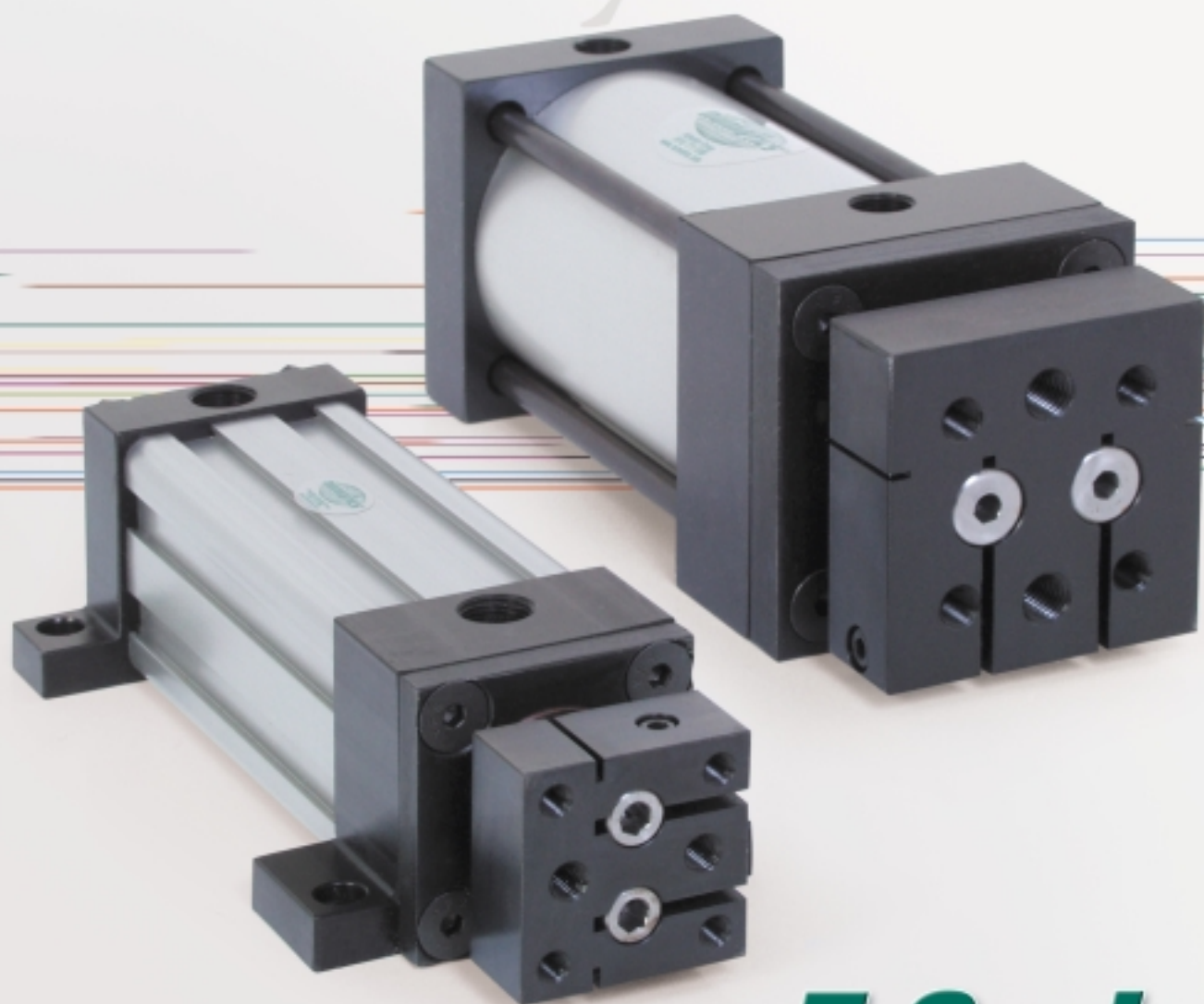




Cylinders



F Series

Non-Rotating NFPA Interchangeable Cylinder Line

We're everywhere you need us to be!



F Series	3-12
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F Series Non-Rotating NFPA Interchangeable



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 Teflon® 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 Teflon® 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.

Teflon® is a registered trademark of DuPont™. For detailed information regarding the properties of Teflon®, please call 1-800-441-0573.

