cylinders

A Series

Aluminum NFPA Interchangeable Cylinder Line

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EMERSON
Industrial Automation

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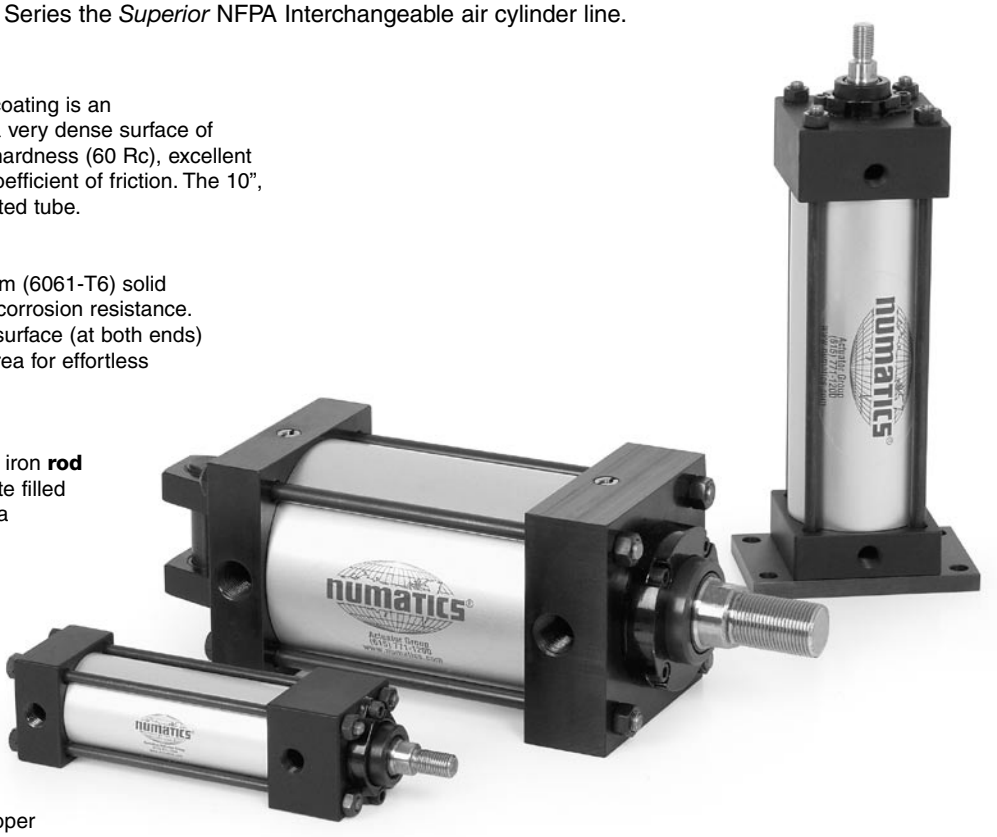
A Series
NFPA Interchangeable

The **A Series** is an aluminum NFPA Interchangeable cylinder line that is designed and built to excel in the most demanding applications. The A Series encompasses many value-added features such as an extra long graphite filled cast iron rod bushing and a standard oversized wear band that is located on the rear of the piston. Additionally, the A Series includes the well-proven "T Seal" piston seal configuration made from carboxilated nitrile with self-lubricating Teflon® compound. These are just a sample of the features that make the A Series the *Superior* NFPA Interchangeable air cylinder line.



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. The 10", 12" and 14" bores use a honed, chrome plated tube.

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

Rod Bushing
The A 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 steel 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. The 10", 12" and 14" bores are equipped with a bronze bushing.

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

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

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

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

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

Piston Seal
The **piston seal** is a carboxilated nitrile with Teflon® compound making it 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.

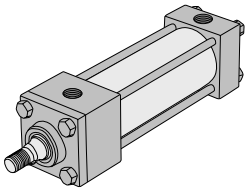
Teflon® is a registered trademark of DuPont™.

Standard Specifications:
- Meets NFPA specifications
- Bore sizes from 1-1/2" through 6" (8" through 14" are Large Bore A Series)
- Piston rod diameters from 5/8" to 1-3/4" (1-3/8" through 2-1/2" for Large Bore A Series)
- Nominal pressure rating is 250 psi air
- Standard temperature -10°F to 165°F (-23°C to 74°C)
- NPTF ports
- Flexible port and cushion location
- Multitude of mounting options

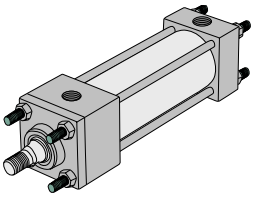
Standard A Series Mounts

Centerline Mounts

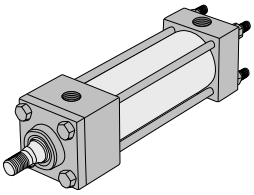
X0 Mount
Basic No Mount



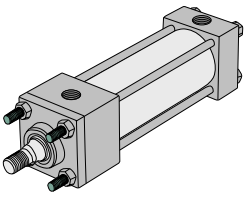
X1 Mount
Extended Tie Rods – Both Ends



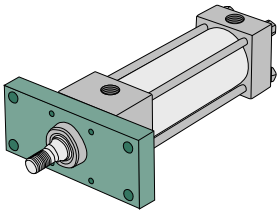
X2 Mount
Extended Tie Rods – Cap End



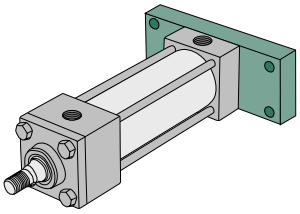
X3 Mount
Extended Tie Rods – Head End



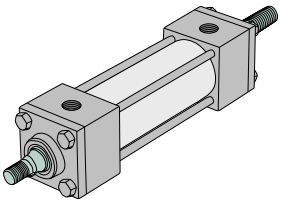
F1 Mount
Head Rectangular Flange



F2 Mount
Cap Rectangular Flange

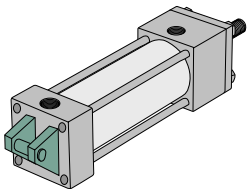


DA Mount
Double Rod End

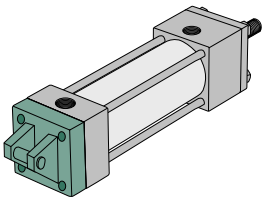


Pivot Mounts

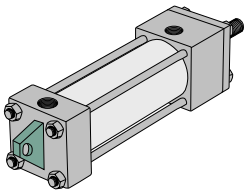
P1 Mount
Fixed Clevis



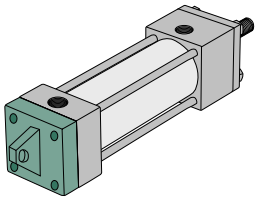
P2 Mount
Detachable Clevis



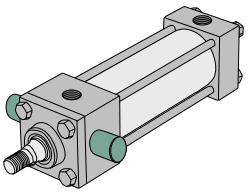
P3 Mount
Fixed Eye



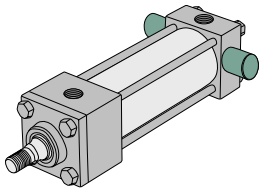
P4 Mount
Detachable Eye



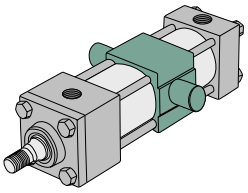
T1 Mount
Head Trunnion



T2 Mount
Cap Trunnion

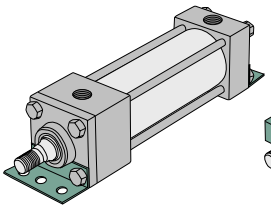


T4 Mount
Intermediate Trunnion

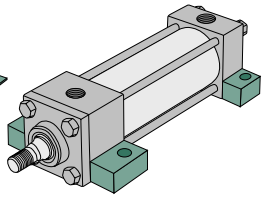


Foot Mounts

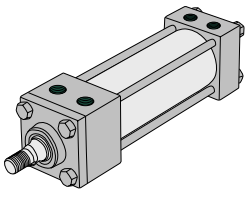
S1 Mount
Angle Mount



S2 Mount
Side Lugs



S4 Mount
Bottom Tapped



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How to Order

Leave blank unless using MU or BK option.

P1 A L - 04 A 1 D - C AA 0 04 0

Mount
F1 = Front Flange
F2 = Rear Flange
P1 = Fixed Clevis
P2 = Detachable Clevis
P3 = Fixed Eye
P4 = Detachable Eye
S1 = Angle Mount
S2 = Side Lug Mount
S4 = Bottom Tap
SN = Sleeve Nut
T1 = Head Trunnion (Fixed Steel Ears)
T6 = Head Trunnion (Removeable Aluminum Ears)
T2 = Cap Trunnion (Fixed Steel Ears)
T7 = Cap Trunnion (Removeable Aluminum Ears)
T4* = Mid Trunnion
X0 = Basic No Mount
X1 = Extended Tie Rods Both Ends
X2 = Extended Tie Rod Cap
X3 = Extended Tie Rod Head
*Specify "XI" length.

Type
A = A Series NFPA Interchangeable

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
99 = 99" Stroke
Note: Consult factory for strokes greater than 99".

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

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

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"

Full Inches of Stroke
00 = 0" Stroke
01 = 1" Stroke
02 = 2" Stroke
03 = 3" Stroke

Magnet
0 = No Magnet
2 = Reed Magnet

Options
AA = No Options
BA** = Bumpers Both Ends
BC** = Bumper Cap Only
BH** = Bumper Head
BK = Back to Back Cylinder
CT = Composite Tube
DA = Double Rod End
EB = Silencer Bumpers
GA = High Temperature Rod Boot
KA* = Stroke Adjuster
LB = Low Breakaway Seals
LP = Profile Tubing (1.5"-3.25" Bores)
MA = Metallic Rod Scraper
MU = Multiposition Cylinder
NA = Nickel Plated Cylinder, Stainless Steel Rod and Tie Rods
PA = Polypak Rod Seal
RB = Rod Boot
RA* = Save Air Stroke Adjuster
SA = Stainless Steel Piston Rod
SS = Stainless Piston Rod and Tie Rod
ST = Stainless Tie Rods
TD = Tandem Cylinder
VA = Viton Seals
1A* = Rod Extension
2A* = Thread Extenson
12* = Rod and Thread Extension
3A = Studded Rod End
4A* = Stop Tube
4D* = Double Piston Stop Tube
* Specify length.
**Bumpers add .062" to OAL (per bumper).
Consult factory for information regarding combination options.

Cushions

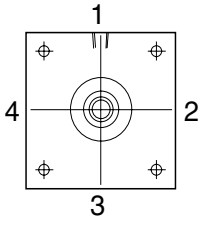
Position	1	2	3	4	Fixed
No Cushion	A	A	A	A	A
Head and Cap	B	C	D	E	Y
Head Only	F	G	H	J	W
Cap Only	K	L	M	N	V

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

Z = Special Ports (must specify ports size(s) and locations(s).
Consult factory for additional details.

Cylinder Orientation



Ports are normally located in position 1. **Cushions** are normally located in position 2.

Rod End Styles, Diameters and Threads

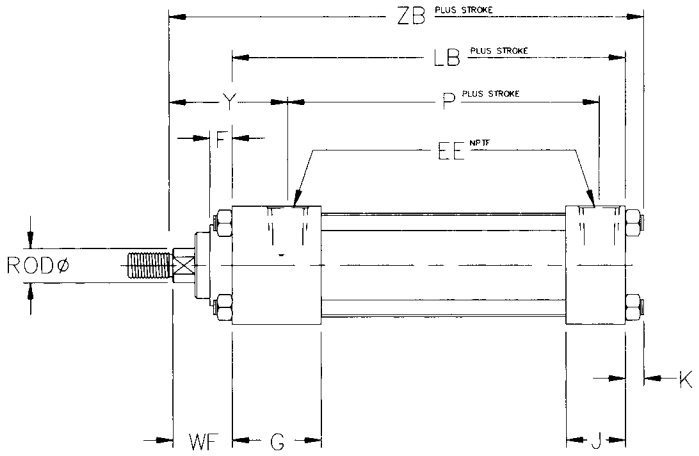
Diameter	Style #1 Standard Male	Style #2 Optional Male	Style #3 Optional Female
0.625	7/16-20	1/2-20	7/16-20
1.000	3/4-16	7/8-14	3/4-16
1.375	1-14	1 1/4-12	1-14
1.750	1 1/4-12	1 1/2-12	1 1/4-12
1.375	1-14	1 1/4-12	1-14

Rod Diameters by Bore Size

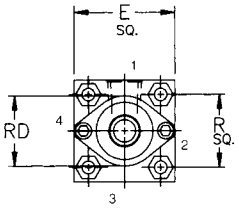
Bore	Standard Dia.	Oversized Dia.
1-1/2"	0.625	1.000
2"	0.625	1.000
2-1/2"	0.625	1.000
3-1/4"	1.000	1.375
4"	1.000	1.375
5"	1.000	1.375
6"	1.375	1.750

The above information is for information purposes only and not all combinations are available.

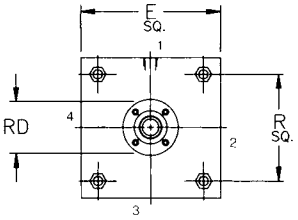
Basic No Mount Cylinder



Mount Code X0 NFPA MX0



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



3-1/4" Through 6"

Dimensions

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.

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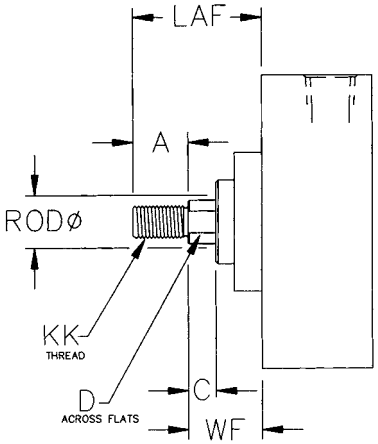
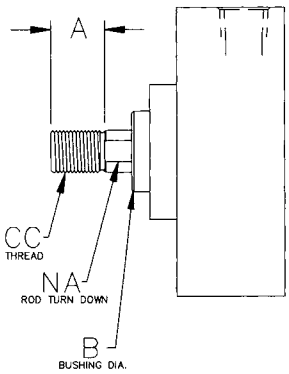
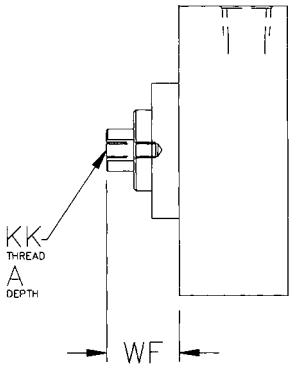
Standard and Optional Rod Ends



Style #1 (Standard Male)



Style #2 (Optional Male)

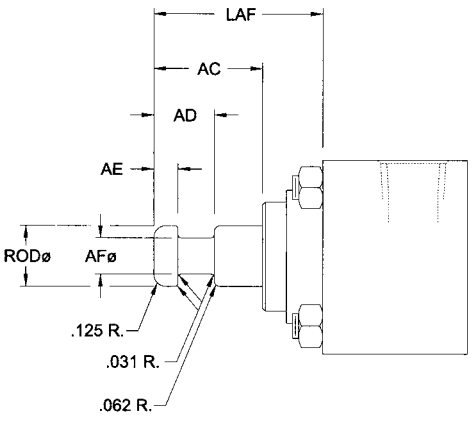


Style #3 (Optional Female)

Dimensions

BORE	ROD	KK(1)	CC(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

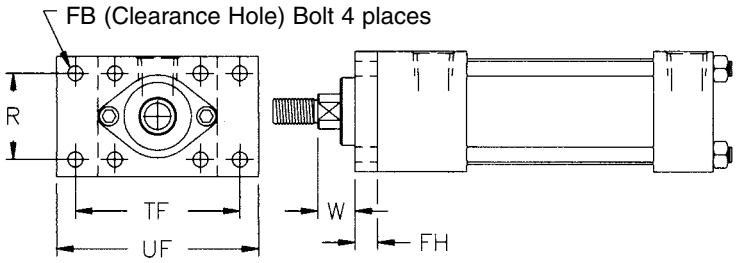


U = Male Coupling Rod End Standard Rod Diameter
V = Male Coupling Rod End Oversized Rod Diameter

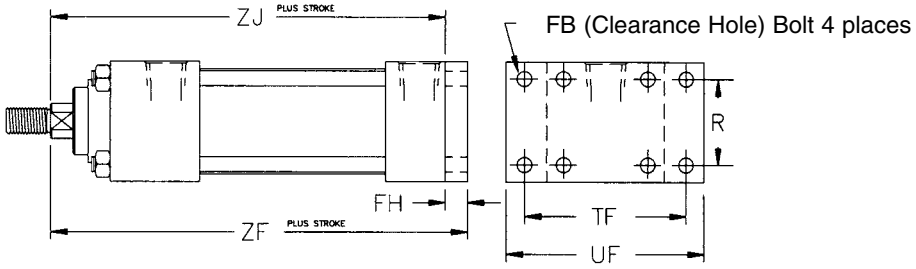
Dimensions

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

Flange Mounts



Mount Code F1 NFPA MF1



Mount Code F2 NFPA MF2

NOTE: This drawing represents 1-1/2" through 2-1/2" bore rod bushing retainer configuration.

