. Apply lube inside the cylinder tube.
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 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 in a crisscross pattern. Use torque tolerance charts for tie rod nuts.
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 12 for additional (visual) instructions.

## Repair Kit and Seal Kit

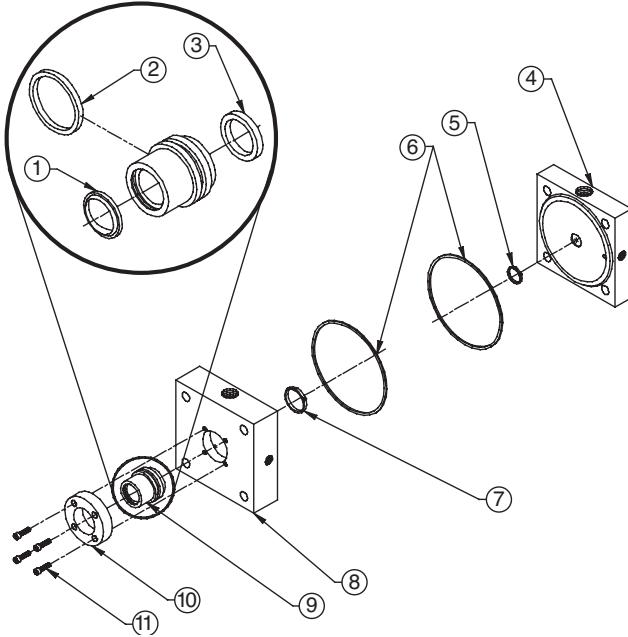
### Removal/Installation Instructions

1. Loosen 2 or 4 Retainer Screws (Part #11) to remove Bushing Retainer (Part #10) and Loaded Bushing (Part #9).
2. Loosen 4 Tie Rod Nuts (Part #18) to remove Head (Part #8) and Piston/Rod Assembly (Part #15 & #16).
3. Carefully remove old seals and Wear Band. (Part #1, #2, #3 Seal Kit only), #5, #6, #7, #12, & #14) 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 #14). Make sure the Piston Seal is not twisted inside groove.
6. Install lubricated Wear Band (Part #12) onto piston. Sink piston/rod assembly into sinker tube. See Sinker Tube Part Numbers Chart.
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. 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.
14. Before final torque, place cylinder on level surface to square head and cap. Torque tie rod nuts in a crisscross pattern. Use the torque tolerance chart 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.

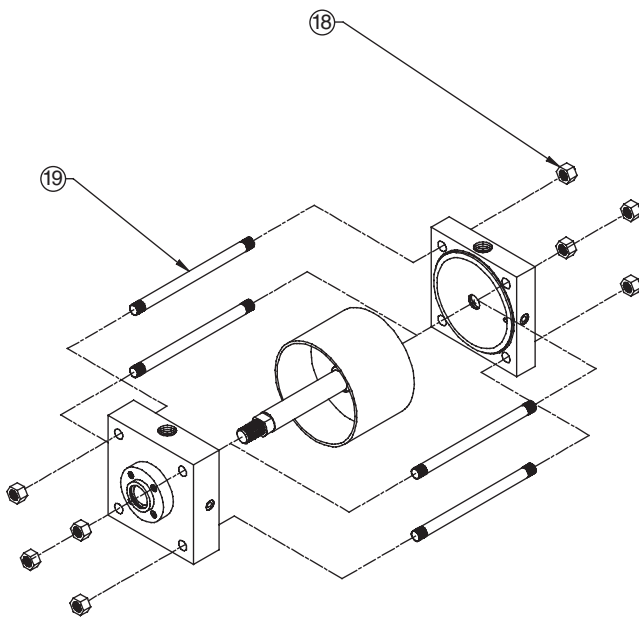
See Seal Installation Guide on page 12 for additional (visual) instructions.

