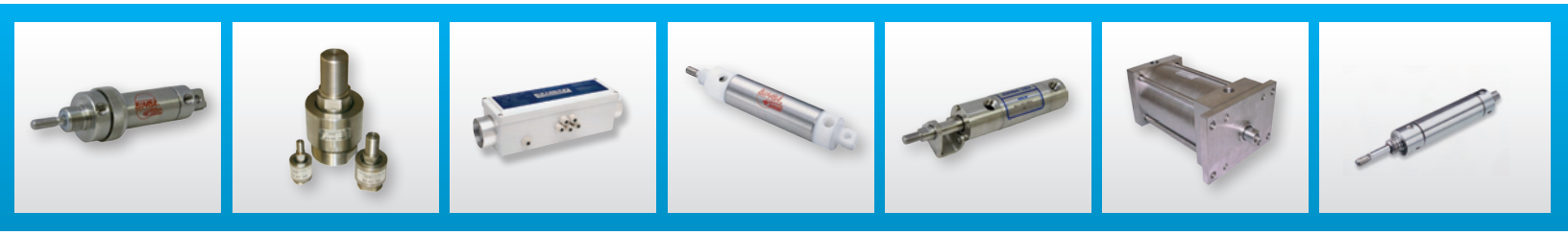
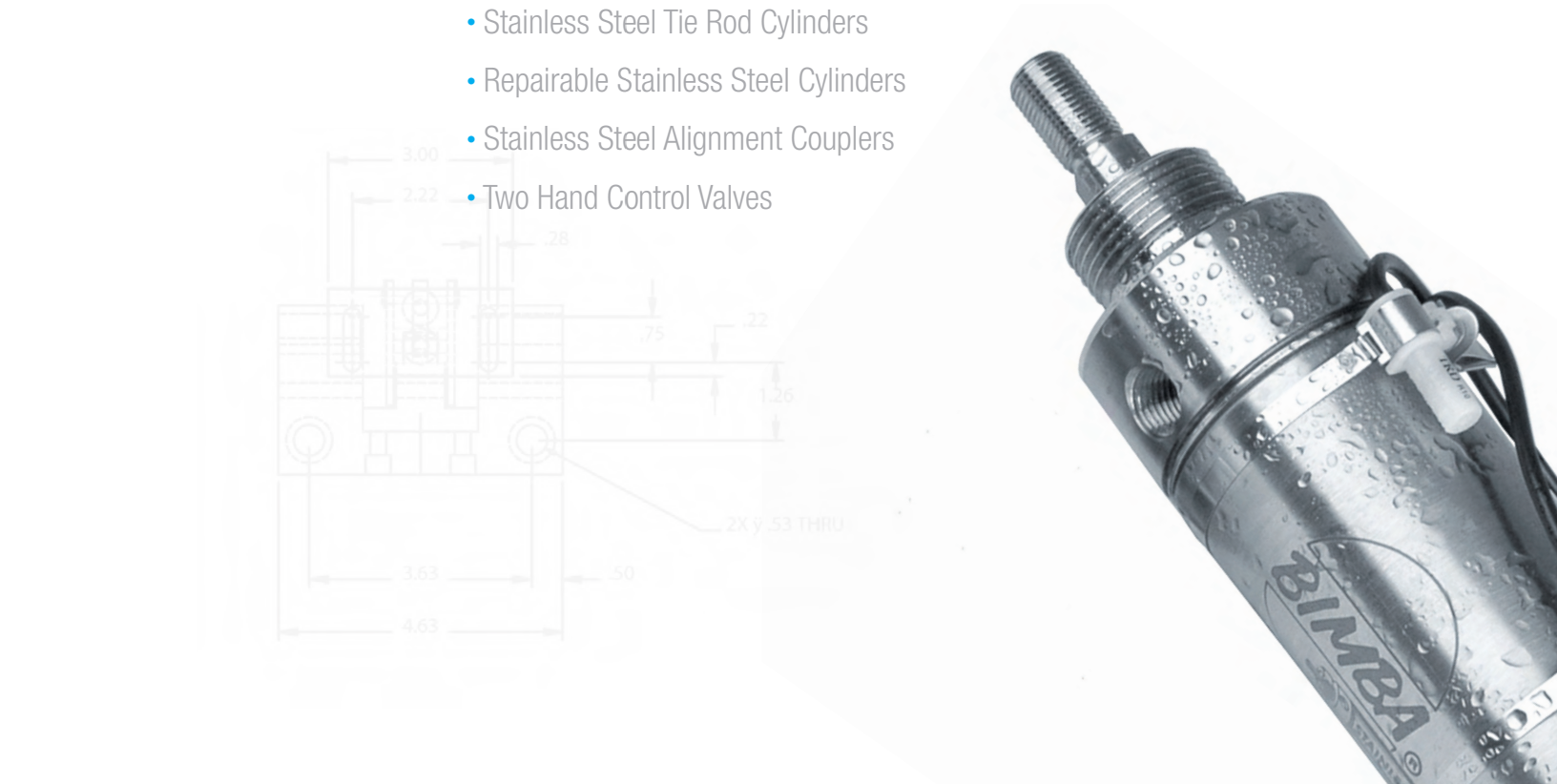
Corrosion Resistant Products Catalog



Setting a new standard for corrosion resistant products with:

- Original Line Cylinders with Stainless Steel End Caps
- Repairable Original Line Cylinders with Stainless Steel End Caps
- Original Line Cylinders with Composite End Caps
- Stainless Steel Tie Rod Cylinders
- Repairable Stainless Steel Cylinders
- Stainless Steel Alignment Couplers
- Two Hand Control Valves



Corrosion Resistant Products

Bimba is focused on providing a variety of corrosion resistant products designed specifically for use in wash down applications. Additional industries that will benefit from corrosion resistant products include:

- Marine
- Pharmaceutical
- Chemical
- Food processing and packaging
- Medical and Life sciences
- Agriculture

We specialize in designing custom actuators specifically engineered to address our customers most challenging applications:

- Customer logos
- Unique geometries
- Special materials
- Fully engineered new products

Work directly with Bimba engineers by contacting our Service Center at 1-800-44-BIMBA or email us at support@bimba.com.

Table of Contents

PC Cylinders

The Bimba PC Cylinder has a stainless steel body, stainless steel rod and acetal resin end caps. It is ideal for applications and environments that require exposure to moisture, lubricants and specific solvents.

How to Order

The model number of all PC Cylinders consists of three alphanumeric clusters. These designate product type, bore size and stroke length, and options. Please refer to the charts below for an example of model number **PC-096-DXPW.** This is an 1-1/16" bore, 6" stroke PC cylinder with a universal mount and rod wiper.

DELRIN END CAP CYLINDER

BORE SIZE

02	9/16"
04	3/4"
09	1-1/16"
17	1-1/2"
31	2"

PC - 09 6 - DXP W

STANDARD STROKE LENGTHS

All models: 1/2", 1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6"
DXP & DXDE models: 7", 8", 9", 10", 11", 12"
Consult your local distributor for price and availability of nonstandard strokes

MOUNTING

D	–	Nose Mount
DXP	–	Universal Mount
DXDE	–	Double Ended Rod

OPTIONS

(in alphabetical order, except for EE which is last)

B	–	Bumpers
C	–	Air Cushion, both ends
C1	–	Air Cushion, front head only
C2	–	Air Cushion, rear head only
E	–	Non-Lube Service
EEX.XX	–	Extra Extension
F	–	Molycoated Body
G	–	Magnalube® G
K	–	Pivot 90˚ (DXP model only)
M	–	Magnetic Piston
NT	–	No Thread
Q	–	Side Ported Rear Head
T	–	Switch Track (T2, T3 or T4, see page 1.9 for track location details. See Switch Products, page 9.3 for switch selection information.)
V	–	Fluoroelastomer Seals (for compatibility only)
W	–	Rod Wiper (not available for 9/16" bore)

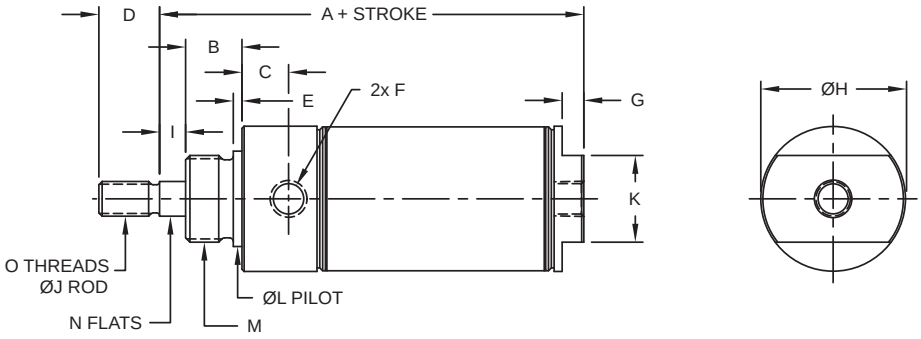
Approximate Power Factors

9/16"	=	0.2
3/4"	=	0.4
1-1/16"	=	0.9
1-1/2"	=	1.7
2"	=	3.1

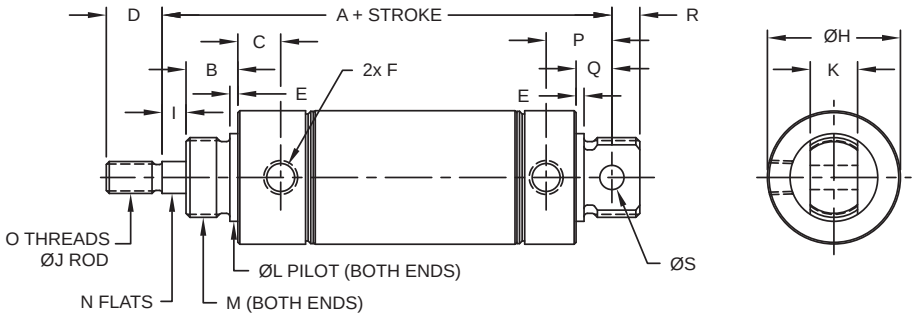
For example, a PC-096-DXPW will exert a force of 0.9 times the air line pressure; a PC-173-D will exert a force of 1.7 times the air pressure, etc.

Dimensions

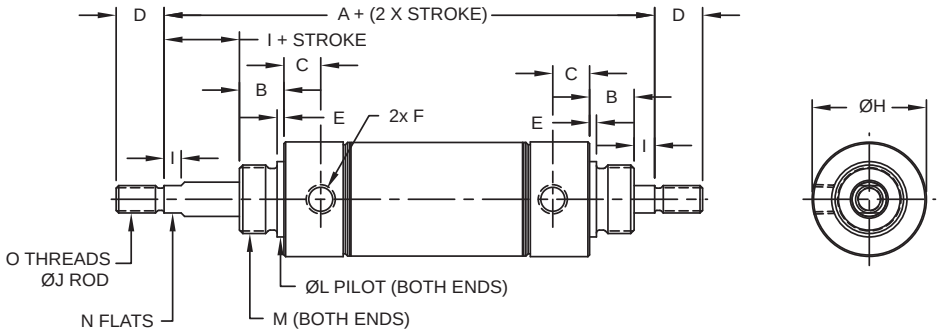
D Mounting Style



DXP Mounting Style



DXDE Mounting



Dimensions

D Mounting Style

Bore	A	A (cushion or Q option)	B	C	D	E	F	G	H	H (cushion option)	I	J	K	L	M	N	O
9/16" (02)	2.28	--	0.38	0.38	0.50	0.06	#10-32	0.19	0.61	--	--	0.19	0.50	.434/437	7/16-20	--	#10-32
3/4" (04)	2.97	3.44	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.81	0.96	--	0.25	0.63	.621/.624	5/8-18	--	1/4-28
1-1/16" (09)	3.25	3.50	0.50	0.56	0.50	0.09	1/8 NPT	0.19	1.13	1.13	0.13	0.31	0.88	.621/.624	5/8-18	0.25	5/16-24
1-1/2" (17)	3.69	3.88	0.63	0.63	0.75	0.09	1/8 NPT	0.25	1.56	1.56	0.25	0.44	0.88	.996/.999	1-14	0.38	7/16-20
2" (31)	4.69	5.27	0.81	0.72	0.88	0.13	1/4 NPT	0.31	2.08	2.08	0.38	0.63	1.25	1.372/1.375	1-1/4-12	0.50	1/2-20

Magnetic Piston Length Adder: 0.125" for 1-1/16" and 1-1/2", all other sizes 0.250"

DXP Mounting Style

Bore	A	B	C	D	E	F	H	H (cushion option)	I	J
9/16" (02)	2.56	0.38	0.38	0.50	0.06	#10-32	0.61	--	--	0.19
3/4" (04)	3.75	0.50	0.47	0.50	0.09	1/8 NPT	0.86	0.96	--	0.25
1-1/16" (09)	3.84	0.50	0.56	0.50	0.09	1/8 NPT	1.13	1.13	0.13	0.31
1-1/2" (17)	4.38	0.63	0.63	0.75	0.09	1/8 NPT	1.56	1.56	0.25	0.44
2" (31)	5.63	0.81	0.73	0.88	0.13	1/4 NPT	2.08	2.08	0.38	0.63

Bore	K	L	M	N	O	P	Q	R	S
9/16" (02)	0.31	.434/.437	7/16-20	--	#10-32	0.38	0.25	0.19	0.16
3/4" (04)	0.38	.621/.624	5/8-18	--	1/4-28	0.63	0.34	0.28	0.25
1-1/16" (09)	0.38	.621/.624	5/8-18	0.25	5/16-24	0.63	0.34	0.28	0.25
1-1/2" (17)	0.63	.996/.999	1-14	0.38	7/16-20	0.81	0.50	0.38	0.38
2" (31)	0.74	1.372/1.375	1-1/4-12	0.50	1/2-20	1.03	0.56	0.44	0.38

Magnetic Piston Length Adder: 0.125" for 1-1/16" and 1-1/2", all other sizes 0.250"

DXDE Mounting

Bore	A	B	C	D	E	F	H	H (cushion option)	I	J	L	M	N	O
9/16" (02)	2.94	0.38	0.38	0.50	0.06	#10-32	0.61	--	--	0.19	.434/.437	7/16-20	--	#10-32
3/4" (04)	4.00	0.50	0.47	0.50	0.09	1/8 NPT	0.86	0.96	--	0.25	.621/.624	5/8-18	--	1/4-28
1-1/16" (09)	4.00	0.50	0.56	0.50	0.09	1/8 NPT	1.13	1.13	0.13	0.31	.621/.624	5/8-18	0.25	5/16-24
1-1/2" (17)	5.13	0.63	0.63	0.75	0.09	1/8 NPT	1.56	1.56	0.25	0.44	.996/.999	1-14	0.38	7/16-20
2" (31)	6.56	0.81	0.73	0.88	0.13	1/4 NPT	2.08	2.08	0.38	0.63	1.372/1.375	1-1/4-12	0.50	1/2-20

Magnetic Piston Length Adder: 0.250"

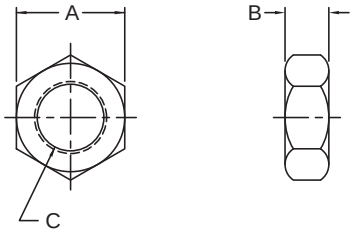
Bumper Length Adder

9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
0.125	0	0.125*	0.125	0.250

**For DXDE model, add 0.500"*

Dimensions

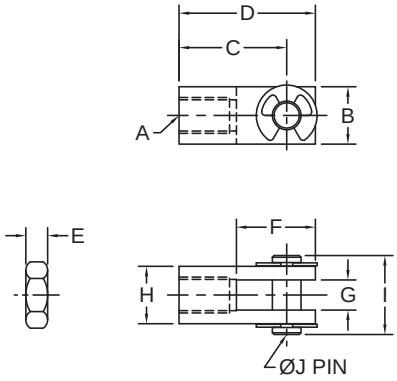
Stainless Steel Mounting Nut*



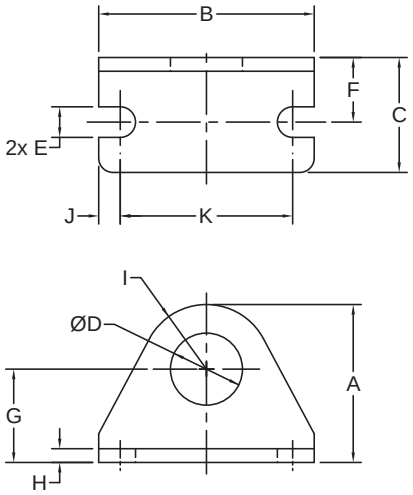
*Bore	Model	A	B	C
9/16" (02)	D-154-SS	0.69	0.25	7/16-20
3/4" (04)	D-9-SS	0.94	0.38	5/8-18
1-1/16" (09)	D-9-SS	0.94	0.38	5/8-18
1-1/2" (17)	D-1331-SS	1.50	0.55	1-14
2" (31)	D-508-SS	1.88	0.50	1-1/4-12

*See page 1.104 for torque specifications

Stainless Steel Rod End Clevis (includes nut)



Stainless Steel Foot Bracket



Stainless Steel Rod End Clevis (includes nut)

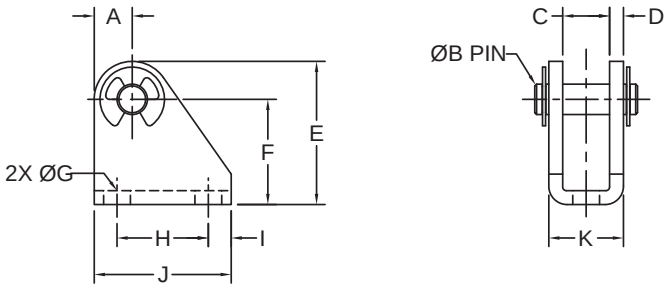
Bore	Model	A	B	C	D	E	F	G	H	I	J
9/16" (02)	D-850-SS	#10-32	0.38	0.75	0.94	0.13	0.56	0.19	0.38	0.56	0.19
3/4" (04)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.25	0.50	0.69	0.25
1-1/16" (09)	D-54564-SS	5/16-24	0.50	0.94	1.19	0.19	0.69	0.25	0.50	0.69	0.25
1-1/2" (17)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.38	0.75	1.03	0.38
2" (31)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.38	0.75	1.03	0.38

Stainless Steel Foot Bracket

Bore	Model	A	B	C	D	E	F	G	H	I	J	K
9/16" (02)	D-770-SS	0.84	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
3/4" (04)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/16" (09)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/2" (17)	D-61288-SS	1.75	2.50	1.50	1.03	0.28	0.75	1.00	0.12	0.75	0.31	1.88
2" (31)	D-615-SS	2.50	3.13	1.63	1.38	0.34	1.00	1.50	0.25	1.00	0.44	2.25

Dimensions

Stainless Steel Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
9/16" (02)	D-55202-SS	0.20	0.16	0.31	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
3/4" (04)	D-55203-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.22	0.75	0.19	1.13	0.63
1-1/16" (09)	D-55203-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.22	0.75	0.19	1.13	0.63
1-1/2" (17)	D-55204-SS	0.38	0.38	0.63	0.13	1.75	1.38	0.28	1.00	0.25	1.50	0.91
2" (31)	D-55205-SS	0.38	0.38	0.75	0.25	1.75	1.38	0.28	1.00	0.25	1.50	1.25

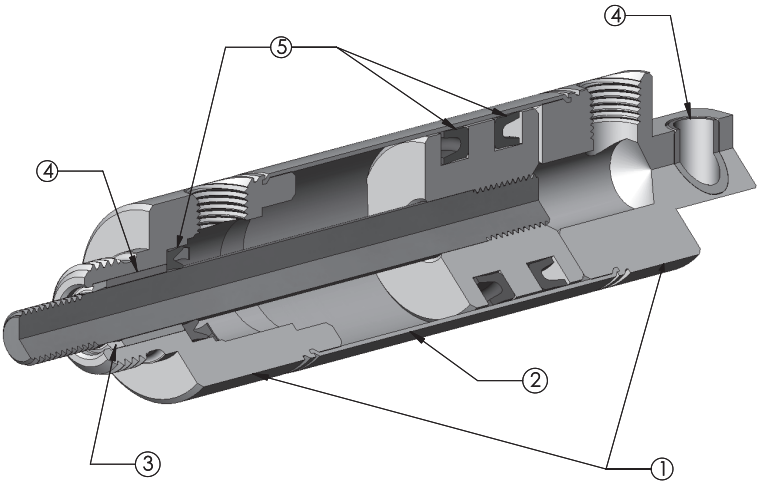
Specifications

Pressure Rating: 100 psi (Air)
Temperature Range: 32°F to 160°F (0°C to 72°C)
Delrin End Caps
304 Stainless Steel Body
303 Stainless Steel Rod
Anodized Aluminum Alloy Piston
Options: Buna N Bumpers
Polyurethane Wiper
Fluoroelastomer Seals (for compatibility only, not high temperature)

CYLINDER WEIGHT (lbs.)					
Bore	Base Weight			Adder per 1"	
	D	DXP	DXDE	D & DXP	DXDE
9/16" (02)	0.05	0.06	0.07	0.02	0.03
3/4" (04)	0.13	0.15	0.18	0.03	0.05
1-1/16" (09)	0.21	0.25	0.3	0.05	0.07
1-1/2" (17)	0.46	0.48	0.6	0.08	0.13
2" (31)	1.08	1.17	1.48	0.15	0.24

MOUNTING NUT Torque Specifications		
Bore Size	Thread Size	Max Torque (in- lbs.)
9/16" (02)	7/16-20	4.0
3/4" (04) 1-1/16" (09)	5/8-18	12.0
1-1/2" (17)	1-14	30.0
2" (31)	1 1/4-12	45.0

Component Description



1. Corrosion resistant 303 Stainless Steel end caps
2. 304 SS body with mirror finish ID for long, reliable seal life.
3. Urethane rod wiper designed to withstand exposure to harsh chemical solutions while limiting ingress of the solutions and application matter into the cylinder.
4. PTFE-based rod and pivot bushings selected for their resistance to many commonly used cleaning solutions.
5. Nitrile seals are standard with optional high temperature or other materials available.

Operating Specifications

Pressure Rating

250 psi air maximum

Temperature Rating

-20ºF to 200ºF. Note that if the magnetic piston is used, maximum temperature is derated to 185ºF. Fluoroelastomer seals rated for higher temperatures (up to 400ºF) are available. Fluoroelastomer seals (option "V") should be ordered for chemical compatibility only. The temperature rating of the standard Urethane rod wiper is 200 degrees F. If a cylinder temperature rating of higher than 200 degrees F is required please contact your local distributor to request a quote for a custom design to meet your application requirements.

If cylinders are operated at temperatures below 0ºF for extended time periods, our low temperature option (N) is recommended. This option has a temperature range of -40ºF to 200ºF. If cylinders are operated below -20ºF with low temperature seals for extended time periods, cylinder performance will be affected by the cold temperature.

Lubrication

Food grade synthetic grease

All Stainless Steel Non-Repairable Original Line Cylinders

How to Order

The model number of all Original Line Cylinders consists of three alphanumeric clusters. These designate product type, bores size and stroke length, and mounting styles and options.

Please refer to the charts below for an example of model number SS-092-DW. This is a 303 Stainless Steel End cap Cylinder, 1-1/16" bore, Double Acting Nose Mount, Rod Wiper (standard).

Model Type
SS - 303 Stainless Steel End caps
SSM - Includes Magnetic Piston

*Stainless Steel Rod Standard on all Models

Bore Size/Power Factors		
007 - 5/16"	06 - 7/8"	24 - 1-3/4"
01 - 7/16"	09 - 1-1/16"	31 - 2"
02 - 9/16"	12 - 1-1/4"	50 - 2-1/2"
04 - 3/4"	17 - 1-1/2"	70 - 3"

Stroke Lengths
In inches and decimal fractions, i.e., 1.75". See individual models for maximum standard stroke. Stroke lengths are available up to 50"

SS - 09 2 - D W

Mounting Styles	
D	- Double Acting Nose Mount
DXP	- Double Acting, Double End or Rear Pivot Mount

Options	
EE	- Extra Rod Extension of x.xx"
G	- Magnalube® G Lubrication
N	- Low Temperature Seals and Lube
NT	- No Rod Thread
V	- Fluoroelastomer Seals (for chemical compatibility)*
W	- Rod Wiper (standard)

*Consult the option combination availability chart on page 1.4 of Full line Catalog.

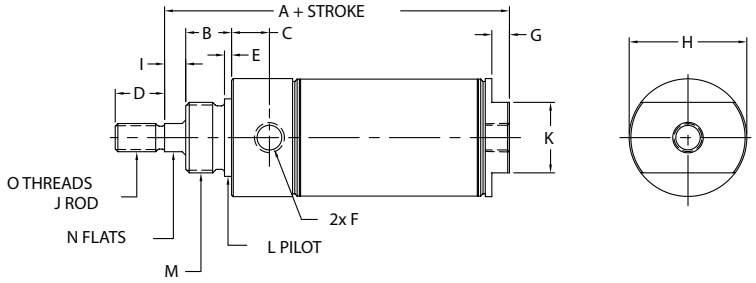
*Rod Wiper is standard; "W" option must be included in part number.

*Specify for chemical compatibility only. For cylinders rated over 200°F, see the note under Operating Specifications on previous page.

®Magnalube is a registered trademark of Carleton Stuart Corp.

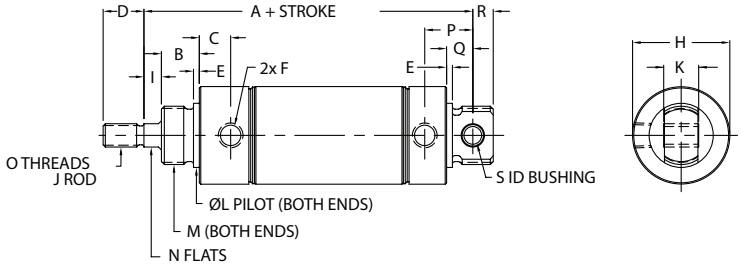
Dimensions

D Mounting Style



Bore	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5/16" (007)	1.55	0.31	0.16	0.38	N/A	#10-32	N/A	0.61	N/A	0.125	N/A	N/A	3/8-24	N/A	#5-40
7/16" (01)	2.13	0.38	0.35	0.50	0.05	#10-32	0.19	0.74	N/A	0.188	0.38	0.433/0.437	7/16-20	N/A	#10.32
9/16" (02)	2.28	0.38	0.38	0.50	0.06	#10-32	0.19	0.62	N/A	0.188	0.50	0.434/0.437	7/16-20	N/A	#10-32
3/4" (04)	2.97	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.86	N/A	0.250	0.62	0.621/0.624	5/8-18	N/A	1/4-28
7/8" (06)	2.71	0.50	0.47	0.50	0.09	1/8 NPT	0.19	0.93	N/A	0.250	0.62	0.621/0.624	5/8-18	N/A	1/4-28
1-1/16" (09)	3.25	0.50	0.57	0.50	0.09	1/8 NPT	0.19	1.11	0.12	0.312	0.88	0.621/0.624	5/8-18	0.25	5/16-24
1-1/4" (12)	3.81	0.63	0.75	0.75	0.09	1/8 NPT	0.25	1.33	0.25	0.438	0.88	0.746/0.749	3/4-16	0.38	7/16-20
1-1/2" (17)	3.69	0.66	0.63	0.75	0.09	1/8 NPT	0.25	1.56	0.25	0.438	0.88	0.746/0.749	3/4-16	0.38	7/16-20
1-3/4" (24)	4.44	0.75	0.88	0.88	0.09	1/4 NPT	0.25	1.85	0.31	0.500	1.25	1.029/1.032	1-14	0.44	1/2-20
2" (31)	4.69	0.81	0.75	0.88	0.13	1/4 NPT	0.31	2.09	0.38	0.625	1.25	1.372/1.375	1-1/4-12	0.50	1/2-20
2-1/2" (50)	4.69	0.81	0.66	0.88	0.13	1/4 NPT	0.31	2.58	0.38	0.625	1.75	1.497/1.500	1-3/8-12	0.50	1/2-20
3" (70)	5.25	1.00	0.72	1.25	0.19	3/8 NPT	0.31	3.13	0.38	0.750	2.00	1.622/1.625	1-1/2-12	0.63	5/8-18

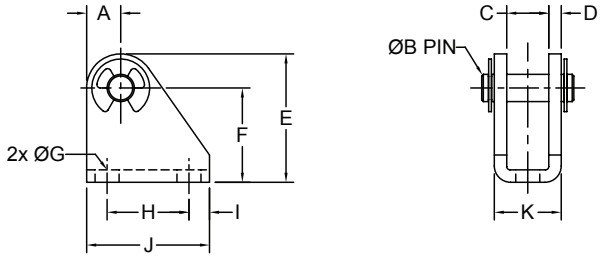
DXP Mounting Style



Bore	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	Q	R	S
5/16" (007)	1.94	0.31	0.16	0.38	N/A	#10-32	0.50 SQ	N/A	0.125	0.25	N/A	3/8-24	N/A	#5-40	0.34	0.19	0.16	0.13
7/16" (01)	2.56	0.38	0.35	0.50	0.05	#10-32	Ø.74	N/A	0.188	0.31	0.433/0.437	7/16-20	N/A	#10-32	0.44	0.25	0.25	0.16
9/16" (02)	2.56	0.38	0.38	0.50	0.06	#10-32	Ø.62	N/A	0.188	0.31	0.434/0.437	7/16-20	N/A	#10-32	0.38	0.25	0.19	0.16
3/4" (04)	3.75	0.50	0.47	0.50	0.09	1/8 NPT	Ø.86	N/A	0.250	0.38	0.621/0.624	5/8-18	N/A	1/4-28	0.63	0.34	0.28	0.25
7/8" (06)	3.34	0.50	0.47	0.50	0.09	1/8 NPT	Ø.93	N/A	0.250	0.38	0.621/0.624	5/8-18	N/A	1/4-28	0.63	0.34	0.28	0.25
1-1/16" (09)	3.84	0.50	0.57	0.50	0.09	1/8 NPT	Ø1.11	0.12	0.312	0.38	0.621/0.624	5/8-18	0.25	5/16-24	0.63	0.34	0.28	0.25
1-1/4" (12)	4.53	0.63	0.75	0.75	0.09	1/8 NPT	Ø1.33	0.25	0.438	0.50	0.746/0.749	3/4-16	0.38	7/16-20	0.78	0.40	0.41	0.25
1-1/2" (17)	4.38	0.66	0.63	0.75	0.09	1/8 NPT	Ø1.56	0.25	0.438	0.63	0.746/0.749	3/4-16	0.38	7/16-20	0.81	0.50	0.38	0.38
1-3/4" (24)	5.50	0.75	0.88	0.88	0.09	1/4 NPT	Ø1.85	0.31	0.500	0.63	1.029/1.032	1-14	0.44	1/2-20	1.13	0.50	0.50	0.38
2" (31)	5.63	0.81	0.75	0.88	0.13	1/4 NPT	Ø2.09	0.38	0.625	0.75	1.372/1.375	1-1/4-20	0.50	1/2-20	1.03	0.56	0.44	0.38
2-1/2" (50)	5.63	0.81	0.66	0.88	0.13	1/4 NPT	Ø2.58	0.38	0.625	0.75	1.497/1.50	1-3/8-12	0.50	1/2-20	1.03	0.56	0.44	0.38
3" (70)	6.50	1.00	0.72	1.25	0.19	3/8 NPT	Ø3.13	0.38	0.750	0.88	1.622/1.625	1-1/2-12	0.63	5/8-18	1.34	0.81	0.63	0.50