Standard Specifications:

- Meets NFPA specifications
- Bore sizes from 1-1/2" through 4"
- Piston rod diameters from 5/16" to 3/4"
- Nominal 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



F Series
Non-Rotating NFPA Interchangeable

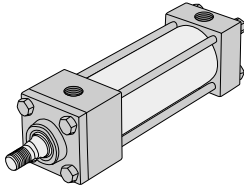


Standard F Series Mounts

Centerline Mounts

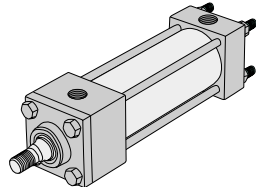
X0 Mount

Basic No Mount



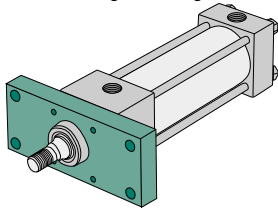
X2 Mount

Extended Tie Rods – Cap End



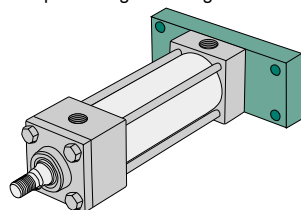
F1 Mount

Head Rectangular Flange



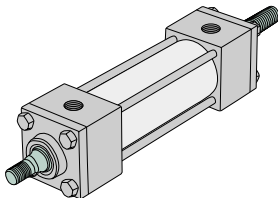
F2 Mount

Cap Rectangular Flange



DA Mount

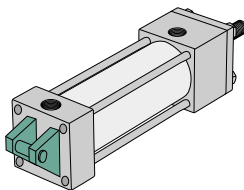
Double Rod End



Pivot Mounts

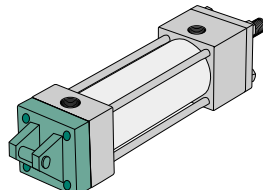
P1 Mount

Fixed Clevis



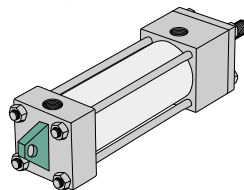
P2 Mount

Detachable Clevis



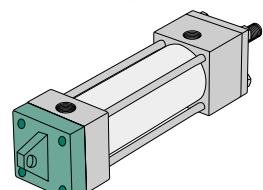
P3 Mount

Fixed Eye



P4 Mount

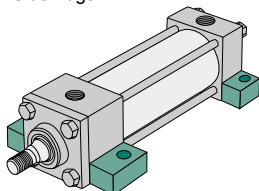
Detachable Eye



Foot Mounts

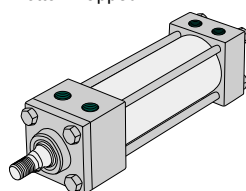
S2 Mount

Side Lugs



S4 Mount

Bottom Tapped





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 NFPA 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
- 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

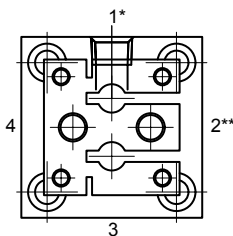
Ports

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 = Vertical Rod Style # 1
- 2 = Vertical Rod Style # 2
- 3 = Vertical Rod Style # 3
- 4 = Special Rod Ends
- 6 = Horizontal Rod Style # 1
- 7 = Horizontal Rod Style # 2
- 8 = Horizontal Rod Style # 3

