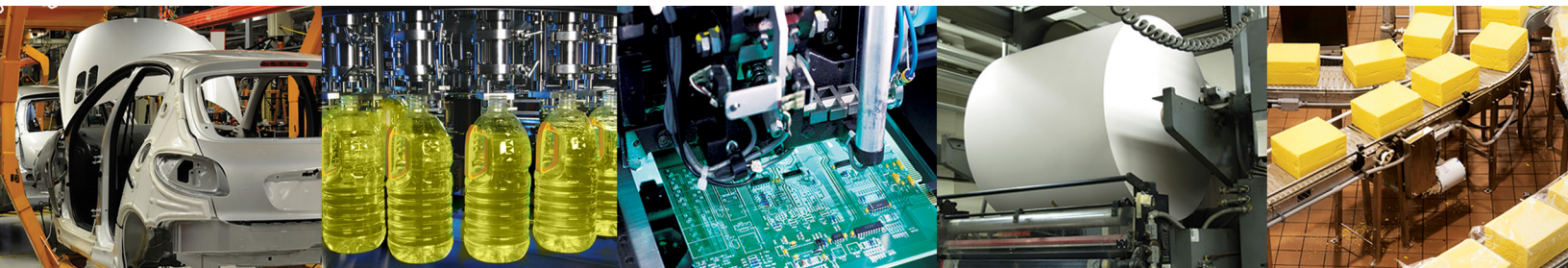


F Series

Non-Rotating NFPA Interchangeable Cylinder Line



F Series

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The **F Series** is a Non-Rotating NFPA Interchangeable pneumatic cylinder line that provides the solution to specific applications where piston rotation is not acceptable. Our innovative dual rod design provides precision positioning and linear movement. This makes the F Series ideal for a multitude of high-tech applications.

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 a low coefficient of friction. Additionally, profile tubing is standard on 1-1/2" through 2-1/2" bore sizes (3-1/4" and 4" bores are the tie rod construction).

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 F Series includes a graphite filled, cast iron **rod bushing** that is extra long in length. Graphite filling 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 and Wiper

The unique **rod seal and wiper** combination is made with carboxylated nitrile with PTFE compound and is self-lubricating and durable. The rounded lip design ensures proper sealing and long life.

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.

Retaining Plate

The steel **retaining plate** has dual functions. It retains the bushing as well as inhibits rod rotation. Precise tolerances on both the bushing and the retaining plate allows for an exact fit which prevents rod rotation. By simply removing the four countersunk screws that maintain exact alignment, the orientation of the piston rod and tooling plate can be rotated 90° without cylinder disassembly.

Tooling Plate

The **tooling plate** is machined from solid steel. The tooling plate is reversible, offering both a flush or concentric mount.

Piston Seal

The **piston seal** is a carboxylated nitrile with PTFE compound for self-lubricating. The "T" seal with back-up ring construction prevents rolling and seals 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.



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.

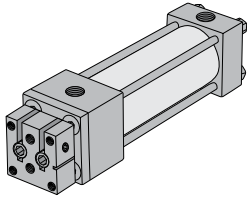
Standard Specifications:

- Meets NFPA specifications
- Bore sizes from 1-1/2" through 4"
- Piston rod diameters from 5/16" to 3/4"
- Maximum pressure rating is 250 psi air
- Standard temperature -10°F to 165°F (-23°C to 74°C)
- All aluminum construction, except retaining plate and tooling plate (steel)
- NPTF ports
- Flexible port and cushion locations

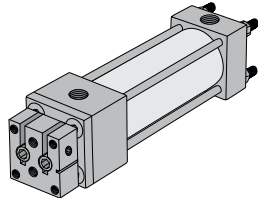
Standard F Series Mounts

Centerline Mounts

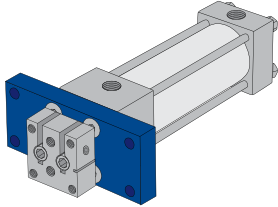
X0 Mount
Basic No Mount



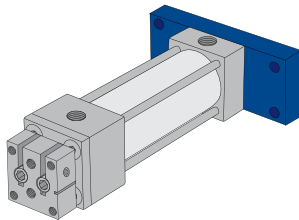
X2 Mount
Extended Tie Rods – Cap End



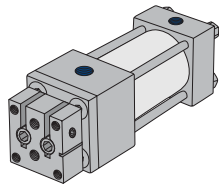
F1 Mount
Head Rectangular Flange



F2 Mount
Cap Rectangular Flange

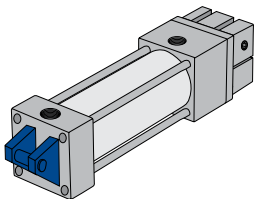


DA Mount
Double Rod End

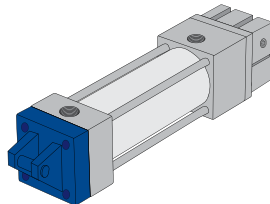


Pivot Mounts

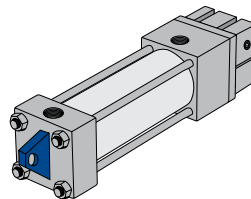
P1 Mount
Fixed Clevis



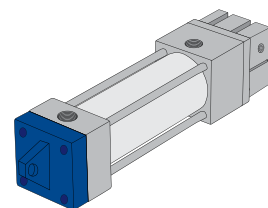
P2 Mount
Detachable Clevis



P3 Mount
Fixed Eye

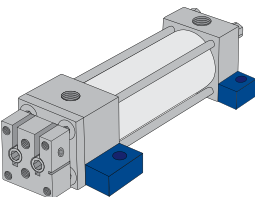


P4 Mount
Detachable Eye

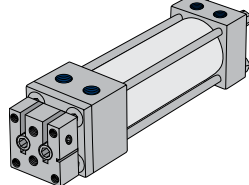


Foot Mounts

S2 Mount
Side Lugs



S4 Mount
Bottom Tapped



*F Series are profile tube from 1 1/2" - 3 1/4" bore. Only 4" bore is round tube and tie rod.

How to Order

F1 F K - 00 A 1 P - C AA 0

Mounting

- F1 = Front Flange
- F2 = Rear Flange
- P1 = Fixed Clevis
- P2 = Detachable Clevis
- P3 = Fixed Eye
- P4 = Detachable Eye
- S2 = Side Lug Mount
- S4 = Bottom Tapped
- X0 = Basic No Mount
- X2 = Cap Extended Tie Rods

Type

- F = F Series Non-Rotating
NFFPA Interchangeable

Bore

- K = 1-1/2"
- L = 2"
- M = 2-1/2"
- P = 3-1/4"
- R = 4"

Full Inch of Stroke

- 00 = 0" Stroke
- 01 = 1" Stroke
- 02 = 2" Stroke
- 03 = 3" Stroke
- 20 = 20" Stroke

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 Options
 - BA** = Bumpers Both Ends (3-1/4" and 4" only)
 - BH** = Bumper Head only (3-1/4" and 4" only)
 - BC** = Bumper Cap only
 - KA* = Stroke Adjuster
 - DA = Double Rod End
 - NA = Nickel Plated Cylinder
Stainless Steel Rod and Tie rods
 - RA* = Save Air Stroke Adjuster
 - SA = Stainless Steel Piston Rod
 - SS = Stainless Piston Rod and Tie Rod
 - ST = Stainless Tie Rods
 - 1A* = Rod Extension
 - 4A* = Stop Tube
- * Specify length.
**Bumpers add 0.062" to OAL (per bumper).