## Diagrams

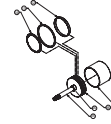
Pneumatic Service Temperatures:  
Nitrile Seals: -10°F (-23°C) to 165°F (74°C)  
FKM Seals: 0°F (-17°C) to 400°F (204°C)



Head, Cap, and Bushing Assembly



Cylinder Assembly and Tie Rod Torque

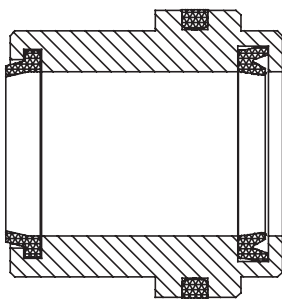


Piston/Rod Assembly

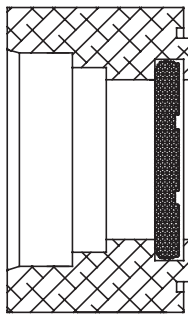
## EQ Series

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	Wear Band	X	X	
13	Magnet			X
14	Piston Seal	X	X	
15	Rod			X
16	Piston			X
17	Tube			
18	Hex Nuts			
19	Tie Rods			
20	Head Cushion Spear			X

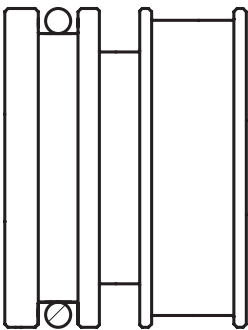
Seal Installation Guide



Loaded Bushing



Cushioned Head or Cap



O-Ring Piston

Torque Tolerances (lbs-ft) Tie Rod Nut Part #19

Bore	Min.	Max.
1-1/2"	8	10
2"	15	20
2-1/2"	15	20
3-1/4"	23	30
4"	23	30
5"	50	60
6"	50	60

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

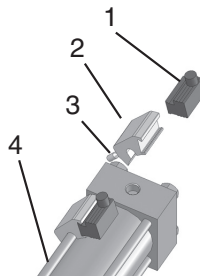
Bore	Min.
1-1/2"	A06-K91
2"	A06-L91
2-1/2"	A06-M91
3-1/4"	A06-P91
4"	A06-R91
5"	A06-T91
6"	A06-U91

## EQ Series Switch Information

### EQ 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



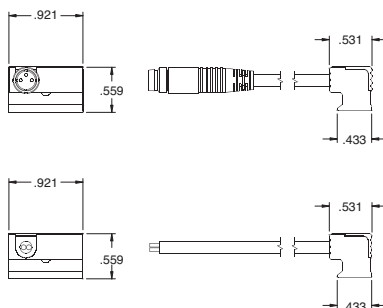
#### EQ Series World Switch Bracket

Cylinders	Bore	Part Number
EQ series Tie Rod	1 1/2"	SB6-K01
EQ series Tie Rod	2"-2 1/2"	SB6-L01
EQ series Tie Rod	3 1/4"-4"	SB6-P01
EQ series Tie Rod	5"-6"	SB6-T01

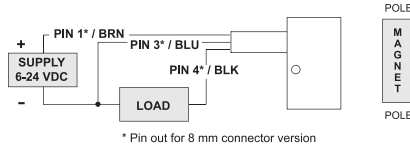
#### EQ Series World Switch Hall Effect Part Numbers

