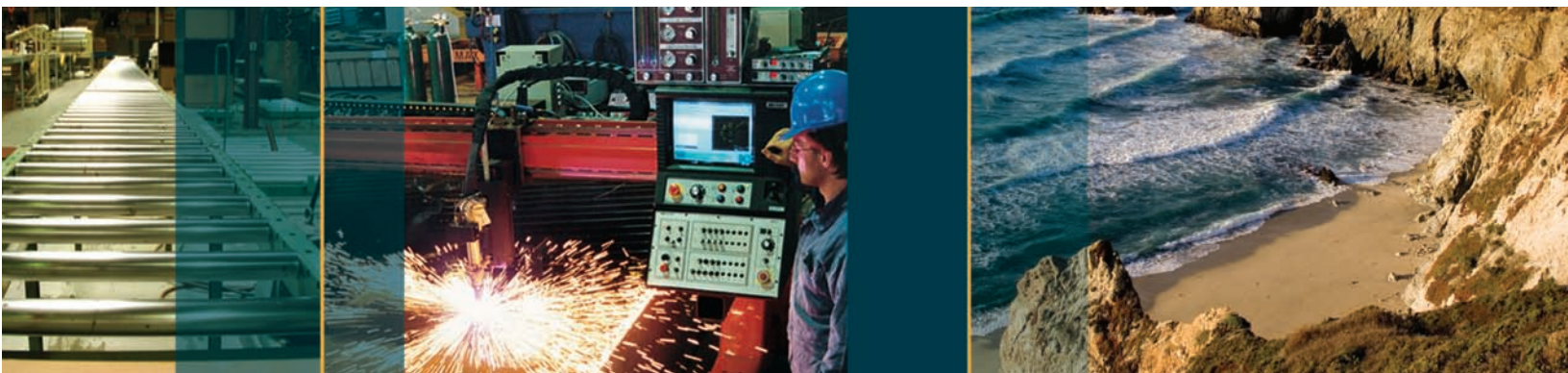




# ITT

## Pneumatic Tie Rod Cylinders



*Engineered for life*

# Table of Contents

## **Pneumatic Tie Rod Cylinder Overview**

Product Overview .....pg. 2

## **Pneumatic Tie Rod Interchangeable Cylinder (1 1/2" to 4" Bore)**

How to Order .....pg. 3  
Force Charts .....pg. 3  
Basic No Mount .....pg. 4  
Rod End Styles .....pg. 4  
Flange and Trunnion Mounts .....pg. 5  
Clevis, Eye and Angle Mounts.....pg. 6  
Side Lug, Bottom Tap and Pneumatic Tie Rod Mounts .....pg. 7  
Accessories .....pg. 8  
Rod Diameter Selection .....pg. 9  
Dual Piston Selection .....pg. 10  
Approximate Cylinder Weight Chart (in. lbs.) .....pg. 10  
Alignment Coupler .....pg. 10

## **Pneumatic Tie Rod Pin-Act Cylinder (1 1/2" to 4" Bore)**

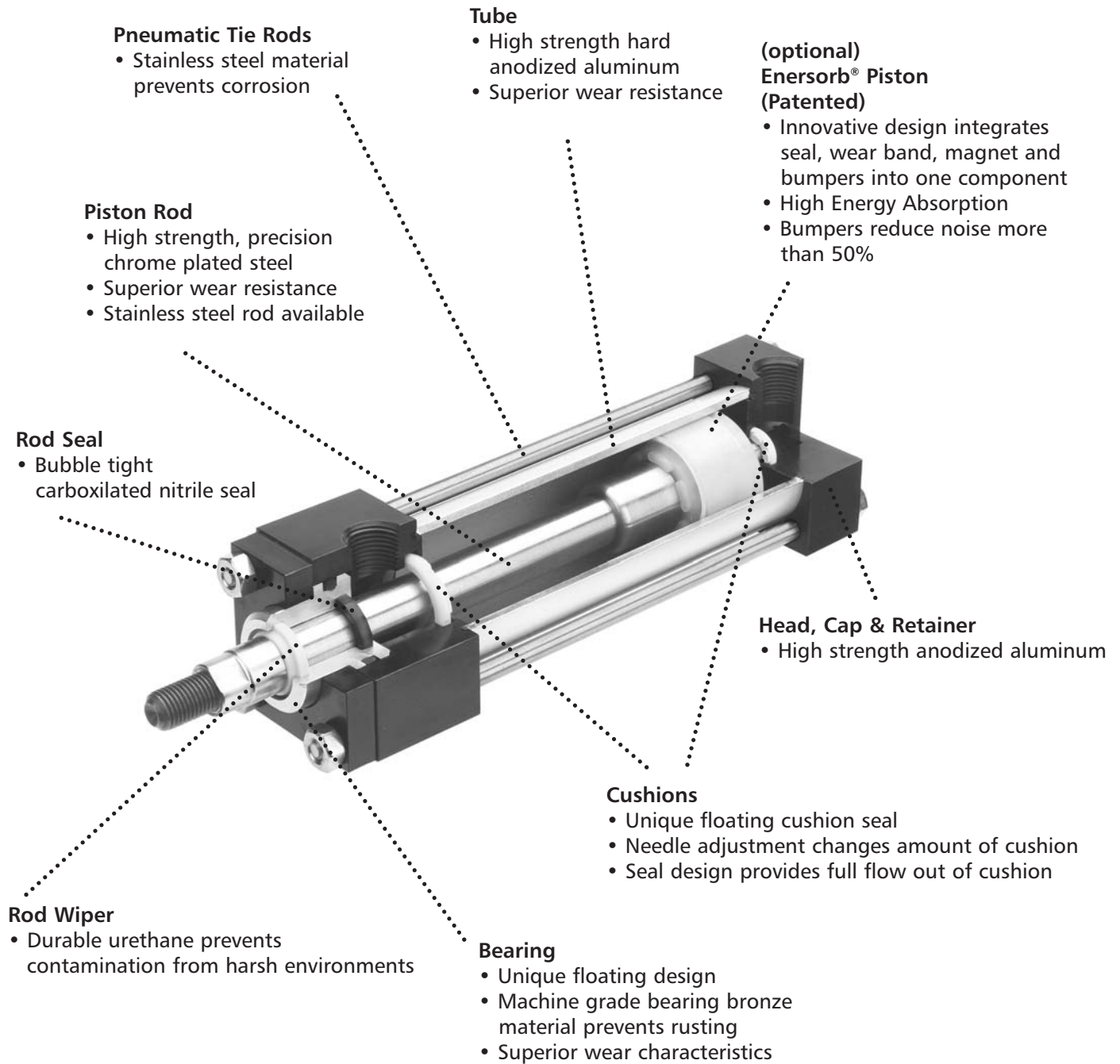
How to Order .....pg. 11  
Basic Dimensions (X0 Mount) .....pg. 12  
Rod End Styles .....pg. 12  
Cone Point Styles .....pg. 12  
Flange and Angle Mounts .....pg. 13  
Side Lug, Bottom Tap and Pneumatic Tie Rod Mounts .....pg. 14

## **Pneumatic Tie Rod Interchangeable Cylinder (5" to 10" Bore)**

How to Order .....pg. 15  
Force Chart .....pg. 15  
Basic No Mount .....pg. 16  
Rod End Styles .....pg. 16  
Flange Mount .....pg. 17  
Clevis and Bottom Mounts .....pg. 18  
Trunnion and Pneumatic Tie Rod Mount .....pg. 19  
Accessories .....pg. 20  
Sensors .....pg. 21

Automotive Shot Pin.....pg. 22  
Air-Transfer System Shaker .....pg. 22  
Special Conditions and Limited Warranty .....pg. 22

# Pneumatic Tie Rod Cylinder Overview



NOTE: Temperature Range -20°F to 180°F

# How to Order - Pneumatic Tie Rod Interchangeable Cylinders (1-1/2" to 4" Bore)

TIE ROD SERIES	BORE	ROD SIZE	MOUNT TYPE	STROKE (INCHES)	CUSHION TYPE	PORT TYPE	ROD END STYLE	OPTIONS (if needed)	OPTIONS (if needed)
TAC	20	SS	MF1	1.25	CB26	PS15	1	MP	STS
1	2	3	45	6	7	8	9	9	

1 **TAC** Tie Rod Interchangeable

2

15	1 1/2 Bore Cylinder
20	2 Bore Cylinder
25	2 1/2 Bore Cylinder
32	3 1/4 Bore Cylinder
40	4 Bore Cylinder

3

SS	Single End, Std Rod Size
SO	Single End, Ovs Rod Size
DS	Double End, Std Rod Size
DO	Double End, Ovs Rod Size

See Rod Size and Thread Style Chart for description.

4

MF1	Front Flange Mount
MF2	Rear Flange Mount
MP1	Fixed Clevis Mount
MP2	Detachable Clevis Mount
MP4	Detachable Eye Mount
MS1	Angle Mount
MS2	Side Lug Mount
MS4	Bottom Tap Mount
MT1	Head Trunnion Mount
MT2	Cap Trunnion Mount
MX0	Basic No Mount
MX1	Both Extended Tie Rod Mount
MX2	Cap Extended Tie Rod Mount
MX3	Head Extended Tie Rod Mount

5

Specify Stroke to Two Decimal Places*
Example 1 1/4" = 1.25
Standard Stroke Tolerance ±.031

\*For Strokes Exceeding 20 inches Consult Factory.

6

NC	No Cushion
CB15	Cushion Both Ends 1 & 5
CB26	Cushion Both Ends 2 & 6 (STD)
CB37	Cushion Both Ends 3 & 7
CB48	Cushion Both Ends 4 & 8
CC5	Cushion Cap End 5
CC6	Cushion Cap End 6
CC7	Cushion Cap End 7
CC8	Cushion Cap End 8
CH1	Cushion Head End 1
CH2	Cushion Head End 2
CH3	Cushion Head End 3
CH4	Cushion Head End 4

See Port and Cushion Position Location Diagram.

7

PS15	Standard Port Size 1 & 5 (STD)
PS26	Standard Port Size 2 & 6
PS37	Standard Port Size 3 & 7
PS48	Standard Port Size 4 & 8

See Port and Cushion Position Location Diagram.

8

1	Style #1 Male Thread (STD)
2	Style #2 Male Thread
3	Style #3 Female Thread

See Rod Size and Thread Style Chart for description.

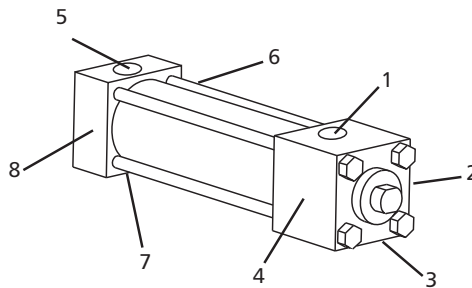
9

EP	Enersorb Piston
MP	Magnetic Piston
STS	Stainless Steel Rod
VS	High Temperature Viton Seals*
D02.00	Dual Piston (specify length)
R02.00	Rod Extension (specify length)
T02.00	Thread Extension (specify length)

\*Not available with EP option

## Port and Cushion Position Location

Standard Port Positions 1 & 5  
Standard Cushion Positions 2 & 6



## Rod Size and Thread Style Chart

Bore	Rod Size	*Style #1	*Style #2	Style #3
		Male Thread	Male Thread	Female Thread
1 1/2	Standard (5/8")	7/16-20	1/2-20	7/16-20
	Oversize (1")	3/4-16	7/8-14	3/4-16
2	Standard (5/8")	7/16-20	1/2-20	7/16-20
	Oversize (1")	3/4-16	7/8-14	3/4-16
2 1/2	Standard (5/8")	7/16-20	1/2-20	7/16-20
	Oversize (1")	3/4-16	7/8-14	3/4-16
3 1/4	Standard (1")	3/4-16	7/8-14	3/4-16
	Oversize (1 3/8")	1-14	1 1/4-12	1-14
4	Standard (1")	3/4-16	7/8-14	3/4-16
	Oversize (1 3/8")	1-14	1 1/4-12	1-14

\*Note: Male Rod Ends are threaded Rod Studs.

# Force Charts

The charts below show maximum usable forces. Standard design practices should take factors such as stroke, speed and friction into account when sizing a cylinder.

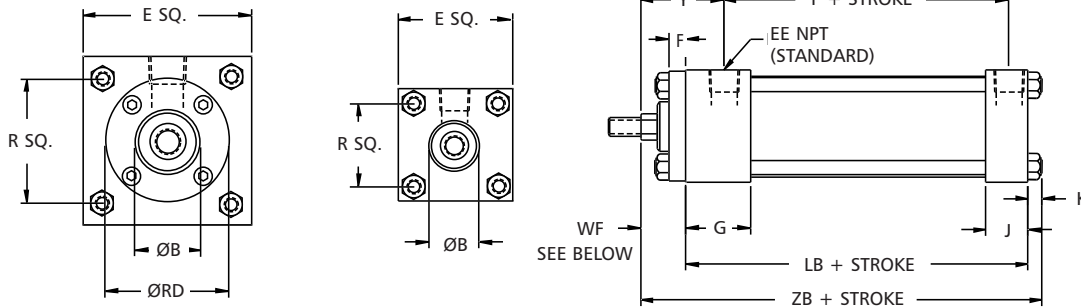
Max Usable Cylinder Extend Force, (lbf)			
Bore	60 psi	80 psi	100 psi
1 1/2"	85	113	141
2"	150	201	251
2 1/2"	235	314	392
3 1/4"	398	530	663
4"	603	804	1005

Max Usable is 80% of Theoretical.