Dimensions

BORE	ROD	FB	FH	R	TF	UF	W	ZJ	ZF
1-1/2"	0.625	0.313	0.375	1.430	2.750	3.375	0.625	4.625	5.000
	1.000	0.313	0.375	1.430	2.750	3.375	1.000	5.000	5.375
2"	0.625	0.375	0.375	1.840	3.375	4.125	0.625	4.625	5.000
	1.000	0.375	0.375	1.840	3.375	4.125	1.000	5.000	5.375
2-1/2"	0.625	0.375	0.375	2.190	3.875	4.625	0.625	4.750	5.125
	1.000	0.375	0.375	2.190	3.875	4.625	1.000	5.125	5.500
3-1/4"	1.000	0.438	0.625	2.760	4.688	5.500	0.750	5.625	6.250
	1.375	0.438	0.625	2.760	4.688	5.500	1.000	5.875	6.500
4"	1.000	0.438	0.625	3.320	5.438	6.250	0.750	5.625	6.250
	1.375	0.438	0.625	3.320	5.438	6.250	1.000	5.875	6.500
5"	1.000	0.563	0.625	4.100	6.625	7.625	0.750	5.875	6.500
	1.375	0.563	0.625	4.100	6.625	7.625	1.000	6.125	6.750
6"	1.375	0.563	0.750	4.880	7.625	8.625	0.875	6.625	7.375
	1.750	0.563	0.750	4.880	7.625	8.625	1.125	6.875	7.625

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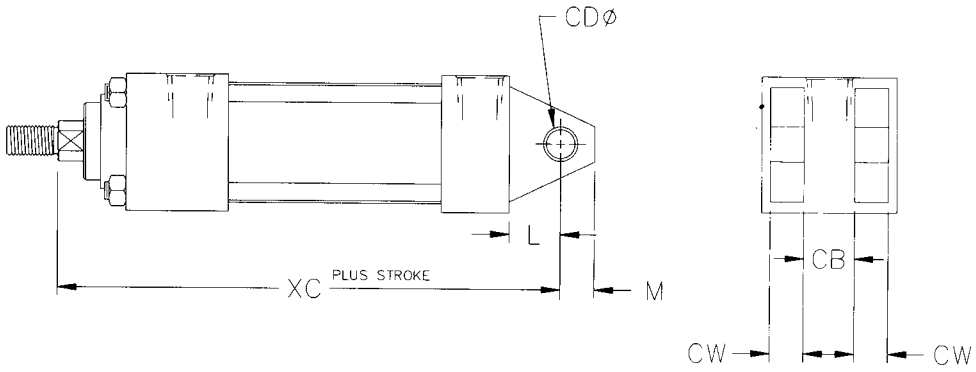
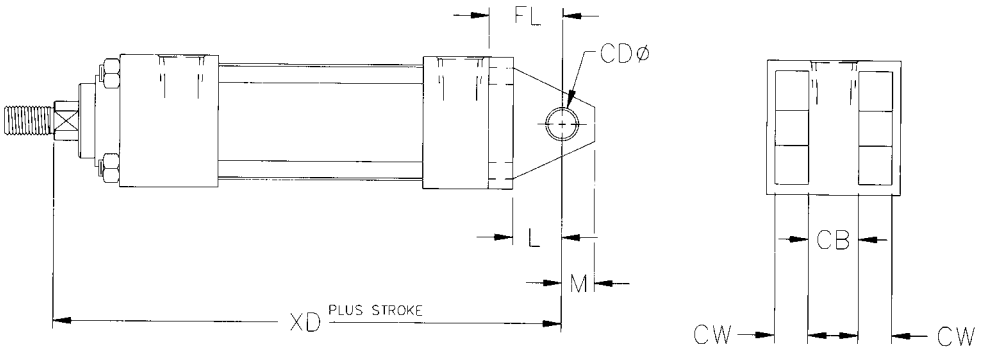
Clevis Mounts



Mount Code P1 NFPA MP1

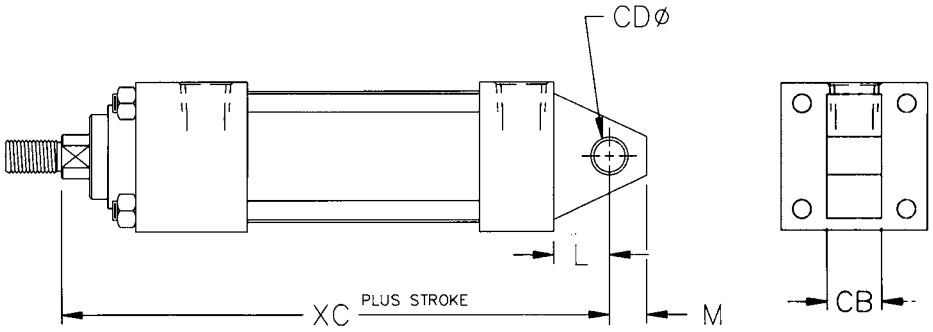


Mount Code P2 NFPA MP2

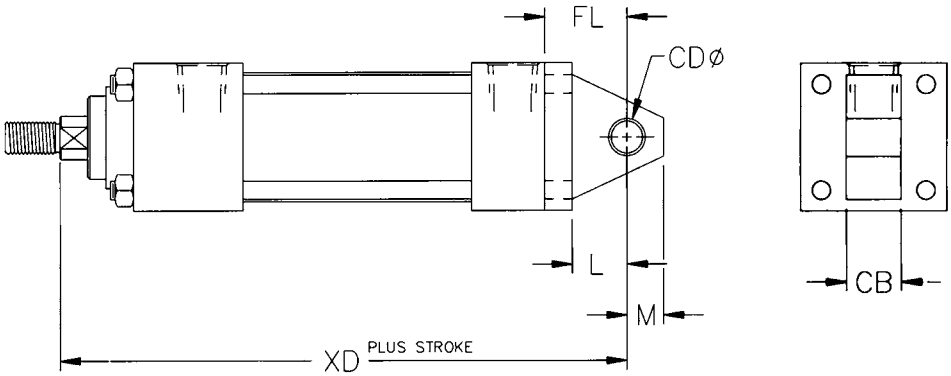
Dimensions

BORE	ROD	CB	CD	CW	FL	L	M	XC	XD
1-1/2"	0.625	0.750	0.500	0.500	1.125	0.750	0.500	5.375	5.750
	1.000	0.750	0.500	0.500	1.125	0.750	0.500	5.750	6.125
2"	0.625	0.750	0.500	0.500	1.125	0.750	0.500	5.375	5.750
	1.000	0.750	0.500	0.500	1.125	0.750	0.500	5.750	6.125
2-1/2"	0.625	0.750	0.500	0.500	1.125	0.750	0.500	5.500	5.875
	1.000	0.750	0.500	0.500	1.125	0.750	0.500	5.875	6.250
3-1/4"	1.000	1.250	0.750	0.625	1.875	1.250	0.750	6.875	7.500
	1.375	1.250	0.750	0.625	1.875	1.250	0.750	7.125	7.750
4"	1.000	1.250	0.750	0.625	1.875	1.250	0.750	6.875	7.500
	1.375	1.250	0.750	0.625	1.875	1.250	0.750	7.125	7.750
5"	1.000	1.250	0.750	0.625	1.875	1.250	0.750	7.125	7.750
	1.375	1.250	0.750	0.625	1.875	1.250	0.750	7.375	8.000
6"	1.375	1.500	1.000	0.750	2.250	1.500	1.000	8.125	8.875
	1.750	1.500	1.000	0.750	2.250	1.500	1.000	8.375	9.125

Eye Mounts



Mount Code P3 NFPA MP3



Mount Code P4 NFPA MP4

Dimensions

BORE	ROD	CB	CD	FL	L	M	XC	XD
1-1/2"	0.625	0.750	0.500	1.125	0.750	0.500	5.375	5.750
	1.000	0.750	0.500	1.125	0.750	0.500	5.750	6.125
2"	0.625	0.750	0.500	1.125	0.750	0.500	5.375	5.750
	1.000	0.750	0.500	1.125	0.750	0.500	5.750	6.125
2-1/2"	0.625	0.750	0.500	1.125	0.750	0.500	5.500	5.875
	1.000	0.750	0.500	1.125	0.750	0.500	5.875	6.250
3-1/4"	1.000	1.250	0.750	1.875	1.250	0.750	6.875	7.500
	1.375	1.250	0.750	1.875	1.250	0.750	7.125	7.750
4"	1.000	1.250	0.750	1.875	1.250	0.750	6.875	7.500
	1.375	1.250	0.750	1.875	1.250	0.750	7.125	7.750
5"	1.000	1.250	0.750	1.875	1.250	0.750	7.125	7.750
	1.375	1.250	0.750	1.875	1.250	0.750	7.375	8.000
6"	1.375	1.500	1.000	2.250	1.500	1.000	8.125	8.875
	1.750	1.500	1.000	2.250	1.500	1.000	8.375	9.125

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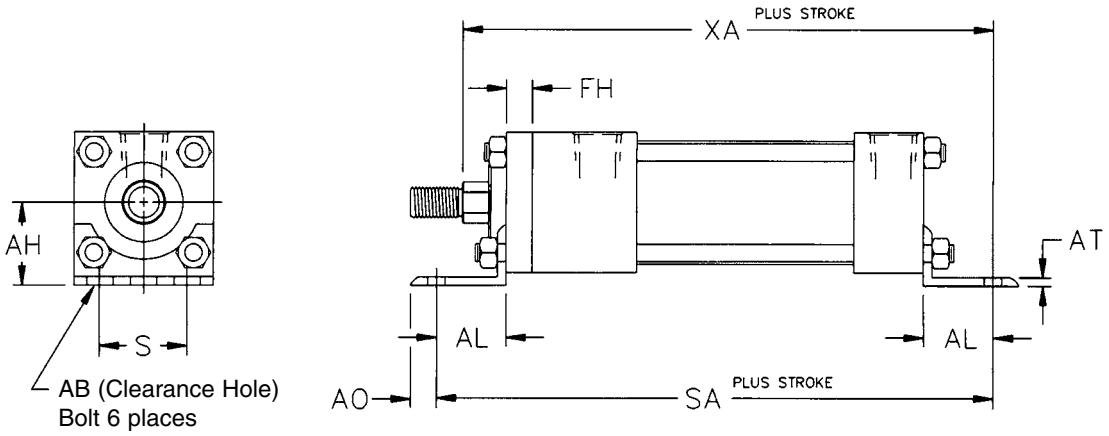
Angle Mount

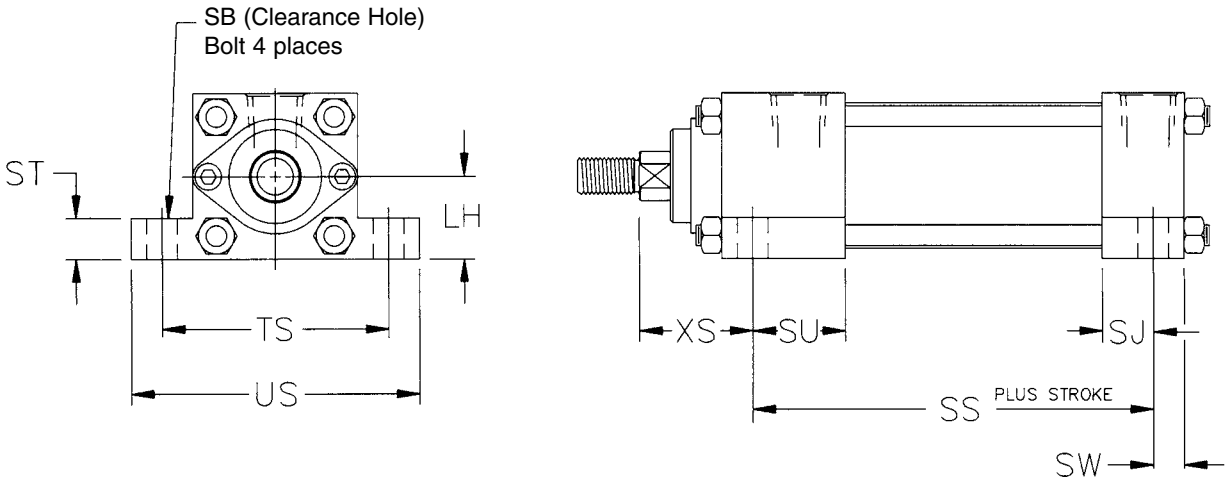


Mount Code S1 NFPA MS1

Dimensions

BORE	ROD	AB	AH	AL	AO	AT	FH	S	SA	XA
1-1/2"	0.625	0.375	1.188	1.000	0.375	0.125	0.375	1.250	6.000	5.625
	1.000	0.375	1.188	1.000	0.375	0.125	0.375	1.250	6.000	6.000
2"	0.625	0.375	1.438	1.000	0.375	0.125	0.375	1.750	6.000	5.625
	1.000	0.375	1.438	1.000	0.375	0.125	0.375	1.750	6.000	6.000
2-1/2"	0.625	0.375	1.625	1.000	0.375	0.125	0.375	2.250	6.125	5.750
	1.000	0.375	1.625	1.000	0.375	0.125	0.375	2.250	6.125	6.125
3-1/4"	1.000	0.500	1.938	1.250	0.500	0.125	0.625	2.750	7.375	6.875
	1.375	0.500	1.938	1.250	0.500	0.125	0.625	2.750	7.375	7.125
4"	1.000	0.500	2.250	1.250	0.500	0.125	0.625	3.500	7.375	6.875
	1.375	0.500	2.250	1.250	0.500	0.125	0.625	3.500	7.375	7.125
5"	1.000	0.625	2.750	1.375	0.625	0.188	0.625	4.250	7.875	7.250
	1.375	0.625	2.750	1.375	0.625	0.188	0.625	4.250	7.875	7.500
6"	1.375	0.750	3.250	1.375	0.625	0.188	0.750	5.250	8.500	8.000
	1.750	0.750	3.250	1.375	0.625	0.188	0.750	5.250	8.500	8.250

