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Pneumatic Actuator Products

Cylinders, Guided Cylinders and Rotary Actuators

Catalog 0900P-E



ENGINEERING YOUR SUCCESS.

Warning, Offer of Sale

 **WARNING**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

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Offer of Sale

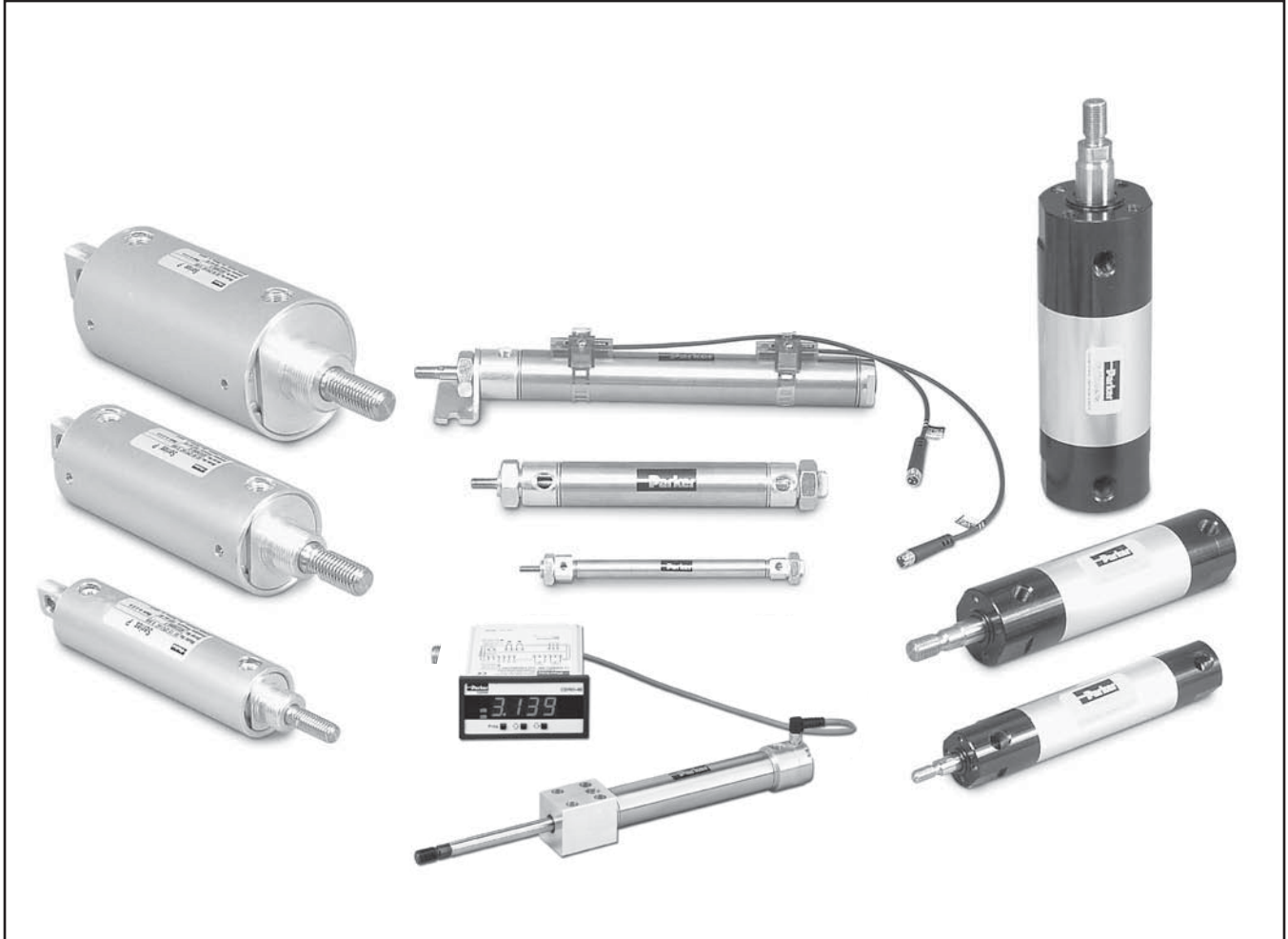
The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled "Offer of Sale".

Application Engineering Data		A	Engineering Data
Tie Rod Cylinders	3MA/4MA Series, 3MAJ/4MAJ Series, 4MNR Series, ACVB Option, LPSO Option, S Series, C Series	B	Tie Rod Cylinders
ISO Cylinders	P1D Series, P1A Series	C	ISO Cylinders
Round Body Cylinders	SR Series, SRM Series, SRD/SRDM Series, SRX Series, P1L Series, P Series	D	Round Body Cylinders
Compact Cylinders	P1M Series, P1M Series with Tooling Plate, P1M Series Swing Clamp, LP/LPM Series, C05 Series, P1G Series	E	Compact Cylinders
Guided Cylinders	P5T Series, P5T2 Series, P5L Series, HB Series, P5E Series	F	Guided Cylinders
Rodless Cylinders	OSP-P, P1X Series, P1Z Series, RC Series, GDL	G	Rodless Cylinders
Rotary Actuators	PV Series, PRN(A) Series, WR Series, PTR Series, B671/F672 Series, HP Series, P5W Series	H	Rotary Actuators
Pneumatic Grippers	For Complete Information, Refer to Catalog 1900-2	J	Pneumatic Grippers
Air Motors	P1V-S Series For Complete Information, Refer to Catalog PDE2554TCUK-ul	K	Air Motors
Complementary Products	Linear Alignment Couplers, Flow Controls, 4TK Air Oil Tanks, PRL Series, Transition Kits	L	Complementary Products
Electronic Sensors	Solid State, Reed and Proximity Sensors	M	Electronic Sensors
Industrial Shock Absorbers	Industrial Shock Absorbers (Linear Decelerators)	N	Industrial Shock Absorbers
Fax Forms, Safety Guide, Offer of Sale	Application FAX Forms	P	Fax Forms, Safety Guide, Offer of Sale



Round Body Pneumatic Cylinders

Section D



D

SR/SRM, SRD/SRDM

SRX

P1L

P



D1

Parker Hannifin Corporation
Pneumatic Division
Wadsworth, Ohio
www.parker.com/pneumatics

Section D – Round Body Cylinders

Non-Repairable Cylinders

SR Series

- 304 Stainless Steel Body
- 12 Bore Sizes: 5/16" through 3"
- 28 Mounting Styles
- 250 PSI Air Service

SRM Series

- Piston Position Sensing
- 8 Bore Sizes, 9/16" through 2-1/2"
- 24 Mounting Styles
- 250 PSI Air Service

SRD / SRDM Series

- 304 Stainless Steel Body with Delrin® End Caps
- 5 Bore Sizes, 9/16" through 2"
- 2 Mounting Styles
- Piston Position Sensing (SRDM Series Only)
- 100 PSI Air

SRX Series

- Continuous Position Feedback Capability
- 5 Bore Sizes, 1-1/16" through 3"
- 3 Mounting Styles
- 3 Display Modules Available
- 150 PSI Air Service

Repairable Cylinders

P1L Series

- High Performance Cylinder
- Metric, Aluminum Body Threaded Design
- 8 Bore Sizes, 20mm through 100mm
- 12 Mounting Styles
- Piston Position Sensing Capable
- Bumpers Standard, Cushions Available
- 150 PSI Air Service

P Series

- Inch, Round Body Snap-Ring Design
- 6 Bore Sizes, 1-1/8" through 4"
- Universal or Tang Mounting Style
- Cushions Available
- Piston Position Sensing Capable
- 150 PSI Air Service

Also in the Guided Cylinders Section:

P5L Series (powered by P1L Cylinder)

- 3 Body Styles (Thrust, Reach, Base)
- Bore Sizes 20, 25, 32, 40, 50, 63, 80 and 100mm
- Maximum Strokes 400 to 1000mm Depending on Model
- 10 Bar (145 PSI) Air Service

Delrin® is a registered trademark of Dupont.



SR/SRM Series SRD/SRDM Series

Stainless Steel Body Air Cylinders



D

SR/SRM, SRD/SRDM

SRX

P1L

P

Contents

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**Stainless Steel
Piston Rods**

Corrosion resistant stainless steel is now the standard piston rod material for all bore sizes up to and including 1.50 inch bore at no additional cost. The only exception to the stainless steel standard is when a hollow rod or non-rotating hexagonal rod option is specified. Stainless steel is also the standard material on block, trunnion and KDX mounts.

Pre-Lubrication

All SR Series cylinders are factory prelubricated for use with or without added lubrication.

Rod Bushings

Oil impregnated bronze, reamed to a close tolerance provides for smooth operation and long life.

Seals

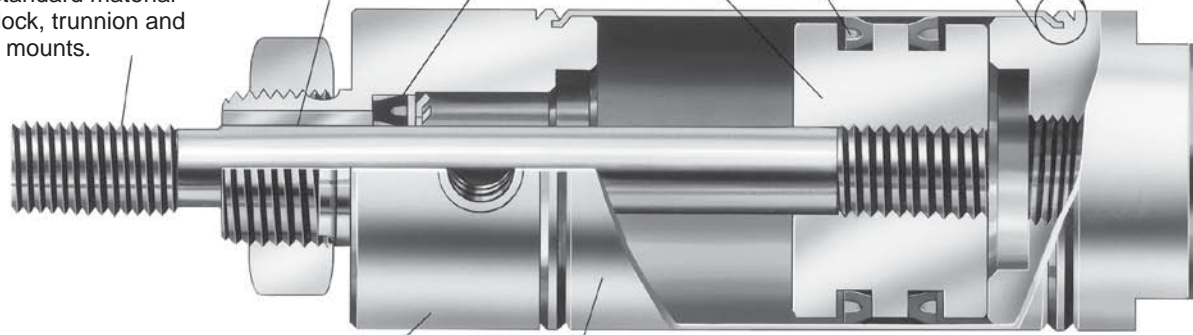
All piston and rod seals are of a lipseal construction. Buna-N is standard on all models. Fluorocarbon seals are available as an option.

Piston Body

Pistons are precision machined aluminum construction. Piston rod connections are threaded and loctited to provide for leakproof and durable service.

Unitized Construction

Precision double-rolled unitized construction provides durable, leak-proof service and long life.



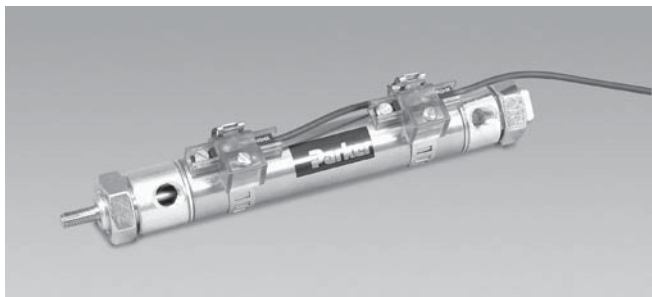
Heads and Caps

Aluminum construction with precision machining provides a smooth break away. The tube-to-head connection is a strong double rolled construction.

Cylinder Tube

Type 304 stainless steel, polished to a micro-inch finish on the I.D. provides low friction and long life. A matte finish on the O.D. provides smudge resistance.

Twelve Bore Sizes – 5/16" thru 3". SR Series cylinders are designed to be dimensionally interchangeable with other major stainless steel cylinders.



SRM Series

The SRM Series air cylinder can be ordered with reed or solid state sensors that are easily adjustable anywhere on the cylinder body, with no special mounting rail required. Ni-trile-barium particle composite surrounds the entire piston diameter for non-contact sensing.

Sensors are compatible with Programmable Controllers; an LED indicator is also standard. A shielded cable is standard, and can be extended to 32 feet maximum by the user.

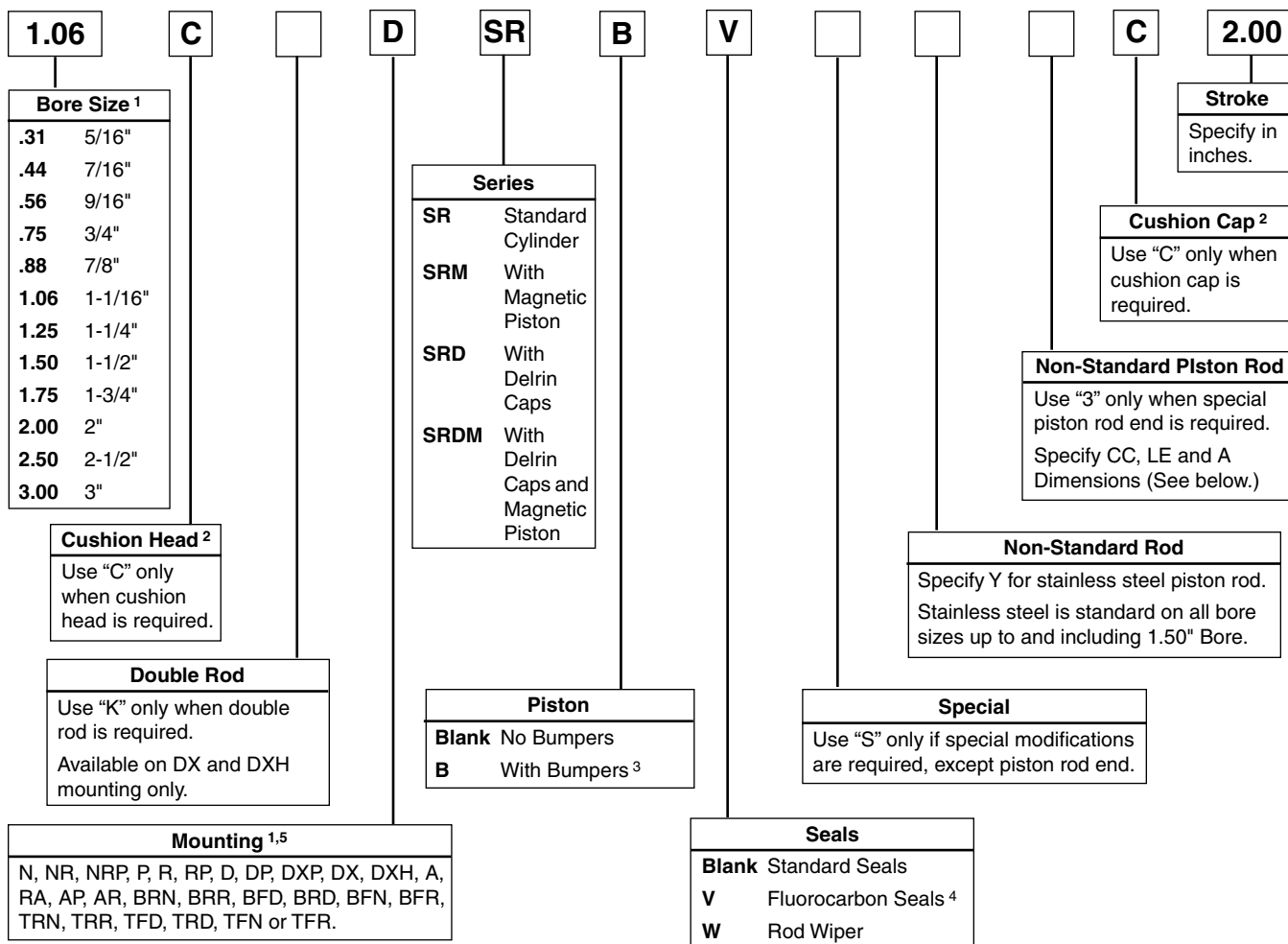


SRD/SRDM Series

SRD/SRDM Series cylinders are designed to withstand a wide range of operating environments to tolerate moisture and many types of lubricants and solvents. The cylinders have a Delrin® (acetal resin) head and cap, an anodized aluminum piston, stainless steel cylinder tube and stainless steel piston rod. Stainless steel accessories are available.

Delrin® is a registered trademark of Dupont. For detailed information regarding the properties of Delrin, contact Dupont.

How To Order SR Series Air Cylinders



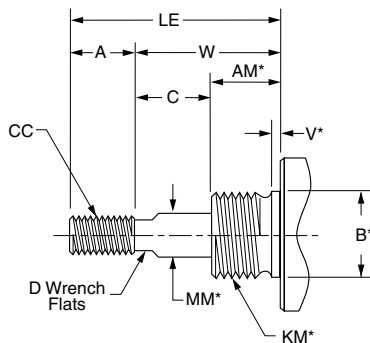
- Bore sizes and mounting styles are limited by series. See table on next page for availability.
- Cushions not available on SRD/SRDM series.
- Bumpers may increase cylinder length. See page D37 for adders.
- Fluorocarbon seals not available on SRM or SRDM series.
- TRD mount not available with cushions.

For ordering purposes, when special options or common modifications are requested, the factory will assign a sequential part number in place of the model number.

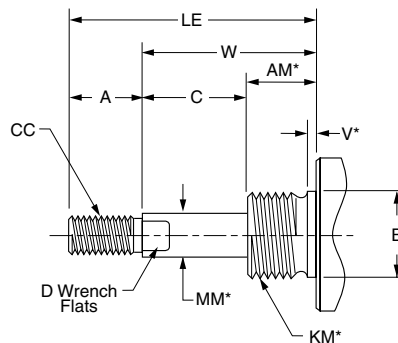
Non-Standard Rods

For non-standard rod dimensions, or undersized rod end threads, put a "3" in model number and describe the rod using the letters shown in the drawing. Specify CC, LE and A dimensions.

Full Diameter Rod End Threads



Undersized Rod End Threads



*Requires an S designation in model number.

Available Mounting Styles

Mount Style	Description	Bore Size (Reference Notes 1 & 2 for availability)											Max. Stroke (in.)	Page	
		5/16" (1,2)	7/16" (1,2)	9/16"	3/4"	7/8" (1,2)	1-1/16"	1-1/4" (2)	1-1/2"	1-3/4" (2)	2"	2-1/2" (2)			3" (1,2)
N ⁽²⁾	Nose mount, spring return	●	●	●	●	●	●	●	●	●	▲	—	—	6" ⁽³⁾	D7
NR ⁽²⁾	Nose mount, spring return, hex rod (non-rotating)	—	●	●	●	●	●	●	●	●	—	—	—	6"	D8
NRP ⁽²⁾	Pivot and nose mount, spring return, hex rod (non-rotating)	—	●	●	●	●	●	●	●	●	—	—	—	6"	D9
P ⁽²⁾	Pivot mount, spring return	●	●	●	●	●	●	●	●	●	▲	—	—	6"	D10
R ⁽²⁾	Nose mount, spring extended	●	●	●	●	●	●	●	●	●	▲	—	—	6"	D11
RP ⁽²⁾	Pivot and nose mount, spring extend	●	●	●	●	●	●	●	—	▲	—	—	—	6"	D12
D	Nose mount, double acting	●	●	●	●	●	●	●	●	●	●	●	●	12"	D13
DP ⁽²⁾	Pivot and nose mount, double acting, pivot pin	—	●	—	●	—	●	—	●	—	—	—	—	12"	D14
DXP	Pivot and nose mount, double acting, no pivot pin	●	●	●	●	●	●	●	●	●	●	●	●	See Note 4	D15
DX	Threaded both ends, double acting	—	See DXP	See DXP	See DXP	See DXP	See DXP	See DXP	●	—	See DXP	—	—	32"	D16
KDX	Threaded both ends, double acting, double rod	—	●	●	●	●	●	●	●	●	●	●	●	See Note 5	D17
KDXH ⁽²⁾	Threaded both ends, double rod, hollow rod	—	—	—	—	—	●	●	●	●	●	—	—	12"	D18
A ^(1,2)	Nose mount, spring return, head adjustable stroke	—	—	—	●	—	●	—	●	—	—	—	—	6"	D19
RA ^(1,2)	Nose mount, spring extend, cap adjustable stroke	—	—	—	●	—	●	—	●	—	—	—	—	6"	D20
AP ^(1,2)	Pivot mount, spring return, head adjustable stroke	—	—	—	●	—	●	—	●	—	—	—	—	6"	D21
AR ^(1,2)	Air reservoirs	—	—	—	●	—	●	—	●	—	●	—	—	12"	D34
BRN ⁽²⁾	Rear block mount, single acting,	—	●	—	●	—	●	—	●	—	—	—	—	6"	D22
BRR ⁽²⁾	Rear block mount, single acting, spring return	—	—	—	●	—	●	—	●	—	—	—	—	6"	D23
BFD ⁽²⁾	Front block mount, double acting	●	●	—	●	—	●	—	●	—	—	—	—	12"	D24
BRD ⁽²⁾	Rear block mount, double acting	—	●	—	●	—	●	—	●	—	—	—	—	12"	D25
BFN ⁽²⁾	Front block mount, single acting spring return	—	●	—	●	—	●	—	●	—	—	—	—	6"	D26
BFR ⁽²⁾	Front block mount, single acting spring extend	—	—	—	●	—	●	—	●	—	—	—	—	6"	D27
TRN ⁽²⁾	Rear trunnion mount, single acting, spring return	—	●	—	●	—	●	—	●	—	—	—	—	6"	D28
TRR ⁽²⁾	Rear trunnion mount, single acting spring extend	—	—	—	●	—	●	—	●	—	—	—	—	6"	D29
TFD ⁽²⁾	Front trunnion mount, double acting	—	●	—	●	—	●	—	●	—	—	—	—	12"	D30
TRD ⁽²⁾	Rear trunnion mount, double acting	—	●	—	●	—	●	—	●	—	—	—	—	12"	D31
TFN ⁽²⁾	Front trunnion mount, single acting spring return	—	●	—	●	—	●	—	●	—	—	—	—	6"	D32
TFR ⁽²⁾	Front trunnion mount, single acting spring extend	—	—	—	●	—	●	—	●	—	—	—	—	6"	D33

- ▲ Recommended maximum stroke is 4" in models N, P, R & RP.
- 1 Not available on SRM (magnetic piston) cylinders.
- 2 Not available on SRD/DM (Delrin caps) cylinders.
- 3 Recommended maximum stroke is 4" for 5/16" bore models.
- 4 Max stroke 12" for bore sizes under 3/4"; 32" for bore sizes 3/4" and up.
- 5 Max stroke 6" for bore sizes under 3/4"; 12" for bore sizes 3/4" and up.



Standard Specifications

- 304 stainless steel cylinder body.
- Aluminum heads and caps.
- Stainless steel piston rods are standard up to 1.50" bore.
- Nominal pressure rating 250 psi for SR and SRM
100 psi for SRD/SRDM
- Standard temperature -10°F to +165°F for SR
+14°F to +140°F for SRM
+32°F to +160°F for SRD/SRDM

- Twelve bore sizes — 5/16" through 3" (see table for SRM and SRD/DM exclusions).
- 28 standard mounting styles (not all available on SRM and SRD/SRDM – see table on previous page).
- Single and double acting
- Bumpers
- Adjustable cushions
- Rod wipers

In line with our policy of continuing product improvement, the specifications in this catalog are subject to change without notice.

For additional mounting styles please consult factory.
 For detailed information regarding the properties of Delrin® contact Dupont.

Port Locations

Mounting Style	Standard Head Port Location	Standard Cap Port Location	Standard Vent Location
AR	Face	Face	None
BFR	2	None	2
BFN	None	Face	2
BRD	2	2	None
BFD	2	Face	None
BRR	2	None	2
BRN	None	2	2
TFR	1	None	1
TFN	None	Face	1
TRD	1	1	None
TFD	1	Face	None
TRR	1	None	1
TRN	None	1	1
AP	None	2	2
RA	2	None	2
A	None	Face	2
KDXH	2	2	None
KDX	2	2	None
DX	2	2	None
DXP	2	2	None
DP	2	2	None
D	2	Face	None
RP	2	None	2
R	2	None	2
P	None	2	2
NRP	None	2	2
NR	None	Face	2
N	None	Face	2

End View of Mountings for Port Location

<p>Mounting Styles N, NR, D, R, AR</p> <p>Standard location for cushion adjustment needle when cushions are specified on D mounts.</p>	
<p>Mounting Styles P, RP, DXP, NRP, DP, AP</p> <p>Standard location for cushion adjustment needle when cushions are specified on DXP mounts.</p>	
<p>Mounting Style A</p>	<p>Mounting Style RA</p>
<p>Mounting Styles BFD, BFN, BFR</p>	<p>Mounting Styles BRN, BRR, BRD</p>
<p>Mounting Styles KDXH, KDX</p>	<p>Mounting Style DX</p>
<p>Mounting Styles TFD, TFN, TFR</p>	<p>Mounting Styles TRN, TRR, TRD</p>

Cylinders will have ports at these locations unless otherwise specified.

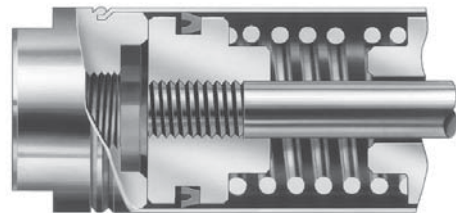
Port Size — Rod Diameter — Spring Force Data

Bore Size	Port Size	Rod Diameter (or Hex)	Force Factor		Spring Return (lbs)		Spring Extend (lbs)	
			Push	Pull	Normal	Extended	Normal	Extended
.31 (5/16")	#10-32	1/8"	0.08	0.06	0.5	1	0.5	1
.44 (7/16")	#10-32	3/16"	0.15	0.12	1	2	1	2
.56 (9/16")	#10-32	3/16"	0.25	0.22	2	4	2	4
.75 (3/4")	1/8 NPTF	1/4"	0.44	0.39	3	6	3	6
.88 (7/8")	1/8 NPTF	1/4"	0.60	0.55	3	6	3	6
1.06 (1-1/16")	1/8 NPTF	5/16"	0.89	0.81	3†	6†	7.5	15
1.25 (1-1/4")	1/8 NPTF	7/16"	1.23	1.08	7.5	15	7.5	15
1.50 (1-1/2")	1/8 NPTF	7/16"	1.77	1.62	6†	12†	9	18
1.75 (1-3/4")	1/4 NPTF	1/2"	2.40	2.21	11	24	11	24
2.00 (2")	1/4 NPTF	5/8"	3.14	2.84	15	30	15	30
2.50 (2-1/2")	1/4 NPTF	5/8"	4.91	4.60	N/A	N/A	N/A	N/A
3.00 (3")	3/8 NPTF	3/4"	7.07	6.63	N/A	N/A	N/A	N/A

* Non-rotating version uses 3/8" hex.

† Block mount and trunnion mount spring return lbs. equals spring extend lbs.

Springs — shot peened music wire for high cycle life. Spring spacers are provided for every one inch of stroke (1/2" for 5/16" and 7/16" bores) to insure uniform spring rate and prevent spring failure.



Option Availability

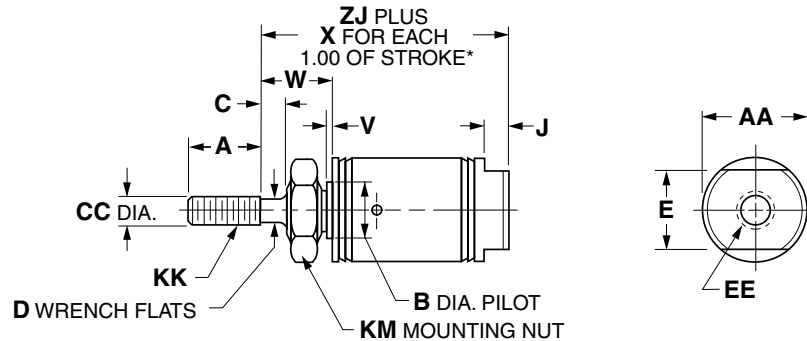
Option	Bumpers	Fluorocarbon Seals	Rod Wipers	Cushions	Delrin® End Caps
Bumpers	—	◆	◆	X	◆
Fluorocarbon Seals	—	—	X	S	◆
Rod Wiper	—	—	—	◆	◆
Cushions	—	—	—	—	X

◆ = Available Options
S = Available as Special
X = Not Available

Delrin® is a registered trademark of Dupont.

Mounting Style N
Nose Mount, Spring Return

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Strokes (in)	Max Stroke (in)	SS Rod Std
5/16"	●		1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	4	✓
7/16"	●		1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6	✓
9/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
3/4"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
7/8"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
1-1/4"	●	●	1/2, 1, 2, 3, 4	6	✓
1-1/2"	●	●	1/2, 1, 2, 3, 4	6	✓
1-3/4"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6	
2"	●	●	—	4	

Bore	A	AA	B	C	CC	D	E	EE	J	KK	KM	V	W	X	ZJ	
															SR	SRM
5/16"	0.38	0.36	—	—	0.125	—	0.36	#10-32	—	#5-40 UNC	1/4-28	0	0.25	0.75**	1.12	—
7/16"	0.50	0.50	0.374	—	0.188	—	0.38	#10-32	0.19	#10-32 UNF	3/8-24	0.05	0.31	0.94**	1.31	—
9/16"	0.50	0.62	0.437	—	0.188	—	0.50	#10-32	0.19	#10-32 UNF	7/16-20	0.06	0.38	1.62	1.53	1.76
3/4"	0.50	0.81	0.499	—	0.250	—	0.62	1/8 NPTF	0.19	1/4-28 UNF	1/2-20	0.09	0.44	1.69	1.50	1.75
7/8"	0.50	0.93	0.624	—	0.250	—	0.62	1/8 NPTF	0.19	1/4-28 UNF	5/8-18	0.09	0.50	1.56	1.84	—
1-1/16"	0.50	1.12	0.624	0.12	0.312	0.25	0.88	1/8 NPTF	0.19	5/16-24 UNF	5/8-18	0.09	0.69	1.56	2.06	2.31
1-1/4"	0.75	1.34	0.749	0.25	0.437	0.38	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	0.09	0.88	1.81	2.66	2.78
1-1/2"	0.75	1.56	0.749	0.25	0.437	0.38	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	0.09	0.88	1.69	2.44	2.69
1-3/4"	0.88	1.84	1.031	0.38	0.500	7/16	1.25	1/4 NPTF	0.25	1/2-20 UNF	1-14	0.09	0.75	2.0	2.97	3.09
2"	0.88	2.08	1.374	0.38	0.625	0.50	1.25	1/4 NPTF	0.31	1/2-20 UNF	1-1/4-12	0.12	1.19	—	▲	▲

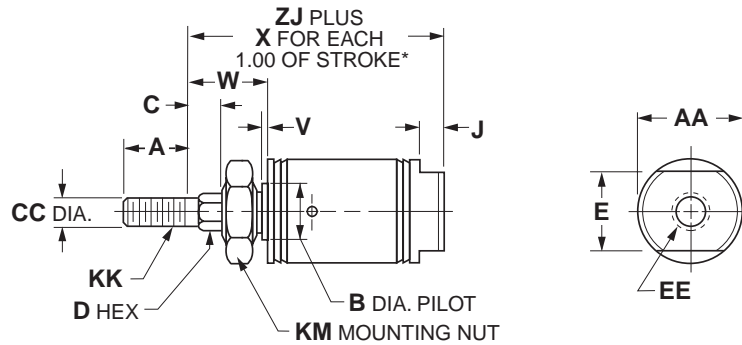
▲ 5.66" for 1" stroke; 7.66" for 2" stroke; 8.91" for 3" stroke; 11.84" for 4" stroke.

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract a half inch.

** For each 0.50" of stroke

Mounting Style NR
Nose Mount, Spring Return, Hex Rod

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓
9/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
3/4"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
7/8"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓
1-1/4"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1/2, 1, 2, 3, 4	6	✓
1-3/4"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6	

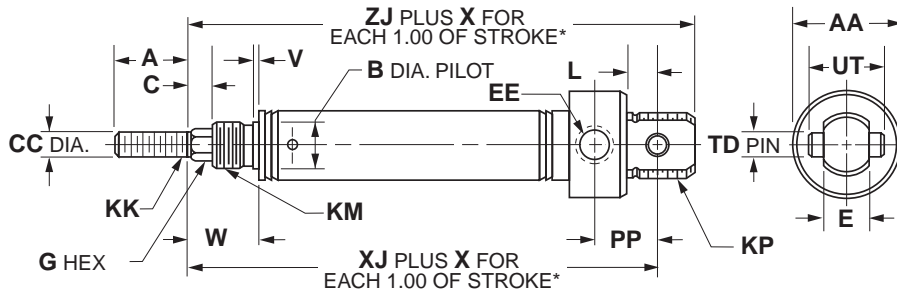
Bore	A	AA	B	C	CC	D	E	EE	J	KK	KM	V	W	X	ZJ	
															SR	SRM
7/16"	0.50	—	0.374	0.25	0.188	3/16	—	#10-32	0.19	#10-32 UNF	3/8-24	0.05	0.56	0.94	1.56	—
9/16"	0.50	—	0.437	0.25	0.188	3/16	—	#10-32	0.19	#10-32 UNF	7/16-20	0.06	0.62	1.62	1.78	2.03
3/4"	0.50	—	0.499	0.25	0.250	1/4	—	1/8 NPTF	0.19	1/4-28 UNF	1/2-20	0.09	0.69	1.69	1.75	2.00
7/8"	0.50	—	0.624	0.25	0.250	1/4	—	1/8 NPTF	0.19	1/4-28 UNF	5/8-18	0.09	0.75	1.56	2.09	—
1-1/16"	0.50	1.12	0.624	0.25	0.312	3/8	0.88	1/8 NPTF	0.19	5/16-24 UNF	5/8-18	0.09	0.75	1.56	2.19	2.44
1-1/4"	0.88	1.34	0.749	0.25	0.437	7/16	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	0.09	0.88	1.81	2.66	2.78
1-1/2"	0.88	1.56	0.749	0.38	0.437	7/16	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	0.09	1.00	1.69	2.56	2.81
1-3/4"	0.88	1.84	1.031	0.38	0.500	1/2	1.25	1/4 NPTF	0.25	1/2-20 UNF	1-14	0.09	1.12	2.0	3.03	3.15

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

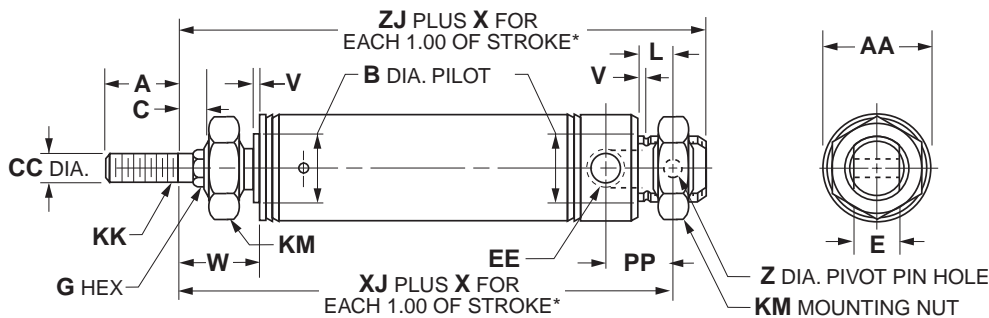
Mounting Style NRP

Pivot & Nose Mount, Spring Return, Hex Rod

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
7/16" *
3/4"



Bore Sizes
9/16" *
7/8" *
11/16" *
11/4" *
11/2" *
13/4"

*No Mounting Nuts

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	C	CC	E	EE
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.74	0.374	0.25	0.188	0.31	#10-32
9/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.62	0.437	0.25	0.188	0.31	#10-32
3/4"	●	●	1, 2, 3, 4	6	✓	0.50	0.86	0.499	0.25	0.250	0.38	1/8 NPTF
7/8"	●		1, 2, 3, 4	6	✓	0.50	0.93	0.624	0.25	0.250	0.38	1/8 NPTF
1-1/16"	●	●	1, 2, 3, 4	6	✓	0.50	1.12	0.624	0.25	0.312	0.38	1/8 NPTF
1-1/4"	●	●	1, 2, 3, 4	6	✓	0.88	1.34	0.749	0.25	0.437	0.50	1/8 NPTF
1-1/2"	●	●	1, 2, 3, 4	6	✓	0.88	1.56	0.749	0.38	0.437	0.62	1/8 NPTF
1-3/4"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6		0.88	1.84	1.031	0.38	0.500	0.62	1/4 NPTF

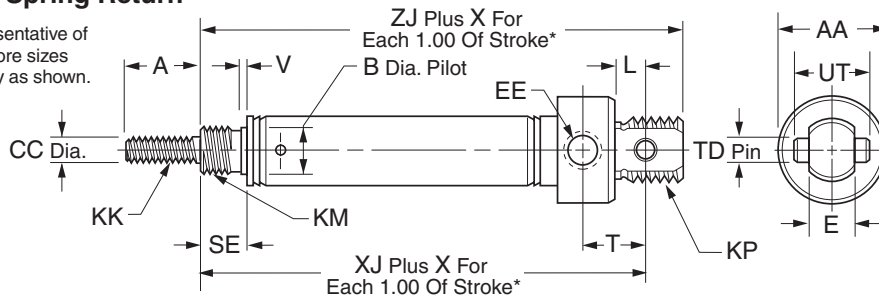
Bore	G HEX	KK	KM	KP	L	PP	TD	UT	V	W	X	XJ		Z	ZJ	
												SR	SRM		SR	SRM
7/16"	3/16	#10-32 UNF	3/8-24	7/16-20 UNF	0.25	0.44	0.156	0.50	0.05	0.56	0.94	2.00	-	-	2.25	-
9/16"	3/16	#10-32 UNF	7/16-20	7/16-20 UNF	0.25	0.38	-	-	0.06	0.62	1.62	2.06	2.31	0.157	2.25	2.50
3/4"	1/4	1/4-28 UNF	1/2-20	5/8-18 UNF	0.34	0.62	0.250	0.75	0.09	0.69	1.69	2.53	2.78	-	2.81	3.06
7/8"	1/4	1/4-28 UNF	5/8-18	5/8-18 UNF	0.34	0.62	0.250	0.75	0.09	0.75	1.56	2.72	-	-	3.00	-
1-1/16"	3/8	5/16-24 UNF	5/8-18	5/8-18 UNF	0.34	0.62	0.250	0.75	0.09	0.75	1.56	2.78	3.03	-	3.06	3.31
1-1/4"	7/16	7/16-20 UNF	3/4-16	-	0.41	0.78	0.251	-	0.09	0.88	1.81	3.38	3.50	0.251	3.78	3.91
1-1/2"	7/16	7/16-20 UNF	3/4-16	-	0.50	0.81	0.375	1.00	0.09	1.00	1.69	3.25	3.50	-	3.62	3.87
1-3/4"	1/2	1/2-20 UNF	1-14	-	0.50	1.12	0.376	0.62	0.09	1.12	2.0	4.09	4.21	0.376	4.59	4.71

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



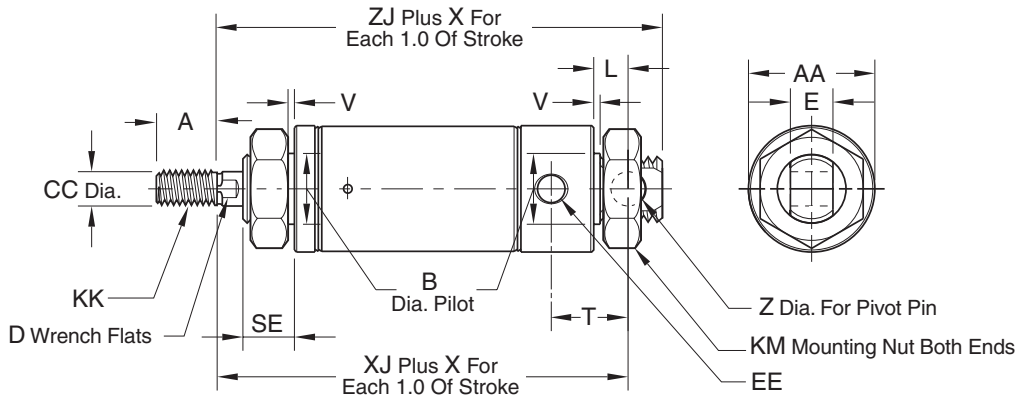
**Mounting Style P
 Pivot Mount, Spring Return**

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
5/16"
7/16"
3/4"

*With Mounting Nuts



Bore Sizes
9/16"
7/8"
1-1/16"
1-1/4"
1-1/2"
1-3/4"
2" *

*No Mounting Nuts

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	CC	D	E	EE
5/16"	●		1/2, 1, 1-1/2, 2, 3, 4	4	✓	0.38	0.39	—	0.125	—	0.25	#10-32
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.74	0.374	0.188	—	0.31	#10-32
9/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.62	0.437	0.188	—	0.31	#10-32
3/4"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.86	0.499	0.250	—	0.38	1/8 NPTF
7/8"	●		1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.93	0.624	0.250	—	0.38	1/8 NPTF
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	1.12	0.624	0.312	0.25	0.38	1/8 NPTF
1-1/4"	●	●	1, 2, 3, 4	6	✓	0.75	1.34	0.749	0.437	0.38	0.50	1/8 NPTF
1-1/2"	●	●	1, 2, 3, 4	6	✓	0.75	1.56	0.749	0.437	0.38	0.62	1/8 NPTF
1-3/4"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6		0.88	1.84	1.031	0.500	7/16	0.62	1/4 NPTF
2"	●	●	—	4		0.88	2.08	1.374	0.625	0.50	0.75	1/4 NPTF

Bore	KK	KM	KP	L	SE	T	TD	UT	V	X	XJ		Z	ZJ	
											SR	SRM		SR	SRM
5/16"	#5-40 UNC	3/8-24	—	0.34	0.25	0.34	—	—	—	0.75	1.52	—	0.125	1.68	—
7/16"	#10-32 UNF	3/8-24	7/16-20 UNF	0.25	0.31	0.44	0.156	0.50	0.05	0.94	1.75	—	—	2.00	—
9/16"	#10-32 UNF	7/16-20	7/16-20 UNF	0.25	0.38	0.38	—	—	0.06	1.62	1.81	2.06	0.157	2.00	2.25
3/4"	1/4-28 UNF	1/2-20	5/8-18 UNF	0.34	0.44	0.62	0.250	0.75	0.09	1.69	2.28	2.53	—	2.56	2.81
7/8"	1/4-28 UNF	5/8-18	5/8-18 UNF	0.34	0.50	0.62	0.250	0.75	0.09	1.56	2.47	—	—	2.75	—
1-1/16"	5/16-24 UNF	5/8-18	5/8-18 UNF	0.34	0.50	0.62	0.250	0.75	0.09	1.56	2.66	2.91	—	2.94	3.19
1-1/4"	7/16-20 UNF	3/4-16	—	0.41	0.63	0.78	—	—	0.09	1.81	3.38	3.91	0.251	3.78	3.50
1-1/2"	7/16-20 UNF	3/4-16	—	0.50	0.63	0.81	0.375	1.00	0.09	1.81	3.12	3.37	—	3.50	3.75
1-3/4"	1/2-20 UNF	1-14	—	0.50	0.75	1.12	—	—	0.09	2.0	4.03	4.15	0.376	4.53	4.65
2"	1/2-20 UNF	1-1/4-12	—	0.56	0.81	1.03	—	—	0.12	—	■	*	—	▲	◆

■ 6.34" for 1" stroke, 8.34" for 2" stroke, 9.59" for 3" stroke, 12.53" for 4" stroke*

▲ 6.78" for 1" stroke, 8.78" for 2" stroke, 10.03" for 3" stroke, 12.97" for 4" stroke*

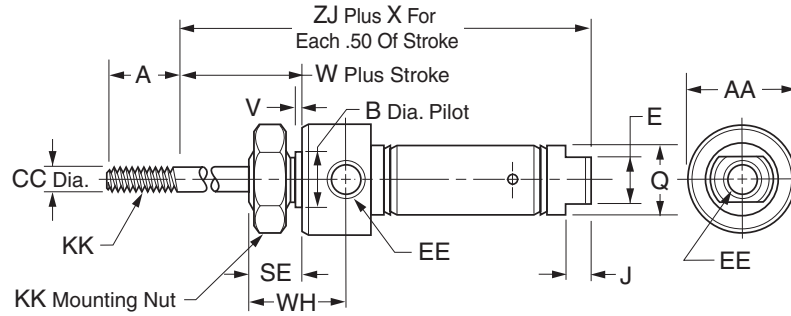
* 6.59" for 1" stroke, 8.59" for 2" stroke, 9.84" for 3" stroke, 12.78" for 4" stroke*

◆ 7.03" for 1" stroke, 9.03" for 2" stroke, 10.28" for 3" stroke, 13.22" for 4" stroke*

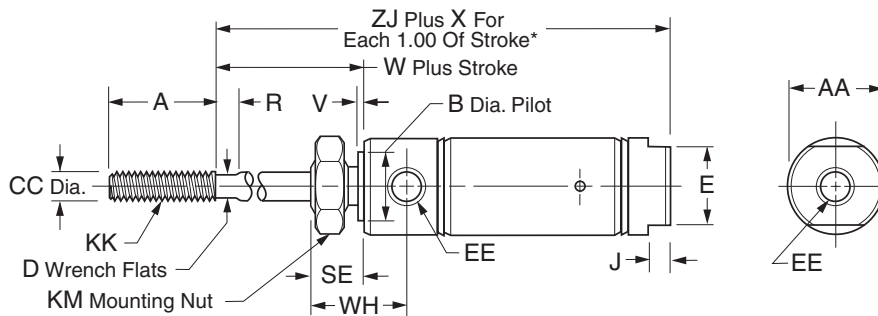
* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract a half inch.