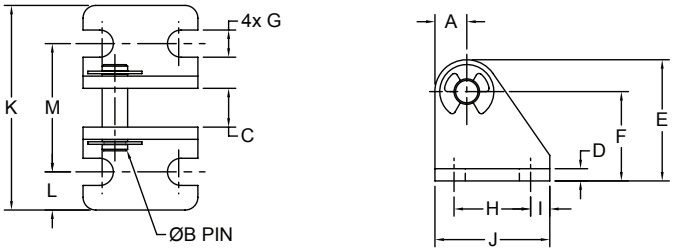
Dimensions

Stainless Steel One Piece Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
5/16" (007)	D-26689-SS	0.13	0.13	0.27	0.04	0.57	0.44	0.16	0.38	0.13	0.63	0.34
7/16" (01)	D-55202-SS	0.20	0.16	0.32	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
9/16" (02)	D-55202-SS	0.20	0.16	0.32	0.06	0.76	0.56	0.20	0.50	0.13	0.75	0.44
3/4" (04)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
7/8" (06)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
1-1/16" (09)	D-55203-SS	0.31	0.25	0.39	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.61
1-1/4" (12)	D-111614-SS	0.31	0.25	0.52	0.11	1.18	0.86	0.22	0.75	0.19	1.13	0.74
1-1/2" (17)	D-55204-SS	0.38	0.37	0.64	0.14	1.77	1.39	0.28	1.00	0.25	1.50	0.92
1-3/4" (24)	D-55204-SS	0.38	0.37	0.64	0.14	1.77	1.39	0.28	1.00	0.25	1.50	0.92
2" (31)	D-55205-SS	0.38	0.37	0.76	0.25	1.77	1.38	0.28	1.00	0.25	1.50	1.26
2-1/2" (50)	D-55205-SS	0.38	0.37	0.76	0.25	1.75	1.38	0.28	1.00	0.25	1.50	1.26
3" (70)	D-111613-SS	0.50	0.50	0.89	0.25	2.25	1.75	0.42	1.38	0.38	2.13	1.39

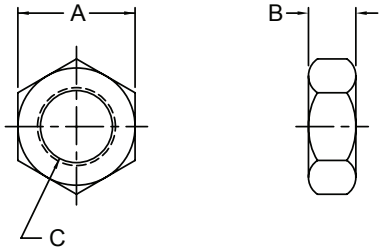
Stainless Steel Two Piece Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K	L	M
5/16" (007)	D-113373-SS	0.13	0.13	0.28	0.04	0.54	0.40	0.13	0.38	0.12	0.63	1.03	0.13	0.78
7/16" (01)	D-12321-SS	0.20	0.16	0.34	0.06	0.77	0.57	0.19	0.50	0.13	0.75	1.36	0.23	0.91
9/16" (02)	D-12321-SS	0.20	0.16	0.34	0.06	0.77	0.57	0.19	0.50	0.13	0.75	1.36	0.23	0.91
3/4" (04)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
7/8" (06)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
1-1/16" (09)	D-13498-SS	0.31	0.25	0.38	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.00	0.38	1.26
1-1/4"(12)	D-1360-SS	0.31	0.25	0.50	0.12	1.19	0.88	0.27	0.75	0.19	1.13	2.13	0.38	1.39
1-1/2" (17)	D-229-SS	0.38	0.38	0.63	0.13	1.75	1.38	0.27	1.00	0.25	1.50	2.63	0.38	1.88
1-3/4" (24)	D-620-1-SS	0.38	0.38	0.63	0.25	1.75	1.38	0.27	1.00	0.25	1.50	2.87	0.43	2.00
2" (31)	D-620-SS	0.38	0.38	0.76	0.25	1.75	1.38	0.27	1.00	0.25	1.50	3.01	0.44	2.14
2-1/2" (50)	D-620-SS	0.38	0.38	0.76	0.25	1.75	1.38	0.27	1.00	0.25	1.50	3.01	0.44	2.14
3" (70)	D-13512-SS	0.50	0.50	0.88	0.25	2.25	1.75	0.27	1.25	0.25	1.75	3.88	0.63	2.63

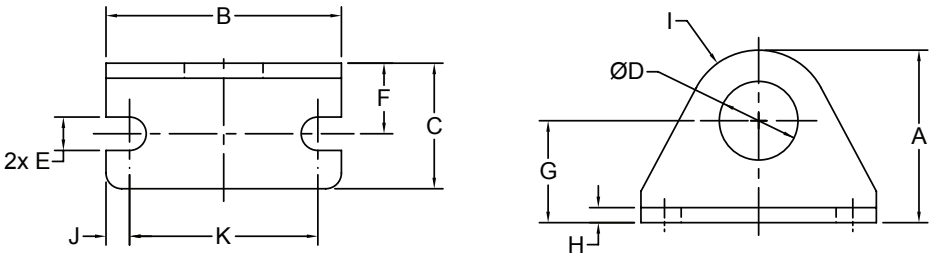
Dimensions

Stainless Steel Mounting Nut



Bore	Model	A	B	C
5/16" (007)	D-801-SS	0.56	0.22	3/8-24
7/16" (01)	D-154-SS	0.69	0.25	7/16-20
9/16"(02)	D-154-SS	0.69	0.25	7/16-20
3/4" (04)	D-9-SS	0.94	0.38	5/8-18
7/8" (06)	D-9-SS	0.94	0.38	5/8-18
1-1/16" (09)	D-9-SS	0.94	0.38	5/8-18
1-1/4" (12)	D-3556-SS	1.12	0.42	3/4-16
1-1/2" (17)	D-3556-SS	1.12	0.42	3/4-16
1-3/4" (24)	D-1331-SS	1.50	0.55	1-14
2" (31)	D-508-SS	1.88	0.50	1-1/4-12
2-1/2" (50)	D-2540-SS	1.85	0.50	1-3/8-12
3" (70)	D-5379-SS	2.25	0.50	1-1/2-12

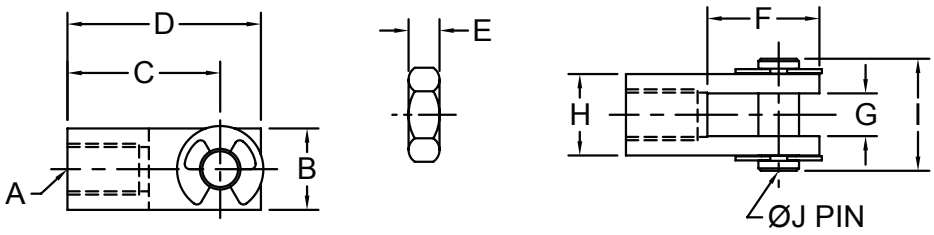
Stainless Steel Foot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
5/16" (007)	D-26765-SS	0.75	1.00	0.38	0.38	0.13	0.25	0.44	0.06	0.31	0.13	0.75
7/16" (01)	D-770-SS	0.83	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
9/16" (02)	D-770-SS	0.83	1.38	0.69	0.44	0.19	0.38	0.56	0.09	0.38	0.19	1.00
3/4" (04)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
7/8" (06)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/16" (09)	D-129-SS	1.38	1.88	1.00	0.63	0.27	0.56	0.81	0.12	0.56	0.19	1.50
1-1/4" (12)	D-241-SS	1.75	2.50	1.50	0.76	0.28	0.75	1.00	0.12	0.75	0.31	1.88
1-1/2" (17)	D-241-SS	1.75	2.50	1.50	0.76	0.28	0.75	1.00	0.12	0.75	0.31	1.88
1-3/4" (24)	D-1337-SS	2.12	3.00	1.50	1.04	0.34	0.88	1.25	0.18	0.91	0.38	2.25
2" (31)	D-615-SS	2.50	3.13	1.65	1.39	0.34	1.00	1.50	0.27	1.00	0.44	2.25
2-1/2" (50)	D-615-1-SS	3.00	3.75	1.63	1.50	0.34	1.00	1.75	0.26	1.25	0.44	2.88
3" (70)	D-19127-SS	3.14	4.38	1.63	1.63	0.34	1.00	1.89	0.25	1.25	0.44	3.50

Dimensions

Stainless Steel Rod End Clevis (includes nut)

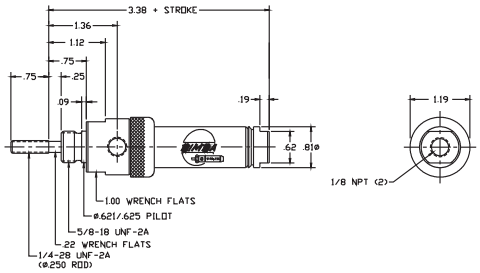
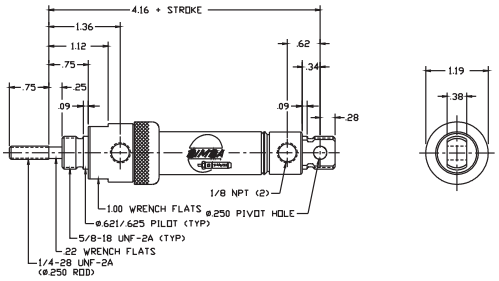


Bore	Model	A	B	C	D	E	F	G	H	I	J
5/16" (007)	D-26690-SS	#5-40	0.31	0.44	0.56	0.11	0.37	0.14	0.31	0.50	0.13
7/16" (01)	D-850-SS	#10-32	0.38	0.75	0.94	0.12	0.56	0.20	0.38	0.55	0.19
9/16" (02)	D-850-SS	#10-32	0.38	0.75	0.94	0.12	0.56	0.20	0.38	0.55	0.19
3/4" (04)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.26	0.50	0.69	0.25
7/8" (06)	D-54565-SS	1/4-28	0.50	0.94	1.19	0.16	0.69	0.26	0.50	0.69	0.25
1-1/16" (09)	D-54564-SS	5/16-24	0.50	0.94	1.19	0.19	0.69	0.26	0.50	0.69	0.25
1-1/4" (12)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.39	0.75	1.03	0.37
1-1/2" (17)	D-54562-SS	7/16-20	0.75	1.31	1.69	0.25	0.94	0.39	0.75	1.03	0.37
1-3/4" (24)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
2" (31)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
2-1/2" (50)	D-54563-SS	1/2-20	0.75	1.31	1.69	0.31	0.94	0.39	0.75	1.03	0.37
3" (70)	D-8314-SS	5/8-18	1.00	2.25	2.75	0.38	1.50	0.50	1.00	1.38	0.50

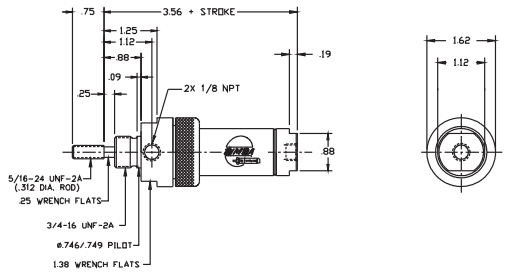
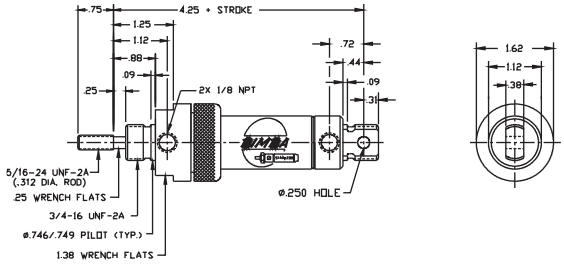
All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinders

The new all stainless repairable Original Line cylinders are ideal for food processing, chemical, medical, pharmaceutical, offshore or marine equipment, and energy production or waste management applications. The bell ring design also offers the added benefit of full repairability without the need for hand tools by securing the body to the rod guide with a knurled, threaded nut.

3/4" Bore

MODEL/PRICE	DESCRIPTION/ACCESSORIES	DIMENSIONS (inch)
D-4161-A- ☐	***Double-Acting*** - Air Return - Front Nose Mounting *Optional Stainless Steel Accessories:* D-129-SS Foot Bracket D-9-SS Mounting Nut D-54565-SS Rod Clevis	
D-4231-A- ☐	***Double-Acting*** - Universal Mounting - Pivot, or Double End Mounting - Air Return *Optional Stainless Steel Accessories:* D-129-SS Foot Bracket D-55203-SS Pivot Bracket D-9-SS Mounting Nut D-54565-SS Rod Clevis	

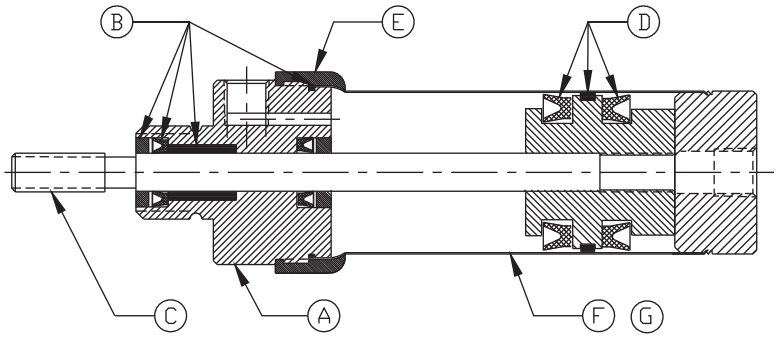
1-1/16" Bore

MODEL/PRICE	DESCRIPTION/ACCESSORIES	DIMENSIONS (inch)
D-4173-A- ☐	***Double-Acting*** - Air Return - Front Nose Mounting *Optional Stainless Steel Accessories:* D-241-SS Foot Bracket D-3556-SS Mounting Nut D-54564-SS Rod Clevis	
D-4232-A- ☐	***Double-Acting*** - Universal Mounting - Pivot, or Double End Mounting - Air Return *Optional Stainless Steel Accessories:* D-241-SS Foot Bracket D-55203-SS Pivot Bracket D-3556-SS Mounting Nut D-54564-SS Rod Clevis	

☐ Enter Stroke Length

All Stainless Steel Repairable (Bell Ring Style) Original Line Cylinders

Cylinder Assemblies and Component List



3/4" Bore

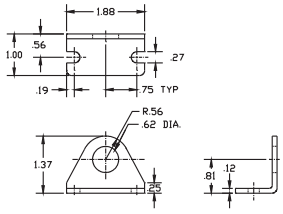
ITEM	PART NO.	DESCRIPTION
A	D-4485-A	ROD GUIDE ASSEMBLY (Includes Rod Guide and D-4530 Kit)
B	D-4530-A	ROD SEAL KIT (Includes Seals, Bushing, Seal Retainer and Body Seal)
C	D-4486-A-□	PISTON ROD ASSEMBLY (Includes Rod, Piston and D-4531 Kit)
D	D-4531	PISTON SEAL KIT (Includes Piston Seals and Piston Guide Ring)
E	D-3961-SS	BELL RING
F	D-4487-A-□	REAR HEAD AND BODY ASSEMBLY (Nose Mount)
G	D-4488-A-□	REAR HEAD AND BODY ASSEMBLY (Universal Mount)

1-1/16" Bore

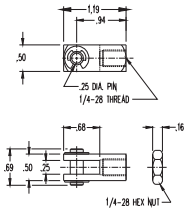
ITEM	PART NO.	DESCRIPTION
A	D-4489-A	ROD GUIDE ASSEMBLY (Includes Rod Guide and D-4533 Kit)
B	D-4533-A	ROD SEAL KIT (Includes Seals, Bushing, Seal Retainer and Body Seal)
C	D-4490-A-□	PISTON ROD ASSEMBLY (Includes Rod, Piston and D-4534 Kit)
D	D-4534-A	PISTON SEAL KIT (Includes Piston Seals and Piston Guide Ring)
E	D-1778-SS	BELL RING
F	D-4491-A-□	REAR HEAD AND BODY ASSEMBLY (Nose Mount)
G	D-4492-A-□	REAR HEAD AND BODY ASSEMBLY (Universal Mount)

SOLID STAINLESS ACCESSORIES (in.)

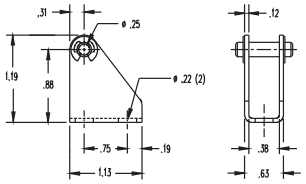
3/4" Bore



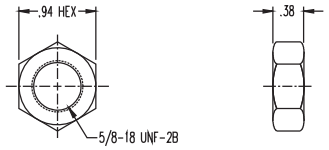
D-129-SS
Foot Bracket



D-54565-SS
Rod Clevis

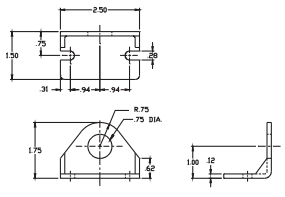


D-55203-SS
Pivot Bracket

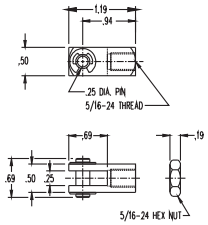


D-9-SS
Mounting Nut

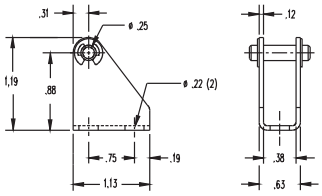
1-1/16" Bore



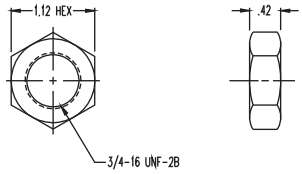
D-241-SS
Foot Bracket



D-54564-SS
Rod Clevis



D-55203-SS
Pivot Bracket



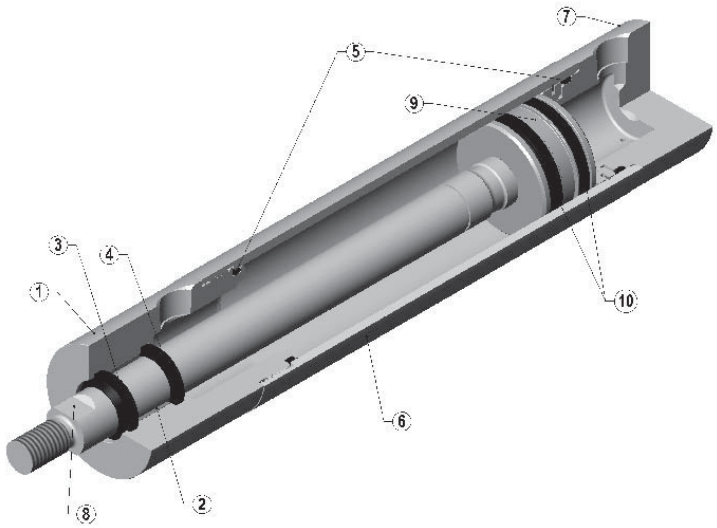
D-3556-SS
Mounting Nut

Engineering Specifications

- 304 Stainless steel body
- Low friction Buna N “U” Cup seals and rod wiper
- 303 Stainless steel endcaps, piston rod, and bell ring nut
- Pressure Rating: 250 psi (air)
- Composite FDA approved rod bearing and FDA approved lubricant

Component Description

1. Rod Guide: Corrosion resistant 303 stainless steel is ideal for washdown applications. Designed specifically to reduce sharp edges and corners and provide a smooth transition to the cylinder body eliminating catch points for contamination and to allow ease in cleaning. Tapped holes are provided to allow easy mounting of USDA approved secondary wiper retainer as an option.
2. Rod Bushing: Material is PTFE (Polytetrafluoroethylene) for extended life, larger bores (5", 6", 8") utilize an acetal bushing.
3. Rod Wiper: A Urethane rod wiper is standard (high temperature material is optional) and offers resistance to a wide variety of washdown chemicals. Larger bores offer a PTFE rod wiper as standard.
4. Rod Seal: Nitrile rod seal (high temperature material is optional) is pressure activated and wear compensating for long life.
5. Body Seal: Nitrile material is standard (high temperature material is optional).
6. Body: Thick walled 316 stainless steel offers superior corrosion resistance and is designed to minimize gaps with the mating end caps where contamination can build up.
7. Rear Head: Corrosion resistant 303 stainless steel is ideal for washdown applications. Designed specifically to reduce sharp edges and corners and provide a smooth transition to the cylinder body eliminating catch points for contamination and to allow ease in cleaning. Optional tapped holes allow for easy mounting of NFPA rear pivot or rear clevis mounting brackets.



8. Piston Rod: Ground and roller burnished 303 stainless steel for maximum corrosion resistance.
9. Piston: Precision machined from aluminum (optional bearing strip) may also be ordered in stainless steel for internal corrosion resistance when required.
10. Piston Seals: Nitrile material is standard, high temperature material is optional. Seals are pressure activated and wear compensating.
11. Lubricant: Food Grade (H1) Grease.

Operating Specifications

Temperature: -20° to 200°F standard; 0° to 400°F with V option
Stroke Maximum: 24" (strokes beyond 24" require an application review)
Operating Pressure: 200 psi maximum

USDA Accepted
(Option U)

EQUIPMENT ACCEPTANCE CERTIFICATE

The issuance of this form is based on U.S. Department of Agriculture, Dairy Grading Branch, Equipment Design Review Section, evaluation of the equipment listed above for compliance with:

USDA Dairy Equipment Guidelines

How to Order

RS - 1-1/2 X 4 - MP2 U

Bore Size
1-1/2"
2"
2-1/2"
3-1/4"
4"
5"
6"
8"

Stroke
4 = 4"
(0 - 24")

Mounting Styles
MXO - Tapped Both Ends
MXF - Tapped Front
MXR - Tapped Rear
MP2 - Clevis Rear
MP4 - Pivot Rear

Options		
B	-	Bumpers[1]
FC	-	Fixed Cushions[5]
KK3	-	Female Rod Thread[2]
M	-	Magnetic Piston[5]
NT	-	Non-threaded Rod[5]
P	-	Prox. Switch Both Ends[5]
TW	-	Piston Bearing Strip[3 5]
SP	-	303 Stainless Steel Piston[5]
U	-	USDA Approved Options[4]
V	-	High Temperature Seals
EE	-	Extra Rod Extension

Option Notes:

Option (B) Bumpers and Option (FC) Cushions are not a valid combination.

Option (B) Bumpers and Option (P) Prox. Switches are not a valid combination.

If Option (B) and Option (V) are ordered in combination, the standard Bumper material will be used in bore sizes 5, 6, and 8".

Option (M) Magnetic Piston and Option (V) High Temperature Seals should be specified for chemical compatibility requirements only. The piston magnet is nitrile based, hence the temperature rating remains at 200 degrees F.

Accessories (All Stainless Steel)

Alignment Couplers 100 psi air (max.) Operating Pressure		
Part No.	Threads	Jam Nuts Part No.
AC250-SS	1/4"-28	D-344-SS
AC312-SS	5/16"-24	D-746-SS
AC375-SS	3/8"-24	D-801-SS
AC437-SS	7/16"-20	D-154-SS
AC500-SS	1/2"-20	D-98-SS
AC625-SS	5/8"-18	D-9-SS
AC750-SS	3/4"-16	D-3556-SS
AC875-SS	7/8"-14	D-2545-SS
AC1000-SS	1"-14	D-1331-SS
AC1250-SS	1-1/4"-12	D-92067-SS

Clevis Brackets	
Part No.	Pin Dia.
RS-CB500	1/2"
RS-CB750	3/4"
RS-CB1000	1"
RS-CB1375	1-3/8"

Clevis Pins	
Part No.	Pin Dia.
RS-CP500	1/2"
RS-CP750	3/4"
RS-CP1000	1"
RS-CP1375	1-3/8"

Eye Brackets	
Part No.	Pin Dia.
RS-EB500	1/2"
RS-EB750	3/4"
RS-EB1000	1"
RS-EB1375	1-3/8"

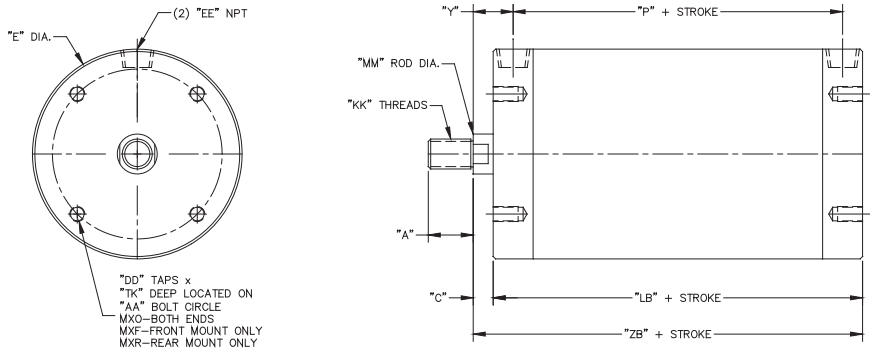
Foot Brackets*	
Part No.	Bore
RS-FB150	1-1/2"
RS-FB200	2"
RS-FB250	2-1/2"
RS-FB325	3-1/4"
RS-FB400	4"
RS-FB500	5"
RS-FB600	6"
RS-FB800	8"

*Must be ordered with MXO cylinder
Pair, fasteners included

Rod Clevis	
Part No.	Threads
RS-RC437	7/16"-20
RS-RC500	1/2"-20
RS-RC750	3/4"-16
RS-RC1000	1"-14
RS-RC1250	1-1/4"-12

Rod Eye	
Part No.	Threads
RS-RE437	7/16"-20
RS-RE500	1/2"-20
RS-RE750	3/4"-16
RS-RE1000	1"-14
RS-RE1250	1-1/4"-12

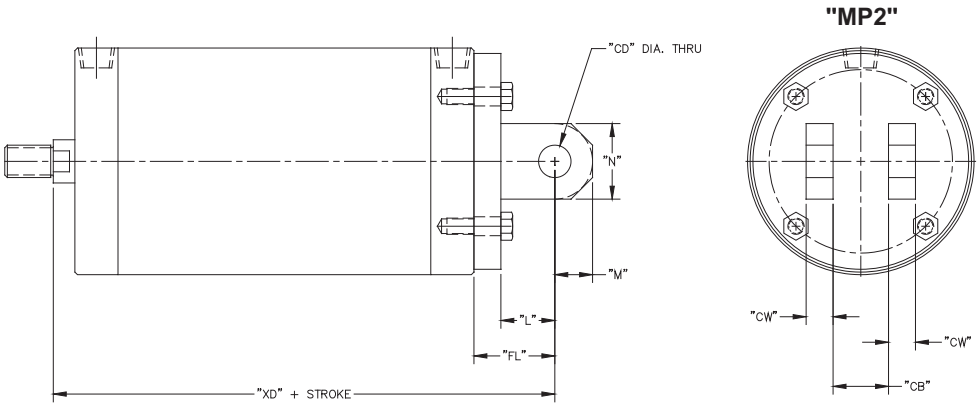
Dimensions for Mounting Styles MXO, MXR, MXF (inches)



Bore	Rod Diameter	A	AA	C	DD	E Dia.	EE NPT	KK	LB	MM	TK	Y	P	ZB
1-1/2"	5/8"	3/4	1.45	.56	10-24	1.75	3/8	7/16-20	5.21	5/8	.33	1.99	3.16	5.77
2"	5/8"	3/4	1.85	.56	10-24	2.25	3/8	7/16-20	5.45	5/8	.38	1.94	3.15	6.01
2-1/2"	5/8"	3/4	2.15	.56	1/4-20	2.75	3/8	7/16-20	5.95	5/8	1/2	1.93	3.39	6.51
3-1/4"	1"	1-1/8"	2.62	.64	5/16-18	3.50	1/2	3/4-16	7.43	1	5/8	2.64	3.83	8.07
4"	1"	1-1/8"	3.25	.64	3/8-16	4.25	1/2	3/4-16	7.43	1	3/4	2.52	3.93	8.07
5"	1"	1-1/8"	4.25	.50	3/8-16	5.25	1/2	3/4-16	5.75	1	5/8	1.00	4.75	6.25
6"	1-3/8"	1-5/8"	5.00	.63	1/2-13	6.25	1/2	1-14	5.75	1-3/8	7/8	1.13	4.75	6.38
8"	1-3/8"	1-5/8"	6.50	.63	5/8-11	8.38	1/2	1-14	5.88	1-3/8	1	1.13	4.88	6.50

Note: Oversized rods are available in 5", 6", and 8" bore in each mounting style. Please contact distributor.

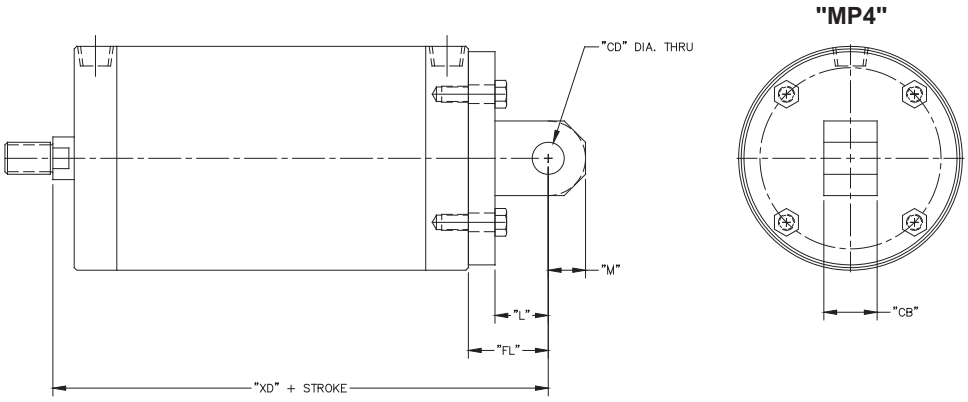
Clevis Mount (MP2) (inches)



Bore	Rod Diameter	CB	CD	CW	FL	L	M	N	XD
1-1/2"	.63	.75	.50	.49	1.13	.75	.35	.70	6.90
2"	.63	.75	.50	.50	1.13	.75	.40	.80	7.14
2-1/2"	.63	.75	.50	.50	1.13	.75	.40	.80	7.64
3-1/4"	1.00	1.25	.75	.63	1.88	1.25	.60	1.00	9.94
4"	1.00	1.25	.75	.63	1.88	1.25	.75	1.40	9.94
5"	1.00	1.25	.75	.63	1.88	1.25	.88	1.75	8.13
6"	1.38	1.50	1.00	.75	2.25	1.50	1.00	2.00	8.63
8"	1.38	1.50	1.00	.75	2.25	1.50	1.00	3.50	8.75

Note: Oversized rods are available in 5", 6", and 8" bore in each mounting style. Please contact distributor.

Pivot Mount (MP4) (inches)

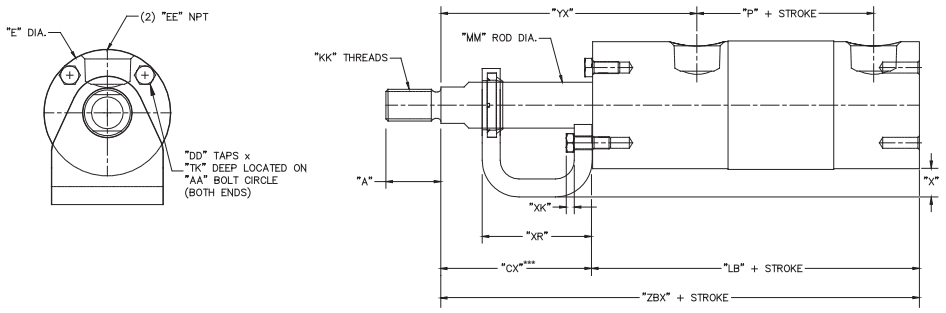


Bore	Rod Diameter	CB	CD	FL	L	M	N	XD
1-1/2"	.63	.75	.50	1.13	.75	.35	.70	6.90
2"	.63	.75	.50	1.13	.75	.40	.80	7.14
2-1/2"	.63	.75	.50	1.13	.75	.40	.80	7.64
3-1/4"	1.00	1.25	.75	1.88	1.25	.60	1.00	9.94
4"	1.00	1.25	.75	1.88	1.25	.75	1.40	9.94
5"	1.00	1.25	.75	1.88	1.25	.88	1.75	8.13
6"	1.38	1.50	1.00	2.25	1.50	1.00	2.00	8.63
8"	1.38	1.50	1.00	2.25	1.50	1.00	3.50	8.75

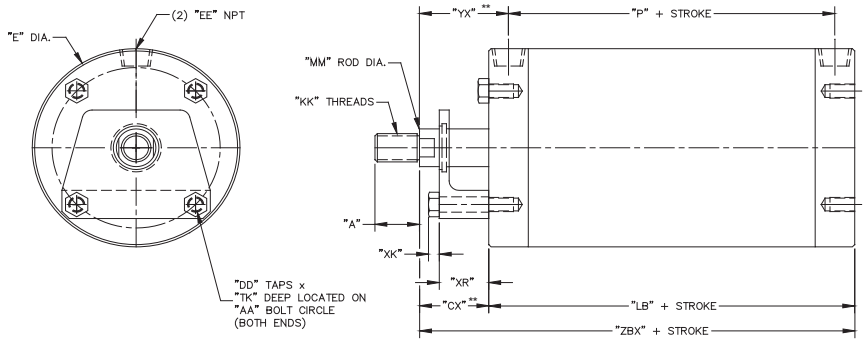
Note: Oversized rods are available in 5", 6", and 8" bore in each mounting style. Please contact distributor.