Side Lug Mount



Mount Code S2 NFPA MS2

Dimensions

BORE	ROD	LH	SB	SJ	SS	ST	SU	SW	TS	US	XS
1-1/2"	0.625	1.000	0.375	0.625	2.875	0.500	1.125	0.375	2.750	3.500	1.375
	1.000	1.000	0.375	0.625	2.875	0.500	1.125	0.375	2.750	3.500	1.750
2"	0.625	1.250	0.375	0.625	2.875	0.500	1.125	0.375	3.250	4.000	1.375
	1.000	1.250	0.375	0.625	2.875	0.500	1.125	0.375	3.250	4.000	1.750
2-1/2"	0.625	1.500	0.375	0.625	3.000	0.500	1.125	0.375	3.750	4.500	1.375
	1.000	1.500	0.375	0.625	3.000	0.500	1.125	0.375	3.750	4.500	1.750
3-1/4"	1.000	1.875	0.500	0.750	3.250	0.750	1.250	0.500	4.750	5.750	1.875
	1.375	1.875	0.500	0.750	3.250	0.750	1.250	0.500	4.750	5.750	2.125
4"	1.000	2.250	0.500	0.750	3.250	0.750	1.250	0.500	5.500	6.500	1.875
	1.375	2.250	0.500	0.750	3.250	0.750	1.250	0.500	5.500	6.500	2.125
5"	1.000	2.750	0.750	0.563	3.125	1.000	1.063	0.688	6.875	8.250	2.063
	1.375	2.750	0.750	0.563	3.125	1.000	1.063	0.688	6.875	8.250	2.313
6"	1.375	3.250	0.750	0.813	3.625	1.000	1.313	0.688	7.875	9.250	2.313
	1.750	3.250	0.750	0.813	3.625	1.000	1.313	0.688	7.875	9.250	2.563

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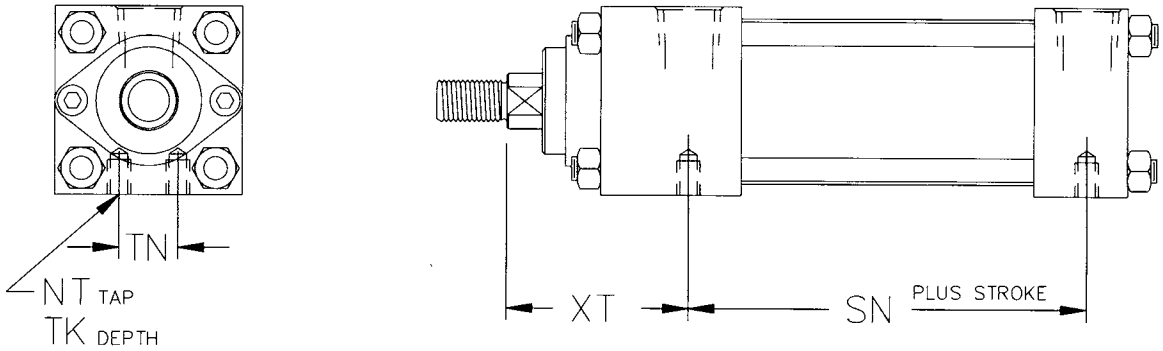
Bottom Tap Mount

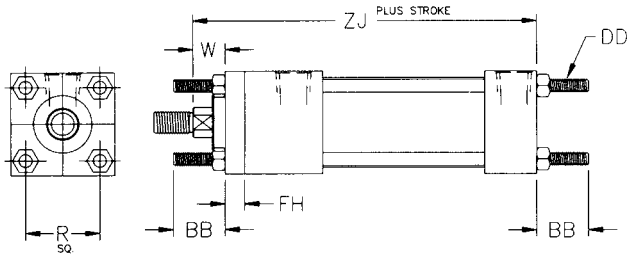


Mount Code S4 NFPA MS4

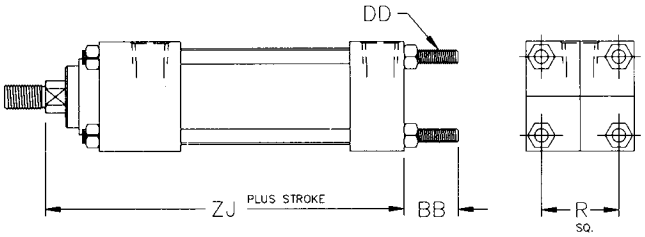
Dimensions

BORE	ROD	NT	TK	TN	SN	XT
1-1/2"	0.625	1/4-20	0.375	0.625	2.250	1.938
	1.000	1/4-20	0.313	0.625	2.250	2.313
2"	0.625	5/16-18	0.500	0.875	2.250	1.938
	1.000	5/16-18	0.500	0.875	2.250	2.313
2-1/2"	0.625	3/8-16	0.625	1.250	2.375	1.938
	1.000	3/8-16	0.625	1.250	2.375	2.313
3-1/4"	1.000	1/2-13	0.750	1.500	2.625	2.438
	1.375	1/2-13	0.750	1.500	2.625	2.688
4"	1.000	1/2-13	0.750	2.063	2.625	2.438
	1.375	1/2-13	0.750	2.063	2.625	2.688
5"	1.000	5/8-11	1.000	2.688	2.875	2.438
	1.375	5/8-11	1.000	2.688	2.875	2.688
6"	1.375	3/4-10	1.125	3.250	3.125	2.813
	1.750	3/4-10	1.125	3.250	3.125	3.063

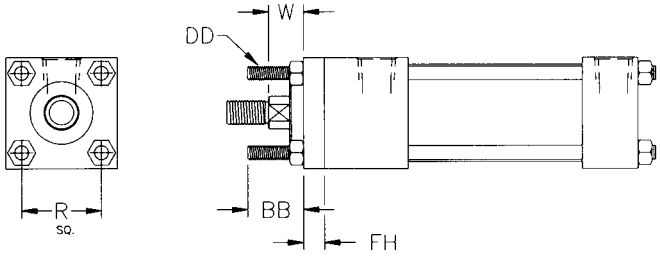
Extended Tie Rod Mounts



Mount Code X1 NFPA MX1



Mount Code X2 NFPA MX2



Mount Code X3 NFPA MX3

Dimensions

BORE	ROD	BB	DD	FH	R	W	ZJ
1-1/2"	0.625	1.000	1/4-28	0.375	1.430	0.625	4.625
	1.000	1.000	1/4-28	0.375	1.430	1.000	5.000
2"	0.625	1.125	5/16-24	0.375	1.840	0.625	4.625
	1.000	1.125	5/16-24	0.375	1.840	1.000	5.000
2-1/2"	0.625	1.125	5/16-24	0.375	2.190	0.625	4.750
	1.000	1.125	5/16-24	0.375	2.190	1.000	5.125
3-1/4"	1.000	1.375	3/8-24	0.625	2.760	0.750	5.625
	1.375	1.375	3/8-24	0.625	2.760	1.000	5.875
4"	1.000	1.375	3/8-24	0.625	3.320	0.750	5.625
	1.375	1.375	3/8-24	0.625	3.320	1.000	5.875
5"	1.000	1.813	1/2-20	0.625	4.100	0.750	5.875
	1.375	1.813	1/2-20	0.625	4.100	1.000	6.125
6"	1.375	1.813	1/2-20	0.750	4.880	0.875	6.625
	1.750	1.813	1/2-20	0.750	4.880	1.125	6.875

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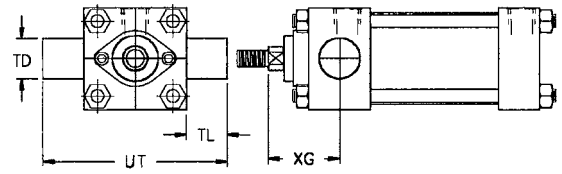
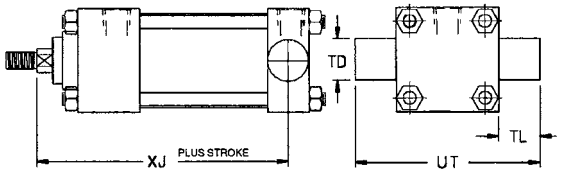
Trunnion Mounts



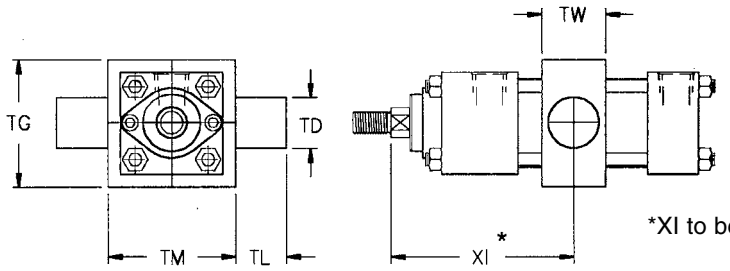
Mount Code T1 (Fixed Steel Trunnion Ears)
Mount Code T6 (Removable Aluminum Trunnion Ears)

NFPA MT1



Mount Code T2 (Fixed Steel Trunnion Ears)
Mount Code T7 (Removable Aluminum Trunnion Ears)

NFPA MT2



*XI to be specified by customer

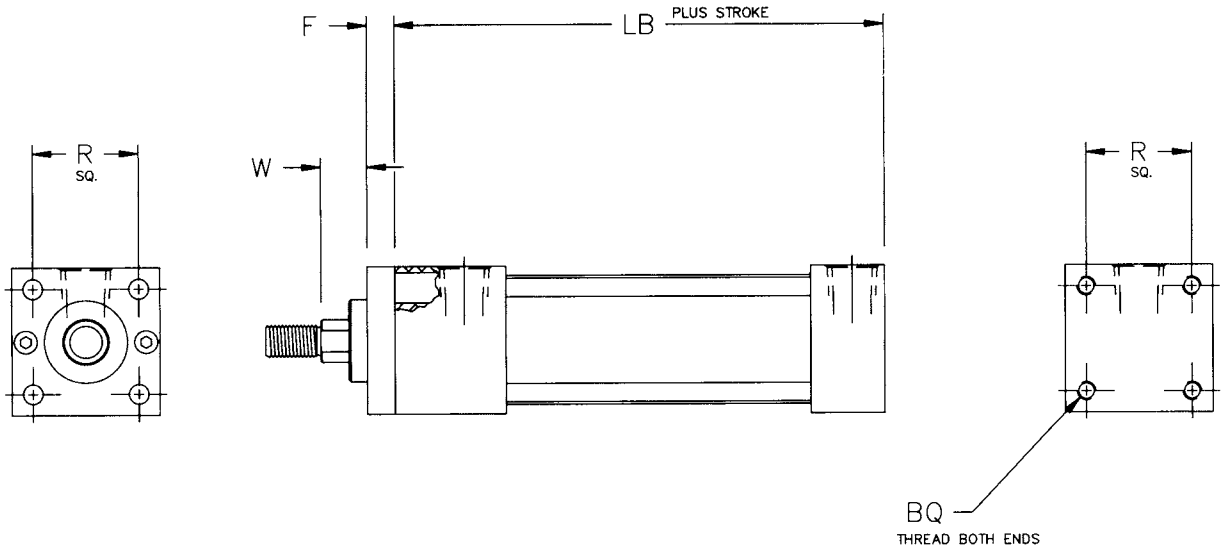
Mount Code T4

NFPA MT4

Dimensions

BORE	ROD	TD	TG	TL	TM	TW	UT	XG	XI (Min.)	XJ
1-1/2"	0.625	1.000	2.500	1.000	2.500	1.250	4.000	1.750	3.125	4.125
	1.000	1.000	2.500	1.000	2.500	1.250	4.000	2.125	3.500	4.500
2"	0.625	1.000	3.000	1.000	3.000	1.500	4.500	1.750	3.250	4.125
	1.000	1.000	3.000	1.000	3.000	1.500	4.500	2.125	3.625	4.500
2-1/2"	0.625	1.000	3.500	1.000	3.500	1.500	5.000	1.750	3.250	4.250
	1.000	1.000	3.500	1.000	3.500	1.500	5.000	2.125	3.625	4.625
3-1/4"	1.000	1.000	4.250	1.000	4.500	2.000	5.750	2.250	4.125	5.000
	1.375	1.000	4.250	1.000	4.500	2.000	5.750	2.500	4.375	5.250
4"	1.000	1.000	5.000	1.000	5.250	2.000	6.500	2.250	4.125	5.000
	1.375	1.000	5.000	1.000	5.250	2.000	6.500	2.500	4.375	5.250
5"	1.000	1.000	6.000	1.000	6.250	2.000	7.500	2.250	4.125	5.250
	1.375	1.000	6.000	1.000	6.250	2.000	7.500	2.500	4.375	5.500
6"	1.375	1.375	7.000	1.375	7.625	2.500	9.250	2.625	4.875	5.875
	1.750	1.375	7.000	1.375	7.625	2.500	9.250	2.875	5.125	6.125

Sleeve Nut Mount



Mount Code SN

Dimensions

BORE	ROD	BQ	F	LB	R	W
1-1/2"	0.625	1/4-28	0.375	3.625	1.430	0.625
	1.000	1/4-28	0.375	3.625	1.430	1.000
2"	0.625	5/16-24	0.375	3.625	1.840	0.625
	1.000	5/16-24	0.375	3.625	1.840	1.000
2-1/2"	0.625	5/16-24	0.375	3.750	2.190	0.750
	1.000	5/16-24	0.375	3.750	2.190	1.000
3-1/4"	1.000	3/8-24	0.625	4.250	2.760	0.750
	1.375	3/8-24	0.625	4.250	2.760	1.000
4"	1.000	3/8-24	0.625	4.250	3.320	0.750
	1.375	3/8-24	0.625	4.250	3.320	1.000
5"	1.000	1/2-20	0.625	4.500	4.100	0.750
	1.375	1/2-20	0.625	4.500	4.100	1.000
6"	1.375	1/2-20	0.625	5.000	4.880	0.875
	1.750	1/2-20	0.750	5.000	4.880	1.125

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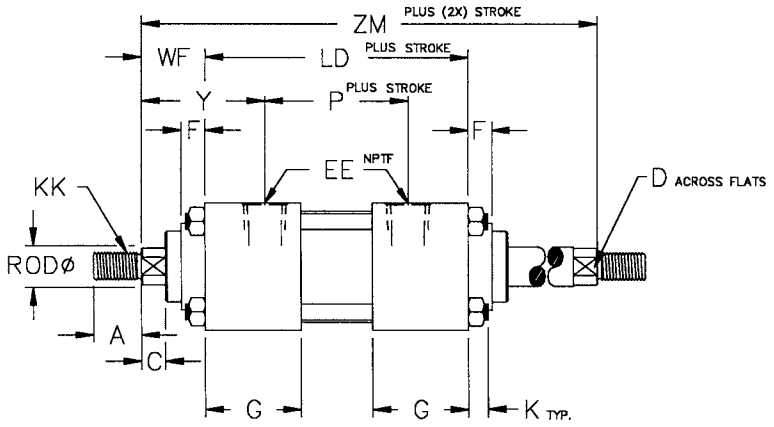
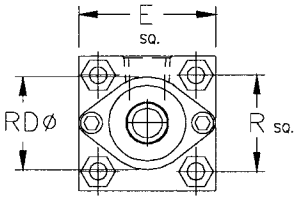
Double Rod End

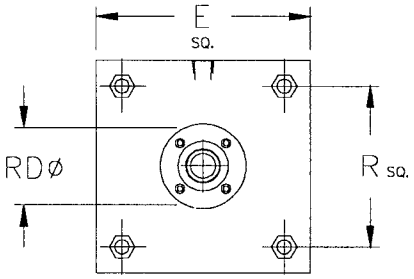


Order as "DA" Option

NFPA MDXO



1 1/2" Through 2 1/2"