**Mounting Style R
 Nose Mount, Spring Extended**

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
5/16"
7/16"
3/4"



Bore Sizes
9/16"
7/8"
1-1/16"
1-1/4"
1-1/2"
1-3/4"
2" *

*No Mounting Nut

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	CC	D	E
5/16"	●		1/2, 1, 1-1/2, 2, 2-1/2, 3	4	✓	0.38	0.50 SQ.	-	0.125	-	-
7/16"	●		1/2, 1, 1-1/2, 2, 3	6	✓	0.50	0.74	0.437	0.188	-	0.38
9/16"	●	●	1/2, 1, 1-1/2, 2, 3	6	✓	0.50	0.62	0.437	0.188	-	0.50
3/4"	●	●	1/2, 1, 2, 3, 4	6	✓	0.50	0.86	0.624	0.250	-	-
7/8"	●		1/2, 1, 2, 3, 4	6	✓	0.50	0.93	0.624	0.250	-	-
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	1.12	0.624	0.312	0.25	-
1-1/4"	●	●	1, 2, 3, 4	6	✓	0.75	1.34	0.749	0.437	0.38	-
1-1/2"	●	●	1, 2, 3, 4	6	✓	1.25	1.56	0.749	0.437	0.38	0.88
1-3/4"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	6		0.88	1.84	1.031	0.500	7/16	-
2"	●	●	-	4		0.88	2.08	1.374	0.625	0.50	-

Bore	EE	J	KK	KM	Q	R	SE	V	W	WH	X	ZJ	
												SR	SRM
5/16"	#10-32	-	#5-40 UNC	3/8-24	0.36	-	0.31	-	0.31	0.47	1.25	1.49	-
7/16"	#10-32	0.19	#10-32 UNF	7/16-20	0.50	-	0.38	0.05	0.38	0.72	1.44	1.94	-
9/16"	#10-32	0.19	#10-32 UNF	7/16-20	0.62	-	0.38	0.05	0.38	0.78	2.62	2.00	2.25
3/4"	1/8 NPTF	-	1/4-28 UNF	5/8-18	0.81	-	0.50	0.09	0.50	0.97	2.69**	2.31	2.56
7/8"	1/8 NPTF	-	1/4-28 UNF	5/8-18	-	-	0.50	0.09	0.50	0.97	2.56	2.31	-
1-1/16"	1/8 NPTF	-	5/16-24 UNF	5/8-18	-	0.12	0.50	0.09	0.62	1.06	2.81	2.62	2.87
1-1/4"	1/8 NPTF	-	7/16-20 UNF	3/4-16	-	0.25	0.62	0.09	0.88	1.38	2.81	3.47	3.60
1-1/2"	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	-	0.25	0.62	0.09	0.88	1.25	3.00	3.19	3.44
1-3/4"	1/4 NPTF	-	1/2-20 UNF	1-14	-	-	0.75	0.09	1.06	1.63	3.0	4.03	4.15
2"	1/4 NPTF	-	1/2-20 UNF	1-1/4-12	-	0.38	0.81	0.12	1.19	1.47	-	▲	◆

▲ 7.11" for 1" stroke, 10.11" for 2" stroke, 12.34" for 3" stroke, 16.34" for 4" stroke.*

◆ 7.36" for 1" stroke, 10.36" for 2" stroke, 12.59" for 3" stroke, 16.59" for 4" stroke*

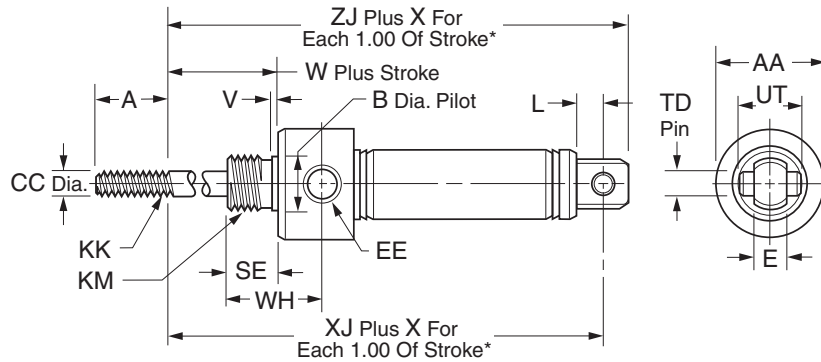
* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

** For each 1.00" of stroke.



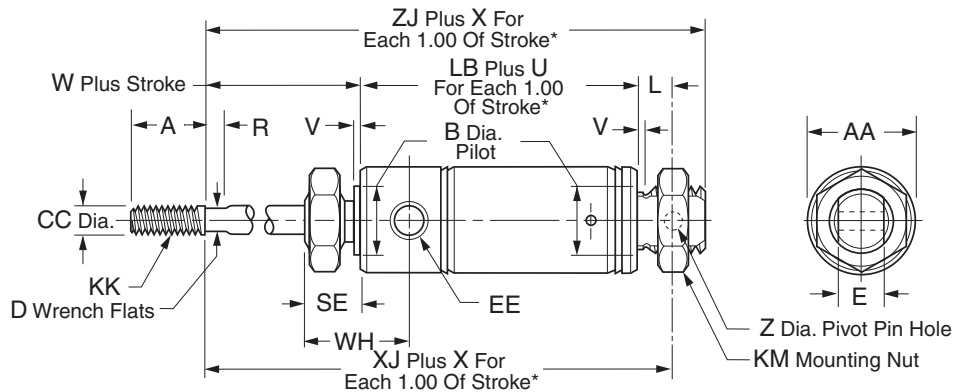
Mounting Style RP
Pivot and Nose Mount, Spring Extended

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes	
5/16"	**
7/16"	
3/4"	

*With Mounting Nuts



Bore Sizes	
9/16"	**
7/8"	**
1-1/16"	**
1-1/4"	
1-1/2"	**
1-3/4"	**
2"	*

*No Mounting Nuts

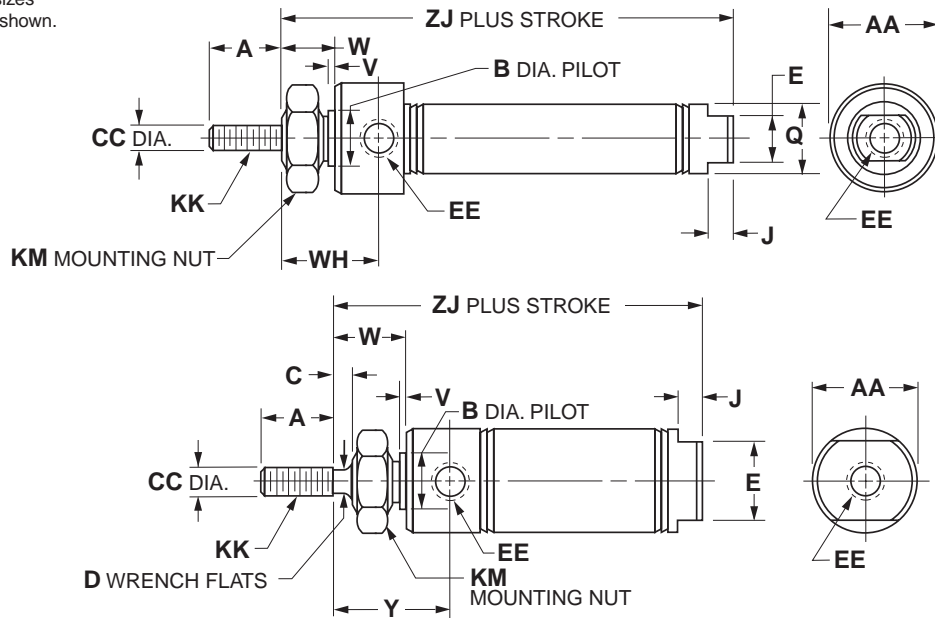
Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	CC	D	E	EE	KK
5/16"	●		1/2, 1, 1-1/2, 2, 2-1/2, 3	4	✓	0.38	0.50 SQ.	—	0.125	—	0.25	#10-32	#5-40 UNC
7/16"	●		1/2, 1, 1-1/2, 2, 3	6	✓	0.50	0.74	0.437	0.188	—	0.31	#10-32	#10-32 UNF
9/16"	●	●	1/2, 1, 1-1/2, 2, 3	6	✓	0.50	0.62	0.437	0.188	—	0.31	#10-32	#10-32 UNF
3/4"	●	●	1/2, 1, 2, 3, 4	6	✓	0.50	0.86	0.624	0.250	—	0.38	1/8 NPTF	1/4-28 UNF
7/8"	●		1/2, 1, 2, 3, 4	6	✓	0.50	0.93	0.624	0.250	—	0.38	1/8 NPTF	1/4-28 UNF
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	1.12	0.624	0.312	0.25	0.38	1/8 NPTF	5/16-24 UNF
1-1/4"	●	●	1, 2, 3, 4	6	✓	0.75	1.34	0.749	0.437	0.38	0.50	1/8 NPTF	7/16-20 UNF
1-1/2"	●	●	1, 2, 3, 4	6	✓	1.25	1.56	0.749	0.437	0.38	0.62	1/8 NPTF	7/16-20 UNF
2"	●	●	—	4		.88	2.08	1.374	0.625	0.50	0.75	1/4 NPTF	1/2-20 UNF

Bore	KM	L	LB	R	SE	TD	U	UT	V	W	WH	X	XJ		Z	ZJ	
													SR	SRM		SR	SRM
5/16"	3/8-24	0.19	—	—	0.31	—	—	—	—	0.31	0.47	1.25	1.88	—	—	2.04	—
7/16"	7/16-20	0.25	—	—	0.38	0.156	—	0.50	0.05	0.38	0.72	1.44	2.38	—	—	2.62	—
9/16"	7/16-20	0.25	—	—	0.38	—	—	—	0.06	0.38	0.78	2.62	2.28	2.53	0.157	2.47	2.72
3/4"	5/8-18	0.34	—	—	0.50	0.250	—	0.75	0.09	0.50	0.97	2.69	2.44	2.69	—	2.72	2.97
7/8"	5/8-18	0.34	—	—	0.50	0.250	—	0.75	0.09	0.50	0.97	2.56	2.63	—	—	2.91	—
1-1/16"	5/8-18	0.34	—	0.12	0.50	0.250	—	0.75	0.09	0.62	1.06	2.81	2.78	3.03	—	3.06	3.31
1-1/4"	3/4-16	0.41	2.47	0.25	0.62	—	1.81	—	0.09	0.88	1.38	2.81	3.78	3.91	0.251	4.16	4.28
1-1/2"	3/4-16	0.50	—	0.25	0.62	0.375	—	1.00	0.09	0.88	1.25	3.00	3.88	4.13	—	4.25	4.50
2"	1-1/4 -12	0.56	—	0.38	0.81	—	—	—	0.12	1.19	1.47	—	■	*	0.376	▲	◆

- 8.05" for 1" stroke, 11.05" for 2" stroke, 13.28" for 3" stroke, 17.28" for 4" stroke*
- ▲ 8.50" for 1" stroke, 11.50" for 2" stroke, 13.72" for 3" stroke, 17.72" for 4" stroke*
- * 8.31" for 1" stroke, 11.31" for 2" stroke, 13.53" for 3" stroke, 17.53 for 4" stroke*
- ◆ 8.75" for 1" stroke, 11.75" for 2" stroke, 13.97" for 3" stroke, 17.97 for 4" stroke*
- * To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

Mounting Style D
Nose Mount, Double Acting

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
5/16"
7/16"
3/4"

Bore Sizes
9/16"
7/8"
1-1/16"
1-1/4"
1-1/2"
1-3/4"
2" *
2-1/2" *
3" *

*No Mounting Nuts

Bore	SR	SRM	SRD SRDM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	C	CC
5/16"	●			1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	4	✓	0.38	0.50 SQ.	-	-	0.125
7/16"	●			1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.74	0.437	-	0.188
9/16"	●	●	●	1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.62	0.437	-	0.188
3/4"	●	●	●	1/2, 1, 2, 2-1/2, 3, 4, 5, 6, 8, 10	12	✓	0.50	0.86	0.624	-	0.250
7/8"	●			1/2, 1, 2, 3, 4, 5, 6	12	✓	0.50	0.93	0.624	-	0.250
1-1/16"	●	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12	12	✓	0.50	1.12	0.624	0.12	0.312
1-1/4"	●	●		1, 2, 3, 4, 5, 6	12	✓	0.75	1.34	0.749	0.25	0.437
1-1/2"	●	●	●	1/2, 1, 2, 3, 4, 5, 6, 8, 10, 12	12	✓	0.75	1.56	0.749	0.25	0.437
1-3/4"	●	●		1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6	12		0.88	1.84	1.031	0.31	0.500
2"	●	●	●	-	12		0.88	2.08	1.374	0.38	0.625
2-1/2"	●	●		-	12		0.88	2.62	1.500	0.38	0.625
3"	●			-	12		1.25	3.16	1.630	0.38	0.750

Bore	D	E	EE	J	KK	KM	Q	V	W	WH	Y	ZJ	
												SR	SRM
5/16"	-	-	#10-32	-	#5-40 UNC	3/8-24	0.36	-	0.31	0.47	-	1.64	-
7/16"	-	0.38	#10-32	0.19	#10-32 UNF	7/16-20	0.50	0.05	0.38	0.72	-	2.12	-
9/16"	-	0.50	#10-32	0.19	#10-32 UNF	7/16-20	-	0.06	0.38	0.78	-	2.28	2.53
3/4"	-	0.62	1/8 NPTF	0.19	1/4-28 UNF	5/8-18	0.81	0.09	0.50	0.97	-	2.97	2.97
7/8"	-	0.62	1/8 NPTF	0.19	1/4-28 UNF	5/8-18	-	0.09	0.50	0.97	-	2.94	-
1-1/16"	0.25	0.88	1/8 NPTF	0.19	5/16-24 UNF	5/8-18	-	0.09	0.62	-	1.19	3.25	3.41
1-1/4"	0.38	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	-	0.09	0.88	-	1.62	4.00	4.03
1-1/2"	0.38	0.88	1/8 NPTF	0.25	7/16-20 UNF	3/4-16	-	0.09	0.88	-	1.50	3.69	3.94
1-3/4"	7/16	1.25	1/4 NPTF	0.25	1/2-20 UNF	1-14	-	0.09	1.06	1.63	-	4.69	4.69
2"	0.50	1.25	1/4 NPTF	0.31	1/2-20 UNF	1-1/4-12	-	0.12	1.19	-	1.84	4.69	4.97
2-1/2"	1/2	1.75	1/4 NPTF	0.31	1/2-20 UNF	1-3/8-12	-	0.13	1.19	-	1.84	4.69	4.69
3"	5/8	2.00	3/8 NPTF	0.31	5/8-18 UNF	1-1/2-12	-	0.19	1.38	-	2.09	5.25	-

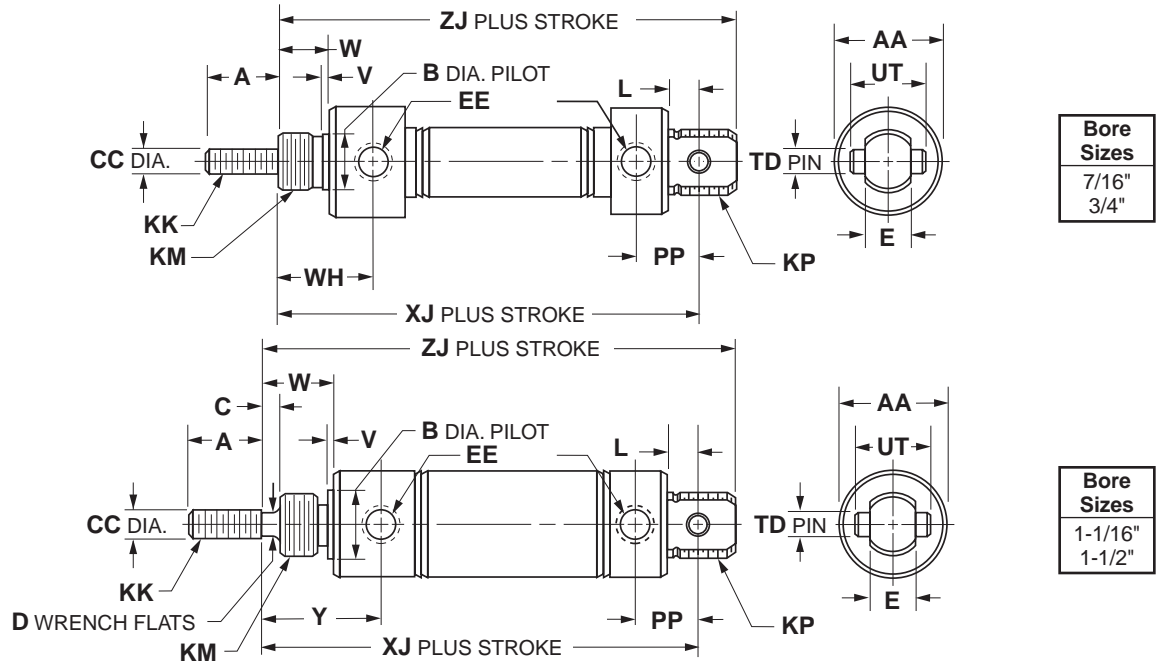


Mounting Style DP

Pivot and Nose Mount, Double Acting, Pivot Pin

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.

D



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod	A	AA	B	CC	D	E
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.74	0.437	0.188	–	0.31
3/4"	●	●	1/2, 1, 2, 2-1/2, 3, 4, 5, 6, 8, 10	12	✓	0.50	0.86	0.624	0.250	–	0.38
1-1/16"	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12	12	✓	0.50	1.12	0.624	0.312	0.25	0.38
1-1/2"	●	●	1, 2, 3, 4, 5, 6, 8, 10, 12	12	✓	0.75	1.56	0.749	0.437	0.38	0.62

Bore	EE	KK	KM	KP	L	PP	TD	UT	V	W	WH	XJ		Y	ZJ	
												SR	SRM		SR	SRM
7/16"	#10-32	#10-32 UNF	7/16-20	7/16-20 UNF	0.25	0.44	0.156	0.50	0.05	0.38	0.72	2.56	–	–	2.81	–
3/4"	1/8 NPTF	1/4-28 UNF	5/8-18	5/8-18 UNF	0.34	0.62	0.250	0.75	0.09	0.50	0.97	3.75	3.75	–	4.03	4.03
1-1/16"	1/8 NPTF	5/16-24 UNF	5/8-18	5/8-18 UNF	0.34	0.62	0.250	0.75	0.09	0.62	–	3.84	4.00	1.19	4.12	4.28
1-1/2"	1/8 NPTF	7/16-20 UNF	3/4-16	–	0.50	0.81	0.375	1.00	0.09	0.87	–	4.38	4.63	1.50	4.75	5.00

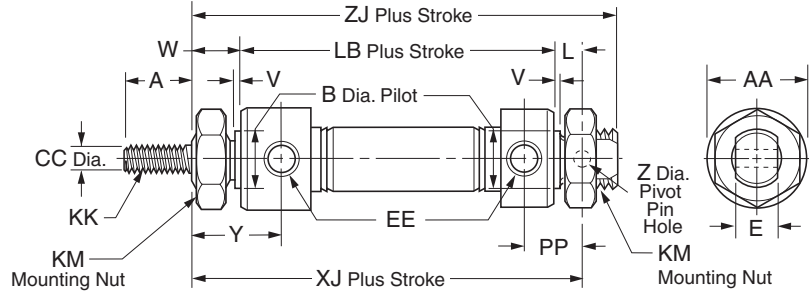


Mounting Style DXP

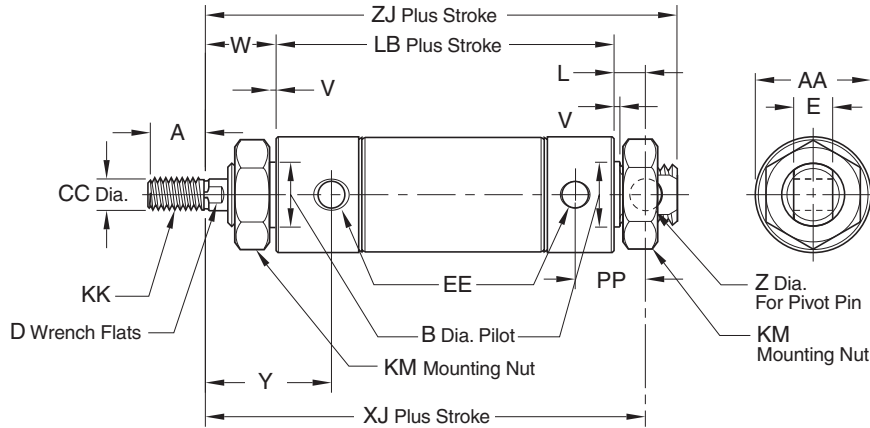
Pivot & Nose Mount, Double Acting, No Pivot Pin

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.

NOTE: Strokes over 12" must be supported at both ends.



Bore Sizes
5/16"
7/16"
3/4"



Bore Sizes
9/16"*
7/8"
1-1/16"
1-1/4"
1-1/2"
1-3/4"
2" *
2-1/2" *
3" *

*No Mounting Nuts

Bore	SR	SRM	SRD SRDM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	CC	D	E
5/16"	●			1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	4	✓	0.38	0.50 SQ.	-	0.125	-	0.25
7/16"	●			1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.74	0.437	0.188	-	0.31
9/16"	●	●	●	1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.62	0.437	0.188	-	0.31
3/4"	●	●	●	1, 2, 3, 4, 5, 6, 8, 10	32	✓	0.50	0.86	0.624	0.250	-	0.38
7/8"	●			1, 2, 3, 4, 5, 6, 8, 10	32	✓	0.50	0.93	0.624	0.250	-	0.38
1-1/16"	●	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12	32	✓	0.50	1.12	0.624	0.312	0.25	0.38
1-1/4"	●	●		1, 2, 3, 4, 5, 6, 7, 8, 10, 12	32	✓	0.75	1.34	0.749	0.437	0.38	0.50
1-1/2"	●	●	●	-	32	✓	0.75	1.56	0.749	0.437	0.38	0.62
1-3/4"	●	●		1, 2, 3, 4, 5, 6, 8, 10, 12	32		0.88	1.84	1.031	0.500	7/16	0.62
2"	●	●	●	-	32		0.88	2.08	1.374	0.625	0.50	0.75
2-1/2"	●	●		-	32		0.88	2.62	1.500	0.625	1/2	0.75
3"	●			-	32		1.25	3.16	1.630	0.750	5/8	0.88

Bore	EE	KK	KM	L	LB	PP	V	W	XJ		Y	Z	ZJ	
									SR	SRM			SR	SRM
5/16"	#10-32	#5-40 UNC	3/8-24	0.19	-	0.34	-	0.31	2.03	-	-	0.125	2.19	-
7/16"	#10-32	#10-32 UNF	7/16-20	0.25	1.94	0.44	0.05	0.38	2.56	-	0.72	0.157	2.81	-
9/16"	#10-32	#10-32 UNF	7/16-20	0.25	-	0.38	0.06	0.38	2.56	2.81	0.78	0.157	2.75	3.00
3/4"	1/8 NPTF	1/4-28 UNF	5/8-18	0.34	2.91	0.62	0.09	0.50	3.75	3.75	0.97	0.251	4.03	4.03
7/8"	1/8 NPTF	1/4-28 UNF	5/8-18	0.34	-	0.62	0.09	0.50	3.56	-	0.97	0.251	3.84	-
1-1/16"	1/8 NPTF	5/16-24 UNF	5/8-18	0.34	-	0.62	0.09	0.62	3.84	-	1.19	0.251	4.12	4.28
1-1/4"	1/8 NPTF	7/16-20 UNF	3/4-16	0.41	-	0.78	0.09	0.88	4.72	4.75	1.62	0.251	5.12	5.16
1-1/2"	1/8 NPTF	7/16-20 UNF	3/4-16	0.50	-	0.81	0.09	0.88	4.38	4.63	1.50	0.376	4.75	5.00
1-3/4"	1/4 NPTF	1/2-20 UNF	1-14	0.50	4.19	1.12	0.09	1.06	5.75	5.75	1.94	0.376	6.25	6.25
2"	1/4 NPTF	1/2-20 UNF	1-1/4-12	0.56	-	1.03	0.12	1.19	5.62	5.91	-	0.376	6.06	6.34
2-1/2"	1/4 NPTF	1/2-20 UNF	1-3/8-12	0.56	-	1.03	0.13	1.19	5.62	5.62	1.84	0.376	6.06	6.06
3"	3/8 NPTF	5/8-18 UNF	1-1/2-12	0.81	-	1.34	0.19	1.38	6.50	-	2.09	0.500	7.12	-



D

SR/SRM, SRD/SRDM

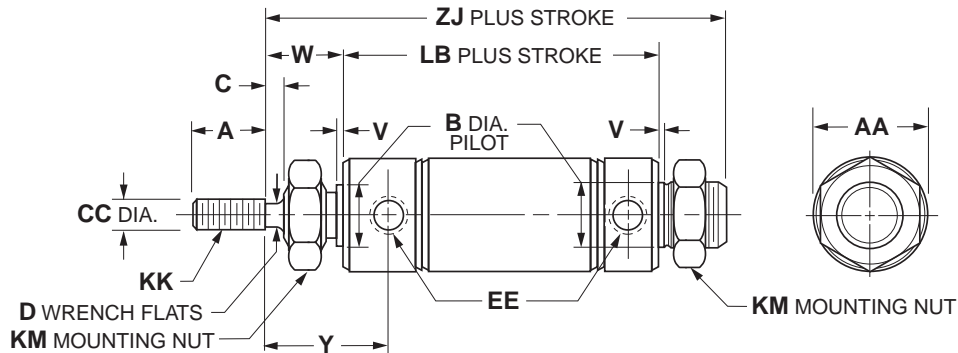
SRX

P1L

P

Mounting Style DX
Threaded Both Ends, Double Acting

Drawing represents 1-1/2" bore size. For other sizes, reference art for DXP on previous page.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16" *	●		1/2, 1, 1-1/2, 2, 3, 4	12	✓
9/16" *	●	●	1/2, 1, 1-1/2, 2, 3, 4	12	✓
3/4" *	●	●	1, 2, 3, 4, 5, 6, 8, 10	32	✓
7/8" *	●	●	1, 2, 3, 4, 5, 6, 8, 10	32	✓
1-1/16" *	●	●	1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12	32	✓
1-1/4" *	●	●	1, 2, 3, 4, 5, 6, 7, 8, 10, 12	32	✓
1-1/2"	●	●	1, 2, 3, 4, 5, 6, 8, 10, 12	32	✓
2" *	●	●	—	32	

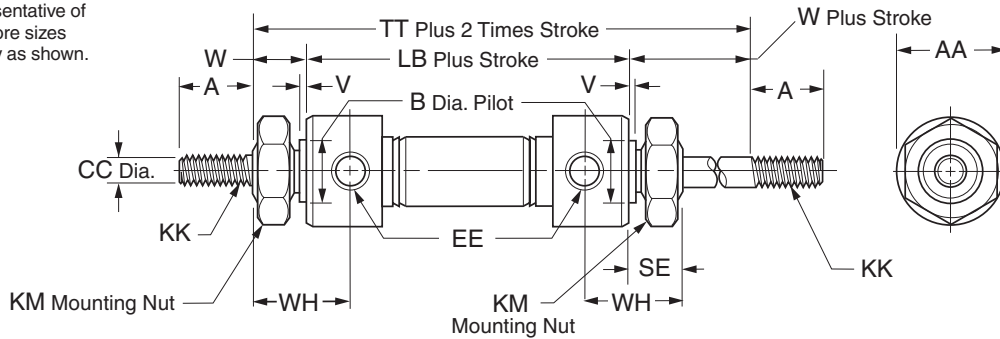
Bore	A	AA	B	C	CC	D	EE	KK	KM	LB		V	W	Y	ZJ	
										SR	SRM				SR	SRM
7/16" *	0.50	0.74	0.437	—	0.188	—	#10-32	#10-32 UNF	7/16-20	1.94		0.05	0.38	0.72	2.81	
9/16" *	0.50	0.62	0.437	—	0.188	—	#10-32	#10-32 UNF	7/16-20	—		0.06	0.38	0.78	2.75	
3/4" *	0.50	0.86	0.624	—	0.250	—	1/8 NPTF	1/4-28 UNF	5/8-18	2.91		0.09	0.50	0.97	4.03	
7/8" *	0.50	0.93	0.624	—	0.250	—	1/8 NPTF	1/4-28 UNF	5/8-18	—		0.09	0.50	0.97	3.84	
1-1/16" *	0.50	1.12	0.624	0.12	0.312	0.25	1/8 NPTF	5/16-24 UNF	5/8-18	—		0.09	0.62	1.19	4.12	
1-1/4" *	0.75	0.34	0.749	0.25	0.437	0.38	1/8 NPTF	7/16-20 UNF	3/4-16	—		0.09	0.88	1.62	5.12	
1-1/2"	0.75	1.56	0.749	0.25	0.437	0.38	1/8 NPTF	7/16-20 UNF	3/4-16	3.00		0.09	0.88	1.50	4.50	
2" *	0.88	2.08	1.374	0.38	0.625	0.50	1/4 NPTF	1/2-20 UNF	1-1/4-12	—		0.12	1.19	—	6.06	

* Available upon request.
 Please consult factory.

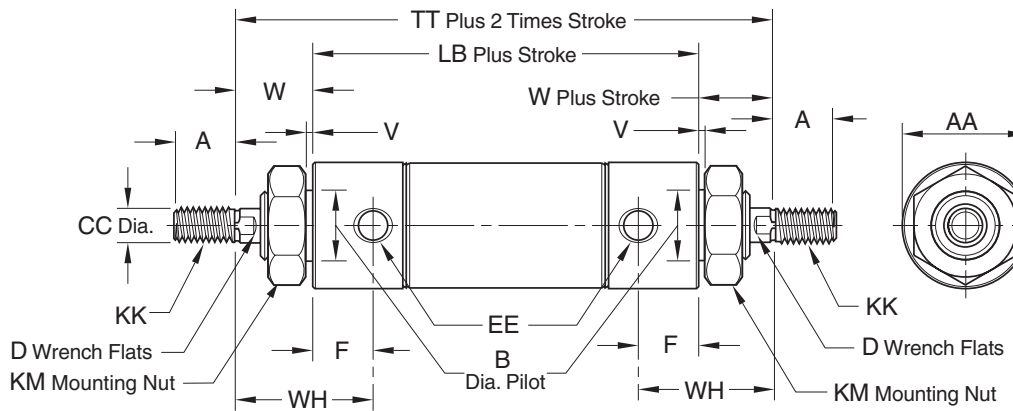
Mounting Style KDX

Threaded Both Ends, Double Acting, Double Rod

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes	
7/16"	3/4"



Bore Sizes	
9/16"	7/8"
1-1/16"	1-1/4"
1-1/2"	1-3/4"
2" *	2-1/2" *
3" *	

*No Mounting Nut

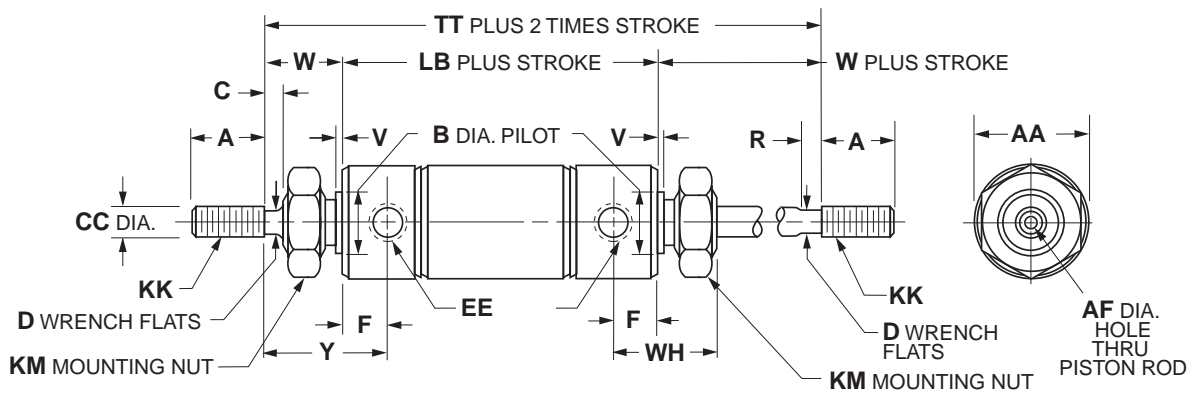
Bore	SR	SRM	SRD SRDM	Std. Stroke (in)	Max Stroke (in)	SS Rod	A	AA	B	CC
7/16"	●			1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.74	0.437	0.188
9/16"	●	●	●	1/2, 1, 1-1/2, 2, 3, 4	6	✓	0.50	0.62	0.437	0.188
3/4"	●	●	●	1, 2, 3, 4, 5, 6	12	✓	0.50	0.86	0.624	0.250
7/8"	●			1, 2, 3, 4, 6	12	✓	0.50	0.93	0.624	0.250
1-1/16"	●	●	●	1, 2, 3, 4, 5, 6	12	✓	0.50	1.12	0.624	0.312
1-1/4"	●	●		1, 2, 3, 4, 5, 6	12	✓	0.75	1.34	0.749	0.437
1-1/2"	●	●	●	1, 2, 3, 4, 5, 6	12	✓	0.75	1.56	0.749	0.437
1-3/4"	●	●		1, 2, 3, 4, 5, 6	12	✓	0.88	1.84	1.031	0.500
2"	●	●	●	-	12	✓	0.88	2.08	1.374	0.625
2-1/2"	●	●		-	18	✓	0.88	2.62	1.500	0.625
3"	●			-	12	✓	1.25	3.16	1.630	0.750

Bore	D	EE	F	KK	KM	LB		SE	TT		V	W	WH
						SR	SRM		SR	SRM			
7/16"	-	#10-32	0.34	#10-32 UNF	7/16-20	2.06	-	0.38	2.81	-	0.05	0.38	0.72
9/16"	-	#10-32	0.40	#10-32 UNF	7/16-20	2.19	2.44	0.38	2.94	3.19	0.06	0.38	0.78
3/4"	-	1/8 NPTF	0.47	1/4-28 UNF	5/8-18	3.00	3.00	0.50	4.00	4.00	0.09	0.50	0.97
7/8"	-	1/8 NPTF	0.47	1/4-28 UNF	5/8-18	2.91	-	0.50	3.91	-	0.09	0.50	0.97
1-1/16"	0.25	1/8 NPTF	0.56	5/16-24 UNF	5/8-18	2.75	3.28	0.50	4.00	4.53	0.09	0.62	1.19
1-1/4"	0.38	1/8 NPTF	0.75	7/16-20 UNF	3/4-16	3.81	3.84	0.63	5.56	5.59	0.09	0.88	1.62
1-1/2"	0.38	1/8 NPTF	0.62	7/16-20 UNF	3/4-16	3.38	3.63	0.63	5.12	5.38	0.09	0.88	1.50
1-3/4"	7/16	1/4 NPTF	0.88	1/2-20 UNF	1-14	4.44	4.69	0.75	6.56	6.81	0.09	1.06	1.94
2"	0.50	1/4 NPTF	0.65	1/2-20 UNF	1-1/4-12	4.19	4.47	-	6.56	6.84	0.12	1.19	1.84
2-1/2"	1/2	1/4 NPTF	0.65	1/2-20 UNF	1-3/8-12	4.19	4.19	-	6.56	6.56	0.13	1.19	1.84
3"	5/8	3/8 NPTF	0.71	5/8-18 UNF	1-1/2-12	4.56	-	-	7.31	-	0.19	1.38	2.09



Mounting Style KDXH
Threaded Both Ends, Double Rod, Hollow Rod

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



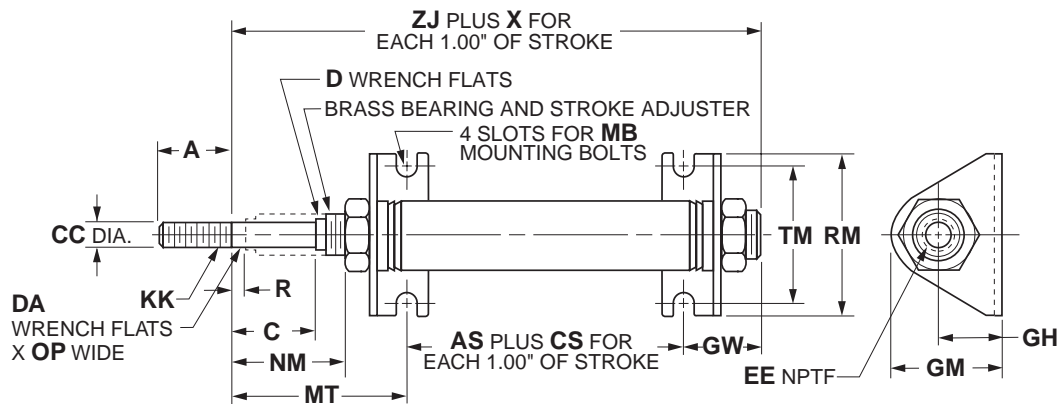
Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod	A	AA	AF	B	C	CC
1-1/16"	●	●	1, 2, 3, 4, 5, 6	12	N/A	0.50	1.12	0.187	0.624	0.12	0.312
1-1/4"	●	●	1, 2, 3, 4, 5, 6	12	N/A	0.75	1.34	0.250	0.749	0.25	0.437
1-1/2"	●	●	1, 2, 3, 4, 5, 6	12	N/A	0.75	1.56	0.250	0.749	0.25	0.437
1-3/4"	●	●	1, 2, 3, 4, 5, 6	12	N/A	0.88	1.84	0.328	1.031	0.38	0.500

Bore	D	EE	F	KK	KM	LB		R	TT		V	W	WH	Y
						SR	SRM		SR	SRM				
1-1/16"	0.25	1/8 NPTF	0.56	5/16-24 UNF	5/8-18	2.75	3.28	0.12	4.00	4.53	0.09	0.62	1.06	1.19
1-1/4"	0.38	1/8 NPTF	0.75	7/16-20 UNF	3/4-16	3.81	3.84	0.25	5.56	5.59	0.09	0.88	1.38	1.62
1-1/2"	0.38	1/8 NPTF	0.62	7/16-20 UNF	3/4-16	3.38	3.63	0.25	5.12	5.38	0.09	0.88	1.25	1.50
1-3/4"	7/16	1/4 NPTF	0.88	1/2-20 UNF	1-14	4.44	4.44	-	6.56	6.56	0.09	1.06	1.63	1.63



Mounting Style A
Nose Mount, Spring Return, Head Adjustable Stroke

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke	Max Stroke (in)	SS Rod Std
3/4"	●		Stroke adjustment in 1" increments to 3": 1" stroke adjusts 0-1" 2" stroke adjusts 1-2" 3" stroke adjusts 2-3"	6	✓
1-1/16"	●			6	✓
1-1/2"	●			6	✓

Bore	A	AS	C	CC	CS	D	EE	GH	GM	GW
3/4"	0.50	—	1.19	0.250	1.69	—	1/8 NPTF	0.81	1.38	0.88
1-1/16"	0.50	0.32	1.25	0.312	1.56	0.25	1/8 NPTF	0.81	1.38	0.93
1-1/2"	0.75	0.19	1.25	0.437	2.00	0.62	1/8 NPTF	1.00	1.78	1.25

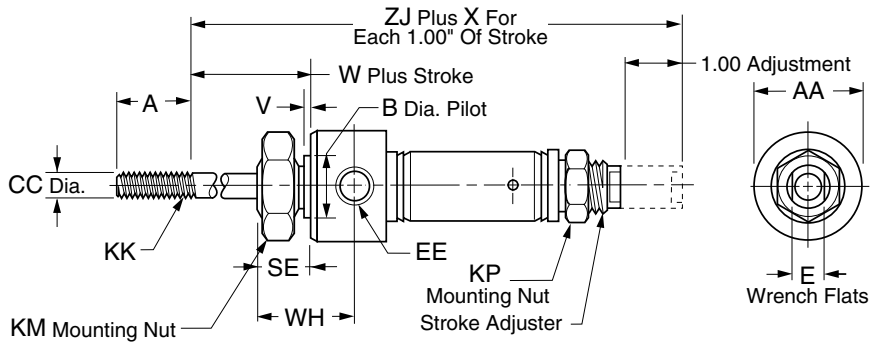
Bore	KK	MB	MT	NM	OP	R	RM	TM	X	ZJ
3/4"	1/4-28 UNF	0.250	2.38	1.44	—	0.19	1.88	1.50	1.69	3.12
1-1/16"	5/16-24 UNF	0.250	2.38	1.44	0.12	0.25	1.88	1.50	1.56	3.63
1-1/2"	7/16-20 UNF	0.250	2.56	1.50	—	0.25	2.50	1.88	2.00	4.00



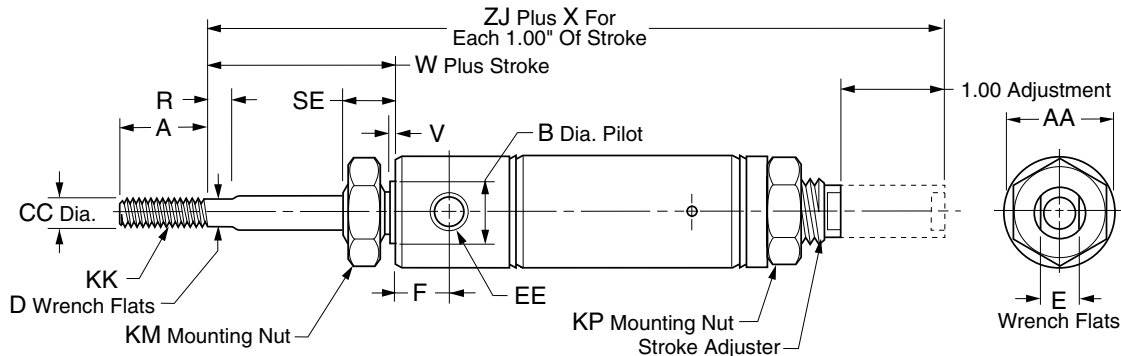
Mounting Style RA

Nose Mount, Spring Return, Cap Adjustable Stroke

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
3/4"



Bore Sizes
1-1/16"
1-1/2"

Bore	SR	SRM	Std. Stroke	Max Stroke (in)	SS Rod Std
3/4"	●		Stroke adjustment in 1" increments to 3": 1" stroke adjusts 0-1" 2" stroke adjusts 1-2" 3" stroke adjusts 2-3"	6	✓
1-1/16"	●			6	✓
1-1/2"	●			6	✓

Bore	A	AS	AA	B	CC	D	E	EE	F
3/4"	0.50	1.69	0.86	0.624	0.250	–	0.34	1/8 NPTF	–
1-1/16"	0.50	0.32	1.12	0.624	0.312	0.25	0.50	1/8 NPTF	0.56
1-1/2"	1.25	0.19	1.56	0.749	0.437	0.38	0.62	1/8 NPTF	0.62

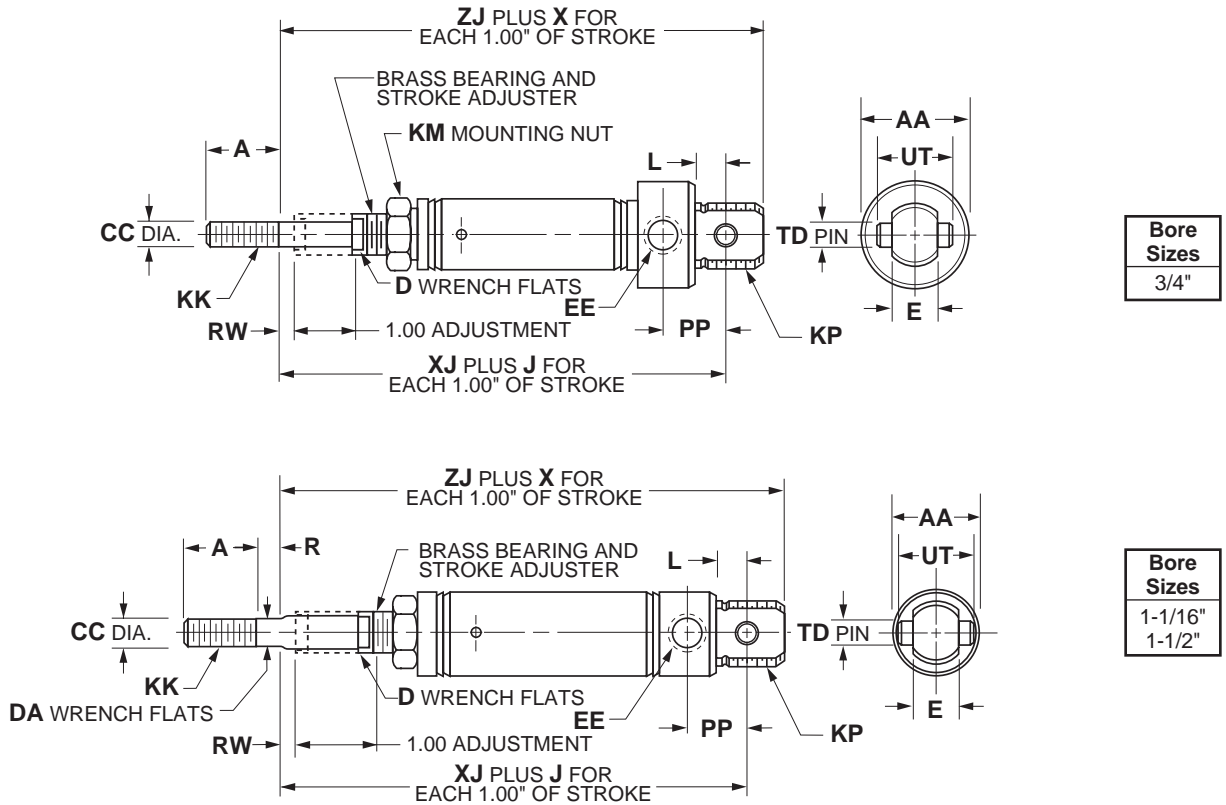
Bore	KK	KM	SE	R	V	W	WH	X	ZJ
3/4"	1/4-28 UNF	5/8-18	0.50	–	0.09	0.53	0.97	2.69	3.78
1-1/16"	5/16-24 UNF	5/8-18	0.50	0.12	0.09	0.50	–	2.56	4.03
1-1/2"	7/16-20 UNF	3/4-16	0.62	0.25	0.09	0.88	–	2.00	5.81



Mounting Style AP

Pivot Mount, Spring Return, Head Adjustable Stroke

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke	Max Stroke (in)	SS Rod Std
3/4"	●		Stroke adjustment in 1" increments to 3": 1" stroke adjusts 0-1" 2" stroke adjusts 1-2" 3" stroke adjusts 2-3"	6	✓
1-1/16"	●			6	✓
1-1/2"	●			6	✓

Bore	A	AA	CC	D	DA	E	EE	J	KK
3/4"	0.50	0.86	0.250	0.34	—	0.38	1/8 NPTF	1.69	1/4-28 UNF
1-1/16"	0.50	1.12	0.312	0.50	0.25	0.38	1/8 NPTF	1.56	5/16-24 UNF
1-1/2"	0.75	1.56	0.437	0.62	0.38	0.62	1/8 NPTF	2.00	7/16-20 UNF

Bore	KM	KP	L	OP	PP	R	RW	TD	UT	X	XJ	ZJ
3/4"	7/16-20	5/8-18 UNF	0.34	—	0.62	0.19	0.19	0.250	0.75	1.69	3.65	3.93
1-1/16"	—	5/8-18 UNF	0.34	0.25	0.62	0.12	0.25	0.250	0.75	1.56	3.97	4.25
1-1/2"	3/4-16	—	0.50	—	0.81	0.25	0.25	0.375	1.00	2.00	4.31	4.69



D

SR/SRM, SRD/SRDM

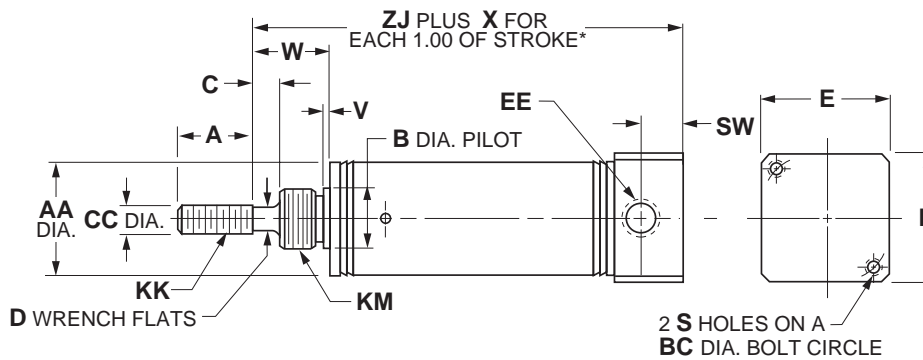
SRX

P1L

P

Mounting Style BRN
Rear Block Mount, Single Acting, Spring Return

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 2, 3, 4	6	✓
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	C	CC	D	E	EE
7/16"	0.50	0.5	0.374	–	0.188	–	0.75	#10-32
3/4"	0.75	0.81	0.499	0.25	0.250	0.22	1.00	1/8 NPTF
1-1/16"	0.75	1.12	0.624	0.38	0.312	0.25	1.25	1/8 NPTF
1-1/2"	1.25	1.56	0.749	0.25	0.437	0.38	1.75	1/4 NPTF