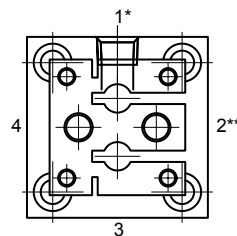
Port and Cushion Orientation



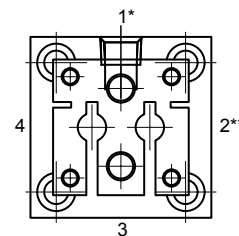
* Ports Normally In Position 1

** Cushions Normally In Position 2

Cylinder Rod Orientation



Standard Rod
Orientation Vertical



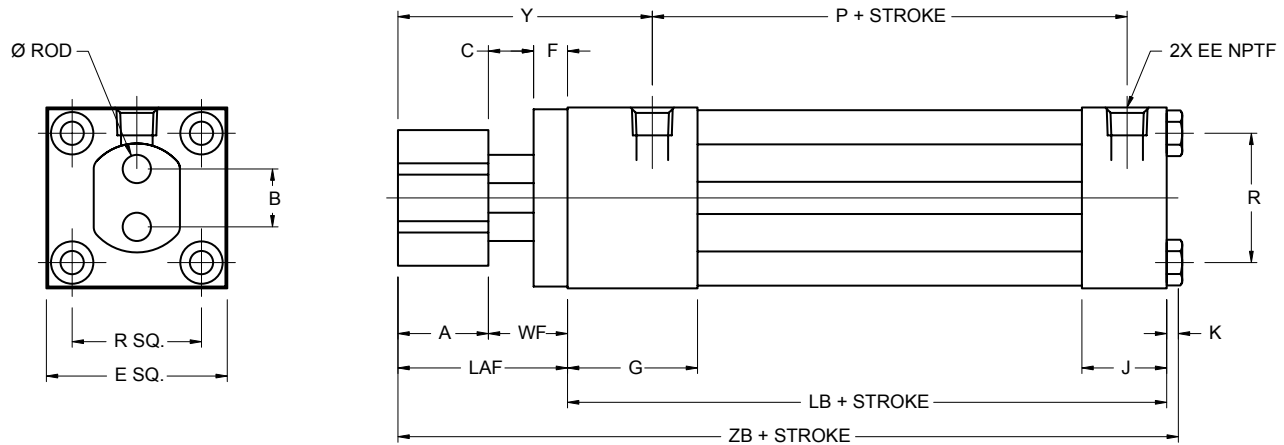
Optional Rod
Orientation Horizontal



F Series Non-Rotating NFPA Interchangeable



Basic-No Mount Cylinder



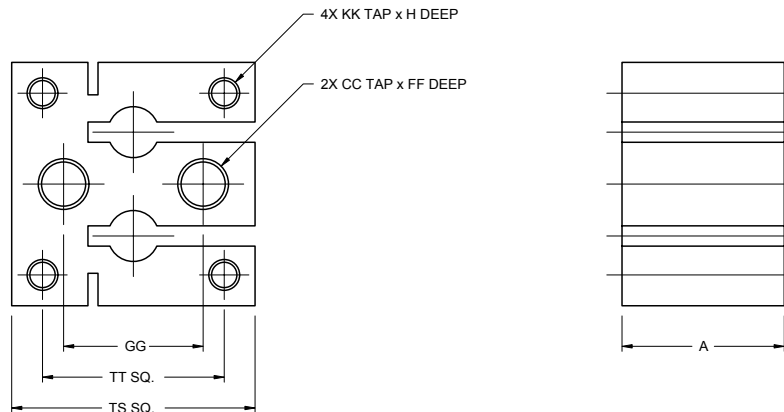
NOTE: Tooling plate removed for clarity.

NFPA Mount Code MX0

Dimensions

BORE	ROD	A	B	C	E	F	G	J	K	P	R	V	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	0.160	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	0.200	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	0.200	3.063	3/8	3.750	0.875	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	0.200	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	0.200	3.438	1/2	4.250	1.125	7.000	2.375