Max Usable Cylinder Retract Force, (lbf)				
Bore	Rod Dia.	60 psi	80 psi	100 psi
1 1/2"	5/8"	70	94	117
	1"	47	62	78
2"	5/8"	136	181	226
	1"	113	150	188
2 1/2"	5/8"	221	294	368
	1"	198	264	330
3 1/4"	1"	360	481	601
	1 3/8"	326	436	545
4"	1"	566	754	942
	1 3/8"	532	709	886

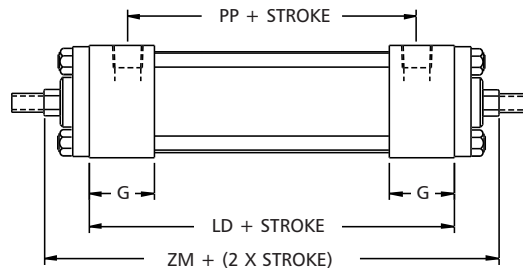
# Basic No Mount

## MX0 BASIC NO MOUNT (SINGLE ROD END)



## MX0 BASIC NO MOUNT (DOUBLE ROD END)

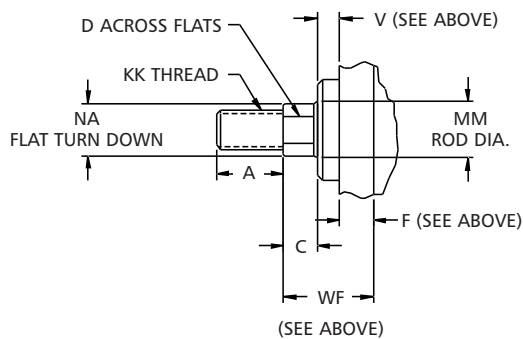
Only mounts available for double rod end are:  
MF1, MS1, MS4, MTI, MT4, MXØ, MX1 and MX3.



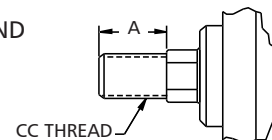
Dimensional Specifications																		
Bore	Rod	B	E	F	G	J	K	P	R	V	Y	EE	LB	LD	PP	RD	ZB	ZM
1 1/2	5/8	1.13	2.00	.38	1.50	1.00	.25	2.34	1.43	.25	1.84	3/8	3.63	4.13	2.44	N/A	4.88	6.13
	1	1.40	2.00	.38	1.50	1.00	.25	2.25	1.43	.50	2.31	3/8	3.63	4.13	2.25	N/A	5.25	6.88
2	5/8	1.13	2.50	.38	1.50	1.00	.31	2.34	1.84	.25	1.84	3/8	3.63	4.13	2.44	N/A	4.94	6.13
	1	1.50	2.50	.38	1.50	1.00	.31	2.34	1.84	.50	2.22	3/8	3.63	4.13	2.44	N/A	5.31	6.88
2 1/2	5/8	1.13	3.00	.38	1.50	1.00	.31	2.47	2.19	.25	1.84	3/8	3.75	4.25	2.56	N/A	5.06	6.25
	1	1.50	3.00	.38	1.50	1.00	.31	2.47	2.19	.50	2.22	3/8	3.75	4.25	2.56	N/A	5.44	7.00
3 1/4	1	1.50	3.75	.63	1.75	1.25	.38	2.63	2.76	.25	2.44	1/2	4.25	4.75	2.63	2.75	6.00	7.50
	1 3/8	2.00	3.75	.63	1.75	1.25	.38	2.63	2.76	.38	2.69	1/2	4.25	4.75	2.63	3.25	6.25	8.00
4	1	1.50	4.50	.63	1.75	1.25	.38	2.63	3.32	.25	2.44	1/2	4.25	4.75	2.63	2.75	6.00	7.50
	1 3/8	2.00	4.50	.63	1.75	1.25	.38	2.63	3.32	.38	2.69	1/2	4.25	4.75	2.63	3.25	6.25	8.00

# Rod End Styles

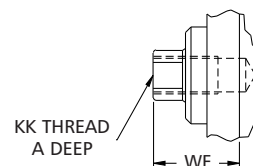
## STANDARD MALE ROD END (STYLE #1)



## OVERSIZE MALE ROD END (STYLE #2)



## FEMALE ROD END (STYLE #3)

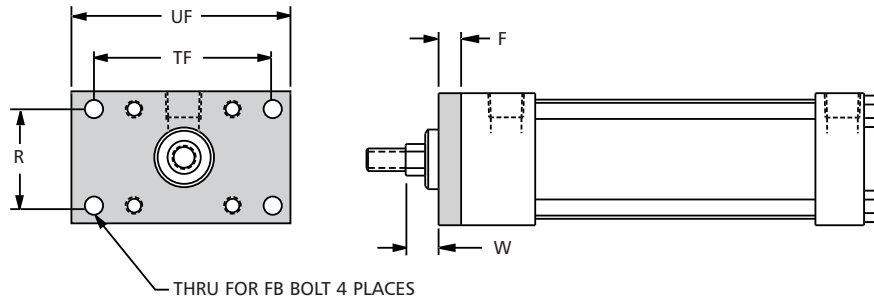


Dimensional Specifications							
MM	A	C	D	CC	KK	NA	WF
5/8	.75	.38	.50	1/2-20	7/16-20	.59	1.00
1	1.13	.50	.81	7/8-14	3/4-16	.96	1.38
1 3/8	1.63	.63	1.13	1 1/4-12	1-14	1.31	1.63

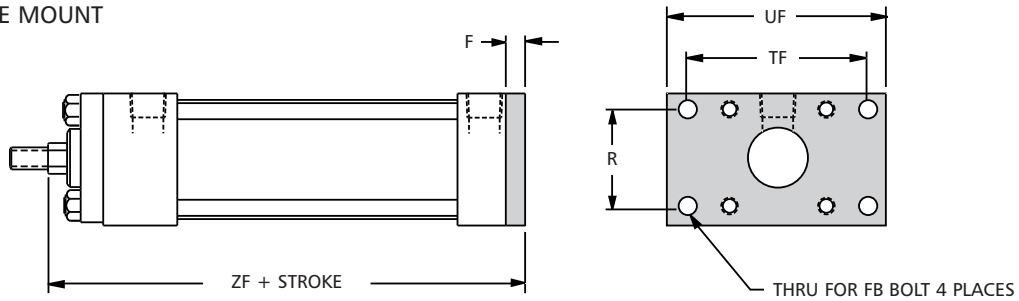
\*Note: Male Rod Ends are threaded Rod Studs.

# Flange and Trunnion Mounts

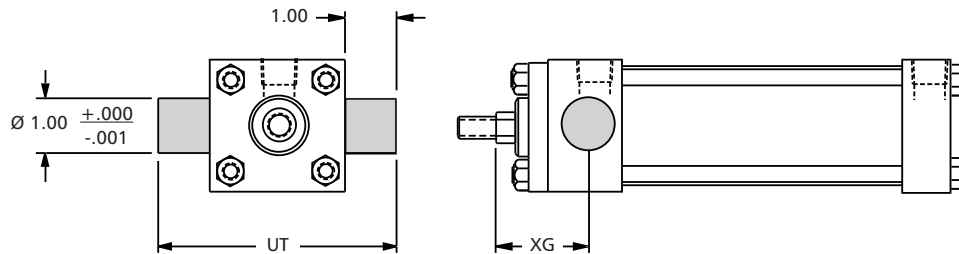
## MF1 FRONT FLANGE MOUNT



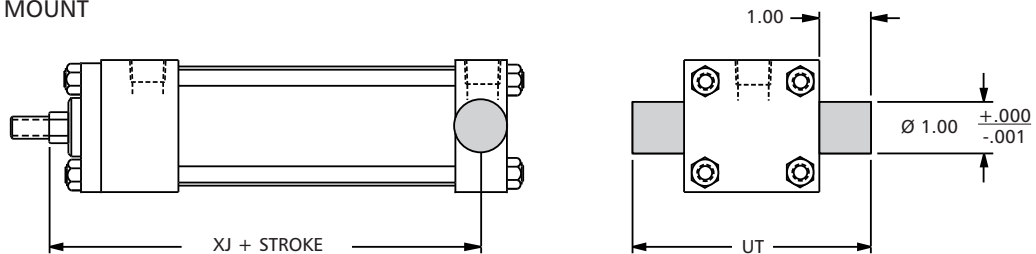
## MF2 REAR FLANGE MOUNT



## MT1 HEAD TRUNNION MOUNT



## MT2 CAP TRUNNION MOUNT

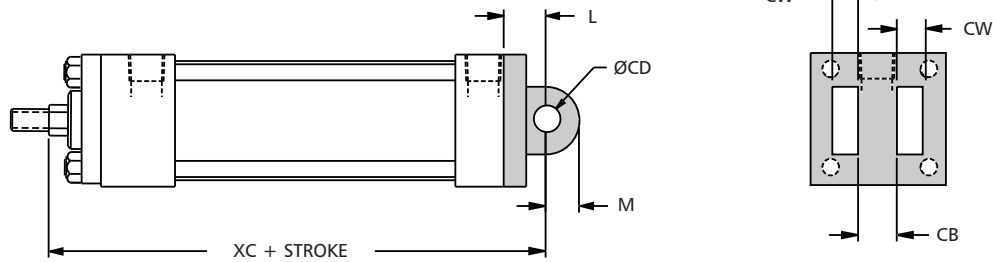


### Dimensional Specifications

Bore	Rod	F	R	W	FB	TF	UF	UT	XG	XJ	ZF
1 1/2	5/8	.38	1.43	.63	1/4	2.75	3.38	4.00	1.75	4.13	5.00
	1	.38	1.43	1.00	1/4	2.75	3.38	4.00	2.13	4.50	5.38
2	5/8	.38	1.84	.63	5/16	3.38	4.13	4.50	1.75	4.13	5.00
	1	.38	1.84	1.00	5/16	3.38	4.13	4.50	2.13	4.50	5.38
2 1/2	5/8	.38	2.19	.63	5/16	3.88	4.63	5.00	1.75	4.25	5.13
	1	.38	2.19	1.00	5/16	3.88	4.63	5.00	2.13	4.63	5.50
3 1/4	1	.63	2.76	.75	3/8	4.69	5.50	5.75	2.25	5.00	6.25
	1 3/8	.63	2.76	1.00	3/8	4.69	5.50	5.75	2.50	5.25	6.50
4	1	.63	3.32	.75	3/8	5.44	6.25	6.50	2.25	5.00	6.25
	1 3/8	.63	3.32	1.00	3/8	5.44	6.25	6.50	2.50	5.25	6.50

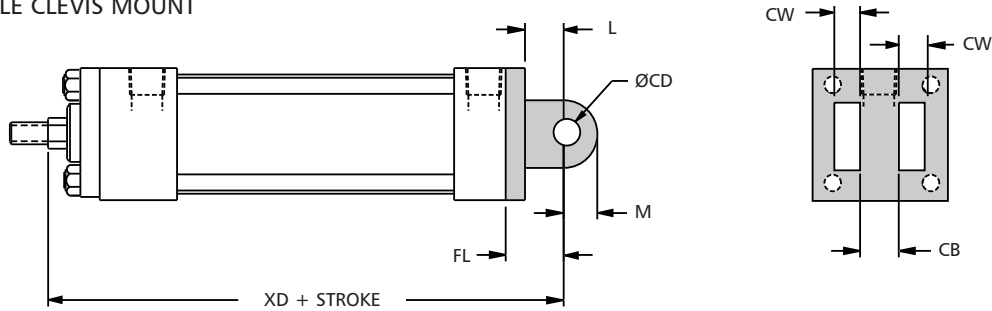
# Clevis, Eye and Angle Mounts

MP1 CLEVIS MOUNT



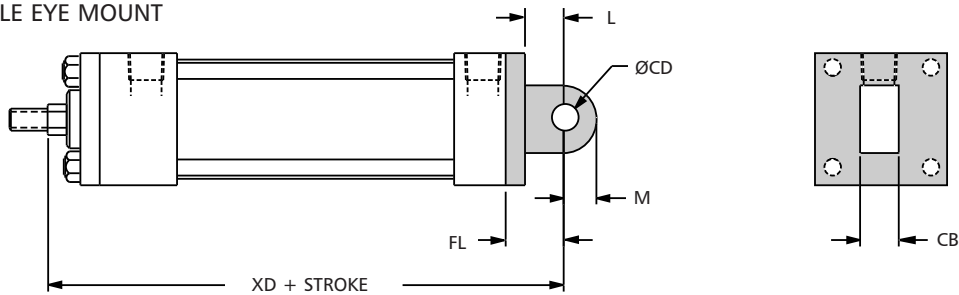
Pin included with mount.

MP2 DETACHABLE CLEVIS MOUNT



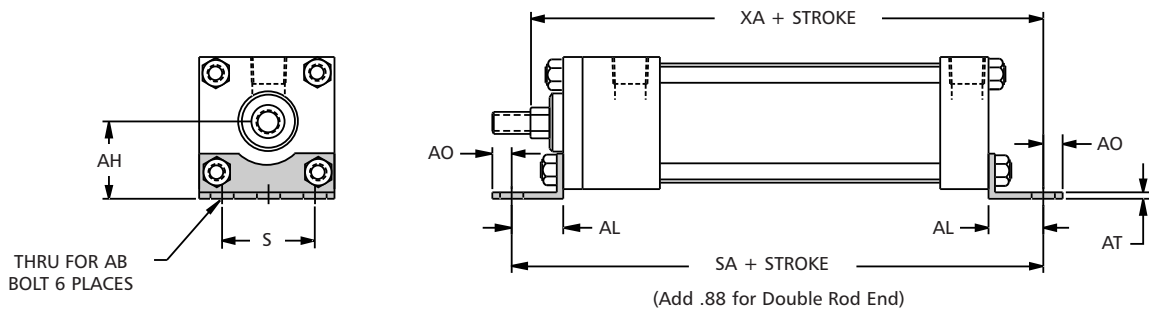
Pin included with mount.