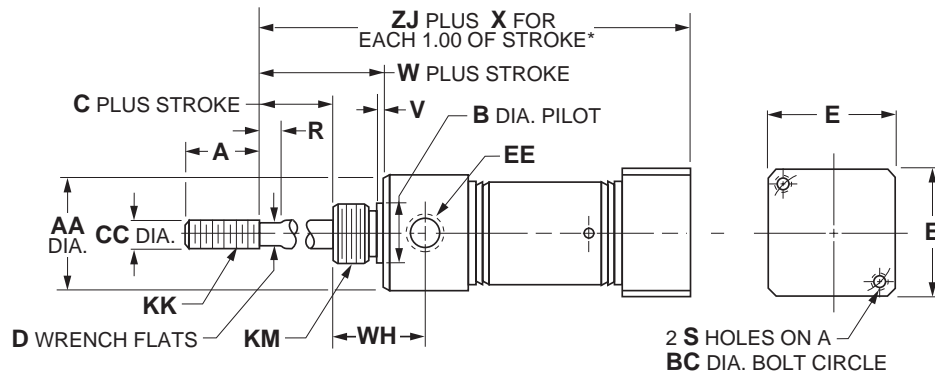
Bore	KK	KM	SW	V	W	X	ZJ	
							SR	SRM
7/16"	#10-32 UNF	3/8-24	0.38	0.05	0.31	0.94	1.62	–
3/4"	1/4-28 UNF	1/2-20	0.44	0.09	0.62	1.69	2.31	2.56
1-1/16"	5/16-24 UNF	5/8-18	0.44	0.09	0.88	1.81	2.81	3.06
1-1/2"	7/16-20 UNF	3/4-16	0.62	0.09	0.88	2.00	3.06	3.31

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

Mounting Style BRR

Rear Block Mount, Single Acting, Spring Extend

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	BC	C	CC	D	E	EE
3/4"	0.75	0.86	0.624	1.00	0.25	0.250	0.22	1.00	1/8 NPTF
1-1/16"	0.75	1.12	0.624	1.25	0.38	0.312	0.25	1.25	1/8 NPTF
1-1/2"	1.25	1.56	0.749	1.75	0.25	0.437	0.38	1.75	1/4 NPTF

Bore	KK	KM	R	S	V	W	WH	X	ZJ	
									SR	SRM
3/4"	1/4-28 UNF	5/8-18	0.25	#10-32 UNF	0.09	0.75	0.97	2.69	3.22	3.47
1-1/16"	5/16-24 UNF	5/8-18	0.25	#10-32 UNF	0.09	0.88	1.06	2.81	3.53	3.78
1-1/2"	7/16-20 UNF	3/4-16	0.25	1/4-20 UNC	0.09	0.88	1.25	3.00	3.88	4.13

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



D

SR/SRM, SRD/SRDM

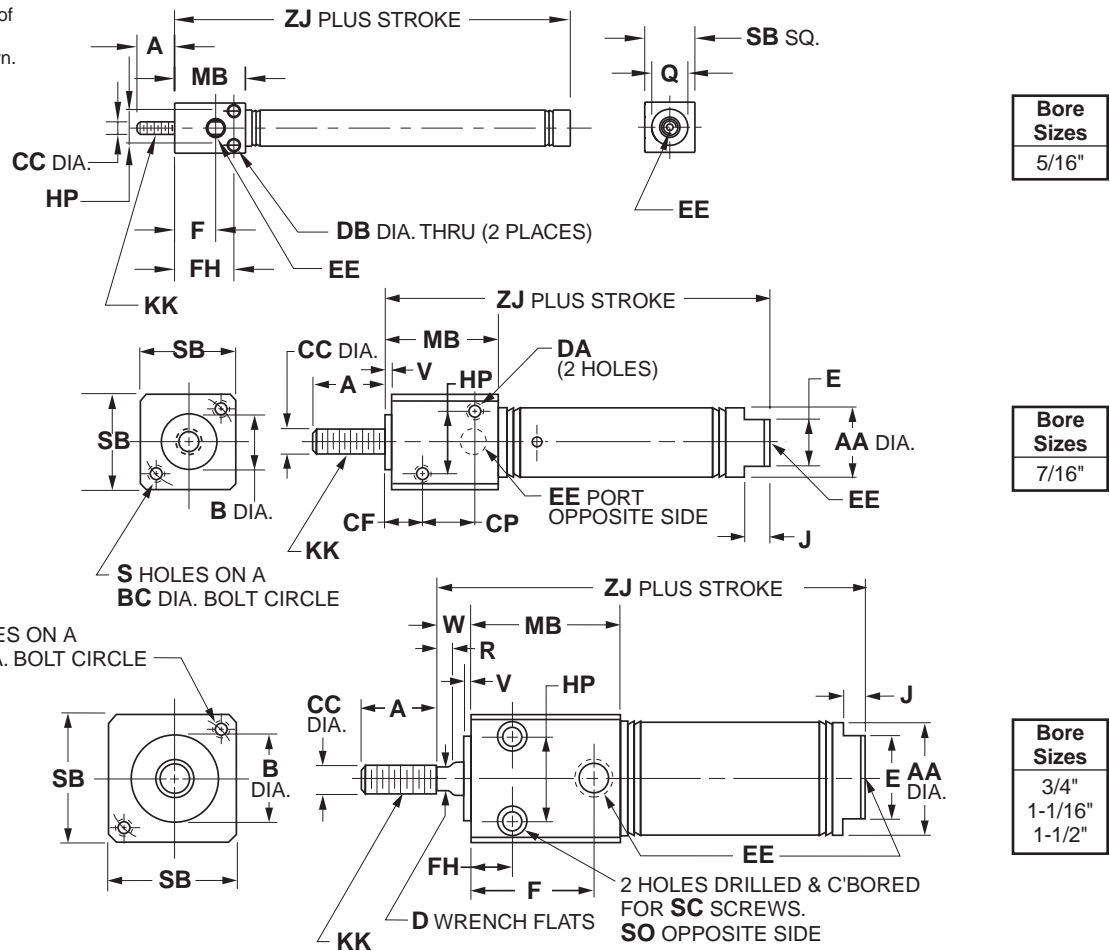
SRX

P1L

P

**Mounting Style BFD
 Front Block Mount, Double Acting**

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



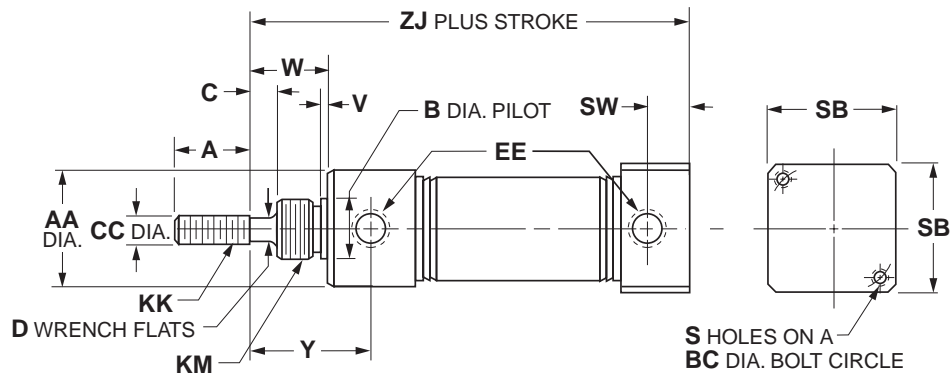
Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std	A	AA	B	BC	CC
5/16"	●		1/2, 1, 1-1/2, 2, 2-1/2, 3, 4	4	✓	0.38	-	-	-	0.125
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	12	✓	0.50	0.50	0.437	0.75	0.188
3/4"	●	●	1/2, 1, 2, 3, 4, 5, 6	12	✓	0.75	0.81	0.624	1.00	0.250
1-1/16"	●	●	1, 2, 3, 4, 5, 6	12	✓	0.75	1.12	0.750	1.25	0.312
1-1/2"	●	●	1, 2, 3, 4, 5, 6	12	✓	1.25	1.56	1.00	1.75	0.437

Bore	CF	CP	D	DA	DB	E	EE	F	FH	HP	J
5/16"	-	-	-	-	0.11	-	#10-32	0.41	0.59	0.34	-
7/16"	0.31	0.44	-	#8-32	-	0.38	#10-32	-	0.31	0.44	0.19
3/4"	-	-	0.22	-	-	0.62	1/8 NPTF	0.88	0.38	0.62	0.19
1-1/16"	-	-	0.25	-	-	0.88	1/8 NPTF	1.16	0.62	0.81	0.19
1-1/2"	-	-	0.38	-	-	0.88	1/4 NPTF	1.53	0.88	1.12	0.25

Bore	KK	MB	Q	R	S	SB	SC	SO	V	W	ZJ	
											SR	SRM
5/16"	#5-40 UNC	0.71	0.36	-	-	0.50 SQ	-	-	-	-	1.72	-
7/16"	#10-32 UNF	0.88	-	-	#8-32 UNC	0.75	-	-	0.062	-	2.12	-
3/4"	1/4-28 UNF	1.12	-	-	#10-32 UNF	1.00	#10-32	1/4-20 UNC	0.093	0.34	3.22	3.22
1-1/16"	5/16-24 UNF	1.41	-	0.25	#10-32 UNF	1.25	#10-32	1/4-20 UNC	0.093	0.47	3.75	3.91
1-1/2"	7/16-20 UNF	1.88	-	-	1/4-20 UNC	1.75	1/4-20	5/16-18 UNC	0.125	0.38	4.19	4.44

Mounting Style BRD
Rear Block Mount, Double Acting

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 2, 3, 4	12	✓
3/4"	●	●	1, 2, 3, 4, 5, 6	12	✓
1-1/16"	●	●	1, 2, 3, 4	12	✓
1-1/2"	●	●	1, 2, 3, 4, 5, 6	12	✓

Bore	A	AA	B	BC	C	CC	D	EE	KK
7/16"	0.50	0.74	0.437	0.75	–	0.188	–	#10-32	#10-32 UNF
3/4"	0.75	0.86	0.624	1.00	0.25	0.250	0.22	1/8 NPTF	1/4-28 UNF
1-1/16"	0.75	1.12	0.624	1.25	0.38	0.312	0.25	1/8 NPTF	5/16-24 UNF
1-1/2"	1.25	1.56	0.749	1.75	0.25	0.437	0.38	1/4 NPTF	7/16-20 UNF

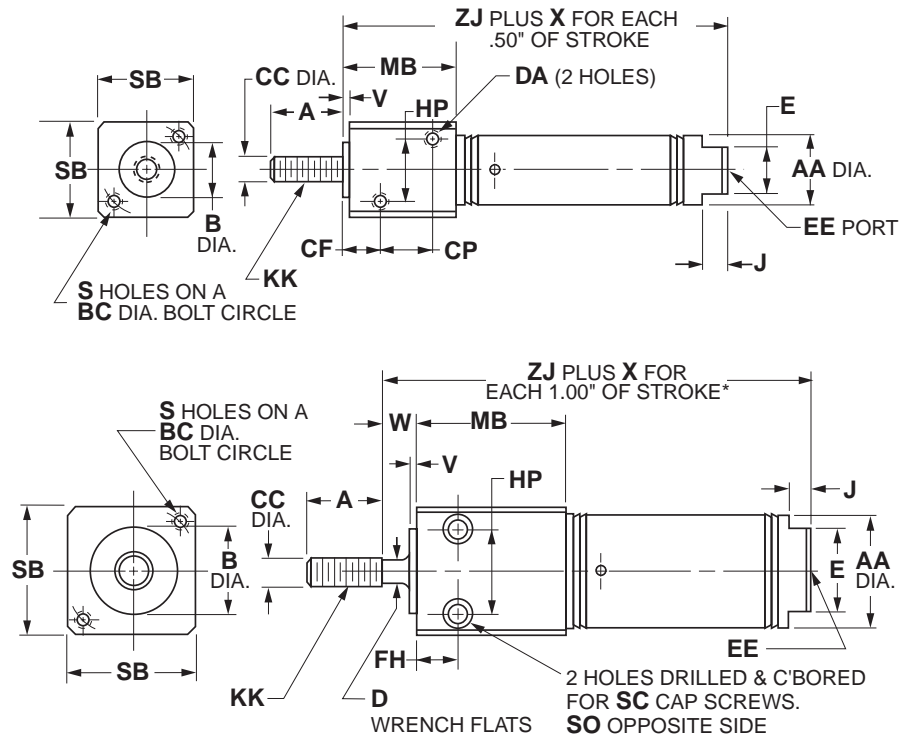
Bore	KM	S	SB	SW	V	W	Y	ZJ	
								SR	SRM
7/16"	7/16-20 UNF	#8-32 UNC	0.75	0.38	0.05	0.43	0.72	2.44	–
3/4"	5/8-18 UNF	#10-32 UNF	1.00	0.44	0.09	0.75	1.22	3.78	3.78
1-1/16"	5/8-18 UNF	#10-32 UNF	1.25	0.44	0.09	0.88	1.44	4.00	4.16
1-1/2"	3/4-16 UNF	1/4-20 UNC	1.75	0.62	0.09	0.88	1.47	4.38	4.63



Mounting Style BFN

Front Block Mount, Single Acting, Spring Return

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore Sizes
7/16"

Bore Sizes
3/4"
1-1/16"
1-1/2"

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 1-1/2, 2, 3	6	✓
3/4"	●	●	1/2, 1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	BC	CC	CF	CP	D	DA	E	EE	FH
7/16"	0.50	0.50	0.437	0.75	0.188	0.31	0.44	–	#8-32 UNC	0.38	#10-32	0.31
3/4"	0.75	0.81	0.624	1.00	0.250	–	–	0.22	–	0.62	1/8 NPTF	0.38
1-1/16"	0.75	1.12	0.750	1.25	0.312	–	–	0.25	–	0.88	1/8 NPTF	0.62
1-1/2"	1.25	1.56	1.00	1.75	0.437	–	–	0.38	–	0.88	1/4 NPTF	0.88

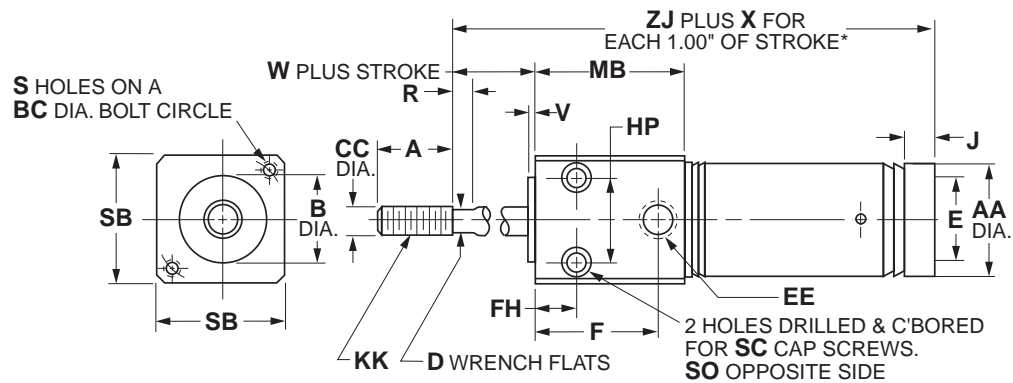
Bore	HP	J	KK	MB	S	SB	SC	SO	V	W	X	ZJ	
												SR	SRM
7/16"	0.44	0.19	#10-32 UNF	0.88	#8-32 UNC	0.75	–	–	0.062	–	0.94	1.94	–
3/4"	0.62	0.19	1/4-28 UNF	1.12	#10-32 UNF	1.00	#10-32	1/4-20 UNC	0.093	0.34	1.69	2.66	2.91
1-1/16"	0.81	0.19	5/16-24 UNF	1.41	#10-32 UNF	1.25	#10-32	1/4-20 UNC	0.093	0.47	1.81	3.38	3.63
1-1/2"	1.12	0.25	7/16-20 UNF	1.88	1/4 UNC	1.75	1/4-20	5/16-18 UNC	0.125	0.38	2.00	3.69	3.94

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



Mounting Style BFR
Front Block Mount, Single Acting, Spring Extend

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



D

SR/SRM, SRD/SRDM

SRX

P1L

P

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	BC	CC	D	E	EE	F	FH	HP	J
3/4"	0.75	0.81	0.624	1.00	0.250	0.22	—	1/8 NPTF	0.88	0.38	0.62	0.19
1-1/16"	0.75	1.12	0.750	1.25	0.312	0.25	—	1/8 NPTF	1.16	0.62	0.81	—
1-1/2"	1.25	1.56	1.00	1.75	0.437	0.38	0.88	1/4 NPTF	1.53	0.88	1.12	0.25

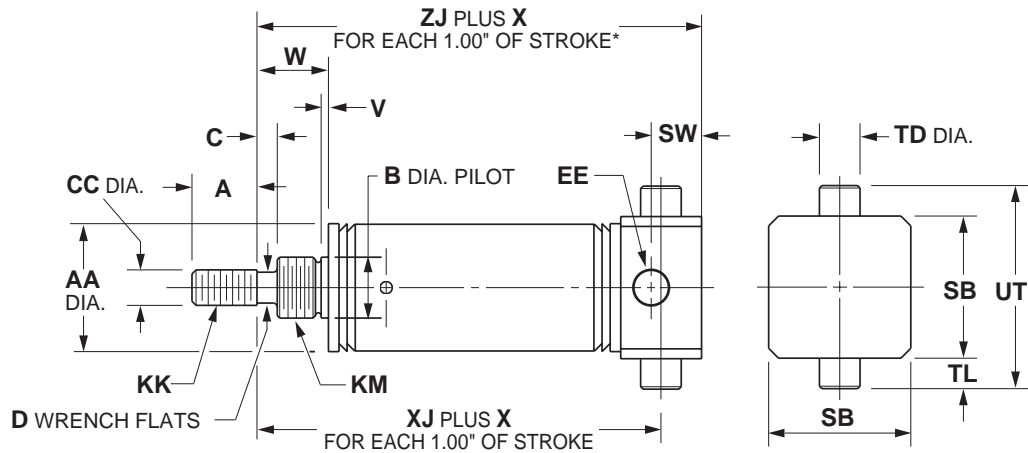
Bore	KK	MB	R	S	SB	SC	SO	V	W	X	ZJ	
											SR	SRM
3/4"	1/4-28 UNF	1.12	0.25	#10-32 UNF	1.00	#10-32	1/4-20 UNC	0.093	0.34	2.69	2.56	2.81
1-1/16"	5/16-24 UNF	1.41	0.25	#10-32 UNF	1.25	#10-32	1/4-20 UNC	0.093	0.47	2.81	3.12	3.37
1-1/2"	7/16-20 UNF	1.88	0.25	1/4-20 UNC	1.75	1/4-20	5/16-18 UNC	0.125	0.38	3.00	3.69	3.94

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



Mounting Style TRN
Rear Trunnion Mount, Single Acting, Spring Return

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



D

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 2, 3, 4	6	✓
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	C	CC	D	EE	KK	KM
7/16"	0.50	0.50	0.374	–	0.188	–	#10-32	#10-32 UNF	3/8-24 UNF
3/4"	0.75	0.81	0.499	0.25	0.250	0.22	1/8 NPTF	1/4-28 UNF	1/2-20 UNF
1-1/16"	0.75	1.12	0.624	0.38	0.312	0.25	1/8 NPTF	5/16-24 UNF	5/8-18 UNF
1-1/2"	1.25	1.56	0.749	0.25	0.437	0.38	1/4 NPTF	7/16-20 UNF	3/4-16 UNF

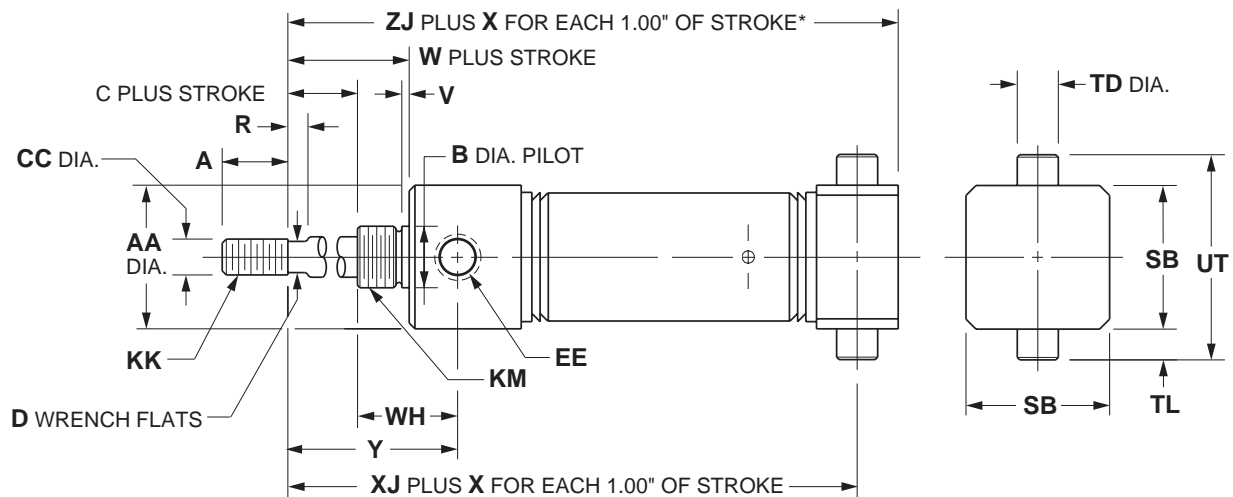
Bore	SB	SW	TD	TL	UT	V	W	X	XJ		ZJ	
									SR	SRM	SR	SRM
7/16"	0.75	0.38	0.374	0.50	1.25	0.05	0.32	0.94**	1.38	–	1.62	–
3/4"	1.00	0.44	0.500	0.38	1.75	0.09	0.62	1.69	1.94	2.19	2.31	2.56
1-1/16"	1.25	0.44	0.500	0.38	2.00	0.09	0.88	1.81	2.44	2.69	2.81	3.06
1-1/2"	1.75	0.62	0.500	0.38	2.50	0.09	0.88	2.00	2.56	2.81	3.06	3.31

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

** For each 0.50" of stroke.

Mounting Style TRR
Rear Trunnion Mount, Single Acting, Spring Extend

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	C	CC	D	EE	KK	KM
3/4"	0.75	0.86	0.624	0.25	0.250	0.22	1/8 NPTF	1/4-28 UNF	1/2-20 UNF
1-1/16"	0.75	1.12	0.624	0.38	0.312	0.25	1/8 NPTF	5/16-24 UNF	5/8-18 UNF
1-1/2"	1.25	1.56	0.749	0.25	0.437	0.38	1/4 NPTF	7/16-20 UNF	3/4-16 UNF

Bore	R	SB	TD	TL	UT	V	W	WH	X	XJ		ZJ	
										SR	SRM	SR	SRM
3/4"	0.25	1.00	0.500	0.38	1.75	0.09	0.75	0.72	2.69	2.85	3.10	3.22	3.47
1-1/16"	0.25	1.25	0.500	0.38	2.00	0.09	0.88	0.68	2.81	3.15	3.40	3.53	3.78
1-1/2"	0.25	1.75	0.500	0.38	2.50	0.09	0.88	1.25	3.00	3.38	3.63	3.88	4.13

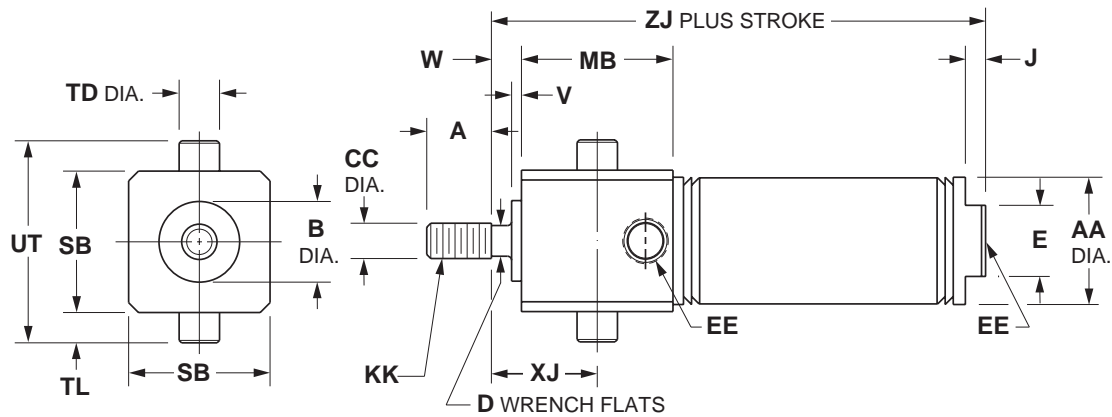
* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



Mounting Style TFD
Front Trunnion Mount, Double Acting

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.

D



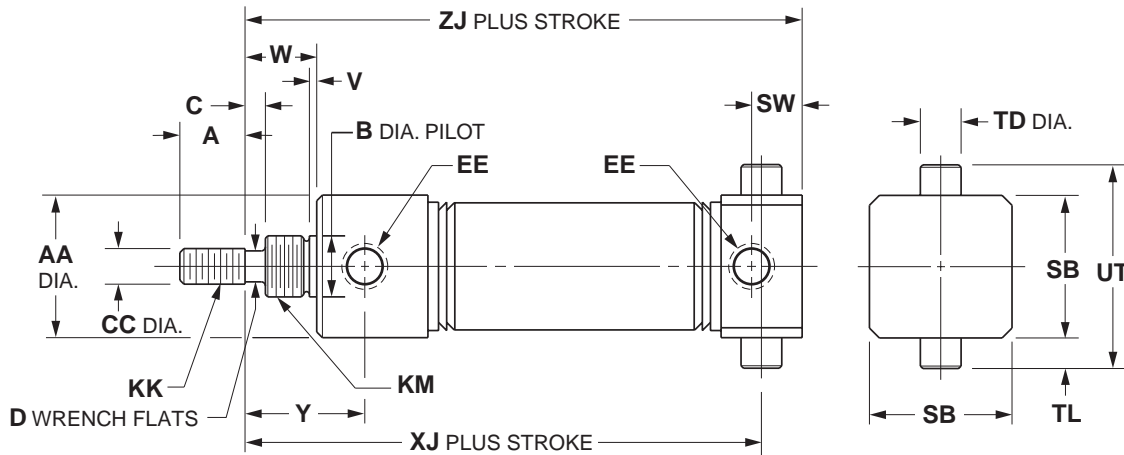
Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	12	✓
3/4"	●	●	1, 2, 3, 4, 5, 6	12	✓
1-1/16"	●	●	1, 2, 3, 4, 5, 6	12	✓
1-1/2"	●	●	1, 2, 3, 4, 5, 6	12	✓

Bore	A	AA	B	CC	D	E	EE	J	KK
7/16"	0.50	0.50	0.437	0.188	–	0.38	#10-32	0.19	#10-32 UNF
3/4"	0.75	0.81	0.624	0.250	0.22	0.62	1/8 NPTF	0.19	1/4-28 UNF
1-1/16"	0.75	1.12	0.750	0.312	0.25	0.88	1/8 NPTF	0.19	5/16-24 UNF
1-1/2"	1.25	1.56	1.000	0.437	0.38	0.88	1/4 NPTF	0.25	7/16-20 UNF

Bore	MB	SB	TD	TL	UT	V	W	XJ	ZJ	
									SR	SRM
7/16"	0.88	0.75	0.374	0.250	1.25	0.062	–	0.31	2.12	–
3/4"	1.12	1.00	0.500	0.38	1.75	0.093	0.34	0.69	3.22	3.22
1-1/16"	1.41	1.25	0.500	0.38	2.00	0.093	0.47	1.09	3.75	3.91
1-1/2"	1.88	1.75	0.500	0.38	2.50	0.125	0.38	1.31	4.19	4.44

Mounting Style TRD
Rear Trunnion Mount, Double Acting

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



D

SR/SRM, SRD/SRDM

SRX

P1L

P

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 1-1/2, 2, 3, 4	12	✓
3/4"	●	●	1, 2, 3, 4, 5, 6	12	✓
1-1/16"	●	●	1, 2, 3, 4	12	✓
1-1/2"	●	●	1, 2, 3, 4, 5, 6	12	✓

Bore	A	AA	B	C	CC	D	EE	KK	KM
7/16"	0.50	0.74	0.437	–	0.188	–	#10-32	#10-32 UNF	7/16-20 UNF
3/4"	0.75	0.86	0.624	0.25	0.250	0.22	1/8 NPTF	1/4-28 UNF	5/8-18 UNF
1-1/16"	0.75	1.12	0.624	0.38	0.312	0.25	1/8 NPTF	5/16-24 UNF	5/8-18 UNF
1-1/2"	1.25	1.56	0.749	0.25	0.437	0.38	1/4 NPTF	7/16-20 UNF	3/4-16 UNF

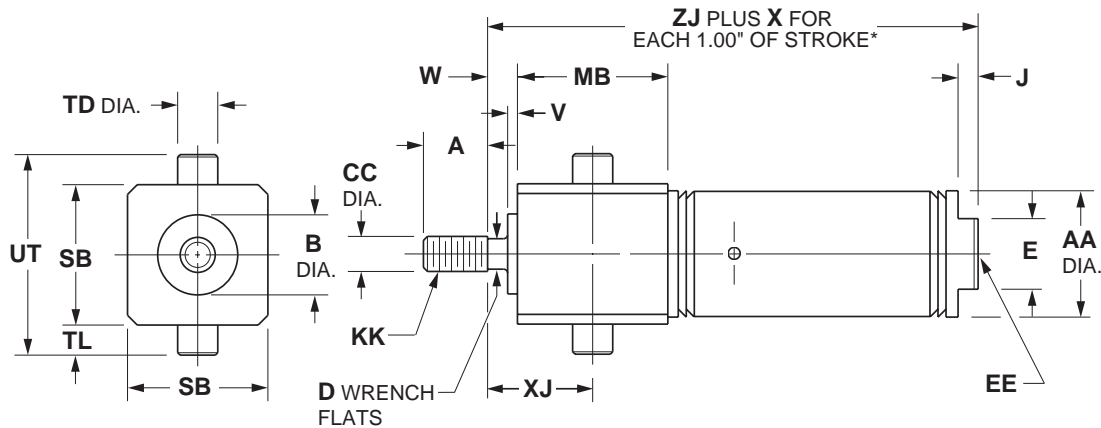
Bore	SB	SW	TD	TL	UT	V	W	XJ		Y	ZJ	
								SR	SRM		SR	SRM
7/16"	0.75	0.38	0.374	0.25	1.25	0.05	0.38	2.19	–	0.72	2.44	–
3/4"	1.00	0.44	0.500	0.38	1.75	0.09	0.75	3.41	3.41	1.22	3.78	3.78
1-1/16"	1.25	0.44	0.500	0.38	2.00	0.09	0.88	3.62	3.62	1.44	4.00	4.16
1-1/2"	1.75	0.62	0.500	0.38	2.50	0.09	0.88	3.88	4.13	1.47	4.38	4.63



Mounting Style TFN

Front Trunnion Mount, Single Acting, Spring Return

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
7/16"	●		1/2, 1, 1-1/2, 2, 3	6	✓
3/4"	●	●	1/2, 1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	CC	D	E	EE	J	KK
7/16"	0.50	0.50	0.437	0.188	-	0.38	#10-32	0.19	#10-32 UNF
3/4"	0.75	0.81	0.624	0.250	0.22	0.62	1/8 NPTF	0.19	1/4-28 UNF
1-1/16"	0.75	1.12	0.750	0.312	0.25	0.88	1/8 NPTF	0.19	5/16-24 UNF
1-1/2"	1.25	1.56	1.000	0.437	0.38	0.88	1/4 NPTF	0.25	7/16-20 UNF

Bore	MB	SB	TD	TL	UT	V	W	X	XJ	ZJ	
										SR	SRM
7/16"	0.88	0.75	0.374	0.25	1.25	0.062	0	0.94**	0.31	1.94	-
3/4"	1.12	1.00	0.500	0.38	1.75	0.093	0.34	1.69	0.69	2.66	2.91
1-1/16"	1.41	1.25	0.500	0.38	2.00	0.093	0.47	1.81	1.09	3.38	3.63
1-1/2"	1.88	1.75	0.500	0.38	2.50	0.125	0.38	2.00	1.31	3.69	3.94

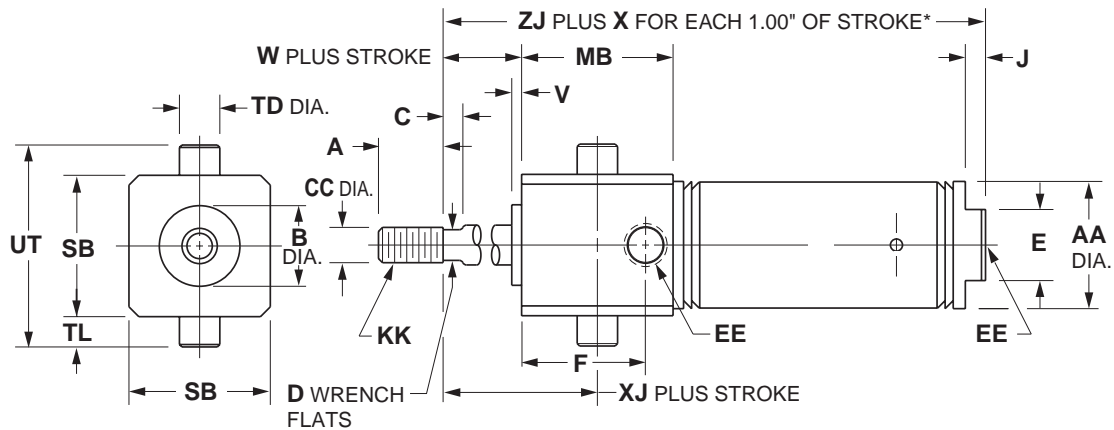
* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.

** For each 0.50" of stroke



Mounting Style TFR
Front Trunnion Mount, Single Acting, Spring Extend

Drawings are representative of cylinders. Certain bore sizes may not look exactly as shown.



D

SR/SRM, SRD/SRDM

SRX

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P

Bore	SR	SRM	Std. Stroke (in)	Max Stroke (in)	SS Rod Std
3/4"	●	●	1, 2, 3, 4	6	✓
1-1/16"	●	●	1, 2, 3, 4	6	✓
1-1/2"	●	●	1, 2, 3, 4	6	✓

Bore	A	AA	B	C	CC	D	E	F	EE	J
3/4"	0.75	0.81	0.624	0.25	0.250	0.22	0	0.88	1/8 NPTF	-
1-1/16"	0.75	1.12	0.750	0.25	0.312	0.25	0	1.16	1/8 NPTF	-
1-1/2"	1.25	1.56	1.000	0.25	0.437	0.38	0.88	-	1/4 NPTF	0.25

Bore	KK	MB	SB	TD	TL	UT	V	W	X	XJ	ZJ	
											SR	SRM
3/4"	1/4-28 UNF	1.12	1.00	0.500	0.38	1.75	0.093	0.34	2.69	0.69	2.56	2.81
1-1/16"	5/16-24 UNF	1.41	1.25	0.500	0.38	2.00	0.093	0.47	2.81	1.09	3.12	3.37
1-1/2"	7/16-20 UNF	1.88	1.75	0.500	0.38	2.50	0.125	0.38	3.00	1.31	3.69	3.94

* To determine lengths for half inch stroke increments, determine length for next highest whole number stroke and subtract one half inch.



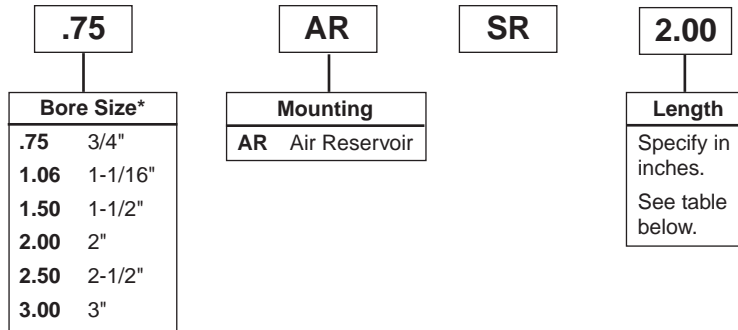
Air Reservoirs

Air Reservoirs installed can significantly reduce the pulsation of a system. In addition air reservoirs can be used as a means to store energy. Caution should always be used when storing energy. Air reservoirs if installed in the correct location and sized correctly can temporarily increase the flow of an actuator or cylinder.

As always never exceed the rated pressure of the cylinder.

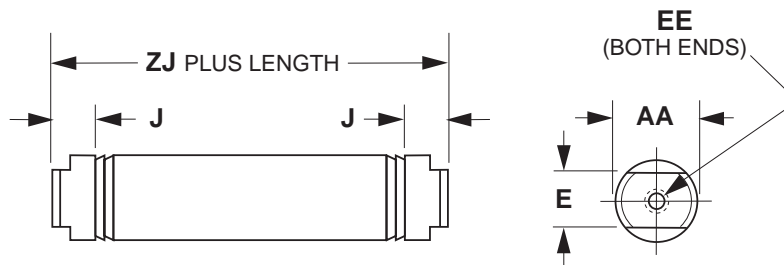
How To Order SR Series Air Reservoirs

D



Bore	Standard Lengths	Max Length	Volume (in ³)
3/4"	1" increments to 4"	32"	0.39 plus 0.44 per inch length
1-1/16"	1" increments to 8"	32"	0.99 plus 0.89 per inch length
1-1/2"	1" increments to 16"	32"	1.91 plus 1.77 per inch length
2"	1" increments to 16"	32"	4.22 plus 3.14 per inch length
2-1/2"	1" increments to 16"	32"	7.04 plus 4.91 per inch length
3"	1" increments to 16"	32"	9.90 plus 7.07 per inch length

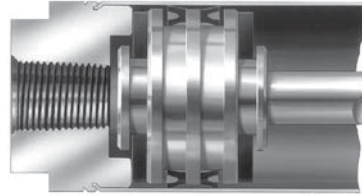
Dimensions



Bore	AA	E	EE	J	ZJ
3/4"	0.813	0.625	1/8" NPTF	0.19	1.938
1-1/16"	1.125	0.88	1/8" NPTF	0.19	2.375
1-1/2"	1.56	0.88	1/8" NPTF	0.250	2.250
2"	2.08	1.25	1/4" NPTF	0.312	2.875
2-1/2"	2.62	1.75	1/4" NPTF	0.312	2.875
3"	3.16	2.00	3/8" NPTF	0.312	3.190

Bumpers

Bumpers are available at extra cost except where noted as standard. Add the following dimensions to the overall cylinder length by bore



SR Bumper Adder

Cylinder Type	SR Series Bore Size											
	5/16"	7/16"	9/16"	3/4"	7/8"	1-1/16"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/2"	3"
Spring Return	*	0.062"	0.062"	0.125"	*	0.125"	*	**	*	0.125"	N/A	N/A
Spring Extend	*	0.125"	0.062"	0.125"	*	0.125"	*	**	*	0.125"	N/A	N/A
Double Acting	*	0.188"	0.125"	**	*	0.125"	*	0.125"	*	0.250"	0.250"	N/A
K-type	N/A	0.250"	0.125"	**	*	0.500"	*	0.125"	*	0.250"	0.250"	N/A

*Bumpers are furnished as standard and do not affect overall length.

**Bumpers do not affect overall length.

SRM Bumper Adder

Cylinder Type	SRM Series Bore Size							
	9/16"	3/4"	1-1/16"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/2"
Spring Return	0.062"	0.125"	0.125"	0.125"	0.125"	*	0.125"	N/A
Spring Extend	0.062"	0.125"	0.125"	0.125"	0.125"	*	0.125"	N/A
Double Acting	0.125"	0.250"	0.250"	0.250"	0.250"	*	0.250"	0.250"
K-type	0.125"	0.312"	0.250"	0.250"	0.250"	*	0.250"	0.250"

Fluorocarbon Seals

Available on all bore sizes at extra cost. Not available on SRM or SRDM series.

Stainless Steel Piston Rods

Corrosion resistant stainless steel is the standard piston rod material for all bore sizes up to and including 1-1/2 inch bore at no additional cost. The only exception to the stainless steel standard is when a hollow rod, KDXH option is specified. Stainless steel is also the standard material on block, trunnion, hex/non-rotating and KDX mounts. Stainless steel is available on other sizes for an additional charge.

Rod Wiper

SR/SRM Series cylinders can be fitted with a rod wiper that is specially designed to prevent contaminants from clinging to the piston rod and damaging the piston rod seal. Available in 3/4", 1-1/16", and 1-1/2" bores, the piston rod wiper can be added to the SR/SRM and SRD/SRDM series.

D

SR/SRM, SRD/SRDM

SRX

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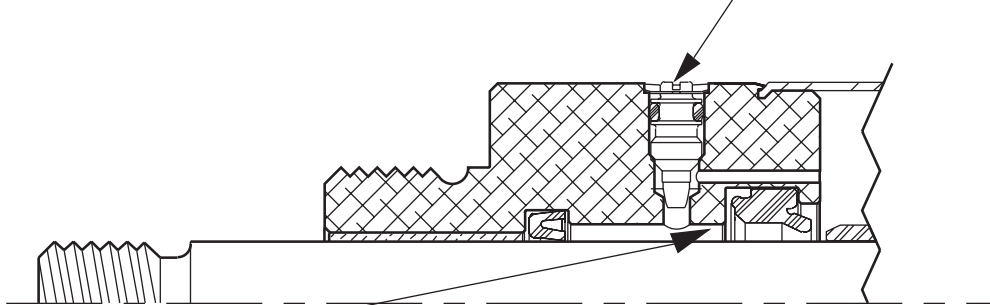
Options

Adjustable Cushion Option

Cushions can be selected on nine bore sizes, ranging from 0.75" bore to 3.0" bore with mounting styles D, front nose mount, and DXP, rear pivot mount. Adjustable cushions are not available with double rod SR Series cylinders.

Cushion Adjusting Needle Valves

The fine-thread cushion needle valves make precise adjustment quick and easy. The needle valve is fully captured to allow for safe cushion adjustment while cylinder is pressurized. The brass needle valves are corrosion resistant. The standard position for needle valve adjustments is position 1, 90° from the port. See port location table for SR Series Cylinders.



Check Seal Cushion

The "Check Seal" system offers excellent cushioning efficiency and long cushion seal life. This seal is specifically designed for cushion applications and has a long proven history in our products. Extensive side by side testing of the check seal in SR Series cylinders significantly outlasted and outperformed competitors' o-ring shaped seals.

The Check Seal's unique geometry exhibits the dynamic sealing capabilities of a lipseal. As the cushion sleeve enters the Check Seal at the end of stroke, the Check Seal blocks the air from exhausting directly through the port and forces

the air through the adjustable needle valve orifice. The exhaust airflow is precisely metered to control the desired rate of deceleration of the cylinder piston.

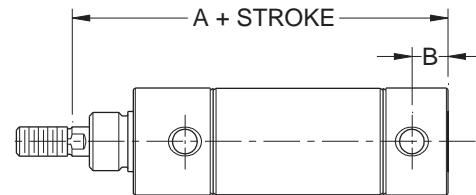
During stroke reversal, the check valve action of the Check Seal induces a fast out-of-cushion response. The Check Seal floats forward in the retainer groove as the cushion sleeve exits the Cushion Seal, thereby creating a path for maximum air flow around the Check Seal to access the piston face. The quick response of the Check Seal design yields faster cycle times and increased productivity.

Critical Mounting Dimensions for SR Series and SRM Cylinders with Adjustable Cushions

In most cases, cylinder mounting dimensions are not affected when cushions are specified. Standard catalog dimensions apply when cushions are specified at either end of a DXP mount and when specified at the head end only of a D mount.

The only exception to standard catalog dimensions is when a cushion is specified on the cap end or both ends of a D mount. Please consult Table A for the critical mounting dimensions on D mount SR and SRM cylinders with cushions both ends or cushions cap end only.

Table B shows the cushion lengths for SR and SRM cylinders.



D Mount

Table A:
Critical Mounting Dimensions for D Mount SR and SRM Cylinders with Cushions Both Ends or Cushions Cap End Only.

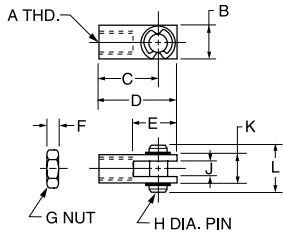
Bore Size	SR Dimensions		SRM Dimensions	
	A + Stroke	B	A + Stroke	B
.75	3.40	0.28	3.40	0.28
.88	3.25	0.28	N/A	N/A
1.06	3.49	0.28	3.65	0.28
1.25	4.31	0.38	4.34	0.38
1.50	4.12	0.31	4.37	0.31
1.75	5.25	0.42	5.25	0.42
2.00	5.06	0.47	5.34	0.47
2.50	5.06	0.47	5.06	0.47
3.00	5.69	0.53	N/A	N/A

Table B:
Cushion Lengths for SR and SRM Cylinders.

Bore Size	Head	Cap
.75	0.750	0.625
.88	0.750	0.625
1.06	0.750	0.625
1.25	0.750	0.625
1.50	0.750	0.625
1.75	0.875	0.625
2.00	0.875	0.750
2.50	0.875	0.750
3.00	0.875	1.000

Piston Rod Clevis

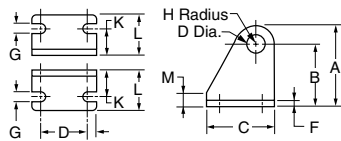
Assembly includes pin and
(2) Retainer Rings
and (1) Jam Nut.



Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L
L071300025	5/16	#5-40	.31	.44	.56	.38	.11	#5-40	.12	.13	.31	.50
L071300100 L077130100*	7/16, 9/16	#10-32	.38	.75	.94	.56	.12	#10-32	.19	.19	.38	.56
L071300200 L077130200*	3/4, 7/8	1/4-28	.50	.94	1.19	.68	.16	1/4-28	.25	.25	.50	.69
L071300300 L077130300*	1-1/16	5/16-24	.50	.94	1.19	.68	.19	5/16-24	.25	.25	.50	.69
L071300400 L077130400*	1-1/4, 1-1/2	7/16-20	.75	1.31	1.69	.94	.25	7/16-20	.38	.38	.75	1.03
L071300500 L077130500*	1-3/4, 2, 2-1/2	1/2-20	.75	1.31	1.69	.94	.31	1/2-20	.38	.38	.75	1.03
L071300600	3	5/8-18	1.00	2.25	2.75	1.50	.38	5/8-18	.50	.50	1.00	1.38

* Stainless Steel for use with SRD/SRDM cylinders.