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

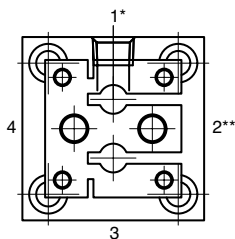
Ports

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

Rod End Codes

- 1 = Rod Vertical, Style # 1 on opposite end if the DA option is used
- 2 = Rod Vertical, Style # 2 on opposite end if the DA option is used
- 3 = Rod Vertical, Style # 3 on opposite end if the DA option is used
- 6 = Rod Horizontal, Style # 1 on opposite end if the DA option is used
- 7 = Rod Horizontal, Style # 2 on opposite end if the DA option is used
- 8 = Rod Horizontal, Style # 3 on opposite end if the DA option is used

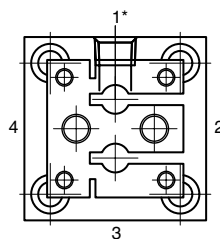
Port and Cushion Orientation



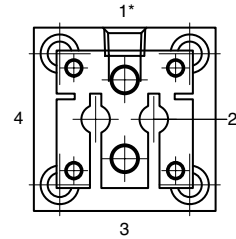
* Ports Normally In Position 1

** Cushions Normally In Position 2

Cylinder Rod Orientation



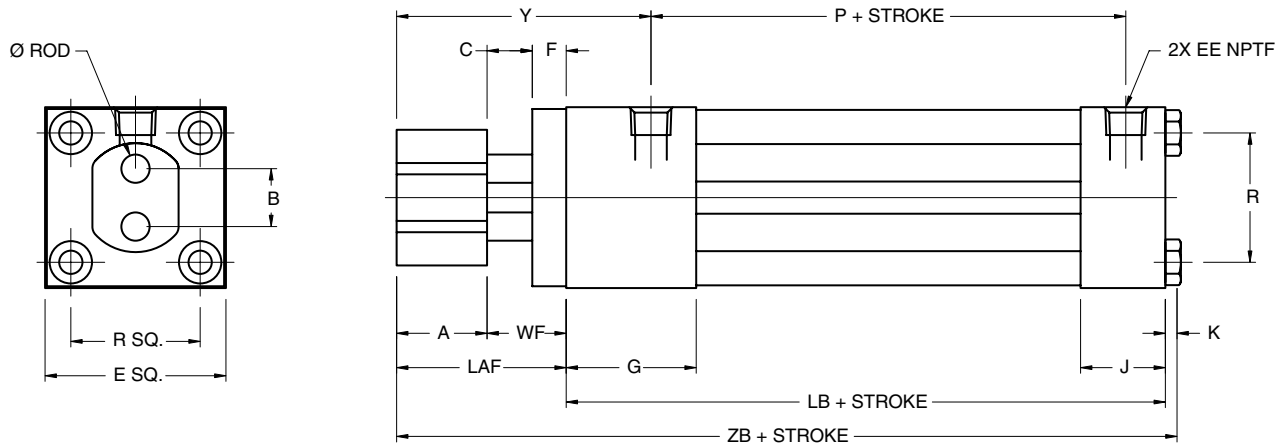
Standard Rod
Orientation Vertical



Optional Rod
Orientation Horizontal

Dimensions: Inches

Basic No Mount Cylinder

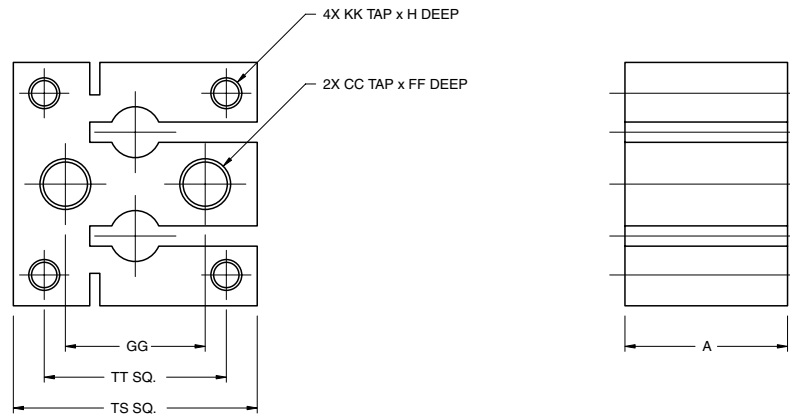


NOTE: Tooling plate removed for clarity.

NFPA Mount Code MX0

Bore	Rod	A	B	C	E	F	G	J	K	P	R	Y	EE	LB	WF	ZB	LAF
1-1/2"	0.313	1.000	0.640	0.500	2.000	0.375	1.500	1.000	0.250	2.250	1.430	2.813	3/8	3.625	0.875	5.750	1.875
2"	0.500	1.000	0.844	0.500	2.500	0.375	1.500	1.000	0.313	2.250	1.840	2.813	3/8	3.625	0.875	5.813	1.875
2-1/2"	0.625	1.250	1.219	0.500	3.000	0.375	1.500	1.000	0.313	2.375	2.190	3.063	3/8	3.750	.875	6.188	2.125
3-1/4"	0.750	1.250	1.219	0.500	3.750	0.625	1.750	1.250	0.375	2.625	2.760	3.438	3/8	4.250	1.125	7.000	2.375
4"	0.750	1.250	1.907	0.500	4.500	0.625	1.750	1.250	0.375	2.625	3.320	3.438	1/2	4.250	1.125	7.000	2.375

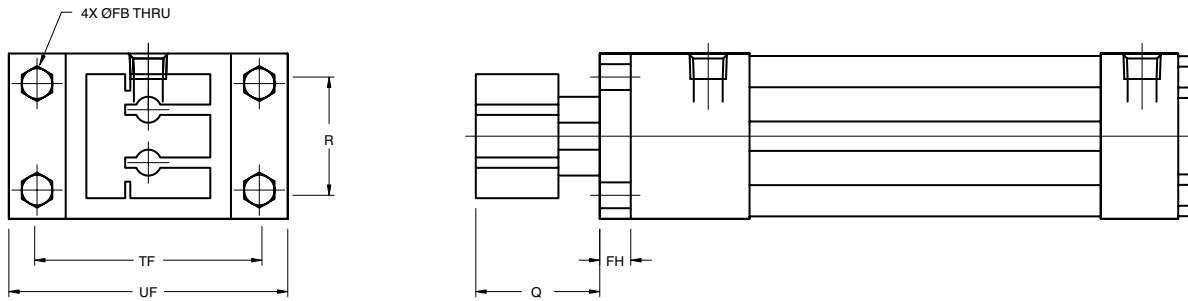
Tooling Plate



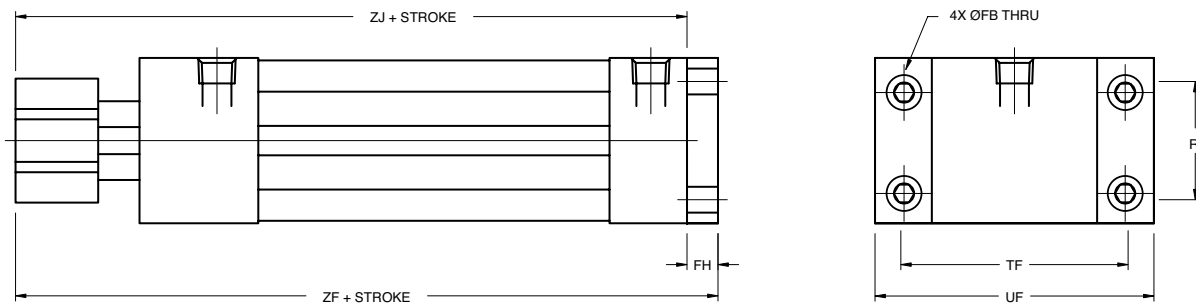
Bore	CC	FF	GG	KK	H	TS	TT
1-1/2"	5/16-18	0.375	0.860	#10-32	0.625	1.500	1.120
2"	5/16-18	0.375	1.180	1/4-28	0.750	2.000	1.430
2-1/2"	3/8-16	0.625	1.500	5/16-24	0.875	2.500	1.840
3-1/4"	1/2-13	0.625	1.970	3/8-24	0.875	3.250	1.790
4"	1/2-13	0.625	2.760	3/8-24	0.875	4.000	3.440

Dimensions: Inches (mm)