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

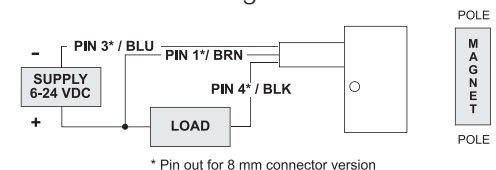
## Hall Effect Switch



#### PNP Sourcing



#### NPN Sinking

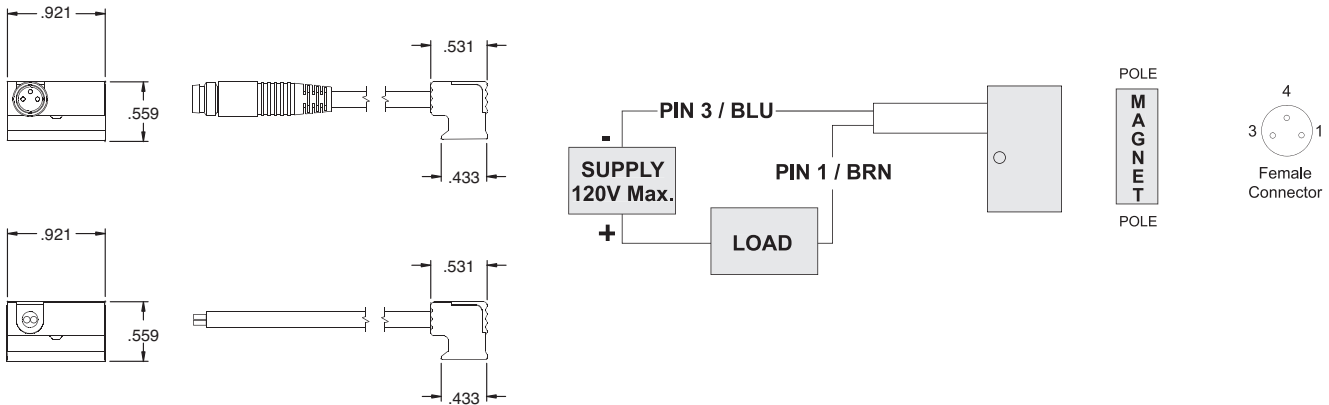




## EQ Series World Switch Reed Switch Part Numbers

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

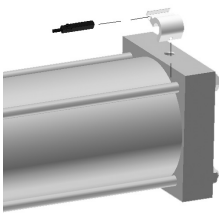
## Reed Switch - Normally Open Type SR6



## NFPA Interchangeable Cylinders

### EQ Series (Tie Rod)

Bore	Bracket P/N
1 1/2"	N99-1181
2"	N99-1182
2 1/2"	N99-1182
3 1/4"	N99-1183
4"	N99-1183
5"	N99-1184
6"	N99-1184
8"	N99-1184
10"	N99-1191
12"	N99-1191
14"	N99-1200

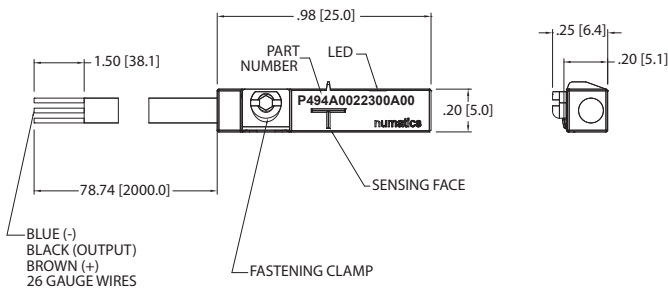


Sensor Description	Standard Cord Set	Quick Disconnect
Reed Switch	REED-FL2-00	REED-QDS-M8U
Hall PNP	PNP-FL2-00-U	PNP-QDS-M8-U
Hall NPN	NPN-FL2-00-U	NPN-QDS-M8-U

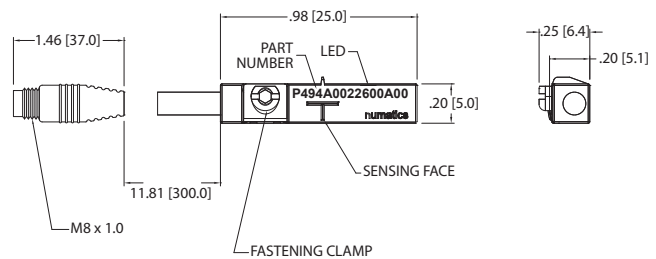
See page 15, 16, & 17 for sensor specifications.

## Sensing Part Numbers

PNP-FL2-00-U



PNP-QDS-M8-U

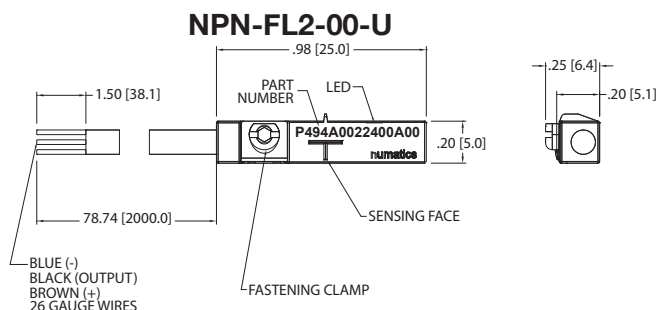





ELECTRICAL DESIGN	DC PNP
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 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 x 26 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	CE cULus RoHS