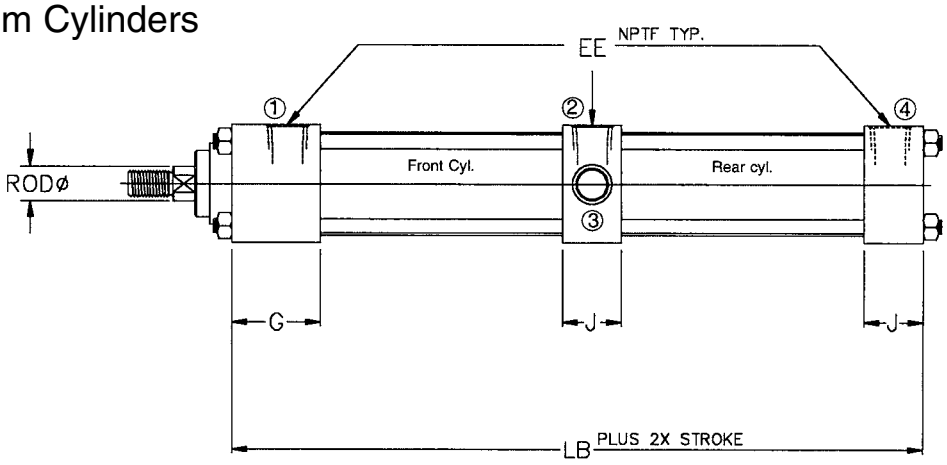


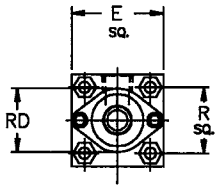
3 1/4" Through 6"

Dimensions

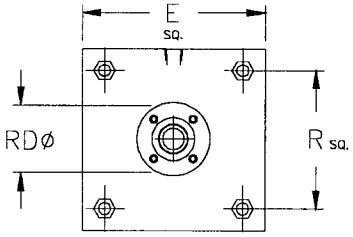
BORE	ROD	A	C	D	E	EE	F	G	K	KK	LD	P	R	SN	SS	RD	WF	Y	ZM
1-1/2"	0.625	0.750	0.375	0.500	2.000	0.375	0.375	1.500	0.250	7/16-20	4.125	2.250	1.430	2.250	3.375	1.375	1.000	1.938	6.125
	1.000	1.125	0.500	0.813	2.000	0.250	0.375	1.500	0.250	3/4-16	4.125	1.955	1.430	2.250	3.375	2.000	1.375	2.460	6.875
2"	0.625	0.750	0.375	0.500	2.500	0.375	0.375	1.500	0.313	7/16-20	4.125	2.250	1.840	2.250	3.375	1.375	1.000	1.938	6.125
	1.000	1.125	0.500	0.813	2.500	0.375	0.375	1.500	0.313	3/4-16	4.125	2.250	1.840	2.250	3.375	2.500	1.375	2.313	6.875
2-1/2"	0.625	0.750	0.375	0.500	3.000	0.375	0.375	1.500	0.313	7/16-20	4.250	2.375	2.190	2.375	3.500	1.375	1.000	1.938	6.250
	1.000	1.125	0.500	0.813	3.000	0.375	0.375	1.500	0.313	3/4-16	4.250	2.375	2.190	2.375	3.500	3.000	1.375	2.313	7.000
3-1/4"	1.000	1.125	0.500	0.813	3.750	0.500	0.625	1.750	0.375	3/4-16	4.750	2.625	2.760	2.625	3.750	2.706	1.375	2.438	7.500
	1.375	1.625	0.625	1.125	3.750	0.500	0.625	1.750	0.375	1-14	4.750	2.625	2.760	2.625	3.750	3.125	1.625	2.688	8.000
4"	1.000	1.125	0.500	0.813	4.500	0.500	0.625	1.750	0.375	3/4-16	4.750	2.625	3.320	2.625	3.750	2.706	1.375	2.438	7.500
	1.375	1.625	0.625	1.125	4.500	0.500	0.625	1.750	0.375	1-14	4.750	2.625	3.320	2.625	3.750	3.125	1.625	2.688	8.000
5"	1.000	1.125	0.500	0.813	5.500	0.500	0.625	1.750	0.500	3/4-16	5.000	2.875	4.100	2.875	3.625	2.706	1.375	2.438	7.750
	1.375	1.625	0.625	1.125	5.500	0.500	0.625	1.750	0.500	1-14	5.000	2.875	4.100	2.875	3.625	3.125	1.625	2.688	8.250
6"	1.375	1.625	0.625	1.125	6.500	0.750	0.625	2.000	0.500	1-14	5.500	3.125	4.880	3.125	4.125	3.125	1.625	2.813	8.750
	1.750	2.000	0.750	1.500	6.500	0.750	0.750	2.000	0.500	1 1/4-12	5.500	3.125	4.880	3.125	4.125	3.788	1.875	3.063	9.250

Tandem Cylinders





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



3-1/4" Through 6"

This configuration provides approximately twice the force of an equivalent basic double acting cylinder. Two pistons are attached to a common piston rod. Ports 2 and 4 are pressurized to roughly double the extend force. Ports 1 and 3 are pressurized to double the retract force.

Dimensions

BORE	ROD	E	EE	G	J	LB	R	RD
1-1/2"	0.625	2.000	3/8	1.500	1.000	5.750	1.430	1.375
	1.000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2"	0.625	2.500	3/8	1.500	1.000	5.750	1.840	1.375
	1.000	2.500	3/8	1.500	1.000	5.750	1.840	2.000
2-1/2"	0.625	3.000	3/8	1.500	1.000	6.000	2.190	1.375
	1.000	3.000	3/8	1.500	1.000	6.000	2.190	3.000
3-1/4"	1.000	3.750	1/2	1.750	1.250	6.750	2.760	2.706
	1.375	3.750	1/2	1.750	1.250	6.750	2.760	3.125
4"	1.000	4.500	1/2	1.750	1.250	6.750	3.320	2.706
	1.375	4.500	1/2	1.750	1.250	6.750	3.320	3.125
5"	1.000	5.500	1/2	1.750	1.250	7.250	4.100	2.706
	1.375	5.500	1/2	1.750	1.250	7.250	4.100	3.125
6"	1.375	6.500	3/4	2.000	1.500	8.000	4.880	3.125
	1.750	6.500	3/4	2.000	1.500	8.000	4.880	3.788

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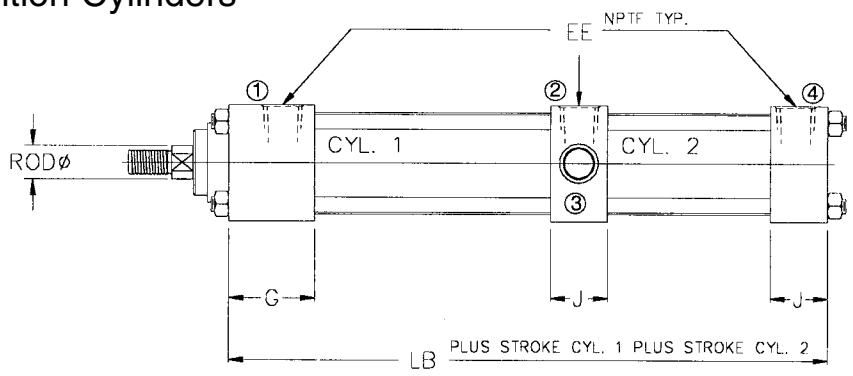
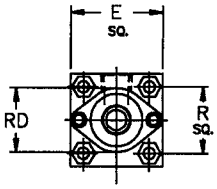
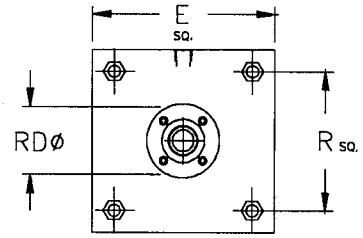
Multi-Position Cylinders





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



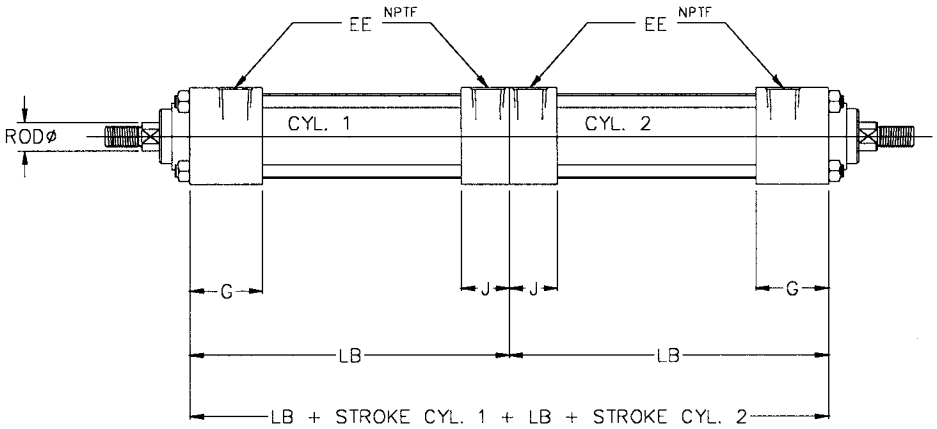
3-1/4" Through 6"

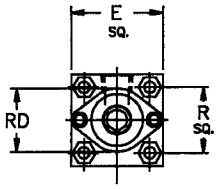
Multi-position cylinders look similar to tandem cylinders. However, in this cylinder the rear and front piston rods are separate. The stroke from full retract to the intermediate extend point is set by the stroke of cylinder #2. The total stroke from full retract to full extend is set by the stroke cylinder #1. Full extend or retract is achieved by pressurizing ports 2 or 1 respectively with ports 3 and 4 vented. An intermediate position is achieved by pressurizing port 4 with the other ports vented or by pressurizing both ports 1 and 4. With 1 and 4 pressurized, the rod is more positively held in the intermediate position.

Dimensions

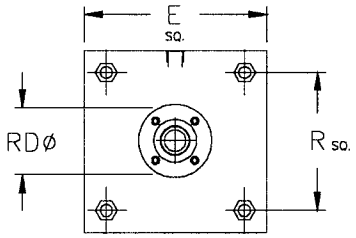
BORE	ROD	E	EE	G	J	LB	R	RD
1-1/2"	0.625	2.000	3/8	1.50	1.00	5.750	1.430	1.375
	1.000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2"	0.625	2.500	3/8	1.500	1.000	5.750	1.840	1.375
	1.000	2.500	3/8	1.500	1.000	5.750	1.840	2.000
2-1/2"	0.625	3.000	3/8	1.500	1.000	6.000	2.190	1.375
	1.000	3.000	3/8	1.500	1.000	6.000	2.190	3.000
3-1/4"	1.000	3.750	1/2	1.750	1.250	6.750	2.760	2.706
	1.375	3.750	1/2	1.750	1.250	6.750	2.760	3.125
4"	1.000	4.500	1/2	1.750	1.250	6.750	3.320	2.706
	1.375	4.500	1/2	1.750	1.250	6.750	3.320	3.125
5"	1.000	5.500	1/2	1.750	1.250	7.250	4.100	2.706
	1.375	5.500	1/2	1.750	1.250	7.250	4.100	3.125
6"	1.375	6.500	3/4	2.000	1.500	8.000	4.880	3.125
	1.750	6.500	3/4	2.000	1.500	8.000	4.880	3.788

Back to Back Cylinders





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



3-1/4" Through 6"

This configuration is two cylinders mounted back to back. Each cylinder can be operated independently. The cylinders can have the same stroke or different strokes. This configuration enables you to have four combinations of rods extended or retracted.

Dimensions

BORE	ROD	E	EE	G	J	LB	R	RD
1-1/2"	0.625	2.000	3/8	1.500	1.000	3.625	1.430	1.375
	1.000	2.000	1/4	1.500	1.000	3.625	1.430	2.000
2"	0.625	2.500	3/8	1.500	1.000	3.625	1.840	1.375
	1.000	2.500	3/8	1.500	1.000	3.625	1.840	2.000
2-1/2"	0.625	3.000	3/8	1.500	1.000	3.750	2.190	1.375
	1.000	3.000	3/8	1.500	1.000	3.750	2.190	3.000
3-1/4"	1.000	3.750	1/2	1.750	1.250	4.250	2.760	2.706
	1.375	3.750	1/2	1.750	1.250	4.250	2.760	3.125
4"	1.000	4.500	1/2	1.750	1.250	4.250	3.320	2.706
	1.375	4.500	1/2	1.750	1.250	4.250	3.320	3.125
5"	1.000	5.500	1/2	1.750	1.250	4.500	4.100	2.706
	1.375	5.500	1/2	1.750	1.250	4.500	4.100	3.125
6"	1.375	6.500	3/4	2.000	1.500	5.000	4.880	3.125
	1.750	6.500	3/4	2.000	1.500	5.000	4.880	3.788

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

Air-Oil Tanks

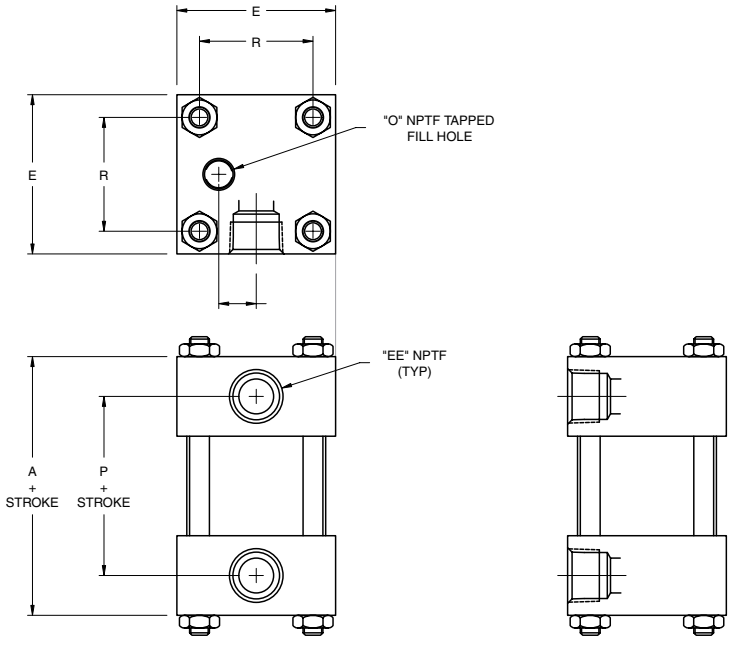
The Numatics Air-Oil Tank offers a way to convert available (shop) air pressure into hydraulic pressure. Compressed air is applied directly to the oil that is in the air-oil tank. In turn, it is converted into hydraulic pressure. Note that the pressure is converted at a 1 to 1 ratio. For example, 90 psi air produces 90 psi hydraulic pressure.

All Numatics Air-Oil Tanks have a sight level gauge, which shows the oil level. They also contain two fluid flow baffles. The top baffle disperses the incoming air over the surface of the oil in an effort to inhibit agitation. The bottom baffle ensures a smooth flow pattern. This will minimize oil turbulence and eliminate swirling. Swirling could cause the oil to be blown from the tank into atmosphere.

Air-Oil Tanks are used to assist in making the piston rod travel smooth and effortless. In turn, preventing unwanted chatter. Air-Oil Tanks are commonly used in slow speed applications. Fluid velocity in or out of the tank through standard ports should be less than 6 feet per second. Again, this will prevent the oil from being blown from the tank into atmosphere. Since each tank is designed for a specific port size, note that increasing the port size in an effort to decrease the fluid velocity is not recommended. Subsequently, a tank with a larger port should be selected.