Tooling Plate

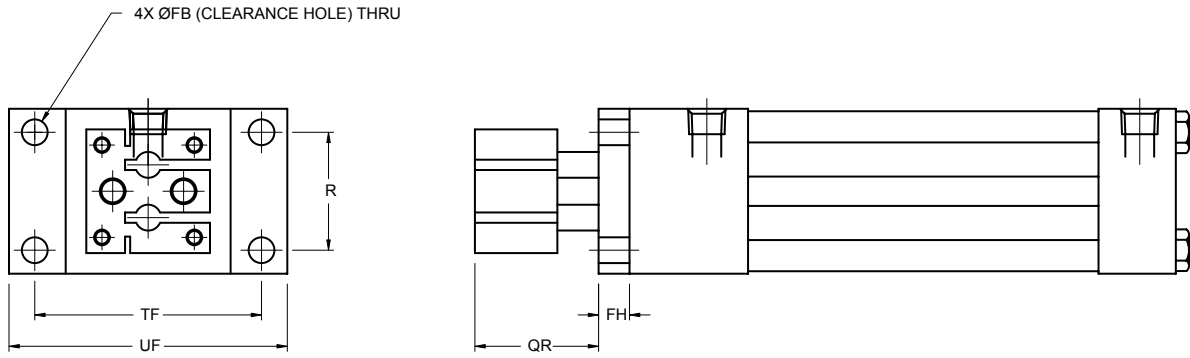


Dimensions

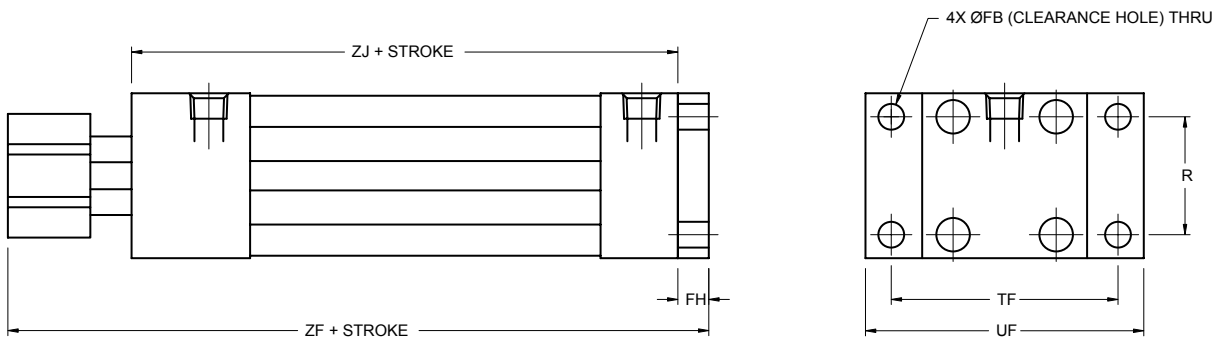
BORE	CC	FF	GG	KK	H	TS	TT
1-1/2"	5/16-18	0.375	0.860	#10-32	0.625	1.500	1.120
2"	5/16-18	0.375	1.180	1/4-28	0.750	2.000	1.430
2-1/2"	3/8-16	0.625	1.500	5/16-24	0.875	2.500	1.840
3 1/4"	1/2-13	0.625	1.970	3/8-24	0.875	3.250	1.790
4"	1/2-13	0.625	2.760	3/8-24	0.875	4.000	3.440



Flange Mounts



Mount Code NFPA MF1



Mount Code NFPA MF2

Dimensions

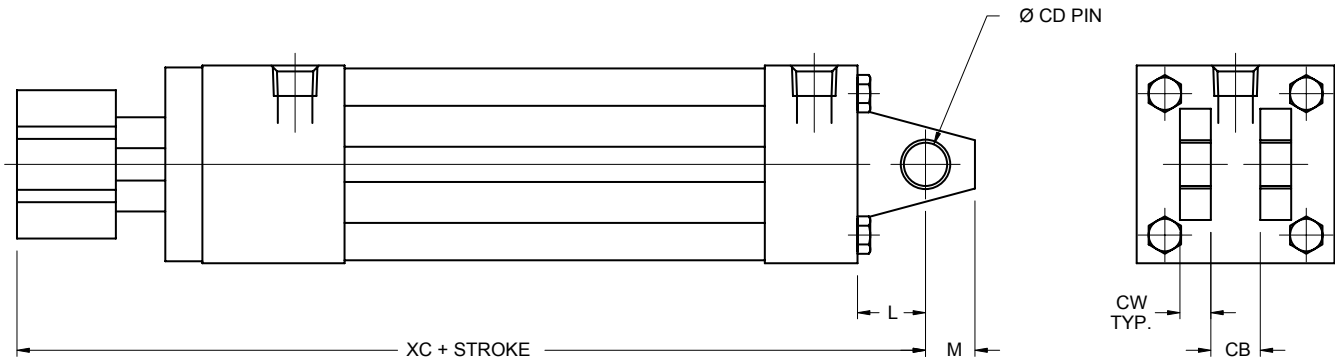
BORE	FB	FH	QR	R	TF	UF	ZF	ZJ
1-1/2"	1/4	0.375	1.500	1.430	2.750	3.375	5.875	5.500
2"	5/16	0.375	1.500	1.840	3.375	4.125	5.875	5.500
2-1/2"	5/16	0.375	1.750	2.190	3.875	4.625	6.250	5.875
3-1/4"	3/8	0.625	1.750	2.760	4.688	5.500	7.250	6.625
4"	3/8	0.625	1.750	3.320	5.438	6.250	7.250	6.625