Flange Mounts



Mount Code NFPA MF1

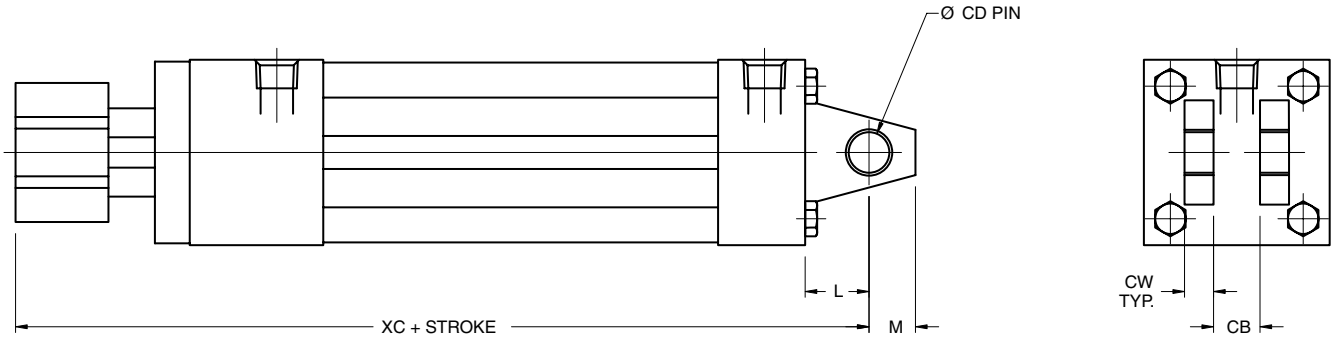


Mount Code NFPA MF2

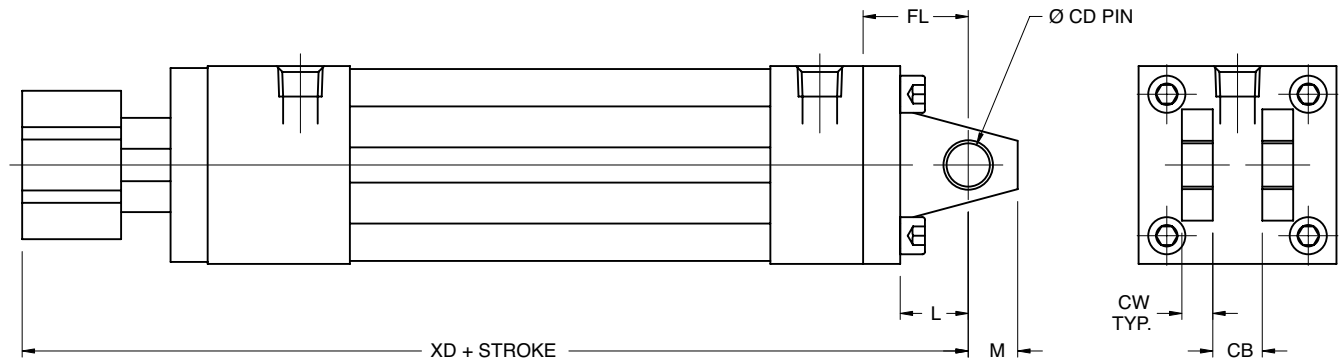
Bore	FB	FH	Q	R	TF	UF	ZF	
1-1/2"	1/4	0.375	1.500	1.430	2.750	3.375	5.875	5.500
2"	5/16	0.375	1.500	1.840	3.375	4.125	5.875	5.500
2-1/2"	5/16	0.375	1.750	2.190	3.875	4.625	6.250	5.875
3-1/4"	3/8	0.625	1.750	2.760	4.688	5.500	7.250	6.625
4"	3/8	0.625	1.750	3.320	5.438	6.250	7.250	6.625

Dimensions: Inches

Clevis Mounts



NFPA Mount Code MP1

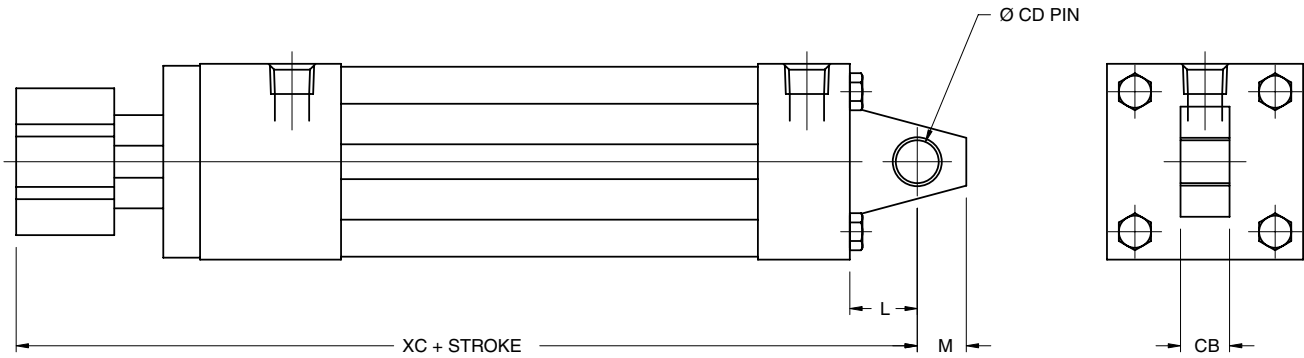


NFPA Mount Code MP2

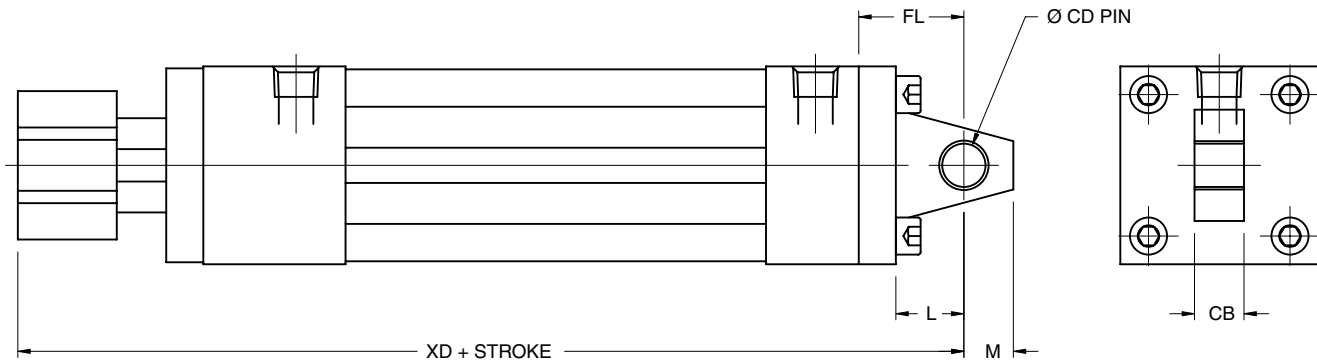
Bore	L	M	CB	CD	CW	FL	XC	XD
1-1/2"	0.750	0.500	0.750	0.500	0.500	1.125	6.250	6.625
2"	0.750	0.500	0.750	0.500	0.500	1.125	6.250	6.625
2-1/2"	0.750	0.500	0.750	0.500	0.500	1.125	6.250	7.000
3-1/4"	1.250	0.750	1.250	0.750	0.625	1.875	7.875	8.500
4"	1.250	0.750	1.250	0.750	0.625	1.875	7.875	8.500

Dimensions: Inches

Eye Mounts



NFPA Mount Code MP3

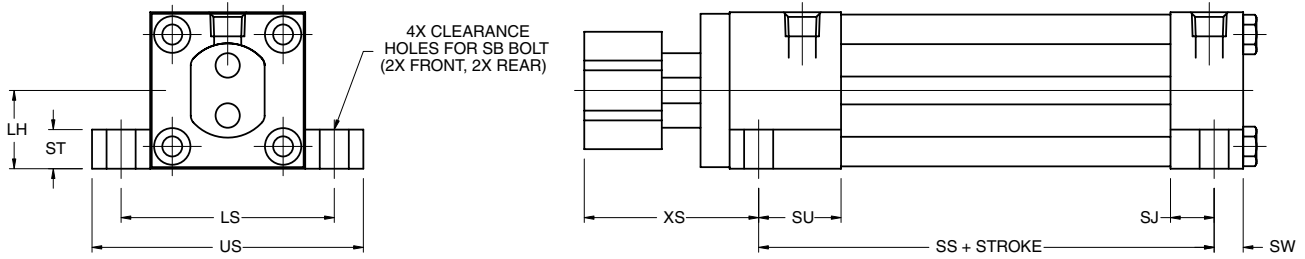


NFPA Mount Code MP4

Bore	L	M	CB	CD	FL	XC	XD
1-1/2"	0.750	0.500	0.750	0.500	1.125	6.250	6.625
2"	0.750	0.500	0.750	0.500	1.125	6.250	6.625
2-1/2"	0.750	0.500	0.750	0.500	1.125	6.250	7.000
3-1/4"	1.250	0.750	1.250	0.750	1.875	7.875	8.500
4"	1.250	0.750	1.250	0.750	1.875	7.875	8.500