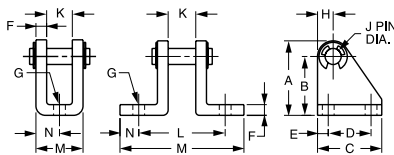
Pivot Brackets



Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L	M
L071310100	7/16	.76	.56	.75	.50	.12	.06	.19	.20	.160	.28	.50	.12
L071310200	3/4, 7/8, 1-1/16	1.19	.88	1.12	.75	.19	.12	.27	.31	.255	.44	.81	.25
L071310300	1-1/2	1.75	1.38	1.50	1.00	.25	.12	.27	.38	.380	.62	1.00	.25

Pivot Bracket Assembly

Assembly includes pin and
(2) Retainer Rings.



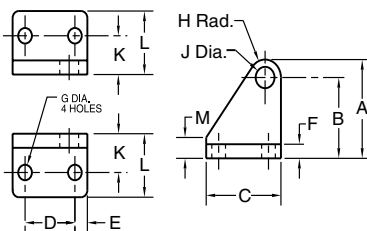
5/16" Bore Only

Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L	M	N
L071320025	5/16	.53	.40	.62	.38	.12	.04	.16	.12	.12	.26	—	.36	.18
L071320100 L077150100*	7/16, 9/16	.76	.56	.75	.50	.12	.06	.19	.19	.156	.34	.91	1.34	.22
L071320200 L077150200*	3/4, 7/8, 1-1/16	1.18	.88	1.12	.75	.19	.12	.27	.30	.250	.38	1.25	2.00	.38
L071320300	1-1/4	1.18	.88	1.12	.75	.19	.12	.27	.30	.250	.50	1.38	2.14	.38
L071320400 L077150400*	1-1/2, 1-3/4	1.75	1.38	1.50	1.00	.25	.25	.27	.37	.375	.62	2.00	2.88	.44
L071320500 L077150500*	2, 2-1/2	1.75	1.38	1.50	1.00	.25	.25	.27	.37	.375	.75	2.12	3.00	.44
L071320600	3	2.25	1.75	1.75	1.25	.25	.25	.27	.50	.50	.88	2.62	3.88	.62

* Stainless Steel for use with SRD/SRDM cylinders.

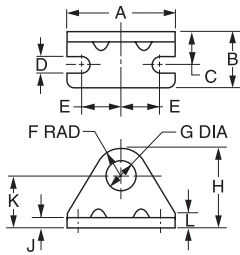
SR Series Trunnion Brackets

Select brackets for SR Series Trunnion Mount Cylinders from the table below.
(Note: Trunnion Brackets are ordered as a separate item from the cylinder.)



Part Number	Bore Sizes	A	B	C	D	E	F	G	H	J	K	L	M
L076600100	7/16	1.75	1.38	1.50	1	.25	.25	.27	.38	.375	.69	1.12	.37
L076600200	3/4, 1-1/16, 1-1/2	1.75	1.38	1.50	1	.25	.25	.27	.38	.500	.69	1.12	.37

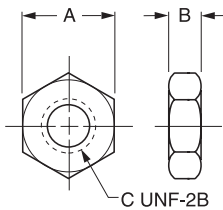
Foot Brackets



Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L
L073790016	5/16	1.00	.37	.25	.13	.37	.31	.25	.75	.06	.44	.12
L073790023	5/16	1.00	.37	.25	.13	.37	.31	.38	.75	.06	.44	.12
L073790024	7/16	1.38	.62	.31	.19	.50	.31	.38	.88	.07	.56	.12
L073790028 L077160028*	7/16, 9/16	1.38	.62	.38	.19	.50	.38	.44	.94	.09	.56	.12
L073790032	3/4	1.62	.75	.44	.19	.62	.41	.50	1.09	.10	.69	.19
L073790040 L077160040*	3/4, 7/8, 1-1/16	1.88	1.00	.56	.27	.75	.56	.63	1.38	.12	.81	.25
L073790048 L077160048*	1-1/4, 1-1/2	2.50	1.50	.75	.27	.94	.75	.75	1.75	.12	1.00	.38
L073790102	1-3/4	3.00	1.50	.87	.35	1.12	.91	1.03	2.16	.19	1.25	.50
L073790124 L077160124*	2	3.12	1.62	1.00	.34	1.12	1.00	1.38	2.50	.25	1.50	.62
L073790132	2-1/2	3.75	1.62	1.00	.35	1.44	1.25	1.51	3.00	.25	1.75	.75
L073790140	3	4.37	1.62	1.00	.35	1.75	1.25	1.64	3.14	.25	1.89	.89

* Stainless Steel for use with SRD/SRDM cylinders.

Mounting Nut



Part Number	Bore	A	B	C
L073800200	5/16	.44	.16	1/4-28
L073800400	5/16, 7/16	.56	.22	3/8-24
L073800500 L077170500*	7/16, 9/16	.69	.25	7/16-20
L073800600	3/4	.75	.31	1/2-20
L073800800 L077170800*	3/4, 7/8, 1-1/16	.94	.38	5/8-18
L073800900 L077170900*	1-1/4, 1-1/2	1.12	.42	3/4-16
L073801100	1-3/4	1.50	.55	1-14
L073801200 L077171200*	2	1.88	.50	1-1/4-12
L073801400	2-1/2	2.06	.78	1-3/8-12
L073801500	3	2.25	.84	1-1/2-12

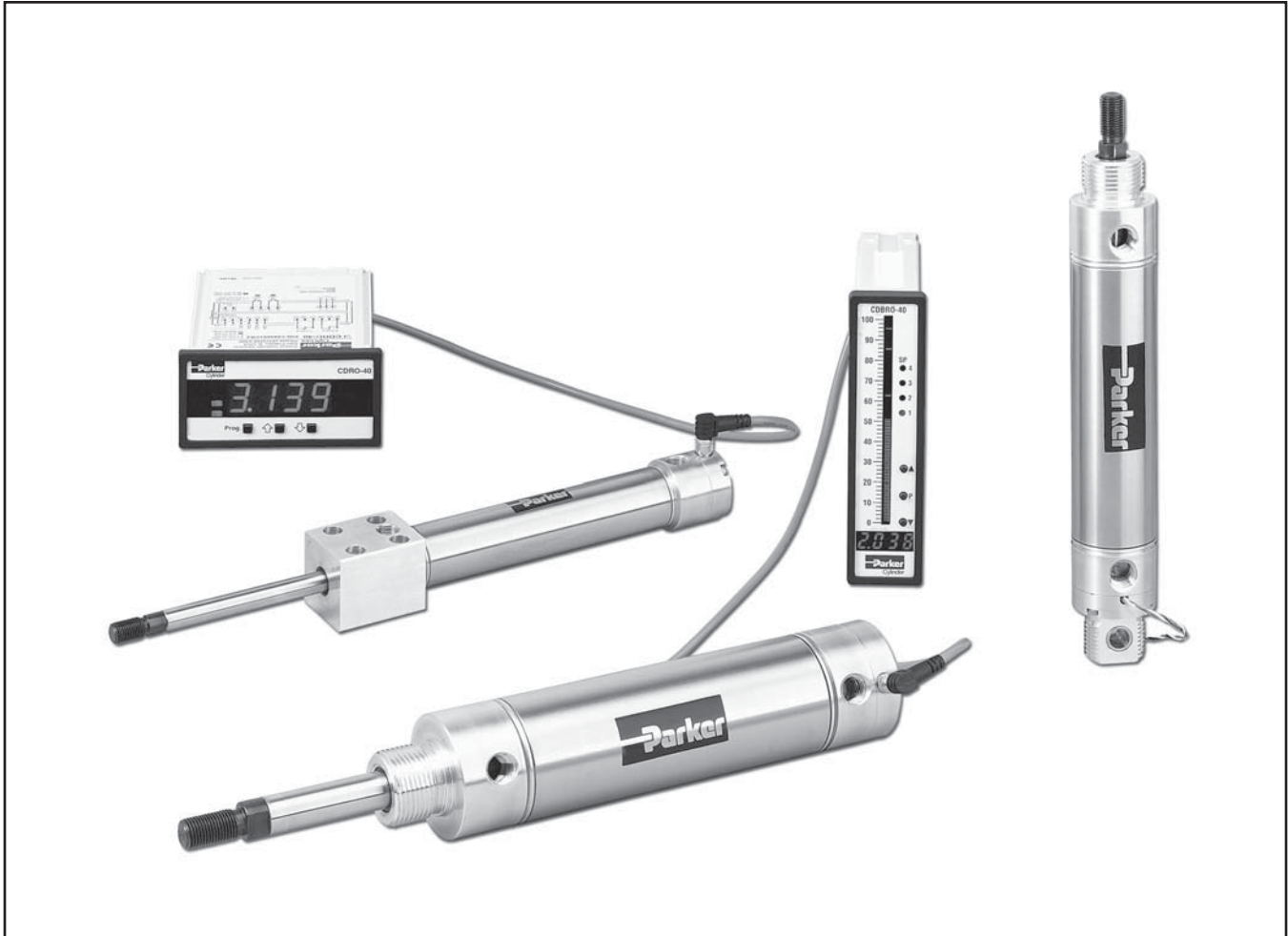
* Stainless Steel for use with SRD/SRDM cylinders.

D



SRX Series

Stainless Steel Body Air Cylinders
with Continuous Position Feedback



D

SR/SRM, SRD/SRDM

SRX

P1L

P

Contents

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Engineering Specifications	D45	Controller Ordering Information.....	D56
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Features

D

Piston Rod

Hard chrome-plated piston rod polished to a 6-10 Ra surface finish with an anodized steel male rod stud for long seal life and minimal surface drag.



Bushing

Oil impregnated bronze rod bushing provides maximum bearing surface area, minimal mod deflection and long service life.



Cylinder Body

304 Stainless Steel cylinder body rated for non-lube service resists corrosion and minimizes maintenance.



Seals

Standard "LipSeal" piston and rod seal provides maximum sealing capability and long life. Optional low friction piston seal is available.



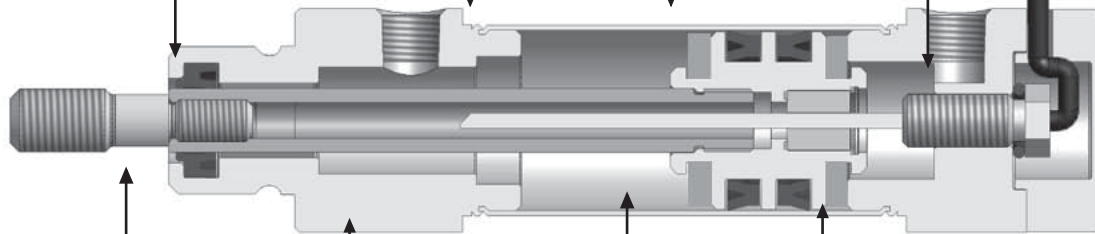
LRT

LRT can be easily removed for maintenance, saving cost of purchasing a new cylinder.



Connector

Optional "flying lead" or 3-pin connector allows maximum flexibility for the end user.



Outboard Rod Seal

Minimizes dirt and contaminant migration into the cylinder.



Optional Bumpers

Buna-N bumpers reduce noise and provide cushioning for the most demanding applications.



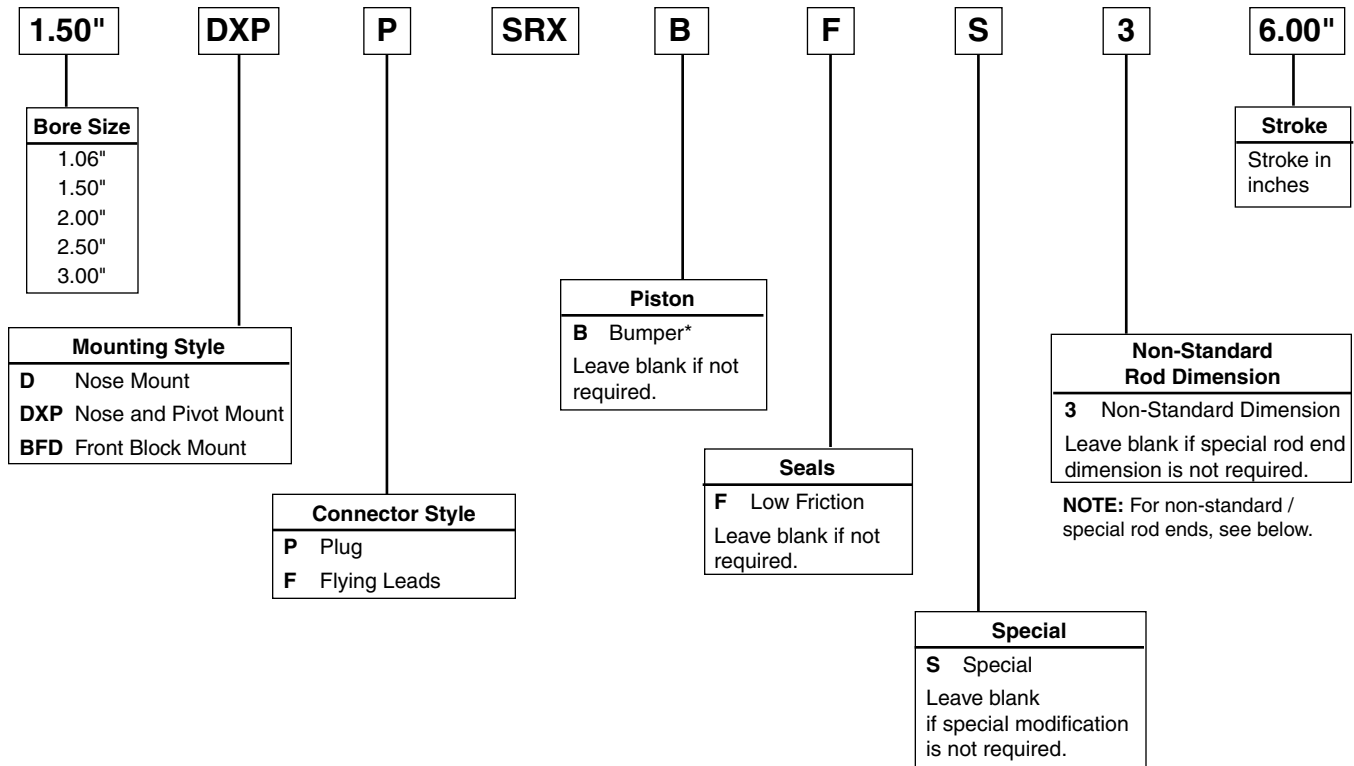
Unitized Construction

Precision double-rolled unitized construction provides durable, leak proof service and long life.

End Caps

Precision machined aluminum end caps provide excellent corrosion resistance and smooth breakaway.





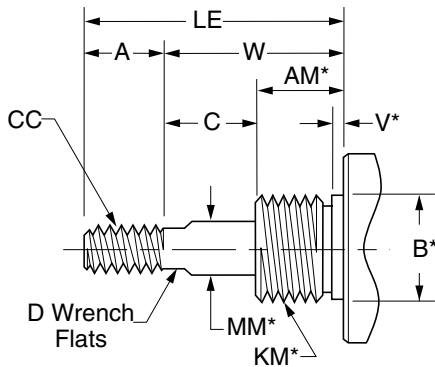
* Incorporating Bumpers adds 1/4" of overall length to the cylinder.

For ordering purposes, when special options or common modifications are requested, the factory will assign a sequential part number in place of the model number.

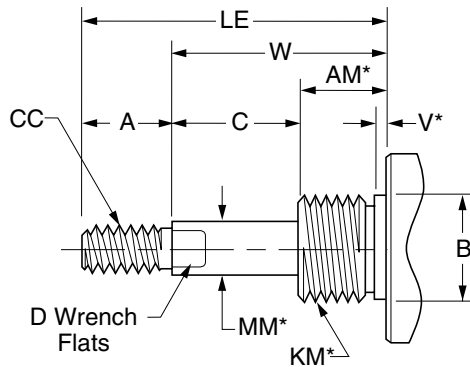
Non-standard Rods

For non-standard rod dimensions, or undersized rod end threads, put a "3" in model number and describe the rod using the letters shown in the drawing. It is necessary to specify only those dimensions that are non-standard.

Full Diameter Rod End Threads



Undersized Rod End Threads

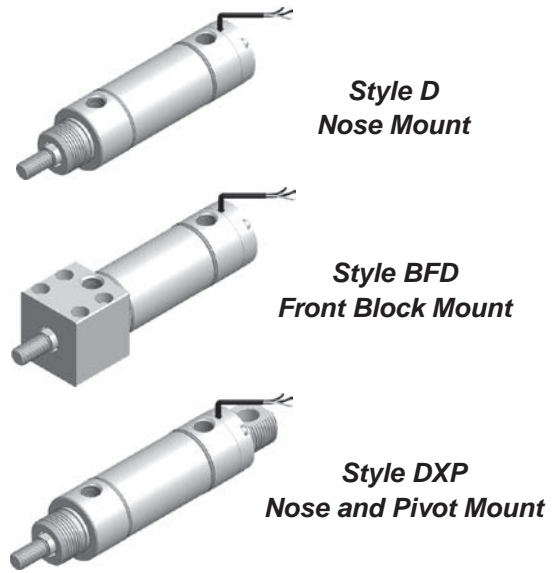


*Requires an "S" designation in model number.

General Specifications

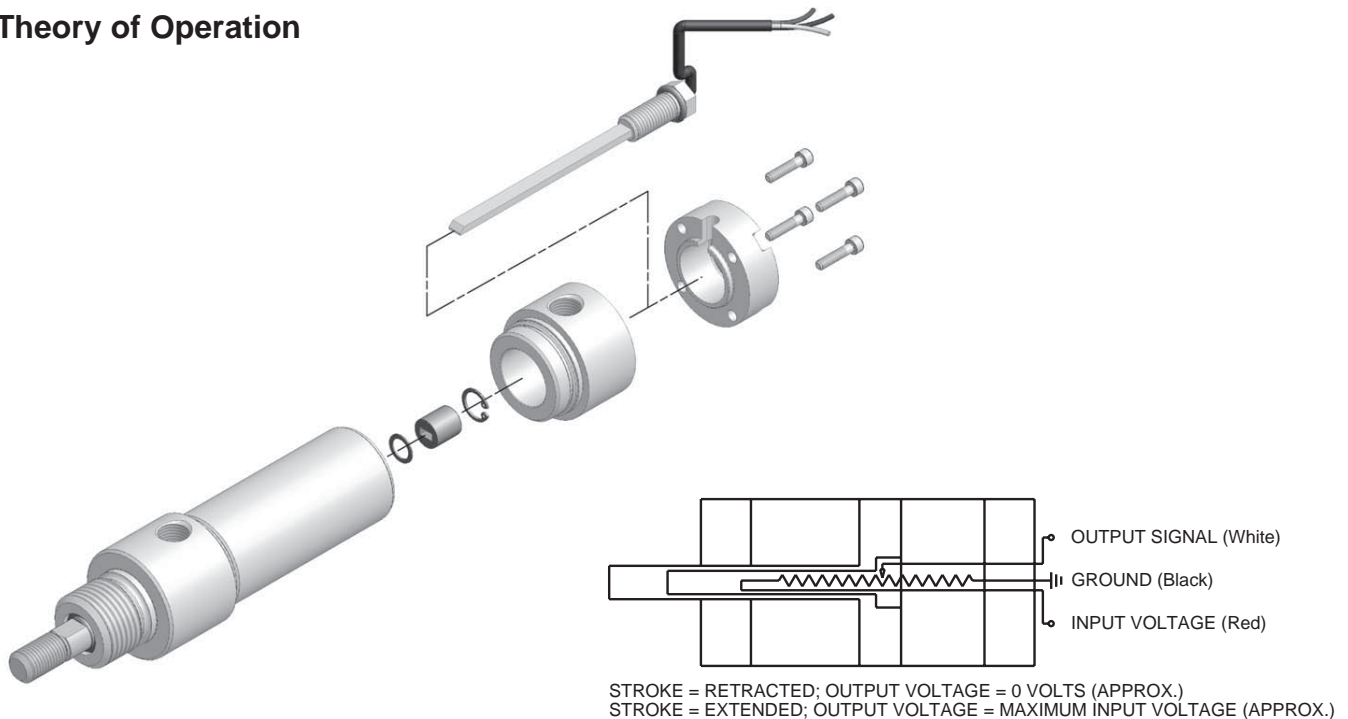
- Bore Sizes: 1-1/16", 1-1/2", 2", 2-1/2", 3"
- Rod Sizes: 0.38" – 0.75"
- Rod Ends: Standard Male
- Mounts: – Nose Mount (D)
 – Front Block Mount (BFD)
 – Nose and Pivot Mount (DXP)
- Rated Air Pressure: 150 PSI Air
- Standard Temperature: 40°F to 160°F
- Strokes: Available in any practical stroke length up to 24"
- Bumpers: Optional

Available Mountings



D

Theory of Operation



The SRX Series Linear Resistive Transducer (LRT) is a position sensor that uses a resistive element, and wiper assembly, to provide a continuous analog output signal relative to the cylinders position. The LRT is a single element type linear potentiometer, with two independent elements mounted on either side of an anodized aluminum extrusion. The LRT operates as a voltage divider by creating a short between the wiper extrusion and the wiper assembly. The position of the wiper changes the resistive load proportionally to its position along the stroke length of the cylinder.

Supplying a 5 to 24VDC voltage energizes the LRT. As the cylinder travels through its range of stroke, the resistive load

changes, thus causing a proportional voltage output change of the LRT. The output voltage, at the endpoint of cylinder stroke, is dictated by the input voltage applied across the device.

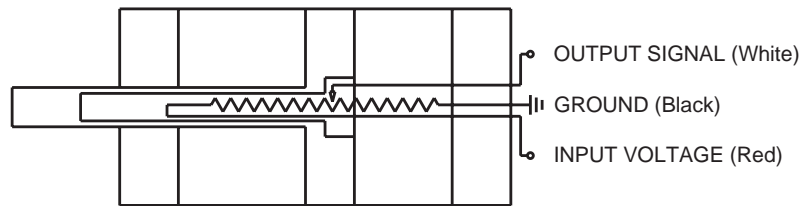
The probe is mounted into the cap end of the cylinder and inserted into the hollow piston rod assembly. When replacing the probe, care must be taken to align the wiper block with the profile of the LRT extrusion. Please review the above schematic and cutaway drawing for reference purposes.

MLRT

- Repeatability: ± 0.001 " (interface electronics dependent)
- Non Linearity: $\pm 1\%$ of Full stroke (18" stroke max.)
- Resolution: Infinite
- Signal Input: 5 to 24 VDC
- Signal Output (w/o controls): DC ratiometric voltage*
- Signal Output (w/controls): 0 to 10 VDC or 4 to 20 mA
- Maximum Speed: 50" per second
- Rated Life of MLRT: 500 Million inches of wiper travel
- Pressure Rating: 150 psi
- Temperature Rating: +40° F to +165° F
- Resistance Rating: 1,000 Ohms per inch $\pm 20\%$
- Connection Options: 6" Flying leads or 3-pin nano connector

*1 Mega Ohm impedance interface device suggested for limiting sensor current if the controller is not used.

MLRT Circuit Diagram



STROKE = RETRACTED; OUTPUT VOLTAGE = 0 VOLTS (APPROX.)
 STROKE = EXTENDED; OUTPUT VOLTAGE = MAXIMUM INPUT VOLTAGE (APPROX.)

MLRT Replacement Kits

For each MLRT replacement kit order, please specify the part number listed below along with the cylinder stroke length and quantity.

A Service Bulletin is included with each kit.

MLRT with Flying Leads

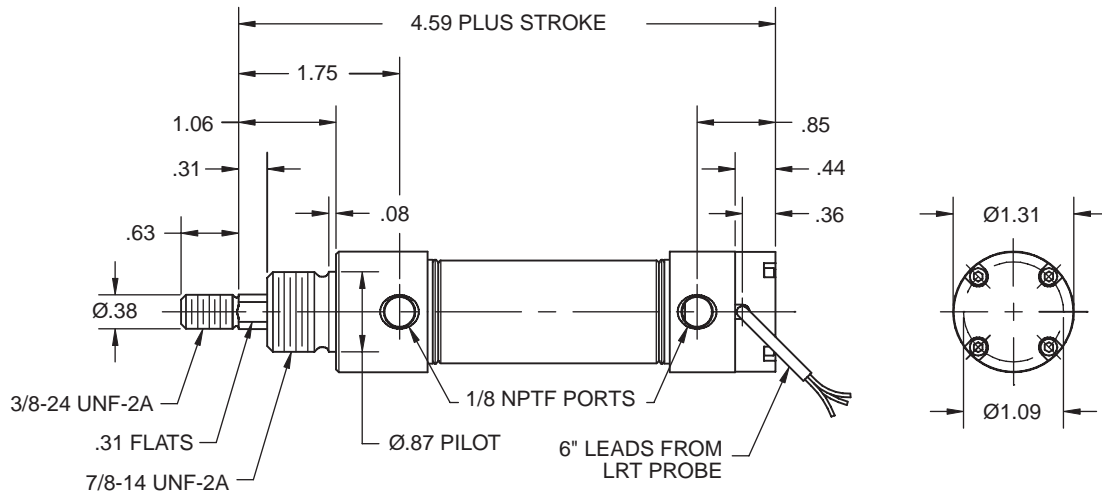
Part #L07831
 Example: L07831, 6" Stroke, Qty. 1

MLRT with Plug Connector

Select part number from table
 Example: L078320000, 4" Stroke, Qty. 1

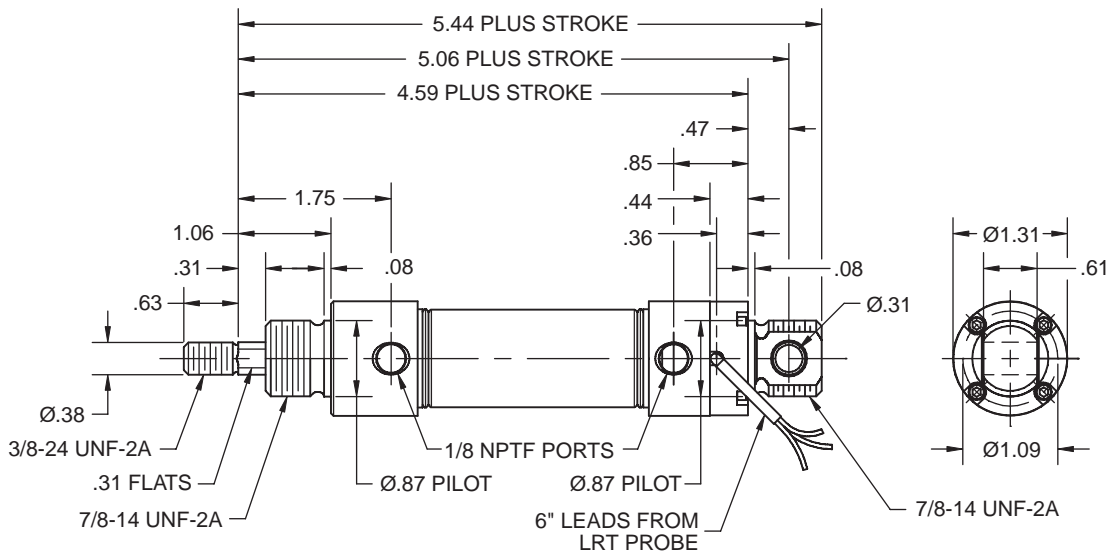
Bore	Mount	Plug Connector MLRT Kit Part Number
1-1/16"	D, BFD	L078320000
	DXP	L078320001
1-1/2"	D, BFD	L078320002
	DXP	L078320003
2"	D, BFD	L078320004
	DXP	L078320005
2-1/2"	D, BFD	L078320006
	DXP	L078320007
3"	D, BFD	L078320008
	DXP	L078320009

Style D

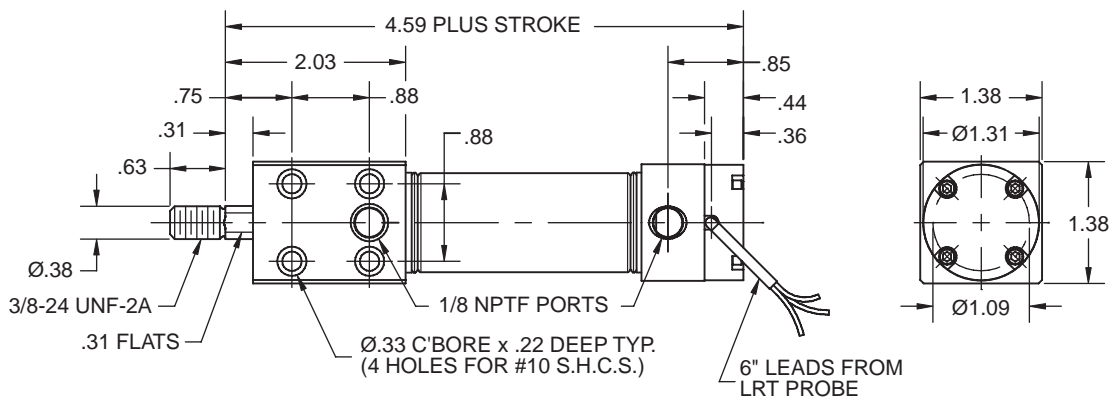


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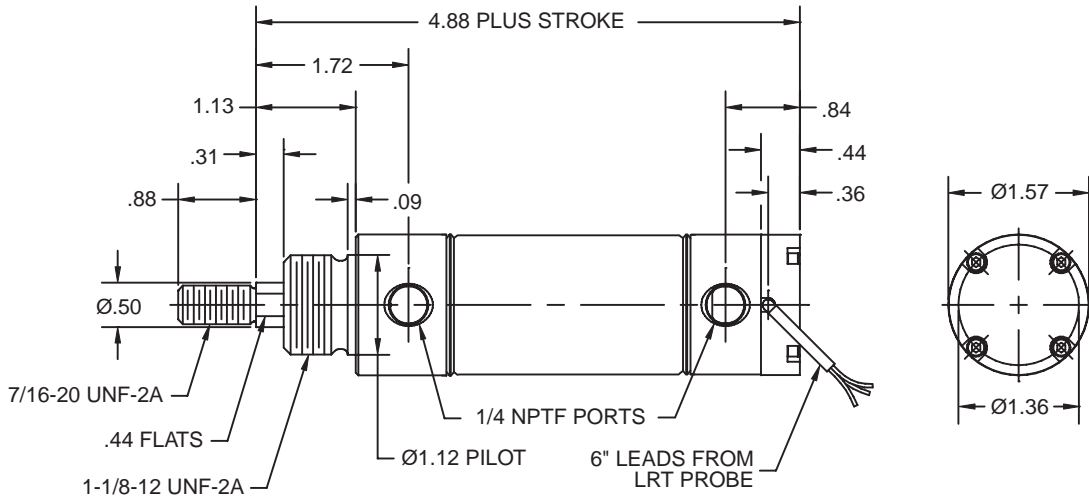
Style DXP



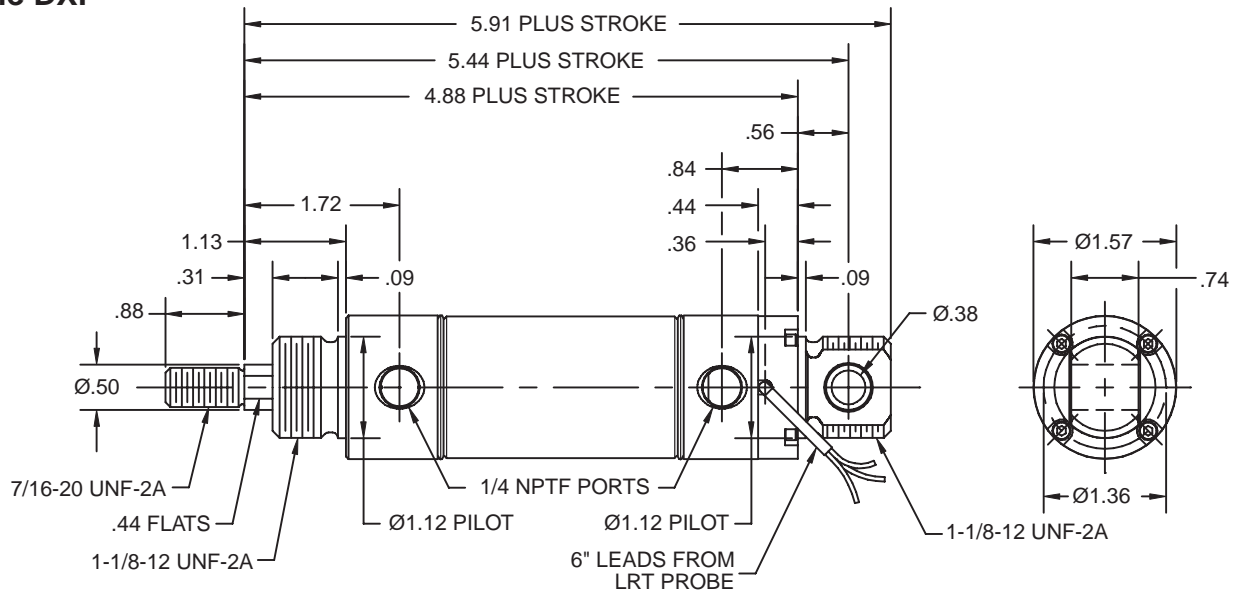
Style BFD



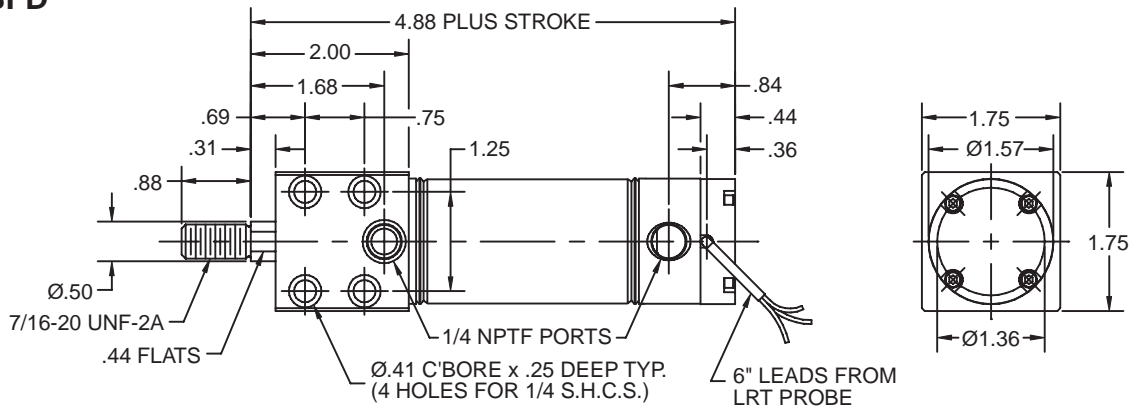
Style D



Style DXP



Style BFD



D

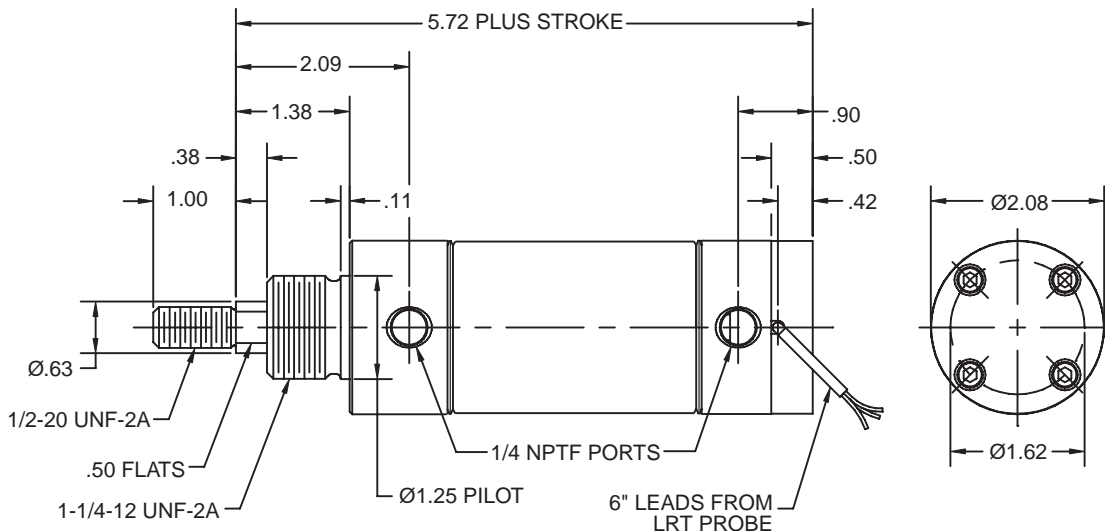
SR/SRM, SRD/SRDM

SRX

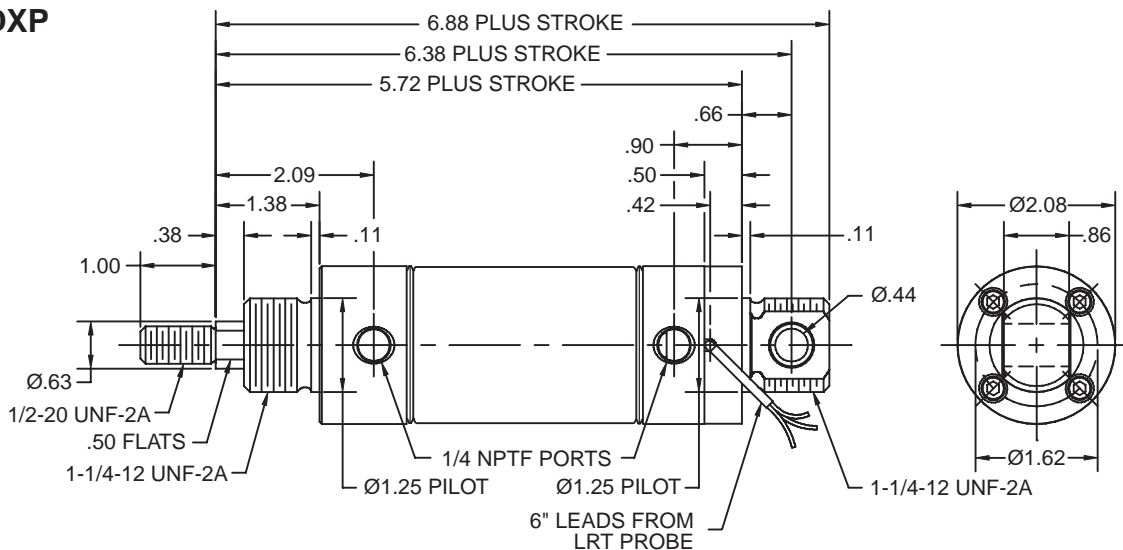
P1L

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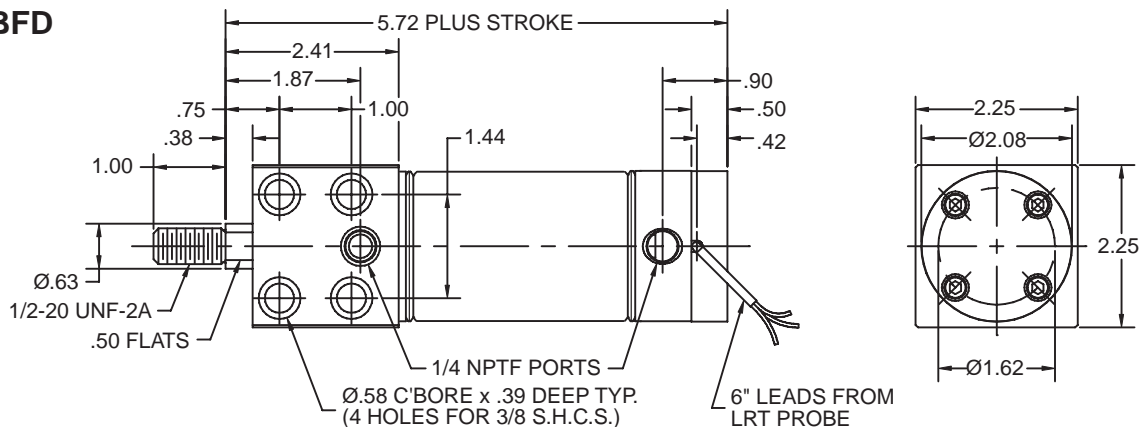
Style D



Style DXP

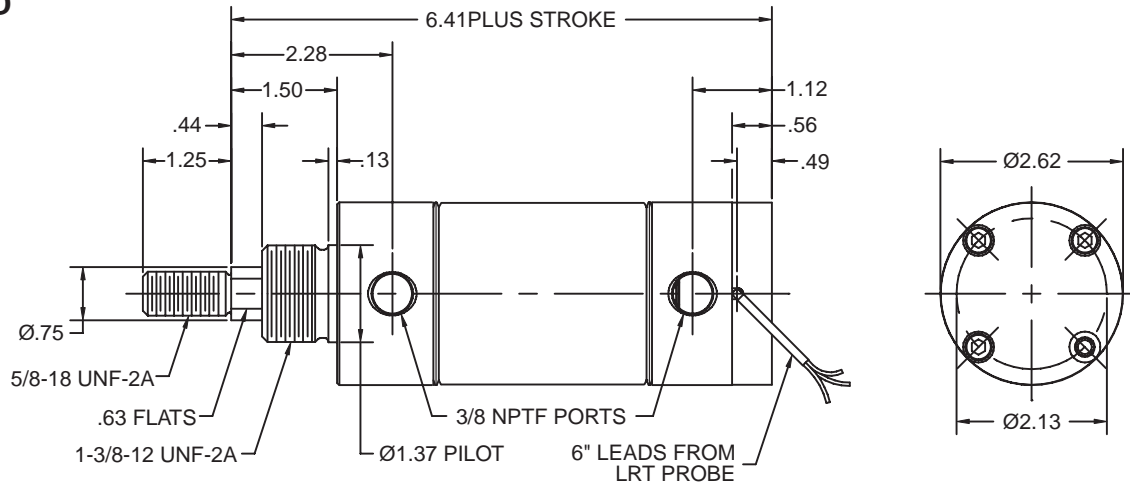


Style BFD

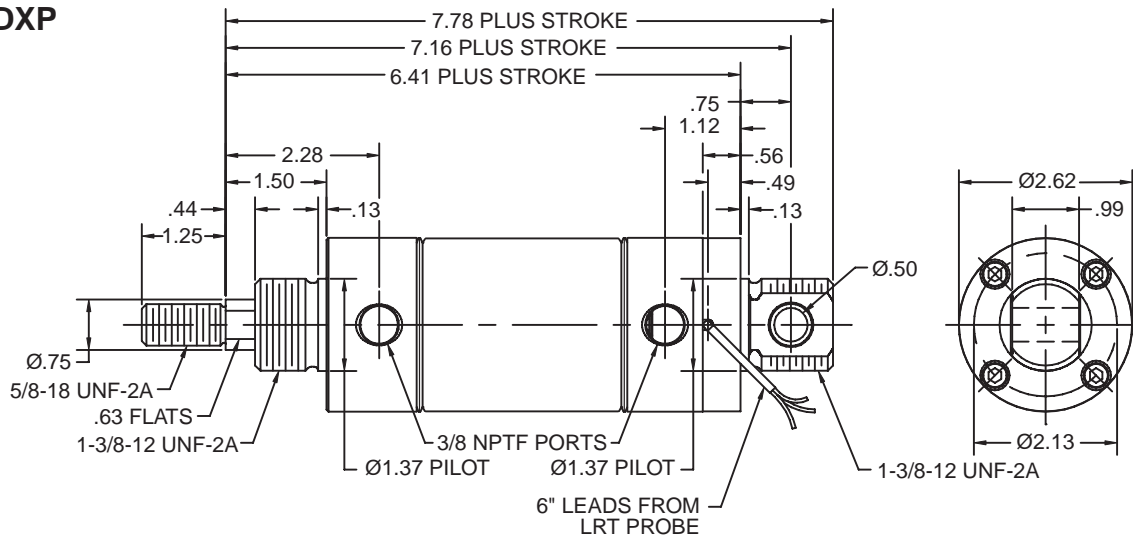


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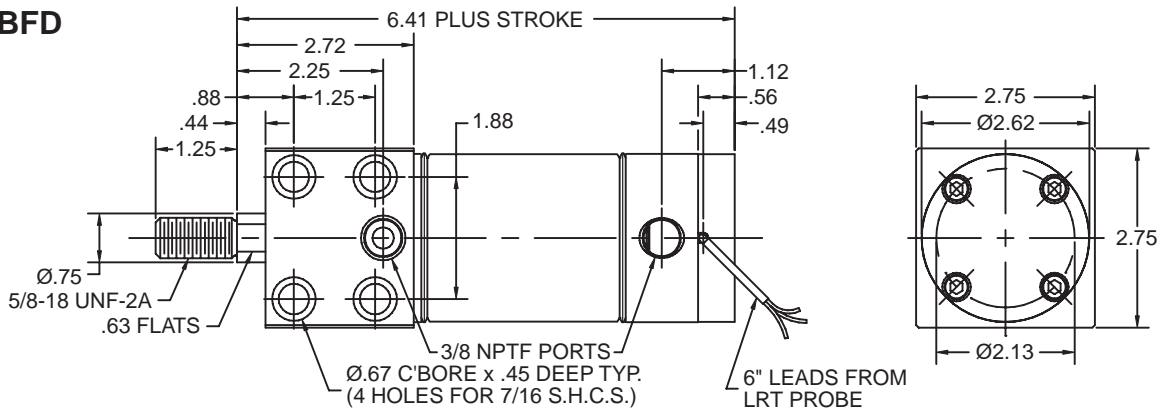
Style D