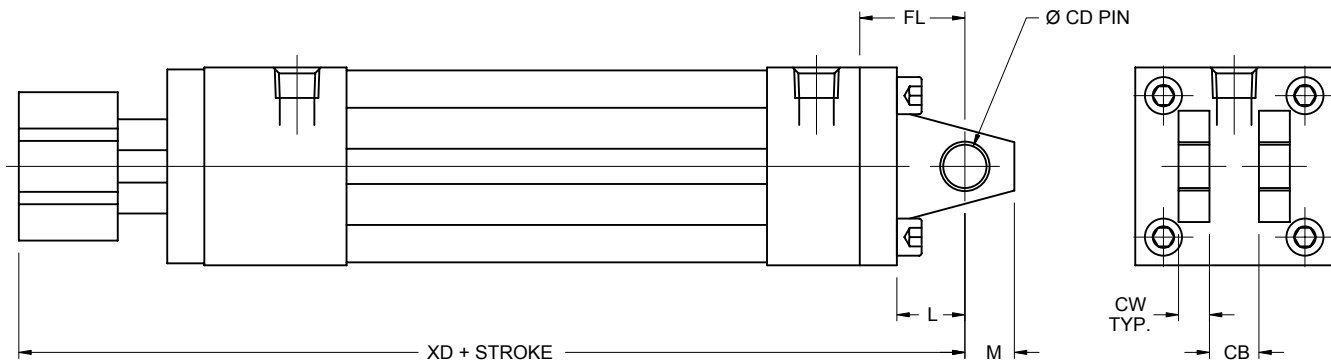
F Series
Non-Rotating NFPA Interchangeable