MP4 DETACHABLE EYE MOUNT



Pin included with mount.

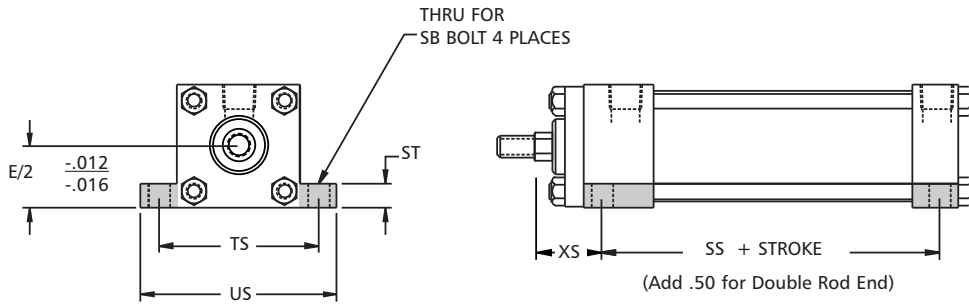
MS1 ANGLE MOUNT



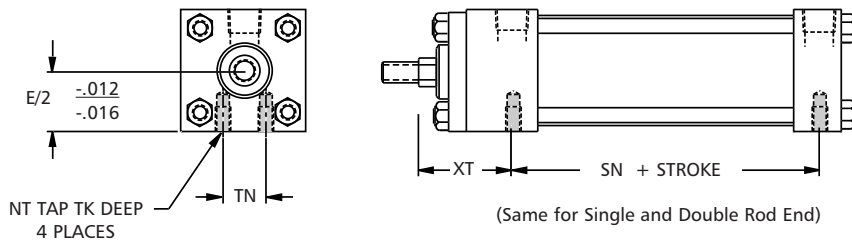
Dimensional Specifications																	
Bore	Rod	L	M	S	AB	AH	AL	AO	AT	CB	CD	CW	FL	SA	XA	XC	XD
1 1/2	5/8	.75	.50	1.25	3/8	1.19	1.00	.38	.13	.75	.50	.50	1.13	6.00	5.63	5.38	5.75
	1	.75	.50	1.25	3/8	1.19	1.00	.38	.13	.75	.50	.50	1.13	6.00	6.00	5.75	6.13
2	5/8	.75	.50	1.75	3/8	1.44	1.00	.38	.13	.75	.50	.50	1.13	6.00	5.63	5.38	5.75
	1	.75	.50	1.75	3/8	1.44	1.00	.38	.13	.75	.50	.50	1.13	6.00	6.00	5.75	6.13
2 1/2	5/8	.75	.50	2.25	3/8	1.63	1.00	.38	.13	.75	.50	.50	1.13	6.13	5.75	5.50	5.88
	1	.75	.50	2.25	3/8	1.63	1.00	.38	.13	.75	.50	.50	1.13	6.13	6.13	5.88	6.25
3 1/4	1	1.25	.75	2.75	1/2	1.94	1.25	.50	.13	1.25	.75	.63	1.88	7.38	6.88	6.88	7.50
	1 3/8	1.25	.75	2.75	1/2	1.94	1.25	.50	.13	1.25	.75	.63	1.88	7.38	7.13	7.13	7.75
4	1	1.25	.75	3.50	1/2	2.25	1.25	.50	.13	1.25	.75	.63	1.88	7.38	6.88	6.88	7.50
	1 3/8	1.25	.75	3.50	1/2	2.25	1.25	.50	.13	1.25	.75	.63	1.88	7.38	7.13	7.13	7.75

# Side Lug, Bottom Tap and Pneumatic Tie Rod Mounts

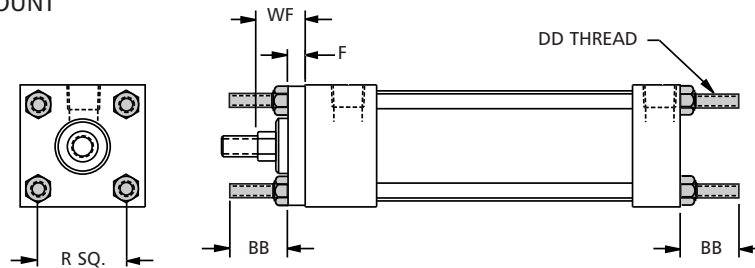
## MS2 SIDE LUG MOUNT



## MS4 BOTTOM TAP MOUNT

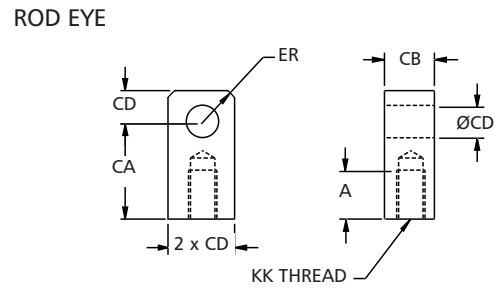
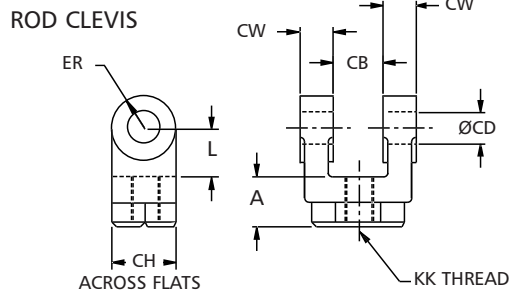


## MX1 BOTH EXTENDED TIE ROD MOUNT MX2 CAP EXTENDED TIE ROD MOUNT MX3 HEAD EXTENDED TIE ROD MOUNT



Dimensional Specifications																		
Bore	Rod	E/2	F	R	BB	DD	NT	SB	SN	SS	ST	TK	TN	TS	US	WF	XS	XT
1 1/2	5/8	1.00	.38	1.43	1.00	1/4-28	1/4-20	3/8	2.25	2.88	.50	.38	.63	2.75	3.50	1.00	1.38	1.94
	1	1.00	.38	1.43	1.00	1/4-28	1/4-20	3/8	2.25	2.88	.50	.31	.63	2.75	3.50	1.38	1.75	2.31
2	5/8	1.25	.38	1.84	1.13	5/16-24	5/16-18	3/8	2.25	2.88	.50	.50	.88	3.25	4.00	1.00	1.38	1.94
	1	1.25	.38	1.84	1.13	5/16-24	5/16-18	3/8	2.25	2.88	.50	.50	.88	3.25	4.00	1.38	1.75	2.31
2 1/2	5/8	1.50	.38	2.19	1.13	5/16-24	3/8-16	3/8	2.38	3.00	.50	.63	1.25	3.75	4.50	1.00	1.38	1.94
	1	1.50	.38	2.19	1.13	5/16-24	3/8-16	3/8	2.38	3.00	.50	.63	1.25	3.75	4.50	1.38	1.75	2.31
3 1/4	1	1.88	.63	2.76	1.38	3/8-24	1/2-13	1/2	2.63	3.25	.75	.75	1.50	4.75	5.75	1.38	1.88	2.44
	1 3/8	1.88	.63	2.76	1.38	3/8-24	1/2-13	1/2	2.63	3.25	.75	.75	1.50	4.75	5.75	1.63	2.13	2.69
4	1	2.25	.63	3.32	1.38	3/8-24	1/2-13	1/2	2.63	3.25	.75	.75	2.06	5.50	6.50	1.38	1.88	2.44
	1 3/8	2.25	.63	3.32	1.38	3/8-24	1/2-13	1/2	2.63	3.25	.75	.75	2.06	5.50	6.50	1.63	2.13	2.69

# Accessories



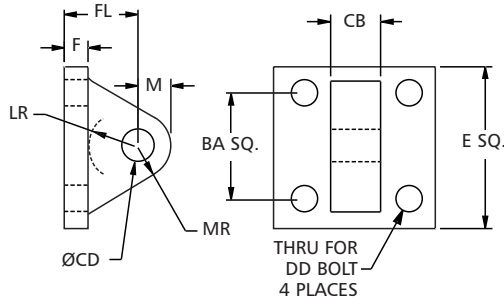
Dimensional Specifications								
Part #	A	L	CB	CD	CH	CW	ER	KK
KL600	.75	.75	.75	.50	1.00	.50	.50	7/16-20
KL601	1.13	1.25	1.25	.75	1.25	.63	.75	3/4-16
KL602	1.63	1.50	1.50	1.00	1.50	.75	1.00	1-14
KL603	.75	.75	.75	.50	1.00	.50	.50	1/2-20
KL604	1.13	1.25	1.25	.75	1.25	.63	.75	7/8-14
KL605	2.00	2.13	2.00	1.38	2.00	1.00	1.38	1 1/4-12

Pin and jam nut included.

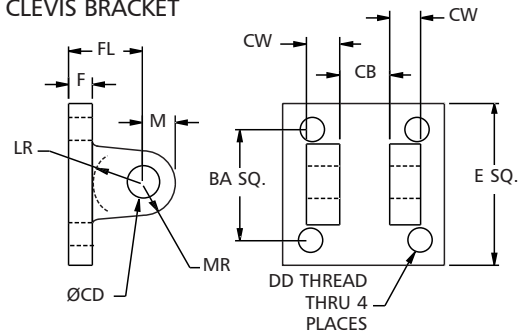
Dimensional Specifications						
Part #	A	CA	CB	CD	ER	KK
KL610	.75	1.50	.75	.50	.63	7/16-20
KL611	1.13	2.06	1.25	.75	.88	3/4-16
KL612	1.63	2.81	1.50	1.00	1.19	1-14
KL613	.75	1.50	.75	.50	.63	1/2-20
KL614	1.13	2.06	1.25	.75	.88	7/8-14
KL615	2.00	3.44	2.00	1.38	1.56	1 1/4-12

Pin and jam nut included.

## EYE BRACKET



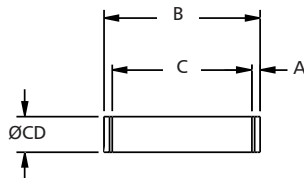
## CLEVIS BRACKET



Dimensional Specifications												
Description	Part#	E	F	M	BA	CB	CD	CW	DD	FL	LR	MR
Eye Brackets	KL620	2.50	.38	.50	1.63	.75	.50	N/A	3/8	1.13	.75	.56
	KL621	3.50	.63	.75	2.56	1.25	.75	N/A	1/2	1.88	1.25	.88
	KL622	4.50	.75	1.00	3.25	1.50	1.00	N/A	5/8	2.25	1.50	1.25
	KL623	5.00	.88	1.38	3.81	2.00	1.38	N/A	5/8	3.00	2.13	1.63
Clevis Brackets	KL630	2.50	.38	.50	1.63	.75	.50	.50	3/8-24	1.13	.50	.56
	KL631	3.50	.63	.75	2.56	1.25	.75	.63	1/2-20	1.88	1.06	1.06
	KL632	4.50	.75	1.00	3.25	1.50	1.00	.75	5/8-18	2.25	1.25	1.13
	KL633	5.00	.88	1.38	3.81	2.00	1.38	1.00	5/8-18	3.00	1.88	1.75

Pin included.

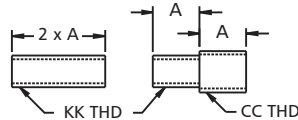
## PIVOT PIN



Dimensional Specifications				
Part#	A	B	C	CD
KL660	.11	2.09	1.88	.50
KL661	.13	2.88	2.63	.75
KL662	.13	3.38	3.13	1.00
KL663	.15	4.49	4.19	1.38

Retaining Rings included.

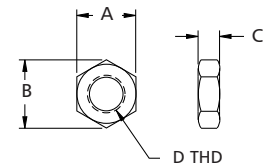
## ROD STUD AND STEP STUD



Dimensional Specifications			
Part #	A	CC	KK
L648	.75	—	7/16-20
L671	1.13	—	3/4-16
L672	1.63	—	1-14
L673	.75	1/2-20	7/16-20
L674	1.13	7/8-14	3/4-16
L675	1.63	1 1/4-12	1-14

For Stainless Steel, place the letter S after the Part Number. For example: L648S.

## JAM NUT



Dimensional Specifications				
Part #	A	B	C	D
L680	.69	.79	.26	7/16-20
L681	.75	.87	.32	1/2-20
L682	1.13	1.30	.45	3/4-16
L683	1.31	1.52	.51	7/8-14
L684	1.50	1.73	.58	1-14
L685	1.88	2.17	.75	1 1/4-12

For Stainless Steel, place the letter S after the Part Number. For example: L680S.

# Rod Diameter Selection

Cylinder thrust load, mounting style and stroke are the three main factors in determining rod diameter. Cylinder thrust loads can be determined from the max usable cylinder extend force charts on page 3. The mounting style can be determined using the drawings below. Once the thrust load, mounting style and stroke are known, the rod diameter chart can be used to determine the rod diameter.

**Example:**

- 2 1/2 inch cylinder bore 80 psi air pressure
- MF1 mount with Rod Clevis 60 inch stroke



Cylinder thrust load = 314 pounds (from page 3)  
 Mounting style = Style #2 (from drawings below)

**From the rod diameter chart**

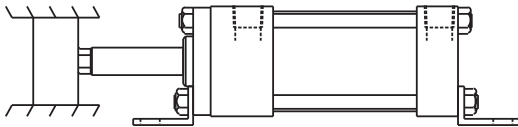
5/8" rod diameter has a load rating of 122 pounds  
 1" rod diameter has a load rating of 796 pounds



Therefore, the 1" rod diameter must be used.