Dimensions: Inches

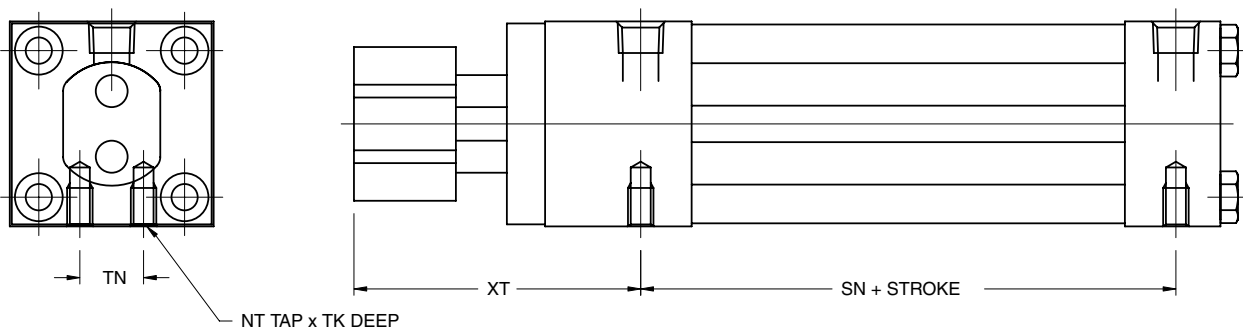
Side Lug Mount



NFPA Mount Code MS2

Bore	LH	LS	SB	SJ	SS	ST	SU	SW	US	XS
1-1/2"	1.000	2.750	3/8	0.625	2.875	0.500	1.125	0.375	3.500	2.250
2"	1.250	3.250	3/8	0.625	2.875	0.500	1.125	0.375	4.000	2.250
2-1/2"	1.500	3.750	3/8	0.625	3.000	0.500	1.125	0.375	4.500	2.500
3-1/4"	1.875	4.750	1/2	0.750	3.250	0.750	1.250	0.500	5.750	2.875
4"	2.250	5.500	1/2	0.750	3.250	0.750	1.250	0.500	6.500	2.875

Bottom Tap Mount

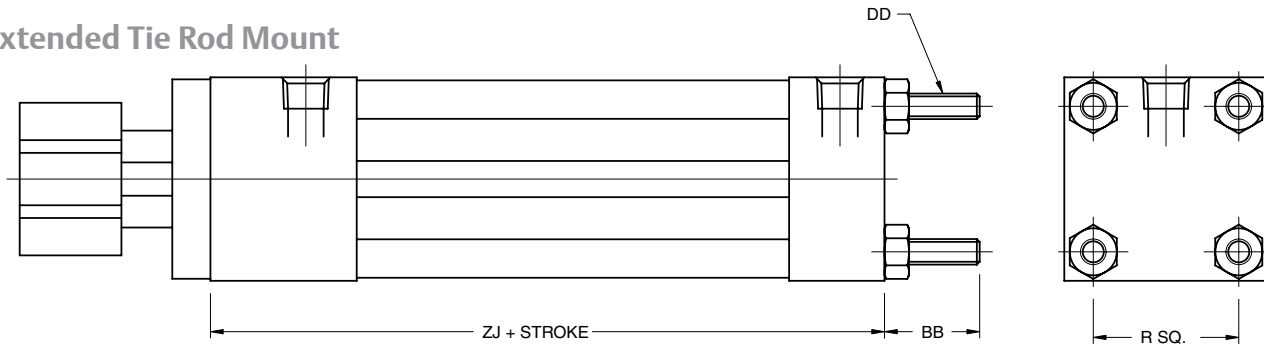


NFPA Mount Code MS4

Bore	NT	TK	TN	SN	XT
1-1/2"	1/4-20	0.250	0.625	2.250	2.813
2"	5/16-18	0.313	0.875	2.250	2.813
2-1/2"	3/8-16	0.375	1.250	2.375	3.063
3-1/4"	1/2-13	0.500	1.500	2.625	3.438
4"	1/2-13	0.500	2.063	2.625	3.438

Dimensions: Inches

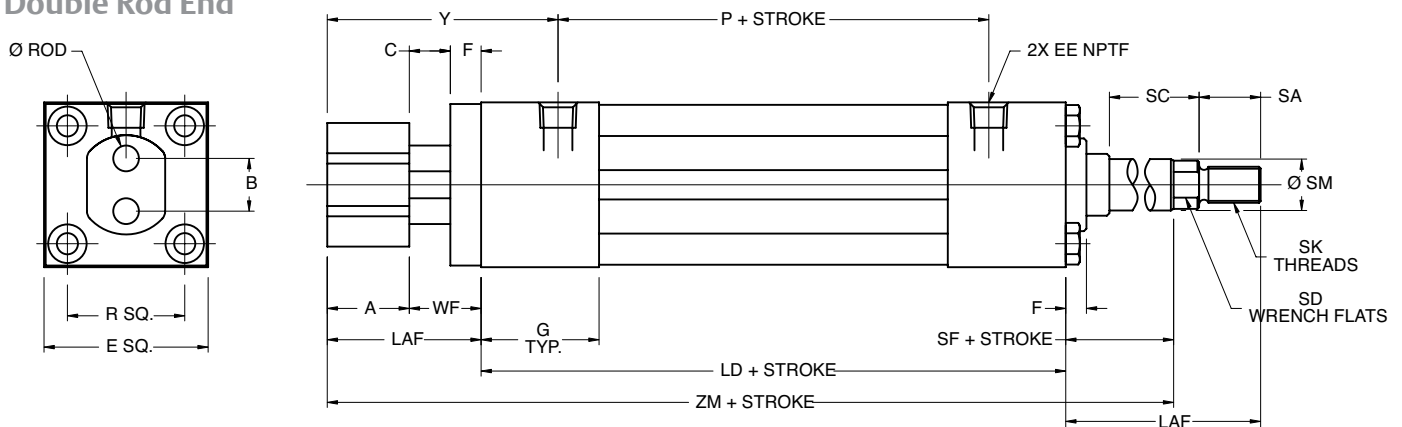
Extended Tie Rod Mount



NFPA Mount Code MX2

Bore	BB	DD	R	ZJ
1-1/2"	1.000	1/4-28	1.430	5.500
2"	1.125	5/16-24	1.840	5.500
2-1/2"	1.125	5/16-24	2.190	5.875
3-1/4"	1.375	3/8-24	2.760	6.625
4"	1.375	3/8-24	3.320	6.625

Double Rod End



Order as "DA" Option

Bore	Rod	A	B	C	E	EE	F	G	LD	LAF	P
1-1/2"	0.313	1.000	0.640	0.500	2.000	3/8	0.375	1.500	4.125	1.875	2.250
2"	0.500	1.000	0.844	0.500	2.500	3/8	0.375	1.500	4.125	1.875	2.250
2-1/2"	0.625	1.250	1.219	0.500	3.000	3/8	0.375	1.500	4.250	2.125	2.375
3-1/4"	0.750	1.250	1.129	0.500	3.750	3/8	0.625	1.750	4.750	2.375	2.625
4"	0.750	1.250	1.907	0.500	4.500	1/2	0.625	1.750	4.750	2.375	2.625

Bore	R	SA	SC	SD	SF	SK	SM	WF	Y	ZM
1-1/2"	1.430	0.750	0.375	0.500	1.000	7/16-20	0.625	0.875	2.813	7.000
2"	1.840	0.750	0.375	0.500	1.000	7/16-20	0.625	0.875	2.813	7.000
2-1/2"	2.190	0.750	0.375	0.500	1.000	7/16-20	0.625	0.875	3.063	7.375
3-1/4"	2.760	1.125	0.500	0.813	1.375	3/4-16	1.000	1.125	3.438	8.500
4"	3.320	1.125	0.500	0.813	1.375	3/4-16	1.000	1.125	3.438	8.500

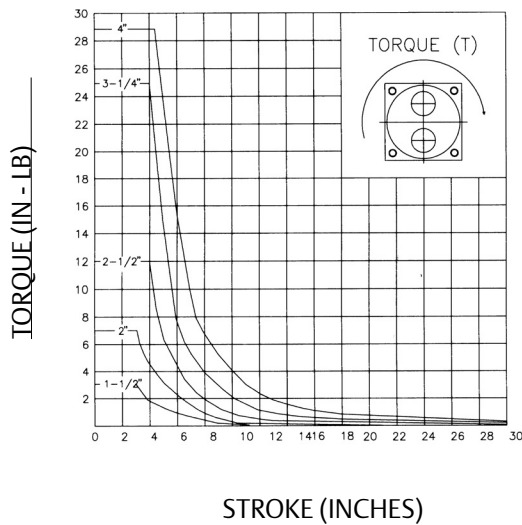
Note: For switch ordering information see the Actuator Accessories section.