BORE	STROKE (IN) 4 VOLUME (IN^3)	STROKE (IN) 8 VOLUME (IN^3)	STROKE (IN) 12 VOLUME (IN^3)	STROKE (IN) 16 VOLUME (IN^3)	STROKE (IN) 20 VOLUME (IN^3)	STROKE (IN) 24 VOLUME (IN^3)
2"	12.6	25.1	37.7	50.3	62.8	75.4
2-1/2"	19.6	39.3	58.9	78.5	98.2	117.8
3-1/4"	33.2	66.4	99.5	132.7	165.9	199.1
4"	50.3	100.5	150.8	201.1	251.3	301.6
5"	78.5	157.1	235.6	314.2	392.7	471.2
6"	113.1	226.2	339.3	452.4	565.5	678.6
8"	201.1	402.1	603.2	804.2	1005.3	1206.4

X0 Mount

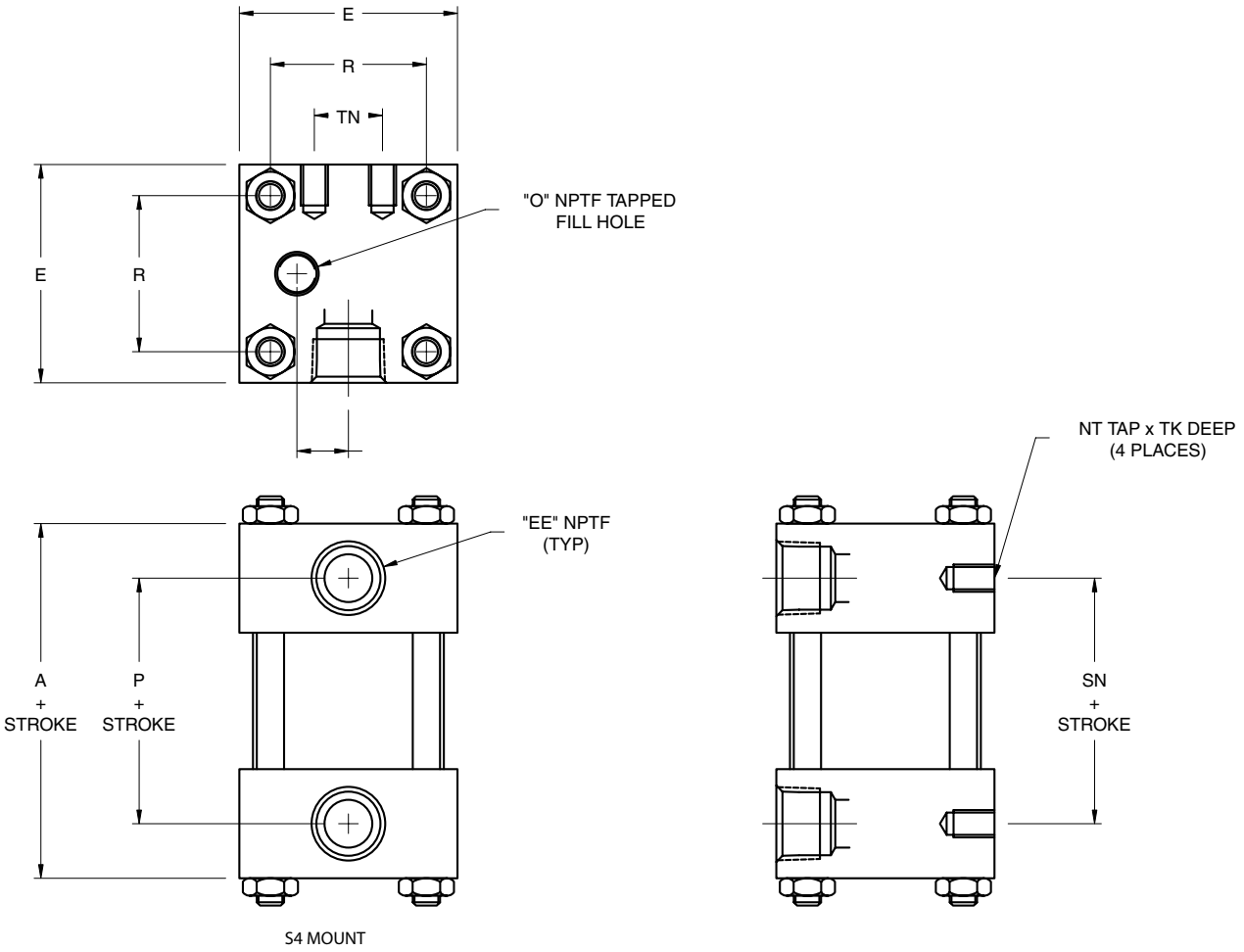


X0 MOUNT

Dimensions

BORE	A	E	EE	M	O	P	R
2"	2.00	2.50	3/8	0.56	1/4	1.12	1.84
2-1/2"	2.00	3.00	3/8	0.69	1/4	1.12	2.19
3-1/4"	2.50	3.75	1/2	0.88	3/8	1.38	2.76
4"	2.50	4.50	1/2	0.88	3/8	1.38	3.32
5"	2.50	5.50	1/2	1.31	3/8	1.38	4.10
6"	3.00	6.50	1/2	1.31	3/8	1.63	4.88
8"	3.00	8.50	3/4	2.25	1/2	1.63	6.44

S4 Mount



Dimensions

BORE	A	E	EE	M	O	P	R	NT	SN	TK	TN
2"	2.00	2.50	3/8	0.56	1/4	1.12	1.84	5/16-18 UNC-2B	1.13	0.28	0.88
2-1/2"	2.00	3.00	3/8	0.69	1/4	1.12	2.19	3/8-16 UNC-2B	1.13	0.28	1.25
3-1/4"	2.50	3.75	1/2	0.88	3/8	1.38	2.76	1/2-13 UNC-2B	1.37	0.25	1.50
4"	2.50	4.50	1/2	0.88	3/8	1.38	3.32	1/2-13 UNC-2B	1.37	0.50	2.06
5"	2.50	5.50	1/2	1.31	3/8	1.38	4.10	5/8-11 UNC-2B	1.37	1.00	2.69
6"	3.00	6.50	1/2	1.31	3/8	1.63	4.88	3/4-10 UNC-2B	1.63	0.94	3.25
8"	3.00	8.50	3/4	2.25	1/2	1.63	6.44	3/4-10 UNC-2B	1.63	0.94	4.50

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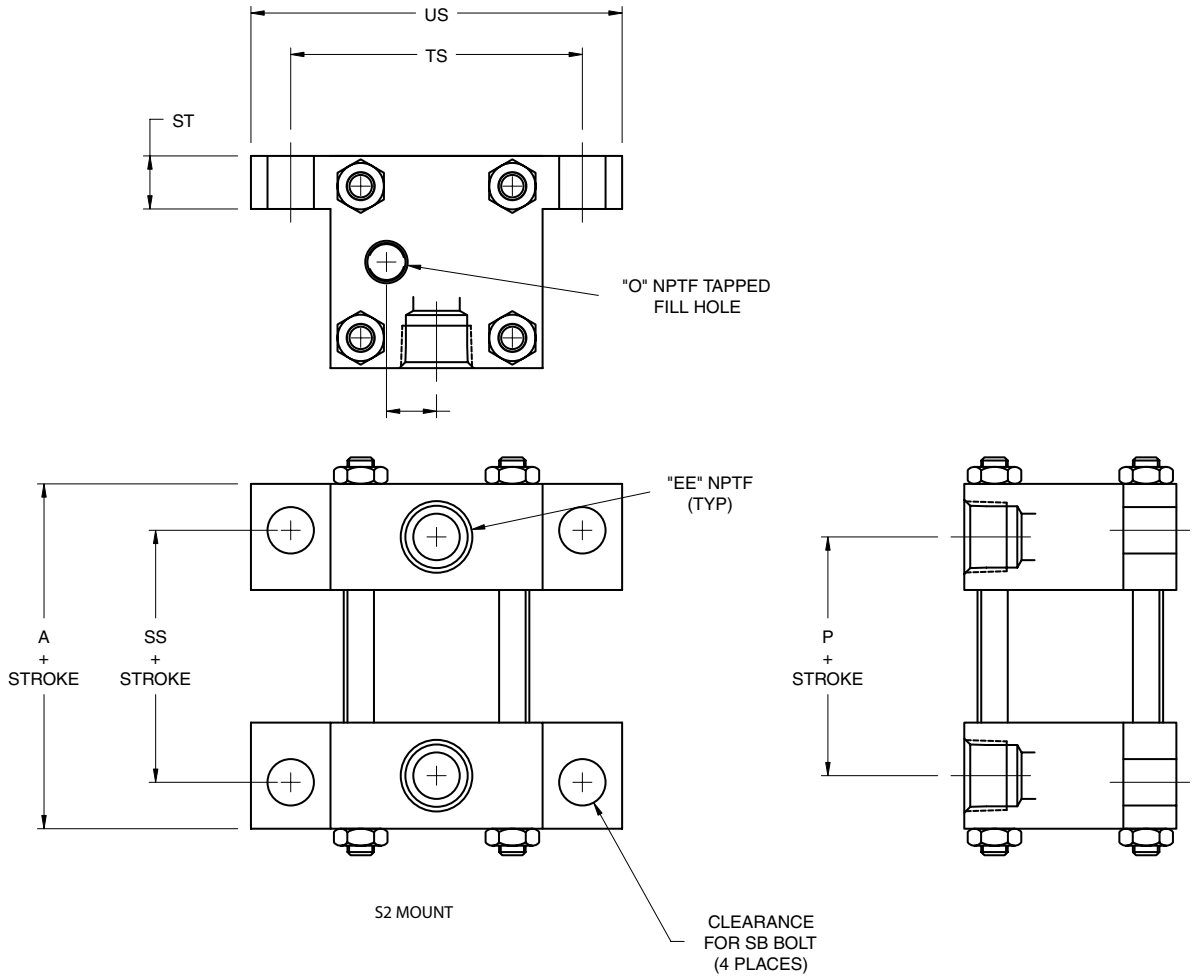
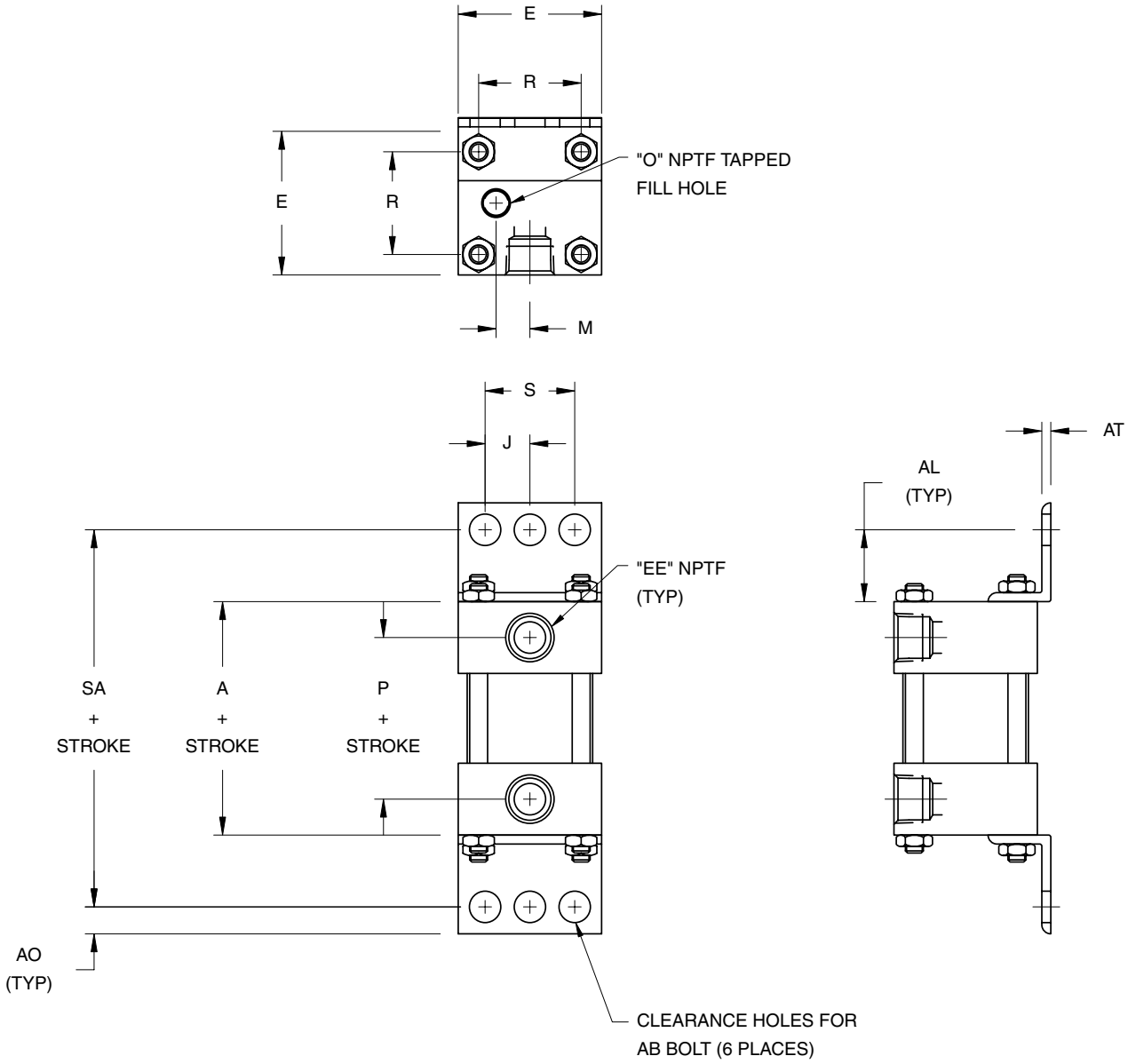
S2 Mount



Dimensions

BORE	A	EE	M	O	P	SB	SS	ST	TS	US
2"	2.00	3/8	0.56	1/4	1.12	3/8	1.13	0.50	3.25	4.00
2-1/2"	2.00	3/8	0.69	1/4	1.12	3/8	1.13	0.50	3.75	4.50
3-1/4"	2.50	1/2	0.88	3/8	1.38	1/2	1.44	0.75	4.75	5.75
4"	2.50	1/2	0.88	3/8	1.38	1/2	1.44	0.75	5.50	6.50
5"	2.50	1/2	1.31	3/8	1.38	3/4	1.44	1.00	6.88	8.25
6"	3.00	1/2	1.31	3/8	1.63	3/4	1.69	1.00	7.88	9.25
8"	3.00	3/4	2.25	1/2	1.63	3/4	1.69	1.00	9.88	11.25

S1 Mount



Dimensions

BORE	A	AO	AL	AT	J	E	EE	M	O	P	R	S	SA	AB
2"	2.00	0.38	1.00	0.13	0.88	2.50	3/8	0.56	1/4	1.12	1.84	1.75	4.00	3/8
2-1/2"	2.00	0.38	1.00	0.13	1.13	3.00	3/8	0.69	1/4	1.12	2.19	2.25	4.00	3/8
3-1/4"	2.50	0.50	1.25	0.13	1.38	3.75	1/2	0.88	3/8	1.38	2.76	2.75	5.00	1/2
4"	2.50	0.50	1.25	0.13	1.75	4.50	1/2	0.88	3/8	1.38	3.32	3.50	5.00	1/2
5"	2.50	0.63	1.38	0.19	2.13	5.50	1/2	1.31	3/8	1.38	4.10	4.25	5.25	5/8
6"	3.00	0.63	1.38	0.19	2.63	6.50	1/2	1.31	3/8	1.63	4.88	5.25	5.75	3/4
8"	3.00	0.69	1.81	0.25	3.56	8.50	3/4	2.25	1/2	1.63	6.44	7.13	6.63	3/4

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

Stop Tube Data

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

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

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

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

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

Example:

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

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

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

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

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

Table 1

MOUNT CODE	“L” (INCHES)
E3*	4 x (W + Stroke)
E4*	4 x (WF + Stroke)
P1 & U3	XC + (2 x Stroke)
S1*	4 x (WF + Stroke)
S2*	4 x (WF + Stroke)
S4*	4 x (WF + Stroke)
X3*	4 x (WF + Stroke)
X2*	4 x (WF + Stroke)
X1*	4 x (WF + Stroke)
T1	XG + Stroke
T2	XJ + (2 x Stroke)
T3	XI + Stroke

Table 2

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

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

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

Force Tables

The **extend force** is determined from Table 1 based on the operating pressure and cylinder bore size. Then determine the Retract Force by subtracting the "Retract Force Deduction" from the Extend Force. The "Retract Force Deduction" is found in Table 2 below corresponding to the piston rod diameter and operating pressure. These forces are theoretical based on areas with no friction allowance.