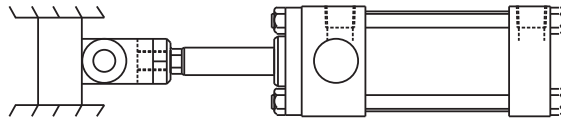
**MOUNTING STYLE DRAWINGS**

STYLE #1



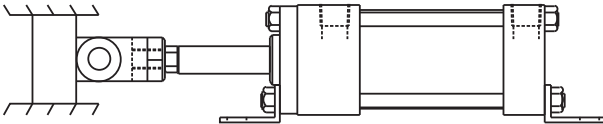
ROD FIXED & SUPPORTED: MF1, MF2, MS1, MS2, MS4, MX0, MX1, MX2, MX3 MOUNTS

STYLE #3



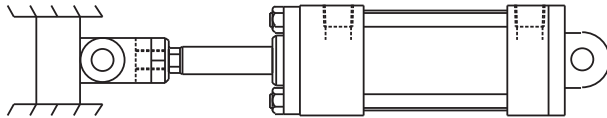
ROD PIVOTED & SUPPORTED: MT1 MOUNT

STYLE #2

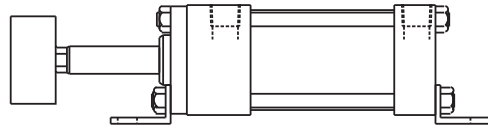


ROD PIVOTED & SUPPORTED: MF1, MF2, MS1, MS2, MS4, MX0, MX1, MX2, MX3 MOUNTS

STYLE #4



ROD PIVOTED & SUPPORTED: MP1, MP2, MP4, MT2 MOUNTS



ROD UNSUPPORTED: MF1, MF2, MS1, MS2, MS4, MX0, MX1, MX2, MX3 MOUNTS

**ROD DIAMETER CHART\***

Stroke Length	Maximum Allowable Cylinder Thrust Load											
	Mounting Style #1			Mounting Style #2			Mounting Style #3			Mounting Style #4		
	5/8" Rod	1" Rod	1 3/8" Rod	5/8" Rod	1" Rod	1 3/8" Rod	5/8" Rod	1" Rod	1 3/8" Rod	5/8" Rod	1" Rod	1 3/8" Rod
15"	644	1767	3442	595	1689	3334	522	1571	3172	238	1178	2632
20"	603	1702	3352	538	1597	3208	440	1440	2992	134	878	2272
25"	562	1636	3262	481	1505	3082	343	1309	2812	86	562	1912
30"	522	1571	3172	423	1414	2956	238	1178	2632	60	390	1395
40"	440	1440	2992	273	1230	2704	134	878	2272	33	220	785
50"	343	1309	2812	175	1047	2452	86	562	1912	21	140	502

\*For Strokes Exceeding 20 inches; consult factory.

# Dual Piston Selection

Dual Pistons (two pistons with a spacer in between) are needed in some cylinders with long strokes. The purpose of a dual piston is to prevent binding or jack-knifing. Below is a chart that shows dual piston length in relation to mounting style (from previous page) and stroke.

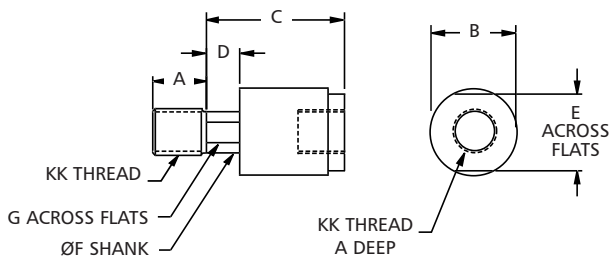
DUAL PISTON CHART

Stroke Length	Minimum Dual Piston Length			
	Mounting Style #1	Mounting Style #2	Mounting Style #3	Mounting Style #4
20"	0	0	0	0
25"	0	0	0	1 1/2
30"	0	0	0	2
40"	0	0	0	3
50"	0	0	1 1/2	4

# Approximate Cylinder Weight Chart (lbs.)

Bore	Rod Diameter	MX0 MS4	MF1 MF2	MP1, MP2 MP4	MX1, MX2 MX3, MS1, MS2	MT1 MT2	Per inch of stroke
1 1/2	5/8"	2.1	2.8	2.8	2.4	2.6	0.20
	1"	2.7	3.4	3.4	3.0	3.2	0.35
2	5/8"	2.7	3.8	3.7	3.1	3.2	0.25
	1"	3.3	4.4	4.3	3.7	3.8	0.40
2 1/2	5/8"	3.7	5.2	4.9	4.2	4.2	0.26
	1"	4.3	5.8	5.5	4.8	4.8	0.41
3 1/4	1"	6.4	10.6	9.6	7.2	6.9	0.47
	1 3/8"	7.2	11.4	11.3	8.0	7.7	0.67
4	1"	9.0	14.0	13.1	9.9	9.5	0.50
	1 3/8"	9.9	14.9	14.0	10.8	10.4	0.70

# Alignment Coupler



(1/16" RADIAL FLOAT)  
(1° SPHERICAL FLOAT)

Part #	Dimensional Specifications								Max Pull Load
	A	B	C	D	E	F	G	KK	
L640	.75	1.25	2.00	.50	1.13	.63	.56	7 /16-20	2,500 LB.
L641	.75	1.25	2.00	.50	1.13	.63	.56	1/2-20	3,500 LB.
L642	1.13	1.75	2.31	.31	1.50	.97	.88	3/4-16	8,500 LB.
L643	1.13	1.75	2.31	.31	1.50	.97	.88	7/8-14	8,500 LB.
L644	1.63	2.50	2.94	.50	2.25	1.38	1.25	1-14	16,000 LB.
L645	1.63	2.50	2.94	.50	2.25	1.38	1.25	1 1/4-12	16,000 LB.

Sensor information is available on page 21.

# How to Order: Pneumatic Tie Rod Pin-Act Cylinder (1 1/2" to 4" Bore)

SERIES	BORE SIZE	ROD SIZE	MOUNT TYPE	STROKE (inches)	CUSHION TYPE	PORT TYPE	THREAD STYLE	OPTIONS (if needed)	OPTIONS (if needed)
PAØ	B	B	F1	1.50	A	S15	9	P2	
1	2	3	4	5	6	7	8	9	9

1	PAØ	NFPA Shot Pin Cylinder
---	-----	------------------------

2	A	1 1/2" Bore Cylinder
	B	2" Bore Cylinder
	C	2 1/2" Bore Cylinder
	D	3 1/4" Bore Cylinder
	E	4" Bore Cylinder

3	A	Single End, Standard Rod Size*
	B	Single End, Oversize Rod Size
	C	Double End, Standard Rod Size*
	D	Double End, Oversize Rod Size

\*NOTE: 3-1/4" and 4" bore only.

4	F1	Front Flange Mount
	F2	Rear Flange Mount
	S1	Angle Mount
	S2	Side Lug Mount
	S4	Bottom Tap Mount
	X0	Basic No Mount
	X1	Both Extended Tie Rod Mount
	X2	Cap Extended Tie Rod Mount
	X3	Rod Extended Tie Rod Mount

5	Specify Stroke to Two Decimal Places*
Example	1 1/2" = 1.50
	Standard Stroke Tolerance +/- .031

\*Consult Factory above 4.00 inches stroke.

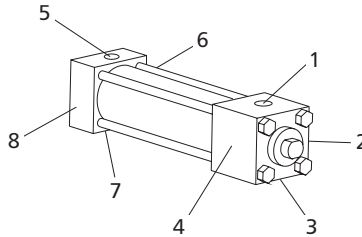
6	A	No Cushion
	B	Cushion Both Ends 1 & 5♦
	C	Cushion Both Ends 2 & 6 (STD)♦
	D	Cushion Both Ends 3 & 7♦
	E	Cushion Both Ends 4 & 8♦
	F	Cushion Cap End 5
	G	Cushion Cap End 6
	H	Cushion Cap End 7
	I	Cushion Cap End 8
	J	Cushion Head End 1♦
	K	Cushion Head End 2♦
	L	Cushion Head End 3♦
	M	Cushion Head End 4♦

♦ Not available for 1 1/2" Bore.

## Port and Cushion Location

Standard Port Position 1 & 5

Standard Cushion Position 2 & 6



7	S15	Standard Port Size 1&5 (STD)
	S26	Standard Port Size 2 & 6
	S37	Standard Port Size 3 & 7
	S48	Standard Port Size 4 & 8

8	1	Style #1 Male Thread
	2	Style #2 Male Thread
	3	Style #3 Female Thread
	8	Style #8 Blunt End
	9	Style #9 Cone Point Thread

Rod Size and Thread Style Chart					
Bore	Rod Size	Style #1 Male Thread	Style #2 Male Thread	Style #3 Female Thread	Style #9 Cone Point Thread
1 1/2"	Oversize (1")	3/4-16	7/8-14	3/4-16	1/2-20
2"	Oversize (1")	3/4-16	7/8-14	3/4-16	1/2-20
2 1/2"	Oversize (1")	3/4-16	7/8-14	3/4-16	1/2-20
3 1/4"	Standard (1")	3/4-16	7/8-14	3/4-16	1/2-20
3 1/4"	Oversize (1 3/8")	1-14	1 1/4-12	1-14	5/8-18
4"	Standard (1")	3/4-16	7/8-14	3/4-16	1/2-20
4"	Oversize (1 3/8")	1-14	1 1/4-12	1-14	5/8-18

NOTE: Male rod ends are threaded rod studs.

The following chart shows maximum static side loads per rod size and stroke. Standard design practices should take factors such as impact and shot pin friction into account when selecting a cylinder and rod diameter.

Maximum Side Loads (lbf)				
Rod Dia.	1" Stroke	2" Stroke	3" Stroke	4" Stroke
1"	500	260	160	80
1 3/8"	1900	930	600	300

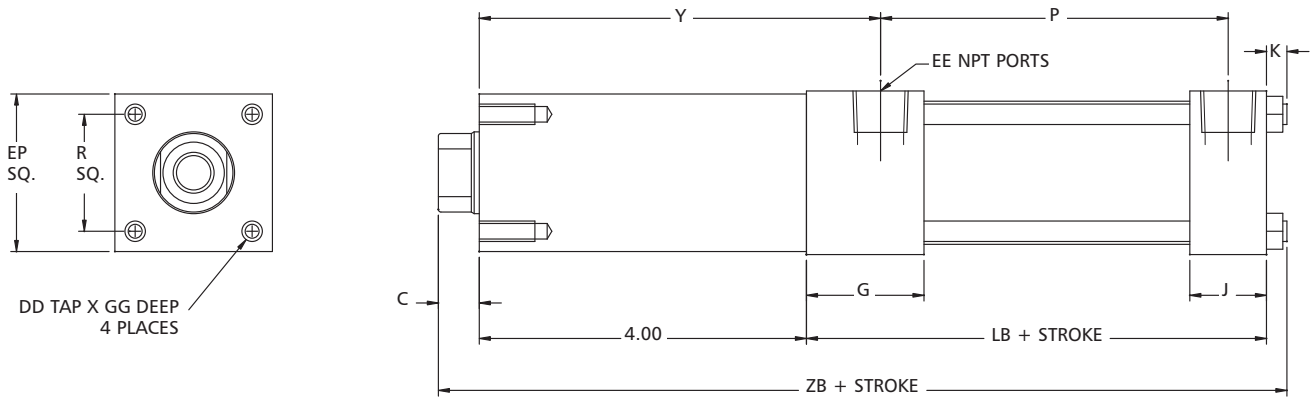
9	EP	Enersorb Piston
	MP	Magnetic Piston
	P1	45° Cone Point*
	P2	60° Cone Point*
	STS	Stainless Steel Rod
	VS	Viton Seals♦
	Dxx.xx	Dual Piston (specify length)
	Rxx.xx	Rod Extension (specify length)
	Txx.xx	Thread Extension (specify length)

\*Style #9 thread required.

♦Not available with EP option

# Basic Dimensions (X0 Mount)

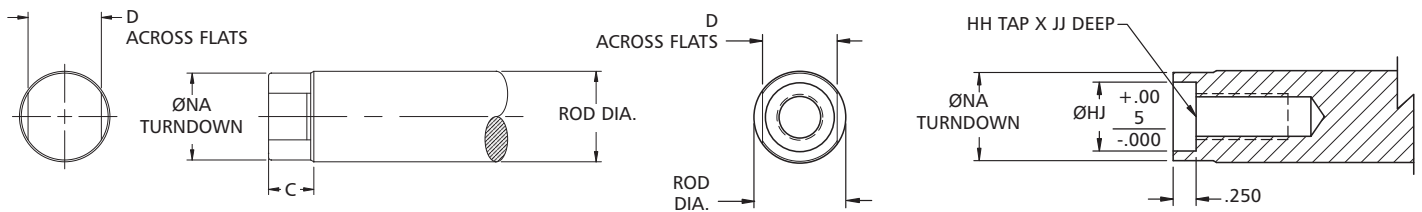
The basic mounting (X0) is shown below; however other mounting styles are available. Special note: F1, S1, X1 mounts are added to the bearing block face.