USDA Approved Option "U" (inches)

1-1/2" to 4" Bores



5", 6", and 8" Bores



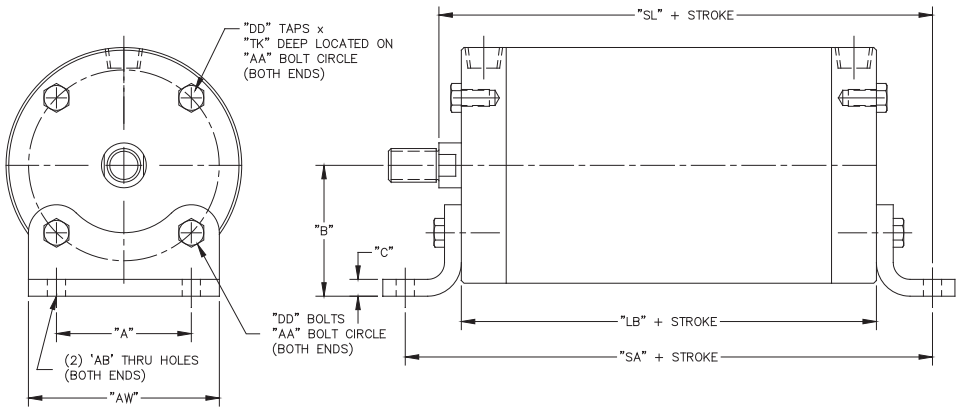
External Wiper (Option U) Dimensions

Bore	Rod Diameter	A	AA	CX	DD	E Dia.	EE NPT	KK	LB	MM	TK	YX	P	XR	XK	ZBX	X
1-1/2"	.63	3/4	1.45	2.06	8-32	1-3/4	3/8	7/16-20	5.21	5/8	.33	3.49	3.16	1.50	.10	7.27	.38
2"	.63	3/4	1.85	2.06	10-24	2-1/4	3/8	7/16-20	5.45	5/8	.38	3.44	3.15	1.50	.12	7.51	.50
2-1/2"	.63	3/4	2.15	2.06	1/4-20	2-3/4	3/8	7/16-20	5.95	5/8	1/2	3.43	3.39	1.50	.17	8.01	.26
3-1/4"	1.00	1-1/8	2.62	2.14	5/16-18	3-1/2	1/2	3/4-16	7.43	1	5/8	4.14	3.83	1.50	.24	9.57	.25
4"	1.00	1-1/8	3.25	2.14	3/8-16	4-1/4	1/2	3/4-16	7.43	1	3/4	4.02	3.93	1.50	.27	9.57	.25
5"	1.00	1-1/8	4.25	1.75	3/8-16	5-1/4	1/2	3/4-16	5.75	1	5/8	2.25	4.75	1.25	.27	7.50	N/A
6"	1.38	1-5/8	5.00	1.88	1/2-13	6-1/4	1/2	1-14	5.75	1-3/8	7/8	2.38	4.75	1.25	.36	7.63	N/A
8"	1.38	1-5/8	6.50	1.88	5/8-11	8-3/8	1/2	1-14	5.88	1-3/8	1	2.38	4.88	1.25	.44	7.75	N/A

Note: The USDA-approved option "U" includes an external wiper as required by the USDA. Cylinder rod length is increased as shown. Oversized rods are available in 5", 6", and 8" bore in each mounting style. Please contact distributor.

Examples of "U" Option Mounting Bracket

Foot Bracket Accessory (inches)

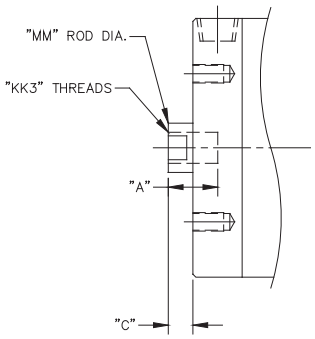


RS Series Foot Mounting Brackets

Bore	Foot Bracket Kit	A	AB	AW	B	C	DD	AA	LB	TK	SA	SL
1-1/2"	RS-FB150	1.03	3/16	1.52	1.25	1/4	8-32	1.45	5.21	.38	6.62	6.46
2"	RS-FB200	1.31	7/32	1.81	1.62	1/4	10-24	1.85	5.45	.38	7.58	7.07
2-1/2"	RS-FB250	1.55	9/32	2.30	1.64	1/4	1/4-20	2.15	5.95	1/2	7.90	7.48
3-1/4"	RS-FB325	1.86	11/32	2.86	2.00	1/4	5/16-18	2.62	7.43	5/8	9.74	9.23
4"	RS-FB400	2.30	13/32	3.50	2.38	1/4	3/8-16	3.25	7.43	3/4	10.05	9.39
5"	RS-FB500	3.00	11/16	4.50	2.88	3/16	3/8-16	4.25	5.75	5/8	8.50	7.63
6"	RS-FB600	4.00	13/16	5.50	3.38	3/16	1/2-13	5.00	5.75	7/8	8.50	7.75
8"	RS-FB800	5.00	13/16	7.00	4.44	1/4	5/8-11	6.50	5.88	1	9.50	8.31

Notes: Foot bracket mounting kits include two brackets and eight stainless steel screws.
Can only be applied to MXO mounting styles.

Female Piston Rod End (Option KK3)



Bore	MM Rod Diameter	KK3	A (Thread Depth)	C
1-1/2", 2", 2-1/2"	5/8" Standard	7/16-20	3/4	.56
3-1/4", 4"	1" Standard	3/4-16	1-1/8	.64
5"	1" Standard	3/4-16	1-1/8	.50
6", 8"	1-3/8" Standard	1-14	1-5/8	.63

Weights of Cylinders

Approximate Weights (lbs.)		
Bore	Base Weight	Adder per inch of stroke
1-1/2"	2.82	0.27
2"	5.25	0.33
2-1/2"	8.92	0.39
3-1/4"	20.63	0.61
4"	30.20	0.70
5"	24.10	0.84
6"	36.45	1.12
8"	69.80	1.80

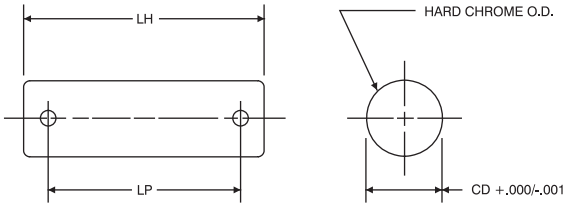
Stainless Steel Accessories (inches)

Clevis Pin

Part No.	CD(+.000/ -.001)	LH	LP
RS-CP500	1/2	2-1/4	1-15/16
RS-CP750	3/4	3	2-23/32
RS-CP1000	1	3-1/2	3-7/32
RS-CP1375	1-3/8	5	4-1/4

Clevis Pin sold with (2) S.S. Cotter Pins

CLEVIS PIN (INCLUDES COTTER PINS)



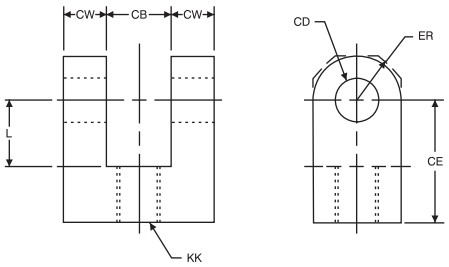
(Clevis Pins sold with (2) S.S. Cotter Pins)

Rod Clevis

Part No.	CB	CD	CE	CW	ER	KK	L
RS-RC437	3/4	1/2	1-1/2	1/2	1/2	7/16-20	3/4
RS-RC500						1/2-20	
RS-RC750	1-1/4	3/4	2-3/8	5/8	3/4	3/4-16	1-1/4
RS-RC1000	1-1/2	1	3-1/8	3/4	1	1-14	1-1/2

Clevis Pins sold separately

ROD CLEVIS



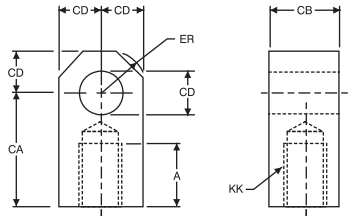
(Clevis Pins sold separately from Rod Clevis)

Rod Eye

Part No.	A	CA	CB	CD	ER	KK
RS-RE437	3/4	1-1/2	3/4	1/2	5/8	7/16-20
RS-RE500						1/2-20
RS-RE750	1-1/8	2-1/16	1-1/4	3/4	7/8	3/4-16
RS-RE1000	1-5/8	2-13/16	1-1/2	1	1-13/16	1-14

Clevis Pins sold separately

ROD EYE



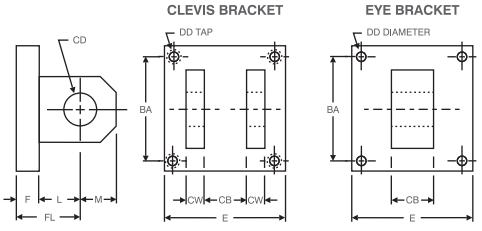
(Clevis Pins sold separately from Rod Eyes)

Clevis Brackets and Eye Brackets

Part No.	BA	CB	CD	CW	DD	E	F	FL	L	M
Clevis Brackets										
RS-CB500	1-5/8	3/4	1/2	1/2	3/8-24	2-1/2	3/8	1-1/8	3/4	5/8
RS-CB750	2-9/16	1-1/4	3/4	5/8	1/2-20	3-1/2	5/8	1-7/8	1-1/4	3/4
RS-CB1000	3-1/4	1-1/2	1	3/4	5/8-18	4-1/2	3/4	2-1/4	1-1/2	1
RS-CB1375	3-13/16	2	1-3/8	1	5/8-18	5	7/8	3	2-1/8	1-3/8
Eye Brackets										
RS-EB500	1-5/8	3/4	1/2	N/A	13/32	2-1/2	3/8	1-1/8	3/4	1/2
RS-EB750	2-9/16	1-1/4	3/4		17/32	3-1/2	5/8	1-7/8	1-1/4	3/4
RS-EB1000	3-1/4	1-1/2	1		21/32	4-1/2	3/4	2-1/4	1-1/2	1
RS-EB1375	3-13/16	2	1-3/8		21/32	5	7/8	3	2-1/8	1-3/8

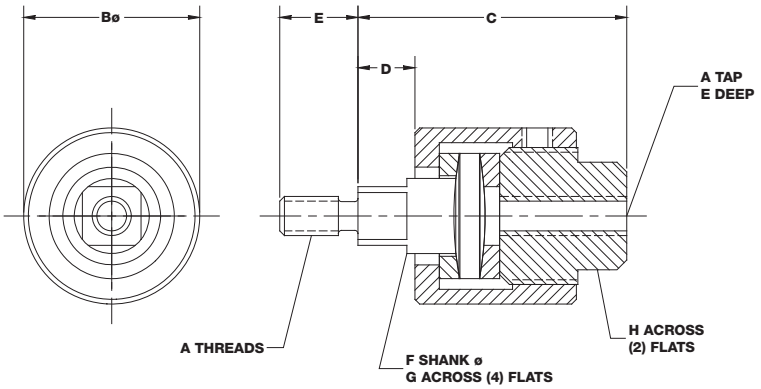
Clevis Pins sold separately

Mounted to machine to interface with rod end access, and MP2/MP4.



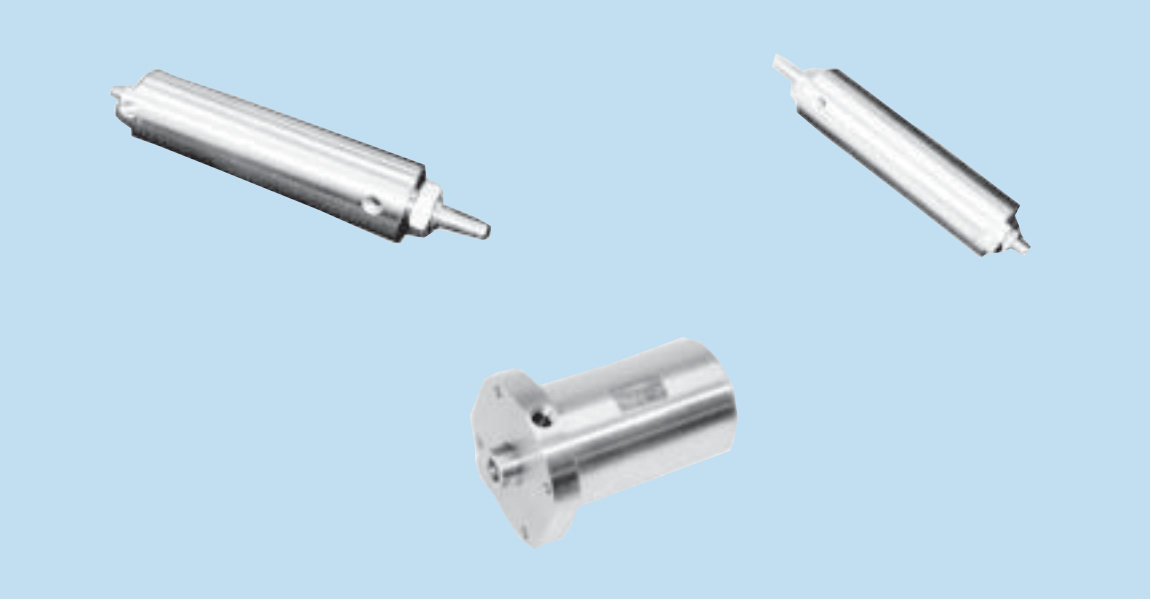
(Clevis Pins sold separately from Clevis & Eye Brackets)

Stainless Steel Accessories
Stainless Steel Alignment Couplers (inches)

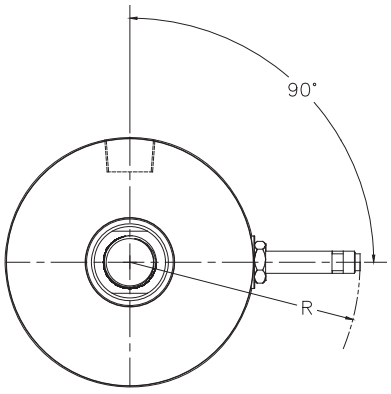


Part Number	A	B	C	D	E	F	G	H	Maximum Pull at Yield (lbs.)
AC250-SS	1/4-28	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	225
AC312-SS	5/16-24	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	375
AC375-SS	3/8-24	1-1/8	1-3/4	3/8	1/2	1/2	3/8	11/16	575
AC437-SS	7/16-20	1-1/4	2	7/16	3/4	5/8	1/2	13/16	800
AC500-SS	1/2-20	1-1/4	2	7/16	3/4	5/8	1/2	13/16	1100
AC625-SS	5/8-18	1-1/4	2	7/16	3/4	5/8	1/2	13/16	1750
AC750-SS	3/4-16	1-3/4	2-5/16	7/16	1-1/8	31/32	13/16	1-1/8	2600
AC875-SS	7/8-14	1-3/4	2-5/16	7/16	1-1/8	31/32	13/16	1-1/8	3550
AC1000-SS	1-14	2-1/2	2-15/16	7/16	1-5/8	1-11/32	1-5/32	1-5/8	4800
AC1250-SS	1-1/4-12	2-1/2	2-15/16	7/16	1-5/8	1-11/32	1-5/32	1-5/8	7600

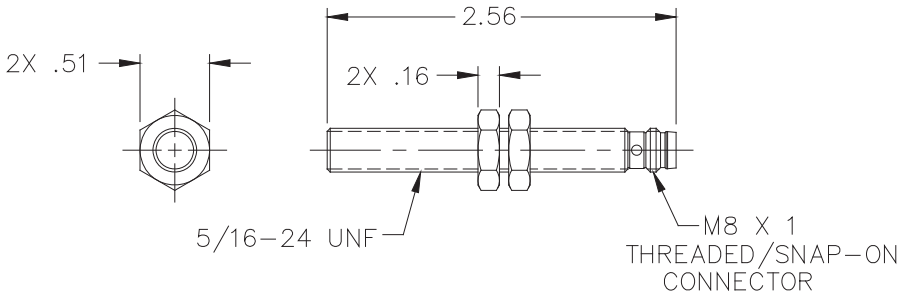
Examples of Specials Capability



Proximity Switch Option Dimensions (Option P)



Bore Size	Dimension R
1-1/2"	3.04"
2"	3.04"
2-1/2"	3.04"
3-1/4"	3.19"
4"	3.19"
5"	N/A
6"	N/A
8"	N/A



Specifications

Output:	PNP Sourcing Output, normally open
Load Current:	100mA max.
Leakage Current:	10uA max.
Voltage Drop:	2 VDC
Short Circuit and Overload Protection:	yes
Reverse Polarity Protection:	yes
Supply voltage:	10-30 VDC
LED:	yes
Current Consumption:	15mA
Repeatability:	0.010° (.25mm)
Hysteresis:	5%
Response Time:	330uS
Electromagnetic Compatibility Compliance:	NEMA ICS5-1996
Protection Class:	IP67
Ambient Temperature:	-14°F to 158°F (-25°C to 70°C)
Housing Material:	Stainless steel
Sensing Face:	Crastin
Approvals:	UL-General Purpose CSA-General Purpose FM-Nonincendive

STAINLES S STEEL CYLINDERS

SS Series

- NFPA Interchangeable
- 1½" thru 8" Bores
- 250 PSI Pneumatic
- 400 PSI Hydraulic (Non-Shock)
- Permanent Lubrication

SS–NR Series

- Non-Rotating
- 2" thru 8" Bores

SS–MSE/MSR

- 2, 3 and 4 Stage, Force Multiplying
- 1½" thru 6" Bores

SS–AT

- Air/Oil Tanks
- 2½", 3¼", 4, 5 and 8" Bores

SS Accessories

- AlignmentCouplers (100 PSI Air Max.)
- Switches & Brackets (Nylon with S.S. Hardware)
- Rod Clevis and Mounts

The TRD difference...

Precision machined throughout. We started in business as precision machinists. Every component is machined in a manner to enhance the performance of our products. Cylinder tubes are lathe cut, not sawed. Heads and caps are 100% CNC machined to tight tolerances in jig bored fixtures. Piston and rod diameters and concentricity are held to within two thousandths of an inch, in CNC lathes. The results: cylinders that have a consistent performance and long life. Our cylinders are truly "square", which eliminates shimming! **Try the TRD difference!**

On time, consistent delivery. Every customer's order is important. Our business is managed so large orders do not disrupt our published delivery schedules.

Quick response on all requests. Most requests are answered the day they are received.

Visit us on the web: http://www.trdmfg.com e-mail: sales@trdmfg.com

2D DXF & DWG CAD files available 3D Step files available for download

NEW 3 YEAR WARRANTY

TRD Manufacturing Incorporated, A Bimba Company, is an employee owned company. We take great pride in our products. TRD Manufacturing, Inc. warranties its cylinders for a full 3 years to be free from defects in material and workmanship. TRD Manufacturing, Inc. must be notified prior to returning product for warranty evaluation. Contact your local TRD distributor to obtain an RGA (Returned Goods Authorization Number) for proper tracking and expedite service on all warranty evaluations. TRD will repair or replace free of charge any products returned to the factory within 3 years of shipment that is proven to be defective in material and/or workmanship.

A complete explanation of defects is required with the returned product. The TRD warranty applies only to products used properly and under normal operating conditions. All products are to be used in a safe manner, in properly designed systems. Safeguards to prevent personal injury or equipment damage must be used and are the sole responsibility of the user.

In no event shall TRD Manufacturing, Inc. be liable for any consequential damages or installation costs resulting from delay or failure of delivery, defective material or workmanship or out of a breach by TRD Manufacturing, Inc. of any contract.

HEAVY DUTY 'SS' STAINLESS STEEL CONSTRUCTION

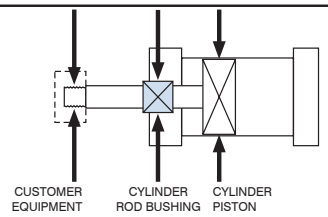
Ideal for:

- Food Processing Applications
- Chemical, Medical or Pharmaceutical
- Offshore or Marine Equipment
- Energy Production or Waste Treatment

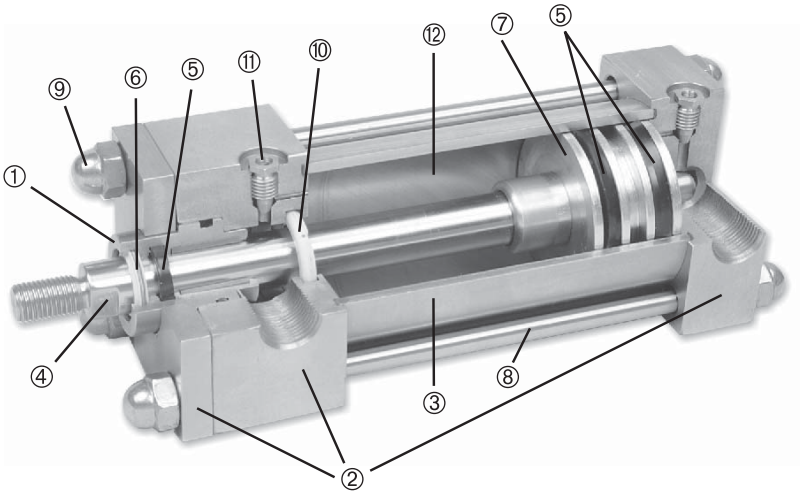
Floating Rod Bushing

SELF ALIGNMENT FEATURE

Rod Bushing is designed to float .002", improving bearing surface alignment



- *Reduces cylinder drag and erratic operation*
- *Reduces cylinder wear*
- *Provides longer life than "fixed" Rod Bushing designs*



① ***FLOATING ROD BUSHING*** – Precision machined from 303 stainless steel, extra-long PTFE composite wear band for extended service.

② ***HEAD, CAP & RETAINER*** – 100% Precision machined from highly corrosion resistant 303 stainless steel bar for tough and corrosive environments.

③ ***CYLINDER TUBE*** – Precision machined and honed from 304 stainless steel, providing smooth consistent operation.

④ ***PISTON ROD*** – Drawn, ground and polished high yeild 303 stainless steel, Hard Chrome plated.

⑤ ***PISTON & ROD SEALS*** – Heavy lip design Carboxilated Nitrile construction. Seals are pressure activated and wear compensating for long life.

⑥ ***ROD WIPER*** – PTFE scraper design for maximum compatibility with wash-down and chemical solutions (FDA approved material).

⑦ ***PISTON*** – Precision machined from 6061-T651 alloy aluminum, provides an excellent bearing surface for extended cylinder life. (Optional: Stainless Steel with PTFE wear band)

⑧ ***TIE RODS*** – Drawn and ground 303 high strength stainless steel, rolled threads for maximum strength.

⑨ ***ACORN NUTS*** – 304 Stainless steel, eliminates exposed threads for food grade applications.

⑩ ***CUSHIONS*** – (Options H & C) Floating cushion seal designed for maximum cushion performance, quick return stroke break-away and extended life.

⑪ ***CUSHION ADJUSTMENT NEEDLE*** - 303 stainless steel design has fine thread metering and is positively captured to prevent needle ejection during adjustment.

⑫ ***LUBRICATION*** - Permanently lubricated with Magna-Lube G PTFE based grease on all internal components. This lubricant is a non-migratory type high performance grease, providing outstanding service for life. (no additional lubrication is required)

OPERATING PRESSURE	250 PSI AIR (17 BAR) 400 PSI Hydraulic (27 BAR) ("TH" Option)

OPERATING TEMPERATURE	Carboxilated Nitrile: -20°F to 200°F (-25°C to 90°C) Fluorocarbon: 0°F to 400°F (-20°C to 200°C)

PERFORMANCE OPTIONS:

FDAL: FDA approved lubricant, rated for 0°F to 300°F (-20°C to 150°C)

DRB: Solid Delrin® Rod Bushing (FDA approved) for extra long life under "high pressure" wash-down applications. This bearing material requires ZERO lubrication due to self lubricating properties.

VS: Fluorocarbon seals provide a higher chemical resistance to most wash-down solutions.

SSP: Solid Stainless Steel Piston provides maximum corrosion resistance and FDA approval for food contact. (PTFE wear band standard)

REFER TO PAGES 4 thru 17 FOR MORE OPTIONS & CYLINDER DESIGNS

SERIES 'SS': HOW TO ORDER

SS - MX0 __ - 1 ½ X 1 - H1C5 - BP - KK3 - MPR - OP = PORTS AT 3 & 7

SERIES	
SS	250 PSI AIR

SEE PAGE 28 TO ORDER SS-MS SERIES (MULTI-STAGE)

NFPA MOUNTS	
MXO	NO MOUNT (1½" - 8" BORE)
MP1	REAR PIVOT CLEVIS (1½" - 8" BORE)
MP4	REAR PIVOT EYE (1½" - 6" BORE)
MT1	FRONT TRUNNION (1½" - 8" BORE)
MT2	REAR TRUNNION (1½" - 8" BORE)
MX1	EXTENDED TIE-RODS (HEAD & CAP) (1½" - 8" BORE)
MX2	EXTENDED TIE-RODS (CAP) (1½" - 8" BORE)
MX3	EXTENDED TIE-RODS (HEAD) (1½" - 8" BORE)
MF1	FRONT FLANGE (1½" - 6" BORE)
MF2	REAR FLANGE (1½" - 6" BORE)
ME3	FRONT MOUNTING HOLES (8" BORE)
ME4	REAR MOUNTING HOLES (8" BORE)
MS2	SIDE LUG (1½"- 8" BORE)
MS4	BOTTOM TAPPED HOLES (1½" - 8" BORE)

CUSHIONS
H = HEAD CUSHION POSITION 2 STANDARD SPECIFY FOR POSITIONS 1, 3 OR 4
C = CAP CUSHION POSITION 6 STANDARD SPECIFY FOR POSITIONS 5, 7 OR 8

STROKE
0" TO 120" MADE TO ORDER

BORE
1½", 2", 2½", 3 ¼" 4", 5", 6", 8"

STYLE
SINGLE ROD (LEAVE BLANK)
D = DOUBLE ROD END

OPTIONS	
A / O	AIR / OIL PISTON
B**	¼" URETHANE BUMPER BOTH ENDS
BH**	¼" URETHANE BUMPER HEAD ONLY
BC**	¼" URETHANE BUMPER CAP ONLY
BP	BUMPER PISTON SEAL (1½"- 5" BORE)
"A" =	EXTENDED PISTON ROD THREAD (SPECIFY)
"C" =	EXTENDED PISTON ROD (SPECIFY)
DRB	DELRIN® ROD BUSHING
FDAL	FDA APPROVED LUBRICANT
KK2	INTERMEDIATE MALE ROD THREAD
KK3	FEMALE ROD THREAD
KK3S	STUDDED PISTON ROD (WITH KK3)
KK4	FULL DIAMETER MALE ROD THREAD
LF	LOW FRICTION, 250 PSI AIR
MPR	MAGNETIC PISTON FOR REED SWITCHES
MPH	MAGNETIC PISTON FOR HALL SWITCHES
MS	METALLIC ROD SCRAPER (BRASS)
NR	NON-ROTATING
OP	OPTIONAL PORT LOCATION
OS	OVERSIZED ROD DIAMETER (SPECIFY SIZE)
SE	SPRING EXTEND (CONSULT FACTORY)
SR	SPRING RETURN (CONSULT FACTORY)
SSP	STAINLESS STEEL PISTON (WITH WEARBAND)
ST	STOP TUBE (SPECIFY LENGTH)
TH	400 PSI HYDRAULIC, NON-SHOCK
VS	FLUOROCARBON SEALS
WB	WEAR BAND ON PISTON
AS	ADJUSTABLE STROKE (RETRACT)
XX	SPECIAL VARIATION (SPECIFY)
	BSP, SAE PORTS (SPECIFY SIZE)

** BUMPERS ADD ¼" PER END TO CYLINDER LENGTH

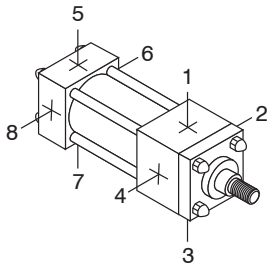
About our Part Number System

- Simple, easy to understand
- No excessive codes!
- Eliminates mistakes when ordering

EXAMPLE: A Stainless Steel cylinder with a 2½" Bore, 10" Stroke, Front Flange Mount, Head and Cap Cushion

Part Number: SS-MF1-2½ X 10-HC

PORT & CUSHION POSITIONS



- **STANDARD PORT POSITIONS @ 1 AND 5**
- **STANDARD CUSHION POSITIONS @ 2 AND 6**
- SPECIFY NON-STANDARD LOCATIONS WHEN ORDERING

NFPA MOUNTS

MXO 1½"-8" Bores Page 5	**MXOD** 1½"-8" Bores Page 10	**MP1** 1½"-8" Bores Page 6	**MP4** 1½"-6" Bores Page 6	**MT1** 1½"-8" Bores Page 6
MT2 1½"-8" Bores Page 6	**MX1** 1½"-8" Bores Page 7	**MX2** 1½"-8" Bores Page 7	**MX3** 1½"-8" Bores Page 7	**MF1** 1½"-6" Bores Page 7
MF2 1½"- 6" Bores Page 7	**ME3** 8" Bore Page 7	**ME4** 8" Bore Page 7	**MS2** 1½"-8" Bores Page 8	**MS4** 1½"-8" Bores Page 8

SERIES 'SS' DIMENSIONS: BASIC CYLINDER (NO MOUNT)

About Rod End Styles

Style 1 Male Rod End is STANDARD

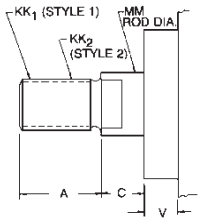
Other NFPA Styles can be specified (See Chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made to order and does not delay shipment. Coarse (UNC) threads, Metric threads or just plain rod ends are common. Thread lengths are also made to order (Specify: "A"=Length).

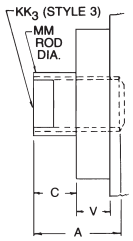
NEED SOMETHING NOT LISTED?
Just send us a sketch.
In most cases, quotes are turned around in one day!