Table 1 Force Chart Extend

BORE	PISTON AREA	PRESSURE											CUBIC FEET DISPLACEMENT PER INCH OF EXTENDED STROKE
		40	50	60	80	90	100	125	150	175	200	400	
1.50	1.77	71	88	106	141	159	177	221	265	309	353	707	.00102
2.00	3.14	126	157	188	251	283	314	393	471	550	628	1257	.00182
2.50	4.91	196	245	295	393	442	491	614	736	859	982	1963	.00284
3.25	8.30	332	415	498	664	747	830	1037	1244	1452	1659	3318	.00480
4.00	12.57	503	628	754	1005	1131	1257	1571	1885	2199	2513	5027	.00727
5.00	19.63	785	982	1178	1571	1767	1963	2454	2945	3436	3927	7854	.01136
6.00	28.27	1131	1414	1696	2262	2545	2827	3534	4241	4948	5655	11310	.01636

Table 2 Retract Force Deduction

ROD	ROD AREA	PRESSURE											CUBIC FEET DISPLACEMENT PER INCH OF STROKE
		40	50	60	80	90	100	125	150	175	200	400	
.625	.307	12	15	18	25	28	31	38	46	54	61	123	.00018
1.000	.785	31	39	47	63	71	79	98	118	137	157	314	.00045
1.375	1.485	59	74	89	119	134	148	186	223	260	297	594	.00086
1.750	2.405	96	120	144	192	216	241	301	361	421	481	962	.00139

Stop tube Selection

Stop tubes are required for long stroke applications. The stop tube length is calculated based on the mount style, stroke and other mounting dimensions. Use the chart on *page 25* to determine the stop tube length for all A Series cylinders 1 1/2" bore through 6" bore.

Common Cylinder Options

For spring extend/retract cylinders consult factory with bore, stroke and spring force requirements.
Viton seals for ambient temperatures to 385 degrees Fahrenheit are also available.
Bumpers are available upon request.

Approximate Cylinder Weights (lbs)

BORE	1-1/2"		2"		2-1/2"		3-1/4"		4"		5"		6"	
Piston Rod Diameter	5/8"	1"	5/8"	1"	5/8"	1"	1"	1-3/8"	1"	1-3/8"	1"	1-3/8"	1-3/8"	1-3/4"
X0, S4	2.10	2.80	2.70	3.40	3.60	4.30	7.10	8.40	9.30	10.80	13.00	14.00	22.00	22.50
F1, F2, S2	2.70	3.50	3.70	4.40	5.00	5.70	10.30	12.00	14.00	15.40	20.00	21.00	32.00	34.00
P2, P4	3.20	4.00	4.10	5.00	5.50	6.40	11.50	13.10	15.50	16.40	20.10	21.80	35.00	36.00
T1, T2	2.60	3.30	3.10	3.90	4.00	4.80	7.50	8.90	9.90	11.30	13.70	15.00	23.00	25.00
P1, P3, X1, X2, X3, S1	2.30	3.00	2.80	3.50	3.70	4.50	7.50	9.00	9.90	11.30	13.30	15.00	23.00	25.00
Per Inch Of Stroke	0.24	0.40	0.30	0.40	0.30	0.44	0.50	0.70	0.60	0.80	0.60	0.80	0.90	1.14

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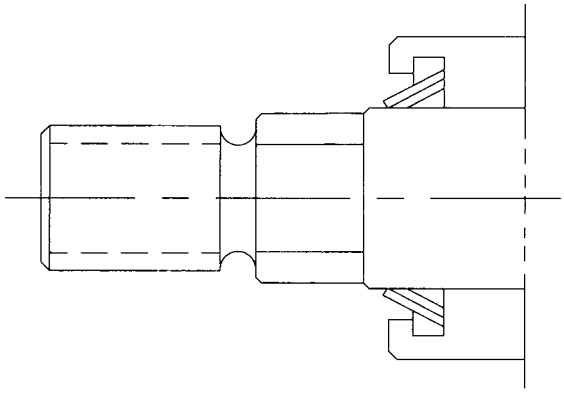
Metallic Rod Scraper



A rod scraper may be necessary when the cylinder must endure paint overspray, weld splatter or flyash.

Order as “MA” Option

Electroless Nickel Protection

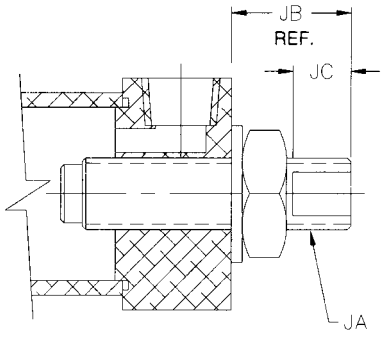
Electroless Nickel Plated NFPA Air Cylinder for Use in Corrosive Environments

1. Tie rods and tie rod nuts are 300 series stainless steel.
2. Piston rod is 303 stainless steel turned, ground, polished and hard chrome plated.
3. Tube, head, cap, bushing retainer and all mounts are protected from corrosion with .0005 thick electroless nickel plating.
4. The rod bushing is a cutting edge PolyLube™ composite bushing.
5. Reed, Hall and Prox switches are NEMA 4 approved for corrosive and wash down environments.
6. Mounting accessories are available with electroless nickel plating.

For detailed information regarding the properties of PolyLube™, call 1-800-918-9261.

Order as “NA” Option

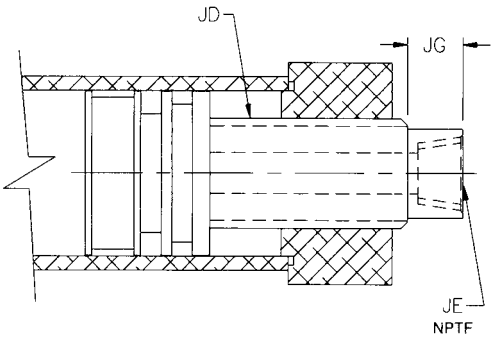
Adjustable Stroke Cylinder



Order as “KA” Option

BORE	JA	JB	JC
1-1/2"	5/8-11	1.50	1.125
2"	5/8-11	1.50	1.125
2-1/2"	5/8-11	1.50	1.125
3-1/4"	1-14	1.25	0.703
4"	1-14	1.25	0.703
5"	1-14	1.25	0.703
6"	1-14	1.00	0.453

Save Air Stroke Adjuster



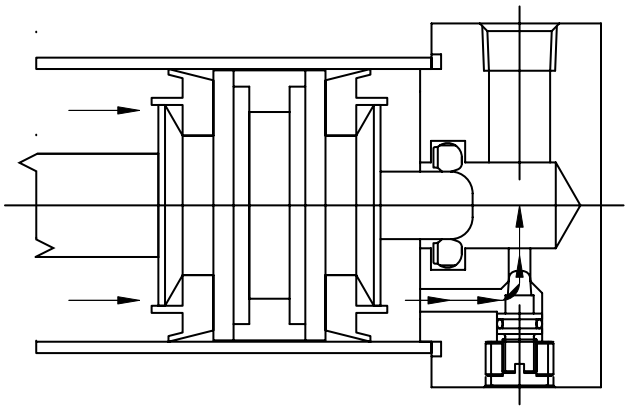
Order as “RA” Option

BORE	JD	JE	JG
1-1/2"	1-8 UNC-2A	3/8	0.50
2"	1-8 UNC-2A	3/8	0.50
2-1/2"	1 3/4-5 UNC-2A	1/2	0.50
3-1/4"	1 3/4-5 UNC-2A	3/4	0.75
4"	1 3/4-5 UNC-2A	3/4	0.75
5"	1 3/4-5 UNC-2A	3/4	0.75
6"	2-4 1/2 UNC-2A	1	0.75

Silencer Bumper Seal

Our “Silencer” design reduces the noise caused by the final impact of the piston against the cap. It also allows usage of standard pneumatic cushions in order to further reduce the amount of end of stroke noise and impact while still giving the deceleration benefits. When the cushion spear enters into the cushion seal, the cushioning effect takes place by trapping air and then metering it out at a rate set via the adjustable cushion needle.

Note: Silencer Bumper does not add length to the cylinder, but a minimum force of 60PSI must be applied to collapse the seals to reach the full extend and retract positions.



Techincal Data

A Series Bore Sizes:	1 1/2", 2", 2 1/2", 4" and 5"
Temperature:	-20°F to 200°F
Pressure Rating:	150 psi air

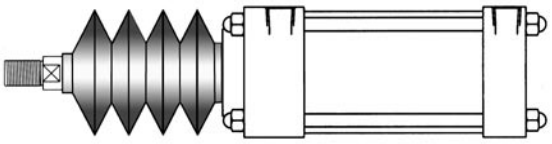
Static Stroke Length Reduction Based on PSI

BORE	0 PSI	20 PSI	40 PSI	60 PSI	80 PSI	100 PSI
1-1/2"	0.106	0.056	0.028	0.018	0.000	0.000
2"	0.090	0.070	0.046	0.037	0.018	0.000
2 1/2"	0.201	0.166	0.122	0.071	0.008	0.000
3 1/4"	0.160	0.102	0.082	0.048	0.038	0.000
4"	0.150	0.085	0.065	0.031	0.005	0.000
5"	0.219	0.158	00.099	0.530	0.015	0.000

Rod Boot

Our cylinder has a hardened bearing surface on the piston rod to protect it from external damage. Furthermore, the cylinder is also equipped with a highly efficient rod wiper. A rod wiper removes external contaminants such as dirt and dust. Exposed piston rods that are subjected to contaminants that contain hardening properties, i.e., paint, must be protected to ensure long life. In these applications, you should consider using a collapsing cover to protect the piston rod. The collapsing cover is commonly referred to as a Rod Boot.

NOTE: High temperature rood boot available (option GA). Consult factory for detailed rod boot information.



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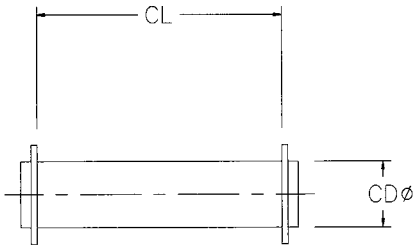
Accessories

Accessories Guide

ROD THREAD	ROD CLEVIS	EYE BRACKET	PIVOT PIN	ROD EYE	CLEVIS BRACKET	BORE
7/16-20	A500-301	A500-101	A500-401	A500-201	A500-001	1 1/2, 2, 2 1/2
1/2-20	A500-302	A500-101	A500-401	A500-202	A500-001	1 1/2, 2, 2 1/2
3/4-16	A500-303	A500-102	A500-402	A500-203	A500-002	3 1/4, 4, 5
7/8-14	A500-304	A500-102	A500-403	–	–	–
1-14	A500-305	A500-103	A500-403	A500-204	A500-003	6
1 1/4-12	A500-306	A500-104	A500-404	A500-205	–	–
1 1/2-12	A500-307	A500-105	A500-405	A500-206	–	–

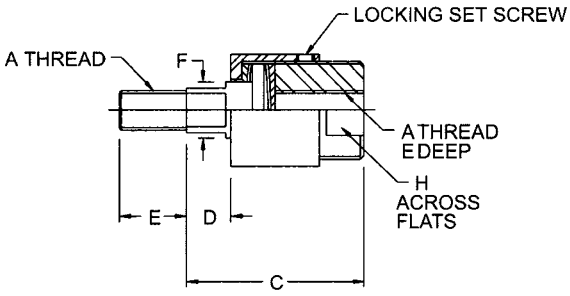


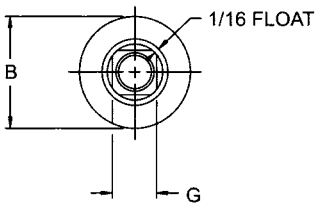
Included with mount codes P1, P2, P3 and P4

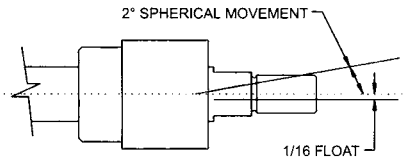
Pivot Pin

PART NO.	CD	CL
A500-401	0.500	1.875
A500-402	0.750	2.625
A500-403	1.000	3.125
A500-404	1.375	4.125
A500-405	1.750	5.125

Rod Couplers





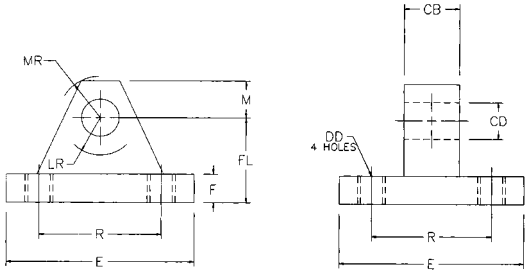


Standard Couplers

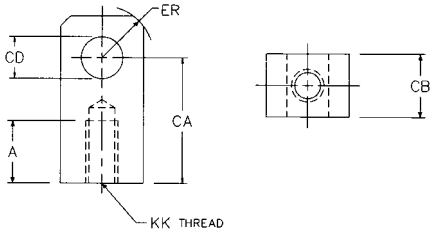
PART NUMBER		A	B	C	D	E	F	G	H	MAXIMUM PULL LOAD
STANDARD	NICKEL									
A500-603	B500-603	7/16-20	1 1/4	2	1/2	3/4	5/8	1/2	1	2,535
A500-604	B500-604	1/2-20	1 1/4	2	1/2	3/4	5/8	1/2	1	3,500
A500-605	B500-605	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1	4,750
A500-606	B500-606	3/4-16	1 3/4	2 5/16	1/2	1 1/8	31/32	13/16	1 1/2	8,750
A500-607	B500-607	7/8-14	1 3/4	2 5/16	1/2	1 1/8	31/32	13/16	1 1/2	9,750
A500-608	B500-608	1-14	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 5/32	2 1/4	16,125
A500-609	B500-609	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 5/32	2 1/4	19,600
N35-1001	N35-1004	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	34,000