Dimensional Specifications

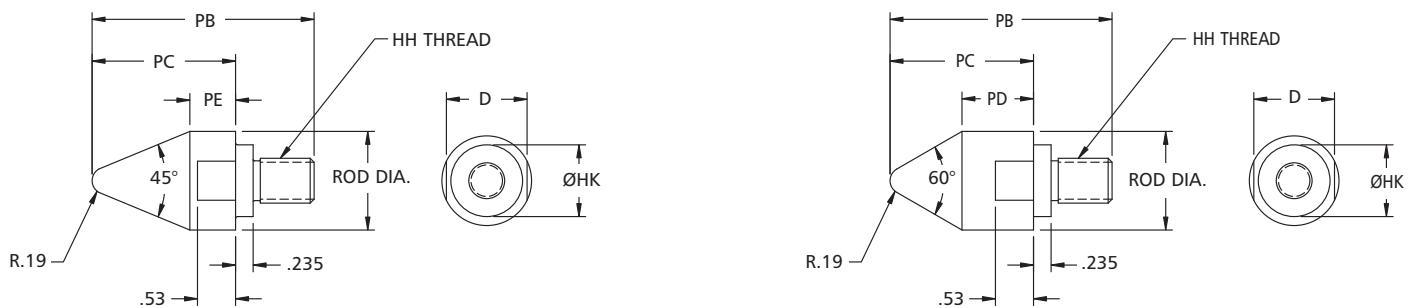
Bore	Rod	Y	P	G	J	EE	LB	EP	K	C	ZB	R	DD TAP	GG DEPTH
1 1/2	1	4.94	2.25	1.50	1.00	3/8	3.63	1.93	.25	.44	8.31	1.43	1/4-28	.63
2	1	4.84	2.34	1.50	1.00	3/8	3.63	2.43	.31	.44	8.38	1.84	5/16-24	.63
2 1/2	1	4.84	2.47	1.50	1.00	3/8	3.75	2.93	.31	.44	8.50	2.19	5/16-24	.63
3 1/4	1	5.06	2.63	1.75	1.25	1/2	4.25	3.68	.38	.44	9.06	2.76	3/8-24	1.00
	1 3/8	5.06	2.63	1.75	1.25	1/2	4.25	3.68	.38	.63	9.19	2.76	3/8-24	1.00
4	1	5.06	2.63	1.75	1.25	1/2	4.25	4.43	.38	.50	9.06	3.32	3/8-24	1.00
	1 3/8	5.06	2.63	1.75	1.25	1/2	4.25	4.43	.38	.63	9.19	3.32	3/8-24	1.00

## Rod End Styles



NOTE: See page 4 for Rod End Styles #1, #2 and #3.

## Cone Point Styles

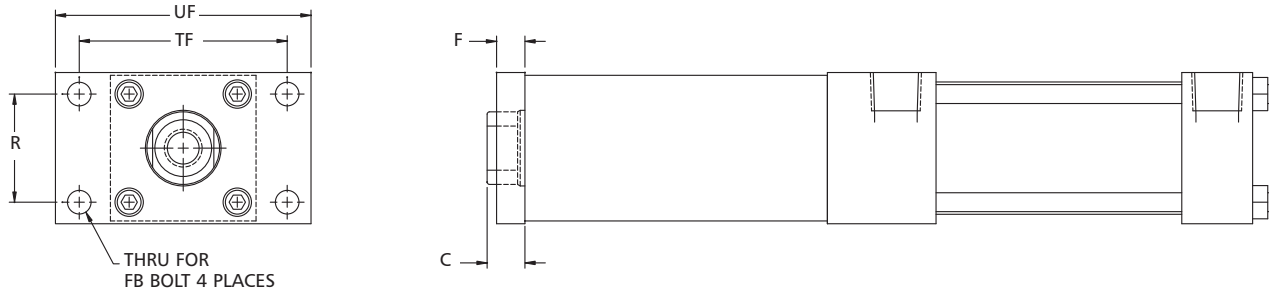


Dimensional Specifications

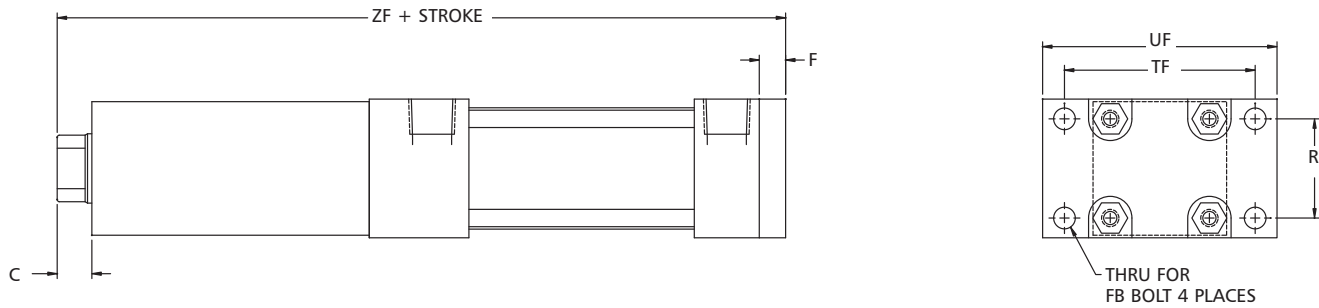
Rod Dia.	D	HH	HJ	HK	PB	PC	PD	NA	PE	JJ
1	.81	1/2-20	.75	.75	2.68	1.59	.91	.96	.68	1.00
1-3/8	1.13	5/8-18	1.00	.10	3.10	2.00	1.00	1.31	.64	1.63

# Flange and Angle Mounts

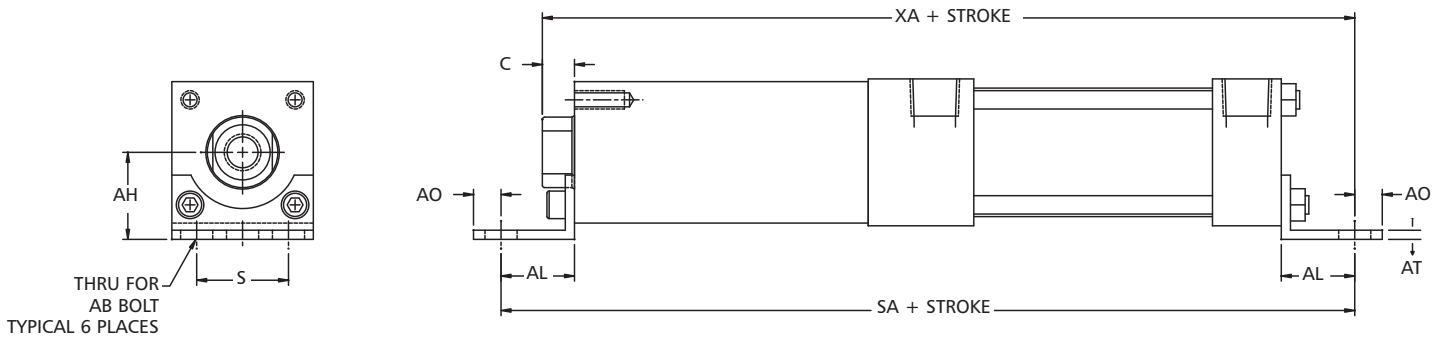
## F1 FRONT FLANGE MOUNT



## F2 REAR FLANGE MOUNT



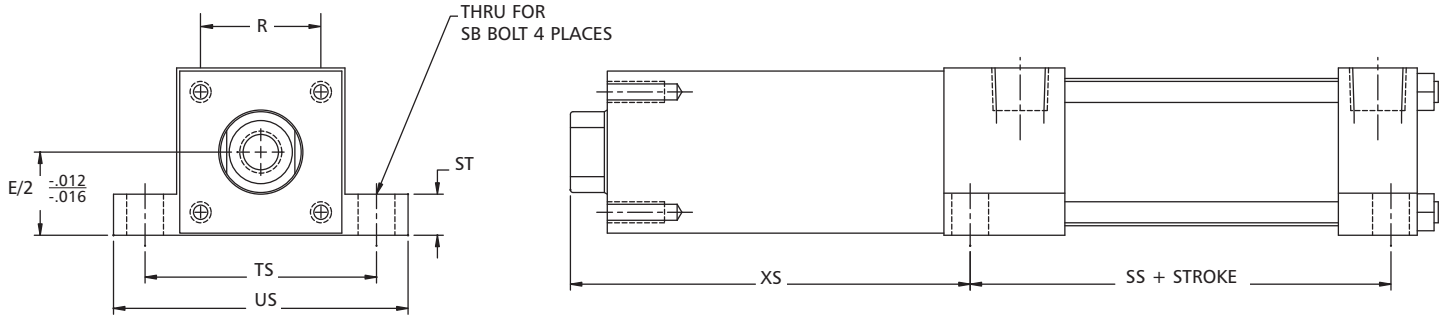
## S1 ANGLE MOUNT



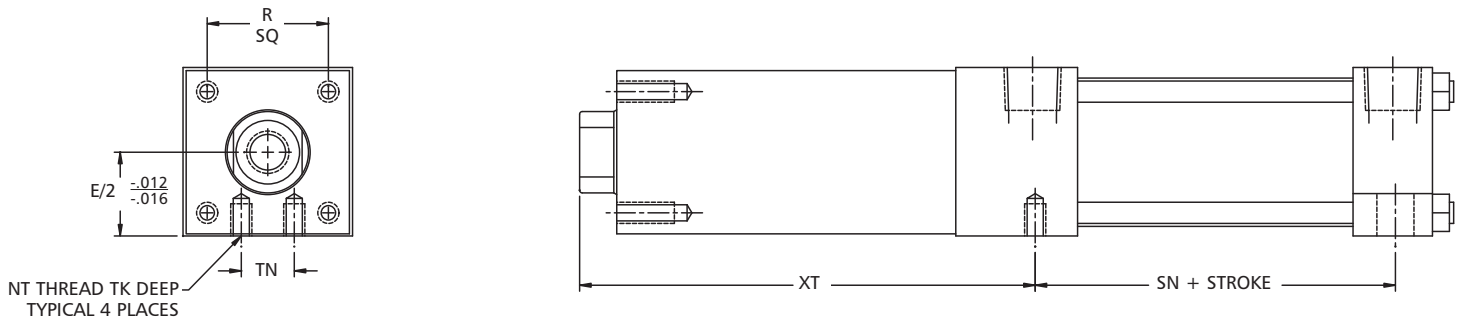
Dimensional Specifications																	
Bore	Rod	C	E	F	R	S	AB	FB	TF	UF	ZF	AL	AO	AH	AT	SA	XA
1 1/2	1	.438	2.00	.38	1.43	1.25	3/8	1/4	2.75	3.38	8.45	1.00	.38	1.19	.13	9.63	9.07
2	1	.438	2.50	.38	1.84	1.75	3/8	5/16	3.38	4.13	8.45	1.00	.38	1.44	.13	9.63	9.07
2 1/2	1	.438	3.00	.38	2.19	2.25	3/8	5/16	3.88	4.63	8.57	1.00	.38	1.63	.13	9.75	9.19
3 1/4	1	.438	3.75	.63	2.76	2.75	1/2	3/8	4.69	5.50	9.32	1.25	.50	1.94	.13	10.75	9.94
	1 3/8	.563	3.75	2.75	2.76	2.75	1/2	3/8	4.69	5.50	9.44	1.25	.50	1.94	.13	10.75	10.06
4	1	.438	4.50	.63	3.32	3.50	1/2	3/8	5.44	6.25	9.32	1.25	.50	2.25	.13	10.75	9.94
	1 3/8	.563	4.50	2.75	3.32	3.50	1/2	3/8	5.44	6.25	9.44	1.25	.50	2.25	.13	10.75	10.06

# Side Lug, Bottom Tap and Pneumatic Tie Rod Mounts

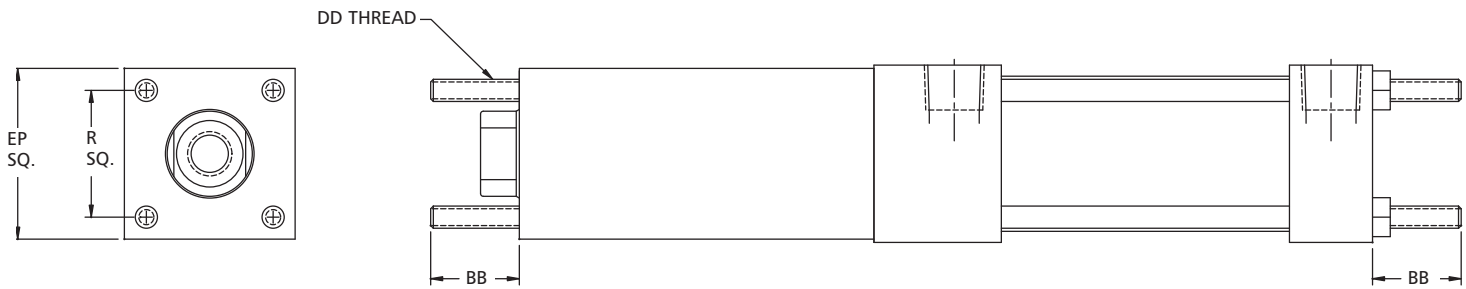
## S2 SIDE LUG MOUNT



## S4 BOTTOM TAP MOUNT



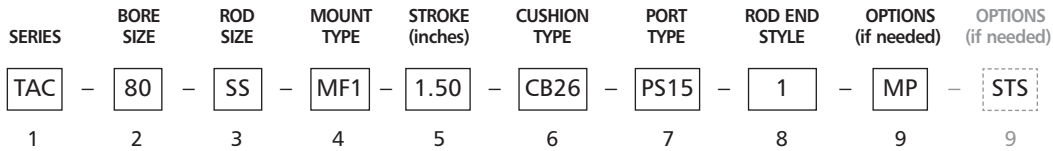
- X1 BOTH ENDS EXTENDED TIE RODS
- X2 CAP EXTENDED TIE RODS
- X3 HEAD EXTENDED TIE RODS



Dimensional Specifications																
Bore	Rod	E/2	R	ST	SB	TS	US	XS	SS	TN	NT	TK	XT	SN	DD	BB
1 1/2	1	1.00	1.43	.50	3/8	2.75	3.50	4.82	2.88	.63	1/4-20 UNC	.31	5.38	2.25	1/4-28 UNF	1.00
2	1	1.25	1.84	.50	3/8	3.25	4.00	4.82	2.88	.88	5/16-18 UNC	.50	5.38	2.25	5/16-24 UNF	1.13
2 1/2	1	1.50	2.19	.50	3/8	3.75	4.50	4.82	3.00	1.25	3/8-16 UNC	.63	5.38	2.38	5/16-24 UNF	1.13
3 1/4	1	1.88	2.76	.75	1/2	4.75	5.75	4.94	3.25	1.50	1/2-13 UNC	.75	5.50	2.63	3/8-24 UNF	1.38
	1 3/8	1.88	2.76	.75	1/2	4.75	5.75	5.06	3.25	1.50	1/2-13 UNC	.75	5.63	2.63	3/8-24 UNF	1.38
4	1	2.25	3.32	.75	1/2	5.50	6.50	4.94	3.25	2.06	1/2-13 UNC	.75	5.50	2.63	3/8-24 UNF	1.38
	1 3/8	2.25	3.32	.75	1/2	5.50	6.50	5.06	3.25	2.06	1/2-13 UNC	.75	5.63	2.63	3/8-24 UNF	1.38

Sensor information is available on page 21.