F Series Case Loads

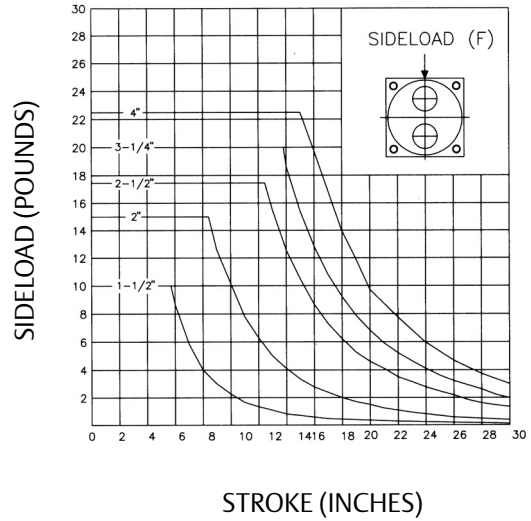
Case Load Instructions:

- 1) Choose the appropriate case for your application.
(See drawings for Case 1, 2, and 3)
- 2) On the left side of the chart, locate the sideload or torque that your application will experience.
- 3) On the bottom scale, locate the maximum stroke for the application.
- 4) Follow the lines up to determine the minimum cylinder your application will require.

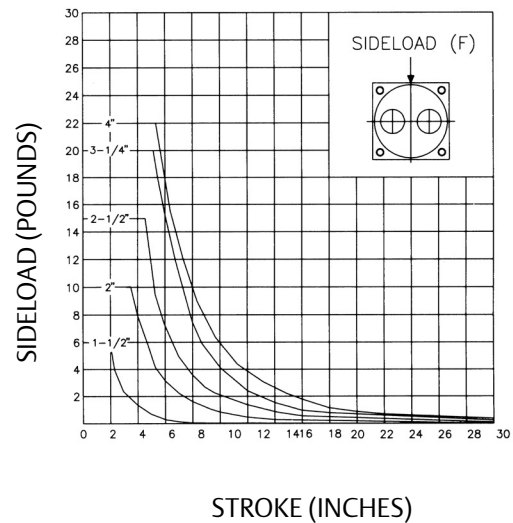
Case 2



Case 1



Case 3



These charts have been developed to aid in bore selection. For strokes/loads exceeding these charts, consult your Emerson distributor.

NOTE:

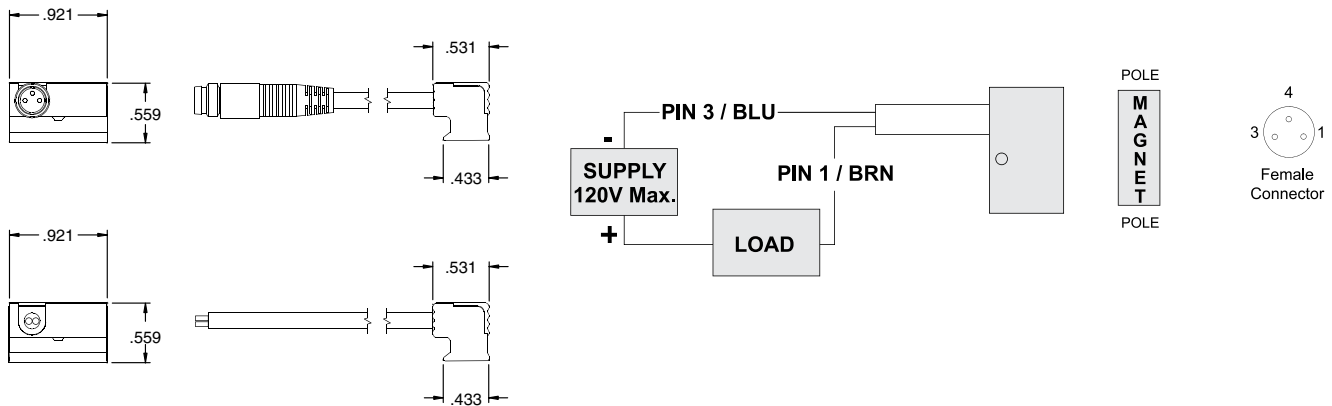
There is a significant difference between Case 1 and Case 3.

F Series Switch Information

F 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.	0.5 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

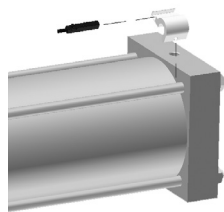
Reed Switch - Normally Open Type SR6



NFPA Interchangeable Cylinders

F Series (Tie Rod)

Bore	Bracket P/N
1 1/2"	P4995051680N001
2"	P4995051670N001
2 1/2"	P4995051670N001
3 1/4"	P499440617MN001
4"	P499440617MN001
5"	P4994406183N001
6"	P4994406183N001
8"	P4994406183N001
10"	P4995051660N001
12"	P4995051660N001
14"	P4995078930N001

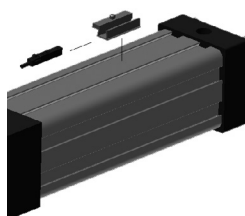


Sensor Description	Standard Cord Set	Quick Disconnect
Reed Switch	P494A0021300A00	P494A0021600A00
Hall PNP	P494A0022300A00	P494A0022600A00
Hall NPN	P494A0022400A00	P494A0022700A00

See page 14, 15, & 16 for sensor specifications

F Series (Profile Tube)

Bore	Bracket P/N
1 1/2"	P4994406190N001
2"	P4994406190N001
2 1/2"	P4994406190N001

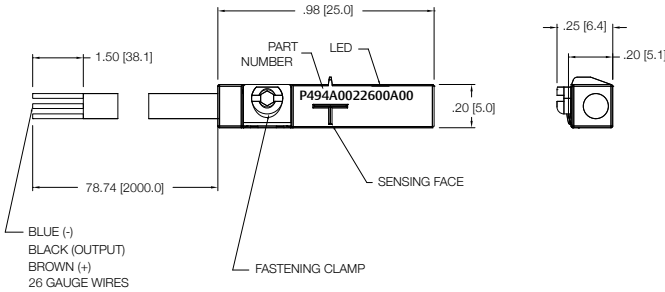


Sensor Description	Standard Cord Set	Quick Disconnect
Reed Switch	P494A0021300A00	P494A0021600A00
Hall PNP	P494A0022300A00	P494A0022600A00
Hall NPN	P494A0022400A00	P494A0022700A00

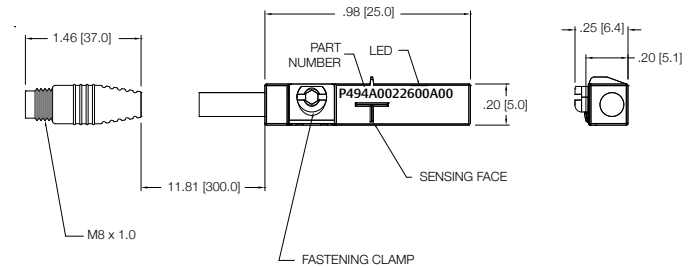
See page 14, 15, & 16 for sensor specifications

Sensing Part Numbers

P494A0022300A00



P494A0022600A00



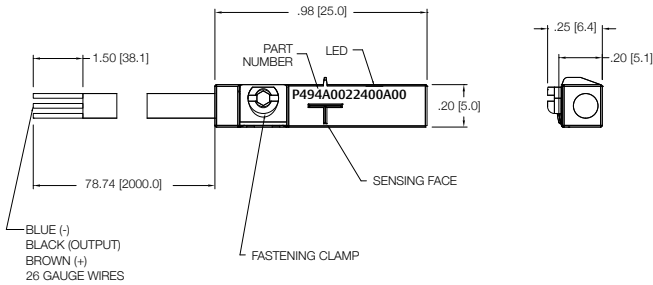
ELECTRICAL DESIGN	DC PNP
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000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

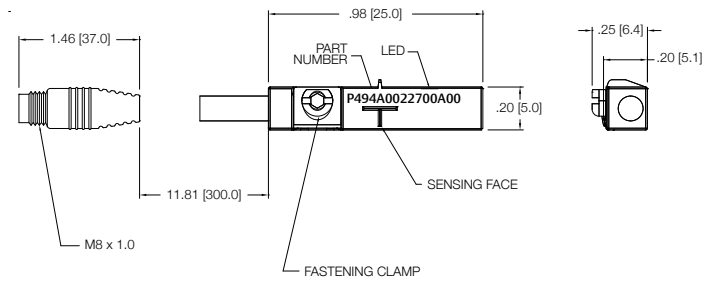
*Switches are not designed for wet environments. Please see your distributor for additional information.