Accessories

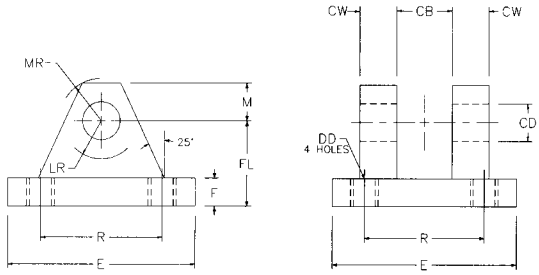
Eye Bracket *



Rod Eye *

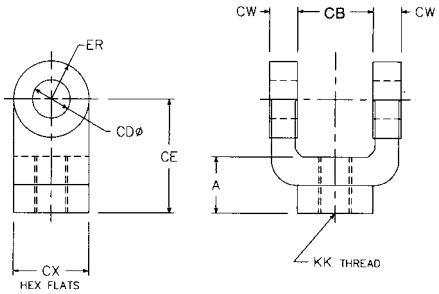


Clevis Bracket *



*Order pivot pin separately

Rod Clevis *



Dimensions

PART NO.	A	CA	CB	CD	CE	CW	CX	DD	E	ER	F	FL	KK	LR	M	MR	R
Clevis Bracket																	
A500-001	-	-	0.750	0.500	-	0.500	-	3/8-24	2.500	-	0.375	1.125	-	0.500	0.500	0.563	1.625
A500-002	-	-	1.250	0.750	-	0.625	-	1/2-20	3.500	-	0.625	1.875	-	1.063	0.750	1.063	2.563
A500-003	-	-	1.500	1.000	-	0.750	-	5/8-18	4.500	-	0.750	2.250	-	1.250	1.000	1.125	3.250
Eye Bracket																	
A500-101	-	-	0.750	0.500	-	-	-	0.406	2.500	-	0.375	1.125	-	0.750	0.500	0.563	1.630
A500-102	-	-	1.250	0.750	-	-	-	0.531	3.500	-	0.625	1.875	-	1.250	0.750	0.875	2.560
A500-103	-	-	1.500	1.000	-	-	-	0.656	4.500	-	0.750	2.250	-	1.500	1.000	1.250	3.250
A500-104	-	-	2.000	1.375	-	-	-	0.656	5.000	-	0.875	3.000	-	2.125	1.375	1.625	3.810
A500-105	-	-	2.500	1.750	-	-	-	0.906	6.500	-	0.875	3.125	-	2.250	1.750	2.125	4.950
Rod Clevis																	
A500-301	0.750	-	0.750	0.500	1.500	0.500	1.000	-	-	0.500	-	-	7/16-20	-	-	-	-
A500-302	0.750	-	0.750	0.500	1.500	0.500	1.000	-	-	0.500	-	-	1/2-20	-	-	-	-
A500-303	1.125	-	1.250	0.750	2.375	0.625	1.250	-	-	0.750	-	-	3/4-16	-	-	-	-
A500-304	1.625	-	1.500	1.000	3.125	0.750	1.500	-	-	1.000	-	-	7/8-14	-	-	-	-
A500-305	1.625	-	1.500	1.000	3.125	0.750	1.500	-	-	1.000	-	-	1-14	-	-	-	-
A500-306	2.000	-	2.000	1.375	4.125	1.000	2.000	-	-	1.375	-	-	1 1/4-12	-	-	-	-
A500-307	2.250	-	2.500	1.750	4.500	1.250	2.375	-	-	1.750	-	-	1 1/2-12	-	-	-	-
Rod Eye																	
A500-201	0.750	1.500	0.750	0.500	-	-	-	-	-	0.625	-	- -	7/16-20	-	-	-	-
A500-202	0.750	1.500	0.750	0.500	-	-	-	-	-	0.625	-	-	1/2-20	-	-	-	-
A500-203	1.125	2.063	1.250	0.750	-	-	-	-	-	0.875	-	-	3/4-16	-	-	-	-
A500-204	1.625	2.813	1.500	1.000	-	-	-	-	-	1.188	-	-	1-14	-	-	-	-
A500-205	2.000	3.438	2.000	1.375	-	-	-	-	-	1.563	-	-	1 1/4-12	-	-	-	-
A500-206	2.250	4.000	2.500	1.750	-	-	-	-	-	2.000	-	-	1 1/2-12	-	-	-	-

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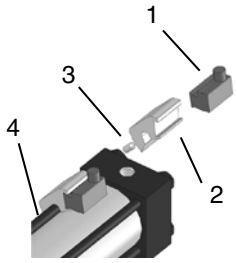
A Series World application Detail

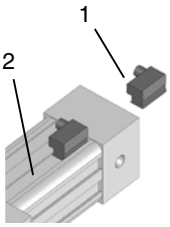
Round Tube and Tie Rod Detail

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



Profile Tube Detail

1. World Switch
2. Dove Tail extrusion



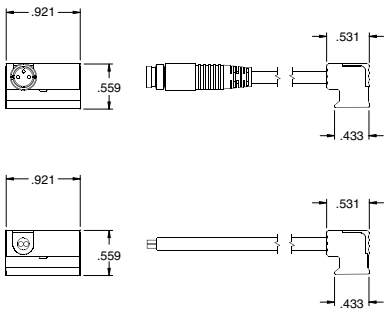
A series World Switch Bracket

Cylinders	Bore	Part Number
A series Tie Rod	1 1/2”	SB6-K01
A series Tie Rod	2”-2 1/2”	SB6-L01
A series Tie Rod	3 1/4”-4”	SB6-P01
A series Tie Rod	5”-6”	SB6-T01
A series Tie Rod	8”	SB6-W01
A series Profile	1 1/2”-3 1/4”	Direct Fit

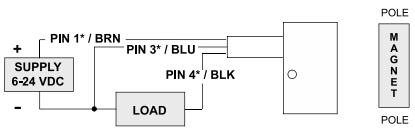
A series World Switch Hall Effect Part Numbers

P/N	Switch Style	Switch Type	Function	Switching Voltage	Switching Current	Switching Power	Voltage Drop
SH6-031	3m Wire Version	Hall Effect for Reed Magnet & Light Sourcing	Normally Open Sourcing (PNP)	6 -24 VDC	0.3 Amps Max.	7.2 Watts Max.	0.5 Volts
SH6-021	8m Connector Pigtail	Hall Effect for Reed Magnet & Light Sourcing	Normally Open Sourcing (PNP)	6 -24 VDC	0.3 Amps Max.	7.2 Watts Max.	0.5 Volts
SH6-032	3m Wire Version	Hall Effect for Reed Magnet & Light Sourcing	Normally Open Sourcing (NPN)	6 -24 VDC	0.3 Amps Max.	7.2 Watts Max.	0.5 Volts
SH6-022	8m Connector Pigtail	Hall Effect for Reed Magnet & Light Sourcing	Normally Open Sourcing (NPN)	6 -24 VDC	0.3 Amps Max.	7.2 Watts Max.	0.5 Volts

Hall Effect Switch

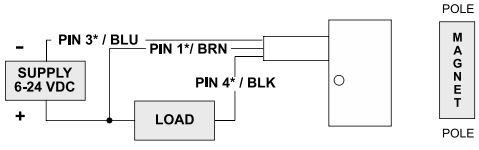


PNP Sourcing



* Pin out for 8 mm connector version

NPN Sinking

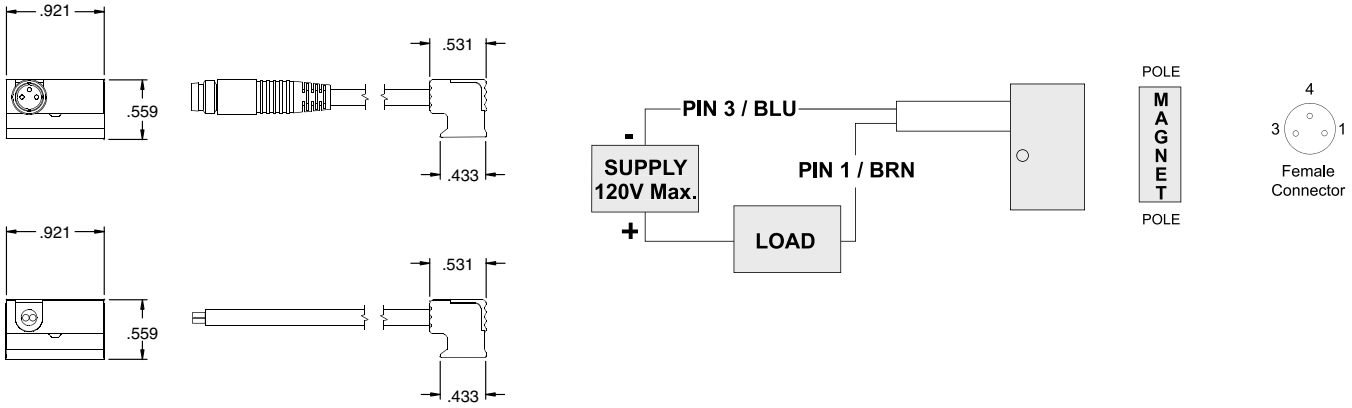


* Pin out for 8 mm connector version

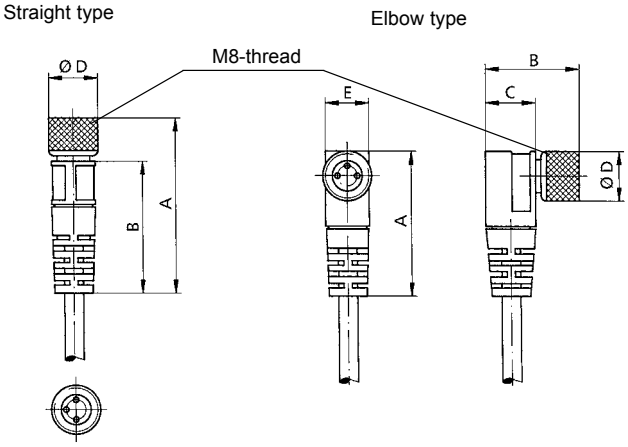
A Series World Switch Reed Switch Part Numbers

P/N	Switch Style	Switch Type	Function	Switching Voltage	Switching Current	Switching Power	Voltage Drop
SR6-002	3m Wire Version	Reed Switch, LED	SPST Normally Open	5 -120V AC/DC	0.025 Amps Max. 0.001 Amps Min.	3 Watts Max.	3.5 Volts
SR6-004	3m Wire Version	Reed Switch, LED & MOV	SPST Normally Open	5 -120V AC/DC	0.5 Amps Max. 0.005 Amps Min.	10 Watts Max.	3.0 Volts
SR6-021	8mm Pigtail	Reed Switch	SPST Normally Open	0 -120V AC/DC	0.5 Amps Max.	10 Watts Max.	0 Volts
SR6-022	8mm Pigtail	Reed Switch, LED	SPST Normally Open	5 -120V AC/DC	0.025 Amps Max. 0.001 Amps Min.	3 Watts Max.	3.5 Volts
SR6-024	8mm Pigtail	Reed Switch, LED & MOV	SPST Normally Open	5 -120V AC/DC	0.5 Amps Max. 0.005 Amps Min.	10 Watts Max.	3.0 Volts

Reed Switch - Normally Open Type SR6



Cords M8-thread for Switches and Sensors with Connector



Dimensions (mm)

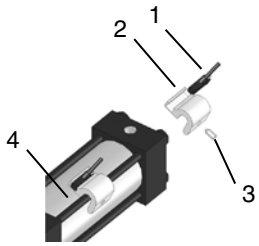
Type		A	B	C	D	E	Weight (approx. kg)	Order Code
Straight with 5m-cable	(3x0.25 mm^2)	32.3	24.4	–	9.0	–	0.143	SC6-001
Elbow with 5m-cable	(3x0.25 mm^2)	26.3	17.1	9.2	9.0	8.0	0.145	SC6-002

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

A Series Global Application Detail

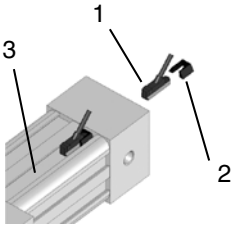
Round Tube and Tie Rod Detail

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



Profile Tube Detail

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

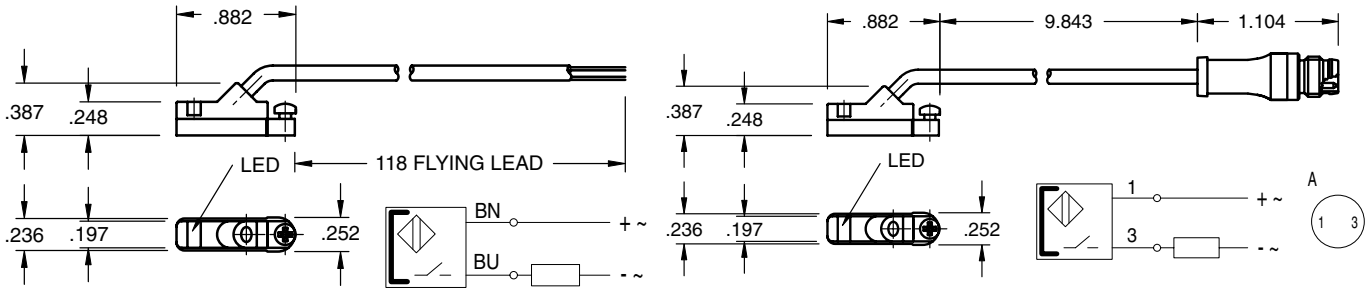


A Series Global Switch Bracket

Cylinders	Bore	Part Number
A series Tie Rod	1 1/2"-2 1/2"	N199-1017
A series Tie Rod	3 1/4"-4"	N199-1018
A series Tie Rod	5"-8"	N199-1019
A series Profile	1 1/2"-3 1/4"	Direct Fit w/included adapter

A Series Global Switches

Reed Switch (AC/DC NO), flying lead - RSS02, 8mm connector - RSQ02



Sensing Data

Ambient temperature range T_a	(°F/°C)	-4 to 176 (-20 to 80)
Frequency of operating cycles f at U_e	(kHz)	0.5
Turn on time t	(ms)	<= 0.25
turn off time t	(ms)	0.03
LED function indication		yes

Electrical Data

Rated operational voltage U_e	(V)	3...130 AC/DC
Supply voltage U_B	(V)	3...130 AC/DC
Voltage drop U_d at I_e Stat./dyn.	(V)	3.5
Rated insulation volatage U_i	(V)	2750 DC (EN 60335-1)
Rated supply frequency	(Hz)	AC/DC
Rated operational current I_e	(mA)	50 (10W max.)
No-load supply current I_o at U_e d./und.	(mA)	0

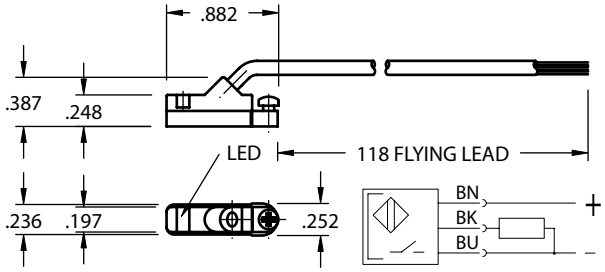
Observe polarity for correct LED function

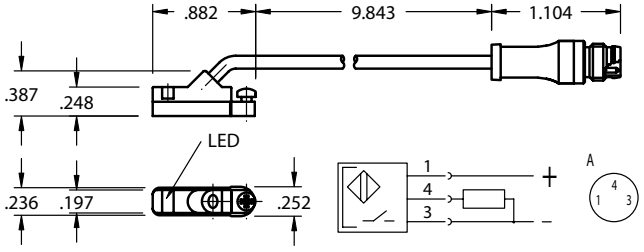
Mechanical Data

Housing material		Polyamide
Material of sensing face		Polyamide
Connection		PVC cable
Degree of Protection	IP	67

Rated shock: half-sinus, 50g, 11 ms
Rated vibration environment: 10g, 10...2000 Hz. 90 min

Electronic Switch (PNP NO), flying lead - HPNPS31, 8mm connector - HPNPQ31





Sensing Data

Ambient temperature range $_d$	(°F/°C)	-13 to +158 (-25 to +70)
Temperature drift	(% of)	<= 0.3%/°C
Frequency of operating cycles f at U_e	(kHz)	10
Turn on time t	(ms)	.05
turn off time t	(ms)	.05
Utilization categories		DC13
Function–/supply voltage indication		YES