# How to Order - Pneumatic Tie Rod Interchangeable Cylinders (5" to 10" Bore)



1 **TAC** NFPA Interchangeable Cylinder

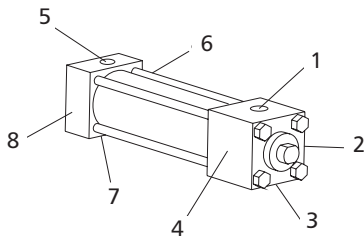
2

<b>50</b>	5" Bore Cylinder
<b>60</b>	6" Bore Cylinder
<b>80</b>	8" Bore Cylinder
<b>100</b>	10" Bore Cylinder

3

<b>SS</b>	Single End, Standard Rod Size
<b>SO</b>	Single End, Oversize Rod Size
<b>DS</b>	Double End, Standard Rod Size
<b>DO</b>	Double End, Oversize Rod Size

**Port and Cushion Location**  
 Standard Port Position 1 & 5  
 Standard Cushion Position 2 & 6



4

<b>ME3</b>	Front Mounting Holes (8"-10")
<b>ME4</b>	Rear Mounting Holes (8"-10")
<b>MF1</b>	Front Flange Mount (5"-6")
<b>MF2</b>	Rear Flange Mount (5"-6")
<b>MP1</b>	Fixed Clevis Mount
<b>MP2</b>	Detachable Clevis Mount
<b>MS1</b>	Angle Mount (5"-8")
<b>MS4</b>	Bottom Tap Mount
<b>MT1</b>	Head Trunnion Mount (5"-8")
<b>MT2</b>	Cap Trunnion Mount (5"-8")
<b>MT4</b>	Mid Trunnion Mount (5"-8")
<b>MX0</b>	Basic No Mount
<b>MX1</b>	Both Extended Tie Rod Mount
<b>MX2</b>	Cap Extended Tie Rod Mount
<b>MX3</b>	Head Extended Tie Rod Mount

5

Specify Stroke to Two Decimal Places
Example 1 1/2" = 1.50 Standard
Stroke Tolerance +/- .031

6

<b>NC</b>	No Cushion
<b>CB15</b>	Cushion Both Ends 1 & 5
<b>CB26</b>	Cushion Both Ends 2 & 6 (STD)
<b>CB37</b>	Cushion Both Ends 3 & 7
<b>CB48</b>	Cushion Both Ends 4 & 8
<b>CH1</b>	Cushion Cap End 5
<b>CH2</b>	Cushion Cap End 6
<b>CH3</b>	Cushion Cap End 7
<b>CH4</b>	Cushion Cap End 8
<b>CC5</b>	Cushion Head End 1
<b>CC6</b>	Cushion Head End 2
<b>CC7</b>	Cushion Head End 3
<b>CC8</b>	Cushion Head End 4

7

<b>PS15</b>	Standard Port Size 1 & 5 (STD)
<b>PS26</b>	Standard Port Size 2 & 6
<b>PS37</b>	Standard Port Size 3 & 7
<b>PS48</b>	Standard Port Size 4 & 8

8

<b>1</b>	Style #1 Male Thread (STD)
<b>2</b>	Style #2 Male Thread
<b>3</b>	Style #3 Female Thread

9

<b>AOP</b>	Air/Oil Piston
<b>Axx.xx</b>	Adjustable Stroke (specify length)
<b>BPP</b>	Bumper Piston
<b>Dxx.xx</b>	Dual Piston (specify length)
<b>H400</b>	400 psi Hydraulic
<b>LFS</b>	Low Friction Seals
<b>MP</b>	Magnetic Piston
<b>MRS</b>	Metallic Rod Scraper
<b>Rxx.xx</b>	Rod Extension (specify length)
<b>SCT</b>	Steel Cylinder Tube
<b>SRE</b>	Studded Rod End
<b>SSTR</b>	Stainless Steel Tie Rods & Fasteners
<b>STS</b>	Stainless Steel Rod
<b>Txx.xx</b>	Thread Extension (specify length)
<b>UB</b>	Urethane Bumper
<b>VS</b>	Hi-Temp Viton Seals
<b>EP</b>	Enersorb Piston

**Rod Size and Thread Style Chart**

Bore	Rod Size Male Thread	Style #1 Male Thread	Style #2 Female Thread	Style #3
5"	Standard (1")	3/4-16	7/8-14	3/4-16
	Oversize (1 3/8")	1-14	1 1/4-12	1-14
6"	Standard (1 3/8")	1-14	1 1/4-12	1-1/4
	Oversize (1 3/4")	1 1/4-12	1 1/2-12	1-1/4-12
8"	Standard (1 3/8")	1-14	1 1/4-12	1-14
	Oversize (1 3/4")	1 1/4-12	1 1/2-12	1 1/4-12
10"	Standard (1 3/4")	1 1/4-12	1 1/2-12	1 1/4-12
	Oversize (2")	1 1/2-12	1 3/4-12	1 1/2-12

## Force Chart

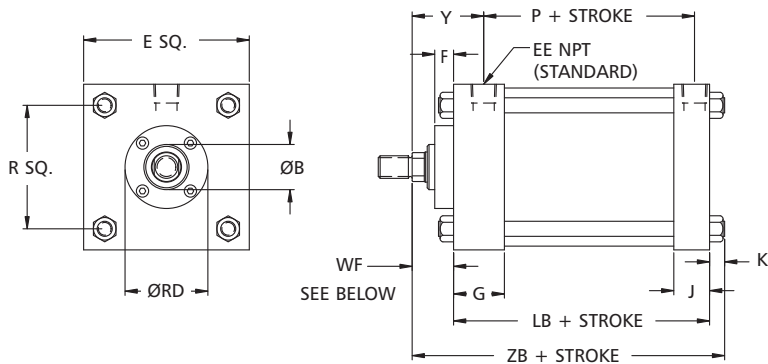
The force charts show maximum usable forces which is 80% of theoretical. Standard design practices should take factors such as stroke, speed and friction into account when sizing a cylinder.

**Max Usable Extend & Retract Force @ 100 psi**

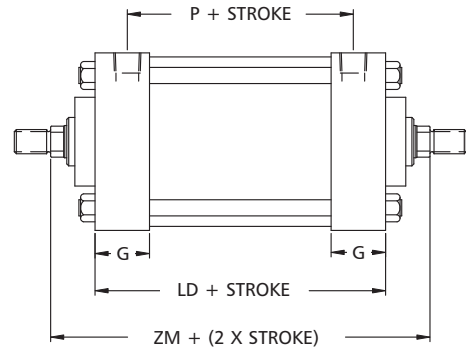
Bore	Rod Dia. (in)	Ext. (lbf)	Retract (lbf)
5	1	1571	1508
	1 3/8		1452
6	1 3/8	2262	2143
	1 3/4		2070
8	1 3/8	4021	3902
	1 3/4		3829
10	1 3/4	6283	6091
	2		6032

# Basic No Mount

MX0 BASIC NO MOUNT (SINGLE ROD END)



MX0 BASIC NO MOUNT (DOUBLE ROD END)



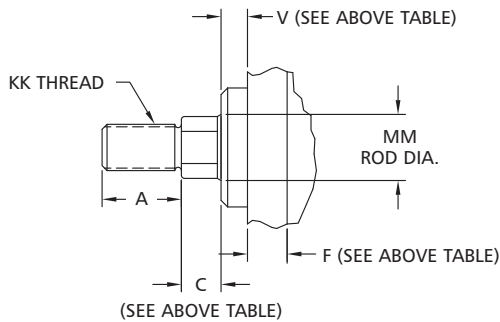
Only mounts available for double rod end are:  
ME3, MF1, MS1, MS4, MT1, MT4, MX0, MX1 and  
MX3.

Dimensional Specifications

Bore	Rod	B	C	E	F	G	J	K	P	R	V	Y	EE	LB	LD	RD	WF	ZB	ZM
5	1	.50	.50	5.50	.63	1.75	1.25	.44	3.00	4.10	.25	2.38	1/2	4.50	5.00	2.75	N/A	6.31	7.75
	1 3/8	2.00	.63	5.50	.63	1.75	1.25	.44	3.00	4.10	.38	2.63	1/2	4.50	5.00	3.50	N/A	6.56	8.25
6	1 3/8	2.00	.63	6.50	.63	2.00	1.50	.44	3.25	4.88	.38	2.75	3/4	5.00	5.50	3.50	N/A	7.06	8.75
	1 3/4	2.38	.75	6.50	.63	2.00	1.50	.44	3.25	4.88	.50	3.00	3/4	5.00	5.50	3.50	N/A	7.31	9.25
8	1 3/8	2.00	.63	8.50	.63	2.00	1.50	.56	3.38	6.44	.38	2.75	3/4	5.13	5.63	3.50	1.63	7.31	8.88
	1 3/4	2.38	.75	8.50	.63	2.00	1.50	.56	3.38	6.44	.50	3.00	3/4	5.13	5.63	3.50	1.88	7.56	9.38
10	1 3/4	2.38	.75	10.63	.63	2.25	2.00	.69	4.31	7.92	.38	3.06	1	6.38	6.63	5.00	1.88	8.94	10.38
	2	2.63	.88	10.63	.75	2.25	2.00	.69	4.31	7.92	.38	3.19	1	6.38	6.63	5.00	2.00	9.00	10.63

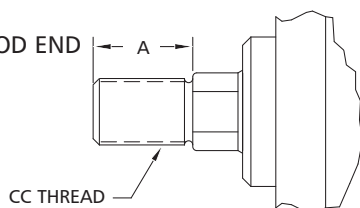
## Rod End Styles

STANDARD MALE ROD END  
(STYLE #1)

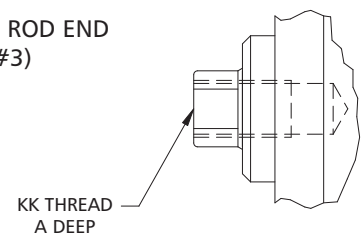


Dimensional Specifications			
MM	A	CC	KK
1"	1.13	7/8-14	3/4-16
1 3/8"	1.63	1 1/4-12	1-14
1 3/4"	2.00	1 1/2-12	1 1/4-12
2"	2.25	1 3/4-12	1 1/2-12

OVERSIZE MALE ROD END  
(STYLE #2)

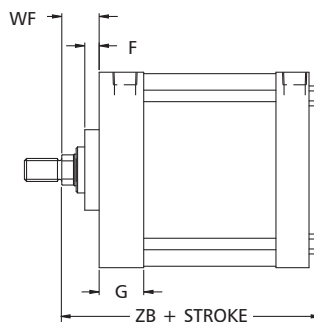
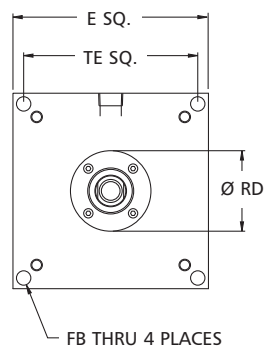


FEMALE ROD END  
(STYLE #3)

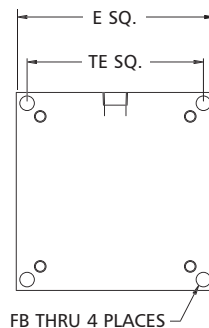
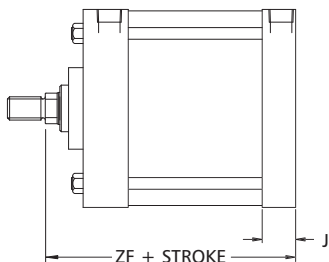