PISTON ROD END STYLES

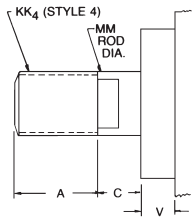
STYLE 1 & 2



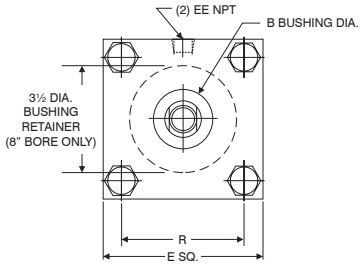
STYLE 3

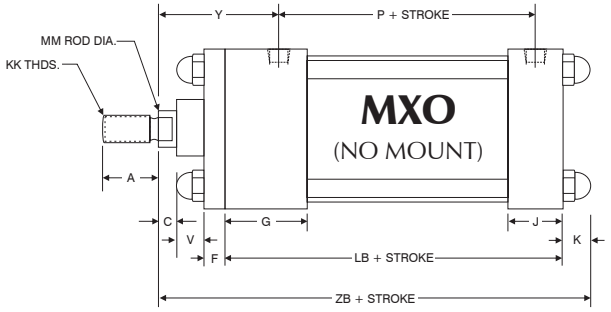


STYLE 4



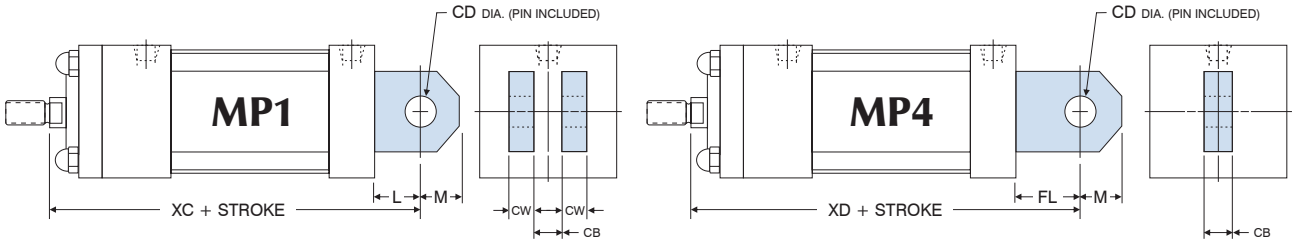
		STANDARD		OPTIONAL							
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male			
BORE	MM ROD DIAMETER	KK1	A	KK2	A	KK3	A	KK4	A	C	V
1½, 2, 2 ½	5/8 Standard	7/16-20	¾	½ -20	¾	7/16-20	¾	5/8-18	¾	3/8	¼
	1 Oversize	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	½
3¼, 4, 5	1 Standard	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	¼
	1 3/8 Oversize	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
6 & 8	1 3/8 Standard	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
	1 ¾ Oversize	1¼-12	2	1½-12	2	1¼-12	2	1¾-12	2	¾	½





BASIC DIMENSIONS 'MXO' STANDARD & OVERSIZED RODS																		
BORE	ROD DIAMETER	A	B	C	E	EE	F	G	J	K	KK	LB	MM	P	R	V	Y	ZB
1½	5/8 Standard	¾	1 1/8	3/8	2	3/8	3/8	1½	1	7/16	7/16-20	3 5/8	5/8	2 3/8	1.43	¼	1 7/8	5 1/16
	1 Oversize	1 1/8	1½	½							¾-16		1			½	2¼	5 7/16
2	5/8 Standard	¾	1 1/8	3/8	2½	3/8	3/8	1½	1	9/16	7/16-20	3 5/8	5/8	2 3/8	1.84	¼	1 7/8	5 3/16
	1 Oversize	1 1/8	1½	½							¾-16		1			½	2¼	5 9/16
2½	5/8 Standard	¾	1 1/8	3/8	3	3/8	3/8	1½	1	9/16	7/16-20	3¾	5/8	2½	2.19	¼	1 7/8	5 5/16
	1 Oversize	1 1/8	1½	½							¾-16		1			½	2¼	5 11/16
3¼	1 Standard	1 1/8	1½	½	3¾	½	5/8	1¾	1¼	5/8	¾-16	4¼	1	2¾	2.76	¼	2 3/8	6¼
	1 3/8 Oversize	1 5/8	2	5/8							1-14		1 3/8			3/8	2 5/8	6½
4	1 Standard	1 1/8	1½	½	4½	½	5/8	1¾	1¼	5/8	¾-16	4¼	1	2¾	3.32	¼	2 3/8	6¼
	1 3/8 Oversize	1 5/8	2	5/8							1-14		1 3/8			3/8	2 5/8	6½
5	1 Standard	1 1/8	1½	½	5½	½	5/8	1¾	1¼	13/16	¾-16	4½	1	3	4.10	¼	2 3/8	6 5/8
	1 3/8 Oversize	1 5/8	2	5/8							1-14		1 3/8			3/8	2 5/8	6 7/8
6	1 3/8 Standard	1 5/8	2	5/8	6½	¾	¾	2	1½	13/16	1-14	5	1 3/8	3¼	4.88	¼	2¾	7 3/8
	1¾ Oversize	2	2 3/8	¾							1¼-12		1¾			3/8	3	7 5/8
8	1 3/8 Standard	1 5/8	2	5/8	8½	¾	5/8	2	1½	1	1-14	5 1/8	1 3/8	3 3/8	6.44	3/8	2¾	7¾
	1¾ Oversize	2	2 3/8	¾							1¼-12		1¾			½	3	8

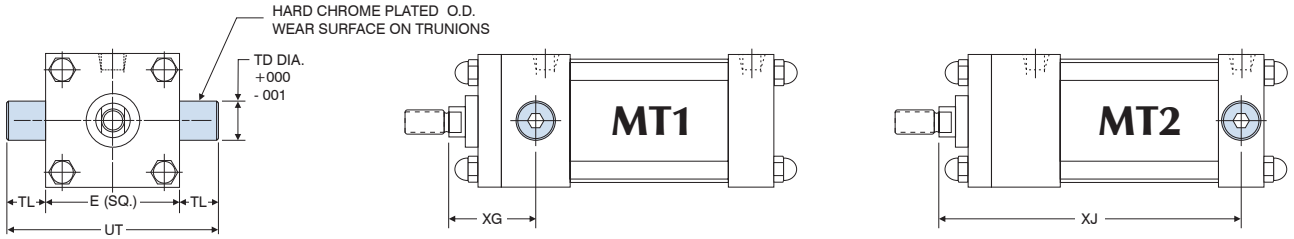
SERIES 'SS' DIMENSIONS: PIVOT MOUNTS



Note: Pivot Mount is non-detachable.
Contact factory for detachable mount options.

'MP1' CLEVIS AND 'MP4' EYE MOUNT DIMENSIONS										ACCESSORIES *(SEE PAGE 18 FOR DIMENSIONS)*			
BORE	ROD DIAMETER	CB	CD	CW	FL	L	M	XC	XD	ROD CLEVIS	ROD EYE	CLEVIS PIN	EYE BRACKET *(FOR MP1)*
1½	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5 3/8	5¾	SS-RC437	SS-RE437	SS-CP500	SS-EB500
	1 Oversize							5¾	6 1/8	SS-RC750	SS-RE750	SS-CP750	
2	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5 3/8	5¾	SS-RC437	SS-RE437	SS-CP500	
	1 Oversize							5¾	6 1/8	SS-RC750	SS-RE750	SS-CP750	
2½	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5½	5 7/8	SS-RC437	SS-RE437	SS-CP500	
	1 Oversize							5 7/8	6¼	SS-RC750	SS-RE750	SS-CP750	
3¼	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	6 7/8	7½	SS-RC750	SS-RE750	SS-CP750	SS-EB750
	1 3/8 Oversize							7 1/8	7¾	SS-RC1000	SS-RE1000	SS-CP1000	
4	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	6 7/8	7½	SS-RC750	SS-RE750	SS-CP750	
	1 3/8 Oversize							7 1/8	7¾	SS-RC1000	SS-RE1000	SS-CP1000	
5	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	7 1/8	7¾	SS-RC750	SS-RE750	SS-CP750	
	1 3/8 Oversize							7 3/8	8	SS-RC1000	SS-RE1000	SS-CP1000	
6	1 3/8 Standard	1½	1	¾	2¼	1½	1	8 1/8	8 7/8	SS-RC1000	SS-RE1000	SS-CP1000	SS-EB1000
	1¾ Oversize							8 3/8	9 1/8	SS-RC1250	SS-RE1250	SS-CP1375	
8	1 3/8 Standard	1½	1	¾	N/A	1½	1	8¼	N/A	SS-RC1000	SS-RE1000	SS-CP1000	
	1¾ Oversize							8½	N/A	SS-RC1250	SS-RE1250	SS-CP1375	

Clevis pin provided with MP1 and MP4 mounts.
MP4 8" bore not available.
For dimension not shown see page 5.



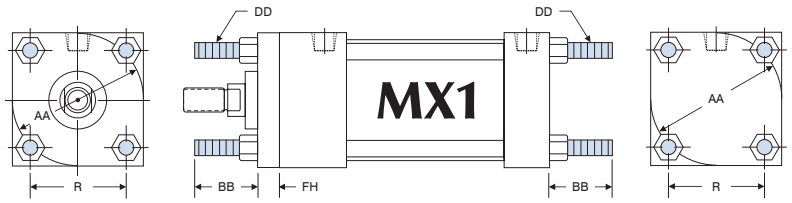
MT1 / MT2

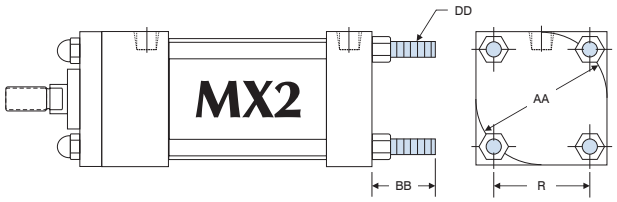
Note: Trunnions are bolt on,
non-removable design.

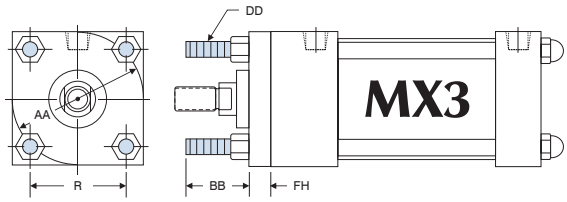
'MT1' HEAD TRUNNION AND 'MT2' CAP TRUNNION MOUNT DIMENSIONS								ACCESSORIES *(SEE PAGE 18 FOR DIMENSIONS)*		
BORE	ROD DIAMETER	E	TD	TL	UT	XG	XJ	ROD CLEVIS	ROD EYE	CLEVIS PIN
1½	5/8 Standard	2	1	1	4	1¾	4 1/8	SS-RC437	SS-RE437	SS-CP500
	1 Oversize*					N/A	4½	SS-RC750	SS-RE750	SS-CP750
2	5/8 Standard	2½	1	1	4½	1¾	4 1/8	SS-RC437	SS-RE437	SS-CP500
	1 Oversize					2 1/8	4½	SS-RC750	SS-RE750	SS-CP750
2½	5/8 Standard	3	1	1	5	1¾	4¼	SS-RC437	SS-RE437	SS-CP500
	1 Oversize					2 1/8	4 5/8	SS-RC750	SS-RE750	SS-CP750
3¼	1 Standard	3¾	1	1	5¾	2¼	5	SS-RC750	SS-RE750	SS-CP750
	1 3/8 Oversize					2½	5¼	SS-RC1000	SS-RE1000	SS-CP1000
4	1 Standard	4½	1	1	6½	2¼	5	SS-RC750	SS-RE750	SS-CP750
	1 3/8 Oversize					2½	5¼	SS-RC1000	SS-RE1000	SS-CP1000
5	1 Standard	5½	1	1	7½	2¼	5¼	SS-RC750	SS-RE750	SS-CP750
	1 3/8 Oversize					2½	5½	SS-RC1000	SS-RE1000	SS-CP1000
6	1 3/8 Standard	6½	1 3/8	1 3/8	9¼	2 5/8	5 7/8	SS-RC1000	SS-RE1000	SS-CP1000
	1¾ Oversize					2 7/8	6 1/8	SS-RC1250	SS-RE1250	SS-CP1375
8	1 3/8 Standard	8½	1 3/8	1 3/8	11¼	2 5/8	6	SS-RC1000	SS-RE1000	SS-CP1000
	1¾ Oversize					2 7/8	6¼	SS-RC1250	SS-RE1250	SS-CP1375

*No oversize rod on 1½" bore MT1.

SERIES 'SS' DIMENSIONS: TIE ROD & FLANGE MOUNTS



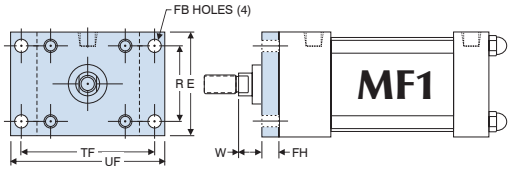




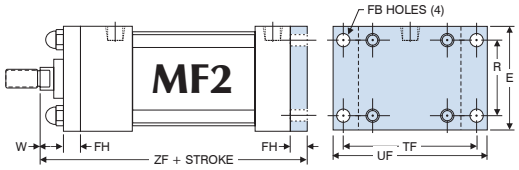
TIE ROD EXTENDED 'MX1', 'MX2' & 'MX3' MOUNT DIMENSIONS						
BORE	ROD DIAMETER	AA	BB	DD	FH	R
1½	5/8 Standard 1 Oversize	2.02	1	¼-28	3/8	1.43
2	5/8 Standard 1 Oversize	2.6	1 1/8	5/16-24	3/8	1.84
2½	5/8 Standard 1 Oversize	3.1	1 1/8	5/16-24	3/8	2.19
3¼	1 Standard 1 3/8 Oversize	3.9	1 3/8	3/8-24	5/8	2.76

TIE ROD EXTENDED 'MX1', 'MX2' & 'MX3' MOUNT DIMENSIONS						
BORE	ROD DIAMETER	AA	BB	DD	FH	R
4	1 Standard 1 3/8 Oversize	4.7	1 3/8	3/8-24	5/8	3.32
5	1 Standard 1 3/8 Oversize	5.8	1 13/16	½-20	5/8	4.10
6	1 3/8 Standard 1¾ Oversize	6.9	1 13/16	½-20	¾	4.88
8	1 3/8 Standard 1¾ Oversize	9.1	2 5/16	5/8-18	*5/8	6.44

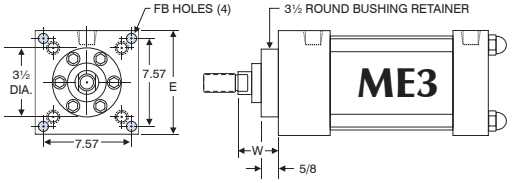
Full square bushing retainer on 1½" thru 6" bore.
* Round retainer on 8" bore. BB dimension from face of head.
For dimensions not shown, see page 5.



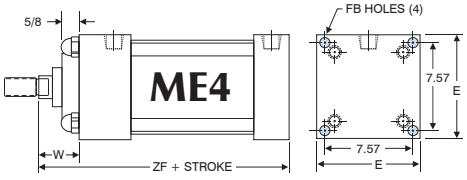
1½" - 6" BORES



1½" - 6" BORES



8" BORE ONLY



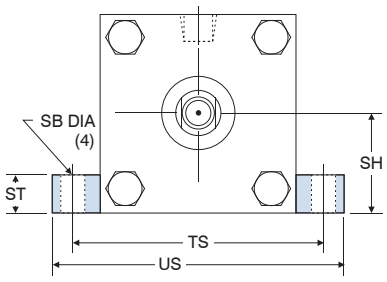
8" BORE ONLY

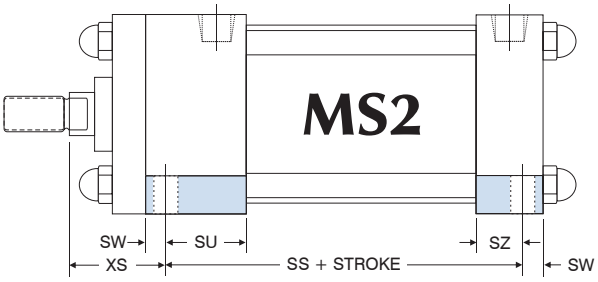
'MF1', 'MF2' FLANGE & 'ME3', 'ME4' CAP MOUNT DIMENSIONS									
BORE	ROD DIAMETER	E	FB	FH	R	TF	UF	W	ZF
1½	5/8 Standard 1 Oversize	2	5/16	3/8	1.43	2¾	3 3/8	5/8 1	5 5 3/8
2	5/8 Standard 1 Oversize	2½	3/8	3/8	1.84	3 3/8	4 1/8	5/8 1	5 5 3/8
2½	5/8 Standard 1 Oversize	3	3/8	3/8	2.19	3 7/8	4 5/8	5/8 1	5 1/8 5½
3¼	1 Standard 1 3/8 Oversize	3¾	7/16	5/8	2.76	4 11/16	5½	¾ 1	6¼ 6½

'MF1', 'MF2' FLANGE & 'ME3', 'ME4' CAP MOUNT DIMENSIONS									
BORE	ROD DIAMETER	E	FB	FH	R	TF	UF	W	ZF
4	1 Standard 1 3/8 Oversize	4½	7/16	5/8	3.32	5 7/16	6¼	¾ 1	6¼ 6½
5	1 Standard 1 3/8 Oversize	5½	9/16	5/8	4.10	6 5/8	7 5/8	¾ 1	6½ 6¾
6	1 3/8 Standard 1¾ Oversize	6½	9/16	¾	4.88	7 5/8	8 5/8	7/8 1 1/8	7 3/8 7 5/8
8	1 3/8 Standard 1¾ Oversize	8½	11/16	N/A	N/A	N/A	N/A	1 5/8 1 7/8	6¾ 7

Full square bushing retainer on 1½" thru 6" bore.
*Round retainer on 8" bore.

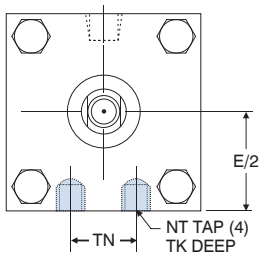
SERIES 'SS' DIMENSIONS: BASE MOUNTS

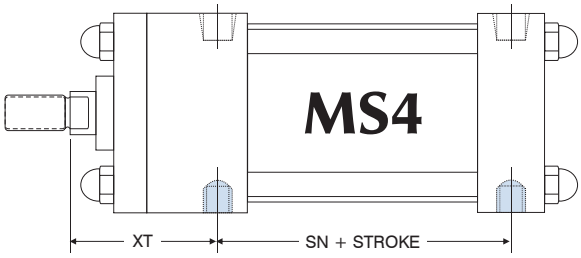




'MS2' SIDE LUG MOUNT DIMENSIONS											
BORE	ROD DIAMETER	SB	SH	ST	SU	SW	SZ	TS	US	XS	SS ADD STROKE
1½	5/8 Standard 1 Oversize	7/16	1	½	1 1/8	3/8	5/8	2¾	3½	1 3/8 1¾	2 7/8
2	5/8 Standard 1 Oversize	7/16	1¼	½	1 1/8	3/8	5/8	3¼	4	1 3/8 1¾	2 7/8
2½	5/8 Standard 1 Oversize	7/16	1½	½	1 1/8	3/8	5/8	3¾	4½	1 3/8 1¾	3
3¼	1 Standard 1 3/8 Oversize	9/16	1 7/8	¾	1¼	½	¾	4¾	5¾	1 7/8 2 1/8	3¼
4	1 Standard 1 3/8 Oversize	9/16	2¼	¾	1¼	½	¾	5½	6½	1 7/8 2 1/8	3¼
5	1 Standard 1 3/8 Oversize	13/16	2¾	1	1 1/16	11/16	9/16	6 7/8	8¼	2 1/16 2 5/16	3 1/8
6	1 3/8 Standard 1¾ Oversize	13/16	3¼	1	1 5/16	11/16	13/16	7 7/8	9¼	2 5/16 2 9/16	3 5/8
8	1 3/8 Standard 1¾ Oversize	13/16	4¼	1	1 9/16	11/16	13/16	9 7/8	11¼	2 5/16 2 9/16	3¾

Full square bushing retainer on 1½" thru 6" bore.
Round retainer on 8" bore.
For dimensions not shown, see page 5.





'MS4' BOTTOM TAP MOUNT DIMENSIONS							
BORE	ROD DIAMETER	E/2	NT	TK	TN	XT	SN ADD STROKE
1½	5/8 Standard 1 Oversize	1	¼-20	3/8	5/8	1 15/16 2 5/16	2¼
2	5/8 Standard 1 Oversize	1¼	5/16-18	½	7/8	1 15/16 2 5/16	2¼
2½	5/8 Standard 1 Oversize	1½	3/8-16	5/8	1¼	1 15/16 2 5/16	2 3/8
3¼	1 Standard 1 3/8 Oversize	1 7/8	½-13	¾	1½	2 7/16 2 11/16	2 5/8
4	1 Standard 1 3/8 Oversize	2¼	½-13	¾	2 1/16	2 7/16 2 11/16	2 5/8
5	1 Standard 1 3/8 Oversize	2¾	5/8-11	1	2 11/16	2 7/16 2 11/16	2 7/8
6	1 3/8 Standard 1¾ Oversize	3¼	¾-10	1 1/8	3¼	2 13/16 3 1/16	3 1/8
8	1 3/8 Standard 1¾ Oversize	4¼	¾-10	1 1/8	4½	2 13/16 3 1/16	3¼

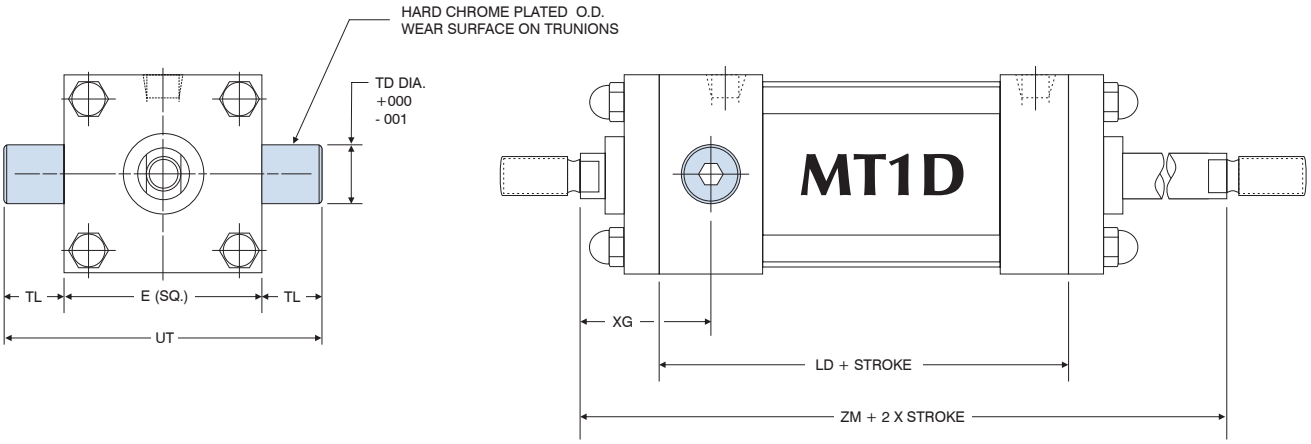
Full square bushing retainer on 1½" thru 6" bore.
Round retainer on 8" bore.

SERIES 'SS' DIMENSIONS: DOUBLE ROD END

Benefits

- Standard and Oversized Piston Rods available.
- Full range of Standard Options
- Durable design. Full Rod Bearing at each end of cylinder.
- Can be provided with Hollow Piston Rods (gun-drilled through, to your size requirements).
- Can be used in adjustable extend stroke applications (by adding a stop collar on one rod end).

(MT1D MOUNT SHOWN)



Note: Trunnions are bolt on, non-removable design.

'SS-MT1D' HEAD TRUNNION MOUNT DIMENSIONS								
BORE	ROD DIAMETER	E	LD	TD	TL	UT	XG	ZM
1½	5/8 Standard	2	4 1/8	1	1	4	1¾	6 1/8
	N/A*						N/A	N/A
2	5/8 Standard	2½	4 1/8	1	1	4½	1¾	6 1/8
	1 Oversize						2 1/8	6 7/8
2½	5/8 Standard	3	4¼	1	1	5	1¾	6¼
	1 Oversize						2 1/8	7
3¼	1 Standard	3¾	4¾	1	1	5¾	2¼	7½
	1 3/8 Oversize						2½	8
4	1 Standard	4½	4¾	1	1	6½	2¼	7½
	1 3/8 Oversize						2½	8
5	1 Standard	5½	5	1	1	7½	2¼	7¾
	1 3/8 Oversize						2½	8¼
6	1 3/8 Standard	6½	5½	1 3/8	1 3/8	9¼	2 5/8	8¾
	1¾ Oversize						2 7/8	9¼
8	1 3/8 Standard	8½	5 5/8	1 3/8	1 3/8	11¼	2 5/8	8 7/8
	1¾ Oversize						2 7/8	9 3/8

* No oversized rod available on 1½" bore.

SERIES 'SS' DIMENSIONS: DOUBLE ROD END

About Rod End Styles

Style 1 Male Rod End is STANDARD

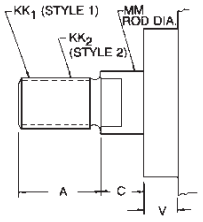
Other NFPA Styles can be specified (See Chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made to order and does not delay shipment. Coarse (UNC) threads, Metric threads or just plain rod ends are common. Thread lengths are also made to order (Specify: "A"=Length).

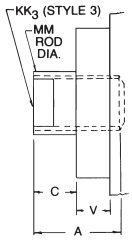
NEED SOMETHING NOT LISTED?
Just send us a sketch.
In most cases, quotes are turned around in one day!

PISTON ROD END STYLES

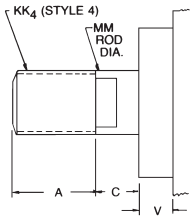
STYLE 1 & 2



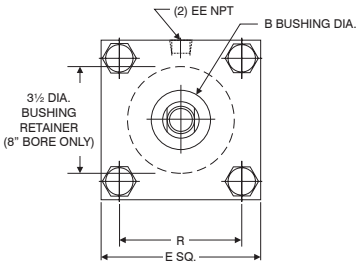
STYLE 3

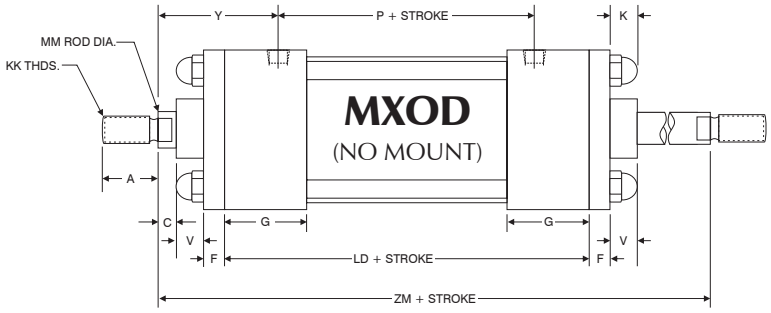


STYLE 4



		STANDARD		OPTIONAL							
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male			
BORE	MM ROD DIAMETER	KK1	A	KK2	A	KK3	A	KK4	A	C	V
1½, 2, 2 ½	5/8 Standard	7/16-20	¾	½ -20	¾	7/16-20	¾	5/8-18	¾	3/8	¼
	1 Oversize	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	½
3¼, 4, 5	1 Standard	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	¼
	1 3/8 Oversize	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
6 & 8	1 3/8 Standard	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
	1 ¾ Oversize	1¼-12	2	1½-12	2	1¼-12	2	1¾-12	2	¾	½

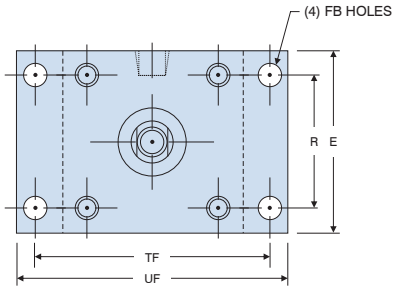


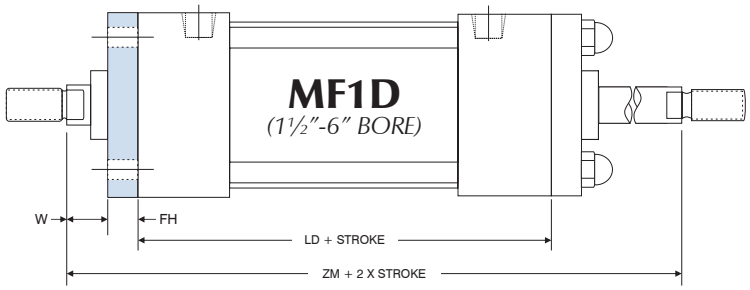


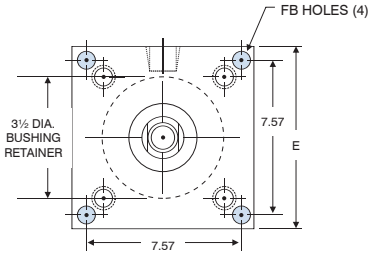
DOUBLE ROD END DIMENSIONS MXOD (NO MOUNT)

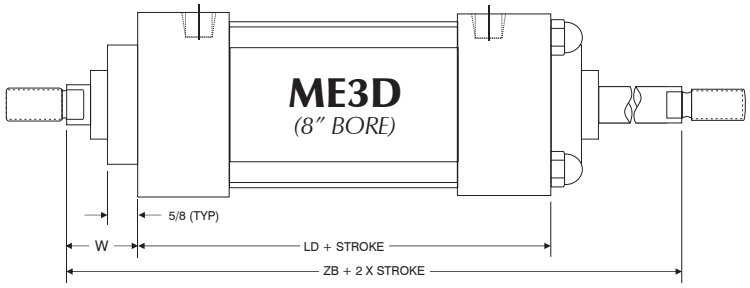
DOUBLE ROD 'MXOD' DIMENSIONS STANDARD & OVERSIZED RODS																	
BORE	ROD DIAMETER	A	B	C	E	EE	F	G	K	KK	LD	MM	P	R	V	Y	ZM
1½	5/8 Standard	¾	1 1/8	3/8	2	3/8	3/8	1½	7/16	7/16-20	4 1/8	5/8	2 3/8	1.43	¼	1 7/8	6 1/8
	1 Oversize	1 1/8	1½	½						¾-16		1			½	2¼	6 7/8
2	5/8 Standard	¾	1 1/8	3/8	2½	3/8	3/8	1½	9/16	7/16-20	4 1/8	5/8	2 3/8	1.84	¼	1 7/8	6 1/8
	1 Oversize	1 1/8	1½	½						¾-16		1			½	2¼	6 7/8
2½	5/8 Standard	¾	1 1/8	3/8	3	3/8	3/8	1½	9/16	7/16-20	4¼	5/8	2½	2.19	¼	1 7/8	6¼
	1 Oversize	1 1/8	1½	½						¾-16		1			½	2¼	7
3¼	1 Standard	1 1/8	1½	½	3¾	½	5/8	1¾	5/8	¾-16	4¾	1	2¾	2.76	¼	2 3/8	7½
	1 3/8 Oversize	1 5/8	2	5/8						1-14		1 3/8			3/8	2 5/8	8
4	1 Standard	1 1/8	1½	½	4½	½	5/8	1¾	5/8	¾-16	4¾	1	2¾	3.32	¼	2 3/8	7½
	1 3/8 Oversize	1 5/8	2	5/8						1-14		1 3/8			3/8	2 5/8	8
5	1 Standard	1 1/8	1½	½	5½	½	5/8	1¾	13/16	¾-16	5	1	3	4.10	¼	2 3/8	7¾
	1 3/8 Oversize	1 5/8	2	5/8						1-14		1 3/8			3/8	2 5/8	8¼
6	1 3/8 Standard	1 5/8	2	5/8	6½	¾	¾	2	13/16	1-14	5½	1 3/8	3¼	4.88	¼	2¾	8¾
	1¾ Oversize	2	2 3/8	¾						1¼-12		1¾			3/8	3	9¼
8	1 3/8 Standard	1 5/8	2	5/8	8½	¾	5/8	2	1	1-14	5 5/8	1 3/8	3 3/8	6.44	3/8	2¾	8 7/8
	1¾ Oversize	2	2 3/8	¾						1¼-12		1¾			½	3	9 3/8