Sensing Part Numbers

P494A0022400A00



P494A0022700A00



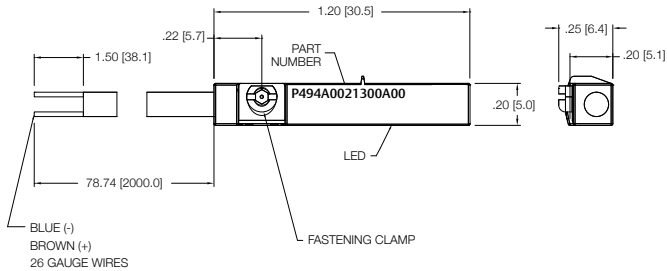
ELECTRICAL DESIGN	DC NPN
OUTPUT	Normally Open
OPERATING VOLTAGE	10-30 VDC
CURRENT RATING	100 mA
SHORT-CIRCUIT PROTECTION	Yes
OVERLOAD PROTECTION	Yes
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 2.5 V
CURRENT CONSUMPTION	< 12 mA
REPEATABILITY	< .2mm
POWER-ON DELAY TIME	< 30 ms
SWITCH FREQUENCY	> 3000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

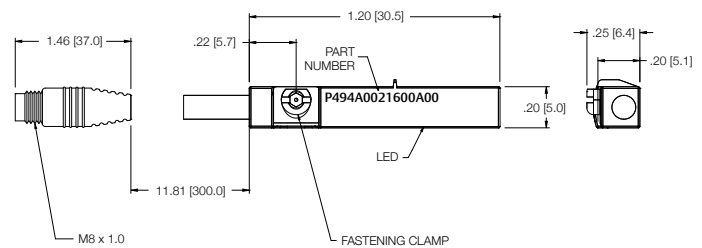
*Switches are not designed for wet environments. Please see your distributor for additional information.

Sensing Part Numbers

P494A0021300A00



P494A0021600A00



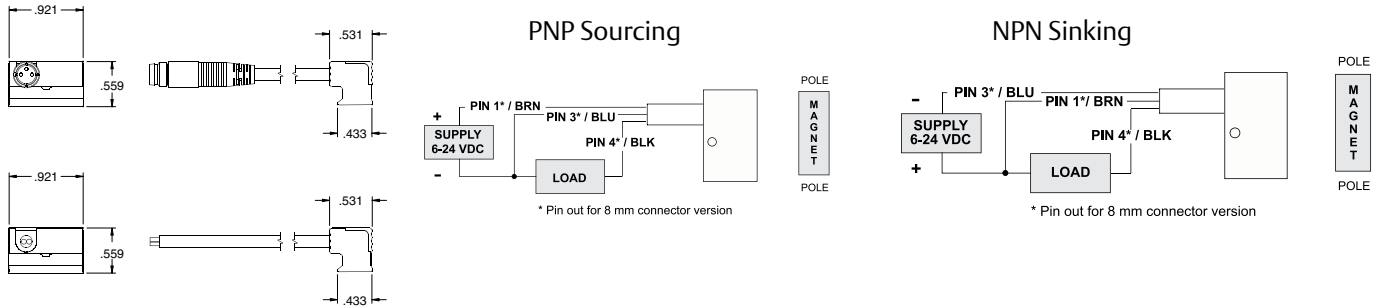
ELECTRICAL DESIGN	AC/DC REED
OUTPUT	Normally Open
OPERATING VOLTAGE	5-120 VAC/DC
CURRENT RATING	100 mA*
SHORT-CIRCUIT PROTECTION	No
OVERLOAD PROTECTION	No
REVERSE POLARITY PROTECTION	Yes
VOLTAGE DROP	< 5 V
REPEATABILITY	± .2mm
MAKETIME INCLUDING BOUNCE	< .6 ms
BREAKTIME	< .1 ms
SWITCHING POWER (MAX)	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 Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE 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 Placehold, Cable Clip, and Cut Sheet To Be Provided with Every Switch
AGENCY APPROVALS	CE RoHS

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

F Series World Switch Hall Effect Part Numbers

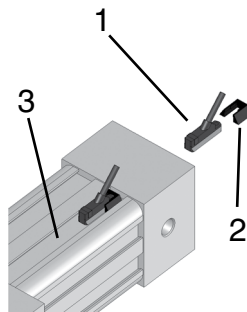
P/N	Switch Style	Electrical Design	Output	Operating Voltage	Current Rating	Switching Power	Voltage Drop	NEMA IP Rating	Temperature Rating
SH6-031	Flying Lead	PNP	Normally Open	6-24 VDC	0.3 Amps Max.	3 Watts Max.	3.5 Volts	NEMA 6	-25° to +75° C
SH6-032	Flying Lead	NPN	Normally Open	6-24 VDC	0.3 Amps Max.	10 Watts Max.	3.0 Volts	NEMA 6	-25° to +75° C
SH6-021	M8 Connector	PNP	Normally Open	6-24 VDC	0.3 Amps Max.	12 Watts Max.	0.5 Volts	NEMA 6	-25° to +75° C
SH6-022	M8 Connector	NPN	Normally Open	6-24 VDC	0.3 Amps Max.	10 Watts Max.	3.0 Volts	NEMA 6	-25° to +75° C



F Series Dove Tail Sensor with 45 Degree Wire

Profile Tube Detail

1. Dove Tail Switch
2. Included Dovetail adapter
3. Dove Tail extrusion

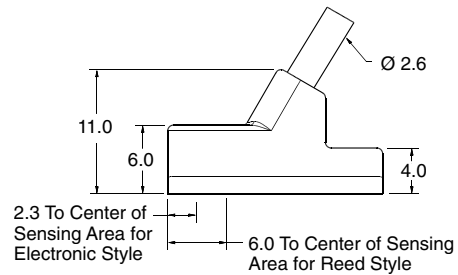
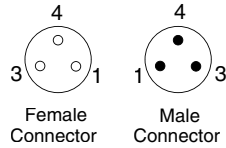
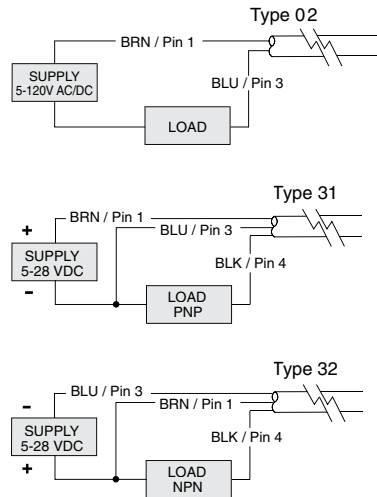


F Series Dove Tail Series Switch

Cylinders	Bore	Part Number
F series Profile	1 1/2"-2 1/2" Bore	Direct Fit w/included adapter