Style DXP

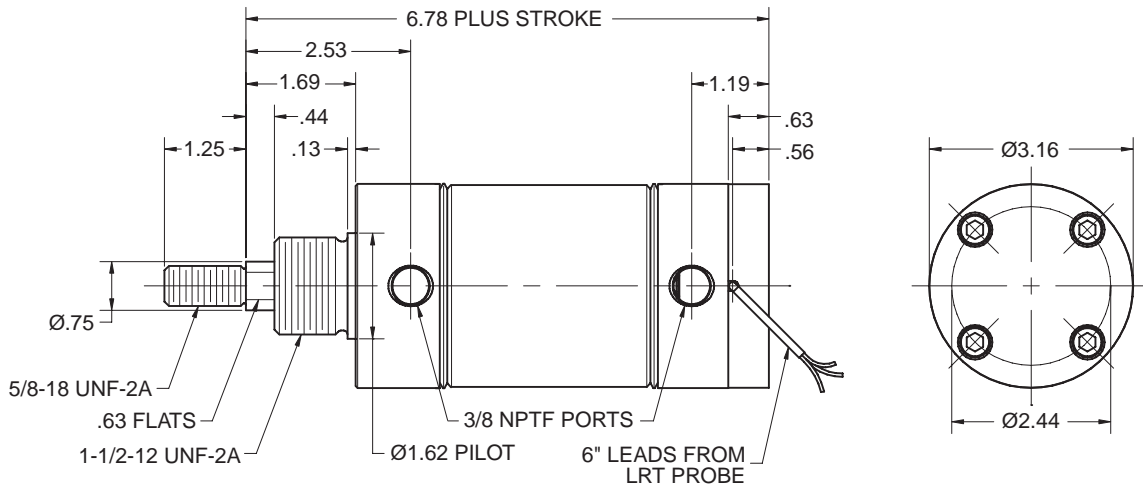


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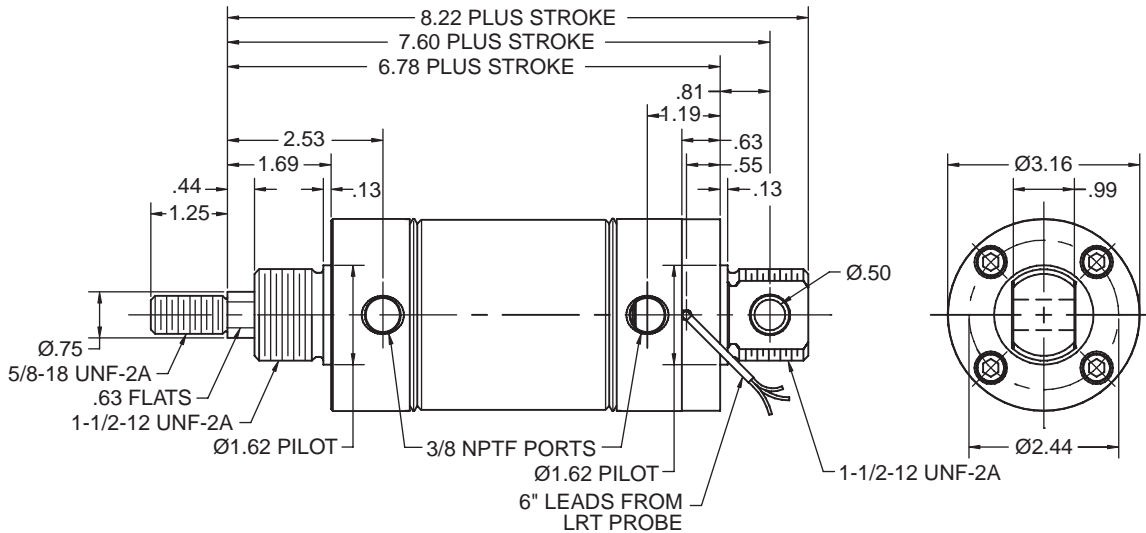


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SR/SRM, SRD/SRDM
SRX
P1L
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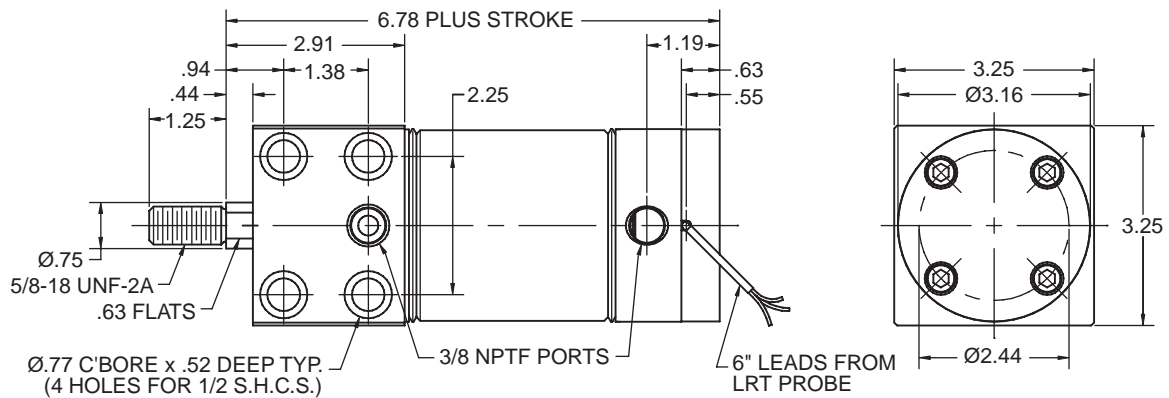
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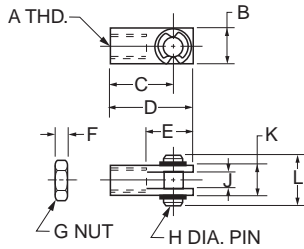
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Style BFD

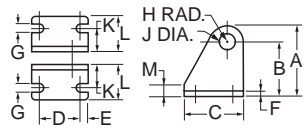


Piston Rod Clevis



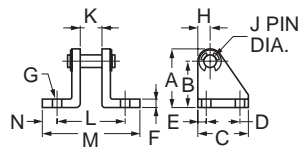
Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L
L071300350	1-1/16	3/8-24	.63	1.38	1.69	.94	.22	3/8-24	.31	.32	.63	.88
L071300400	1-1/2	7/16-20	.75	1.31	1.69	.94	.25	7/16-20	.38	.38	.75	1.03
L071300550	2	1/2-20	.88	1.88	2.31	1.31	.31	1/2-20	.44	.45	.88	1.14
L071300600	2-1/2, 3	5/8-18	1.00	2.25	2.75	1.50	.38	5/8-18	.50	.51	1.00	1.38

Pivot Brackets



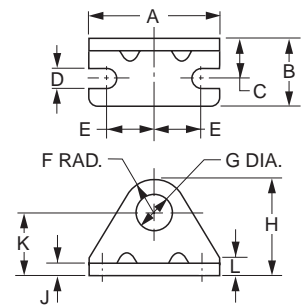
Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L	M
L071310400	1-1/16	1.31	1.00	1.31	.81	.25	.16	.28	.31	.315	.56	.88	.28
L071310500	1-1/2	1.63	1.25	1.63	1.00	.31	.19	.34	.38	.378	.69	1.13	.31
L071310600	2	1.81	1.38	1.81	1.19	.31	.25	.34	.44	.440	.75	1.19	.38
L071310700	2-1/2, 3	2.13	1.63	2.13	1.38	.38	.25	.41	.50	.503	.88	1.38	.38

Pivot Brackets



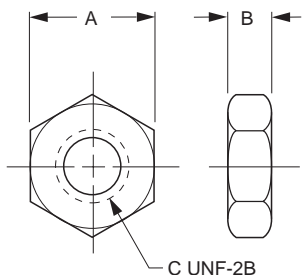
Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L	M	N
L071320250	1-1/16	1.31	1.00	1.31	.81	.25	.16	.28	.31	.312	.62	1.75	2.38	.31
L071320350	1-1/2	1.63	1.25	1.63	1.00	.31	.19	.34	.38	.375	.75	2.13	3.00	.44
L071320450	2	1.81	1.38	1.81	1.19	.31	.25	.34	.44	.437	.88	2.38	3.25	.44
L071320550	2-1/2, 3	2.13	1.63	2.13	1.38	.38	.25	.41	.50	.500	1.00	2.75	3.75	.50

Foot Brackets



Part Number	Bore	A	B	C	D	E	F	G	H	J	K	L
L073790056	1-1/16	2.13	1.16	.66	.28	.75	.75	.88	1.75	.16	1.00	.38
L073790108	1-1/2	2.75	1.44	.81	.35	1.00	.94	1.13	2.19	.19	1.25	.38
L073790116	2	3.00	1.59	.91	.35	1.19	1.06	1.26	2.44	.22	1.38	.44
L073790125	2-1/2	3.75	1.88	1.06	.41	1.50	1.19	1.38	2.81	.25	1.63	.50
L073790140	3	4.38	1.62	1.00	.35	1.75	1.25	1.64	3.14	.25	1.89	.89

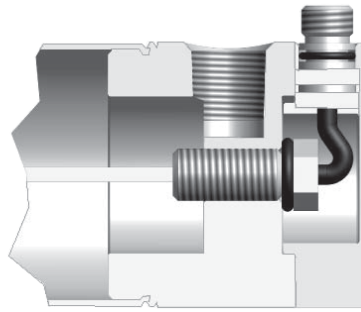
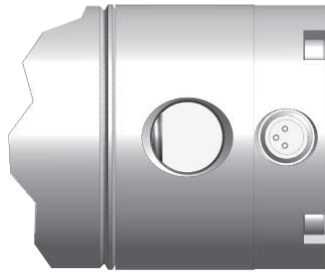
Mounting Nut



Part Number	Bore	A	B	C
L073801000	1-1/16	1.31	.48	7/8-14
L073801300	1-1/2	1.69	.61	1-1/8-12
L073801200	2	1.88	.50	1-1/4-12
L073801400	2-1/2	2.06	.78	1-3/8-12
L073801500	3	2.25	.84	1-1/2-12

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3-pin Nano Connector



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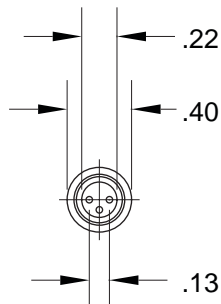
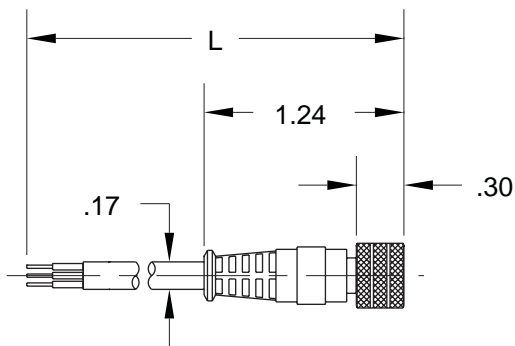
Wire Color

Wires	6" Leads	Plug Option
Input	Red	Brown
Ground	Black	Blue
Output	White	Black

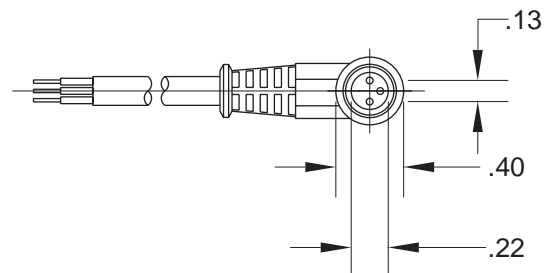
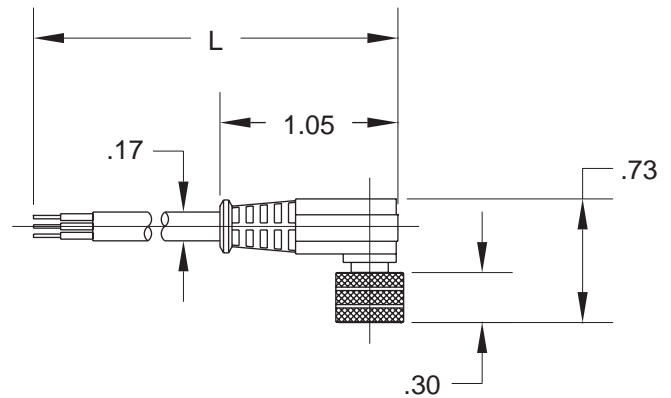
Connectors

Cable Length	Threaded Straight Connector	Threaded Right Angle Connector
5 meters	086620T005	086620R005
2 meters	086620T002	086620R002

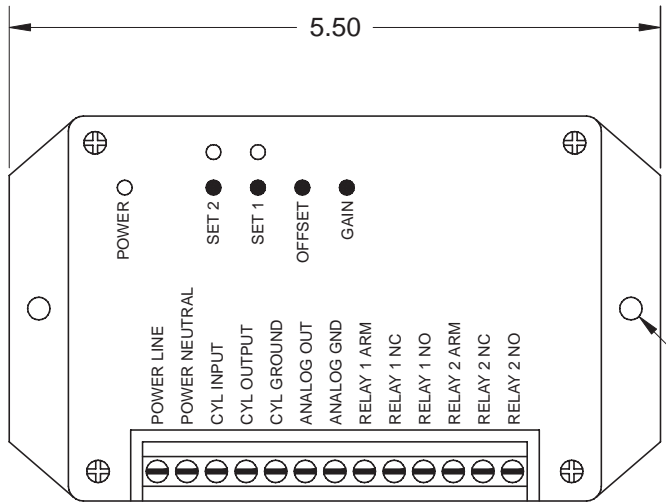
Straight Connector



Right-angle Connector

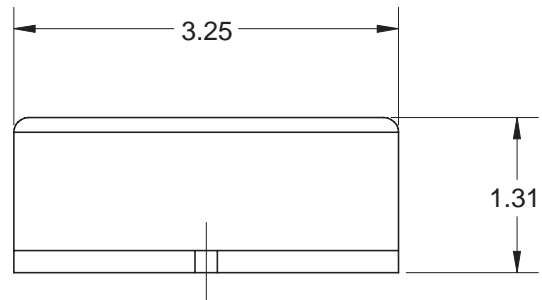
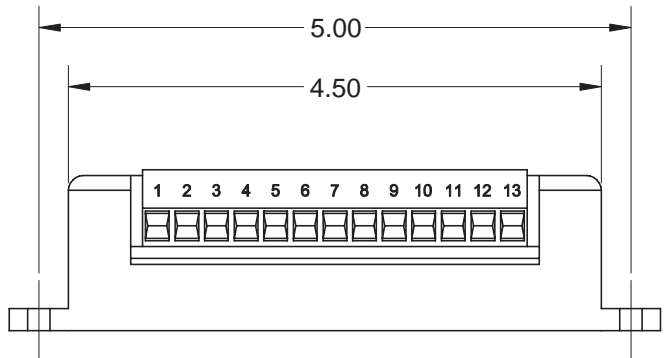


Dual Set Point Controller, Part #149344000



Ordering Information

Model Number	Input Specifications	Output Specifications
1493440002	120 VAC	0-10 V
1493440003	120 VAC	4-20 mA
1493440004	12-24 VDC	0-10 V
1493440005	12-24 VDC	4-20 mA



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SR/SRM, SRD/SRDM

SRX

P1L

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Dual Set Point Controller Specifications, Part #149344000

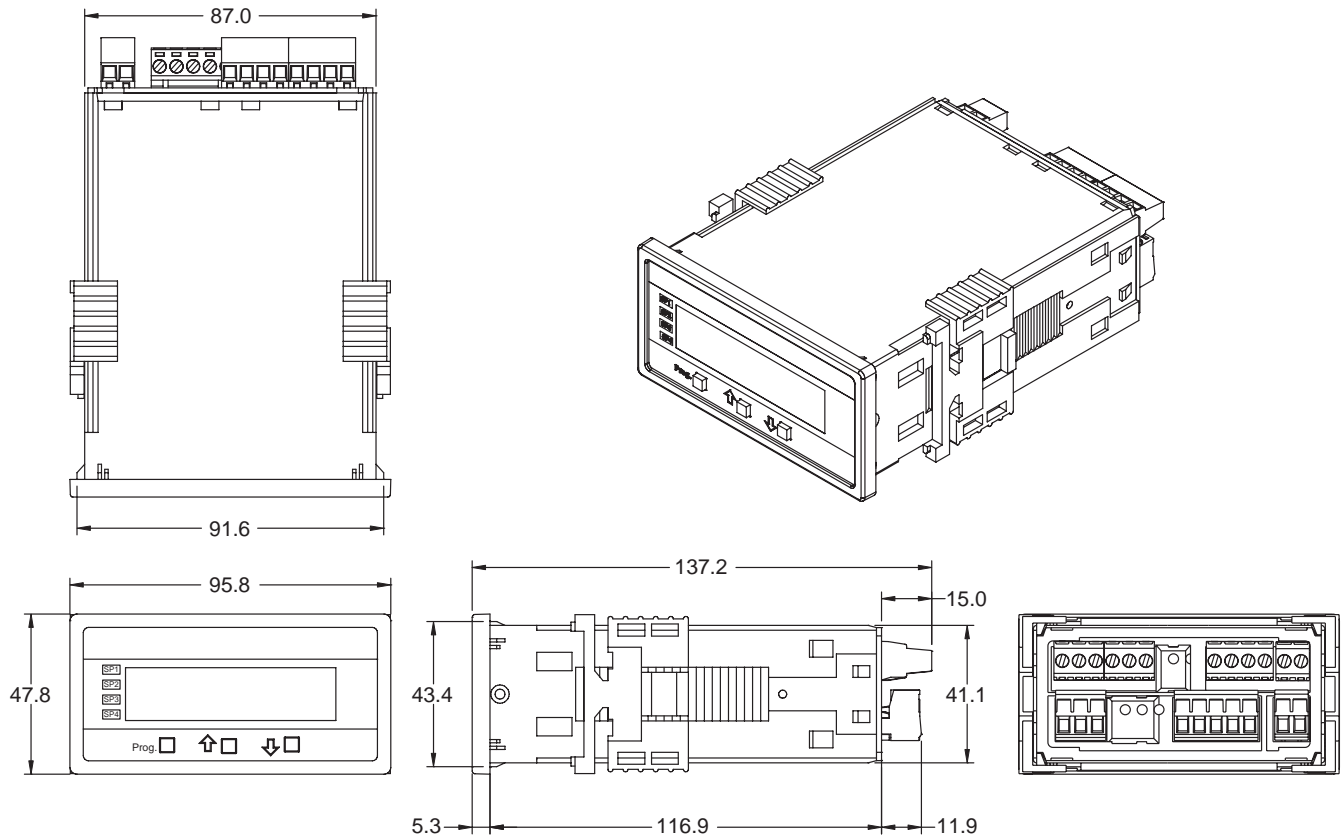
- Power Input Requirements 12 to 24 VDC, 0.1 amps, or 120 VAC, 60 Hz, 0.1 amps
- Output specifications – Set Point..... Relay (2) 2 amps @ 24 VDC or 120 VAC
- Output Specifications – Scaleable..... 0 to 10 V, 1 mA max. output current (10K ohm impedance min.) 4 to 20mA, into 500-ohm max. impedance
- Maximum Zero Offset..... 50% of cylinder stroke
- Minimum Span Range 50% of cylinder stroke
- Enclosure Dimensions..... 1.31" h x 5.50" w x 3.25" d
- Electronics Temperature Operating Range..... +40°F to +160°F

Please reference Parker Bulletin #0971-G-B2 for information regarding programming and operation of this controller.

CDRO Panel Meter Controller Dimensions, Part #149345 _ _ _ _

(See page D56 for complete ordering instructions)

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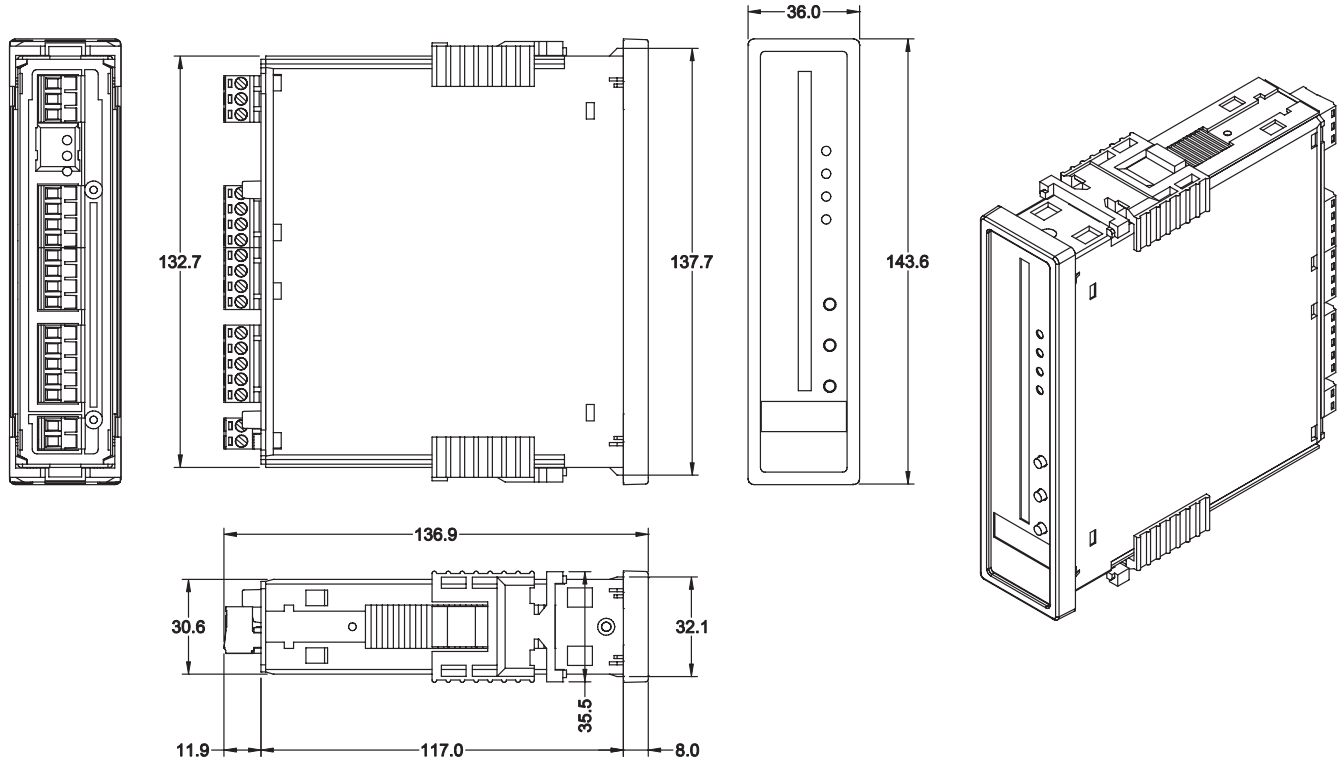


CDRO Panel Meter Controller Specifications, Part #149345 _ _ _ _

- Power Input Requirements High voltage, 85 – 265 VAC, or 95 – 370 VDC
 Low voltage, 15 – 48 VAC, OR 10 – 72 VDC
- Relay Output Options One 5A Form A Relay
 Dual 5A Form A Relays
 Four 5A Form A Relays
- Analog Output Specification Isolated, 16-bit Current Output; 0 – 20 mA or 4 – 20 mA (Scaleable)
 Isolated, 16-bit Voltage Output; 0 – 10 VDC (Scaleable)
 Accuracy: 0.02% over Full Scale
 Resolution: 1/45,000
 Update Rate: 7 Readings per second
- Internal Resolution 16 Bits
- Operating Temperature Range 0 – 50°C, +32°F to +122°F
- Warm-up Time 10 Minutes
- Numerical Display..... Digital, 4 digits
- Display Range -1,999 to +9,999
- Setpoints..... Setpoint 1 activates Relay 1
 Setpoint 2 activates Relay 2
 Setpoint 3 activates Relay 3
 Setpoint 4 activates Relay 4
- NEMA Rating..... 4 (with cover, Part #087861000)

Please reference Parker Bulletin #0971-B1 for information regarding programming and operation of this controller.

CDBRO 101 Segment Bargraph Controller Dimensions, Part #149346 _ _ _ _
 (See page D56 for complete ordering instructions)

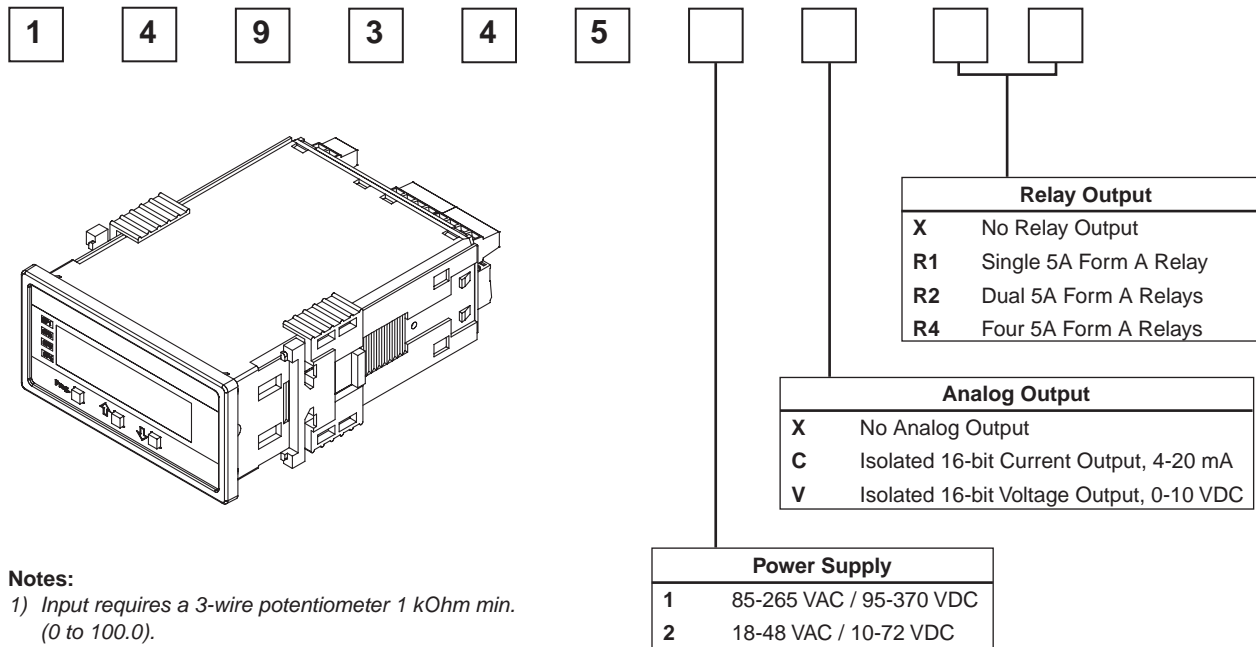


CDBRO 101 Segment Bargraph Controller Specifications, Part #149346 _ _ _ _

- Power Input Requirements High voltage, 85 – 265 VAC, or 95 – 370 VDC
 Low voltage, 15 – 48 VAC, OR 10 – 72 VDC
- Relay Output Options One 5A Form A Relay
 Two 5A Form A Relays
 Dual 10A Form C & Dual 5A Form A Relays
- Analog Output Specification Isolated, 16-bit Current Output; 0 – 20 mA or 4 – 20 mA (Scaleable)
 Isolated, 16-bit Voltage Output; 0 – 10 VDC (Scaleable)
 Accuracy: 0.02% over Full Scale
 Resolution: 1/45,000
 Update Rate: 7 Readings per second
- Internal Resolution 16 Bits
- Operating Temperature Range 0 – 50°C, +32°F to +122°F
- Warm-up Time 10 Minutes
- Vertical Display VRR – 101 Segment, Red LED Vertical Bar Graphic Display
 VTR – 101 Segment, Tri-color Vertical Bar Graphic Display
- Annunciators..... Six, red LED's on front panel; one annunciator per setpoint
- Numerical Display..... Digital, 4 digits
- Display Range -1,999 to +9,999
- Setpoints..... Setpoint 1 activates Relay 1
 Setpoint 2 activates Relay 2
 Setpoint 3 activates Relay 3
 Setpoint 4 activates Relay 4
- NEMA Rating..... 4 (with cover, Part #087867000)

Please reference Parker Bulletin #0971-B2 for information regarding programming and operation of this controller.

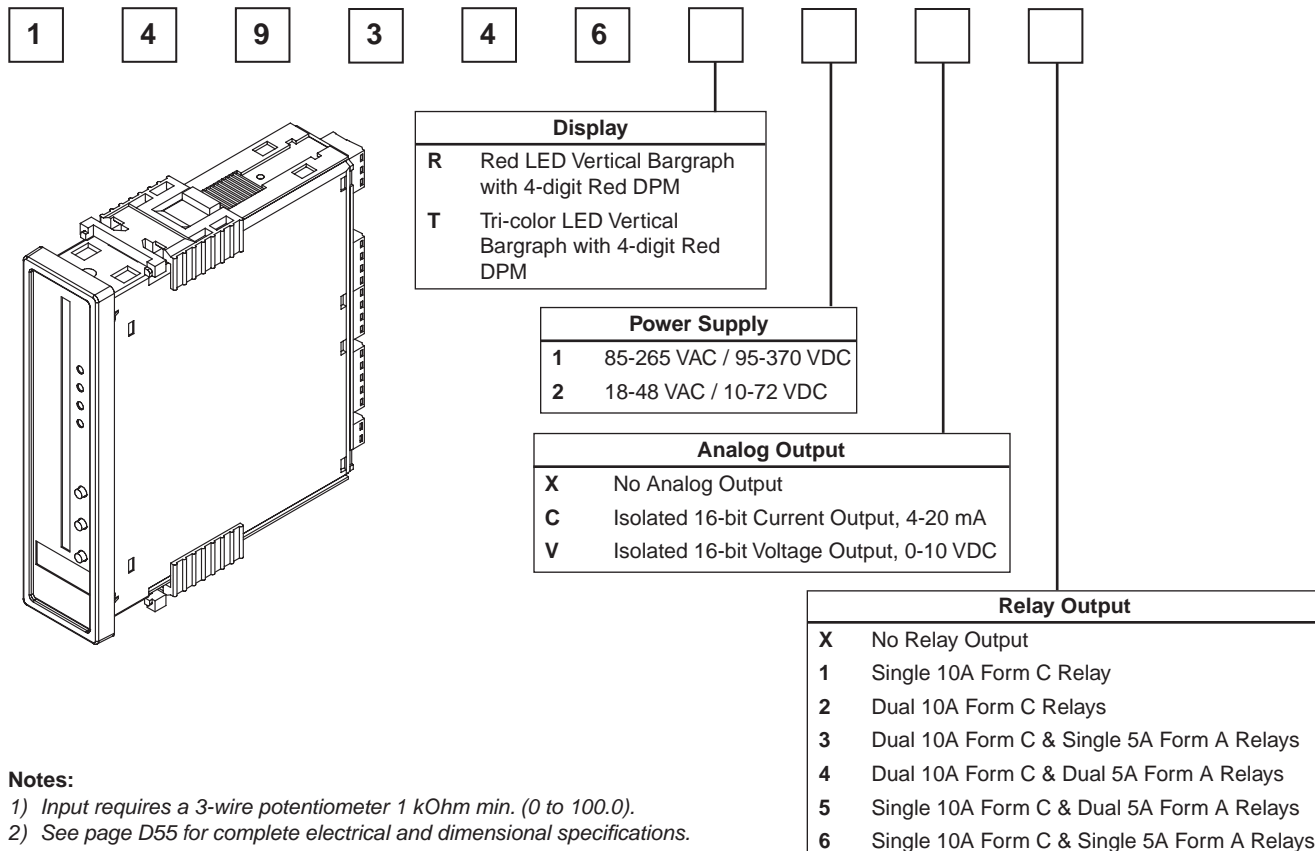
Ordering Code for CDRO Panel Meter Controller



Notes:

- 1) Input requires a 3-wire potentiometer 1 kOhm min. (0 to 100.0).
- 2) See page D54 for complete electrical and dimensional specifications.

Ordering Code for CDBRO 101 Segment Bargraph Controller



Notes:

- 1) Input requires a 3-wire potentiometer 1 kOhm min. (0 to 100.0).
- 2) See page D55 for complete electrical and dimensional specifications.



P1L Series

High Performance Repairable
Pneumatic Cylinder



D

SR/SRM, SRD/SRDM

SRX

P1L

P

Contents

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Technical Information.....	D61	Mounting Kits & Accessories.....	D90
Dimensions.....	D62-D81		



D

Optional Piston Magnet

Located under wear band, piston magnet is used for through-the-barrel sensors for electronic piston position indication. Does not add length to the piston.

Aluminum Piston with Ultra-Wide Nylon Wear Band

Piston is permanently sealed and locked to rod with anaerobic adhesive. Ultra wide wear band prevents metal-to-metal contact and distributes piston loads across wide bearing area.

Z-Profile Piston Seal

Dynamic nitrile piston seal features two rounded micro sealing edges for maximum wear compensation and rounded grooves for retaining lubrication. Dual lipseal for 40mm to 100mm bore sizes.

Adjustable Cushion Option

Available for high speed applications, it features fine-thread, brass needle valves with a captive design.

High Strength Rod Bearing

PTFE-coated bronze rod bearing is inboard of rod seal. Long rod bearing provides rigid support of piston while minimizing bearing stress.

Ports

Optional NPTF or BSPT ports provide full air flow to piston.

Rounded Lip Rod Wiper Seal

Non-lube, urethane rod seal provides dual function as rod seal and rod wiper to eliminate leakage and prevent contamination from entering the cylinder.

Bumpers

Impact resistant urethane bumpers are standard for all bore sizes to provide noise reduction and impact resistance

Four Standard Piston Rod Ends

Inch or metric with male or female to meet a variety of requirements.

Tapped Mounting Holes

Inch or metric holes provide flush mounting from the head or cap face. Standard mounting kits can be bolted-on for adapting to a wide range of applications.

Cylinder Body

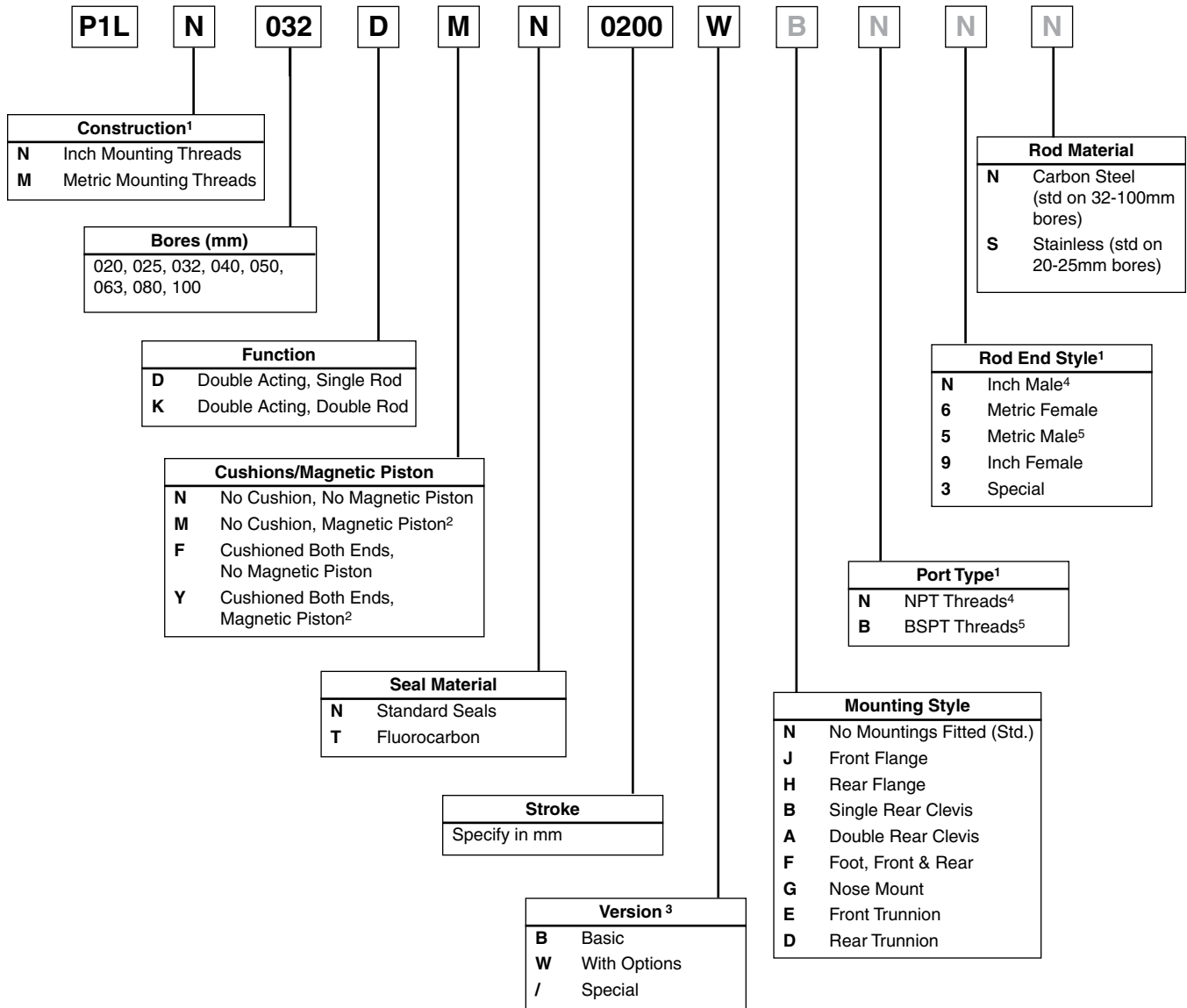
Smooth anodized aluminum tube provides wear-resistant surface. Clean tubular design eliminates area where contamination can accumulate.

Piston Rod

Ground, polished hard chrome plated steel piston rod. Stainless steel is standard on 20 and 25mm bore. Smooth rod surface finish provides minimum friction and maximum seal life.

Threaded End Cap Construction

Precision-machined, aluminum alloy end caps are black anodized and removable from either end for easy cylinder repair. Construction minimizes cylinder size and weight.



Minimum and Maximum Stroke Length for Standard P1L Cylinders

Bore	Min. Stroke (mm)	Max. Stroke (mm) ⁶
20	2	1000
25	2	1000
32	2	1000
40	4	1000
50	5	1000
63	7	1000
80	4	1000
100	4	1000

Notes:

- When selecting inch or metric construction, be advised that the piston rod end and porting thread will coincide with the mounting thread selected as the standard for the basic cylinder. For example, selecting "M" in the construction field will automatically provide a metric male piston rod end and BSPT ports as standard.
- Not available with fluorocarbon seal option.
- If cylinder contains no options, then use "B" as the last digit in the model code. The last 4 boxes are used only when "W" or "/" appears in this field.
- Standard with Inch Construction
- Standard with Metric Construction
- Please consult factory for availability of stroke lengths longer than those listed.

For sensor part numbers and specifications, see the Electronic Sensors Section.

For ordering purposes, when special options or common modifications are requested, the factory will assign a sequential part number in place of the model number.



Specifications

- Bore Sizes: 20 to 100mm (3/4" to 4")
- Rod Diameters: 8 to 32mm (5/16" to 1-1/4")
- Rod Ends: Four Standard, specials to order
- Bumpers standard on both ends
- Adjustable Cushions provided at both ends as an option
- Single End or Double End Mounting
- Mounting Styles: 9 standard
- Rated Air Pressure: 10 bar (145 psi) Non-Lube
- Strokes available in any practical stroke length
- Standard Temperature: -23°C to + 74°C (- 10°F to + 165°F)
- Optional High Temp Service: -23°C to +121°C (-10°F to +250°F)*

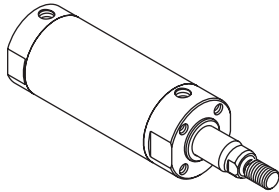
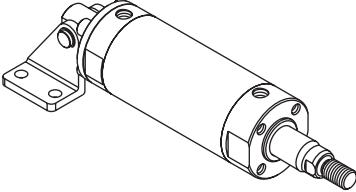
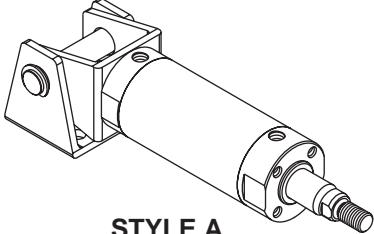
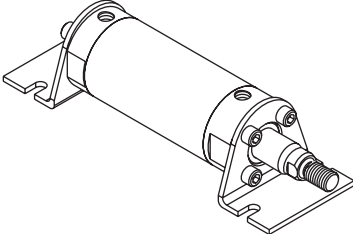
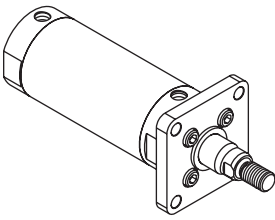
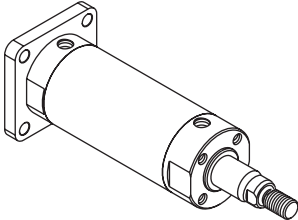
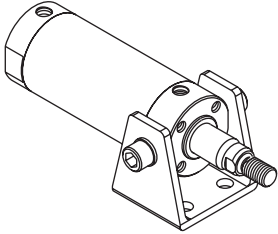
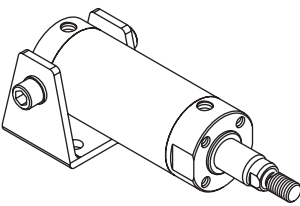
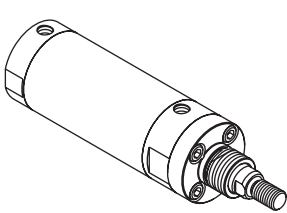
*Option intended for limited exposure to temperatures over +80°C or +176°F. This option is primarily for applications which subject the cylinder to fluids that have an adverse effect on external seals.

Cylinder Weights

Bore	Base (Lb)	Per 25mm of Stroke (Lb)
20	0.24	0.06
25	0.35	0.08
32	0.55	0.11
40	0.9	0.17
50	1.58	0.25
63	2.19	0.28
80	4	0.41
100	6.75	0.59

D

Available Mountings

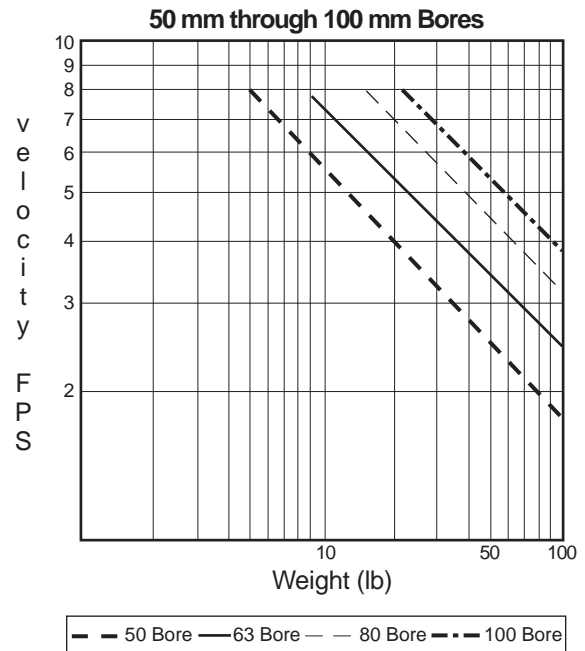
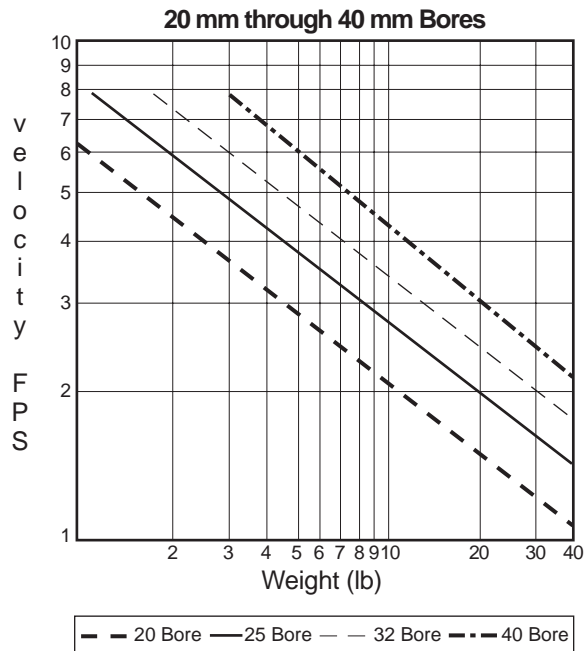
		
STYLE N Basic No Mounts	STYLE B Single Rear Clevis	STYLE A Double Rear Clevis
		
STYLE F Foot Mount	STYLE J Front Flange	STYLE H Rear Flange
		
STYLE E Front Trunnion	STYLE D Rear Trunnion	STYLE G Nose Mount

Theoretical Push and Pull Forces in lbs.

Bore mm	Rod Diameter mm	Action	Effective Area in ²	Operating Pressure (PSI)				
				40	60	80	100	125
20	0	Extend	0.5	19	29	39	49	61
	8	Retract	0.4	16	24	33	41	51
25	0	Extend	0.8	30	46	61	76	95
	10	Retract	0.6	26	38	51	64	80
32	0	Extend	1.2	50	75	100	125	156
	12	Retract	1.1	43	64	86	107	134
40	0	Extend	1.9	78	117	156	195	243
	16	Retract	1.6	65	98	131	164	204
50	0	Extend	3.0	122	183	243	304	380
	20	Retract	2.6	102	153	204	256	320
63	0	Extend	4.8	193	290	386	483	604
	20	Retract	4.3	174	261	348	434	543
80	0	Extend	7.8	312	467	623	779	974
	25	Retract	7.0	281	422	562	703	879
100	0	Extend	12.2	487	730	974	1217	1522
	32	Retract	10.93	437	656	874	1093	1366

Cushioning Capacity Charts

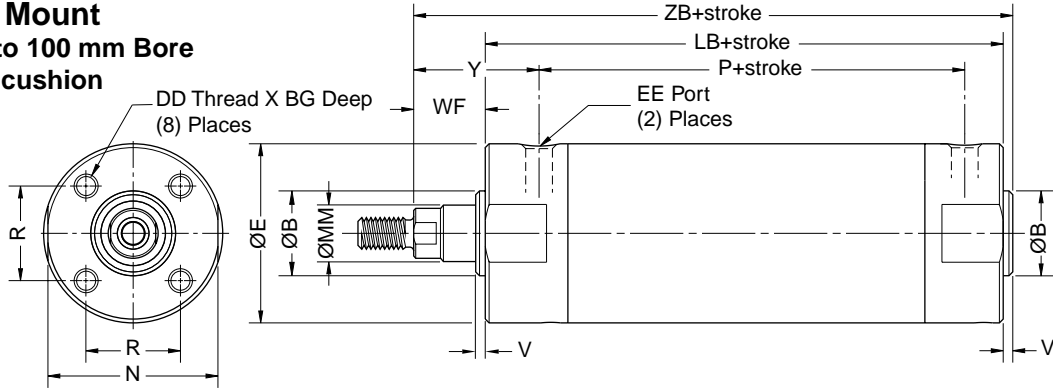
Use the graphs below to determine whether a cylinder will adequately decelerate a load without damage to the cylinder. Find the point on the graph where the piston rod speed intersects the weight of the load. Any cylinder bore size above the intersect point will adequately decelerate the load at that speed.



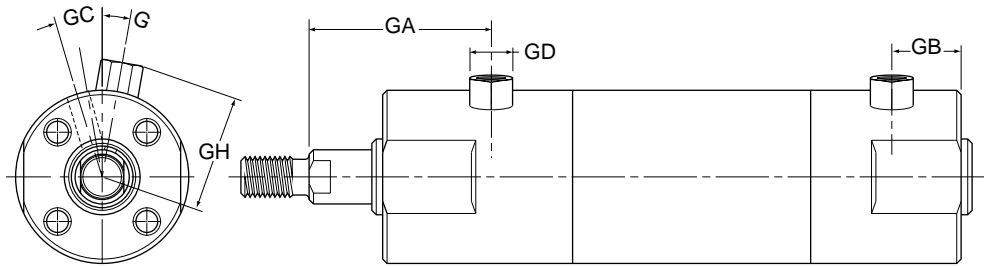
Note: Cushions are recommended for applications with cylinder velocities exceeding 1 ft/sec.