# Flange Mount

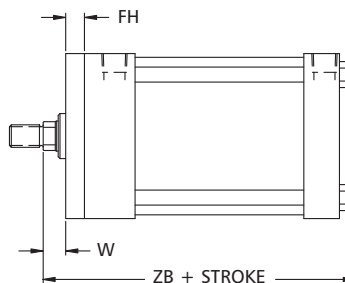
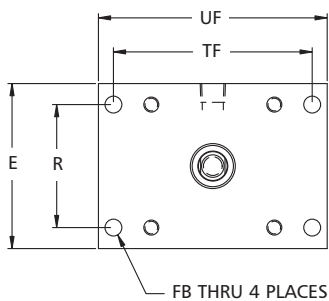
ME3 FRONT  
MOUNTING HOLES  
(8" AND 10" BORE ONLY)



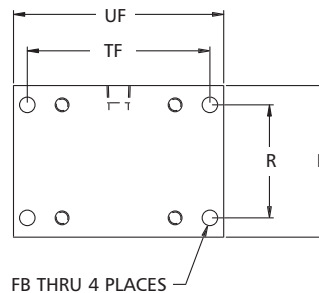
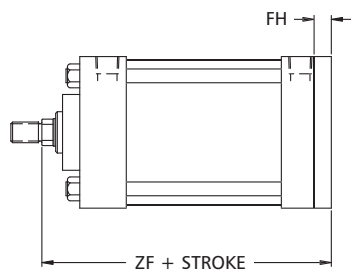
ME4 REAR  
MOUNTING HOLES  
(8" AND 10" BORE ONLY)



MF1 FRONT  
FLANGE MOUNT  
(NOT AVAILABLE 8" AND 10" BORE USE ME3)



MF2 REAR  
FLANGE MOUNT  
(NOT AVAILABLE 8" AND 10" BORE USE ME4)

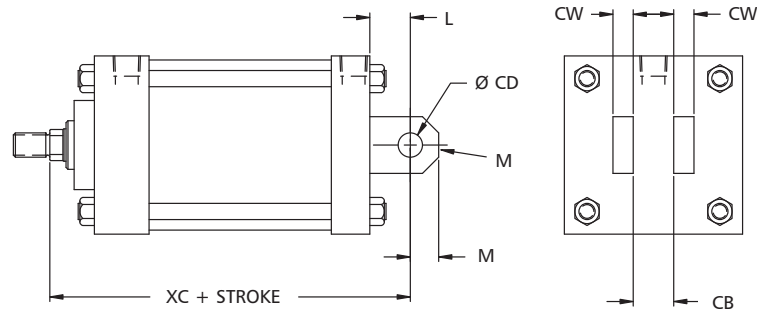


## Dimensional Specifications

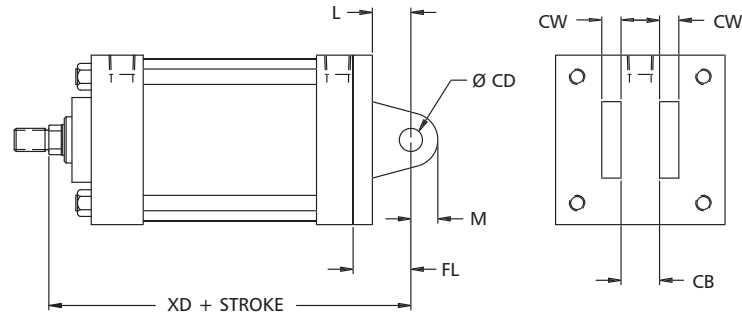
Bore	Rod	E	F	G	J	R	W	FB	FH	RD	TE	TF	UF	WF	ZF	ZB
5	1	5.50	.63	N/A	N/A	4.10	.75	9/16	.63	N/A	N/A	6.63	7.63	N/A	6.50	6.31
	1 3/8	5.50	.63	N/A	N/A	4.10	1.00	9/16	.63	N/A	N/A	6.63	7.63	N/A	6.75	6.56
6	1 3/8	6.50	.63	N/A	N/A	4.88	.88	9/16	.75	N/A	N/A	7.63	8.63	N/A	7.38	7.06
	1 3/4	6.50	.63	N/A	N/A	4.88	1.13	9/16	.75	N/A	N/A	7.63	8.63	N/A	7.63	7.38
8	1 3/8	8.50	.63	2.00	1.50	N/A	N/A	11/16	N/A	3.50	7.57	N/A	N/A	1.63	6.75	7.31
	1 3/4	8.50	.63	2.00	1.50	N/A	N/A	11/16	N/A	3.50	7.57	N/A	N/A	1.88	7.00	7.56
10	1 3/4	10.63	.63	2.25	2.00	N/A	N/A	13/16	N/A	5.00	9.40	N/A	N/A	1.88	8.25	8.94
	2	10.63	.75	2.25	2.00	N/A	N/A	13/16	N/A	5.00	9.40	N/A	N/A	2.00	8.38	9.06

# Clevis and Bottom Mounts

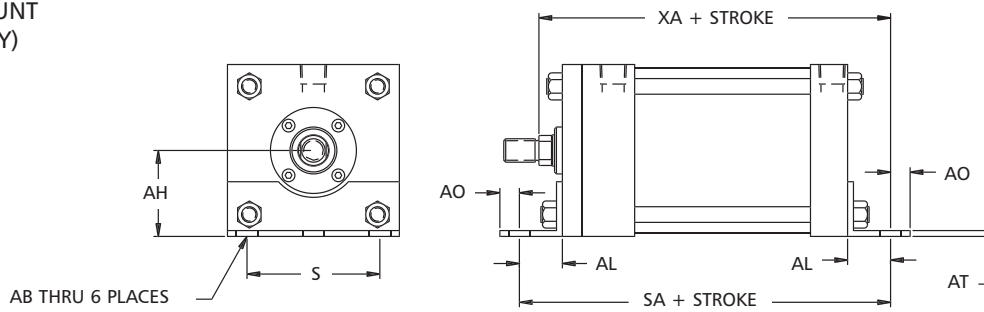
MP1 FIXED CLEVIS MOUNT  
(PIN INCLUDED WITH MOUNT)  
5"-8" BORES ARE EXTRUDED WITH BEARING;  
10" BORE IS WELDED



MP2 Detachable  
Clevis Mount  
(Pin included with mount)

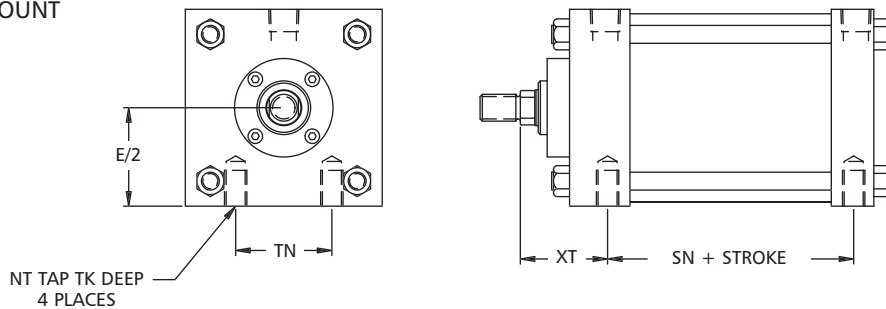


MS1 ANGLE MOUNT  
(5" - 8" BORE ONLY)



NOTE: SA dimensions increase 1/2" plus one "F" on double rod cylinders.

MS4 BOTTOM TAP MOUNT

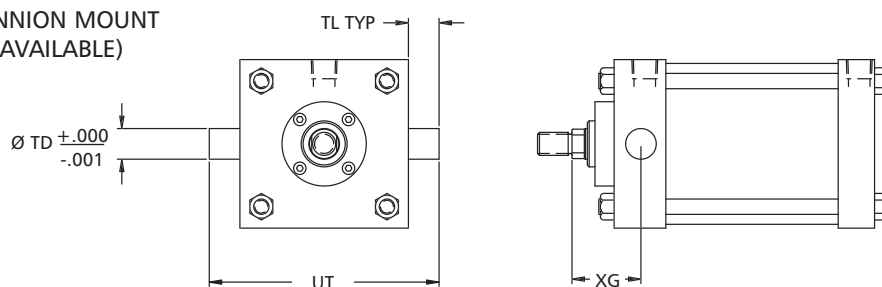


## Dimensional Specifications

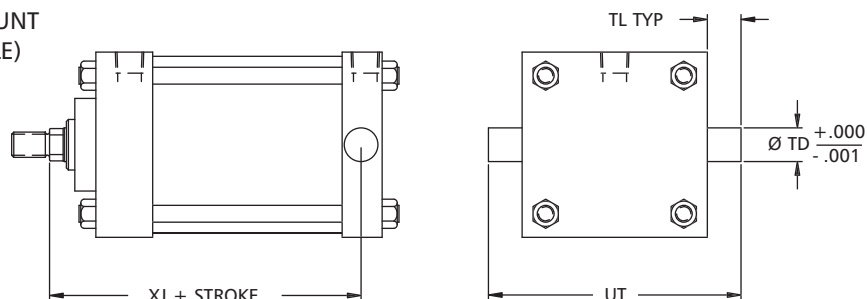
Bore	Rod	E/2	F	L	M	S	AB	AH	AL	AO	AT	CB	CD	CW	FL	NT	SA	SN	TK	TN	XA	XC	XD	XT
5	1	2.75	.63	1.25	.88	4.25	11/16	2.75	1.38	.63	.19	1.25	.75	.63	1.88	5/8-11	7.88	2.88	1.00	2.69	7.25	7.13	7.75	2.44
	1 3/8	2.75	.63	1.25	.88	4.25	11/16	2.75	1.38	.63	.19	1.25	.75	.63	1.88	5/8-11	7.88	2.88	1.00	2.69	7.50	7.38	8.00	2.69
6	1 3/8	3.25	.63	1.50	1.00	5.25	13/16	3.25	1.38	.63	.19	1.50	1.00	.75	2.25	3/4-10	8.50	3.13	1.13	3.25	8.00	8.13	8.88	2.81
	1 3/4	3.25	.63	1.50	1.00	5.25	13/16	3.25	1.38	.63	.19	1.50	1.00	.75	2.25	3/4-10	8.50	3.13	1.13	3.25	8.25	8.38	9.13	3.06
8	1 3/8	4.25	.63	1.50	1.00	7.13	13/16	4.25	1.81	.69	.25	1.50	1.00	.75	N/A	3/4-10	8.75	3.25	1.13	4.50	8.56	8.25	N/A	2.81
	1 3/4	4.25	.63	1.50	1.00	7.13	13/16	4.25	1.81	.69	.25	1.50	1.00	.75	N/A	3/4-10	8.75	3.25	1.13	4.50	8.81	8.50	N/A	3.06
10	1 3/4	5.31	.63	2.13	1.38	N/A	N/A	N/A	N/A	N/A	N/A	2.00	1.38	1.00	N/A	1-8	N/A	4.13	1.50	5.50	N/A	10.38	N/A	3.13
	2	5.31	.63	2.13	1.38	N/A	N/A	N/A	N/A	N/A	N/A	2.00	1.38	1.00	N/A	1-8	N/A	4.13	1.50	5.50	N/A	10.50	N/A	3.25

# Trunnion & Pneumatic Tie Rod Mount

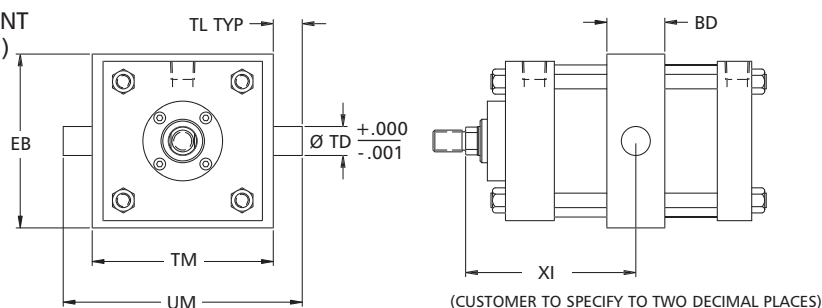
MT1 HEAD TRUNNION MOUNT  
(10" BORE NOT AVAILABLE)



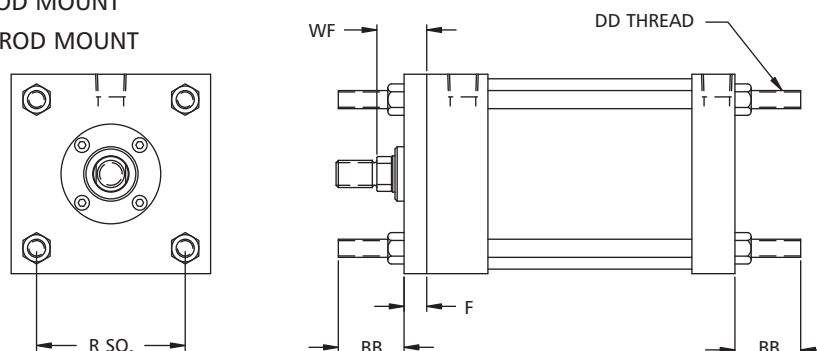
MT2 CAP TRUNNION MOUNT  
(10" BORE NOT AVAILABLE)



MT4 MID TRUNNION MOUNT  
(10" BORE NOT AVAILABLE)



MX1 BOTH EXTENDED TIE ROD MOUNT  
MX2 CAP EXTENDED TIE ROD MOUNT  
MX3 HEAD EXTENDED TIE ROD MOUNT



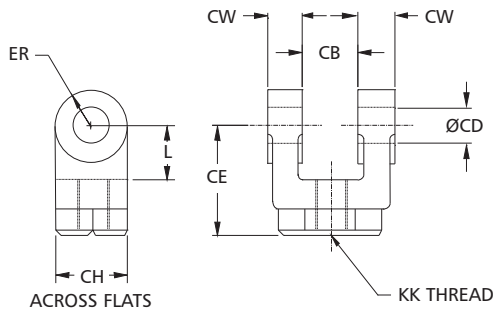
NOTE: Round retainer used to retain bushing, not a full front plate as other bores. "BB" dimensioned from head for 8" & 10" bores.