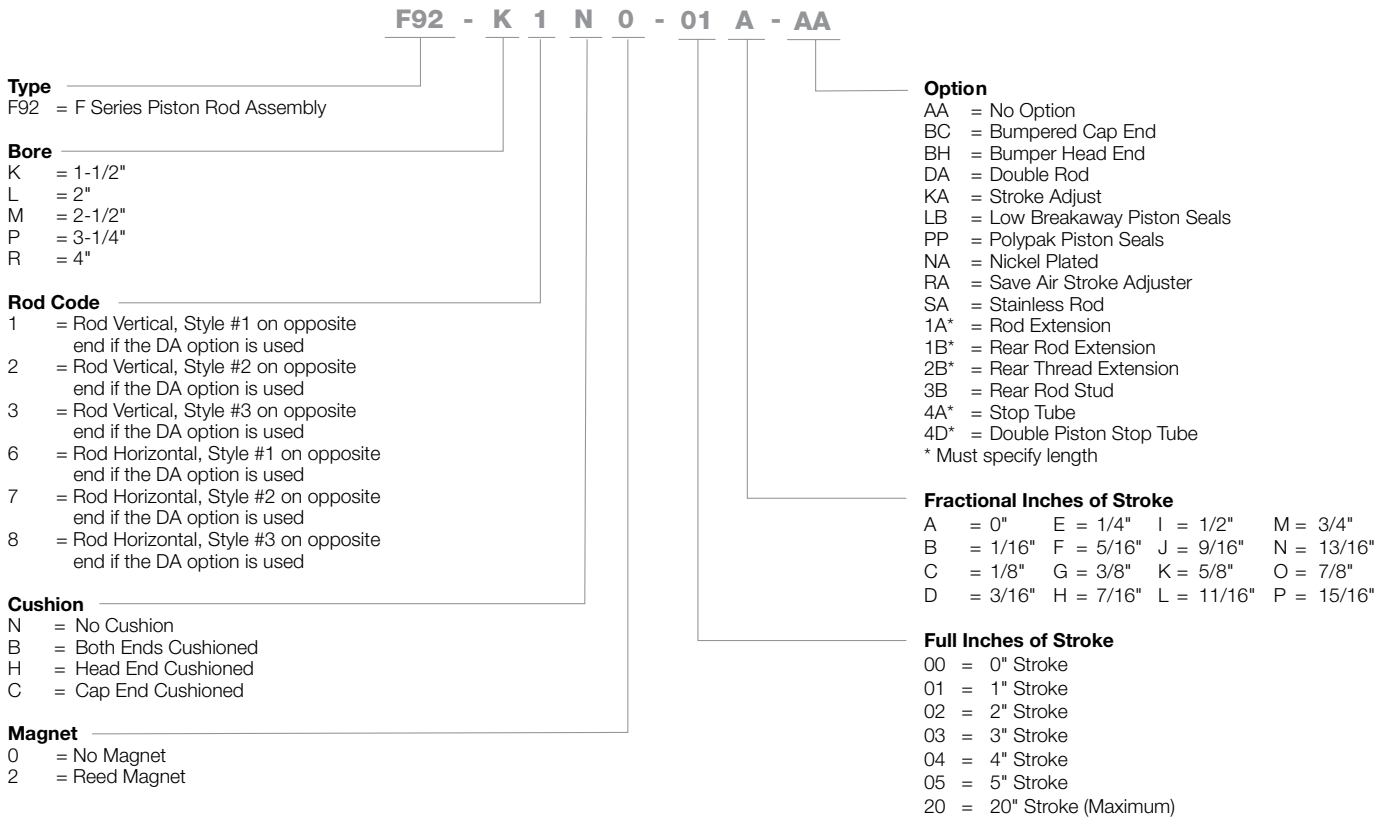
Dove Tail Type 02, 31 & 32

Wiring Diagrams



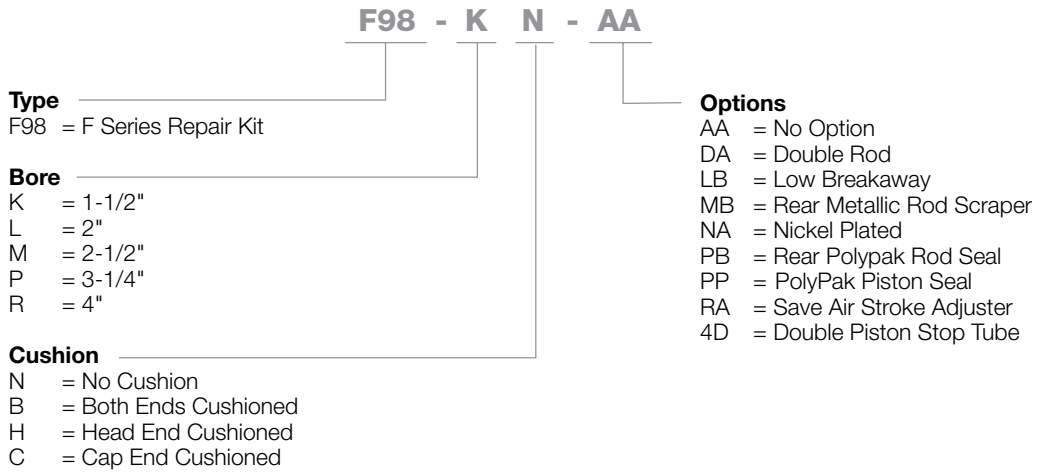
Type Code	Description	Function	Switching Voltage	Switching Current	Switching Power	Switching Speed	Voltage Drop
940-100-002	Reed Switch for PLC's, LED (current limiting)	SPST Normally Open	5-120V AC/DC 50/60 Hz	0.03 Amps max. 0.001 Amps min.	4 Watts max.	0.4 ms operate 0.1 ms release	3.5 Volts @ 5 mA
940-100-031	Electronic for Reed Magnet, LED & Sourcing	PNP Normally Open	5-28 VDC	0.2 Amps max.	4.8 Watts max.	4 µs operate 4 µs release	1.0 Volts max
940-100-032	Electronic for Reed Magnet, LED & Sinking	NPN Normally Open	5-28 VDC	0.2 Amps max.	4.8 Watts max.	4 µs operate 4 µs release	1.0 Volts max

How to Order - F Series Piston Rod Assembly



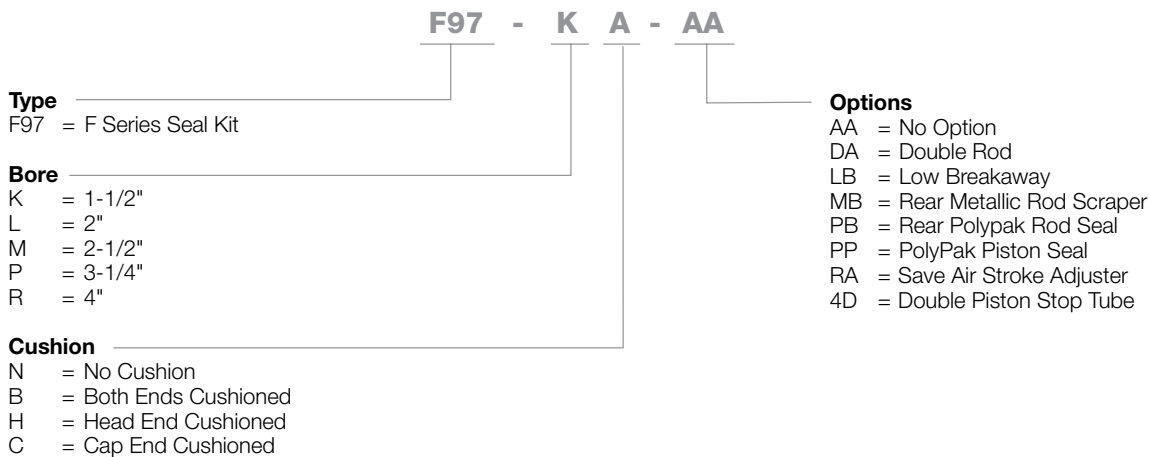
Note: Options listed are ones that apply to a piston rod assembly only.
Model number is set up to use option code supplied with original cylinder or with any above.

How to Order - F 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 - F 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 2 Tooling Plate Socket Head Cap Screws (Part #25) to remove Tooling Plate (Part #24)
2. Loosen 4 Bushing Retainer Flat Head Cap Screws (Part #13) to remove bushing retainer.
3. Loosen 4 Head Sleeve Bolts (Part #23) and 4 Hex Head Cap Screws (Part #22) to remove Piston/Rod Assembly (Part #20 & #26).
4. Carefully remove old seals and wearband (Part #14, #16, and #17). Any damage to the seals may result in leakage.
5. Lubricate seals with supplied Emerson Lube. Examine seals before installing for any contamination. Contamination may cause leakage.
6. Install Piston Seal (Part #17). Make sure the piston seal is not twisted inside groove. Next, install back-up rings (Part #16) if piston seal is a T-seal. See Seal Installation guide.
7. Install lubricated wearband (Part #14) onto piston. Sink piston/rod assembly into sinker tube. See Sinker Tube Part Numbers Chart.
8. Apply lube inside the cylinder tube.
9. Sink piston/rod assembly into cylinder tube.
10. Press piston/rod assembly flush with the cylinder tube. Wipe off any lube from the face of the piston.
11. Place Tube End Seals (Part #8) into head and cap seal grooves. Examine seals after installing for any contamination. Contamination may cause leakage.
12. Lightly grease Rod Seal/Wiper and Bushing O-rings after installation. This will ease the installation of the rod bushing over the rod and into the head.
13. Reassemble cylinder except for loaded bushing. First, loosely torque Head Sleeve Bolts and Hex Head Cap Screws to allow head and cap to rotate slightly. Carefully place bushing over the rod until getting interference. Slide the bushing down onto the rods and into the bushing pocket on the head.
14. Before final torque, place cylinder on level surface to square head and cap. Torque Head Sleeve Bolts and Hex Head Cap Screws in a crisscross pattern. Use torque tolerance chart for Head Sleeve Bolts and Hex Head Cap Screws.
15. Place Bushing Retainer (Part #12) over bushing. Lightly tighten Retainer Screws (Part #13). Place Tooling Plate over rods and hand tighten Tooling Plate Socket Head Cap Screws.
16. Stroke cylinder by hand. This will enable detection of any binding. If binding does occur, repeat steps 13-15. If there is no binding, torque Retainer Screws to torque tolerances for bushing retainer screws.