SERIES 'SS' DIMENSIONS: DOUBLE ROD END FLANGE MOUNTS



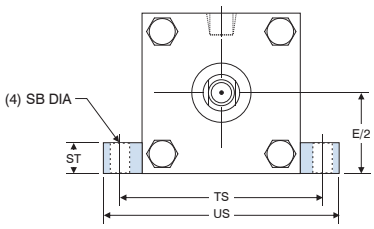


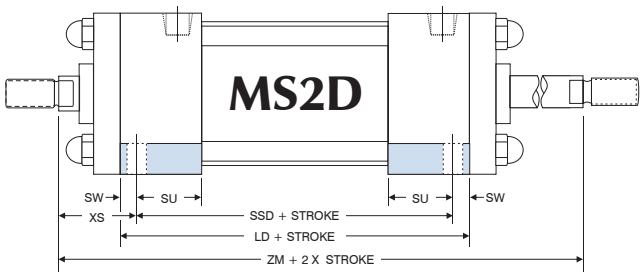




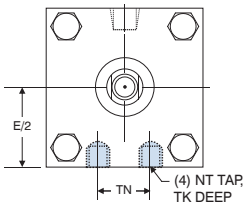
'SS-MF1D' FLANGE & 'SS-ME3D' HEAD MOUNT DIMENSIONS										
BORE	ROD DIAMETER	E	FB	FH	LD	R	TF	UF	W	ZM
1½	5/8 Standard	2	5/16	3/8	4 1/8	1.43	2¾	3 3/8	5/8	6 1/8
	1 Oversize								1	6 7/8
2	5/8 Standard	2½	3/8	3/8	4 1/8	1.84	3 3/8	4 1/8	5/8	6 1/8
	1 Oversize								1	6 7/8
2½	5/8 Standard	3	3/8	3/8	4¼	2.19	3 7/8	4 5/8	5/8	6¼
	1 Oversize								1	7
3¼	1 Standard	3¾	7/16	5/8	4¾	2.76	4 11/16	5½	¾	7½
	1 3/8 Oversize								1	8
4	1 Standard	4½	7/16	5/8	4¾	3.32	5 7/16	6¼	¾	7½
	1 3/8 Oversize								1	8
5	1 Standard	5½	9/16	5/8	5	4.10	6 5/8	7 5/8	¾	7¾
	1 3/8 Oversize								1	8¼
6	1 3/8 Standard	6½	9/16	¾	5½	4.88	7 5/8	8 5/8	7/8	8¾
	1¾ Oversize								1 1/8	9¼
8	1 3/8 Standard	8½	11/16	N/A	5 5/8	N/A	N/A	N/A	1 5/8	8 7/8
	1¾ Oversize								1 7/8	9 3/8

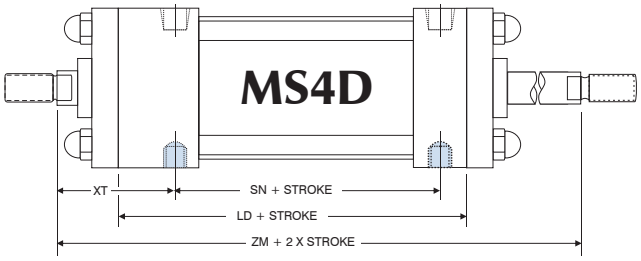
SERIES 'SS' DIMENSIONS: DOUBLE ROD END BASE MOUNTS





'SS-MS2D' SIDE LUG MOUNT DIMENSIONS												
BORE	ROD DIAMETER	E/2	LD	SB	ST	SU	SW	TS	US	XS	ZM	SSD
1½	5/8 Standard	1	4 1/8	7/16	½	1 1/8	3/8	2¾	3½	1 3/8	6 1/8	3 3/8
	1 Oversize									1¾	6 7/8	
2	5/8 Standard	1¼	4 1/8	7/16	½	1 1/8	3/8	3¼	4	1 3/8	6 1/8	3 3/8
	1 Oversize									1¾	6 7/8	
2½	5/8 Standard	1½	4¼	7/16	½	1 1/8	3/8	3¾	4½	1 3/8	6¼	3½
	1 Oversize									1¾	7	
3¼	1 Standard	1 7/8	4¾	9/16	¾	1¼	½	4¾	5¾	1 7/8	7½	3¾
	1 3/8 Oversize									2 1/8	8	
4	1 Standard	2¼	4¾	9/16	¾	1¼	½	5½	6½	1 7/8	7½	3¾
	1 3/8 Oversize									2 1/8	8	
5	1 Standard	2¾	5	13/16	1	1 1/16	11/16	6 7/8	8¼	2 1/16	7¾	3 5/8
	1 3/8 Oversize									2 5/16	8¼	
6	1 3/8 Standard	3¼	5½	13/16	1	1 5/16	11/16	7 7/8	9¼	2 5/16	8¾	4 1/8
	1¾ Oversize									2 9/16	9¼	
8	1 3/8 Standard	4¼	5 5/8	13/16	1	1 5/16	11/16	9 7/8	11¼	2 5/16	8 7/8	4¼
	1¾ Oversize									2 9/16	9 3/8	





'SS-MS4D' BOTTOM TAPPED MOUNT DIMENSIONS									
BORE	ROD DIAMETER	E/2	LD	NT	TK	TN	XT	SN	ZM
1½	5/8 Standard	1	4 1/8	¼-20	3/8	5/8	1 15/16	2¼	6 1/8
	1 Oversize						2 5/16		6 7/8
2	5/8 Standard	1¼	4 1/8	5/16-18	½	7/8	1 15/16	2¼	6 1/8
	1 Oversize						2 5/16		6 7/8
2½	5/8 Standard	1½	4¼	3/8-16	5/8	1¼	1 15/16	2 3/8	6¼
	1 Oversize						2 5/16		7
3¼	1 Standard	1 7/8	4¾	½-13	¾	1½	2 7/16	2 5/8	7½
	1 3/8 Oversize						2 11/16		8
4	1 Standard	2¼	4¾	½-13	¾	2 1/16	2 7/16	2 5/8	7½
	1 3/8 Oversize						2 11/16		8
5	1 Standard	2¾	5	5/8-11	1	2 11/16	2 7/16	2 7/8	7¾
	1 3/8 Oversize						2 11/16		8¼
6	1 3/8 Standard	3¼	5½	¾-10	1 1/8	3¼	2 13/16	3 1/8	8¾
	1¾ Oversize						3 1/16		9¼
8	1 3/8 Standard	4¼	5 5/8	¾-10	1 1/8	4½	2 13/16	3¼	8 7/8
	1¾ Oversize						3 1/16		9 3/8

SERIES 'SS' WITH 'NR' OPTION: NON-ROTATING (NFPA)

Non-Rotating Cylinders
2" through 8" Bore
200 PSI Air, 400 PSI Hydraulic (Non-Shock)

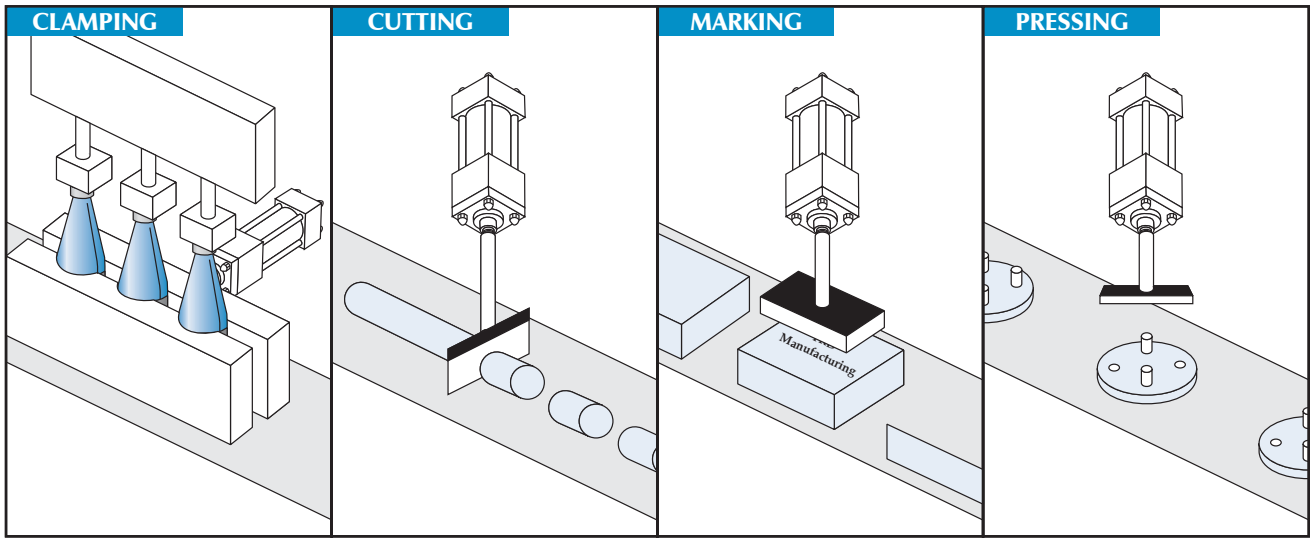
Benefits

- Two internal guide rods throughout stroke
- High repeatability at each end of stroke
- All external dimensions are the same as 'SS' Series (no additional length or width required)
- Standard Diameter Guide Rod Seals & Bronze Bearings for long life and reliable operation
- Standard Piston Rods available on all models. Oversized Piston Rods available on 2½" thru 8" Bore Models
- Adjustable Cushion (Option H or C) with Standard Piston Rods, available 3¼" thru 8" Bore. (On Oversized Piston Rods, 4" thru 8" Bore)
- Available in Double Rod End Models

Advantages

- Eliminates the need for external guide shafts in many positioning applications
- Guide rods are internal, self-cleaning, not subjected to harsh cleaners
- Compact design saves space, no larger than standard NFPA cylinders!
- Durable, self-contained construction

Application Possibilities:



SERIES 'SS': OPTIONS

BP Bumper Piston Seals


1½" Bore Shown


Available on 1½" to 5" Bore

TRD's Bumper Piston Seal, when used with our advanced cushion design, decelerates the cylinder at end of stroke - reducing noise and extending cylinder life.

Standard Material: Nitrile
Operating Temp: -20°F to 200°F (-25°C to 90°C)

Optional Material: Fluorocarbon
Available in 1½"- 8" Bores
Operating Temp: 0°F to 400°F (-18°C to 205°C)

Operating Pressure: 250 PSI Air (17 BAR)

Benefits

- **Reduces cycle rates** - Higher piston velocities can be achieved due to rapid deceleration feature, increasing productivity.
- **Provides maximum impact dampening** - Reduces machine vibration
- **Reduces cylinder end-of-stroke noise**
- **Available in Fluorocarbon Seals (1½" to 8" Bore)**

Design Tips

- Use cushions to achieve optimum performance on longer strokes (Options HC & BP).
- Use the BP Seals without cushions on short strokes requiring fast cycles.
- Due to compressibility, BP Seals are not recommended for applications that require 100% repeatable stroke increments.

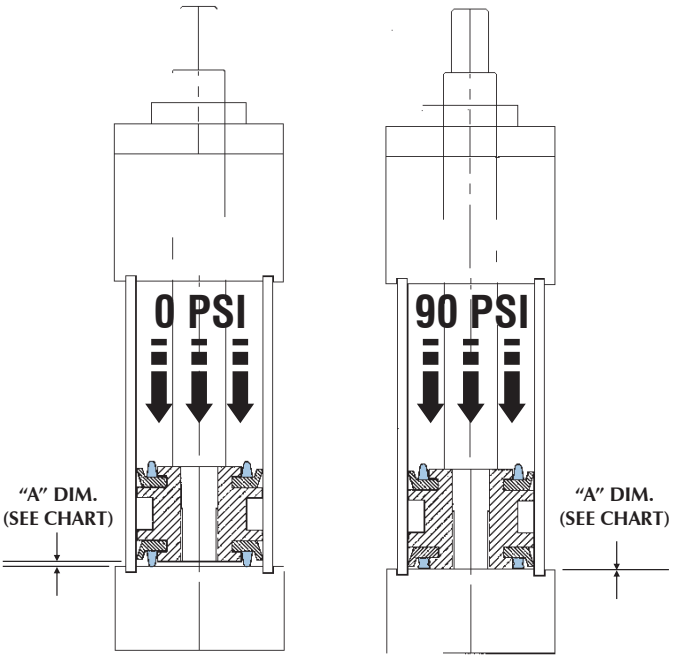
Bumper Piston Seals will shorten the cylinder stroke when operated at less than 90 PSI supply air. The charts below show the approximate (average) stroke reduction, at various pressure (for new cylinders). As the cylinders are cycled, the seals will take a slight set. Tests have shown that after 1,500,000 cycles, the seals will have between .001" and .008" compression set per seal. After that, there is no noticeable compression set.

TOTAL STROKE REDUCTION
("A" DIMENSION X 2) (IN INCHES)

BORE	0 PSI	10 PSI	30 PSI	50 PSI	70 PSI	90 PSI
1½	.10	.09	.07	.06	.04	.00
2	.14	.11	.07	.04	.01	.00
2½	.18	.14	.08	.05	.02	.00
3¼	.14	.12	.08	.04	.01	.00
4	.17	.14	.09	.05	.02	.00
5	.18	.14	.07	.03	.01	.00
6	.23	.18	.10	.05	.01	.00
8	.31	.26	.15	.07	.03	.00

PER END STROKE REDUCTION
("A" DIMENSION) (IN INCHES)

BORE	0 PSI	10 PSI	30 PSI	50 PSI	70 PSI	90 PSI
1½	.048	.043	.035	.028	.021	.00
2	.069	.056	.037	.020	.010	.00
2½	.091	.070	.042	.024	.008	.00
3¼	.071	.059	.039	.020	.002	.00
4	.087	.069	.045	.026	.009	.00
5	.092	.072	.036	.013	.005	.00
6	.113	.091	.051	.023	.003	.00
8	.154	.132	.076	.037	.016	.00



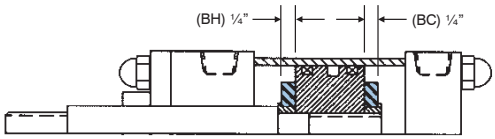
SERIES 'SS': OPTIONS

B BC BH Bumpers

Urethane impact dampening bumpers, used when cylinder speeds do not allow for standard cushions.

BC=Cap Bumper **BH**=Head Bumper **B**=Head & Cap Bumper

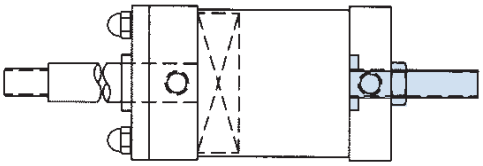
(Note: Each bumper adds ¼" to cylinder length)



AS Adjustable Stroke (Retract)

Consists of a threaded rod in the cylinder cap, non-removable. Provides an adjustable positive stop on the cylinder retract.

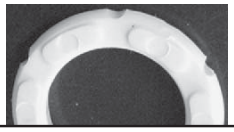
To order, specify "AS" and length of adjustment (Example: AS=3")



H C Cushions

TRD's advanced cushion design features a unique, one piece seal that is allowed to float in a precision machined groove. *This type of seal design provides consistent cushion performance and maximum seal life.* Oversized flow paths molded in the periphery of the seal provide "full flow" on the return stroke without the use of ball checks.

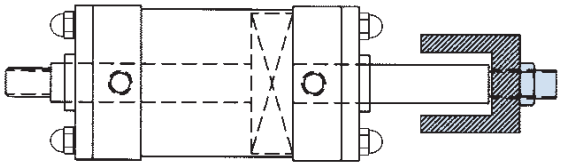
H=Head Cushion **C**=Cap Cushion



DAS Double Rod Adjustable Stroke (Extend)

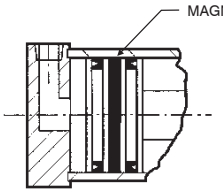
Consists of a double rod end cylinder and an adjustable stop collar. Used to adjust the extend cylinder stroke.

To order, specify "DAS" and length of adjustment. (Example: DAS = 4")



MPR MPH Magnetic Piston

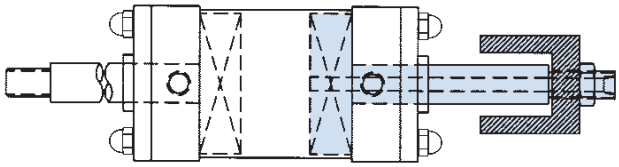
Magnetic Pistons are used in conjunction with Reed and Hall Effect (solid state) Switches. *(See pages 20-26 for switches)*



AS3POS Ajustable Mid Stroke (3 Position Cyl.)

Double piston design allows for adjustment of the mid stroke position. Three ported cylinder with adjustable stop collar.

To order, specify "AS3POS" and length of adjustment. (Example: AS3POS = 4")



MS Metallic Rod Scraper

Aggressively scrapes the piston rod, removing foreign material such as spatter, sprays and powders. *(Brass construction)*

KK3S Studded KK3 Rod Thread

Offers highest fatigue resistance. A non-removable stud is inserted in a "KK3" (female rod end). Does not effect "A" Dim. *(Rod thread length).*

SE SR Spring Extend, Spring Retract

Available in 1½", 2" & 2½" Bore. Strokes up to 6" in SR, up to 3" in SE (in 1" increments).

WB Wear Band

PTFE composite material, provides a more durable, long life wear surface without lubrication. *(Can be ordered with MPR or MPH Options.)*

Other Options Available

- **Shock Absorber** (Ready)
- **Rod Boots**
- **316 Stainless Steel** *(allow for longer lead time)*
- **Hollow Piston Rods**
- **Clean Room Cylinders**
- **Air to Air Intensifiers**
- **Long Strokes** *(Consult factory for proper selection)*
- **Multiple NFPA Mounts**
- **Special Mounts & Accessories**

If the option you need isn't listed, just call TRD! We can accommodate most requests.

SERIES 'SS': OPTIONS

ST Stop Tube

Stop Tubes are designed to reduce the piston rod bushing stress to within the designed range of the bearing material. This will insure proper cylinder performance, in any given application. Stop Tubes lower cylinder bearing stress by adding length to the piston, which increases the overall length of the cylinder. (Note: TRD uses a double piston design for 2" and longer stop tubes)

Stop Tube Selection

To determine the proper amount of stop tube for your application, you must first find the value of "D", which represents the "stroke, *adjusted for mounting condition*". Each mounting condition creates different levels of bushing stress, which have direct impact on the amount of stop tube required. (See Chart 1)

Once the value of "D" is known, refer to Chart 2 for the recommended amount of stop tube.

To order a Stop Tube, add the stop tube prefix (ST) and the length, to the end of your cylinder model number.

(example: SS MP1 3¼ x 40"effective stroke plus 2" stop tube). **As noted, the effective stroke must be included when ordering.**

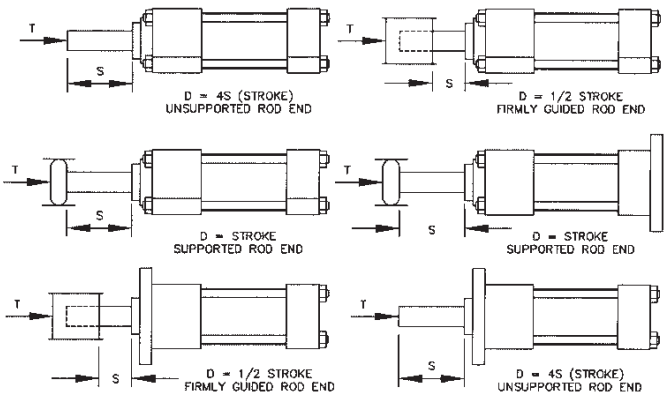
OS Oversized Rod

Applications requiring long strokes may require oversized piston rod diameters to prevent sagging or buckling. To determine the recommended rod diameter, refer to Chart 3.

Chart 1

Find the value of "D" for your application

"D" = Stroke, adjusted for mounting condition
"S" = Actual cylinder stroke
"T" = Axial thrust (refer to Chart 3)



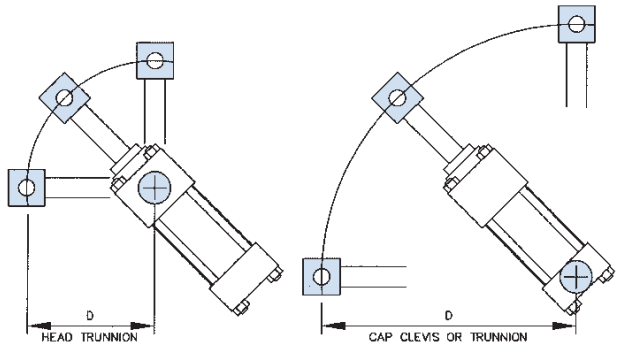


Chart 2

Using the value of "D", find the recommended amount of stop tube

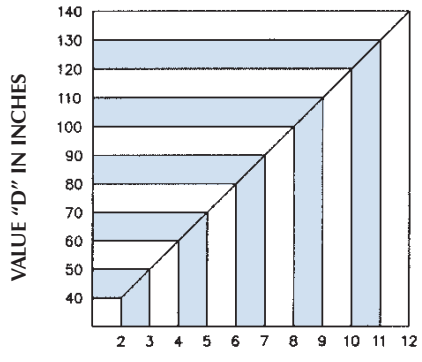
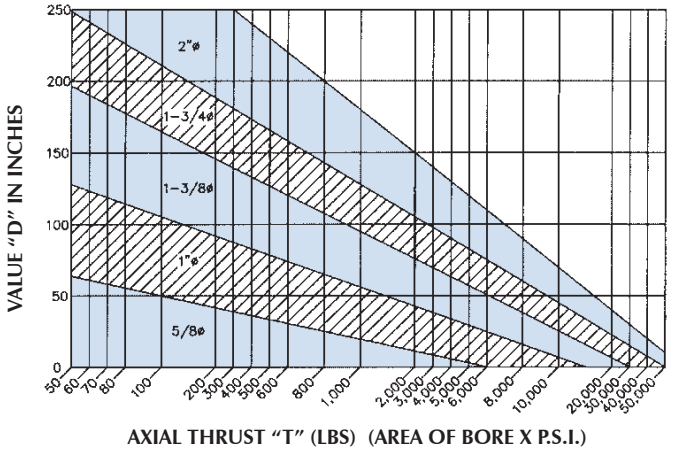


Chart 3

ROD SIZE SELECTION

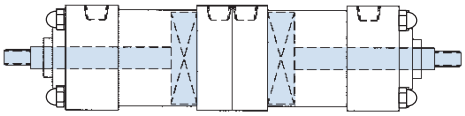


SERIES 'SS': OPTIONS & CUSTOMS

BACK-TO-BACK

The Back-to-Back option consists of two separate cylinders assembled with common tie rods. For use when three or four rod positions are required, and a "double rod" style is acceptable.

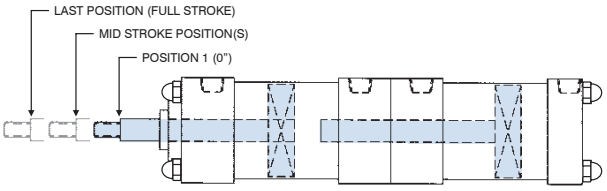
To order, specify each cylinder model, with "Back-to-Back" note.



MULTIPLE POSITION

The Multi-Position option is used when three, four or five rod positions are required in a "single rod" design. Piston rods are not connected. The back cylinder(s) achieve the mid-stroke positions.

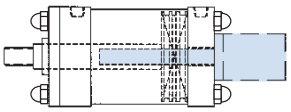
To order, specify model and each stroke position required.



LINEAR TRANSDUCER READY

Cylinder can be equipped ready to accept linear transducers (Bimba, Balluff, MTS, etc.), to provide actual position feedback throughout the entire stroke.

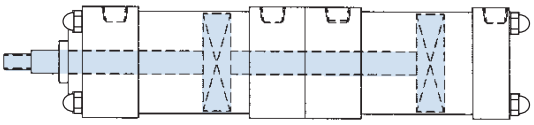
To order, specify "Ready for (type of transducer) at end of model number. (Note: TRD can furnish Bimba PFC transducers. Customer to provide and install all other types).



AIR/OIL TANDEM

The Air/Oil Tandem cylinder consists of a hydraulic cylinder coupled with an air cylinder. Piston rods are connected. (Note: hydraulic unit is in front, having the exposed piston rod). Used to provide smooth, controlled stroke, even at slow speeds.

To order, specify standard model number, with "Air/Oil Tandem" note.

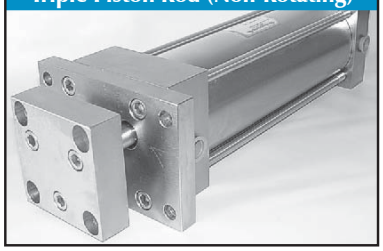


CUSTOM SOLUTIONS

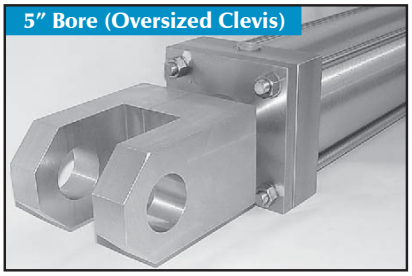
Still don't see what you need? No Problem! With our extensive machining abilities, our engineering staff can assist with the design of a cylinder for your application. Call, fax or e-mail your specifications for a quick response! When it comes to delivery, TRD has the reputation as being one of the fastest. *No more long waits for your customized products!*

Some examples of our abilities...

Triple Piston Rod (Non-Rotating)

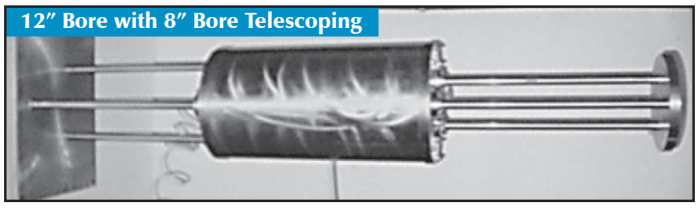


5" Bore (Oversized Clevis)



10" Piston (1" Wide Wear Bands)

12" Bore with 8" Bore Telescoping



Hollow Rod

Special MF1 Flange

ACCESSORIES: CLEVIS, PINS & MOUNTS

Accessories Cross Reference Chart

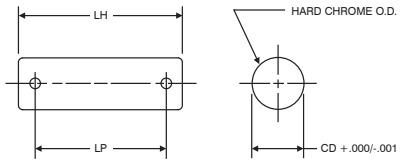
CYLINDER MODEL					ACCESSORIES				
BORE	ROD SIZE	ROD STYLE (KK)		ROD THREAD	ROD CLEVIS	ROD EYE	CLEVIS PIN	CLEVIS BRACKET	EYE BRACKET
1½, 2, 2½	5/8	#1 (STANDARD)	KK1	7/16-20	SS-RC437	SS-RE437	SS-CP500	SS-CB500	SS-EB500
		#2	KK2	½-20	SS-RC500	SS-RE500	SS-CP500		
	1	#1 (ST'D-OVERSIZED)	KK1	¾-16	SS-RC750	SS-RE750	SS-CP750		
		#4	KK4	1-14	SS-RC1000	SS-RE1000	SS-CP1000		
3¼, 4, 5	1	#1 (STANDARD)	KK1	¾-16	SS-RC750	SS-RE750	SS-CP750	SS-CB750	SS-EB750
		#4	KK4	1-14	SS-RC1000	SS-RE1000	SS-CP1000		
	1 3/8	#1 (ST'D-OVERSIZED)	KK1	1-14	SS-RC1000	SS-RE1000	SS-CP1000		
		#2	KK2	1¼-12	SS-RC1250	N/A	SS-CP1375		
6 & 8	1 3/8	#1 (STANDARD)	KK1	1-14	SS-RC1000	SS-RE1000	SS-CP1000	SS-CB1000	SS-EB1000
		#2	KK2	1¼-12	SS-RC1250	N/A	SS-CP1375		
	1¾	#1 (ST'D-OVERSIZED)	KK1	1¼-12	SS-RC1250	N/A	SS-CP1375		
		#2	KK2	1½-12	SS-RC1500	N/A	SS-CP1750		

Accessories (303 Stainless Steel)

CLEVIS PIN			
PART NO.	CD +.000 -.001	LH	LP
SS-CP500	½	2¼	1 15/16
SS-CP750	¾	3	2 23/32
SS-CP1000	1	3½	3 7/32
SS-CP1375	1 3/8	5	4¼
SS-CP1750	1¾	6	5½

Clevis Pins sold with (2) S.S. Cotter Pins

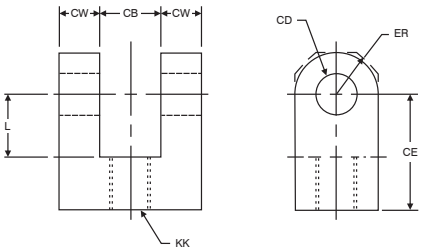
CLEVIS PIN



ROD CLEVIS							
PART NO.	CB	CD	CE	CW	ER	KK	L
SS-RC437	¾	½	1½	½	½	7/16-20	¾
SS-RC500						½-20	
SS-RC750	1¼	¾	2 3/8	5/8	¾	¾-16	1¼
SS-RC1000	1½	1	3 1/8	¾	1	1-14	1½
SS-RC1250	2	1 3/8	4 1/8	1	1 3/8	1¼-12	2 1/8
SS-RC1500	2½	1¾	4½	1¼	1¾	1½-12	2¼

Clevis Pins sold separately

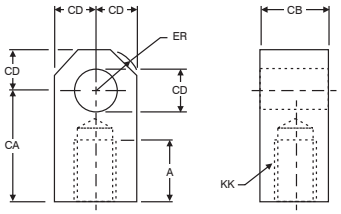
ROD CLEVIS



ROD EYE						
PART NO.	A	CA	CB	CD	ER	KK
SS-RE437	¾	1½	¾	½	5/8	7/16-20
SS-RE500						½-20
SS-RE750	1 1/8	2 1/16	1¼	¾	7/8	¾-16
SS-RE1000	1 5/8	2 13/16	1½	1	1 3/16	1-14
SS-RE1250	2	3 7/16	2	1 3/8	1 9/16	1¼-12

Clevis Pins sold separately

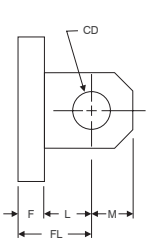
ROD EYE

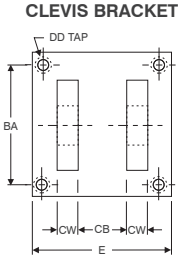


CLEVIS BRACKETS AND EYE BRACKETS											
	PART NO.	BA	CB	CD	CW	DD	E	F	FL	L	M
CLEVIS BRACKETS	SS-CB500	1 5/8	¾	½	½	3/8-24	2½	3/8	1 1/8	¾	5/8
	SS-CB750	2 9/16	1¼	¾	5/8	½-20	3½	5/8	1 7/8	1¼	¾
	SS-CB1000	3¼	1½	1	¾	5/8-18	4½	¾	2¼	1½	1
EYE BRACKETS	SS-EB500	1 5/8	¾	½	N/A	13/32	2½	3/8	1 1/8	¾	½
	SS-EB750	2 9/16	1¼	¾		17/32	3½	5/8	1 7/8	1¼	¾
	SS-EB1000	3¼	1½	1		21/32	4½	¾	2¼	1½	1

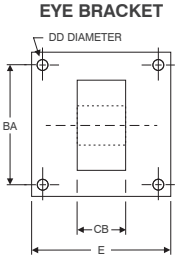
Clevis Pins sold separately

CLEVIS BRACKET





EYE BRACKET



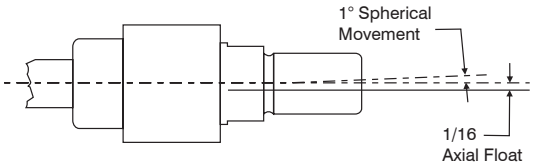
ACCESSORIES: ALIGNMENT COUPLERS

Solid Stainless Steel self-aligning piston rod couplers

TRD's alignment couplers can virtually pay for themselves by eliminating the need to precisely mount cylinders in your applications. Our couplers prevent binding and erractic movement that misalignment causes, extending the bearing and seal life of your cylinders. Proper use of alignment couplers will allow cylinders to stroke in the shortest time possible, increasing production!

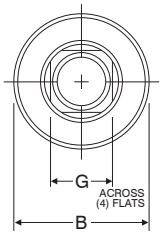
Benefits

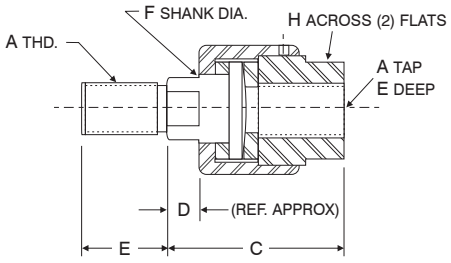
- Rod alignment couplers eliminate expensive machining for mounting fixed or rigid cylinders on guided or slide applications.
- Cylinder efficiency is increased by eliminating friction caused by misalignment. Couplers compensate for 1° angular error and 1/16" lateral misalignment on push or pull strokes.
- Couplers provide greater reliability, performance, and reduce cylinder component wear.
- Simplifies alignment problems in the field.