Clevis Mounts



NFPA Mount Code MP1



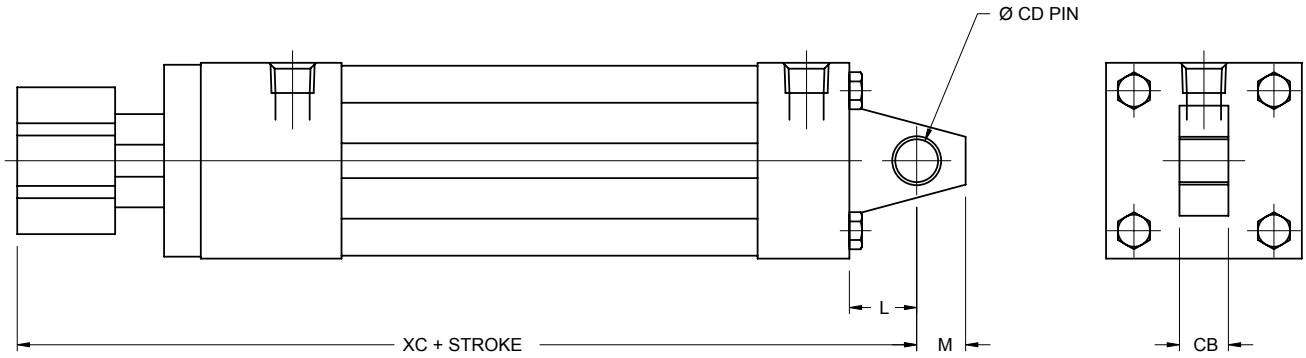
NFPA Mount Code MP2

Dimensions

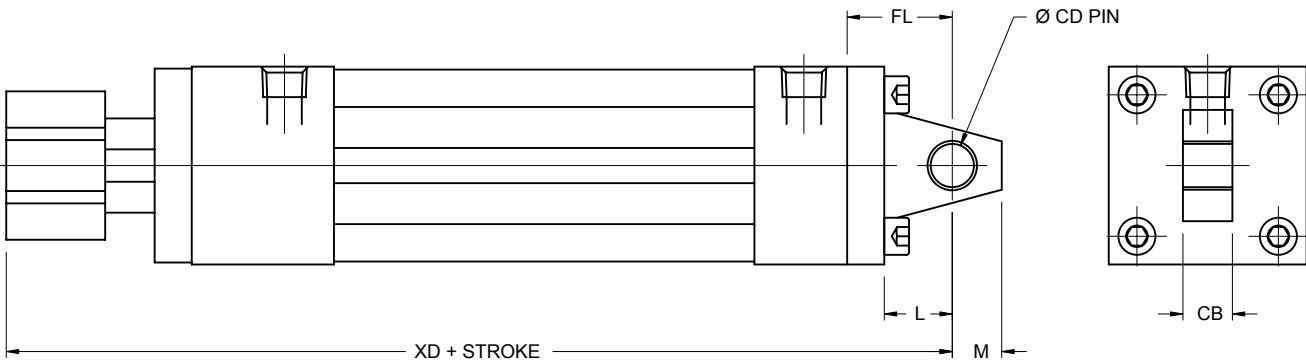
BORE	L	M	CB	CD	CW	FL	XC	XD
1-1/2"	0.750	0.500	0.750	0.500	0.500	1.125	6.250	6.625
2"	0.750	0.500	0.750	0.500	0.500	1.125	6.250	6.625
2-1/2"	0.750	0.500	0.750	0.500	0.500	1.125	6.625	7.000
3-1/4"	1.250	0.750	1.250	0.750	0.625	1.875	7.875	8.500
4"	1.250	0.750	1.250	0.750	0.625	1.875	7.875	8.500



Eye Mounts



NFPA Mount Code MP3



NFPA Mount Code MP4

Dimensions

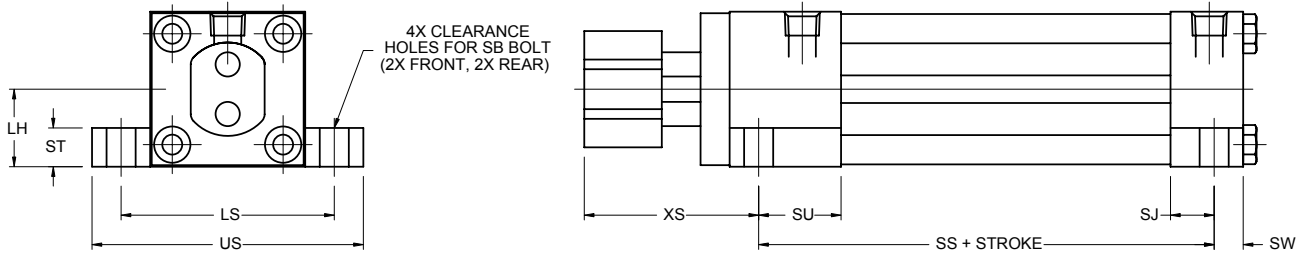
BORE	L	M	CB	CD	FL	XC	XD
1-1/2"	0.750	0.500	0.750	0.500	1.125	6.250	6.625
2"	0.750	0.500	0.750	0.500	1.125	6.250	6.625
2-1/2"	0.750	0.500	0.750	0.500	1.125	6.625	7.000
3-1/4"	1.250	0.750	1.250	0.750	1.875	7.875	8.500
4"	1.250	0.750	1.250	0.750	1.875	7.875	8.500