Style N

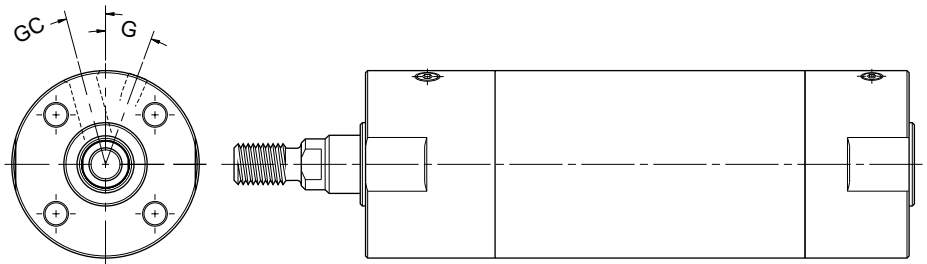
Basic No Mount
Typical 20 to 100 mm Bore
without air cushion



With adjustable air cushion - 20 to 25 mm bores



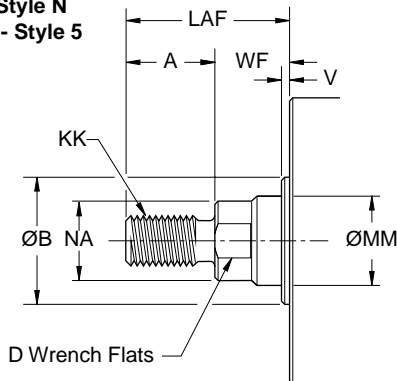
With adjustable air cushion - 32 to 100 mm bores (feature a flush-fit cushion adjustment screw)



Rod End Details

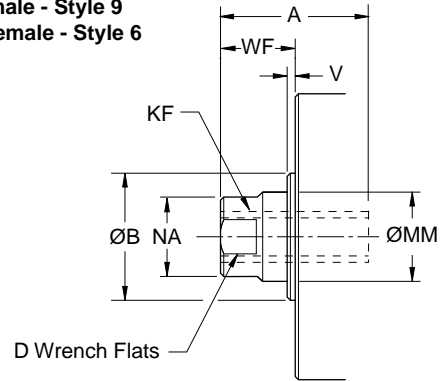
MALE THREADS

Inch Male - Style N
Metric Male - Style 5



FEMALE THREADS

Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

D

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	DD	BG (Depth)	D	ØE	EE	Thread KK Style 5	Thread KF Style 6	LAF	Ø MM Rod Dia.	N	NA	R	V	WF	Y
20	13	12	M4x0.7	7	6	27	1/8*	M8 x 1.25	M5 x 0.80	26	8	24	–	14	2	13	28
25	13	14	M5x0.8	7.6	8	32	1/8*	M10 x 1.25	M6 x 1.00	29	10	29	–	16.5	2	16	30
32	19	18	M5x0.8	7.6	10	39	1/8	M10 x 1.25	M8 x 1.25	41	12	36	11	20	2	22	40
40	19	25	M6x1	12	12	48.5	1/8	M14 x 1.5	M8 x 1.25	41	16	44	14	26	2	22	42
50	22	30	M8x1.25	16	16	59	1/4	M18 x 1.5	M10 x 1.25	52	20	55	18	32	2	30	53
63	22	32	M10x1.5	16	16	72	1/4	M18 x 1.5	M10 x 1.25	52	20	69	18	38	2	30	53
80	38	40	M10x1.5	22	20	90	3/8	M22 x 1.5	M16 x 1.5	69	25	86	23	50	3	31	59
100	48	50	M12x1.75	22	26	110	1/2	M26 x 1.5	M20 x 1.5	79	32	106	30	60	3	31	57

*Ports are M5 for cushioned versions

Bore	Add Stroke		
	LB	P	ZB
20	69	45	83
25	69	46	86
32	71	43	95
40	78	49	102
50	90	53	122
63	90	52	122
80	108	64	142
100	108	66	142

Bore	Adjustable Air Cushion							
	GA	GB	GD Hex	GC°	G°	GH	EE	Cushion Length
20	33	14	8	13-1/2	25-1/2	20.5	M5 x 0.8	9
25	35	14	8	15-1/2	20-1/2	23	M5 x 0.8	9
32	–	–	–	10-1/2	30-1/2	–	1/8	10
40	–	–	–	10-1/2	22-1/2	–	1/8	12
50	–	–	–	10-1/2	23-1/2	–	1/4	15
63	–	–	–	15-1/2	20-1/2	–	1/4	15
80	–	–	–	15-1/2	25-1/2	–	3/8	15
100	–	–	–	15-1/2	25-1/2	–	1/2	15

Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore Size	A	ØB +0 -0.001	DD (UNF)	BG (Depth)	D	ØE	EE (NPTF)	Thread		LAF	ØMM Rod Dia.	N	NA	R	V	WF	Y
								KK (UNF) Style N	KF (UNF) Style 9								
								20	0.50								
25	0.50	0.551	10-32	0.30	0.31	1.26	1/8†	5/16-24	1/4-28	1.12	0.394	1.14	–	0.65	0.08	0.62	1.18
32	0.75	0.709	10-32	0.30	0.39	1.53	1/8	7/16-20	5/16-24	1.63	0.472	1.42	0.43	0.79	0.08	0.88	1.57
40	0.75	0.984	1/4-28	0.47	0.47	1.91	1/8	7/16-20	3/8-24	1.63	0.630	1.73	0.55	1.02	0.08	0.88	1.65
50	0.88	1.181	5/16-24	0.63	0.63	2.32	1/4	1/2-20	1/2-20	2.07	0.787	2.17	0.71	1.26	0.08	1.19	2.09
63	0.88	1.260	3/8-24	0.63	0.63	2.83	1/4	1/2-20	1/2-20	2.07	0.787	2.72	0.71	1.50	0.08	1.19	2.09
80	1.50	1.575	3/8-24	0.88	0.79	3.54	3/8	3/4-16	5/8-18	2.72	0.984	3.39	0.91	1.97	0.12	1.22	2.32
100	1.88	1.968	1/2-20	0.88	1.02	4.33	1/2	1-14	3/4-16	3.11	1.260	4.17	1.18	2.36	0.12	1.22	2.24

† Ports are 10-32 for cushioned versions

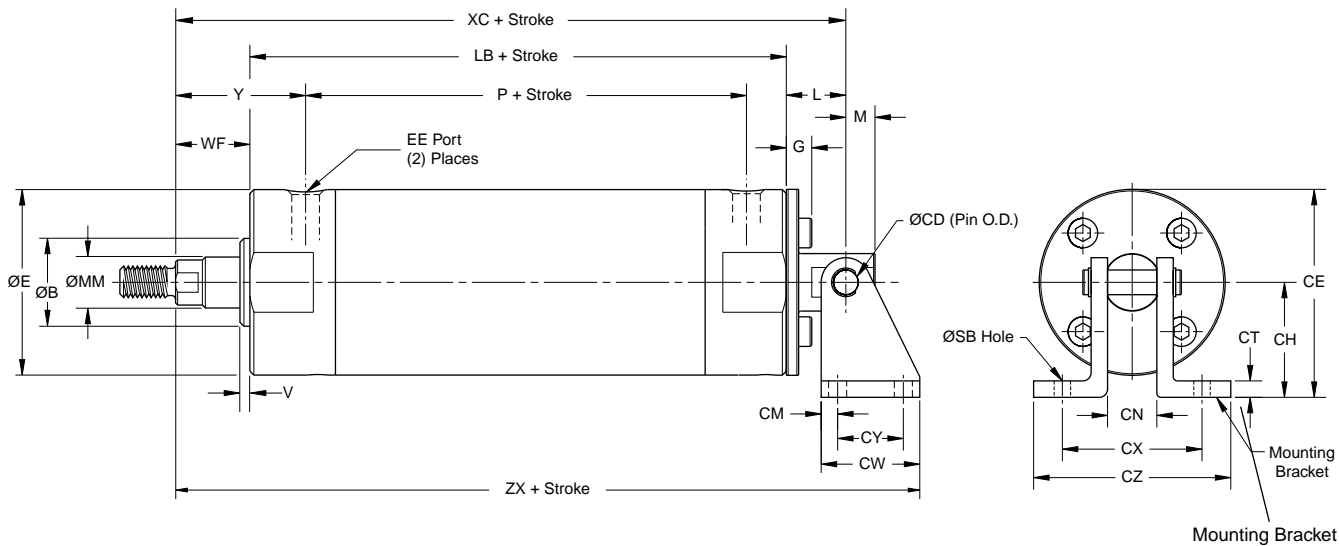
Bore (mm)	Add Stroke		
	LB	P	ZB
20	2.70	1.77	3.28
25	2.70	1.81	3.40
32	2.78	1.69	3.74
40	3.06	1.93	4.02
50	3.53	2.09	4.80
63	3.53	2.05	4.80
80	4.25	2.52	5.59
100	4.25	2.60	5.59

Bore (mm)	Adjustable Air Cushion							
	GA	GB	GD Hex	GC°	G°	GH	EE	Cushion Length
20	1.30	0.55	0.31	13-1/2	25-1/2	0.81	10-32 UNF	0.35
25	1.38	0.55	0.31	15-1/2	20-1/2	0.91	10-32 UNF	0.35
32	–	–	–	10-1/2	30-1/2	–	1/8 NPTF	0.39
40	–	–	–	10-1/2	22-1/2	–	1/8 NPTF	0.47
50	–	–	–	10-1/2	23-1/2	–	1/4 NPTF	0.59
63	–	–	–	15-1/2	20-1/2	–	1/4 NPTF	0.59
80	–	–	–	15-1/2	25-1/2	–	3/8 NPTF	0.59
100	–	–	–	15-1/2	25-1/2	–	1/2 NPTF	0.59



Style B
Single Rear Clevis
Typical 20 to 100 mm Bore

D

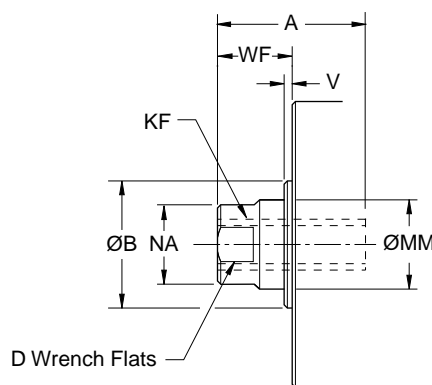
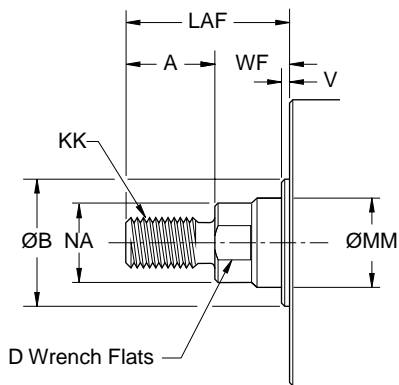


Note: Mating Mounting Bracket and Pin must be ordered as separate items

Rod End Details

MALE THREADS
Inch Male - Style N
Metric Male - Style 5

FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	ØCD h9	D	ØE	EE (BSPT)	G	Thread KK Style 5	Thread KF Style 6	L	LAF	M	ØMM Rod Dia.	NA	V	WF	Y
20	13	12	6.35	6	27	1/8*	7	M8 x 1.25	M5 x 0.80	18	26	7	8	–	2	13	28
25	13	14	6.35	8	32	1/8*	8	M10 x 1.25	M6 x 1.00	17	29	7	10	–	2	16	30
32	19	18	6.35	10	39	1/8	15.5	M10 x 1.25	M8 x 1.25	27	41	10	12	11	2	22	40
40	19	25	9.52	12	48.5	1/8	10	M14 x 1.5	M8 x 1.25	22	41	10	16	14	2	22	42
50	22	30	9.52	16	59	1/4	12	M18 x 1.5	M10 x 1.25	23	52	11	20	18	2	30	53
63	22	32	9.52	16	72	1/4	13	M18 x 1.5	M10 x 1.25	23	52	11	20	18	2	30	53
80	38	40	19.07	20	90	3/8	15	M22 x 1.5	M16 x 1.5	35	69	19	25	23	3	31	59
100	48	50	19.07	26	110	1/2	17	M26 x 1.5	M20 x 1.5	43	79	19	32	30	3	31	57

Bore	CE	CH	CM	CN	CT	CW	CX	CY	CZ	ØSB	Add Stroke			
											LB	P	XC	ZX
20	35.5	22	5	10	3	29	32	19	51	7	69	45	99	120
25	38	22	5	10	3	29	32	19	51	7	69	46	102	123
32	41.5	22	5	13	3	29	35	19	54	7	71	43	120	141
40	59	35	6	16	3	38	47	25	67	7	78	49	122	151
50	64.5	35	6	19	6	38	54	25	76	7	90	53	143	172
63	80	44	6	19	6	38	54	25	76	7	90	52	143	172
80	96	51	13	28	6	64	72	38	104	11	108	64	173	218
100	115	60	13	32	6	70	76	44	108	14	108	66	189	240

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

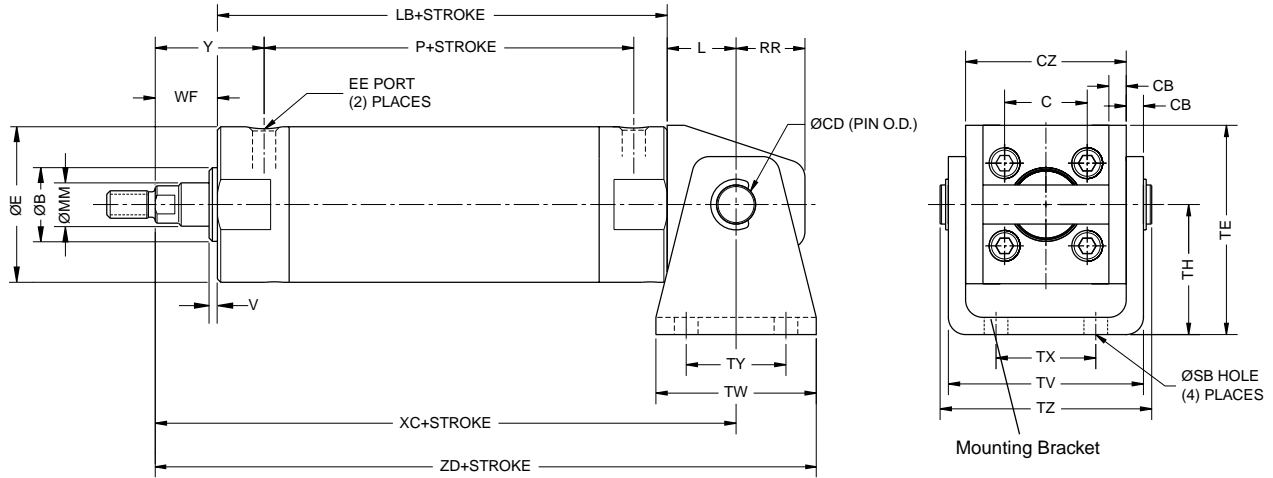
Bore (mm)	A	ØB +0 -0.001	ØCD +0 -0.002	D	ØE	EE (NTPF)	G	Thread KK Style N	Thread KF Style 9	L	LAF	M	ØMM Rod Dia.	NA	V	WF	Y
20	0.50	0.472	0.250	0.24	1.06	1/8†	0.26	1/4-28	#10-32	0.70	1.00	0.28	0.315	–	0.08	0.50	1.10
25	0.50	0.551	0.250	0.31	1.26	1/8†	0.27	5/16-24	1/4-28	0.68	1.12	0.28	0.394	–	0.08	0.62	1.18
32	0.75	0.709	0.250	0.39	1.53	1/8	0.57	7/16-20	5/16-24	1.07	1.63	0.39	0.472	0.43	0.08	0.88	1.57
40	0.75	0.984	0.375	0.47	1.91	1/8	0.36	7/16-20	3/8-24	0.88	1.63	0.38	0.630	0.55	0.08	0.88	1.65
50	0.88	1.181	0.375	0.63	2.32	1/4	0.43	1/2-20	1/2-20	0.91	2.07	0.44	0.787	0.71	0.08	1.19	2.09
63	0.88	1.260	0.375	0.63	2.83	1/4	0.46	1/2-20	1/2-20	0.91	2.07	0.44	0.787	0.71	0.08	1.19	2.09
80	1.50	1.575	0.751	0.79	3.54	3/8	0.54	3/4-16	5/8-18	1.38	2.72	0.75	0.984	0.91	0.12	1.22	2.32
100	1.88	1.968	0.751	1.02	4.33	1/2	0.64	1-14	3/4-16	1.69	3.11	0.75	1.260	1.18	0.12	1.22	2.24

Bore (mm)	CE	CH	CM	CN	CT	CW	CX	CY	CZ	ØSB	Add Stroke			
											LB	P	XC	ZX
20	1.39	0.87	0.19	0.38	0.12	1.13	1.25	0.75	2.00	0.27	2.70	1.77	3.91	4.74
25	1.49	0.87	0.19	0.38	0.12	1.13	1.25	0.75	2.00	0.27	2.70	1.81	4.00	4.83
32	1.63	0.87	0.19	0.50	0.12	1.13	1.38	0.75	2.12	0.27	2.78	1.69	4.72	5.55
40	2.31	1.38	0.25	0.62	0.12	1.50	1.86	1.00	2.62	0.27	3.06	1.93	4.81	5.94
50	2.52	1.38	0.25	0.75	0.25	1.50	2.12	1.00	3.00	0.27	3.53	2.09	5.63	6.76
63	3.17	1.75	0.25	0.75	0.25	1.50	2.12	1.00	3.00	0.27	3.53	2.05	5.63	6.76
80	3.77	2.00	0.50	1.09	0.25	2.50	2.84	1.50	4.09	0.42	4.25	2.52	6.82	8.57
100	4.54	2.37	0.50	1.25	0.25	2.75	3.00	1.75	4.25	0.55	4.25	2.60	7.44	9.44

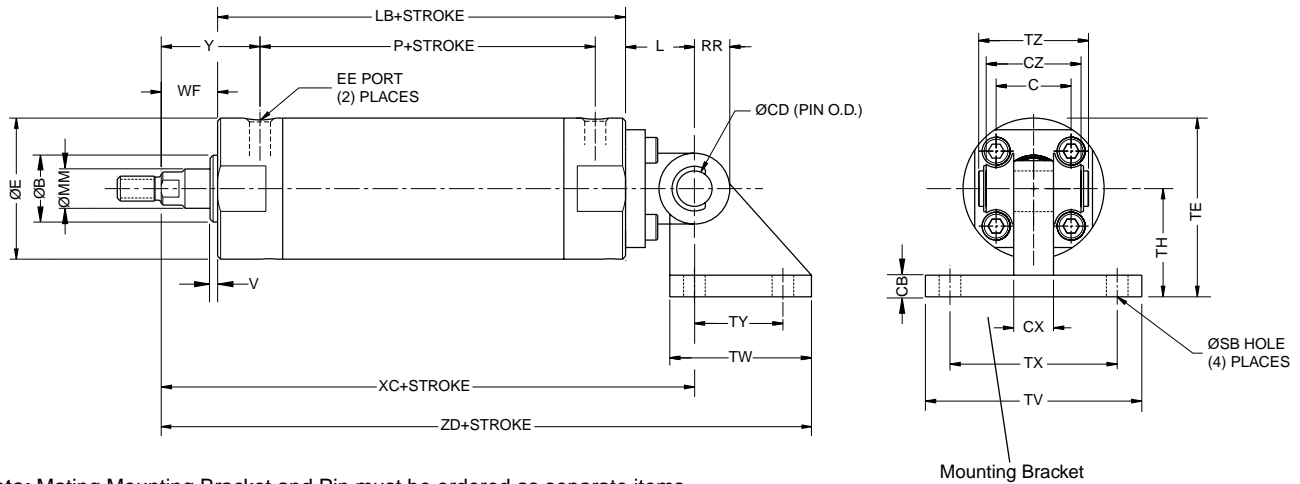
† Ports are 10-32 for cushioned versions



Style A
Double Rear Clevis
Typical 20 to 63 mm Bore



Style A
Double Rear Clevis
Typical 80 to 100 mm Bore



Note: Mating Mounting Bracket and Pin must be ordered as separate items.

Rod End Details

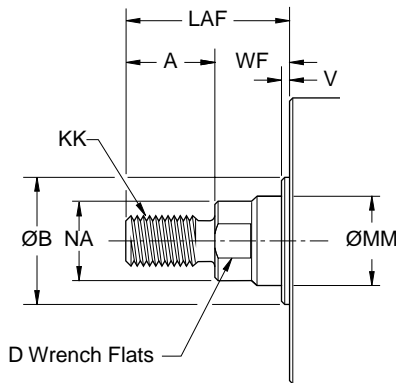
MALE THREADS

Inch Male - Style N
Metric Male - Style 5

SPECIAL ROD END THREADS

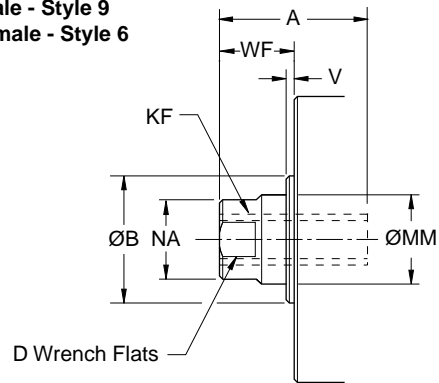
Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.



FEMALE THREADS

Inch Female - Style 9
Metric Female - Style 6



Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	C	CB	ØCD d9	CZ	CX	D	ØE	EE (BSPT)	Thread KK Style 5	Thread KF Style 6	L	LAF	ØMM Rod Dia.	NA	RR	V	WF
20	13	12	14	3	8	29	-	6	27	1/8*	M8x1.25	M5x0.80	14	26	8	-	11	2	13
25	13	14	16.5	3	10	33	-	8	32	1/8*	M10x1.25	M6x1.00	16	29	10	-	13	2	16
32	19	18	20	4.5	12	40	-	10	39	1/8	M10x1.25	M8x1.25	20	41	12	11	15	2	22
40	19	25	26	4.5	14	49	-	12	48.5	1/8	M14x1.5	M8x1.25	22	41	16	14	18	2	22
50	22	30	32	6	16	60	-	16	59	1/4	M18x1.5	M10x1.25	25	52	20	18	20	2	30
63	22	32	38	8	18	74	-	16	72	1/4	M18x1.5	M10x1.25	30	52	20	18	22	2	30
80	38	40	50	11	18	56	28	20	90	3/8	M22x1.5	M16x1.5	35	69	25	23	18	3	31
100	48	50	60	12	22	64	32	26	110	1/2	M26x1.5	M20x1.5	43	79	32	30	22	3	31

Bore	ØSB	TY	TV	TE	TH	TX	TW	TZ	Y	Add Stroke			
										LB	P	XC	ZD
20	5.5	28	35	38	25	16	42	43.4	28	69	45	95	116
25	5.5	28	39	45.5	30	20	42	48	30	69	46	100	121
32	7	28	49	54	35	22	48	59.4	40	71	43	113	137
40	7	30	58	63.5	40	30	56	71.4	42	78	49	122	150
50	9	36	72	79	50	36	64	86	53	90	53	145	177
63	11	46	90	96	60	46	74	105.4	53	90	52	150	187
80	11	45	110	100	55	85	72	64	59	108	64	174	232.5
100	13.5	60	130	120	65	100	93	72	57	108	66	182	258.5

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore (mm)	A	ØB +0 -0.001	C	CB	ØCD -0.001 -0.003	CZ	CX	D	ØE	EE (NPTF)	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	L	LAF	ØMM	NA	RR	V	WF
20	0.50	0.472	0.55	0.12	0.315	1.14	-	0.24	1.06	1/8†	1/4-28	#10-32	0.55	1.00	0.315	-	0.43	0.08	0.50
25	0.50	0.551	0.65	0.12	0.394	1.30	-	0.31	1.26	1/8†	5/16-24	1/4-28	0.63	1.12	0.394	-	0.51	0.08	0.62
32	0.75	0.709	0.79	0.18	0.472	1.57	-	0.39	1.53	1/8	7/16-20	5/16-24	0.79	1.63	0.472	0.43	0.59	0.08	0.88
40	0.75	0.984	1.02	0.18	0.551	1.93	-	0.47	1.91	1/8	7/16-20	3/8-24	0.87	1.63	0.630	0.55	0.71	0.08	0.88
50	0.88	1.181	1.26	0.25	0.630	2.36	-	0.63	2.32	1/4	1/2-20	1/2-20	0.98	2.07	0.787	0.71	0.79	0.08	1.19
63	0.88	1.260	1.50	0.31	0.709	2.91	-	0.63	2.83	1/4	1/2-20	1/2-20	1.18	2.07	0.787	0.71	0.87	0.08	1.19
80	1.50	1.575	1.97	0.43	0.709	2.20	1.10	0.79	3.54	3/8	3/4-16	5/8-18	1.38	2.72	0.984	0.91	0.71	0.12	1.22
100	1.88	1.968	2.36	0.47	0.866	2.52	1.26	1.02	4.33	1/2	1-14	3/4-16	1.69	3.11	1.260	1.18	0.87	0.12	1.22

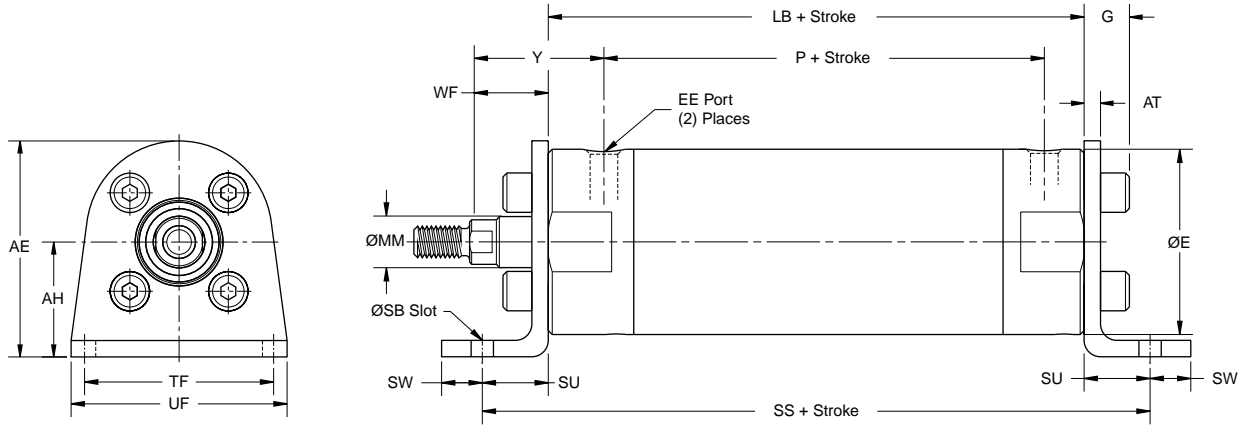
Bore (mm)	ØSB	TY	TV	TE	TH	TX	TW	TZ	Y	Add Stroke			
										LB	P	XC	ZD
20	0.22	1.10	1.39	1.50	0.98	0.63	1.66	1.71	1.10	2.70	1.77	3.75	4.58
25	0.22	1.10	1.55	1.79	1.18	0.79	1.66	1.89	1.18	2.70	1.81	3.95	4.78
32	0.28	1.10	1.93	2.13	1.38	0.87	1.88	2.34	1.57	2.78	1.69	4.45	5.39
40	0.28	1.18	2.28	2.50	1.57	1.18	2.20	2.81	1.65	3.06	1.93	4.81	5.91
50	0.35	1.42	2.83	3.11	1.97	1.42	2.52	3.38	2.09	3.53	2.09	5.70	6.96
63	0.43	1.81	3.54	3.78	2.36	1.81	2.91	4.15	2.09	3.53	2.05	5.90	7.36
80	0.43	1.77	4.33	3.94	2.17	3.35	2.83	2.52	2.32	4.25	2.52	6.85	9.15
100	0.53	2.36	5.12	4.72	2.56	3.94	3.66	2.83	2.24	4.25	2.60	7.17	10.18

†Ports are 10-32 for cushioned versions



**Style F
 Foot Mount
 Typical 20 to 100 mm Bore**

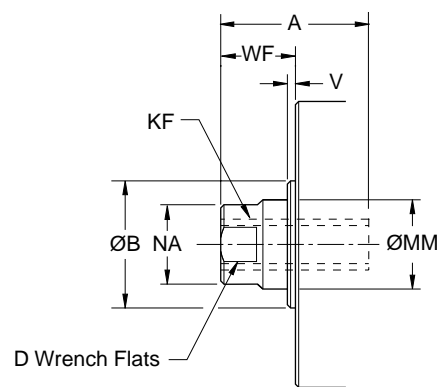
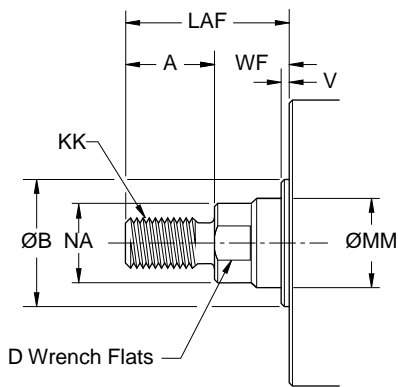
D



Rod End Details

MALE THREADS
 Inch Male - Style N
 Metric Male - Style 5

FEMALE THREADS
 Inch Female - Style 9
 Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	AE	AH	AT	ØB +0 -0.02	D	ØE	EE (BSPT)	G	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NA	ØSB
20	13	36.5	20.6	3	12	6	27	1/8*	6	M8x1.25	M5x0.80	26	8	–	7
25	13	38.5	20.6	3	14	8	32	1/8*	6.5	M10x1.25	M6x1.00	29	10	–	7
32	19	46.5	25.4	3	18	10	39	1/8	6.5	M10x1.25	M8x1.25	41	12	11	7
40	19	51	25.4	3	25	12	48.5	1/8	7	M14x1.5	M8x1.25	41	16	14	7
50	22	72	38.1	6	30	16	59	1/4	11	M18x1.5	M10x1.25	52	20	18	9
63	22	83.5	44.5	6	32	16	72	1/4	12	M18x1.5	M10x1.25	52	20	18	9
80	38	101	55	6	40	20	90	3/8	12	M22x1.5	M16x1.5	69	25	23	11
100	48	121	65	6	50	26	110	1/2	13	M26x1.5	M20x1.5	79	32	30	14

Bore	SU	SW	TF	UF	V	WF	Y	Add Stroke		
								LB	P	SS
20	14	11	38	48	2	13	28	69	45	97
25	14	11	38	48	2	16	30	69	46	97
32	19	19	48	63.5	2	22	40	71	43	109
40	18	20	48	63.5	2	22	42	78	49	114
50	25	16	57	79	2	30	53	90	53	140
63	25	16	73	95	2	30	53	90	52	140
80	28.5	14	100	125	3	31	59	108	64	165
100	30	16	120	150	3	31	57	108	66	168

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore	A	AE	AH	AT	ØB +0 -0.001	D	ØE	EE (NPTF)	G	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM	NA	ØSB
20	0.50	1.44	0.81	0.12	0.472	0.24	1.06	1/8†	0.20	1/4-28	#10-32	1.00	0.315	–	0.27
25	0.50	1.52	0.81	0.12	0.551	0.31	1.26	1/8†	0.22	5/16-24	1/4-28	1.12	0.394	–	0.27
32	0.75	1.83	1.00	0.12	0.709	0.39	1.53	1/8	0.22	7/16-20	5/16-24	1.63	0.472	0.43	0.28
40	0.75	2.02	1.00	0.12	0.984	0.47	1.91	1/8	0.25	7/16-20	3/8-24	1.63	0.630	0.55	0.28
50	0.88	2.84	1.50	0.25	1.181	0.63	2.32	1/4	0.41	1/2-20	1/2-20	2.07	0.787	0.71	0.34
63	0.88	3.29	1.75	0.25	1.260	0.63	2.83	1/4	0.44	1/2-20	1/2-20	2.07	0.787	0.71	0.34
80	1.50	3.98	2.17	0.25	1.575	0.79	3.54	3/8	0.44	3/4-16	5/8-18	2.72	0.984	0.91	0.43
100	1.88	4.76	2.56	0.25	1.968	1.02	4.33	1/2	0.50	1-14	3/4-16	3.11	1.260	1.18	0.55

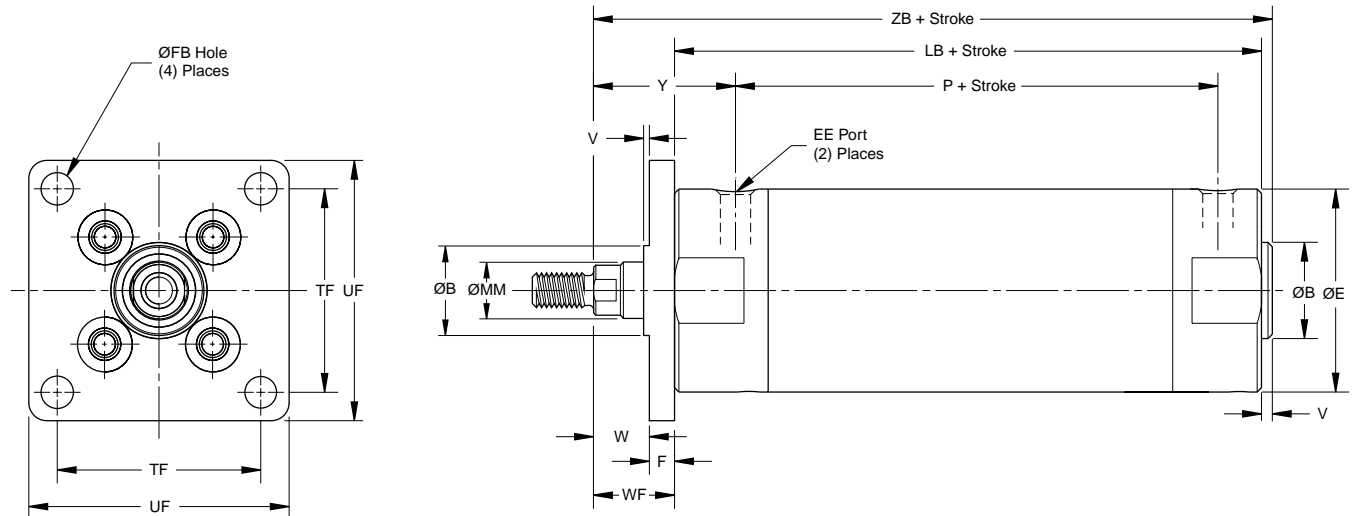
Bore (mm)	SU	SW	TF	UF	V	WF	Y	Add Stroke		
								LB	P	SS
20	0.56	0.44	1.50	1.88	0.08	0.50	1.10	2.70	1.77	3.82
25	0.56	0.44	1.50	1.88	0.08	0.62	1.18	2.70	1.81	3.82
32	0.75	0.75	1.88	2.50	0.08	0.88	1.57	2.78	1.69	4.28
40	0.72	0.78	1.88	2.50	0.08	0.88	1.65	3.06	1.93	4.50
50	1.00	0.62	2.24	3.12	0.08	1.19	2.09	3.53	2.09	5.53
63	1.00	0.62	2.88	3.75	0.08	1.19	2.09	3.53	2.05	5.53
80	1.12	0.55	3.94	4.92	0.12	1.22	2.32	4.25	2.52	6.49
100	1.18	0.63	4.72	5.91	0.12	1.22	2.24	4.25	2.60	6.61

† Ports are 10-32 for cushioned versions



Style J
Front Flange
Typical 20 to 100 mm Bore

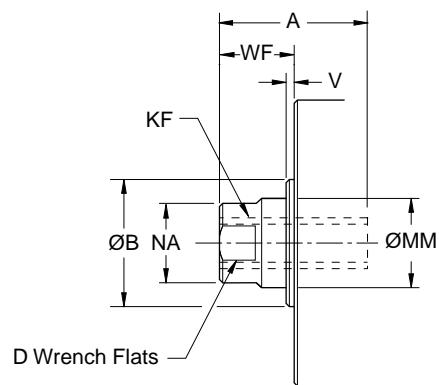
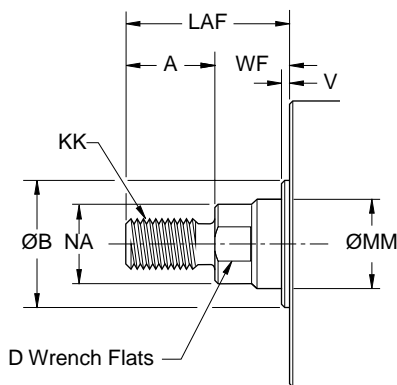
D



Rod End Details

MALE THREADS
Inch Male - Style N
Metric Male - Style 5

FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	D	ØE	EE (BSPT)	F	ØFB	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NA	TF	UF	V	WF	W	Y
20	13	12	6	27	1/8*	6	5.5	M8x1.25	M5x0.80	26	8	–	28	40	2	13	7	28
25	13	14	8	32	1/8*	7	5.5	M10x1.25	M6x1.00	29	10	–	32	44	2	16	9	30
32	19	18	10	39	1/8	7	7	M10x1.25	M8x1.25	41	12	11	38	53	2	22	15	40
40	19	25	12	48.5	1/8	8	7	M14x1.5	M8x1.25	41	16	14	46	61	2	22	14	42
50	22	30	16	59	1/4	9	9	M18x1.5	M10x1.25	52	20	18	58	76	2	30	21	53
63	22	32	16	72	1/4	9	11	M18x1.5	M10x1.25	52	20	18	70	92	2	30	21	53
80	38	40	20	90	3/8	11	11	M22x1.5	M16x1.5	69	25	23	82	104	3	31	20	59
100	48	50	26	110	1/2	14	14	M26x1.5	M20x1.5	79	32	30	100	128	3	31	17	57

Bore	Add Stroke		
	LB	P	ZB
20	69	45	83
25	69	46	86
32	71	43	95
40	78	49	102
50	90	53	122
63	90	52	122
80	108	64	142
100	108	66	142

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore (mm)	A	ØB +0 -0.001	D	ØE	EE (NPTF)	F	ØFB	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	NA	TF	UF	V	WF	W	Y
20	0.50	0.472	0.24	1.06	1/8†	0.24	0.22	1/4-28	#10-32	1.00	0.315	–	1.10	1.57	0.08	0.50	0.26	1.10
25	0.50	0.551	0.31	1.26	1/8†	0.28	0.22	5/16-24	1/4-28	1.12	0.394	–	1.26	1.73	0.08	0.62	0.34	1.18
32	0.75	0.709	0.39	1.53	1/8	0.28	0.28	7/16-20	5/16-24	1.63	0.472	0.43	1.50	2.09	0.08	0.88	0.60	1.57
40	0.75	0.984	0.47	1.91	1/8	0.31	0.28	7/16-20	3/8-24	1.63	0.630	0.55	1.81	2.40	0.08	0.88	0.57	1.65
50	0.88	1.181	0.63	2.32	1/4	0.35	0.35	1/2-20	1/2-20	2.07	0.787	0.71	2.28	3.00	0.08	1.19	0.84	2.09
63	0.88	1.260	0.63	2.83	1/4	0.35	0.43	1/2-20	1/2-20	2.07	0.787	0.71	2.76	3.62	0.08	1.19	0.84	2.09
80	1.50	1.575	0.79	3.54	3/8	0.43	0.43	3/4-16	5/8-18	2.72	0.984	0.91	3.23	4.09	0.12	1.22	0.79	2.32
100	1.88	1.968	1.02	4.33	1/2	0.55	0.55	1-14	3/4-16	3.11	1.260	1.18	3.94	5.04	0.12	1.22	0.67	2.24

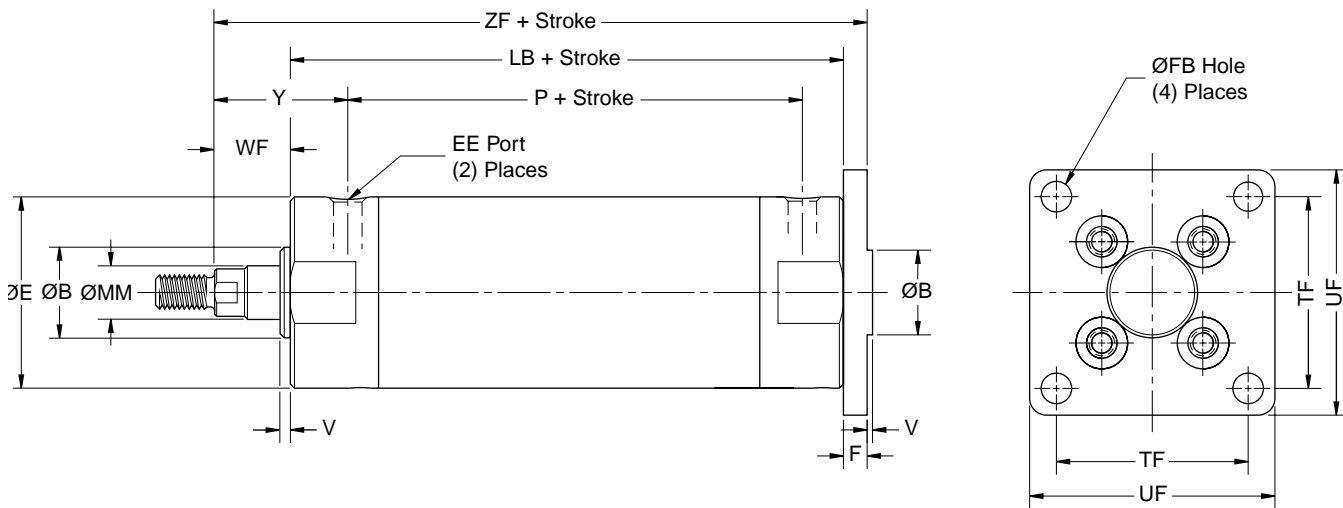
Bore (mm)	Add Stroke		
	LB	P	ZB
20	2.70	1.77	3.28
25	2.70	1.81	3.40
32	2.78	1.69	3.74
40	3.06	1.93	4.02
50	3.53	2.09	4.80
63	3.53	2.05	4.80
80	4.25	2.52	5.59
100	4.25	2.60	5.59

† Ports are 10-32 for cushioned versions



Style H
Rear Flange
Typical 20 to 100 mm Bore

D



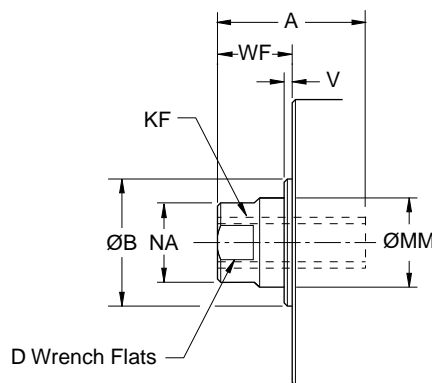
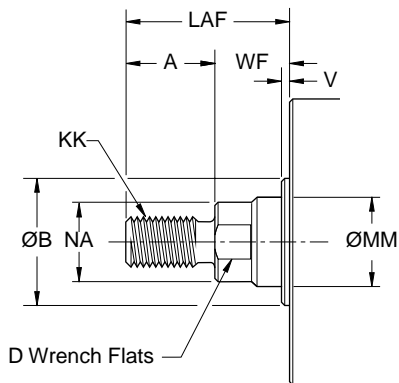
Rod End Details

MALE THREADS

Inch Male - Style N
Metric Male - Style 5

FEMALE THREADS

Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	D	ØE	EE (BSPT)	F	ØFB	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NA	TF	UF	V	WF	Y
20	13	12	6	27	1/8*	6	5.5	M8x1.25	M5x0.80	26	8	–	28	40	2	13	28
25	13	14	8	32	1/8*	7	5.5	M10x1.25	M6x1.00	29	10	–	32	44	2	16	30
32	19	18	10	39	1/8	7	7	M10x1.25	M8x1.25	41	12	11	38	53	2	22	40
40	19	25	12	48.5	1/8	8	7	M14x1.5	M8x1.25	41	16	14	46	61	2	22	42
50	22	30	16	59	1/4	9	9	M18x1.5	M10x1.25	52	20	18	58	76	2	30	53
63	22	32	16	72	1/4	9	11	M18x1.5	M10x1.25	52	20	18	70	92	2	30	53
80	38	40	20	90	3/8	11	11	M22x1.5	M16x1.5	69	25	23	82	104	3	31	59
100	48	50	26	110	1/2	14	14	M26x1.5	M20x1.5	79	32	30	100	128	3	31	57

Bore	Add Stroke		
	LB	P	ZF
20	69	45	87
25	69	46	91
32	71	43	100
40	78	49	108
50	90	53	129
63	90	52	129
80	108	64	150
100	108	66	153

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

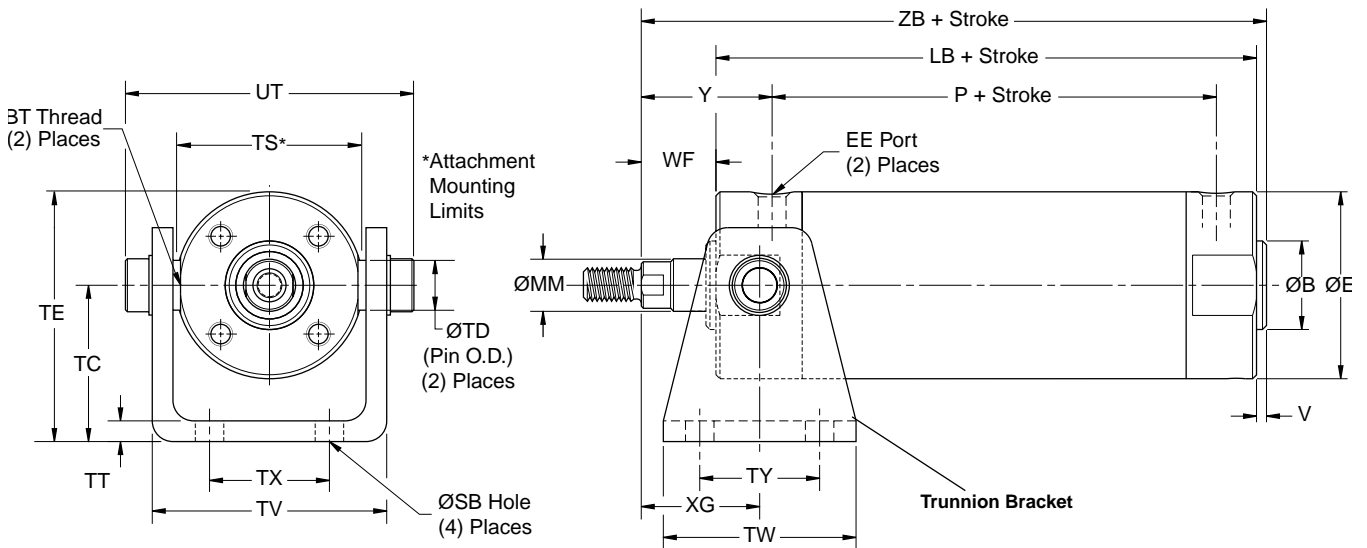
Bore (mm)	A	ØB +0 -0.001	D	ØE	EE (NPTF)	F	ØFB	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	NA	TF	UF	V	WF	Y
20	0.50	0.472	0.24	1.06	1/8†	0.24	0.22	1/4-28	#10-32	1.00	0.315	–	1.10	1.57	0.08	0.50	1.10
25	0.50	0.551	0.31	1.26	1/8†	0.28	0.22	5/16-24	1/4-28	1.12	0.394	–	1.26	1.73	0.08	0.62	1.18
32	0.75	0.709	0.39	1.53	1/8	0.28	0.28	7/16-20	5/16-24	1.63	0.472	0.43	1.50	2.09	0.08	0.88	1.57
40	0.75	0.984	0.47	1.91	1/8	0.31	0.28	7/16-20	3/8-24	1.63	0.630	0.55	1.81	2.40	0.08	0.88	1.65
50	0.88	1.181	0.63	2.32	1/4	0.35	0.35	1/2-20	1/2-20	2.07	0.787	0.71	2.28	3.00	0.08	1.19	2.09
63	0.88	1.260	0.63	2.83	1/4	0.35	0.43	1/2-20	1/2-20	2.07	0.787	0.71	2.76	3.62	0.08	1.19	2.09
80	1.50	1.575	0.79	3.54	3/8	0.43	0.43	3/4-16	5/8-18	2.72	0.984	0.91	3.23	4.09	0.12	1.22	2.32
100	1.88	1.968	1.02	4.33	1/2	0.55	0.55	1-14	3/4-16	3.11	1.260	1.18	3.94	5.04	0.12	1.22	2.24