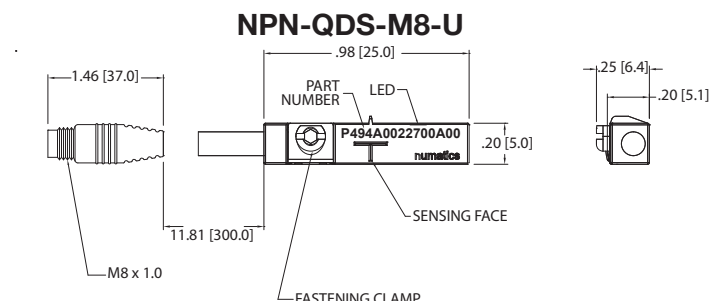
ELECTRICAL DESIGN	DC PNP
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 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	CE cULus RoHS




\*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 x 26 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	  

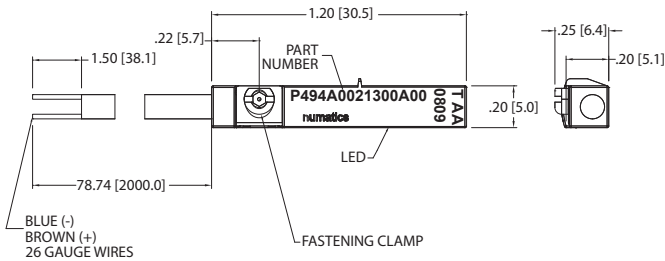



ELECTRICAL DESIGN	DC NPN
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000 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 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.

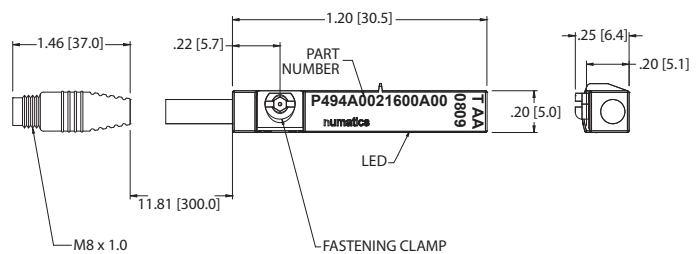
## Sensing Part Numbers


## 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	-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 x 26 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	 <b>RoHS</b>

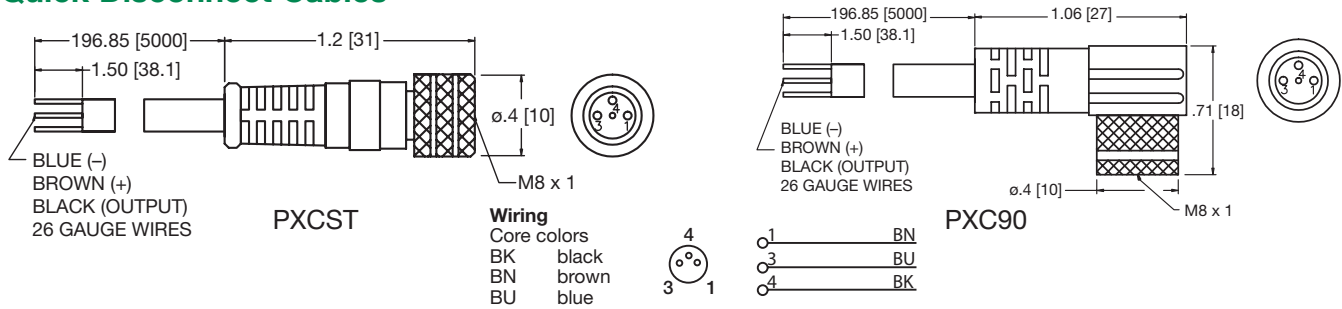
## REED-QDS-M8U



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	-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	 <b>RoHS</b>



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





World Class Supplier of Pneumatic Components



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10M-IPC-1/09

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