See Seal Installation Guide on page 24 for additional (visual) instructions.

Repair and Seal Kit Removal/Installation Instructions

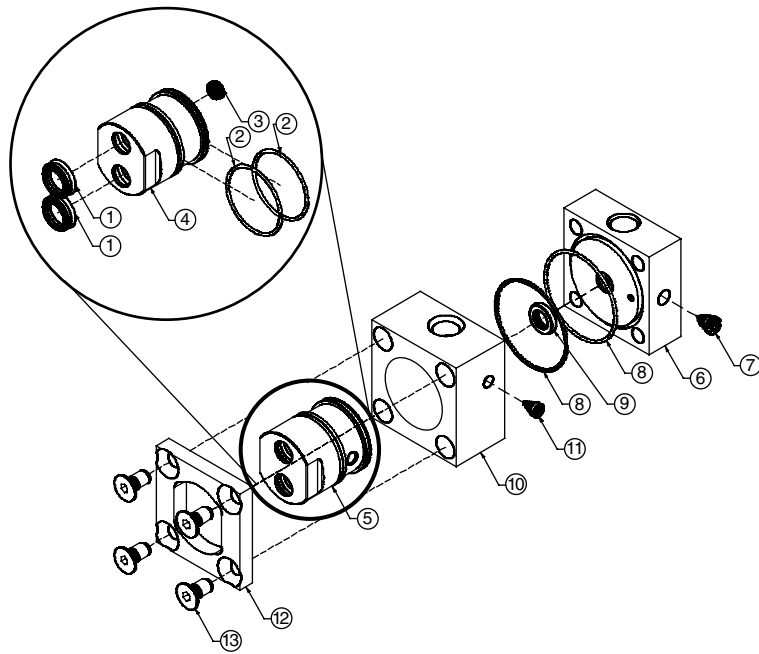
1. Loosen 2 Tooling Plate Socket Head Cap Screws (Part #25) to remove Tooling Plate (Part #24)
2. Loosen 4 Bushing Retainer Flat Head Cap Screws (Part #13) to remove bushing retainer (Part #12) and Loaded Bushing (Part #5).
3. Loosen 4 Head Sleeve Bolts (Part #23) and 4 Hex Head Cap Screws (Part #22) to remove Piston/Rod Assembly (Part #20 & #26).
4. Carefully remove old seals and wearband. (Part [#1, #2, #3 Seal Kit only], #8, #9, #14, #16, and #17) Any damage to the seal grooves may result in leakage.
5. Lubricate new seals with supplied Emerson Lube. Examine seals before installing for any contamination. Contamination may cause leakage.
6. Install Piston Seal (Part #17). Make sure the piston seal is not twisted inside groove. Next, install back-up rings (Part #16) if piston seal is a T-seal. See Seal Installation guide.
7. Install lubricated wearband (Part #14) onto piston. Sink piston/rod assembly into sinker tube. See Sinker Tube Part Numbers Chart.
8. Apply lube inside the cylinder tube.
9. Sink piston/rod assembly into cylinder tube.
10. Press piston/rod assembly flush with the cylinder tube. Wipe off any lube from the face of the piston.
11. Place Tube End Seals (Part #8) into head and cap seal grooves. Examine seals after installing for any contamination. Contamination may cause leakage.
12. Install Rod Seal/Wiper (Part #1), Bushing O-rings (Part #2), and Head Cushion Seal (Part #3*) if available into bushing (Seal Kit only for this step). See Seal Installation Guide. Lightly grease Rod Seal/Wiper and Bushing O-rings after installation. This will ease the installation of the rod bushing over the rod and into the head.
13. Reassemble cylinder except for loaded bushing. First, loosely torque Head Sleeve Bolts and Hex Head Cap Screws (Part #22) to allow head and cap to rotate slightly. Carefully place bushing over the rods until getting interference. Slide the bushing down onto the rods and into the bushing pocket on the head.
14. Before final torque, place cylinder on level surface to square head and cap. Torque Head Sleeve Bolts and Hex Head Cap Screws in a crisscross pattern. Use torque tolerance charts for Head Sleeve Bolts and Hex Head Cap Screws.
15. Place Bushing Retainer (Part #12) over bushing. Lightly tighten Retainer Screws (Part #13). Place Tooling Plate over rods and hand tighten Tooling Plate Socket Head Cap Screws.
16. Stroke cylinder by hand. This will enable detection of any binding. If binding does occur, repeat steps 13-15. If there is no binding, torque Retainer Screws to torque tolerances for bushing retainer screws.

See Seal Installation Guide on page 24 for additional (visual) instructions.

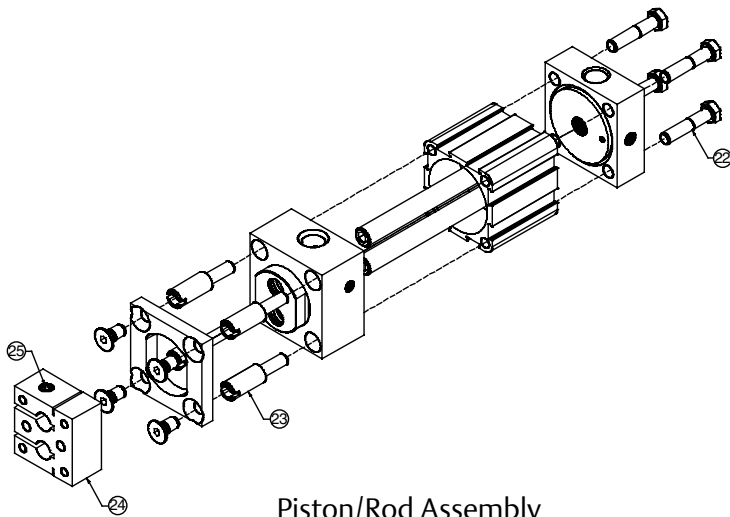


Diagrams

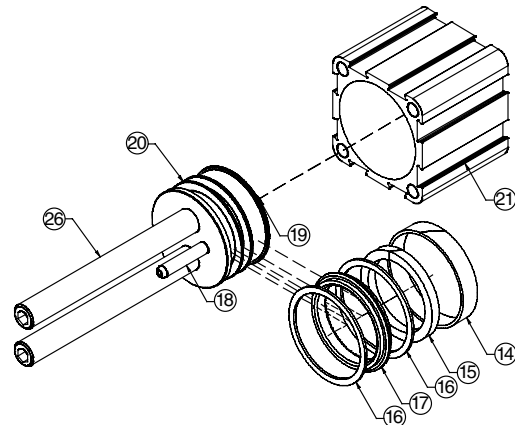
Pneumatic Service Temperatures:
Nitrile Seals: -10 °F (-23 °C) to 165 °F (74 °C)



Head, Cap, and Bushing Assembly



Piston/Rod Assembly

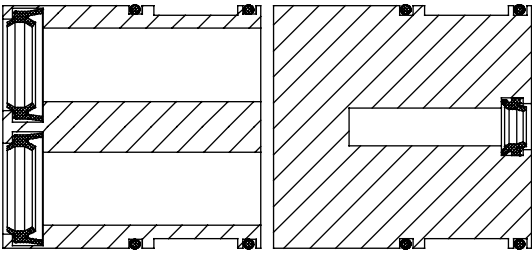


Cylinder Assembly and Tie Rod Torque

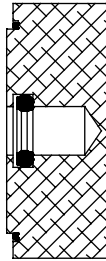
F Series

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

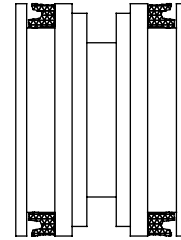
Seal Installation Guide



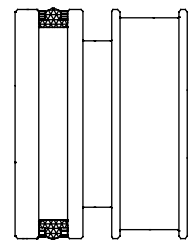
Loaded Bushing



Cushioned Cap



Low Breakaway Piston



T-Seal Piston

Bushing Retainer Screws Torque Tolerances (lbs-ft) Part #13

Size	Min.	Max.
1/4-28	5	7
5/16-24	10	12
3/8 - 24	15	20

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

Sinker Tube Part Numbers

Bore	Part #
1-1/2"	A06-K91
2"	A06-L91
2-1/2"	A06-M91
3-1/4"	A06-P91
4"	A06-R91

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



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