Design Tips

- Alignment couplers can be exposed to high stresses that are not apparent in an application. Always use the largest thread size practical in your application. (see chart for maximum pull yields)
- Use jam nut to lock coupler to rod when used with full diameter threads (example: 5/8" thread on 5/8" rod).
- Large thread sizes can be "pinned" in high impact applications, eliminating unwanted loosening of coupler from rod. Always use the smallest pin possible to avoid weakening the piston rod thread. (example: Use a 3/32" diameter pin for 5/8" rod threads and larger)





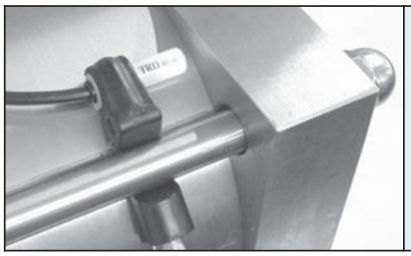
ALIGNMENT COUPLERS									
PART NO.	A	B	C	D	E	F	G	H	MAX PULL AT YIELD
SS-AC250	¼-28	1 1/8	1¾	3/8	½	½	3/8	11/16	1,000 LBS.
SS-AC312	5/16-24	1 1/8	1¾	3/8	½	½	3/8	11/16	1,800 LBS.
SS-AC375	3/8-24	1 1/8	1¾	3/8	½	½	3/8	11/16	2,900 LBS.
SS-AC437	7/16-20	1¼	2	7/16	¾	5/8	½	13/16	4,000 LBS.
SS-AC500	½-20	1¼	2	7/16	¾	5/8	½	13/16	5,500 LBS.
SS-AC625	5/8-18	1¼	2	7/16	¾	5/8	½	13/16	7,000 LBS.
SS-AC750	¾-16	1¾	2 5/16	7/16	1 1/8	31/32	13/16	1 1/8	10,300 LBS.
SS-AC875	7/8-14	1¾	2 5/16	7/16	1 1/8	31/32	13/16	1 1/8	12,000 LBS.
SS-AC1000	1-14	2½	2 15/16	7/16	1 5/8	1 11/32	1 5/32	1 5/8	15,000 LBS.
SS-AC1250	1¼-12	2½	2 15/16	7/16	1 5/8	1 11/32	1 5/32	1 5/8	17,000 LBS.
SS-AC1500	1½-12	3¼	4 3/8	7/8	2¼	1 31/32	1¾	2 3/8	20,000 LBS.

SS-AC250 to SS-AC1500

±1° SPHERICAL MOVEMENT
±1/16" AXIAL FLOAT

THREADS RANGE FROM
¼-28 UNF to 1½-12 UNF

ACCESSORIES: SWITCHES



- Miniature AC/DC Reed
- High Power AC Reed
- Miniature DC Solid State
- CE RoHS
- Miniature AC/DC Reed with built-in Circuit Protection
- Extended Temperature Range Reed

TRD offers Reed, High Power AC Reed, DC Solid State and Reed Switches with built-in Circuit Protection to meet a wide variety of customer needs.

Advantages:

- Compact low profile Switch/Bracket Assembly
- Switches and Brackets are Nylon and Stainless Steel Hardware construction – suitable for wash down or corrosive environments (IP67)
- Quick, Simple Set-up: Requires Standard (slotted) Screwdriver
- High visibility LED can be seen up to 20 feet
- Suitable for all bore sizes (1.50" to 12")
- Magnetically operated, can be located anywhere in the actuator stroke range
- **One magnet type (MPR) for both Reed AND Solid State TRD Switches.**
- Can be used with all TRD Aluminum Series Actuators (TA, TD, TRA, FM, MSE, MSR), Electroless Nickel Plated Series (EN), and Stainless Steel Series (SS)

Benefits of REED Switch

- Internal Circuit Protection Option
- Lower Cost
- Low or High Current Models available, AC or DC, and TRIAC type switch for inductive loads
- High Visibility Red LED (on Low Current Models)
- Choice of lead lengths available on all models
- Optional 8mm Quick Connect on Low Current Model

Benefits of SOLID STATE Switch

- Shock Proof
- GMR Technology - Giant Magneto Resistive Design
- Reverse Polarity and Over Voltage Protection
- High Visibility Red LED (All Models)
- Choice of lead lengths available or 8mm Quick Connect

R10 Miniature REED Switch

- 120 Volts Max. (AC or DC)
- Cable options include 24 inch or 120 inch plain cable leads, and 8mm Threaded Quick Connect
- High visibility LED

RAC High Power AC REED Switch

- 12-240 Volts AC, 800 mA current rating, TRIAC output
- Cable options include 24 inch or 120 inch plain cable leads

MSS Miniature Solid State Switch

- 10-30 Volts DC, 4-300 mA current rating
- Can be wired Current Sinking (NPN) or Current Sourcing (PNP)
- Cable options include 24 inch or 120 inch plain cable leads, and 8mm Threaded Quick Connect
- High Visibility LED

R10P Miniature AC/DC REED Switch with built-in Circuit Protection

- 120 Volts Max. (AC or DC), 150 mA current rating (MAX.)
- Cable options include 24 inch or 120 inch plain cable leads
- High visibility LED

RHT Miniature Extended Temperature Range Reed Switch

- -40°F to 260°F (-40°C to 125°C)
- Cable options include 24 inch or 120 inch plain cable leads

Switch Application Selection Guide - *For selecting the right switch for your application*

SWITCH MODEL	PROGRAMMABLE CONTROLLERS	RELAYS	SOLENOIDS	INDICATOR LIGHTS		MOTORS	TIME COUNTERS
				BULBS	SOLID STATE		
R10 or RHT REED SWITCH	YES	<10VA*	<10VA*	<10VA*	YES	<10VA*	<10VA*
RAC HIGH POWERED REED SWITCHES**	NO	YES	YES	YES	NO	YES	YES
MSS SOLID STATE SWITCH	YES	<300mA	<300mA	<300mA	YES	<300mA	<300mA
R10P REED SWITCH	YES	<10VA	<10VA	<10VA	YES	<10VA	<10VA

*Use resistor-capacitor protection

**Minimum current = 80mA

Specify 'MPR' Option for ALL switch models when ordering actuators.

ACCESSORIES: SWITCHES — REED

Electrical Specifications

R10 **Miniature Reed Switch, 24" (24 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

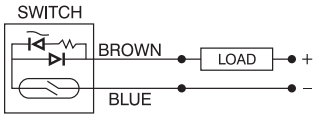
R10X **Miniature Reed Switch, 120" (24 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

R10Q **Miniature Reed Switch, 8mm Male Quick Connect, 24 AWG Wire, PVC Jacket (2 wire Switch)**

Contacts	SPST Form A (Normally Open)
Contact Rating	10 Watts Max.
Input Voltage	120 Volts Max. (AC or DC)
Maximum Load Current	500 mA Max. (Resistive)
Actuating Time Average	1.0 millisecond
LED Indicator	High Luminescence Housing
Temperature Range	-20° C to 70° C (-4° F to 158° F)
Protection Rating	IP67

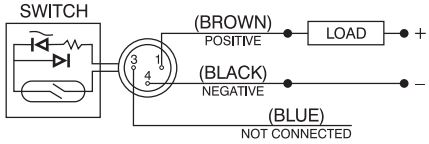
Schematics

R10 / R10X
Miniature Reed Switch, Cable Type,
(2 Wire Switch)



Input Voltage	120 Volts Max. AC/DC
Maximum Load Current	500 mA Max. (Resistive)

R10Q
Miniature Reed Switch, 8mm Male Quick Connect,
(2 Wire Switch)



Input Voltage	120 Volts Max. AC/DC
Maximum Load Current	500 mA Max. (Resistive)

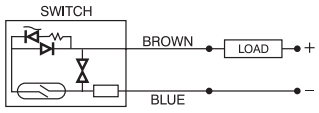
R10P **Miniature Reed Switch, 24" (24 AWG Wire, PVC Jacket) Plain Cable Lead, Circuit Protection (2 wire Switch)**

R10PX **Miniature Reed Switch, 120" (24 AWG Wire, PVC Jacket) Plain Cable Lead, Circuit Protection (2 wire Switch)**

R10PQ **Miniature Reed Switch, 120" (24 AWG Wire, PVC Jacket) Plain Cable Lead, Circuit Protection (2 wire Switch)**

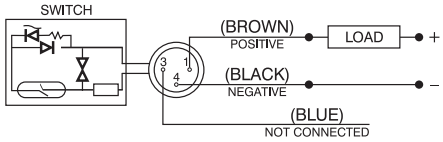
Contacts	SPST Form A (Normally Open)
Contact Rating	10 Watts Max.
Input Voltage	120 Volts Max. (AC or DC)
Maximum Load Current	150 mA Max.
Actuating Time Average	1.0 millisecond
LED Indicator	High Luminescence Housing
Temperature Range	-20° C to 70° C (-4° F to 158° F)
Protection Rating	IP67
Circuit Protection	
Varistor	138 Volts
Choke	680 μH

R10P / R10PX
Miniature Reed Switch, Cable Type,
(2 Wire Switch)



Input Voltage	120 Volts Max. AC/DC
Maximum Load Current	150 mA Max.

R10PQ
Miniature Reed Switch, 8mm Male Quick Connect,
(2 Wire Switch)



Input Voltage	120 Volts Max. AC/DC
Maximum Load Current	150 mA Max.

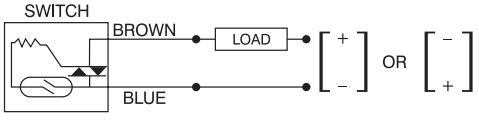
Note: The circuit protection consists of a Varistor and Choke arrangement. The Varistor will take transient & voltage spikes out of the line and is mounted in parallel with the switch. The Choke will disperse inrush currents (normally caused by long cable runs) and is mounted in series with the switch.

RAC **High Power AC Reed Switch, 24" (20 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

RACX **High Power AC Reed Switch, 120" (20 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

Contacts	TRIAC Output
Contact Rating	200 Watts Max.
Input Voltage	12 to 240 Volts (AC only)
Minimum Load Current	80 mA
Maximum Load Current	800 mA
Actuating Time Average	2.0 milliseconds
LED Indicator	Not Available
Temperature Range	-20° C to 70° C (-4° F to 158° F)
Protection Rating	IP67

RAC / RACX
High Power AC Reed Switch, Cable Type,
(2 Wire Switch)



Contact Rating	200 Watts Max.
Input Voltage	12 to 240 Volts (AC only)
Minimum Load Current	80 mA
Maximum Load Current	800 mA

Specify 'MPR' Option for ALL switch models when ordering actuators.

ACCESSORIES: SWITCHES — REED

Electrical Specifications

RHT **Extended Temperature Range Miniature Reed Switch, 24" (24 AWG Wire, Silicone rubber insulation with gray outer sheath, 4.5mm O.D.) Plain Cable Lead, (2 wire Switch)**

RHTX **Extended Temperature Range Miniature Reed Switch, 120" (24 AWG Wire, Silicone rubber insulation with gray outer sheath, 4.5mm O.D.) Plain Cable Lead, (2 wire Switch)**

Contacts	SPST Form A (Normally Open)
Contact Rating	10 Watts Max.
Input Voltage	120 Volts Max. (AC or DC)
Maximum Load Current	500 mA Max. (Resistive)
Actuating Time Average	1.0 millisecond
LED Indicator	Not Available
Temperature Range	-40° C to 125° C (-40° F to 260° F)
Protection Rating	IP67

Schematics

RHT / RHTX
Miniature Reed Switch, Cable Type, Extended Temperature Range
(2 Wire Switch)

Input Voltage	5-120 Volts Max. AC/DC
Maximum Load Current	500 mA Max. (Resistive)

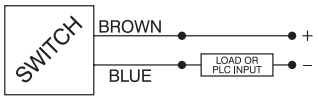
SWITCHES — SOLID STATE

MSS **Miniature Solid State Switch, 24" (24 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

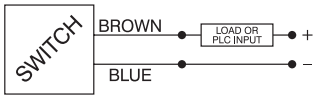
MSSX **Miniature Solid State Switch, 120" (24 AWG Wire, PVC Jacket) Plain Cable Lead, (2 wire Switch)**

*Output Type	Current Sinking or Current Sourcing
Input Voltage	10 to 30 Volts DC
Current Consumption (not sensing)	1mA
Minimum Load Current	4 mA
Maximum Load Current	300 mA
"ON" Voltage Drop	2.5 Volts @ 4 mA
	3.5 Volts @ 300 mA
LED Indicator	High Luminescence Housing
Temperature Range	-20° C to 70° C (-4° F to 158° F)
Actuating Time Average	2.0 microseconds
Protection Rating	IP67
Reverse Polarity Protected	yes
Transient (over voltage) Protected	yes

MSS / MSSX
Miniature Solid State Switch, Cable Type,
(2 Wire Switch)



Typical Current Sourcing (PNP) Configuration



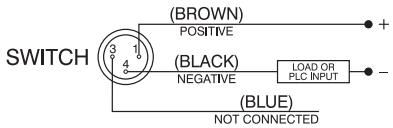
Typical Current Sinking (NPN) Configuration

***NOTE:** This is a (2) wire switch used in series with the load. Therefore, this switch can be used with devices requiring either a current sinking (NPN) output or a current sourcing (PNP) output from the solid state switch.

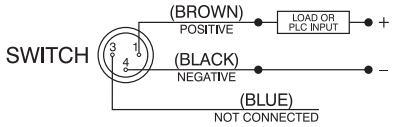
MSSQ **Miniature Solid State Switch, 8mm Male Quick Connect, 24 AWG Wire, PVC Jacket (2 wire Switch)**

*Output Type	Current Sinking or Current Sourcing
Input Voltage	10 to 30 Volts DC
Current Consumption (not sensing)	1mA
Minimum Load Current	4 mA
Maximum Load Current	300 mA
"ON" Voltage Drop	2.5 Volts @ 4 mA
	3.5 Volts @ 300 mA
LED Indicator	High Luminescence Housing
Temperature Range	-20° C to 70° C (-4° F to 158° F)
Actuating Time Average	2.0 microseconds
Protection Rating	IP67
Reverse Polarity Protected	yes
Transient (over voltage) Protected	yes

MSSQ
Miniature Solid State Switch, 8mm Male Quick Connect,
(2 Wire Switch)



Typical Current Sourcing (PNP) Configuration



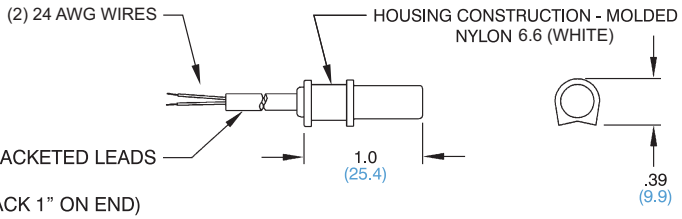
Typical Current Sinking (NPN) Configuration

***NOTE:** This is a (2) wire switch used in series with the load. Therefore, this switch can be used with devices requiring either a current sinking (NPN) output or a current sourcing (PNP) output from the solid state switch.

Specify 'MPR' Option for ALL switch models when ordering actuators.

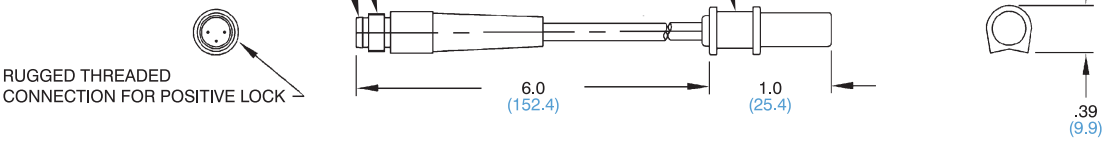
ACCESSORIES: SWITCHES AND BRACKET DIMENSIONS

FOR SWITCHES: **R10 / R10X**
RHT / RHTX
MSS / MSSX

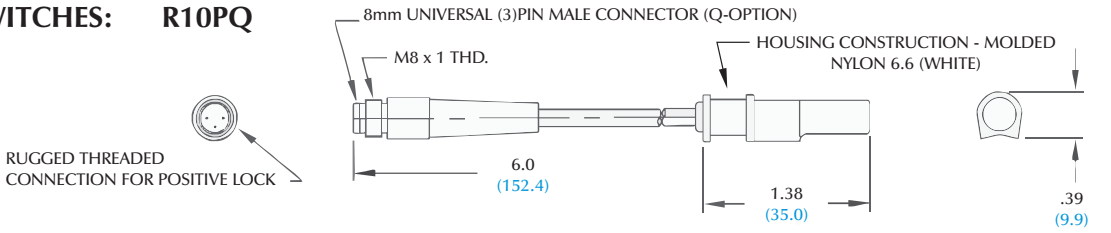


PLAIN CABLE LEADS
R10 / RHT / MSS = 24" (0.6m) PVC JACKETED LEADS
R10X / RHTX / MSSX = 120" (3.0m)
(JACKET CUT BACK 1" ON END)
(25.4)

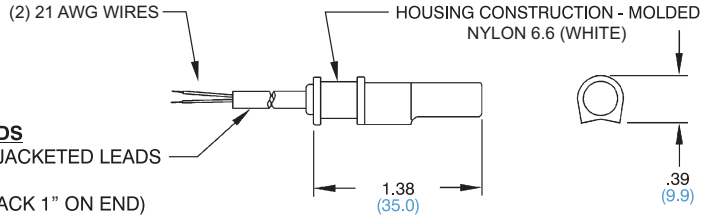
FOR SWITCHES: **R10Q**
MSSQ



FOR SWITCHES: **R10PQ**



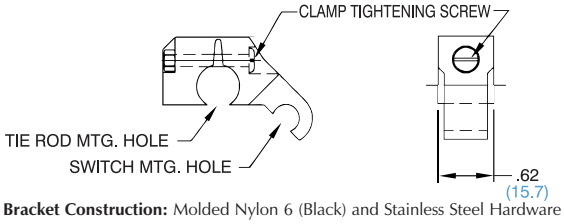
FOR SWITCHES: **RAC / RACX**
R10P / R10PX



PLAIN CABLE LEADS
R10P / RAC = 24" (0.6m) PVC JACKETED LEADS
R10PX / RACX = 120" (3.0m)
(JACKET CUT BACK 1" ON END)
(25.4)

SWITCH BRACKET: SB15

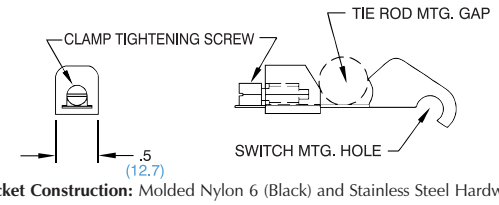
(For 1.50" Through 2.50" Bore Cylinders)



Bracket Construction: Molded Nylon 6 (Black) and Stainless Steel Hardware

SWITCH BRACKET: SB32

(For 3.25" Through 12" Bore Cylinders)



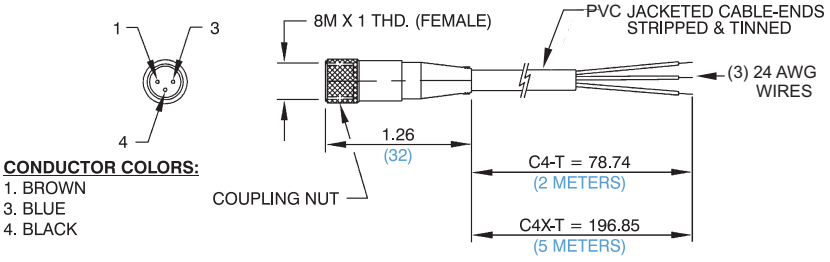
Bracket Construction: Molded Nylon 6 (Black) and Stainless Steel Hardware

QUICK CONNECT CORD SETS

(Used with "Q" Type Switch Leads)

FOR CABLES:
C4-T (2 METER CABLE LENGTH)
C4X-T (5 METER CABLE LENGTH)

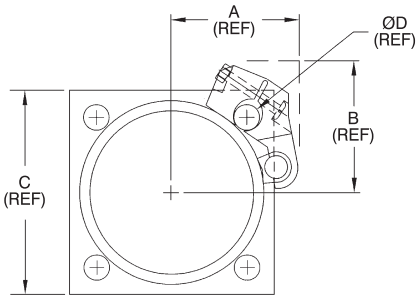
All Dimensions are in INCHES
(mm in parentheses)



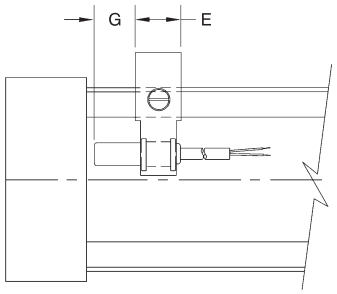
CONDUCTOR COLORS:
1. BROWN
3. BLUE
4. BLACK

Specify 'MPR' Option for ALL switch models when ordering actuators.

ACCESSORIES: SWITCH MOUNTING DIMENSIONS



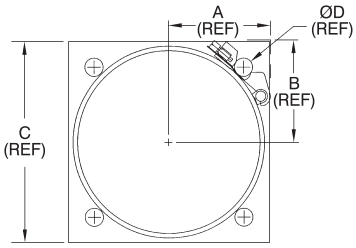
SB15



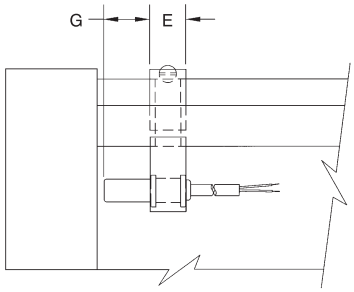
SB15

SWITCH BRACKET LETTER DIMENSIONS							
PART NO.	BORE	A	B	C	D	E	G
SB15	1.50	1.38	1.41	2	.25	.63	.50
	2	1.63	1.66	2.50	.31	.63	.50
	2.50	1.88	1.88	3	.31	.63	.50
SB32	3.25	2.13	2.13	3.75	.38	.50	.56
	4	2.44	2.38	4.50	.38	.50	.56
	5	2.88	2.75*	5.50	.50	.50	.56
	6	3.25*	3.25*	6.50	.50	.50	.56
	8	4.25*	4.25*	8.50	.63	.50	.56
	10	5.31*	5.31*	10.63	.75	.50	.56
	12	6.38*	6.38*	12.75	.75	.50	.56

*THESE DIMENSIONS ARE .50" OF THE 'C' DIMENSION. THE SWITCH BRACKET **DOES NOT** PROTRUDE BEYOND STANDARD HEAD/CAP.



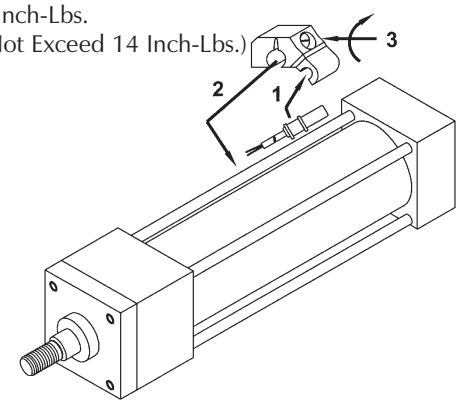
SB32



SB32

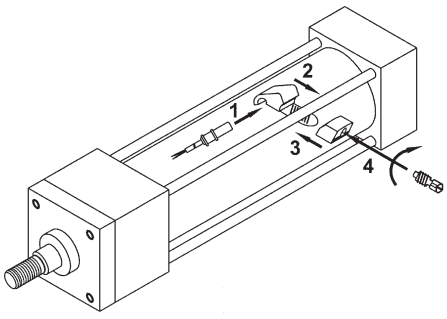
How To Assemble Switch and Brackets

Recommended Torque:
6-10 Inch-Lbs.
(Do Not Exceed 14 Inch-Lbs.)



SB15 SWITCH BRACKET (MOUNTING ILLUSTRATION)

Recommended Torque:
8-12 Inch-Lbs.
(Do Not Exceed 14 Inch-Lbs.)



SB32 SWITCH BRACKET (MOUNTING ILLUSTRATION)

Specify 'MPR' Option for ALL switch models when ordering actuators.

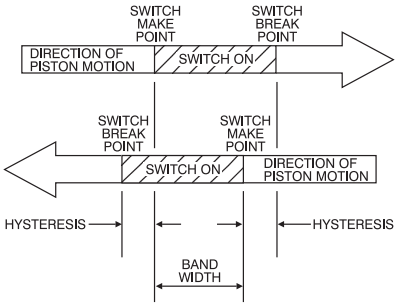
ACCESSORIES: SWITCHES HYSTERESIS & BAND WIDTH

HYSTERESIS:

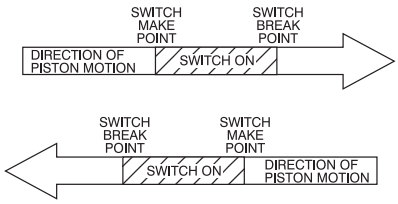
THE DISTANCE BETWEEN THE SWITCH BREAK POINT MOVING IN ONE DIRECTION, AND THE SWITCH MAKE POINT MOVING IN THE OPPOSITE DIRECTION.

BAND WIDTH:

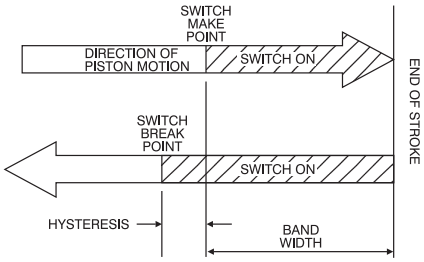
THE DISTANCE THE PISTON MOVES WHILE THE SWITCH IS MADE (IN EITHER DIRECTION), LESS THE HYSTERESIS.



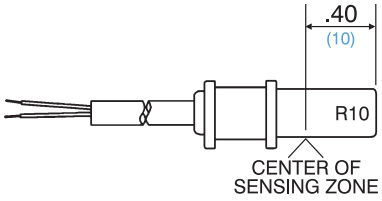
MID STROKE OPERATION



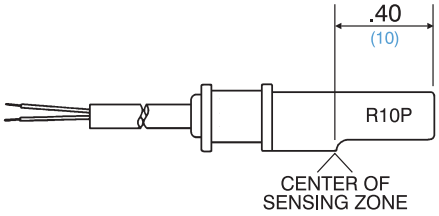
TERMINOLOGY ILLUSTRATION



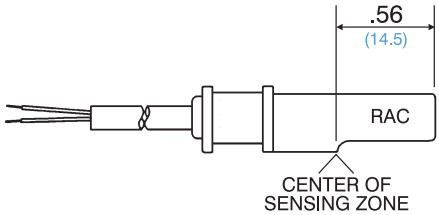
END OF STROKE OPERATION



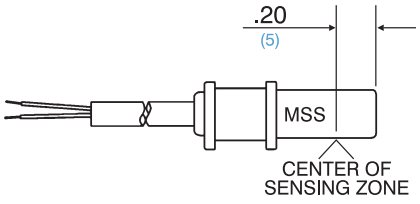
Switch	Repeatability	Hysteresis (Maximum)	Band Width (Minimum)
R10 RHT R10X RHTX R10Q	±.010″ (±.25)	.040″ (1)	.200″ (5)



Switch	Repeatability	Hysteresis (Maximum)	Band Width (Minimum)
R10P R10PQ R10PX	±.010″ (±.25)	.040″ (1)	.200″ (5)



Switch	Repeatability	Hysteresis (Maximum)	Band Width (Minimum)
RAC RACX	±.010″ (±.25)	.085″ (2.1)	.345″ (8.8)



Switch	Repeatability	Hysteresis (Maximum)	Band Width (Minimum)
MSS MSSX MSSQ	±.010″ (±.25)	.075″ (1.9)	.315″ (8)

Note:
Dimensions are in inches, (mm in parentheses).
Results are based upon TRD piston and magnet assemblies. Results may vary if used with other manufacturers cylinder products.

Specify 'MPR' Option for ALL switch models when ordering actuators.

ACCESSORIES: SWITCH ORDERING INSTRUCTIONS

TO ORDER, SPECIFY: Switch Model, Lead Type, and Bracket Size

R10 X - SB15

Switch Model	Switch Lead Options	Switch Bracket
R10 = AC/DC Reed RAC = High Power AC Reed RHT = Extended Temperature Reed MSS = Solid State R10P = AC/DC Reed with Circuit Protection	(leave blank) = 24″ Plain Cable X = 120″ Plain Cable Q = 8mm Quick Connect (not available on RAC, or RHT)	SB15 = 1.50″ to 2.50″ Bore SB32 = 3.25″ to 12″ Bore (leave blank for switch only)

Switch Accessories	
Quick Connect Cord Sets	
MODEL	**DESCRIPTION**
C4-T	8mm Straight Quick Connect Cord X 2 Meter (78″)
C4X-T	8mm Straight Quick Connect Cord X 5 Meter (196″)

About our switches

Our switches are different! The most common complaint in the market is the unreliability of magnetically operated switches. Most cylinder piston magnets have about 10-30% more power than required to operate the switch. This results in erractic operation, a nuisance for maintenance and lowering overall plant productivity.

TRD designed our magnet to have 50-100% more power than required to operate our switch! The combination of TRD R10, R10P, RAC, RHT and MSS Switches and our Cylinders, raises the reliability of switch operation comparable to that of many mechanically operated limit switches.

Application recommendations and precautions

- Noise suppression - Motors and valve solenoids will produce high pulses throughout an electrical system. Therefore, primary and control circuit wiring should not be mixed in the same conduit. Separate power supplies for both logic level signals (Microprocessor, P.C., CPU, Input Devices) and Output Field Devices (Motors, Valve Solenoids) is recommended.
- Never connect R10, R10P, RHT or MSS type switches without a load present. The switch will be destroyed.
- Some electrical loads may be capacitive. Capacitive loading may occur due to distributed capacity in cable runs over 25 feet. Use switch model RAC whenever capacitive loading may occur.
- To obtain optimum performace and long life, switches should not be subjected to strong magnetic fields, extreme temperatures (outside of specifications), or excessive ferrous filings or chip buildup.
- Improper wiring may damage or destroy the switch. Therefore, the wiring diagrams along with the listed power ratings, should be carefully observed before connecting power to the switch.

Following these tips can save time and provide trouble free installations!

Other switches available:

- 12mm Quick Connect
- Special Length Cable
- Weld Immune Switch
- Pulse Extension Switch (For Sensing Mid-Stroke Positions)
- Change Over Switch (SPDT)

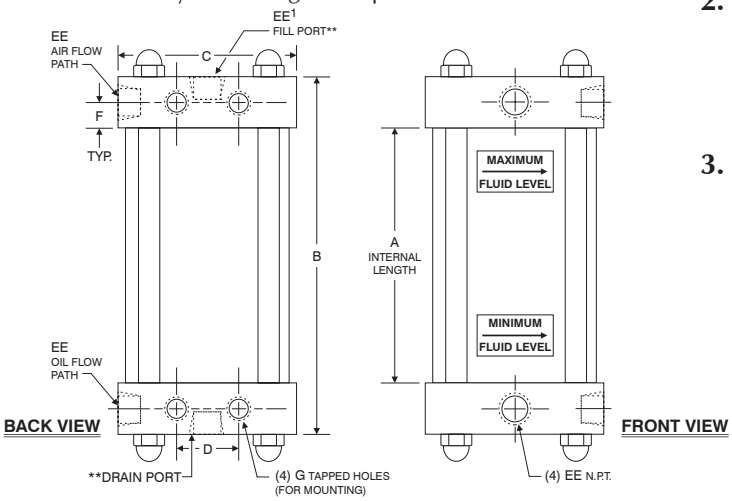
(Consult factory for details.)

Specify 'MPR' Option for ALL switch models when ordering actuators.