F Series Non-Rotating NFPA Interchangeable



Side Lug Mount

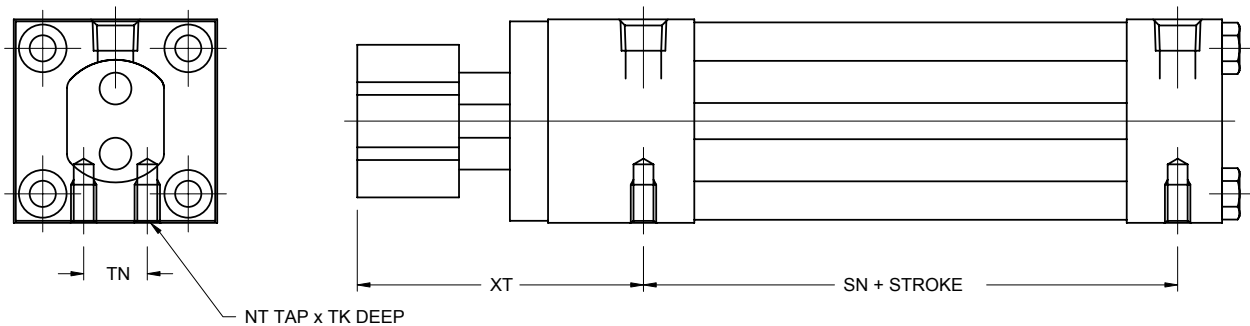


NFPA Mount Code MS2

Dimensions

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



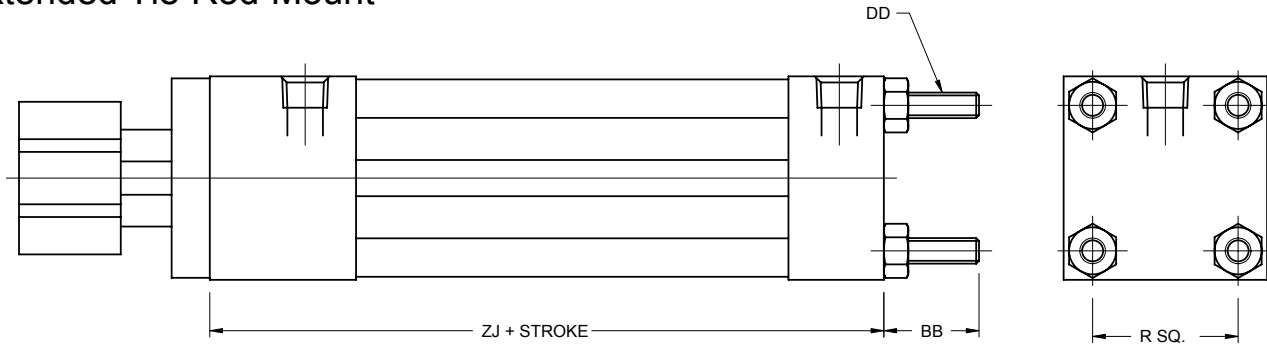
NFPA Mount Code MS4

Dimensions

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



Extended Tie Rod Mount

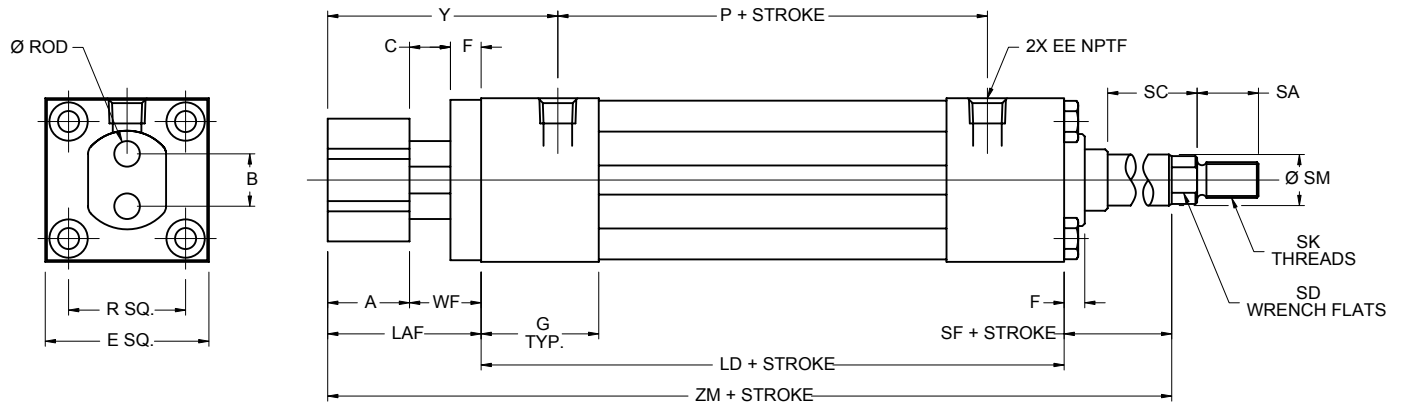


NFPA Mount Code MX2

Dimensions

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

Dimensions

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	V	WF	Y	ZM
1-1/2"	1.430	0.750	0.375	0.500	1.000	7/16-20	0.625	0.160	0.875	2.813	7.000
2"	1.840	0.750	0.375	0.500	1.000	7/16-20	0.625	0.200	0.875	2.813	7.000
2-1/2"	2.190	0.750	0.375	0.500	1.000	7/16-20	0.625	0.200	0.875	3.063	7.375
3-1/4"	2.760	1.125	0.500	0.813	1.375	3/4-16	1.000	0.200	1.125	3.438	8.500
4"	3.320	1.125	0.500	0.813	1.375	3/4-16	1.000	0.200	1.125	3.438	8.500