Bore (mm)	Add Stroke		
	LB	P	ZF
20	2.70	1.77	3.44
25	2.70	1.81	3.60
32	2.78	1.69	3.94
40	3.06	1.93	4.25
50	3.53	2.09	5.07
63	3.53	2.05	5.07
80	4.25	2.52	5.91
100	4.25	2.60	6.02

† Ports are 10-32 for cushioned versions



Style E
Front Trunnion
Typical 20 to 63 mm Bore



Note: Trunnion Bracket must be ordered as separate item

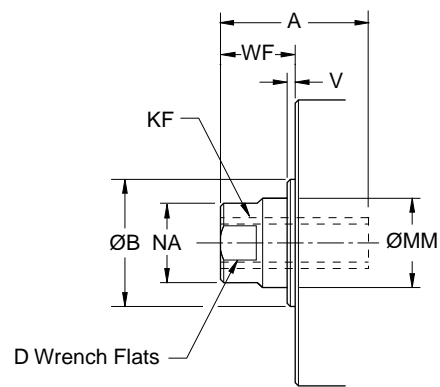
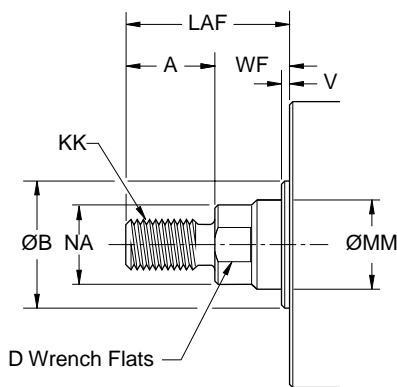
Rod End Details

MALE THREADS

Inch Male - Style N
Metric Male - Style 5

FEMALE THREADS

Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	BT	D	ØE	EE (BSPT)	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NA	V	WF	XG	Y	ØSB
20	13	12	M5x0.80	6	27	1/8*	M8x1.25	M5x0.80	26	8	–	2	13	24	28	5.5
25	13	14	M6x0.75	8	32	1/8*	M10x1.25	M6x1.00	29	10	–	2	16	27	30	5.5
32	19	18	M8x1.00	10	39	1/8	M10x1.25	M8x1.25	41	12	11	2	22	33	40	7
40	19	25	M10x1.25	12	48.5	1/8	M14x1.5	M8x1.25	41	16	14	2	22	34	42	7
50	22	30	M12x1.25	16	59	1/4	M18x1.5	M10x1.25	52	20	18	2	30	43	53	9
63	22	32	M14x1.50	16	72	1/4	M18x1.5	M10x1.25	52	20	18	2	30	43	53	11

Bore	TC	ØTD _{e8}	TE	TS	TT	TV	TW	TX	TY	UT	Add Stroke		
											LB	P	ZB
20	25	8	38.5	28	3	35	42	16	28	47.5	69	45	83
25	30	10	46	33	3	39	42	20	28	53	69	46	86
32	35	12	54.5	40	4.5	49	48	22	28	68	71	43	95
40	40	14	64	49	4.5	58	56	30	30	79	78	49	102
50	50	16	79.5	60	6	72	64	36	36	99	90	53	122
63	60	18	96	74	8	90	74	46	46	119	90	52	122

* Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore (mm)	A	ØB +0 -0.001	BT	D	ØE	EE (NPTF)	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	NA	V	WF	XG	Y	ØSB
20	0.50	0.472	M5x0.80	0.24	1.06	1/8†	1/4-28	#10-32	1.00	0.315	–	0.08	0.50	0.93	1.10	0.22
25	0.50	0.551	M6x0.75	0.31	1.26	1/8†	5/16-24	1/4-28	1.12	0.394	–	0.08	0.62	1.05	1.18	0.22
32	0.75	0.709	M8x1.00	0.39	1.53	1/8	7/16-20	5/16-24	1.63	0.472	0.43	0.08	0.88	1.31	1.57	0.28
40	0.75	0.984	M10x1.25	0.47	1.91	1/8	7/16-20	3/8-24	1.63	0.630	0.55	0.08	0.88	1.35	1.65	0.28
50	0.88	1.181	M12x1.25	0.63	2.32	1/4	1/2-20	1/2-20	2.07	0.787	0.71	0.08	1.19	1.70	2.09	0.35
63	0.88	1.260	M14x1.50	0.63	2.83	1/4	1/2-20	1/2-20	2.07	0.787	0.71	0.08	1.19	1.70	2.09	0.43

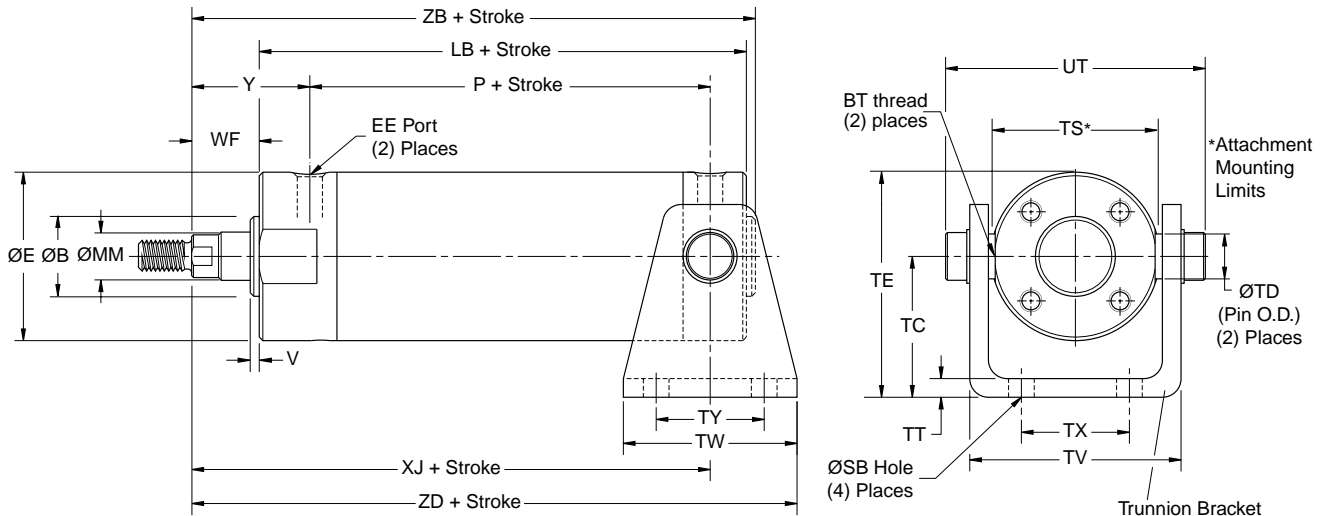
Bore (mm)	TC	ØTD	TE	TS	TT	TV	TW	TX	TY	UT	Add Stroke		
											LB	P	ZB
20	0.98	0.315	1.51	1.10	0.12	1.39	1.66	0.63	1.10	1.87	2.70	1.77	3.28
25	1.18	0.394	1.81	1.30	0.12	1.55	1.66	0.79	1.10	2.09	2.70	1.81	3.40
32	1.38	0.472	2.15	1.58	0.18	1.93	1.88	0.87	1.10	2.67	2.78	1.69	3.74
40	1.57	0.551	2.53	1.93	0.18	2.28	2.20	1.18	1.18	3.10	3.06	1.93	4.02
50	1.97	0.630	3.13	2.36	0.25	2.83	2.52	1.42	1.42	3.88	3.53	2.09	4.80
63	2.36	0.709	3.78	2.91	0.31	3.54	2.91	1.81	1.81	4.69	3.53	2.05	4.80

† Ports are 10-32 for cushioned versions



Style D
Rear Trunnion
Typical 20 to 63 mm Bore

D

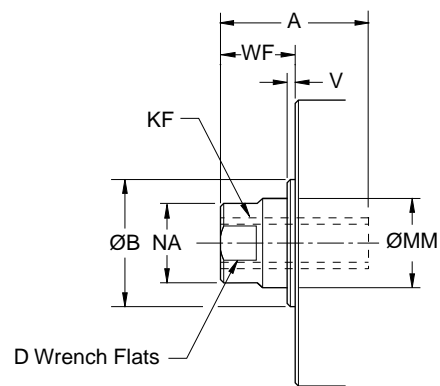
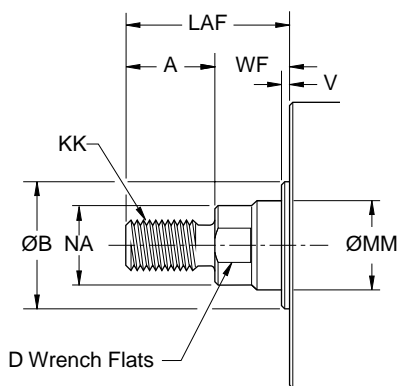


Note: Trunnion Bracket must be ordered as separate item

Rod End Details

MALE THREADS
Inch Male - Style N
Metric Male - Style 5

FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	BT	D	ØE	EE (BSPT)	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NA	V	WF	Y	ØSB	TC
20	13	12	M5x0.80	6	27	1/8*	M8x1.25	M5x0.80	26	8	–	2	13	28	5.5	25
25	13	14	M6x0.75	8	32	1/8*	M10x1.25	M6x1.00	29	10	–	2	16	30	5.5	30
32	19	18	M8x1.00	10	39	1/8	M10x1.25	M8x1.25	41	12	11	2	22	40	7	35
40	19	25	M10x1.25	12	48.5	1/8	M14x1.5	M8x1.25	41	16	14	2	22	42	7	40
50	22	30	M12x1.25	16	59	1/4	M18x1.5	M10x1.25	52	20	18	2	30	53	9	50
63	22	32	M14x1.50	16	72	1/4	M18x1.5	M10x1.25	52	20	18	2	30	53	11	60

Bore	ØTD e8	TE	TS	TT	TV	TW	TX	TY	UT	Add Stroke				
										LB	P	XJ	ZB	ZD
20	8	38.5	28	3	35	42	16	28	47.5	69	45	70	83	91
25	10	46	33	3	39	42	20	28	53	69	46	73	86	94
32	12	54.5	40	4.5	49	48	22	28	68	71	43	83	95	107
40	14	64	49	4.5	58	56	30	30	79	78	49	90	102	118
50	16	79.5	60	6	72	64	36	36	99	90	53	108	122	140
63	18	96	74	8	90	74	46	46	119	90	52	108	122	145

*Ports are M5 for cushioned versions

Inch Dimensions – Envelope and Mounting Dimensions (inch)

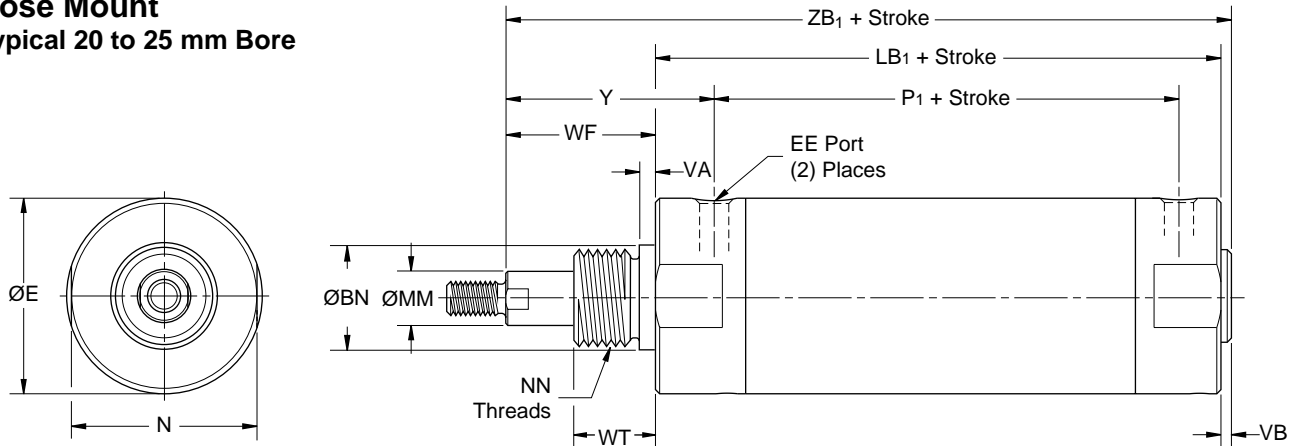
Bore	A	ØB +0 -0.001	BT	D	ØE	EE (NPTF)	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	NA	V	WF	Y	ØSB	TC
20	0.50	0.472	M5x0.80	0.24	1.06	1/8†	1/4-28	#10-32	1.00	0.315	–	0.08	0.50	1.10	0.22	0.98
25	0.50	0.551	M6x0.75	0.31	1.26	1/8†	5/16-24	1/4-28	1.12	0.394	–	0.08	0.62	1.18	0.22	1.18
32	0.75	0.709	M8x1.00	0.39	1.53	1/8	7/16-20	5/16-24	1.63	0.472	0.43	0.08	0.88	1.57	0.28	1.38
40	0.75	0.984	M10x1.25	0.47	1.91	1/8	7/16-20	3/8-24	1.63	0.630	0.55	0.08	0.88	1.65	0.28	1.57
50	0.88	1.181	M12x1.25	0.63	2.32	1/4	1/2-20	1/2-20	2.07	0.787	0.71	0.08	1.19	2.09	0.35	1.97
63	0.88	1.260	M14x1.50	0.63	2.83	1/4	1/2-20	1/2-20	2.07	0.787	0.71	0.08	1.19	2.09	0.43	2.36

Bore (mm)	ØTD -0.001 -0.002	TE	TS	TT	TV	TW	TX	TY	UT	Add Stroke				
										LB	P	XJ	ZB	ZD
20	0.315	1.51	1.10	0.12	1.39	1.66	0.63	1.10	1.87	2.70	1.77	2.77	3.28	3.60
25	0.394	1.81	1.30	0.12	1.55	1.66	0.79	1.10	2.09	2.70	1.81	2.89	3.40	3.72
32	0.472	2.15	1.58	0.18	1.93	1.88	0.87	1.10	2.67	2.78	1.69	3.27	3.74	4.21
40	0.551	2.53	1.93	0.18	2.28	2.20	1.18	1.18	3.10	3.06	1.93	3.54	4.02	4.64
50	0.630	3.13	2.36	0.25	2.83	2.52	1.42	1.42	3.88	3.53	2.09	4.25	4.80	5.51
63	0.709	3.78	2.91	0.31	3.54	2.91	1.81	1.81	4.69	3.53	2.05	4.25	4.80	5.71

† Ports are 10-32 for cushioned versions



Style G
Nose Mount
Typical 20 to 25 mm Bore



Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	BN +0 -0.08	D	ØE	EE (BSPT)	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	NN	N	VA	VB	WF	WT	Y	Add Stroke		
																	LB ¹	P ¹	ZB ¹
20	13	19.02	6	27	1/8*	M8x1.25	M5x0.80	35	8	3/4-16	24	3	2	22	16	32	66	47	90
25	13	19.02	8	32	1/8*	M10x1.25	M6x1.00	35	10	3/4-16	29	3	2	22	16	32	66	47	90

* Ports are M5 for cushioned versions

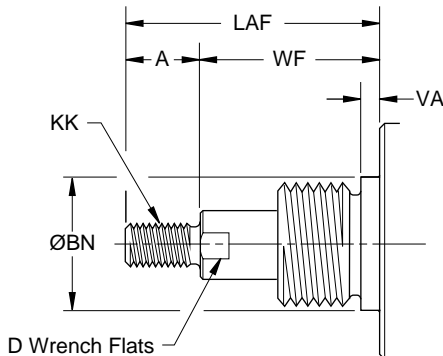
Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore	A	BN +0 -0.003	D	ØE	EE (NPTF)	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	NN	N	VA	VB	WF	WT	Y	Add Stroke		
																	LB ¹	P ¹	ZB ¹
20	0.50	0.749	0.24	1.06	1/8†	1/4-28	#10-32	1.38	0.315	3/4-16	0.94	0.12	0.08	0.88	0.63	1.25	2.60	1.85	3.56
25	0.50	0.749	0.31	1.26	1/8†	5/16-24	1/4-28	1.38	0.394	3/4-16	1.14	0.12	0.08	0.88	0.63	1.25	2.60	1.85	3.56

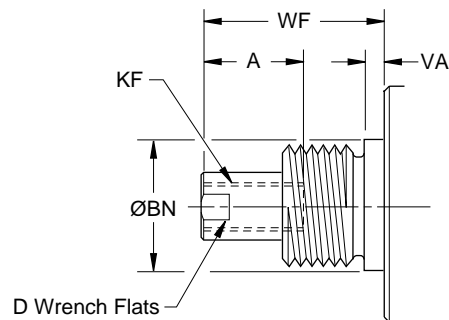
† Ports are 10-32 for cushioned versions

Rod End Details – 20 and 25 mm Bore

MALE THREADS
Inch Male - Style N
Metric Male - Style 5



FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6

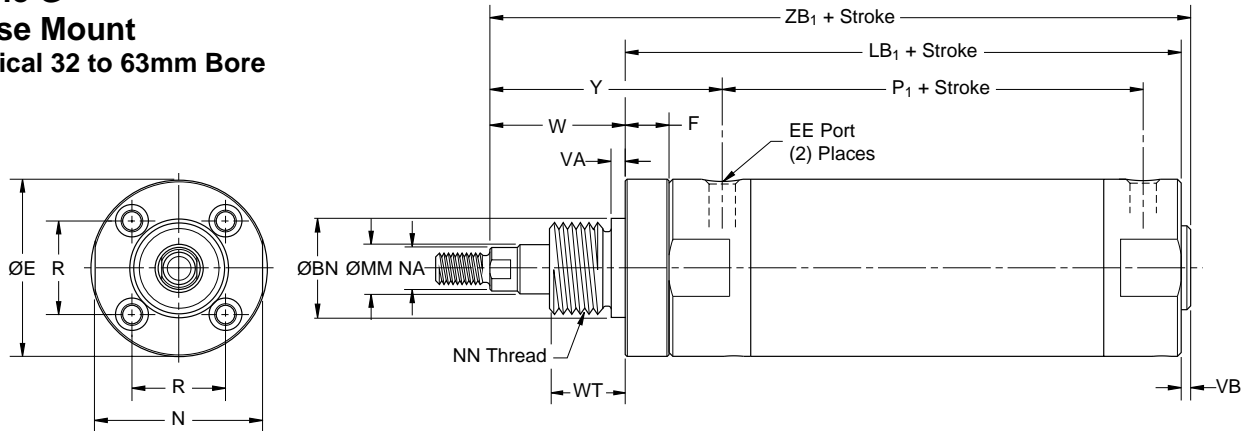


SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

Style G
Nose Mount
Typical 32 to 63mm Bore



Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	BN +0 -0.8	D	ØE	EE* (BSPT)	F	Thread KK Style 5	Thread KF Style 6	LA	ØMM Rod Dia.	NN	N	NA	R	VA	VB	W	WT	Y	Add Stroke		
																				LB ¹	P ¹	ZB ¹
32	19	19.02	10	39	1/8	9	M10x1.25	M8x1.25	41	12	3/4-16	36	11	20	3	2	22	16	49	80	43	104
40	19	26.87	12	48.5	1/8	14	M14x1.5	M8x1.25	51	16	1-14	44	14	26	5	2	32	22	66	92	49	126
50	22	34.90	16	59	1/4	15	M18x1.5	M10x1.25	52	20	1-1/4-12	55	18	32	3	2	30	20.5	68	105	53	137
63	22	38.10	16	72	1/4	16	M18x1.5	M10x1.25	52	20	1-3/8-12	69	18	38	3	2	30	20.5	70	106	52	139

* See Inch Dimensions for NPTF Port Size.

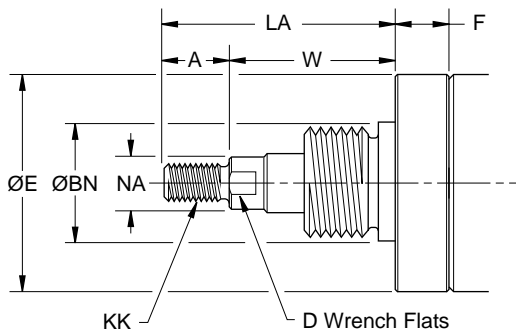
Inch Dimensions – Envelope and Mounting Dimensions (inch)

Bore (mm)	A	BN +0 -0.003	D	ØE	EE* (NPTF)	F	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LA	ØMM Rod Dia.	NN	N	NA	R	VA	VB	W	WT	Y	Add Stroke		
																				LB ¹	P ¹	ZB ¹
32	0.75	0.749	0.39	1.53	1/8	0.37	7/16-20	5/16-24	1.63	0.472	3/4-16	1.42	0.43	0.79	0.12	0.08	0.88	0.63	1.93	3.15	1.69	4.11
40	0.75	1.058	0.47	1.91	1/8	0.56	7/16-20	3/8-24	2.00	0.630	1-14	1.73	0.55	1.02	0.19	0.08	1.25	0.88	2.60	3.62	1.93	4.95
50	0.88	1.374	0.63	2.32	1/4	0.59	1/2-20	1/2-20	2.07	0.787	1-1/4-12	2.17	0.71	1.26	0.12	0.08	1.19	0.81	2.68	4.12	2.09	5.39
63	0.88	1.500	0.63	2.83	1/4	0.63	1/2-20	1/2-20	2.07	0.787	1-3/8-12	2.72	0.71	1.50	0.12	0.08	1.19	0.81	2.76	4.19	2.05	5.46

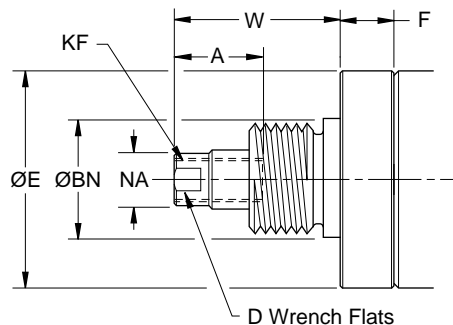
* See Metric Dimensions for BSPT Port Size.

Rod End Details – 32 and 63 mm Bore

MALE THREADS
Inch Male - Style N
Metric Male - Style 5



FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6



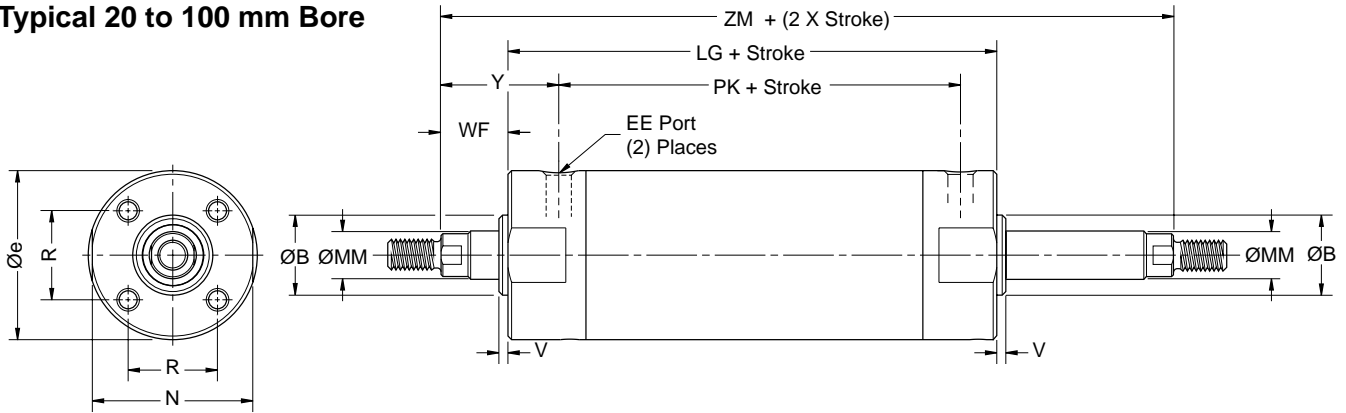
SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (Note: LAF = LA+F and WF = W+F) (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

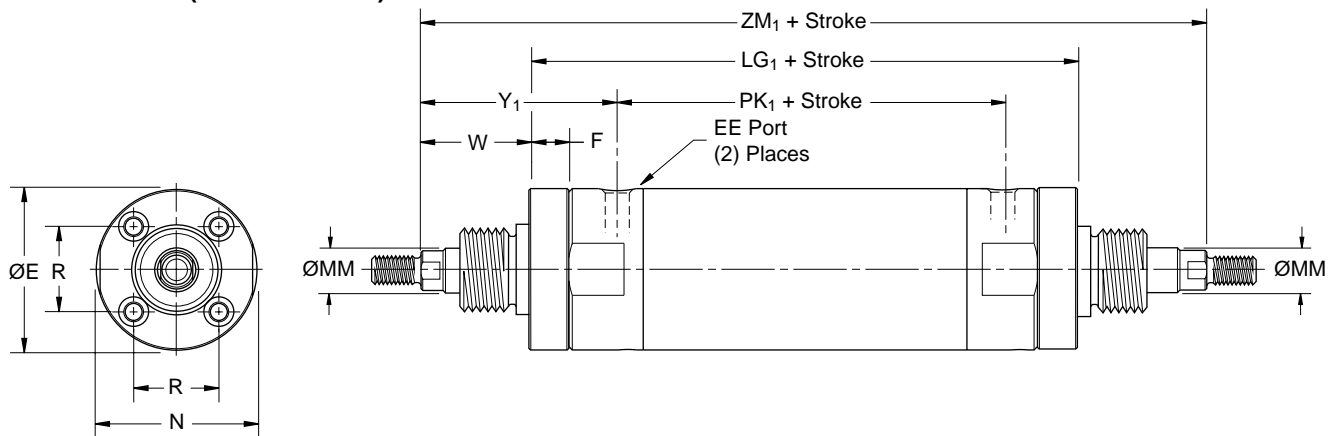


**Double-Rod
Typical 20 to 100 mm Bore**



D

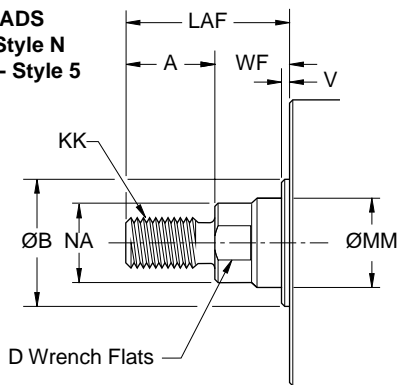
**Double-Rod
Nose Mount (32-63mm bore)**



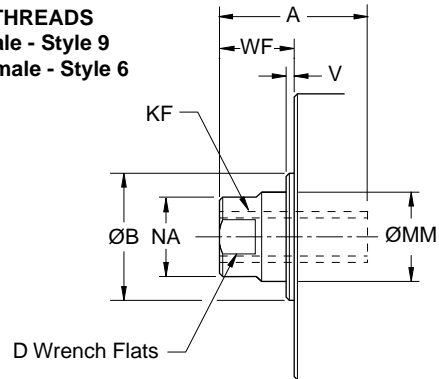
For detailed dimensions for the nose mount from 20 to 63 mm bore, please refer to pages D78 and 2D793.

Rod End Details

MALE THREADS
Inch Male - Style N
Metric Male - Style 5



FEMALE THREADS
Inch Female - Style 9
Metric Female - Style 6



SPECIAL ROD END THREADS

Thread Style 3

Special Metric or Inch threads, extension, blank, etc., are also available. To order, specify "Style 3" and give desired dimensions for KK or KF, A and LAF or WF (length dimensions in millimeters). If otherwise special, supply a dimensioned sketch.

When two rod ends are different on double rod cylinder, please clearly indicate what rod end should be provided on which end of the cylinder, or provide a sketch.

Metric Dimensions – Envelope and Mounting Dimensions (mm)

Bore	A	ØB +0 -0.02	D	ØE	F	EE (BSPT)	Thread KK Style 5	Thread KF Style 6	LAF	ØMM Rod Dia.	N	NA	R	V	W	WF
20	13	12	6	27	–	1/8*	M8x1.25	M5x0.80	26	8	24	–	14	2	–	13
25	13	14	8	32	–	1/8*	M10x1.25	M6x1.00	29	10	29	–	16.5	2	–	16
32	19	18	10	39	9	1/8	M10x1.25	M8x1.25	41	12	36	11	20	2	22	22
40	19	25	12	48.5	14	1/8	M14x1.5	M8x1.25	41	16	44	14	26	2	32	22
50	22	30	16	59	15	1/4	M18x1.5	M10x1.25	52	20	55	18	32	2	30	30
63	22	32	16	72	17	1/4	M18x 1.5	M10x1.25	52	20	69	18	38	2	30	30
80	38	40	20	90	–	3/8	M22 x1.5	M16x1.5	69	25	86	23	50	3	–	31
100	48	50	26	110	–	1/2	M26x1.5	M20x1.5	79	32	106	30	60	3	–	31

Bore	Y	Y ¹	Add Stroke					
			LG	LG ¹	PK	PK ¹	ZM	ZM ¹
20	28	32	75	70	45	50	101	95
25	30	32	75	70	47	50	107	101
32	40	49	78	97	42	42	122	141
40	42	66	87	115	47	47	131	179
50	53	68	100	130	54	54	160	190
63	53	70	100	133	54	54	160	194
80	59	–	119	–	61	–	181	–
100	57	–	119	–	65	–	181	–

* Ports are M5 for cushioned versions

INCH DIMENSIONS - Envelope and Mounting Dimensions (inch)

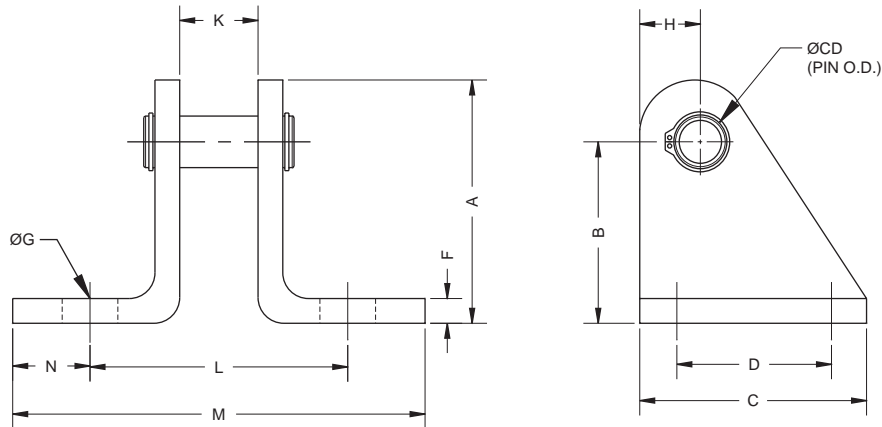
Bore (mm)	A	ØB +0 -0.001	D	ØE	F	EE (NPTF)	Thread KK (UNF) Style N	Thread KF (UNF) Style 9	LAF	ØMM Rod Dia.	N	NA	R	V	W	WF
20	0.50	0.472	0.24	1.06	–	1/8†	1/4-28	#10-32	1.00	0.315	0.94	–	0.55	0.08	–	0.50
25	0.50	0.551	0.31	1.26	–	1/8†	5/16-24	1/4-28	1.12	0.394	1.14	–	0.65	0.08	–	0.62
32	0.75	0.709	0.39	1.53	0.37	1/8	7/16-20	5/16-24	1.63	0.472	1.42	0.43	0.79	0.08	0.88	0.88
40	0.75	0.984	0.47	1.91	0.56	1/8	7/16-20	3/8-24	1.63	0.630	1.73	0.55	1.02	0.08	1.25	0.88
50	0.88	1.181	0.63	2.32	0.59	1/4	1/2-20	1/2-20	2.07	0.787	2.17	0.71	1.26	0.08	1.19	1.19
63	0.88	1.260	0.63	2.83	0.66	1/4	1/2-20	1/2-20	2.07	0.787	2.72	0.71	1.50	0.08	1.19	1.19
80	1.50	1.575	0.79	3.54	–	3/8	3/4-16	5/8-18	2.72	0.984	3.39	0.91	1.97	0.12	–	1.22
100	1.88	1.968	1.02	4.33	–	1/2	1-14	3/4-16	3.11	1.260	4.17	1.18	2.36	0.12	–	1.22

Bore (mm)	Y	Y ¹	Add Stroke					
			LG	LG ¹	PK	PK ¹	ZM	ZM ¹
20	1.10	1.25	2.97	2.74	1.77	1.97	3.97	3.74
25	1.18	1.25	2.97	2.74	1.85	1.97	4.21	3.98
32	1.57	1.93	3.06	3.80	1.65	1.65	4.82	5.56
40	1.65	2.60	3.41	4.53	1.85	1.85	5.17	7.03
50	2.09	2.68	3.93	5.11	2.13	2.13	6.31	7.49
63	2.09	2.76	3.93	5.25	2.13	2.13	6.31	7.63
80	2.32	–	4.70	–	2.40	–	7.14	–
100	2.24	–	4.70	–	2.56	–	7.14	–

† Ports are 10-32 for cushioned versions

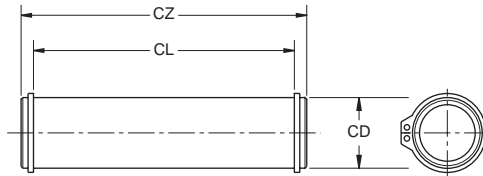


Single Clevis Brackets



D

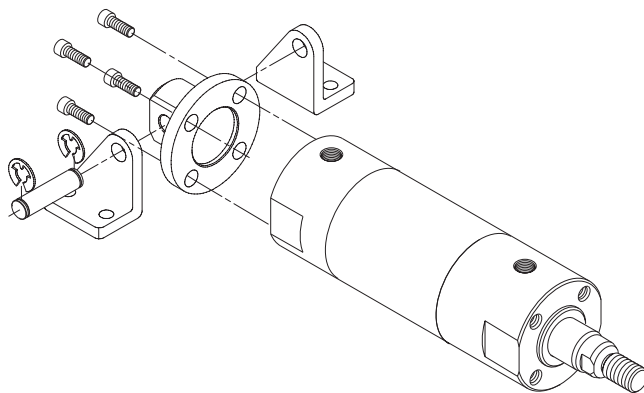
Single Clevis Pin



Note :
 Two snap rings shown are included with the pivot pin.
 Order clevis bracket separately.

Single Clevis Kit Assembly Instructions

Align the rear clevis with the port location as desired. Insert the four (4) screws through the bracket and thread them into the end caps until they are hand tight. Torque the screws to the values listed in the table below.
 Single Clevis Kit, bracket and pivot pin are ordered separately.
 Please see next page for part numbers.



Bore	Fastener Size		Torque	
20	8-32	M4x0.7	10-12 in-lbs	1.1-1.4 Nm
25	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
32	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
40	1/4-28	M6x1	32-36 in-lbs	3.6-4.1 Nm
50	5/16-24	M8x1.25	72-82 in-lbs	8.1-9.3 Nm
63	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
80	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
100	1/2-20	M12x1.75	40-44 ft-lbs	54-60 Nm

Single Clevis Brackets

Metric Dimensions (mm)

Part Number	Bore	A	B	C	ØCD _{h9}	D	F	ØG	H	K	L	M	N
L077520075	20	30	22	29	6.35	19	3	7	8	10	32	51	9
L077520075	25	30	22	29	6.35	19	3	7	8	10	32	51	9
L077520125	32	30	22	29	6.35	19	3	7	8	13	35	54	9
L077520150	40	44	35	38	9.52	25	3	7	9	16	47	67	10
L077520200	50	44	35	38	9.52	25	6	7	9	19	54	76	11
L077520250	63	54	44	38	9.52	25	6	7	9	19	54	76	11
L077520312	80	70	51	64	19.07	38	6	11	19	28	72	104	16
L077520400	100	79	60	70	19.07	44	6	14	19	32	76	108	16

Imperial Dimensions (Inch)

Part Number	Bore (mm)	A	B	C	ØCD _{+0 -0.002}	D	F	ØG	H	K	L	M	N
L077520075	20	1.17	0.87	1.13	0.250	0.75	0.12	0.27	0.30	0.38	1.25	2.00	0.37
L077520075	25	1.17	0.87	1.13	0.250	0.75	0.12	0.27	0.30	0.38	1.25	2.00	0.37
L077520125	32	1.17	0.87	1.13	0.250	0.75	0.12	0.27	0.30	0.50	1.38	2.12	0.37
L077520150	40	1.75	1.38	1.50	0.375	1.00	0.12	0.27	0.37	0.62	1.86	2.62	0.38
L077520200	50	1.75	1.38	1.50	0.375	1.00	0.25	0.27	0.37	0.75	2.12	3.00	0.44
L077520250	63	2.12	1.75	1.50	0.375	1.00	0.25	0.27	0.37	0.75	2.12	3.00	0.44
L077520312	80	2.75	2.00	2.50	0.751	1.50	0.25	0.42	0.75	1.09	2.84	4.09	0.62
L077520400	100	3.12	2.37	2.75	0.751	1.75	0.25	0.55	0.75	1.25	3.00	4.25	0.62

Single Clevis Pins

Metric Dimensions (mm)

Part Number	Bore	ØCD _{h9}	CL	CZ
L077490075	20	6.35	16	22
L077490075	25	6.35	16	22
L077490125	32	6.35	19	25
L077490150	40	9.52	23	29
L077490200	50	9.52	32	39
L077490200	63	9.52	32	39
L077490312	80	19.07	41	51
L077490400	100	19.07	45	55

Imperial Dimensions (Inch)

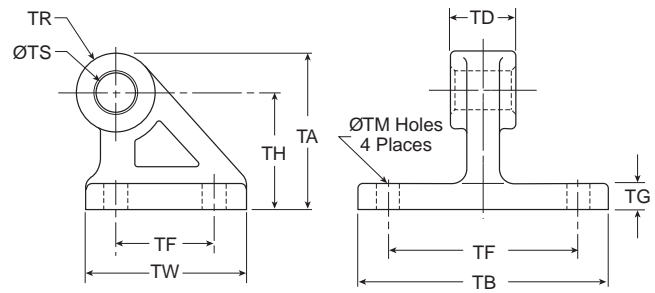
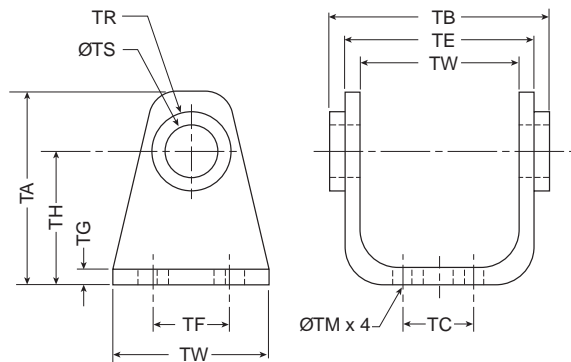
Part Number	Bore	ØCD _{+0 -0.002}	CL	CZ
L077490075	20	0.250	0.63	0.85
L077490075	25	0.250	0.63	0.85
L077490125	32	0.250	0.76	0.97
L077490150	40	0.375	0.89	1.15
L077490200	50	0.375	1.27	1.53
L077490200	63	0.375	1.27	1.53
L077490312	80	0.751	1.63	2.00
L077490400	100	0.751	1.79	2.16



Double Clevis Brackets

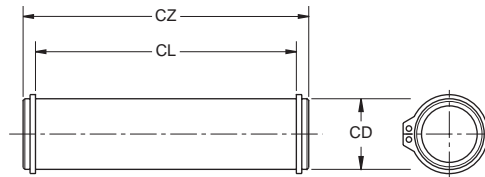
20-63 mm Bore Double Clevis Bracket

80-100 mm Bore Double Clevis Bracket



D

Double Clevis Pin

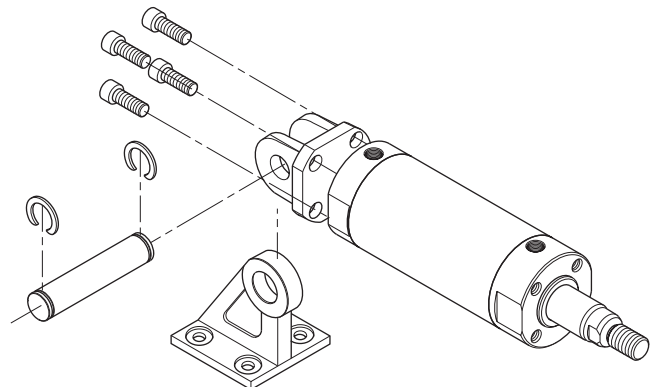
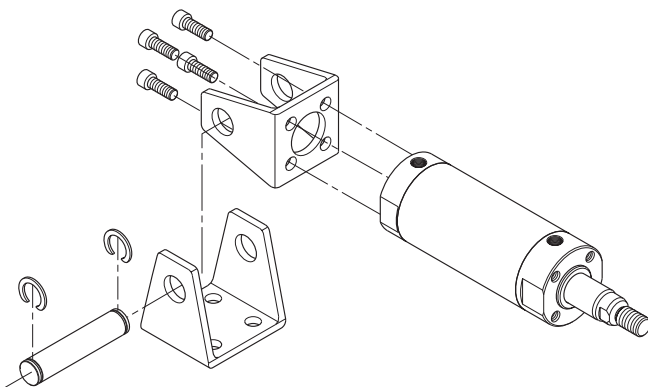


Note:

Two snap rings shown are included with the pivot pin.
 Order clevis bracket separately.

Double Clevis 20-63 mm Bore

Double Clevis 80-100 mm Bore



Double Clevis Kit Assembly Instructions

Align the rear clevis with the port location as desired.
 Insert the four (4) screws through the bracket and thread them into the end caps until they are hand tight. Torque the screws to the values listed in the table beside.
 Double Clevis Kit, bracket and pivot pin are ordered separately. Please see next page for part numbers.

Bore	Fastener Size		Torque	
20	8-32	M4x0.7	10-12 in-lbs	1.1-1.4 Nm
25	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
32	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
40	1/4-28	M6x1	32-36 in-lbs	3.6-4.1 Nm
50	5/16-24	M8x1.25	72-82 in-lbs	8.1-9.3 Nm
63	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
80	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
100	1/2-20	M12x1.75	40-44 ft-lbs	54-60 Nm

Double Clevis Brackets

Metric Dimensions (mm)

Part Number	Bore	TA	TB	TC	TD	TE	TF	TG	TH	TM	TR	TS ⁴⁹	TW
L077510020	20	36	38	16	29	35	28	3	25	5.5	13	8	42
L077510025	25	43	42	20	33	39	28	3	30	5.5	15	10	42
L077510032	32	50	53.4	22	40	49	28	4.5	35	7	17	12	48
L077510040	40	58	64.4	30	49	58	30	4.5	40	7	21	14	56
L077510050	50	70	78.8	36	60	72	36	6	50	9	24	16	64
L077510063	63	82	96.6	46	74	90	46	8	60	11	26	18	74
L077510080	80	73	110	85	28	110	45	11	55	11	36	18	72
L077510100	100	90	130	100	32	130	60	12	65	13.5	50	22	93

Imperial Dimensions (Inch)

Part Number	Bore	TA	TB	TC	TD	TE	TF	TG	TH	TM	TR	TS ⁴⁹ +0.002, -0	TW
L077510020	20	1.42	1.50	0.63	1.14	1.39	1.10	0.12	0.98	0.22	0.51	0.315	1.66
L077510025	25	1.69	1.65	0.79	1.30	1.55	1.10	0.12	1.18	0.22	0.59	0.394	1.66
L077510032	32	1.97	2.10	0.87	1.57	1.93	1.10	0.18	1.38	0.28	0.67	0.472	1.88
L077510040	40	2.28	2.53	1.18	1.93	2.28	1.18	0.18	1.57	0.28	0.83	0.551	2.20
L077510050	50	2.76	3.10	1.42	2.36	2.83	1.42	0.25	1.97	0.35	0.94	0.630	2.52
L077510063	63	3.23	3.80	1.81	2.91	3.54	1.81	0.31	2.36	0.43	1.02	0.709	2.91
L077510080	80	2.87	4.33	3.35	1.10	4.33	1.77	0.43	2.17	0.43	1.42	0.709	2.83
L077510100	100	3.54	5.12	3.94	1.26	5.12	2.36	0.47	2.56	0.53	1.97	0.866	3.66

Double Clevis Pins

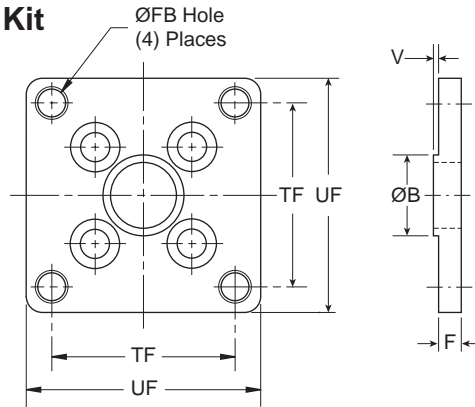
Metric Dimensions (mm)

Part Number	Bore	∅CD ^{d9}	CL	CZ
L077500020	20	8	38.6	43.4
L077500025	25	10	42.6	48
L077500032	32	12	54	59.4
L077500040	40	14	65	71.4
L077500050	50	16	79.6	86
L077500063	63	18	97.8	105.4
L077500080	80	18	56.2	64
L077500100	100	22	64.2	72

Imperial Dimensions (Inch)

Part Number	Bore	∅CD ^{-0.001 -0.003}	CL	CZ
L077500020	20	0.315	1.52	1.71
L077500025	25	0.394	1.68	1.89
L077500032	32	0.472	2.12	2.34
L077500040	40	0.551	2.56	2.81
L077500050	50	0.630	3.13	3.38
L077500063	63	0.709	3.85	4.15
L077500080	80	0.709	2.21	2.52
L077500100	100	0.866	2.53	2.83

Front or Rear Flange Mount Kit



Metric Dimensions (mm)

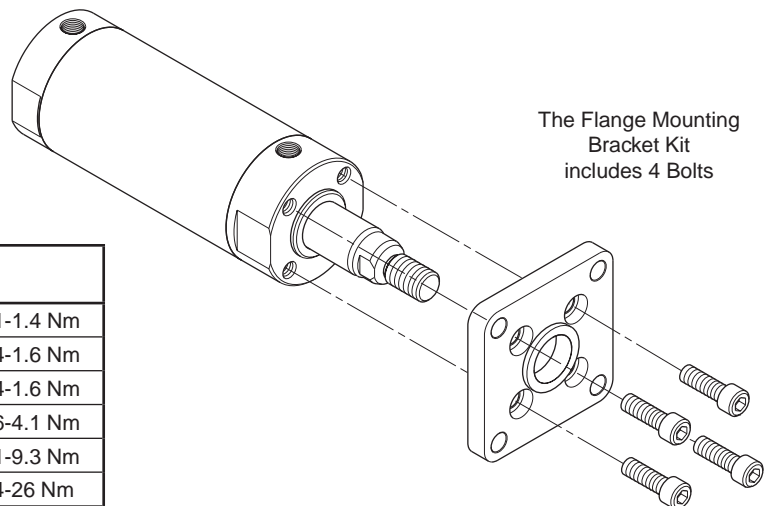
Part Number	Bore	ØB ⁺⁰ / _{-0.02}	F	FB	UF	TF	V
L077560020	20	12	6	5.5	40	28	2
L077560025	25	14	7	5.5	44	32	2
L077560032	32	18	7	7	53	38	2
L077560040	40	25	8	7	61	46	2
L077560050	50	30	9	9	76	58	2
L077560063	63	32	9	11	92	70	2
L077560080	80	40	11	11	104	82	3
L077560100	100	50	14	14	128	100	3

Imperial Dimensions (Inch)

Part Number	Bore	ØB ⁺⁰ / _{-0.001}	F	FB	UF	TF	V
L077450075	20	0.472	0.24	0.22	1.57	1.10	0.08
L077450100	25	0.551	0.28	0.22	1.73	1.26	0.08
L077450125	32	0.709	0.28	0.28	2.09	1.50	0.08
L077450150	40	0.984	0.31	0.28	2.40	1.81	0.08
L077450200	50	1.181	0.35	0.35	3.00	2.28	0.08
L077450250	63	1.260	0.35	0.43	3.62	2.76	0.08
L077450312	80	1.575	0.43	0.43	4.09	3.23	0.12
L077450400	100	1.968	0.55	0.55	5.04	3.94	0.12

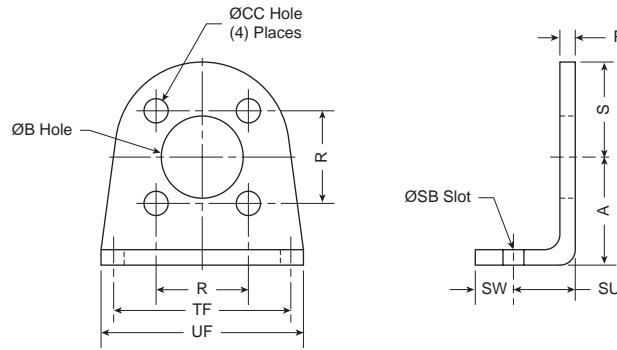
**Flange Mount Kit
 Installation Instructions**

Insert the four (4) screws through the nose mount or the flange mounts and thread them into the cylinder head or cap until they are hand tight. Torque the screws to the values listed in the table below.