Mechanical Data

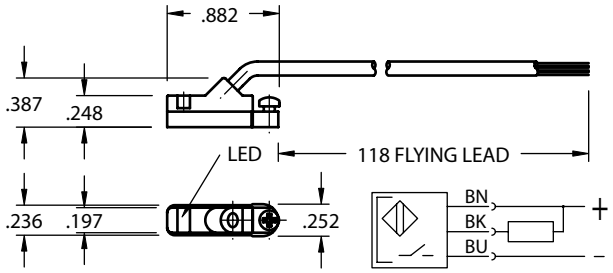
Housing material		Polyamide
Material of sensing face		Polyamide
Connection		PVC cable
Degree of Protection	IP	67
Rated shock: half-sinus, 30 g, 11 ms		
Rated vibration environment: 55 Hz, 1mm amplitude, 3 x 30		

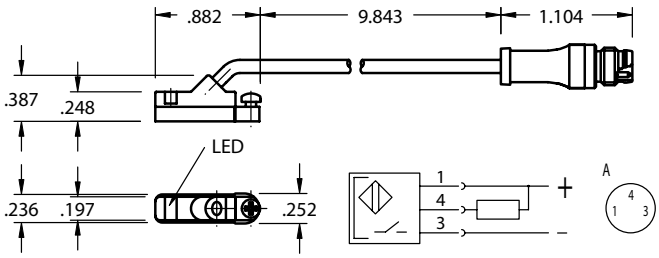
Electrical Data

Rated operational voltage U_e	(V)	24 DC
Supply voltage U_B	(V)	10...30 DC
incl. ripple	(% of U_e)	15
Voltage drop U_d at I_e Stat./dyn.	(V)	1/–
Rated insulation volatage U_i	(V)	75 AC
Rated supply frequency	(Hz)	DC
Rated operational current I_e	(mA)	200
No-load supply current I_o at U_e d./und.	(mA)	25/13
Protected against polarity reversal		YES

CE
CSA

Electronic Switch (NPN NO), flying lead - HNPNS32, 8mm connector - HNPNQ32





Sensing Data

Ambient temperature range $_d$	(°F/°C)	-13 to +158 (-25 to +70)
Temperature drift	(% of S_r)	<= 0.3%/°C
Frequency of operating cycles f at U_e	(kHz)	10
Turn on time t	(ms)	.05
turn off time t	(ms)	.05
Utilization categories		DC13
Function–/supply voltage indication		YES

Mechanical Data

Housing material		Polyamide
Material of sensing face		Polyamide
Connection		PVC cable
Degree of Protection	IP	67
Rated shock: half-sinus, 30 g, 11 ms		
Rated vibration environment: 55 Hz, 1mm amplitude, 3 x 30		

Electrical Data

Rated operational voltage U_e	(V)	24 DC
Supply voltage U_B	(V)	10...30 DC
incl. ripple	(% of U_e)	15
Voltage drop U_d at I_e Stat./dyn.	(V)	1/–
Rated insulation volatage U_i	(V)	75 AC
Rated supply frequency	(Hz)	DC
Rated operational current I_e	(mA)	200
No-load supply current I_o at U_e d./und.	(mA)	25/13
Protected against polarity reversal		YES

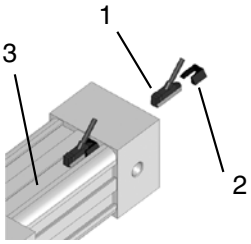
CE
CSA

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

A Series 9000 application Detail

Profile Tube Detail

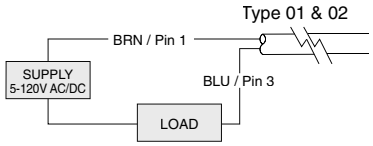
1. 9000 Switch
2. Included Dovetail adapter
3. Dove Tail extrusion

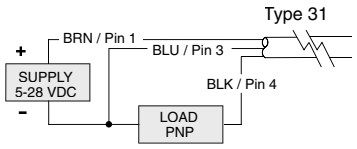


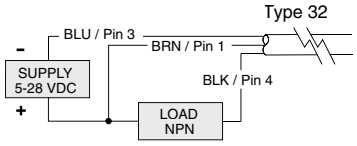
A Series 9000 series Switch

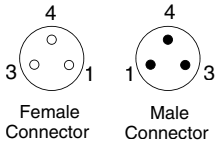
Cylinders	Bore	Part Number
A series Profile	1 1/2"-3 1/4" Bore	Direct Fit w/included adapter

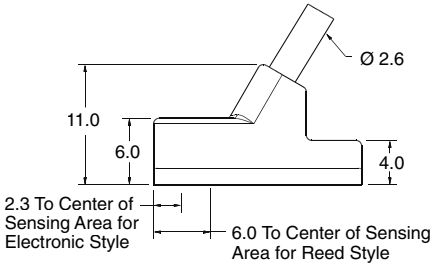
Series 9000 Type 02, 31 & 32 Wiring Diagrams





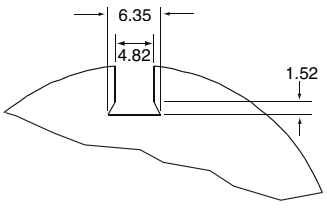




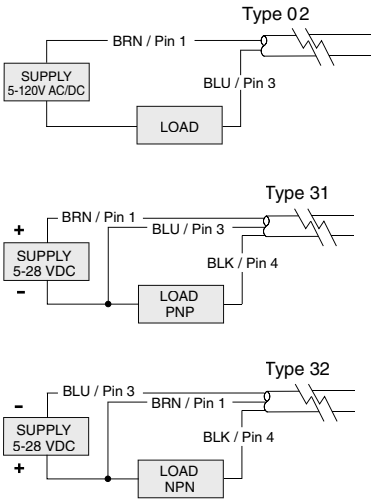


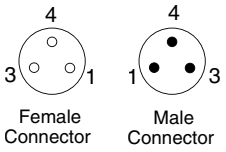
Type Code	Description	Function	Switching Voltage	Switching Current	Switching Power	Switching Speed	Voltage Drop
940-100-002	Reed Switch for PLC's, LED (current limiting)	SPST Normally Open	5-120V AC/DC 50/60 Hz	0.03 Amps max. 0.001 Amps min.	4 Watts max.	0.4 ms operate 0.1 ms release	3.5 Volts @ 5 mA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

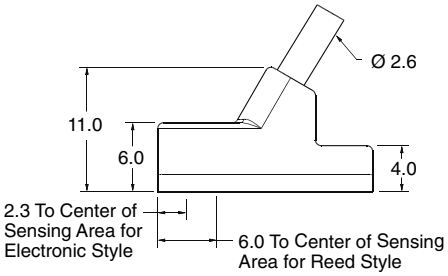
Groove Dimension



Series 9000 Type 02, 31 & 32
Wiring Diagrams

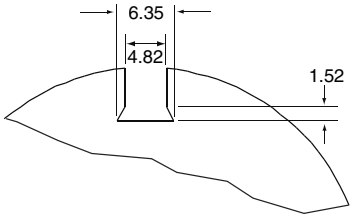






Type Code	Description	Function	Switching Voltage	Switching Current	Switching Power	Switching Speed	Voltage Drop
940-100-002	Reed Switch for PLC's, LED (current limiting)	SPST Normally Open	5-120V AC/DC 50/60 Hz	0.03 Amps max. 0.001 Amps min.	4 Watts max.	0.4 ms operate 0.1 ms release	3.5 Volts @ 5 mA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

Groove Dimension



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

How to Order - A Series **Piston Rod Assembly**

A92- K 1 N 0 - 01 A - AA

Type
A92 = A Series Piston Rod Assembly

Bore

K	= 1-1/2"	U	= 6"
L	= 2"	W	= 8"
M	= 2-1/2"	X	= 10"
P	= 3-1/4"	Y	= 12"
R	= 4"	B	= 14"
T	= 5"		

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

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

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

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

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

Fractional Inches of Stroke

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

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

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

How to Order - A Series **Repair Kit**

A98 - K 1 N - AA

Type
A98 = A Series Repair Kit

Bore

K	= 1-1/2"	U	= 6"
L	= 2"	W	= 8"
M	= 2-1/2"	X	= 10"
P	= 3-1/4"	Y	= 12"
R	= 4"	B	= 14"
T	= 5"		

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

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

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

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

How to Order - A Series **Seal Kit**

A97 - K 1 N - AA

Type
A97 = A Series Seal Kit

Bore

K	= 1-1/2"	U	= 6"
L	= 2"	W	= 8"
M	= 2-1/2"	X	= 10"
P	= 3-1/4"	Y	= 12"
R	= 4"	B	= 14"
T	= 5"		

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

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

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

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

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

Piston Rod Assembly Kit Installation Instructions

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

See Seal Installation Guide on page 41 for additional (visual) instructions.

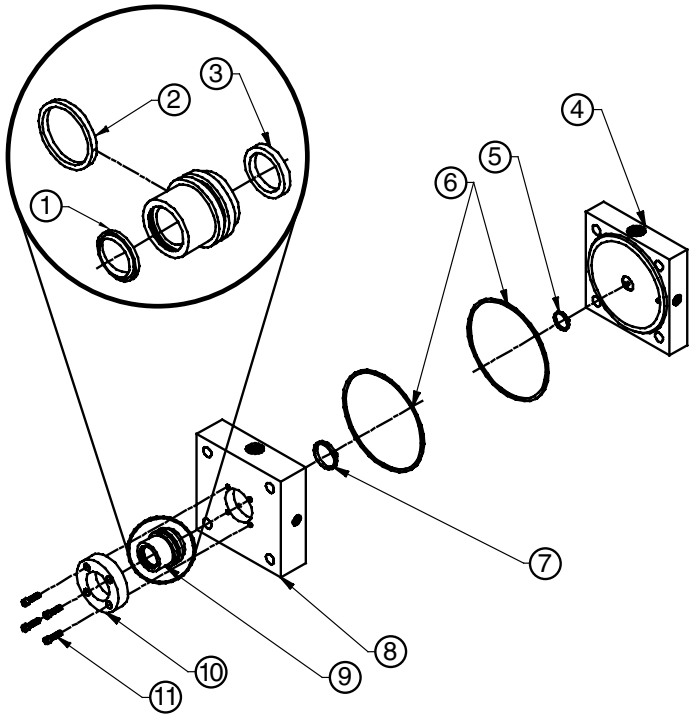
Repair Kit and Seal Kit Removal/Installation Instructions

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

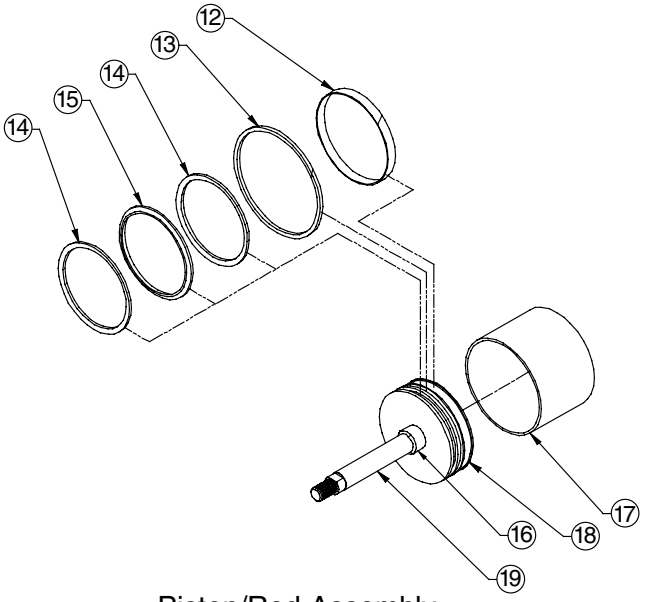
See Seal Installation Guide on page 41 for additional (visual) instructions.

Diagrams

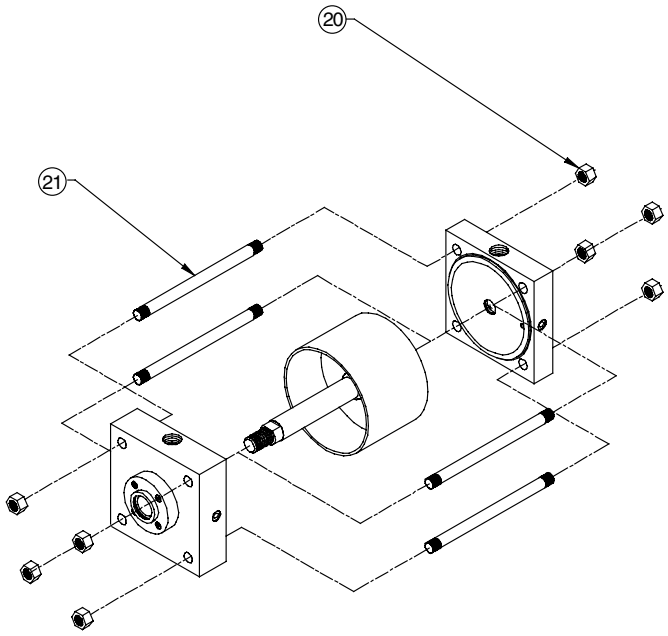
Pneumatic Service Temperatures:
Nitrile Seals: -10˚F (-23˚C) to 165˚F (74˚C)
Viton® Seals: 0˚F (-17˚C) to 400˚F (204˚C)



Head, Cap, and Bushing Assembly



Piston/Rod Assembly



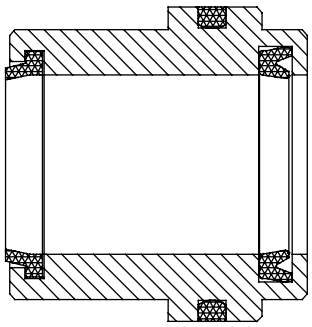
Cylinder Assembly and Tie Rod Torque

A Series

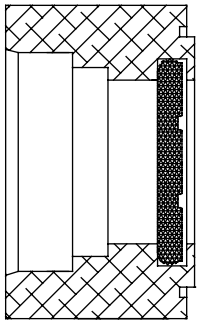
Part #	Description	Parts included in: Seal Kit	Repair Kit	Piston/Rod Assembly
1	Rod Wiper	X		
2	Bushing O-ring	X		
3	Rod Seal	X		
4	Cap			
5	Cap Cushion Seal	X	X	
6	Tube End Seals	X	X	
7	Head Cushion Seal	X	X	
8	Head			
9	Loaded Bushing Assembly		X	
10	Bushing Retainer			
11	Retainer Screws			
12	Wearband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

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

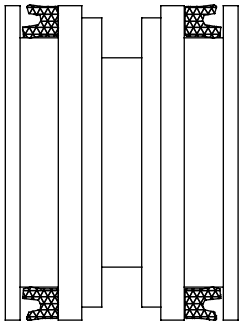
Seal Installation Guide



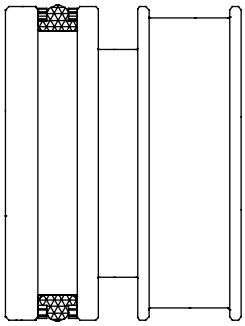
Loaded Bushing



Cushioned Head or Cap



Low Breakaway Piston



T-Seal Piston

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

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

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

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

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

Sinker Tube Part Numbers

Bore	Part #
1-1/2"	A06-K91
2"	A06-L91
2-1/2"	A06-P91
3-1/4"	A06-M91
4"	A06-R91
5"	A06-T91
6"	A06-U91
8"	A06-W91
10"	A06-X91
12"	A06-Y91
14"	A06-B91

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