SERIES 'SS-AT': AIR/OIL TANKS

Series SS-AT features:

- 303/304 Stainless Steel Hardware
- 200 PSI Operating Pressure
- Internal Steel baffles to reduce aeration and foaming
- Fiber wound translucent tube (non-FDA material)
- Optional stainless steel tube, fittings and sight glass (FDA approved materials)
- Standard mount (MS4), (4 tapped mounting holes back side)
- Side lug mount (MS2) optional
- Fill port located in top, drain port in bottom cap
- Optional oversized ports for high flow applications (For oil velocity exceeding 6 feet per second)



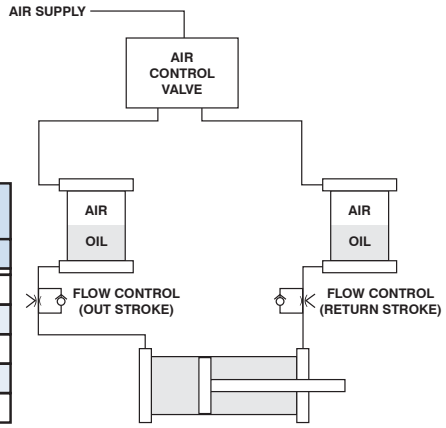
The TRD air/oil system gives you the smooth operation typically associated with hydraulic systems, without the expense! Uses shop air, (2) air/oil tanks, and a cylinder equipped with "TH" (hydraulic seals). Low initial investment and low maintenance to operate!

Tanks need to be mounted above the cylinder, but not necessarily by the cylinder. This will create a self-purging oil circuit. It is advisable to size tanks 30-50% larger than cylinder volume, to prevent the tanks from running dry and to allow for heat expansion.

Sizing your air/oil tank:

1. Determine the cylinder volume by multiplying the square inches of piston area by the inches of stroke. (See Table B) Add 30-50% to determine actual tank size.
2. Find the volume closest to your tank volume requirement in Table C. (Note: Tanks of smaller diameters with greater lengths are generally less expensive than larger diameter, short tanks of equal volume).
3. **To order,** *specify Bore and internal length required.* Example: SS-AT250 x 14 (2½" Bore, 14" internal tank length, with a usable volume of 52 cubic inches).

TYPICAL AIR-OIL CIRCUIT



SS-AT MODEL			PLUS INTERNAL LENGTH	TANK DIMENSIONS						
PART NO.	BORE	*GALS PER INCH TANK	A	B	C	D	F	G	EE	EE[1]
SS-AT250	2½	.0213	0	2	3	1¼	7/16	3/8-16 x 5/8 DEEP	3/8	3/8
SS-AT325	3¼	.0359	0	2½	3¾	1½	9/16	½-13 x ¾ DEEP	½	3/8
SS-AT400	4	.0544	0	2½	4½	2 1/16	9/16	½-13 x ¾ DEEP	½	3/8
SS-AT500	5	.0850	0	2½	5½	2 11/16	11/16	5/8-11 x 1 DEEP	½	3/8
SS-AT800	8	.2175	0	3	8½	4½	11/16	¾-10 x 1 1/8 DEEP	¾	¾

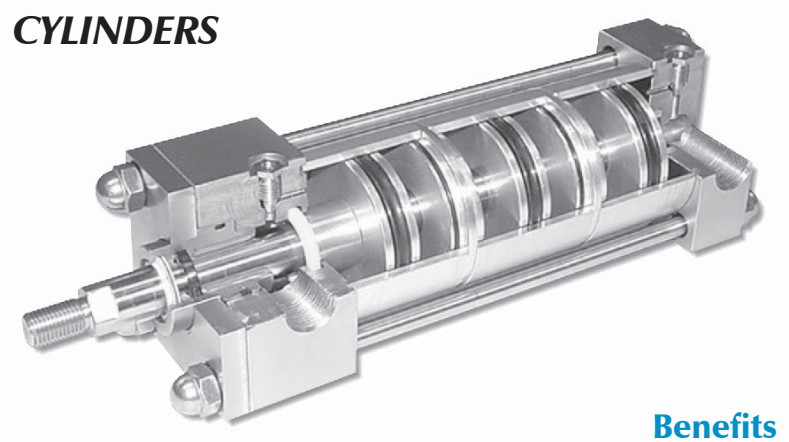
* This is total internal volume, not recommended usable oil capacity.
** Fill and drain ports located at top & bottom of air oil tank.

TABLE B – CYLINDER PISTON AREA	
CYLINDER BORE (In.)	PISTON AREA (Sq. In.)
1½	1.77
2	3.14
2½	4.91
3¼	8.30
4	12.57
5	19.64
6	28.27
8	50.27

TABLE C – RECOMMENDED USABLE TANK VOLUME (cubic inches) WITH 30% SAFETY FACTOR																		
BORE	AREA	ACTUAL INTERNAL LENGTH OF TANK																
		5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45
2½	4.91	17	20	24	27	31	34	41	48	55	61	68	86	103	120	137	154
3¼	8.30	29	34	40	46	52	58	69	81	93	104	116	145	174	203	232	261
4	12.57	44	52	61	70	79	88	105	123	140	158	176	220	264	308	352	396
5	19.64	68	82	96	110	123	137	165	192	220	247	275	343	412	481	550	618
8	50.27	176	211	246	281	317	352	422	493	563	633	704	880	1056	1232	1408	1584

SERIES 'SS-MS': MULTI-STAGE

FORCE MULTIPLYING CYLINDERS



The TRD SS-MSE and SS-MSR Series are double acting, single rod end cylinders that multiply the force output by supplying air to multiple pistons.

The SS-MSE multiplies the force on the extend stroke, the SS-MSR multiplies the force on the retract stroke. Both models use only one piston on the return stroke, saving air volume and operating costs.

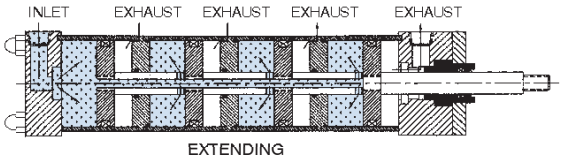
Benefits

- Rated for 125 PSI Air, or Hydraulic (non-shock)
- Eliminates the need for high pressure systems
- Bore size vs. output force saves space
- Optional Double Rod End Models available
- Optional force multiplying in both extend and retract strokes available
- Heavy Duty S.S. construction
- 2 Stage, 3 Stage and 4 Stage models

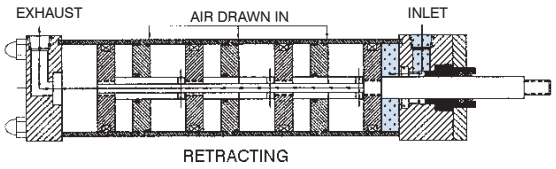
How they work

Model SS-MSE **4 Stage Shown**

Extension-air supplied to multiple pistons

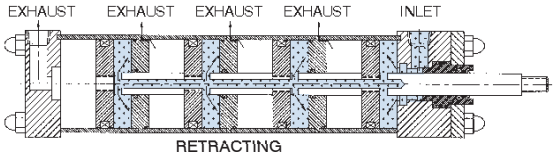


Retraction-air supplied to one piston

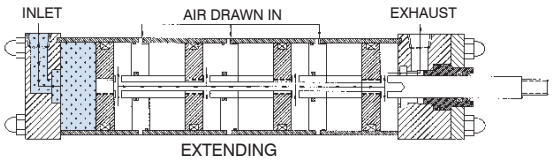


Model SS-MSR **4 Stage Shown**

Retraction-air supplied to multiple pistons



Extension-air supplied to one piston

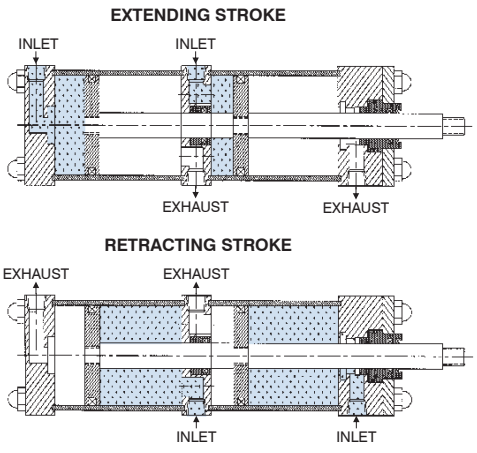


Force multiplying in both Extend and Retract strokes

(Note: Overall lengths are increased- consult factory for details)

To Order, specify:
"SS-MSE/MSR" as model number.

Extension AND Retraction-air supplied to multiple pistons



Model SS-MSE/MSR
2 Stage Shown

SERIES 'SS-MS': ORDERING INSTRUCTIONS

Stainless Steel Multi-Stage NFPA Mount Cylinders
Force Multiplier Air and Non-Shock Hydraulic Cylinders 125 PSI
Six Bore Sizes 1½" thru 6" Bores, Extend or Retract 2, 3 or 4 Stages

BASIC MODEL		MODEL VARIATIONS		NFPA MOUNTS		BORE		X	STROKE	X	STAGES		—	OPTIONS
SS-MSE	MULTI STAGE EXTEND	LEAVE BLANK IF NONE		MX0	MX1	1½	2		1" TO 12" CONSULT FACTORY FOR OTHER STROKES		2S	TWO		ADDS LENGTH TO CYLINDER - SEE CHART
SS-MSR	MULTI STAGE RETRACT	D	DOUBLE ROD END	MX2	MX3	2½	3¼				3S	THREE		X B 1/4" URETHANE BUMPER BOTH ENDS
				MF1	MF2	4	5				4S	FOUR		X BH 1/4" URETHANE BUMPER HEAD ONLY
				MP1	MP2	6								X BC 1/4" URETHANE BUMPER CAP ONLY
				MS2	MS4									"A"- EXTEND PISTON ROD THREAD *(SPECIFY)*
														"C"- EXTEND PISTON ROD *(SPECIFY)*
														H HEAD CUSHION *(AVAILABLE ON MSE ONLY)*
														C CAP CUSHION *(AVAILABLE ON MSR ONLY)*
														DRB DELRIN® ROD BUSHING
														FDAL FDA APPROVED LUBRICANT
														KK2 LARGE MALE ROD THREAD
														KK3 FEMALE ROD THREAD
														KK3S STUDDED PISTON ROD *(WITH KK3)*
														KK4 FULL DIAMETER MALE ROD THREAD
														X MPR MAGNETIC PISTON FOR REED SWITCHES
														X MPH MAGNETIC PISTON FOR HALL SWITCHES
														MS METALLIC ROD SCRAPER *(BRASS)*
														X NR NON-ROTATING *(INTERNALLY GUIDED)* **ADDITIONAL LENGTH - SEE CHART BELOW**
														OP OPTIONAL PORT LOCATION
														OS OVERSIZED ROD DIAMETER *(SPECIFY SIZE)*
														ST STOP TUBE *(SPECIFY LENGTH)*
														TH HYDRAULIC *(NON-SHOCK)*
														VS FLUOROCARBON SEALS
														AS ADJUSTABLE STROKE *(RETRACT)*
														XX SPECIAL VARIATION *(SPECIFY)*
														BSP, SAE PORTS *(SPECIFY SIZE)*

ORDERING EXAMPLES:

EXAMPLE 1: MF1 3¼ Bore, 2" Stroke, 3 Stage Force Multiplied in EXTEND is:
SS-MSE MF1 3¼ x 2 x 3S

EXAMPLE 2: Double Rod End MS4 Mount, 2 Stage, 6" Bore, 3" Stroke, Force Multiplied in RETRACT with Magnetic Piston for REED Switches is:
SS-MSR MS4D 6 x 3 x 2S - MPR
(NOTE: MPR Option adds ¾" to Cylinder Length)

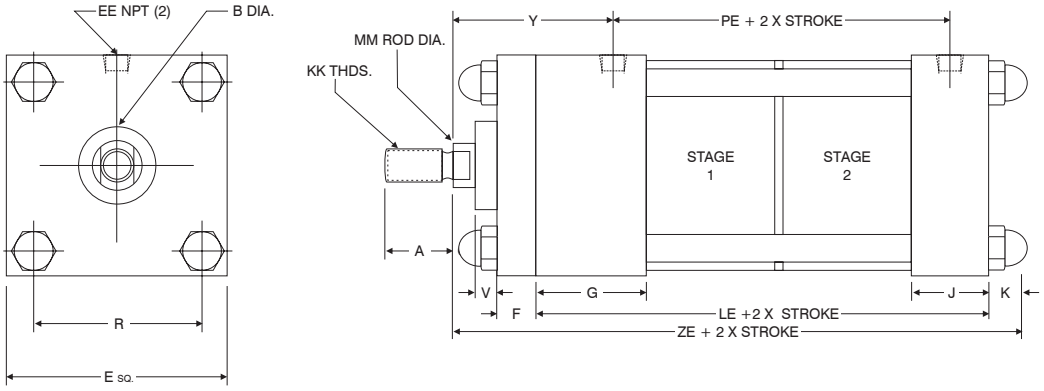
OPTION LENGTH ADDER
(ADD TO CATALOG BASIC OVERALL LENGTH DIMENSIONS)

BORE	OPTION					
	B	BC	BH	MPR	MPH	NR
1½	½	¼	¼	5/8	5/8	5/8
2	½	¼	¼	5/8	5/8	5/8
2½	½	¼	¼	¾	¾	¾
3¼	½	¼	¼	5/8	5/8	5/8
4	½	¼	¼	5/8	5/8	5/8
5	½	¼	¼	7/8	7/8	7/8
6	½	¼	¼	¾	¾	¾

MPR/MPH OPTION: Magnet is located in stage at cap for standard units, in stage at head for 'NR' units.

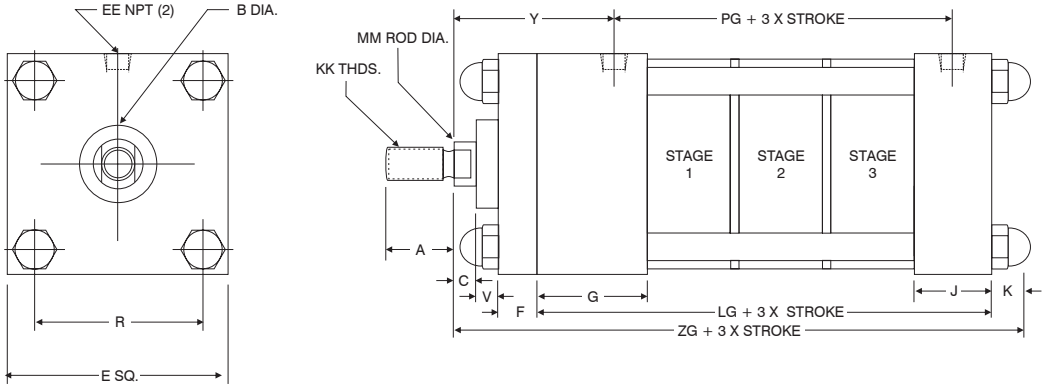
'SS-MS' SERIES CYLINDERS - 2 STAGE EXTEND OR RETRACT

STANDARD ROD DIAMETER BASIC DIMENSIONS MXO



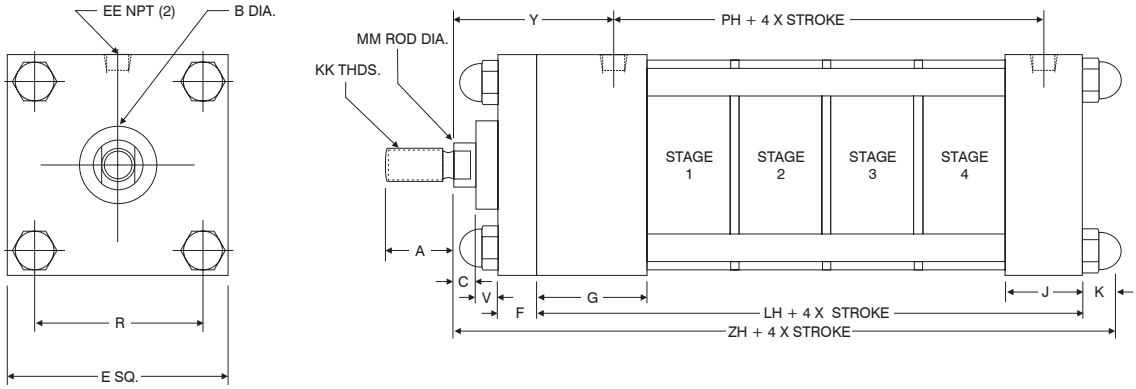
BORE	A	B	C	E	EE	F	G	J	K	KK	LE	MM	PE	R	V	Y	ZE
1½	¾	1 1/8	3/8	2	3/8	3/8	1½	1	7/16	7/16-20	4	5/8	2¾	1.43	¼	1 7/8	5 7/16
2	¾	1 1/8	3/8	2½	3/8	3/8	1½	1	9/16	7/16-20	4	5/8	2¾	1.84	¼	1 7/8	5 9/16
2½	¾	1 1/8	3/8	3	3/8	3/8	1½	1	9/16	7/16-20	4	5/8	2¾	2.19	¼	1 7/8	5 9/16
3¼	1 1/8	1½	½	3¾	½	5/8	1¾	1¼	5/8	¾-16	4 7/8	1	3 3/8	2.76	¼	2 3/8	6 7/8
4	1 1/8	1½	½	4½	½	5/8	1¾	1¼	5/8	¾-16	4 7/8	1	3 3/8	3.32	¼	2 3/8	6 7/8
5	1 1/8	1½	½	5½	½	5/8	1¾	1¼	13/16	¾-16	4 7/8	1	3 3/8	4.10	¼	2 3/8	7 1/16
6	1 5/8	2	5/8	6½	¾	¾	2	1½	13/16	1-14	5¾	1 3/8	4	4.88	¼	2¾	8 5/16

'SS-MS' SERIES CYLINDERS - 3 STAGE EXTEND OR RETRACT
STANDARD ROD DIAMETER BASIC DIMENSIONS MXO



BORE	A	B	C	E	EE	F	G	J	K	KK	LG	MM	PG	R	V	Y	ZG
1½	¾	1 1/8	3/8	2	3/8	3/8	1½	1	7/16	7/16-20	5	5/8	3¾	1.43	¼	1 7/8	6 7/16
2	¾	1 1/8	3/8	2½	3/8	3/8	1½	1	9/16	7/16-20	5	5/8	3¾	1.84	¼	1 7/8	6 9/16
2½	¾	1 1/8	3/8	3	3/8	3/8	1½	1	9/16	7/16-20	5	5/8	3¾	2.19	¼	1 7/8	6 9/16
3¼	1 1/8	1½	½	3¾	½	5/8	1¾	1¼	5/8	¾-16	6 1/8	1	4 5/8	2.76	¼	2 3/8	8 1/8
4	1 1/8	1½	½	4½	½	5/8	1¾	1¼	5/8	¾-16	6 1/8	1	4 5/8	3.32	¼	2 3/8	8 1/8
5	1 1/8	1½	½	5½	½	5/8	1¾	1¼	13/16	¾-16	6 1/8	1	4 5/8	4.10	¼	2 3/8	8 5/16
6	1 5/8	2	5/8	6½	¾	¾	2	1½	13/16	1-14	7¼	1 3/8	5½	4.88	¼	2¾	9 13/16

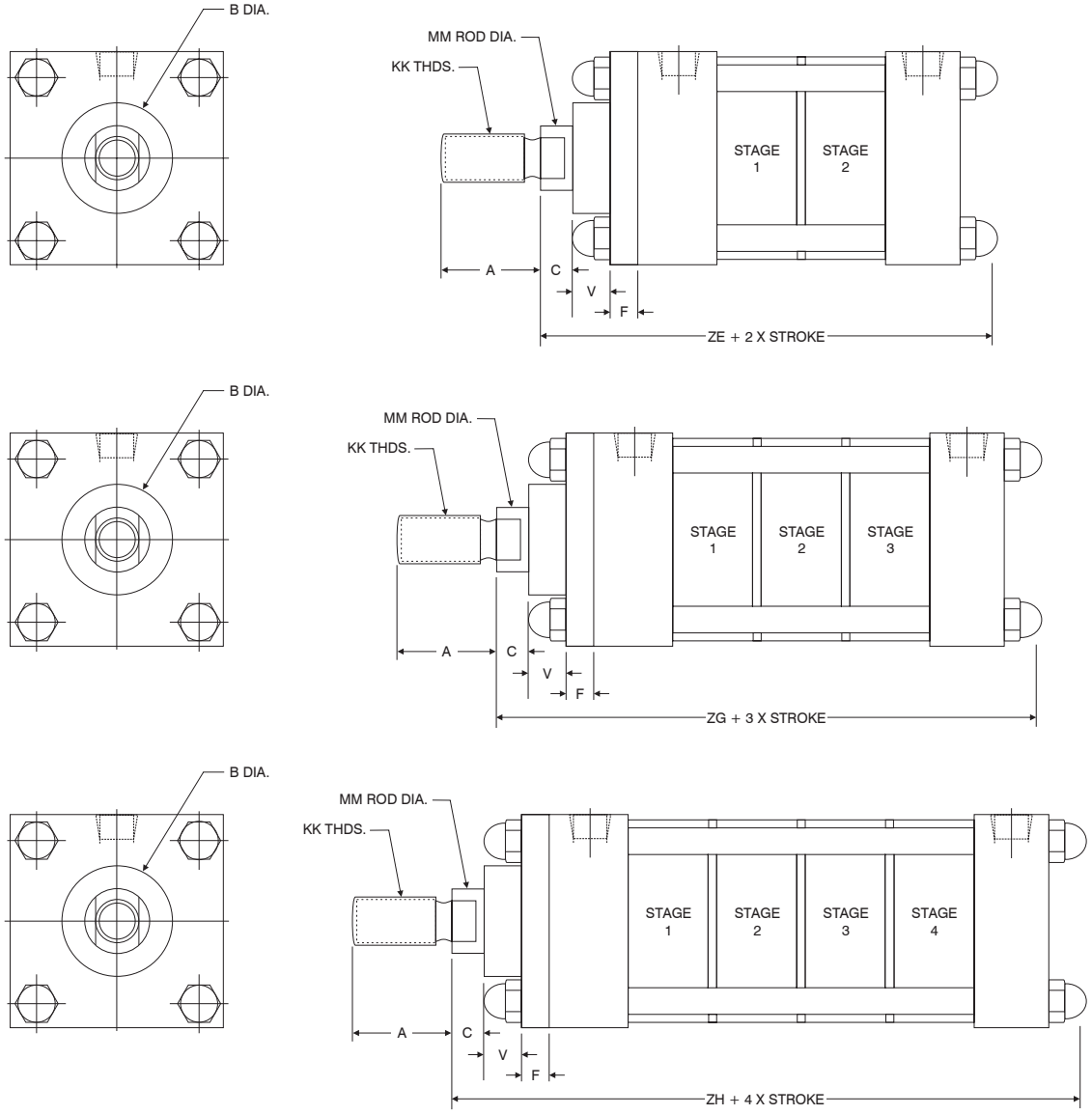
'SS-MS' SERIES CYLINDERS - 4 STAGE EXTEND OR RETRACT
STANDARD ROD DIAMETER BASIC DIMENSIONS MXO



BORE	A	B	C	E	EE	F	G	J	K	KK	LH	MM	PH	R	V	Y	ZH
1½	¾	1 1/8	3/8	2	3/8	3/8	1½	1	7/16	7/16-20	6	5/8	4¾	1.43	¼	1 7/8	7 7/16
2	¾	1 1/8	3/8	2½	3/8	3/8	1½	1	9/16	7/16-20	6	5/8	4¾	1.84	¼	1 7/8	7 9/16
2½	¾	1 1/8	3/8	3	3/8	3/8	1½	1	9/16	7/16-20	6	5/8	4¾	2.19	¼	1 7/8	7 9/16
3¼	1 1/8	1½	½	3¾	½	5/8	1¾	1¼	5/8	¾-16	7 3/8	1	5 7/8	2.76	¼	2 3/8	9 3/8
4	1 1/8	1½	½	4½	½	5/8	1¾	1¼	5/8	¾-16	7 3/8	1	5 7/8	3.32	¼	2 3/8	9 3/8
5	1 1/8	1½	½	5½	½	5/8	1¾	1¼	13/16	¾-16	7 3/8	1	5 7/8	4.10	¼	2 3/8	9 9/16
6	1 5/8	2	5/8	6½	¾	¾	2	1½	13/16	1-14	8¾	1 3/8	7	4.88	¼	2¾	11 5/16

SERIES 'SS-MS' DIMENSIONS: OVERSIZED ROD

Oversize Rod Diameter
Basic Dimensions MXO (No Mount)



MULTI-STAGE OVERSIZE ROD DIAMETER								ADD STROKE PER STAGE		
BORE	A	B	C	F	V	KK	MM	ZE	ZG	ZH
1½	1 1/8	1½	½	3/8	½	¾-16	1	5 13/16	6 13/16	7 13/16
2	1 1/8	1½	½	3/8	½	¾-16	1	5 15/16	6 15/16	7 15/16
2½	1 1/8	1½	½	3/8	½	¾-16	1	5 15/16	6 15/16	7 15/16
3¼	1 5/8	2	5/8	5/8	3/8	1-14	1 3/8	7 1/8	8 3/8	9 5/8
4	1 5/8	2	5/8	5/8	3/8	1-14	1 3/8	7 1/8	8 3/8	9 5/8
5	1 5/8	2	5/8	5/8	3/8	1-14	1 3/8	7 5/16	8 9/16	9 13/16
6	2	2 3/8	¾	¾	3/8	1¼-12	1¾	8 7/16	9 15/16	11 7/16

SERIES 'SS' DIMENSIONS: 'SS-MS' DIMENSIONS

About Rod End Styles

Style 1 Male Rod End is STANDARD

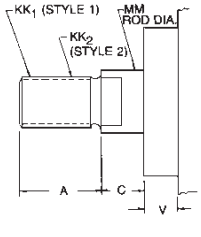
Other NFPA Styles can be specified (See Chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made to order and does not delay shipment. Coarse (UNC) threads, Metric threads or just plain rod ends are common. Thread lengths are also made to order (Specify: "A"=Length).

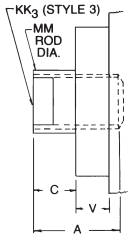
NEED SOMETHING NOT LISTED?
Just send us a sketch.
Quotes are turned around in one day!

PISTON ROD END STYLES

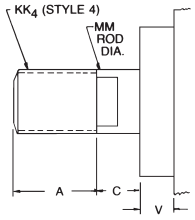
STYLE 1 & 2



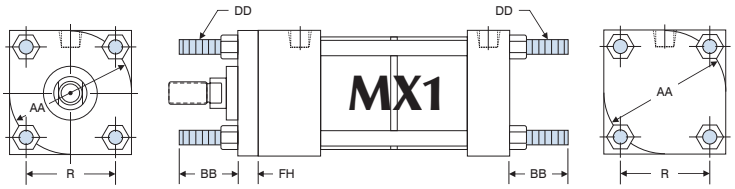
STYLE 3

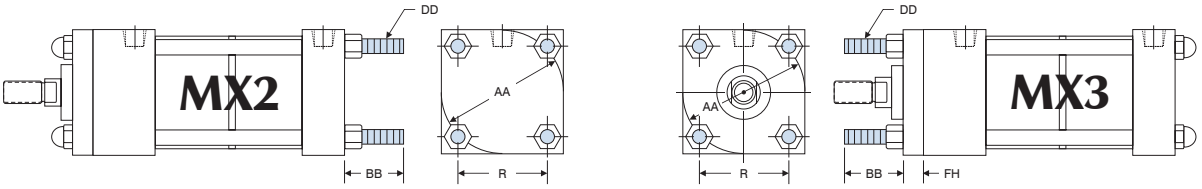


STYLE 4



		STANDARD		OPTIONAL							
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male			
BORE	MM ROD DIAMETER	KK1	A	KK2	A	KK3	A	KK4	A	C	V
1½, 2, 2 ½	5/8 Standard	7/16-20	¾	½ -20	¾	7/16-20	¾	5/8-18	¾	3/8	¼
	1 Oversize	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	½
3¼, 4, 5	1 Standard	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	¼
	1 3/8 Oversize	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
6 & 8	1 3/8 Standard	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
	1 ¾ Oversize	1¼-12	2	1½-12	2	1¼-12	2	1¾-12	2	¾	½





TIE ROD EXTENDED 'MX1', 'MX2' & 'MX3' MOUNT DIMENSIONS						
BORE	ROD DIAMETER	AA	BB	DD	FH	R
1½	5/8 Standard	2.02	1	¼-28	3/8	1.43
	1 Oversize					
2	5/8 Standard	2.6	1 1/8	5/16-24	3/8	1.84
	1 Oversize					
2½	5/8 Standard	3.1	1 1/8	5/16-24	3/8	2.19
	1 Oversize					
3¼	1 Standard	3.9	1 3/8	3/8-24	5/8	2.76
	1 3/8 Oversize					

TIE ROD EXTENDED 'MX1', 'MX2' & 'MX3' MOUNT DIMENSIONS						
BORE	ROD DIAMETER	AA	BB	DD	FH	R
4	1 Standard	4.7	1 3/8	3/8-24	5/8	3.32
	1 3/8 Oversize					
5	1 Standard	5.8	1 13/16	½-20	5/8	4.10
	1 3/8 Oversize					
6	1 3/8 Standard	6.9	1 13/16	½-20	¾	4.88
	1¾ Oversize					

SERIES 'SS' DIMENSIONS: 'SS-MS' DIMENSIONS

About Rod End Styles

Style 1 Male Rod End is STANDARD

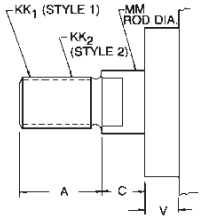
Other NFPA Styles can be specified (See Chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made to order and does not delay shipment. Coarse (UNC) threads, Metric threads or just plain rod ends are common. Thread lengths are also made to order (Specify: "A"=Length).

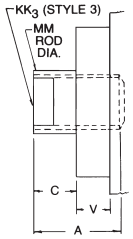
NEED SOMETHING NOT LISTED?
Just send us a sketch.
In most cases, quotes are turned around in one day!