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



F Series Non-Rotating NFPA Interchangeable



Repair and Seal Kits

BORE	ROD DIAMETER	REPAIR KIT*		SEAL KIT**	
		NON-CUSHIONED	CUSHIONED	NON-CUSHIONED	CUSHIONED
1-1/2"	5/16	F90-K01	F90-K11	F91-K01	F91-K11
2"	1/2	F90-L01	F90-L11	F91-L01	F91-L11
2-1/2"	5/8	F90-M01	F90-M11	F91-M01	F91-M11
3-1/4"	3/4	F90-P01	F90-P11	F91-P01	F91-P11
4"	3/4	F90-R01	F90-R11	F91-R01	F91-R11

*Repair Kit: Includes bushing and all internal cylinder seals.

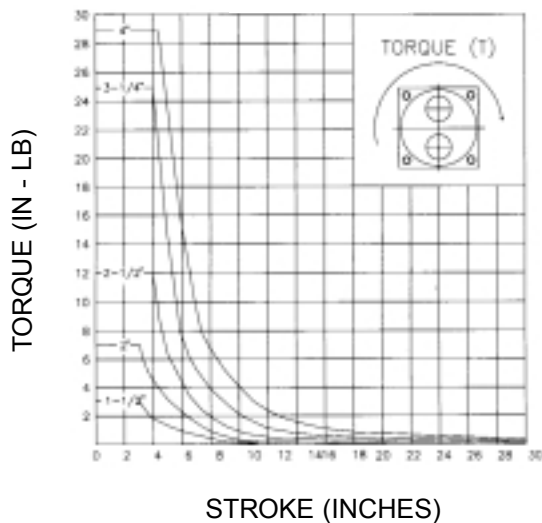
**Seal Kit: includes internal cylinder seals.

F Series Case Loads

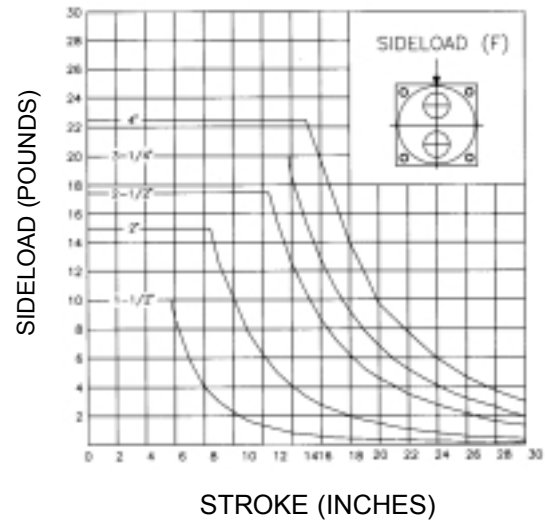
Case Load Instructions:

- 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.

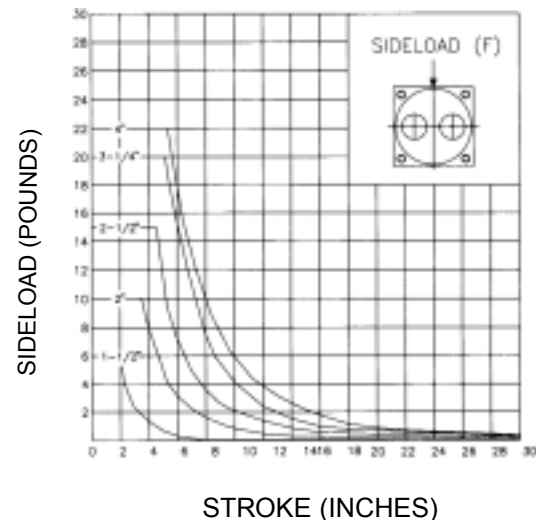
Case 2



Case 1



Case 3



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

NOTE:

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



numatics®

World Class Supplier of Pneumatic Components



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Fax: 810-667-3902

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Numatics – Miniature Valves

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Fax: 248-960-2160

Numatics – Cylinders

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Fax: 615-771-1201

Numatics – Rodless Cylinders

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