## Dimensional Specifications

Bore	Rod	F	R	BB*	BD	DD	EB	TD	TL	TM	UM	UT	WF	XG	XI	XJ
5	1	.63	4.10	1.81	2.00	1/2-20	6.00	1.000	1.00	6.25	8.25	7.50	1.38	2.25	Customer to Specify (2 decimal places)	5.25
	1 3/8	.63	4.10	1.81	2.00	1/2-20	6.00	1.000	1.00	6.25	8.25	7.50	1.63	2.50		5.50
6	1 3/8	.75	4.88	1.81	2.00	1/2-20	7.00	1.375	1.38	7.63	10.38	9.25	1.63	2.63	Customer to Specify (2 decimal places)	5.88
	1 3/4	.75	4.88	1.81	2.00	1/2-20	7.00	1.375	1.38	7.63	10.38	9.25	1.88	2.88		6.13
8	1 3/8	.63	6.44	2.31	2.50	5/8-18	9.50	1.375	1.38	9.75	12.50	11.25	1.63	2.63	Customer to Specify (2 decimal places)	6.00
	1 3/4	.63	6.44	2.31	2.50	5/8-18	9.50	1.375	1.38	9.75	12.50	11.25	1.88	2.88		6.25
10	1 3/4	.63	7.92	2.69	N/A	3/4-16	N/A	N/A	N/A	N/A	N/A	N/A	1.88	N/A	N/A	N/A
	2	.75	7.92	2.69	N/A	3/4-16	N/A	N/A	N/A	N/A	N/A	N/A	2.00	N/A	N/A	N/A

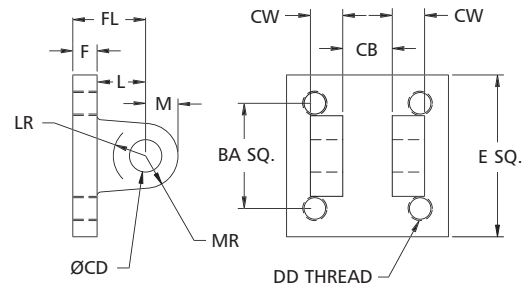
# Accessories

ROD CLEVIS (PIN AND JAM NUT INCLUDED)



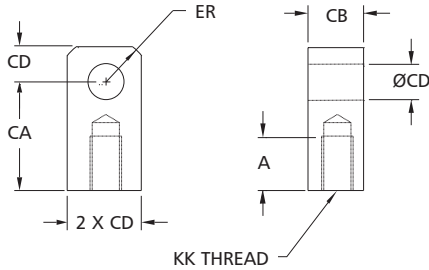
Dimensional Specifications								
Part #	CE	L	CB	CD	CH	CW	ER	KK
KL601	2.38	1.25	1.25	.75	1.25	.63	.75	3/4-16
KL602	3.13	1.50	1.50	1.00	1.50	.75	1.00	1-14
KL605	4.13	2.13	2.00	1.38	2.00	1.00	1.38	1 1/4-12
KL606	4.50	2.25	2.50	1.75	2.38	1.25	1.75	1 1/2-12

CLEVIS BRACKET (PIN INCLUDED)



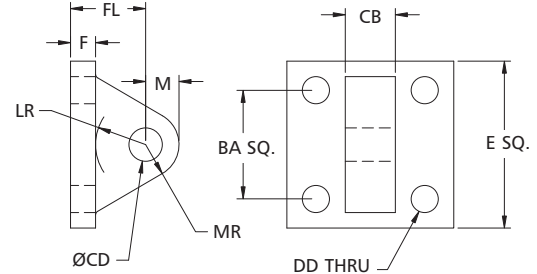
Dimensional Specifications												
Part #	E	F	M	BA	CB	CD	CW	DD	FL	LR	MR	L
KL631	3.50	.63	.75	2.56	1.25	.75	.63	1/2-20	1.88	1.06	1.06	1.25
KL632	4.50	.75	1.00	3.25	1.50	1.00	.75	5/8-18	2.25	1.13	1.13	1.50
KL633	5.00	.88	1.38	3.81	2.00	1.38	1.00	5/8-18	3.00	1.75	1.75	2.13

ROD EYE (PIN AND JAM NUT INCLUDED)



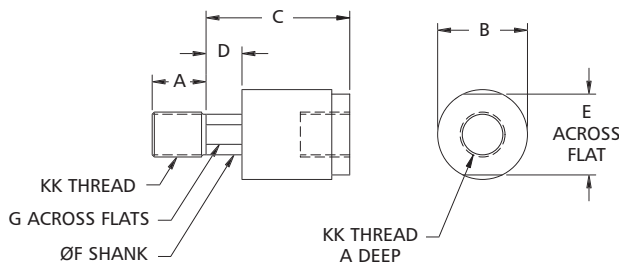
Dimensional Specifications						
Part #	A	CA	CB	CD	ER	KK
KL611	1.13	2.06	1.25	.75	.88	3/4-16
KL612	1.3	2.81	1.50	1.00	1.19	1-14
KL615	2.00	3.44	2.00	1.38	1.56	1 1/4-12
KL616	2.25	4.00	2.50	1.75	2.00	1 1/2-12

EYE BRACKET (PIN INCLUDED)



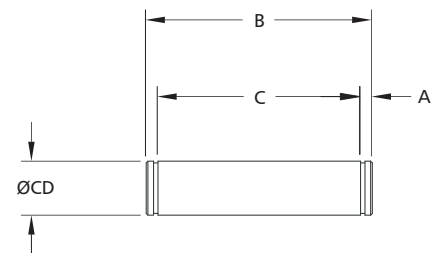
Dimensional Specifications										
Part #	E	F	M	BA	CB	CD	DD	FL	LR	MR
KL621	3.50	.63	.75	2.56	1.25	.75	1/2-20	1.88	1.25	.88
KL622	4.50	.75	1.00	3.25	1.50	1.00	5/8-18	2.25	1.50	1.25
KL623	5.00	.88	1.38	3.81	2.00	1.38	5/8-18	3.00	2.13	1.63

ALIGNMENT COUPLER (1/16" RADIAL FLOAT, 1 DEG. SPHERICAL FLOAT)



Dimensional Specifications									
Part #	A	B	C	D	E	F	G	KK	Max Pull Load
L642	1.13	1.75	2.31	.31	1.50	.97	.88	3/4-16	8,500 LB.
L643	1.13	1.75	2.31	.31	1.50	.97	.88	7/8-14	8,500 LB.
L644	1.63	2.50	2.94	.50	2.25	1.38	1.25	1-14	16,000 LB.
L645	1.63	2.50	2.94	.50	2.25	1.38	1.25	1 1/4-12	16,000 LB.
L646	2.25	3.25	4.38	.81	3.00	1.75	1.50	1 1/2-12	30,000 LB.
L647	2.25	3.25	4.38	.81	3.00	1.75	1.50	1 3/4-12	30,000 LB.

PIVOT PIN (RETAINING RINGS INCLUDED)



Dimensional Specifications				
Part #	A	B	C	CD
KL661	.13	2.88	2.63	.75
KL662	.13	3.38	3.13	1.00
KL663	.15	4.49	4.19	1.38
KL664	.18	5.55	5.19	1.75

NOTE: Safety factor of four compared to yield point.

# Sensors

## SWITCH PART NUMBERS (1 1/2" - 2 1/2" BORE)

Switch type	9 ft. lead	8mm quick connect*
Reed	KL690	KL693
Electronic PNP	KL691	KL694
Electronic NPN	KL692	KL695

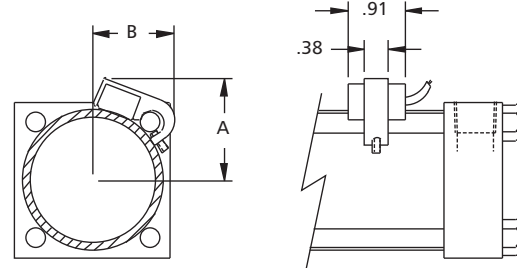
\*Supplied with 15 ft. connecting cable.



## SWITCH PART NUMBERS (3 1/4" - 10" BORE)

Switch type	9 ft. lead	8mm quick connect*
Reed	KL690-4	KL693-4
Electronic PNP	KL691-4	KL694-4
Electronic NPN	KL692-4	KL695-4

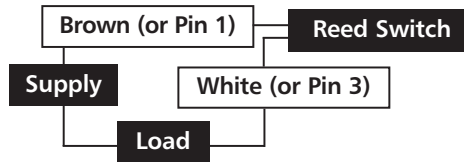
\*Supplied with 15 ft. connecting cable.



Bore	A	B
1 1/2"	1.44	1.13
2"	1.63	1.28
2 1/2"	1.84	1.50
3 1/4"	2.25	2.00
4"	2.50	2.25

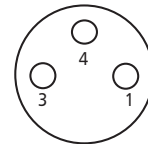
Reed Switch Specifications	
Function	SPST normally open
Switching voltage	5-120 VDC/VAC 50/60 Hz
Switching current	.030 Amp max. .001 Amp min.
Switching power	4 Watts max.
Switching speed	.5 ms operate .1 ms release
Voltage drop	3.5 volts

### WIRING DIAGRAM



Load can be connected as sinking or sourcing. Power supply polarity need not be observed.

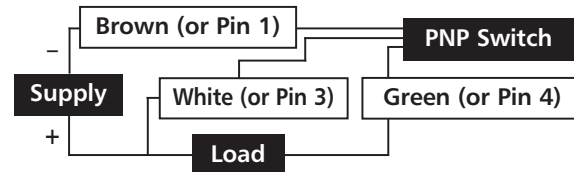
### 8 MM QUICK CONNECT CABLE PIN DESIGNATION



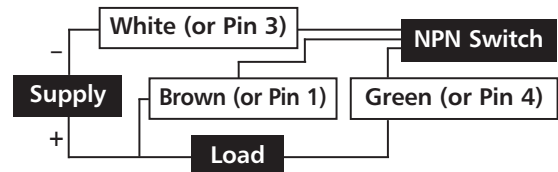
Brown = Pin 1  
Blue = Pin 3  
Black = Pin 4

Electronic Switch Specifications	
Function	PNP or NPN output Normally open
Switching voltage	6-24 VDC
Switching current	.500 Amp max.
Switching power	12 Watts max.
Switching speed	1.5 $\mu$ s operate .5 $\mu$ s release
Voltage drop	1.0 volts

### WIRING DIAGRAM



Power supply polarity must be observed for proper operation.

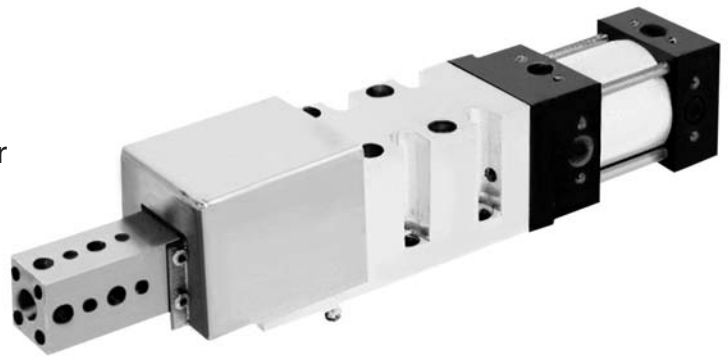


NOTE: The Magnetic Piston option, MP, must be ordered when using switches.

## Automotive Shot Pin

The Non-Rotating Pin-Act is used in many automotive applications, but primarily as a welding shot pin cylinder. The minimal deflection and high repeatability make this product ideal for all pin locating applications.

Consult factory for pricing and How to Order.



## Air-Transfer System Shaker

Shaker Systems are pneumatically driven Feeder/Beltless Conveyor systems. These systems are ideal for the stamping industry or other parts transfer and scrap removal applications.

Consult factory for pricing and How to Order.



## Special Conditions and Limited Warranty

Determination of the suitability of any information or product for the application contemplated by any user or the manner of that use is the sole responsibility of the user.

Compact Automation Products, LLC reserves the right to improve or change designs without notice.

All orders are subject to acceptance by the factory sales department.

Compact Automation Products, LLC agrees to repair or replace to the original purchaser any standard parts or products for a period of 12 months from date of shipment which Compact Automation Products, LLC determines upon inspection to be defective in workmanship or material. Wear components including but not limited to seals and bearings are excluded from this warranty.

Under no circumstance may merchandise be returned without written authorization from the factory.

This warranty is void in the event the product has been tampered with, altered, or serviced by unauthorized personnel.

Compact Automation Products, LLC's total responsibility for any claims, damages, losses or liabilities related to the product covered thereunder shall not exceed the purchase price of such product. In no event shall Compact Automation Products, LLC be liable for any special, indirect, incidental or consequential damages of any character, including but not limited to loss of use of productive facilities or equipment, lost profit, property damage, transportation, installation or removal or lost production whether suffered by purchaser or third party. Compact Automation Products, LLC disclaims all liability for any and all cost, claims demands, charges, expenses, and other damages, either direct or indirect, incident to all property damage arising out of any cause of action based on strict liability. This warranty gives you specific legal rights and you may have other rights, which vary from state to state.

## Compact Automation Products

105 Commerce Way  
Westminster, SC 29693

p. 864 647 9521

f. 864 647 9574

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

[www.itt-tie-rod-cylinders.com](http://www.itt-tie-rod-cylinders.com)