PISTON ROD END STYLES

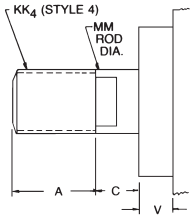
STYLE 1 & 2



STYLE 3

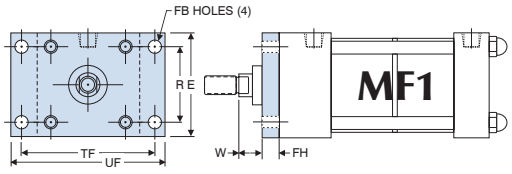


STYLE 4

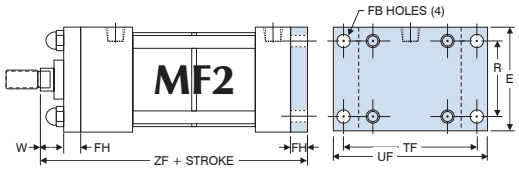


		STANDARD		OPTIONAL							
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male			
BORE	MM ROD DIAMETER	KK1	A	KK2	A	KK3	A	KK4	A	C	V
1½, 2, 2 ½	5/8 Standard	7/16-20	¾	½ -20	¾	7/16-20	¾	5/8-18	¾	3/8	¼
	1 Oversize	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	½
3¼, 4, 5	1 Standard	¾-16	1 1/8	7/8-14	1 1/8	¾-16	1 1/8	1-14	1 1/8	½	¼
	1 3/8 Oversize	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
6 & 8	1 3/8 Standard	1-14	1 5/8	1¼-12	1 5/8	1-14	1 5/8	1 3/8-12	1 5/8	5/8	3/8
	1 ¾ Oversize	1¼-12	2	1½-12	2	1¼-12	2	1¾-12	2	¾	½

SERIES 'SS-MS' DIMENSIONS: FLANGE MOUNTS



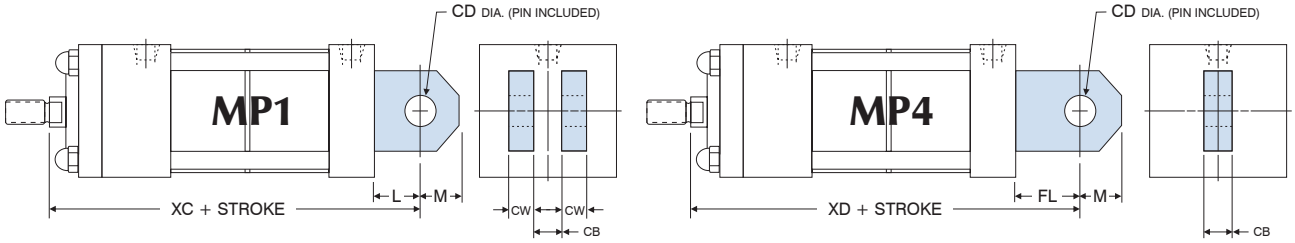
1½" - 6" BORES



1½" - 6" BORES

'MF1', 'MF2' FLANGE DIMENSIONS											
BORE	ROD DIAMETER	E	FB	FH	R	TF	UF	W	ZF + STROKE PER STAGE 2 STAGE	3 STAGE	4 STAGE
1½	5/8 Standard	2	5/16	3/8	1.43	2¾	3 3/8	5/8	5 3/8	6 3/8	7 3/8
	1 Oversize							1	5¾	6¾	7¾
2	5/8 Standard	2½	3/8	3/8	1.84	3 3/8	4 1/8	5/8	5 3/8	6 3/8	7 3/8
	1 Oversize							1	5¾	6¾	7¾
2½	5/8 Standard	3	3/8	3/8	2.19	3 7/8	4 5/8	5/8	5 3/8	6 3/8	7 3/8
	1 Oversize							1	5¾	6¾	7¾
3¼	1 Standard	3¾	7/16	5/8	2.76	4 11/16	5½	¾	6 7/8	8 1/8	9 3/8
	1 3/8 Oversize							1	7 1/8	8 3/8	9 5/8
4	1 Standard	4½	7/16	5/8	3.32	5 7/16	6¼	¾	6 7/8	8 1/8	9 3/8
	1 3/8 Oversize							1	7 1/8	8 3/8	9 5/8
5	1 Standard	5½	9/16	5/8	4.10	6 5/8	7 5/8	¾	6 7/8	8 1/8	9 3/8
	1 3/8 Oversize							1	7 1/8	8 3/8	9 5/8
6	1 3/8 Standard	6½	9/16	¾	4.88	7 5/8	8 5/8	7/8	8¼	9¾	11¼
	1¾ Oversize							1 1/8	8½	10	11½

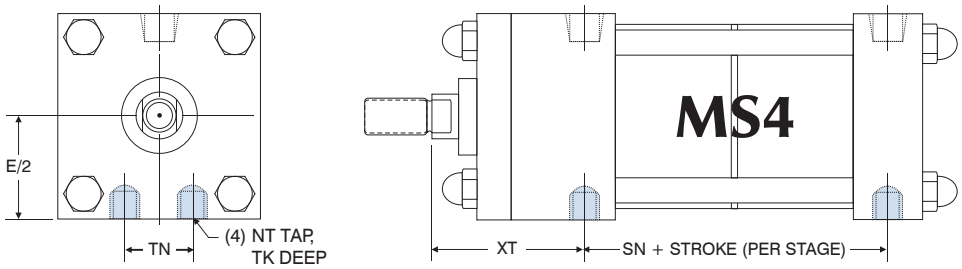
SERIES 'SS-MS' DIMENSIONS: PIVOT MOUNTS



MULTI-STAGE 'MP1' & 'MP2' CLEVIS AND 'MP4' EYE MOUNT DIMENSIONS								ADD STROKE PER STAGE					
								2 STAGE		3 STAGE		4 STAGE	
BORE	ROD DIAMETER	CB	CD	CW	FL	L	M	XC	XD	XC	XD	XC	XD
1½	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5¾	6 1/8	6¾	7 1/8	7¾	8 1/8
	1 Oversize							6 1/8	6½	7 1/8	7½	8 1/8	8½
2	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5¾	6 1/8	6¾	7 1/8	7¾	8 1/8
	1 Oversize							6 1/8	6½	7 1/8	7½	8 1/8	8½
2½	5/8 Standard	¾	½	½	1 1/8	¾	5/8	5¾	6 1/8	6¾	7 1/8	7¾	8 1/8
	1 Oversize							6 1/8	6½	7 1/8	7½	8 1/8	8½
3¼	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	7½	8 1/8	8¾	9 3/8	10	10 5/8
	1 3/8 Oversize							7¾	8 3/8	9	9 5/8	10¼	10 7/8
4	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	7½	8 1/8	8¾	9 3/8	10	10 5/8
	1 3/8 Oversize							7¾	8 3/8	9	9 5/8	10¼	10 7/8
5	1 Standard	1¼	¾	5/8	1 7/8	1¼	7/8	7½	8 1/8	8¾	9 3/8	10	10 5/8
	1 3/8 Oversize							7¾	8 3/8	9	9 5/8	10¼	10 7/8
6	1 3/8 Standard	1½	1	¾	2 ¼	1½	1	8 7/8	9 5/8	10 3/8	11 1/8	11 7/8	12 5/8
	1 ¾ Oversize							9 1/8	9 7/8	10 5/8	11 3/8	12 1/8	12 7/8

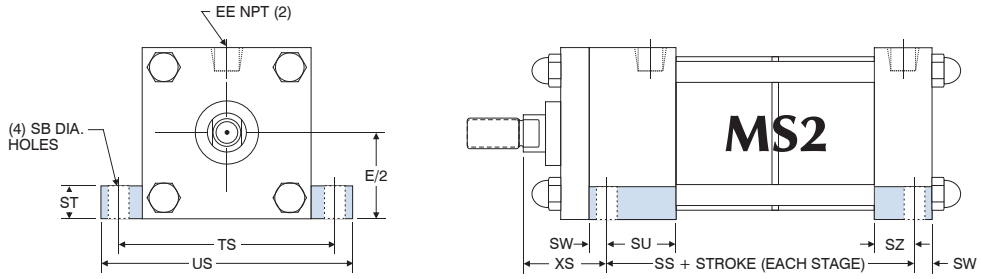
For dimensions not shown see pages 29 - 30
* (Pivot Pin included)

'SS-MS' SERIES: BASE MOUNTS



'MS4' BOTTOM TAPPED MOUNT DIMENSIONS									
							SN + STROKE PER STAGE		
BORE	ROD DIAMETER	E/2	NT	TK	TN	XT	2 STAGE	3 STAGE	4 STAGE
1½	5/8 Standard	1	¼-20	3/8	5/8	1 15/16	2 5/8	3 5/8	4 5/8
	1 Oversize					2 5/16			
2	5/8 Standard	1¼	5/16-18	½	7/8	1 15/16	2 5/8	3 5/8	4 5/8
	1 Oversize					2 5/16			
2½	5/8 Standard	1½	3/8-16	5/8	1¼	1 15/16	2 5/8	3 5/8	4 5/8
	1 Oversize					2 5/16			
3¼	1 Standard	1 7/8	½-13	¾	1½	2 7/16	3¼	4½	5¾
	1 3/8 Oversize					2 11/16			
4	1 Standard	2¼	½-13	¾	2 1/16	2 7/16	3¼	4½	5¾
	1 3/8 Oversize					2 11/16			
5	1 Standard	2¾	5/8-11	1	2 11/16	2 7/16	3¼	4½	5¾
	1 3/8 Oversize					2 11/16			
6	1 3/8 Standard	3¼	¾-10	1 1/8	3¼	2 13/16	3 7/8	5 3/8	6 7/8
	1¾ Oversize					3 1/16			

SERIES 'SS-MS' DIMENSIONS: BASE MOUNTS



'MS2' SIDE LUG MOUNT DIMENSIONS													
BORE	ROD DIAMETER	E/2	SB	ST	SU	SW	SZ	TS	US	XS	SS + STROKE PER STAGE		
											2 STAGE	3 STAGE	4 STAGE
1½	5/8 Standard	1	7/16	½	1 1/8	3/8	5/8	2¾	3½	1 3/8	3¼	4¼	5¼
	1 Oversize									1¾			
2	5/8 Standard	1¼	7/16	½	1 1/8	3/8	5/8	3¼	4	1 3/8	3¼	4¼	5¼
	1 Oversize									1¾			
2½	5/8 Standard	1½	7/16	½	1 1/8	3/8	5/8	3¾	4½	1 3/8	3¼	4¼	5¼
	1 Oversize									1¾			
3¼	1 Standard	1 7/8	9/16	¾	1¼	½	¾	4¾	5¾	1 7/8	3 7/8	5 1/8	6 3/8
	1 3/8 Oversize									2 1/8			
4	1 Standard	2¼	9/16	¾	1¼	½	¾	5½	6½	1 7/8	3 7/8	5 1/8	6 3/8
	1 3/8 Oversize									2 1/8			

* SS dimensions increase ½" on double rod cylinders
For dimensions not shown see pages 29 - 30

Note: overall lengths will change with the addition of non-rotating or magnetic pistons – consult factory

'SS-MS' SERIES EFFECTIVE PISTON AREA/FORCE CHART

BORE	STAGES	EFF. PISTON AREA (SQ. IN.)				FORCE IN LBS. AT 60 PSI				FORCE IN LBS. AT 100 PSI			
		EXTEND (MSE)		RETRACT (MSR)		EXTEND (MSE)		RETRACT (MSR)		EXTEND (MSE)		RETRACT (MSR)	
		STD. ROD Ø	O'SIZE Ø	STD. ROD Ø	O'SIZE Ø	STD. ROD Ø	O'SIZE Ø	STD. ROD Ø	O'SIZE Ø	STD. ROD Ø	O'SIZE Ø	STD. ROD Ø	O'SIZE Ø
1½	2	3.228	2.749	2.922	1.964	193	164	175	117	322	274	292	196
	3	4.687	3.731	4.383	2.946	281	223	262	176	468	373	438	294
	4	6.150	4.713	5.844	3.928	369	282	350	235	615	471	584	392
2	2	5.974	5.499	5.668	4.714	358	329	340	282	597	549	566	471
	3	8.808	7.856	8.502	7.071	528	471	510	424	880	785	850	707
	4	11.642	10.213	11.336	9.428	698	612	680	565	1164	1021	1133	942
2½	2	9.490	9.033	9.188	8.248	569	541	551	494	949	903	918	824
	3	14.080	13.157	13.782	12.372	844	789	826	742	1408	1315	1378	1237
	4	18.680	17.281	18.376	16.496	1120	1036	1102	989	1868	1728	1837	1649
3¼	2	15.807	15.107	15.022	13.622	948	906	901	817	1580	1510	1502	1362
	3	23.317	21.918	22.532	20.433	1399	1315	1351	1225	2331	2191	2253	2043
	4	30.828	28.729	30.043	27.244	1849	1723	1802	1634	3082	2872	3004	2724
4	2	24.347	23.647	23.562	22.166	1460	1418	1413	1329	2434	2364	2356	2216
	3	36.127	34.728	35.342	33.243	2167	2083	2120	1994	3612	3472	3534	3324
	4	47.908	45.809	47.123	44.324	2874	2748	2827	2659	4790	4580	4712	4432
5	2	38.485	37.785	37.700	36.3	2309	2267	2262	2178	3848	3778	3770	3630
	3	57.334	55.935	56.549	54.45	3440	3356	3392	3267	5733	5593	5654	5445
	4	76.184	74.085	75.399	72.6	4571	4445	4523	4356	7618	7408	7539	7260
6	2	55.065	54.143	53.582	51.736	3303	3248	3214	3104	5506	5414	5358	5136
	3	81.854	80.012	80.370	77.607	4911	4800	4822	4656	8185	8001	8037	7760
	4	108.644	105.881	107.16	103.476	6518	6352	6429	6208	10864	10588	10716	10347

SERIES 'SS': TECHNICAL DATA

How to determine the right size Cylinder for the job

To determine what size cylinder the task requires, you need to answer a few questions about three main points: load, velocity and air pressure.

How heavy (in pounds) is the load to be moved? The answer to this is usually given, set by the machine design. However, unless you are lifting a load vertically-with no external friction, it can be difficult to determine the true load. If the load cannot be calculated, try to physically measure the load. The closer the true load is known, the better the results. In order to move the load, you need to choose a cylinder that provides force greater than the load. So, if the load is 100 lbs., it will take of force greater than 100 lbs. to move it. In fact, it's a good idea to allow an additional factor of 25% force to allow for friction.

What's the required velocity? Although velocity may also be set by machine design, often you have some latitude within a range. Whenever possible, for best results, we recommend using moderate speed because the greater the velocity required, the greater the *additional* force needed to achieve it. Slow speeds (up to 4 in/sec) require 25% more force than the load, moderate speeds (4 to 16 in/sec) about 50% more, and high speeds (greater than 16 in/sec) about 100% more force. So, for that 100 lb. load, you need 125 lbs. of force to move it slowly, 150 lbs. of force to move it at moderate speeds, and 200 lbs. of force to move it quickly. *Don't forget to add 25 lbs. (25% of 100 lbs.) for friction!*

What's the minimum effective air pressure you can use - and is your pressure source constant?
This is important because high pressures can accelerate seal wear and create stress on the cylinder, and inconsistent pressures can cause system malfunctions or failures. So, to maximize cylinder life and performance, you need to provide consistent airflow at the minimum effective pressure to maintain the desired velocity. The idea then, is for the cylinder to be able to move the maximum load, at the minimum acceptable velocity, and at the minimum available pressure.

About bore sizes
Once you've determined the force you need to move the load at the desired velocity and allow for friction, here's how to find the cylinder bore that meets your specifications.
The force generated by a cylinder is determined by the effective piston area times the air pressure. The chart below lists the effective piston area for each bore size, the "Push" (extend) and "Pull" (retract) stroke, at various air pressures. If you assume a maximum load of 100 lbs., a minimum velocity of 4 in/sec, and a minimum pressure of 60 psi, here's how to select the right cylinder bore. Since the velocity is slow, the force should be 25% greater than the load, or 125 lbs. After adding 25 lbs. for friction (25% of 100 lbs.), the total force needed is 150 lbs. The chart below shows that at 60 psi, the 2" bore with 5/8" rod extend force is 188 lbs., and retract force is 170 lbs. - the right cylinder for the application.

FORCE/VOLUME CHART

CYLINDER BORE	CYLINDER ROD	STROKE TYPE	EFFECTIVE PISTON AREA	POUNDS OF FORCE AT PSI 60	80	100	200	250	400	CU. FT. DISPLACEMENT PER IN. OF STROKE
1½	ALL	PUSH	1.767	106	142	177	353	442	706	.00102
	5/8	PULL	1.460	88	117	146	292	365	584	.00084
	1	PULL	.982	59	79	98	196	246	392	.00057
2	ALL	PUSH	3.142	188	251	314	628	785	1256	.00182
	5/8	PULL	2.835	170	227	284	567	708	1134	.00164
	1	PULL	2.357	141	189	236	471	589	942	.00136
2½	ALL	PUSH	4.909	295	393	491	981	1227	1962	.00284
	5/8	PULL	4.602	276	368	460	920	1150	1840	.00266
	1	PULL	4.124	247	330	412	825	1031	1650	.00239
3¼	ALL	PUSH	8.296	498	664	830	1659	2074	3318	.00480
	1	PULL	7.511	451	601	751	1502	1877	3004	.00435
	1 3/8	PULL	6.811	409	545	681	1362	1702	2724	.00394
4	ALL	PUSH	12.566	754	1005	1257	2513	3141	5026	.00727
	1	PULL	11.781	707	942	1178	2356	2945	4712	.00682
	1 3/8	PULL	11.081	665	886	1108	2216	2770	4432	.00641
5	ALL	PUSH	19.635	1178	1571	1964	3927	4908	7854	.01136
	1	PULL	18.850	1131	1508	1885	3770	4712	7540	.01090
	1 3/8	PULL	18.150	1089	1452	1815	3630	4537	7260	.01050
6	ALL	PUSH	28.274	1696	2262	2827	5655	7068	11310	.01636
	1 3/8	PULL	26.789	1607	2144	2679	5358	6697	10716	.01550
	1¾	PULL	25.869	1552	2070	2587	5174	6467	10348	.01497
8	ALL	PUSH	50.265	3016	4021	5026	10053	12566	20106	.02908
	1 3/8	PULL	48.780	2927	3902	4878	9756	12195	19512	.02823
	1¾	PULL	47.860	2872	3829	4786	9572	11965	19144	.02770

SERIES 'SS': TECHNICAL DATA

How the right mounting and careful installation help prevent premature cylinder wear

Choosing the right style of mounting for your cylinder's size, force and function has a direct effect on it's service life. The wrong mounting, or incorrect installation, can result in side load, which creates excessive wear on the piston, piston rod, rod bearing and seals. When wear occurs, leakage usually follows and that's how cylinders fail.

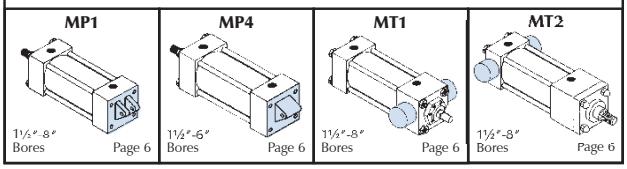
Side load occurs when a load is placed on the piston rod without guideance or support, or when the mounting and piston rod connection are misaligned. It can also occur in pivot type mounts when the weight of the cylinder places load on the piston and rod bearing points.

There are cylinder mounts and options to suit virtually every application.

Pivot Type Mountings: Clevis & Trunnion

These type of mounts can eliminate side load in one plane, but careful alignment in the other plane is crucial. Since TRD uses a "floating" Rod Bushing design, side loading caused by misalignment is minimized, but not totally eliminated.

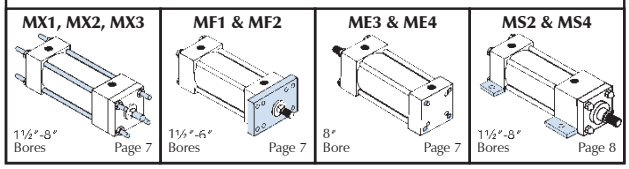
Long stroke pivot mount cylinders will have high side loads just because of the weight of the cylinder components. In these applications, a stop tube is usually essential for proper cylinder operation (see page 16 to determine if a stop tube is needed for your application).



Rigid Mount Cylinders

Base mounted, flange mounted, and tie-rod mounted cylinders must be carefully aligned with the direction of load travel to avoid side loads.

If for some reason, proper alignment cannot be maintained throughout the entire cylinder stroke, a rod end connection that allows for some lateral misalignment should be used. TRD offers a full line of Rod Alignment Couplers to solve misalignment issues (refer to page 19 for details). Keep in mind, the rod alignment couplers do not provide any rod end support. Always check to see if your application requires a stop tube.



Choose options that enhance and extend the working life of your cylinders

Cushions. Can be designed into either one or both ends of the cylinder to provide controlled deceleration. This option prevents excessive end-of-stroke impact, reducing vibration and noise. Cushions are designed to stop light loads at moderate speeds. Heavy loads or higher speed applications may require shock absorbers. Your local distributor representative is qualified to provide expert advise on what options are best suited for your application.

Bumper Piston Seals. Whether used by themselves or with cushions, bumper piston seals provide additional controlled deceleration at end of stroke.

Wear band. A 1/16" thick X 3/8" wide (for 1½" to 2½" bore, larger strips for bigger bores) PTFE composite material strip is added to the piston diameter to eliminate metal to metal contact between the piston and the tube. Since wear band materials are compressive in nature, they can provide some cylinder side load protection. As side load pressure is applied, the wear band contact area with the tube increases, enabling a higher transfer of load due to the high amount of contact area.

Even though wear bands contain a high percentage of PTFE, they do add additional internal "drag" in the cylinder. Additional drag can effect cycle rates, and at times, lower overall production in high speed applications.

Fluorocarbon Seals. Usually associated with higher temperature applications, Fluorocarbon can provide additional chemical resistance. Consult factory for additional information.

Stainless Steel Piston (with wear band). When cylinder bores are used to measure or dispense food products, it is essential to eliminate non-FDA approved materials from the cylinder internal construction. Specify "FDA approved materials only", at time of order.

FDA Lubricant. Typically used with stainless steel pistons for food dispensing applications. Can also be specified when there is concern for possible contamination from petroleum based, air-born particles associated with the normal cylinder operation.

Switches. Position sensing switches give you the potential for expanding the capabilities of your cylinder functions to include accurate piston sensing, event timing, sequencing and more. Magnetically operated, the switches are mounted to the exterior of the cylinder where they are actuated by a magnet contained on the piston.

SERIES 'SS': TECHNICAL DATA

Weight Chart - Basic Cylinders

WEIGHT IN POUNDS

BORE	ROD DIAMETER	MODEL				ADD PER INCH OF STROKE
		MX0/MS4 ME3/ME4	MF1/MF2	MT1/MT2	MP1*	
1½	5/8	3.3	4	3.8	3.8	0.3
	1	4.1	4.8	4.6	4.6	0.4
2	5/8	5.8	7	6.4	6.4	0.5
	1	6.2	7.4	6.8	6.8	0.6
2½	5/8	8	9.5	8.5	8.7	0.6
	1	8.5	10	9	9.2	0.7
3¼	1	15	18.7	15.5	16	0.8
	1 3/8	15.4	19.2	16	16.5	1.0
4	1	23	28	23.5	27	1.0
	1 3/8	23.4	28.5	24	27.5	1.2
5	1	34.4	42	35	41	1.1
	1 3/8	34.9	42.5	35.5	41.5	1.3
6	1 3/8	60	71.9	61.5	69	1.5
	1¾	62	73.9	63.2	71	1.7
8	1 3/8	79	N/A	80.2	88	2.0
	1¾	82	N/A	83.2	91	2.3

* Weight includes clevis pins.

Accessories Weight Chart

WEIGHT IN POUNDS

ROD CLEVIS		ROD EYES		EYE BRACKETS & CLEVIS BRACKETS		CLEVIS PINS	
PART NO.	WEIGHT	PART NO.	WEIGHT	PART NO.	WEIGHT	PART NO.	WEIGHT
SS-RC437	.28	SS-RE750	.32	SS-EB500	1.2	SS-CP500-1	.12
SS-RC500	.28	SS-RE1000	.30	SS-EB750	3.8	SS-CP750-1	.38
SS-RC750	.78	SS-RE1375	1.10	SS-EB1000	6.9	SS-CP1000-1	.80
SS-RC1000	2.13	SS-RE1500	2.40	SS-CB500	1.5	SS-CP1375-1	1.22
SS-RC1250	5.8	—	—	SS-CB750	4.5	SS-CP1750-1	4.7
SS-RC1500	11.1	—	—	SS-CB1000	7.6	—	—

Alignment Couplers Weight Chart

WEIGHT IN POUNDS

PART NO.	WEIGHT	PART NO.	WEIGHT
SS-AC250	.30	SS-AC750	1.10
SS-AC312	.32	SS-AC875	1.30
SS-AC375	.34	SS-AC1000	2.90
SS-AC437	.36	SS-AC1250	3.10
SS-AC500	.38	SS-AC1500	8.00
SS-AC625	.40		

Cylinder Torques

CYLINDER BORE	TIE ROD THREAD SIZE	TORQUE IN FT.-LBS.
1½	¼-28	7
2	5/16-24	12
2½	5/16-24	14
3¼	3/8-24	30
4	3/8-24	35
5	½-20	45
6	½-20	50
8	5/8-18	125

Tighten cylinders using an "X" tightening pattern on tie rods.

Break-away Pressures

CYLINDER BORE	SS SERIES	
	STANDARD SEALS	LOW FRICTION (LF)
1½	5-6 PSI	3-4 PSI
2	5-6 PSI	3-4 PSI
2½	4-5 PSI	3-4 PSI
3¼	4-5 PSI	2-3 PSI
4	3-4 PSI	2-3 PSI
5	3-4 PSI	2-3 PSI
6	2-3 PSI	1-2 PSI
8	2-3 PSI	1-2 PSI

Corrosion Resistant Two-Hand Control Valves

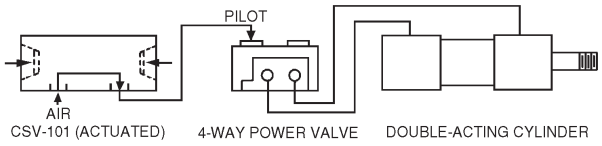
CSV-102W

Designed specifically to help customers conform with OSHA Safety Standard 1910.217 for the guarding of presses:

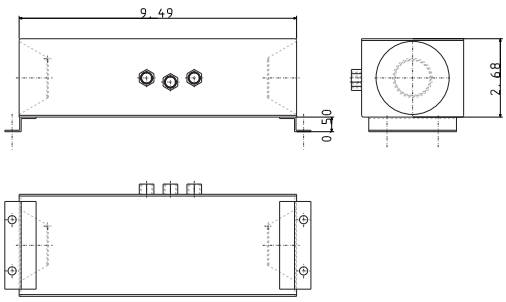
- The operator is required to use two hands to provide a concurrent and sustained manual signal to the valve.
- The triggers are guarded preventing them from accidental actuation.
- Releasing one or both hands interrrupts the valve signal.

Available in two models, the CSV-101W and CSV-102W are each designed for use in a wash-down environment. The logic circuitry is housed in a fiberglass industrial control panel enclosure, providing excellent chemical and corrosion resistance.

CSV-101W



Will actuate any 3 or 4-way air piloted, spring return power valve or small single-acting cylinders. (C_v = 0.11)

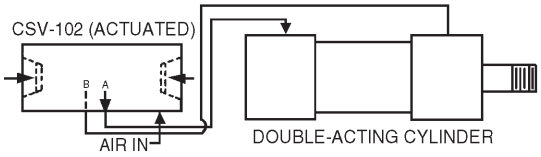


Specifications

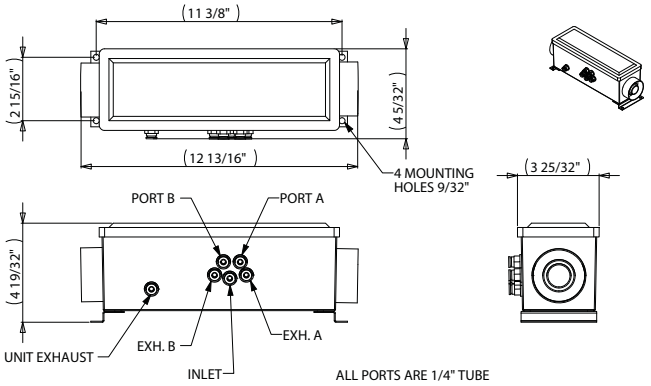
Model No.	Function	Ports (NPTF)
CSV-101W	Actuation of Power Valve	(3) 1/8"

Note: Operating pressure range is 70 - 100 PSI.
Warning: CSV's are intended to operate pneumatic valves and cylinders. They are not meant to be used on full or partial revolution fly wheel presses, power brakes or other similar devices.

CSV-102W



Complete power package containing a 4-way power valve (C_v=1.00) for direct actuation of single-acting or double acting air cylinders. Actuation sends a sustained air flow to one cylinder port. Releasing one or both buttons shifts the flow to the other cylinder port. Built-in mufflers reduce sound levels.



Specifications

Model No.	Function	Ports (NPTF)
CSV-102W	Direct Actuation of Air Cylinder or Air Press	(6) 1/4" Fittings

Note: Operating pressure range is 70 - 100 PSI.
Warning: CSV's are intended to operate pneumatic valves and cylinders. They are not meant to be used on full or partial revolution fly wheel presses, power brakes or other similar devices.

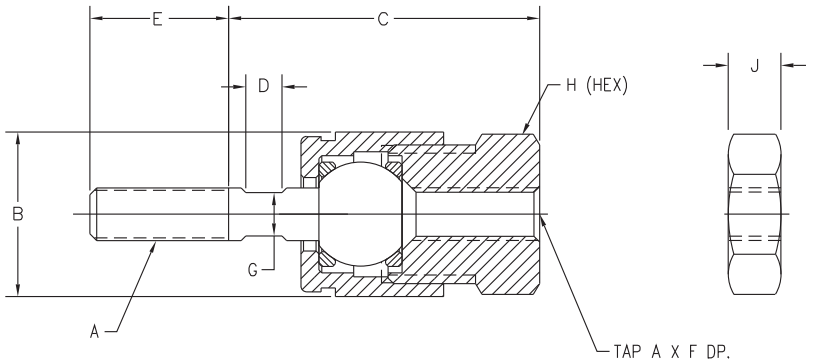
Stainless Steel Alignment Couplers

Features and Advantages

- Bimba's miniature coupler design allows excellent freedom of movement on the three new, miniature sizes; #5-40 through #10-32 sizes.
- The miniature couplers allow up to 20 degrees of spherical movement and 0.02" lateral allowance with only .002" of axial play and are manufactured from high tensile, hardened and blackened steel components.
- Larger sizes are available, from 1/4"-28 to 1"-14, with 1 degree of spherical movement and 1/16" of lateral allowance.
- The alignment allowances can eliminate the need for expensive precision machining in rigidly mounted applications.
- Alignment couplers help reduce binding and simplify field alignment problems, enhancing cylinder performance and reducing seal and bearing wear.
- An innovative design to resist vibrational loosening is available on sizes 5/16"-24 and larger. In the ACH style coupler, a slot is milled through the tapped mounting threads. Two socket head cap screws are strategically placed to allow the coupler to be clamped to the rod, offering superior strength connection.

Dimensions

Models #5-40 through #10-32



Model*	A	B	C	D	E	F
AC5-40-SS	#5-40	15/32"	31/32"	1/8"	3/8"	3/8"
AC8-32-SS	#8-32	17/32"	31/32"	1/8"	3/8"	3/8"
AC10-32-SS	#10-32	19/32"	1-1/8"	1/8"	1/2"	1/2"

Model*	G	H	J	Maximum Pull at Yield (lbs.)	Alignment Allowance		Weight (oz.)
					Lateral	Spherical	
AC5-40-SS	1/8"	3/8"	1/8"	200	0.02	20°	0.3
AC8-32-SS	1/8"	7/16"	1/8"	650	0.02	10°	0.5
AC10-32-SS	5/32"	1/2"	1/8"	1200	0.02	10°	0.8

*** Specify SS at the end of the part number for Stainless Steel.**

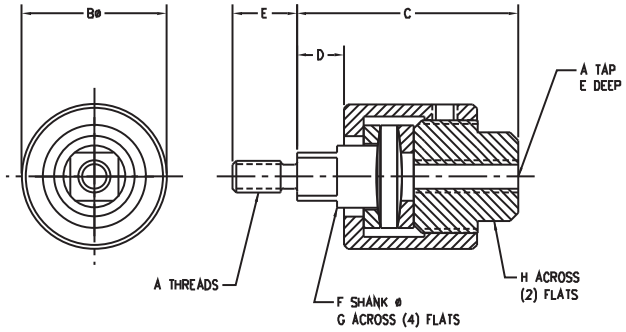
Additional Jam Nuts

Size	Stainless Steel Part No.
#5-40	D-3745-SS
#8-32	D-D0737-SS
#10-32	D-5288-SS

Stainless Steel Alignment Couplers

Models 1/4"-28 through 1"-14

Standard Coupler
AC250-AC1000



1/16" of lateral allowance
1° spherical movement

Part Number	A	B	C	C Hex	D	E	F	G	H	H Hex	Maximum Pull at Yield (lbs.)
AC250-SS	1/4"-28	1-1/8"	1-3/4"	--	3/8"	1/2"	1/2"	3/8"	11/16"	--	6,000
AC312-SS	5/16"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8,300
AC375-SS	3/8"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8.300
AC437-SS	7/16"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	10,000
AC500-SS	1/2"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/8"	14,000
AC625-SS	5/8"-18	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	19,000
AC750-SS	3/4"-16	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	34,000
AC875-SS	7/8"-14	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	39,000
AC1000-SS	1"-14	2-1/2"	2-15/16"	2-15/16"	7/16"	1-5/8"	1-11/32"	1-5/32"	1-5/8"	2-1/2"	64,000

Please specify – SS at the end of the part number for Stainless Steel.
Jam nut sold separately for 1/4"-28 through 1"-14 size
*SS valid for AC models only

Jam Nuts

Size	Stainless Steel Part No.
1/4"-28	D-344-SS
5/16"-24	D-746-SS
3/8"-24	D-801-SS
7/16"-20	D-154-SS
1/2"-20	D-98-SS
5/8"-18	D-9-SS
3/4"-16	D-3556-SS
7/8"-14	D-2545-SS
1"-14	D-1331-SS

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