Bore Size	Fastener Size		Torque	
20	8-32	M4x0.7	10-12 in-lbs	1.1-1.4 Nm
25	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
32	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
40	1/4-28	M6x1	32-36 in-lbs	3.6-4.1 Nm
50	5/16-24	M8x1.25	72-82 in-lbs	8.1-9.3 Nm
63	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
80	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
100	1/2-20	M12x1.75	40-44 ft-lbs	54-60 Nm

Foot Mount Bracket



Metric Dimensions (mm)

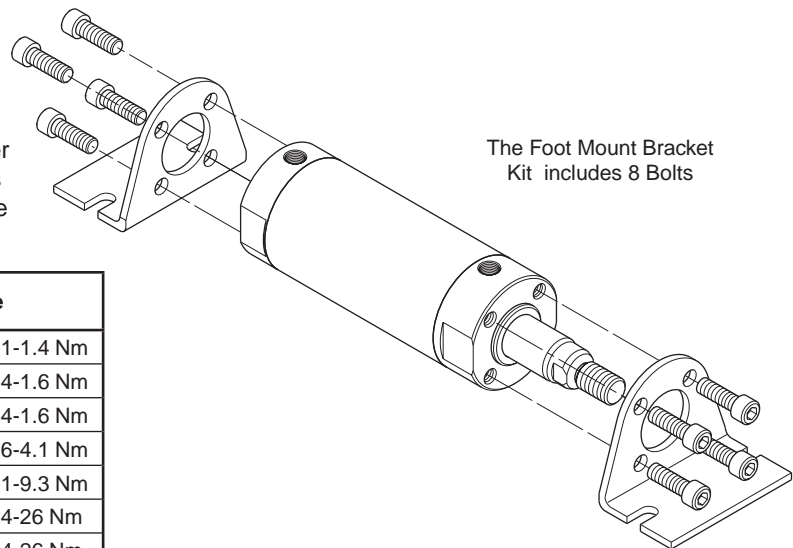
Part Number	Bore	A	ØB ^{+0.15} ₋₀	ØCC	P	R	S	ØSB	SU	SW	TF	UF
L077550020	20	20.6	12.2	5.00	3	14	16	7	14	11	38	48
L077550025	25	20.6	14.2	5.80	3	16.5	18	7	14	11	38	48
L077550032	32	25.4	18.2	5.80	3	20	21	7	19	19	48	63.5
L077550040	40	25.4	25.2	7.50	3	26	26	7	18	20	48	63.5
L077550050	50	38.1	30.2	9.00	6	32	34	9	25	16	57	79
L077550063	63	44.5	32.2	11.50	6	38	39	9	25	16	73	95
L077550080	80	55	40.2	11.50	6	50	46	11	28.5	14	100	125
L077550100	100	65	50.2	14.50	6	60	56	14	30	16	120	150

Imperial Dimensions (inch)

Part Number	Bore	A	ØB ^{+0.006} ₋₀	ØCC	P	R	S	ØSB	SU	SW	TF	UF
L077440075	20	0.81	0.480	0.20	0.12	0.55	0.63	0.27	0.56	0.44	1.50	1.88
L077440100	25	0.81	0.559	0.23	0.12	0.65	0.71	0.27	0.56	0.44	1.50	1.88
L077440125	32	1.00	0.717	0.23	0.12	0.79	0.83	0.28	0.75	0.75	1.88	2.50
L077440150	40	1.00	0.992	0.30	0.12	1.02	1.02	0.28	0.72	0.78	1.88	2.50
L077440200	50	1.50	1.189	0.35	0.25	1.26	1.34	0.34	1.00	0.62	2.24	3.12
L077440250	63	1.75	1.268	0.45	0.25	1.50	1.54	0.34	1.00	0.62	2.88	3.75
L077440312	80	2.17	1.583	0.45	0.25	1.97	1.81	0.43	1.12	0.55	3.94	4.92
L077440400	100	2.56	1.976	0.57	0.25	2.36	2.20	0.55	1.18	0.63	4.72	5.91

**Foot Mount Kit
 Assembly Instructions**

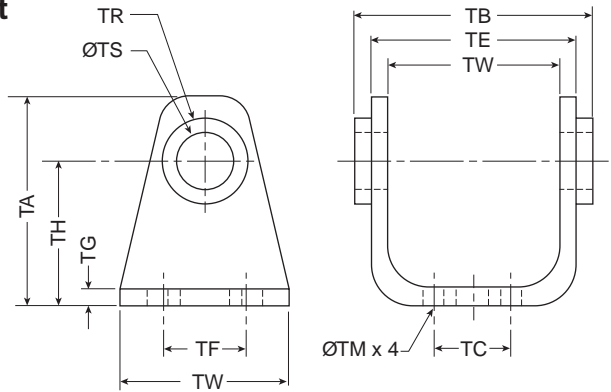
Align each of the foot brackets with the port location as desired. Insert the four (4) screws through the foot mounts and thread them into the end caps until they are hand tight. Place the cylinder assembly on to a flat surface and torque the screws to the values listed in the table below. Make sure the foot mounts rest properly on a flat surface.



The Foot Mount Bracket Kit includes 8 Bolts

Bore Size	Fastener Size		Torque	
20	8-32	M4x0.7	10-12 in-lbs	1.1-1.4 Nm
25	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
32	10-32	M5x0.8	12-14 in-lbs	1.4-1.6 Nm
40	1/4-28	M6x1	32-36 in-lbs	3.6-4.1 Nm
50	5/16-24	M8x1.25	72-82 in-lbs	8.1-9.3 Nm
63	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
80	3/8-24	M10x1.5	18-19 ft-lbs	24-26 Nm
100	1/2-20	M12x1.75	40-44 ft-lbs	54-60 Nm

Trunnion Mount Bracket



Metric Dimensions (mm)

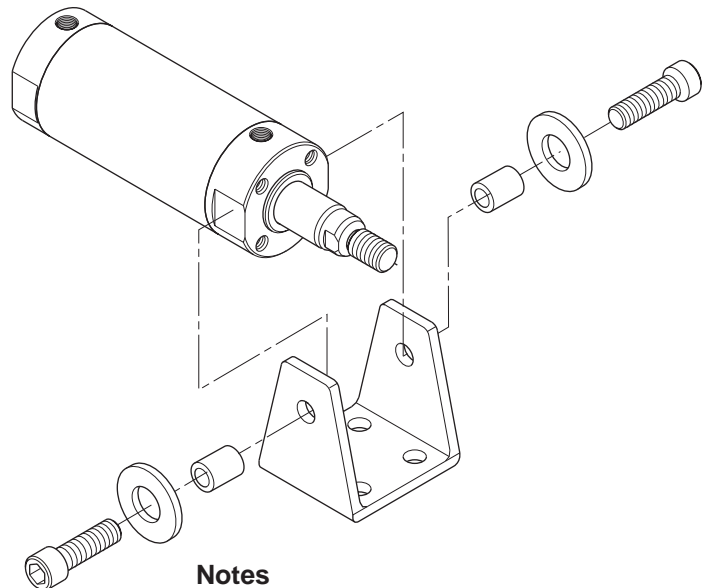
Part Number	Bore	TA	TB	TC	TD	TE	TF	TG	TH	TM	TR	TS H9	TW
L077510020	20	36	38	16	29	35	28	3	25	5.5	13	8	42
L077510025	25	43	42	20	33	39	28	3	30	5.5	15	10	42
L077510032	32	50	53.4	22	40	49	28	4.5	35	7	17	12	48
L077510040	40	58	64.4	30	49	58	30	4.5	40	7	21	14	56
L077510050	50	70	78.8	36	60	72	36	6	50	9	24	16	64
L077510063	63	82	96.6	46	74	90	46	8	60	11	26	18	74

Imperial Dimensions (Inch)

Part Number	Bore	TA	TB	TC	TD	TE	TF	TG	TH	TM	TR	TS ^{+0.002} ₀	TW
L077510020	20	1.42	1.50	0.63	1.14	1.39	1.10	0.12	0.98	0.22	0.51	0.315	1.66
L077510025	25	1.69	1.65	0.79	1.30	1.55	1.10	0.12	1.18	0.22	0.59	0.394	1.66
L077510032	32	1.97	2.10	0.87	1.57	1.93	1.10	0.18	1.38	0.28	0.67	0.472	1.88
L077510040	40	2.28	2.53	1.18	1.93	2.28	1.18	0.18	1.57	0.28	0.83	0.551	2.20
L077510050	50	2.76	3.10	1.42	2.36	2.83	1.42	0.25	1.97	0.35	0.94	0.630	2.52
L077510063	63	3.23	3.80	1.81	2.91	3.54	1.81	0.31	2.36	0.43	1.02	0.709	2.91

**Trunnion Mount
 Assembly Instructions**

Align the bracket on the machine member providing cylinder rotation as desired. Securely mount the bracket to the machine member. Align the cylinder head or cap with the bracket. Insert the bearing, washer and pivot bolt on to each side of the cylinder as shown. Torque the pivot bolts to the values listed in the table below. Use only bolts provided, as they have a special adhesive coating for secure fastening.

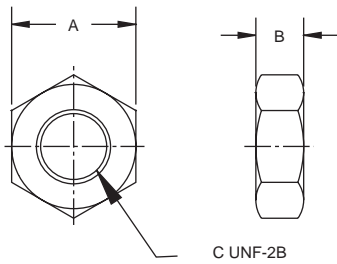


Notes

Order trunnion mounts by specifying "E" for front trunnion or "D" for rear trunnion in the "Mounting Style" digit of the model code. The bearings, washers and pivot bolts will be supplied with the cylinder. The trunnion bracket must be ordered as a separate item, using the part numbers shown above.

Bore Size	Trunnion Pivot Bolt	Torque	
		in-lbs	Nm
20	M5x0.8	12-14	1.4-1.6
25	M6x0.75	32-36	3.6-4.1
32	M8x1	72-82	8.1-9.3
40	M10x1.25	18-19	24-26
50	M12x1.25	40-44	54-60
63	M14x1.5	70-74	95-100

Rod Jam Nut



Rod Jam Nut should be ordered separately on all mounting styles

Rod Jam Nut Dimensions

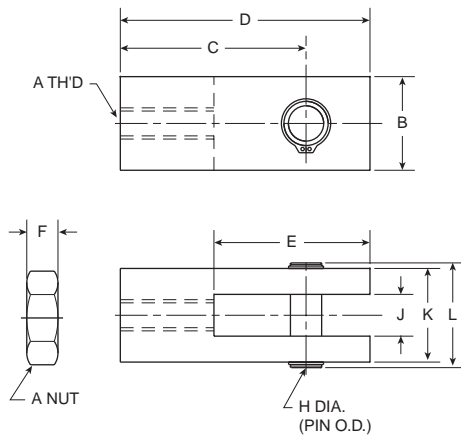
Metric Dimensions (mm)

Part Number	Bore	A	B	C
L075540008	20	13	4	M8 x 1.25
L075540010	25-32	17	5	M10 x 1.25
L075540014	40	22	7	M14 x 1.5
L075540018	50-63	27	8	M18 x 1.5
L075540022	80	32	11	M22 x 1.5
L075540026	100	41	16	M26 x 1.5

Imperial Dimensions (inch)

Part Number	Bore	A	B	C
L077970025	20	0.44	0.16	1/4-28
L077970031	25	0.50	0.19	5/16-24
L077970044	32-40	0.69	0.25	7/16-20
L077970050	50-63	0.75	0.31	1/2-20
L077970075	80	1.12	0.42	3/4 -16
L077970100	100	1.50	0.55	1-14

Piston Rod Clevis



Piston Rod Clevis Dimensions

Metric Dimensions (mm)

Part Number	Bore	A	B	C	D	E	F	H h9	J	K	L
L077590020	20	M8x1.25	13	24	30	18	4	6.35	6.5	13	17.5
L077590025	25	M10x1.25	19	24	30	18	5	6.35	6.5	19	24.5
L077590032	32	M10x1.25	19	34	43	24	5	9.52	10	19	26
L077590040	40	M14x1.5	19	34	43	24	7	9.52	10	19	26
L077590050	50	M18x1.5	28	34	43	24	8	9.52	10	28	36
L077590050	63	M18x1.5	28	34	43	24	8	9.52	10	28	36
PIM-4PRC	80	M22x1.5	38	50	71	48	11	18	28	56	64
L077590100	100	M26x1.5	44	55	79	55	16	22	32	63.5	72

Imperial Dimensions (inch)

Part Number	Bore	A	B	C	D	E	F	H ⁺⁰ / _{-0.002}	J	K	L
L077960025	20	1/4-28	0.50	0.94	1.19	0.69	0.16	0.250	0.26	0.50	0.69
L077960031	25	5/16-24	0.50	0.94	1.19	0.69	0.19	0.250	0.26	0.50	0.69
L077960044	32	7/16-20	0.75	1.32	1.69	0.94	0.25	0.375	0.38	0.75	1.03
L077960044	40	7/16-20	0.75	1.32	1.69	0.94	0.25	0.375	0.38	0.75	1.03
L077960050	50	1/2-20	0.75	1.32	1.69	0.94	0.31	0.375	0.38	0.75	1.03
L077960050	63	1/2-20	0.75	1.32	1.69	0.94	0.31	0.375	0.38	0.75	1.03
L077960075	80	3/4-16	1.25	1.81	2.38	1.31	0.42	0.437	0.52	1.25	1.66
L077960100	100	1-14	1.50	2.63	3.38	1.81	0.55	0.500	0.64	1.50	1.91

How to Order P1L Mounting Kits as a Separate Item

Bore Size	Foot Mounting		Flange	
	Inch	Metric	Inch	Metric
20	L077440075	L077550020	L077450075	L077560020
25	L077440100	L077550025	L077450100	L077560025
32	L077440125	L077550032	L077450125	L077560032
40	L077440150	L077550040	L077450150	L077560040
50	L077440200	L077550050	L077450200	L077560050
63	L077440250	L077550063	L077450250	L077560063
80	L077440312	L077550080	L077450312	L077560080
100	L077440400	L077550100	L077450400	L077560100

Bore Size	Single Clevis		Double Clevis		Single Clevis Pin	Double Clevis Pin
	Inch	Metric	Inch	Metric		
20	L077470075	L077570020	L077480075	L077580020	L077490075	L077500020
25	L077470100	L077570025	L077480100	L077580025	L077490075	L077500025
32	L077470125	L077570032	L077480125	L077580032	L077490125	L077500032
40	L077470150	L077570040	L077480150	L077580040	L077490150	L077500040
50	L077470200	L077570050	L077480200	L077580050	L077490200	L077500050
63	L077470250	L077570063	L077480250	L077580063	L077490200	L077500063
80	L077470312	L077570080	L077480312	L077580080	L077490312	L077500080
100	L077470400	L077570100	L077480400	L077580100	L077490400	L077500100

Notes :

- "Inch" mounting kits include inch threaded bolts, while "Metric" mounting kits include metric threaded bolts. Please verify that the kit style matches the cylinder Construction type (code "N" or "M") for which it is intended.
- Clevis pins may be used for either Inch or Metric mounting kits.

Mounting Brackets and Rod End Accessories

Bore Size	Trunnion/ Double Clevis Bracket	Single Clevis Bracket	Piston Rod Clevis		Rod Jam Nut	
			Inch	Metric	Inch	Metric
20	L077510020	L077520075	L077960025	L077590020	L077970025	L075540008
25	L077510025	L077520075	L077960031	L077590025	L077970031	L075540010
32	L077510032	L077520125	L077960044	L077590032	L077970044	L075540010
40	L077510040	L077520150	L077960044	L077590040	L077970044	L075540014
50	L077510050	L077520200	L077960050	L077590050	L077970050	L075540018
63	L077510063	L077520250	L077960050	L077590050	L077970050	L075540018
80	L077510080	L077520312	L077960075	PIM-4PRC	L077970075	L075540022
100	L077510100	L077520400	L077960100	L077590100	L077970100	L075540026

Service Kits

Bore Size	Single Rod Cylinder Repair Kits		Double Rod Cylinder Repair Kits	
	Consisting of: 1 ea. Symbol #5, 7, 12, & 2 ea. Symbol #1, 8 11, 14		Consisting of: 1 ea. Symbol #5, 7, & 2 ea. Symbol #1, 8 11, 12, 14	
	Class 1 Seals, Std. Service	Class 5 Seals, High Temp.	Class 1 Seals, Std. Service	Class 5 Seals, High Temp.
mm	Part No.	Part No.	Part No.	Part No.
20	P1L020D001	P1L020D005	P1L020K001	P1L020K005
25	P1L025D001	P1L025D005	P1L025K001	P1L025K005
32	P1L032D001	P1L032D005	P1L032K001	P1L032K005
40	P1L040D001	P1L040D005	P1L040K001	P1L040K005
50	P1L050D001	P1L050D005	P1L050K001	P1L050K005
63	P1L063D001	P1L063D005	P1L063K001	P1L063K005
80	P1L080D001	P1L080D005	P1L080K001	P1L080K005
100	P1L100D001	P1L100D005	P1L100K001	P1L100K005





P Series

Round Aluminum Air Cylinders



D

SR/SRM, SRD/SRDM

SRX

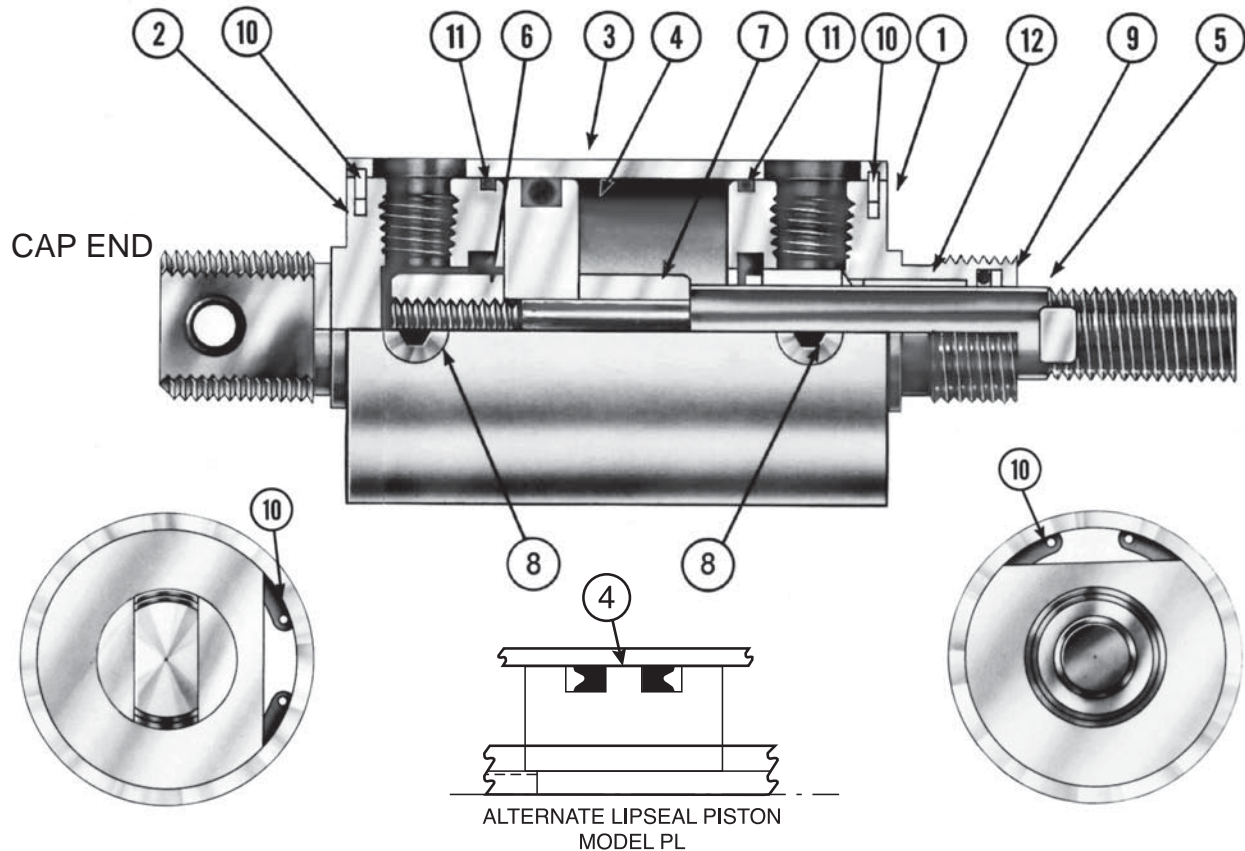
P1L

P

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Features	D92	Sensor Mounting	D100
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Specifications	D94		
Dimensional Data	D95-D98		
Mounting Accessories	D99		





Features

①② **Heads and Caps** are lightweight aluminum for maximum corrosion resistance. The cap is provided with a steel pivot bushing.

③ **Cylinder Body** is hard anodized aluminum for corrosion and abrasion resistance. The smooth I.D. finish provides long seal life.

④ **The Piston** is available with either O-Ring or Lipseal® design.

⑤ **Piston Rod** is chrome plated steel.* The piston is secured to the rod with anaerobic adhesive. Full diameter threads are provided for maximum strength. Wrench flats are standard.

⑥⑦ **Adjustable Cushions** are available on 2" thru 4" bore sizes, while fixed cushions are available on 1-1/8" and 1-1/2" bore sizes.

⑧ **The Cushion Adjustment Needle** is recessed and retained for precise, safe adjustment on all adjustable cushions.

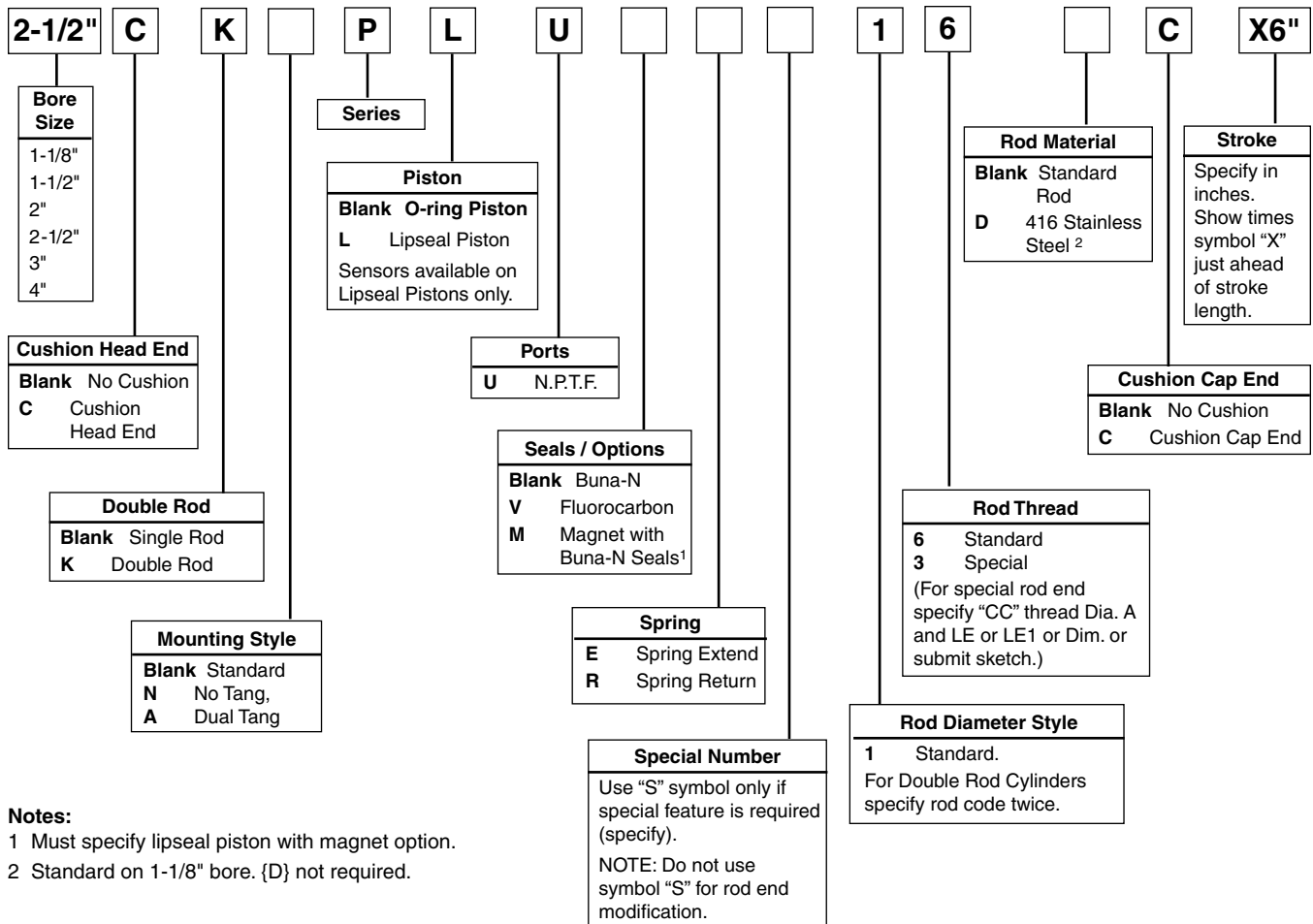
⑨ The wear-compensating **Rod Seal** design conforms to pressure variations and provides maximum seal life.

⑩ **High Strength Steel Retaining Snap Ring** (210,000 PSI ultimate) is precision made to securely lock the head and cap in place. Easily removed for quick disassembly.

⑪ **O-Ring Static Tube Seal** is standard for positive no-leak sealing.

⑫ **Rod Bearing** is low friction bronze for high performance and longer wear.

* 1-1/8" bore has standard 416 stainless steel piston rod material.



Notes:

- 1 Must specify lipseal piston with magnet option.
- 2 Standard on 1-1/8" bore. {D} not required.

How to Order P Series Cylinders

When ordering P Series cylinders, specify each of the following:

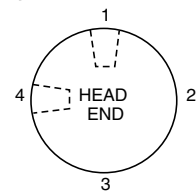
- 1) Bore size.
- 2) Basic model number (see chart above).
- 3) Piston style O-ring or Lipseal.
- 4) Cushions (if required), specify head end, cap end, or both ends.
- 5) Spring return (if required).
- 6) Mounting accessories.
- 7) Special modifications (if required).

P Series Model Numbers

Each P Series cylinder can be specified by use of symbol numbers. To develop a model number from the chart above select only those symbols that represent the cylinder features desired, and place them in the sequence indicated by the example at the top of the chart.

The example shown is a 2-1/2" bore, cushion head end, double rod cylinder, P SERIES, with Lipseal Piston, standard diameter rod and threads, cushion cap end – 6" stroke. (A 2" bore cylinder with O-Ring piston, no cushions, standard seals and standard rod bearing, 4" stroke would be indicated as **2PU16 4.**)

Safety Cushion Adjustment Location



With port in position 1, cushion location will be position 4.

For ordering purposes, when special options or common modifications are requested, the factory will assign a sequential part number in place of the model number.

Standard Specifications

- Nominal Pressure – up to 150 PSI air
- Repairable Design
- Bore Sizes: 1-1/8", 1-1/2", 2", 2-1/2", 3" and 4"
- Double-Acting, Spring-Return and Spring-Extend Models
- Cushions optional at either or both ends
- Universal Nose and Tang Mounts
- Factory Pre-lubricated
- Standard Temperature Range: -10°F to +165°F.
Fluorocarbon Seals for operation up to 250°F are available at extra cost.
- Standard Stroke Lengths to 20 inches in one inch increments, plus 1-1/2", 2-1/2" and 3-1/2" strokes. Fraction strokes and strokes over 20 inches are available upon request.

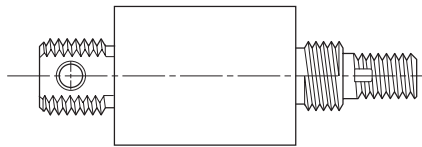
⚠ DANGER

The piston to rod threaded connection is secured with an anaerobic adhesive which is temperature sensitive. Operating cylinders in excess of the following recommendations can cause the piston and piston rod assembly to unthread. Cylinders ordered with standard seals (Buna-N) are assembled with an anaerobic adhesive with a maximum operating temperature rating of +165°F. Cylinders ordered with Fluorocarbon seals are assembled with an anaerobic adhesive with a maximum operating temperature rating of +250°F.

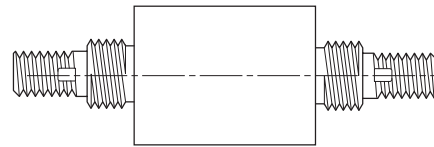
Cylinders originally manufactured with standard seals (Buna-N) that will be exposed to an ambient temperature above +165°F must be modified for higher temperature service. Contact your local factory immediately and arrange for the piston to piston rod connection to be properly modified for the higher temperature service.

D

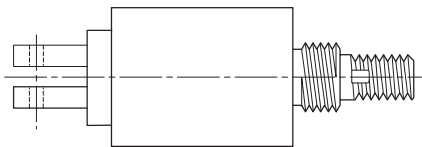
Mounting Styles Available



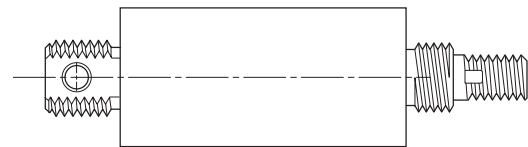
Model P – O-Ring Piston – Single Rod
1 1/8" Bore thru 3" Bore
Model PL – Lipseal Piston – Single Rod
1 1/8" Bore thru 4" Bore



Model KP – O-Ring Piston – Double Rod
1 1/8" Bore thru 3" Bore
Model KPL – Lipseal Piston – Double Rod
1 1/8" Bore thru 4" Bore



Model AP – O-Ring Piston – Single Rod
1 1/8" Bore thru 3" Bore
Model APL – Lipseal Piston – Single Rod
1 1/8" Bore thru 4" Bore



Model PR – O-Ring Piston – Spring Return
Model PE – O-Ring Piston – Spring Extend
1 1/8" Bore thru 3" Bore
Model PLR – Lipseal Piston – Spring Return
Model PLE – Lipseal Piston – Spring Extend
1 1/8" Bore thru 4" Bore

Force Data

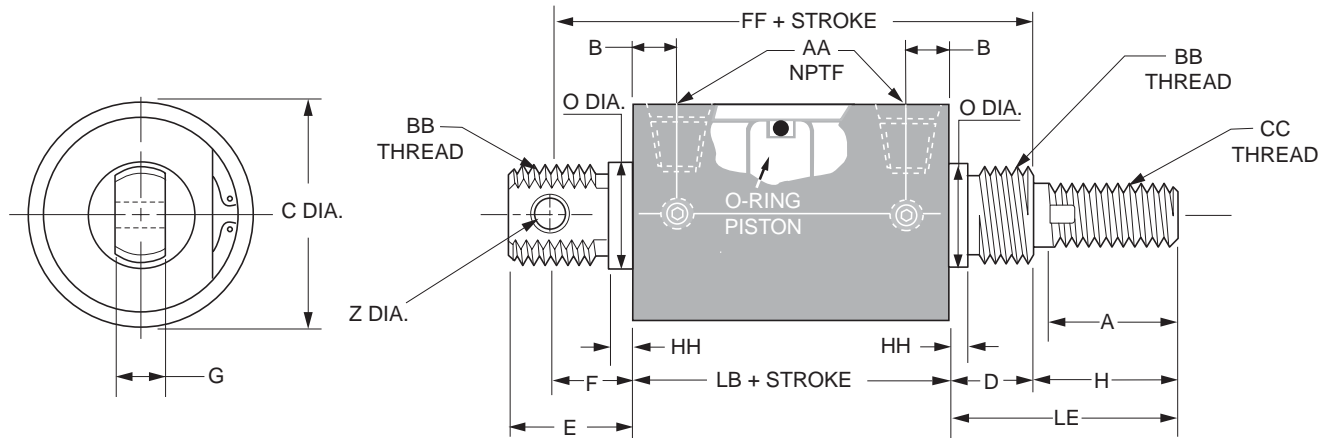
(to determine force multiply operating pressure by area figures below)

Bore Size	Rod Dia.	Major Area (sq. in.)	Minor Area (sq. in.)
1-1/8"	3/8"	0.992	0.882
1-1/2"	1/2"	1.766	1.570
2"	5/8"	3.141	2.835
2-1/2"	3/4"	4.906	4.464
3"	3/4"	7.065	6.623
4"	1"	12.560	11.775

Cylinder Cushion Lengths

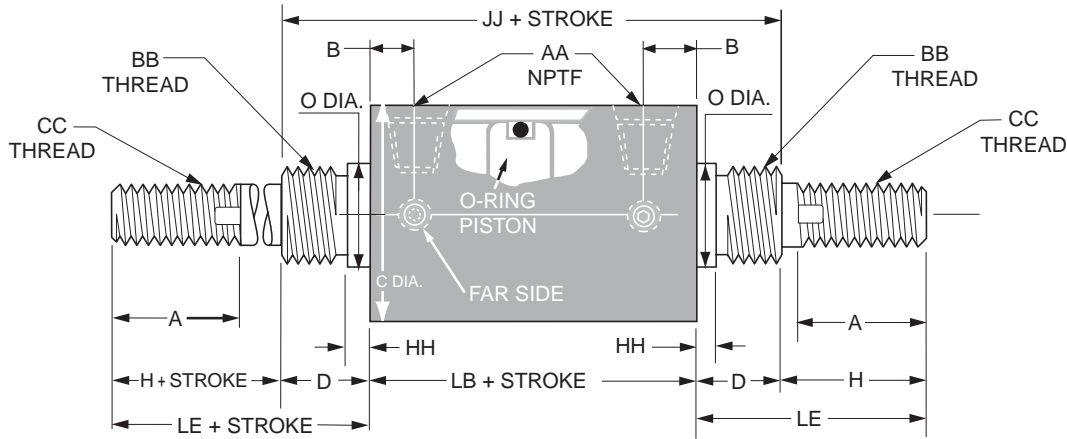
Bore	Head	Cap
1-1/8"	0.560"	0.560"
1-1/2" & 2"	0.750"	0.750"
2-1/2" & 3"	0.875"	0.875"
4"	1.250"	1.250"

**Model P –
O-Ring Piston – Single Rod**



Model P cylinders are available without tang covered by dimension E minus HH at no extra charge. To order specify Model NP.

**Model KP –
O-Ring Piston – Double Rod**



Mounting nuts not supplied with cylinder.

Dimensions – Model P and KP Single and Double Rod Cylinders

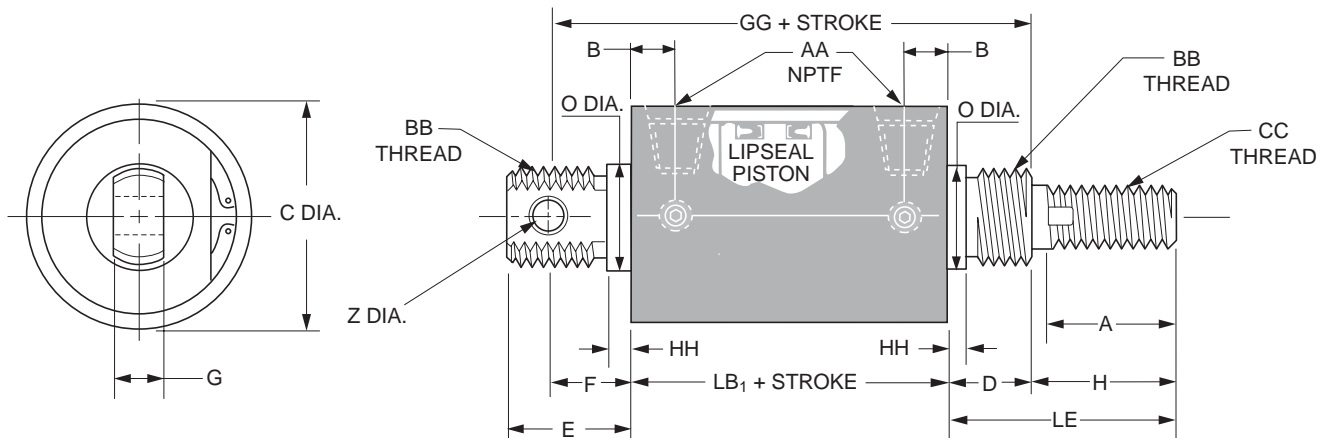
Bore Size	Rod Dia.	LB	B	C	D	E	F	G	H	A	O	Z	AA	BB	CC	FF	HH	JJ	LE
1-1/8	3/8	2-1/16	13/32	1-3/8	5/8	1	11/16	3/8	1	7/8	3/4	1/4	1/8	3/4-16	3/8-16	3-3/8	3/32	3-5/16	1-5/8
1-1/2	1/2	2-5/8	1/2	1-3/4	7/8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	1/2-13	4-3/8	1/8	4-3/8	2-5/16
2	5/8	2-5/8	1/2	2-1/4	7/8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	5/8-11	4-3/8	1/8	4-3/8	2-5/16
2-1/2	3/4	3	5/8	2-3/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	5-3/8	3/16	5	2-11/16
3	3/4	3	5/8	3-1/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	5-3/8	3/16	5	2-11/16

Note: 4" bore size offered only with Lipseal Piston.

FLUOROCARBON SEALS for operation to 250°F are available at extra cost. Specify model PV or KPV.

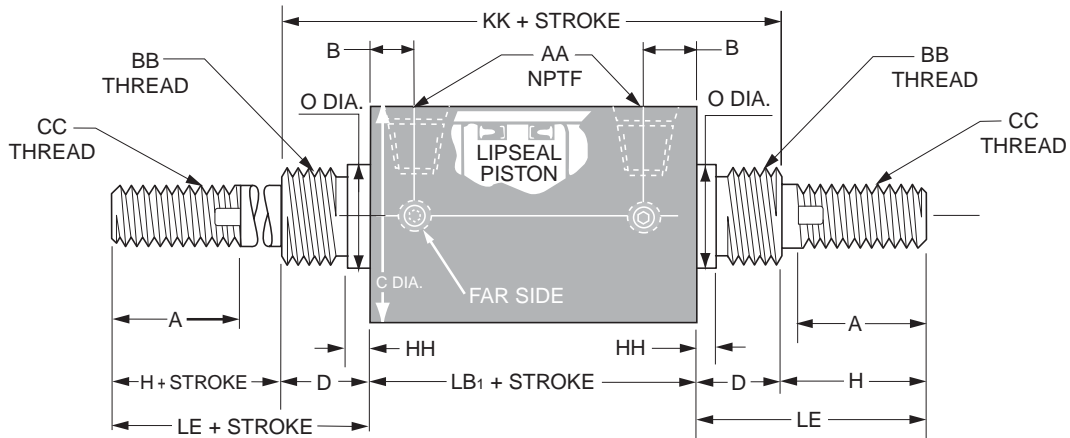


**Model PL –
Lipseal Piston – Single Rod**



Model PL cylinders are available without tang covered by dimension E minus HH at no extra charge. To order specify Model NPL.

**Model KPL –
Lipseal Piston – Double Rod**



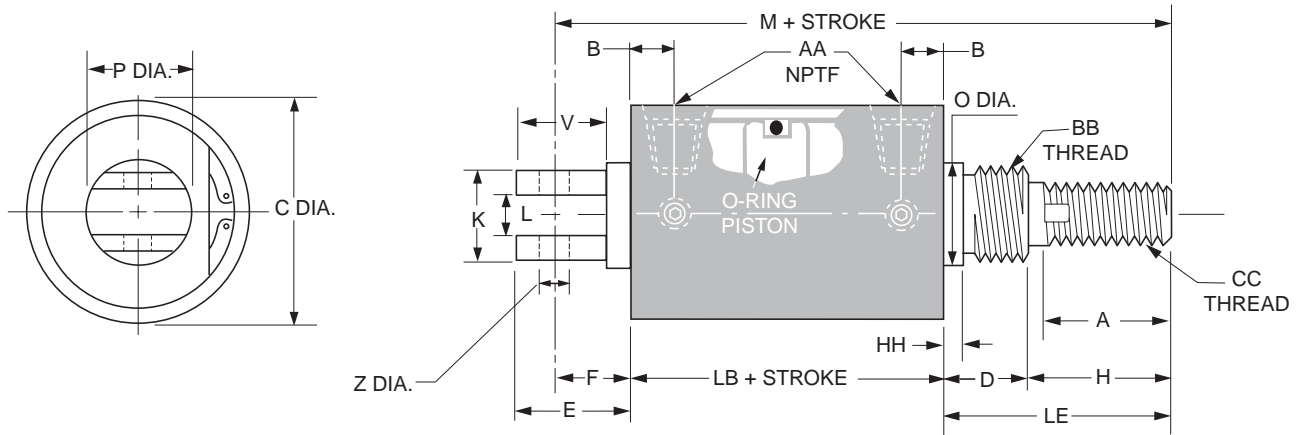
Mounting nuts not supplied with cylinder.

Dimensions – Model PL and KPL Single and Double Rod Cylinders

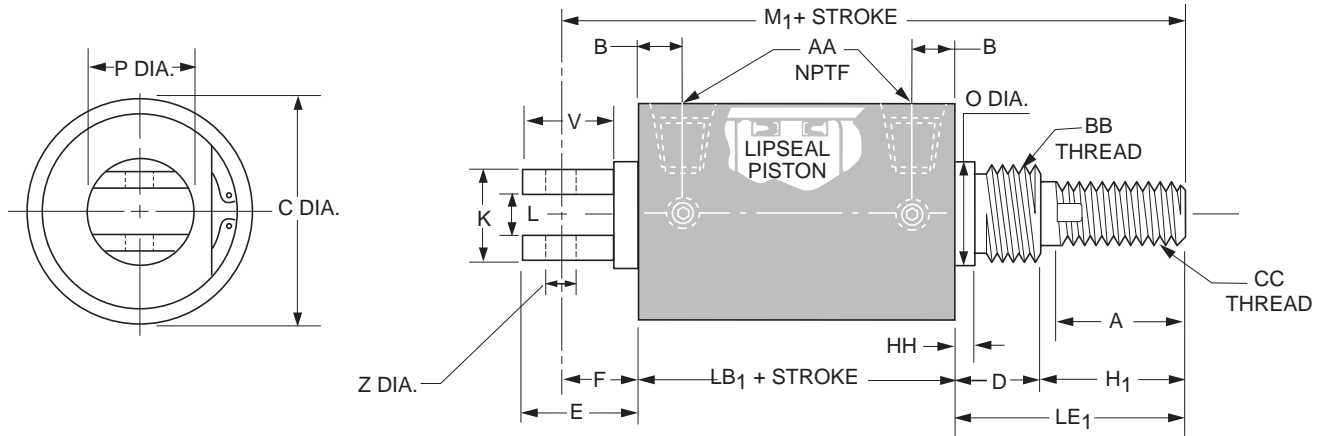
Bore Size	Rod Dia.	LB ₁	B	C	D	E	F	G	H	A	O	Z	AA	BB	CC	GG	HH	KK	LE
1-1/8	3/8	3-1/16	13/32	1-3/8	5/8	1	11/16	3/8	1	7/8	3/4	1/4	1/8	3/4-16	3/8-16	4-3/8	3/32	4-5/16	1-5/8
1-1/2	1/2	3-5/8	1/2	1-3/4	7/8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	1/2-13	5-3/8	1/8	5-3/8	2-5/16
2	5/8	3-5/8	1/2	2-1/4	7/8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	5/8-11	5-3/8	1/8	4-3/8	2-5/16
2-1/2	3/4	4	5/8	2-3/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	6-3/8	3/16	6	2-11/16
3	3/4	4	5/8	3-1/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	6-3/8	3/16	6	2-11/16
4	1	5-1/2	15/16	4-3/8	1-1/8	2-3/16	1-7/16	3/4	2-1/4	1-7/8	1-3/4	1/2	1/2	1-3/4-12	1-14	8-1/16	3/16	7-1/4	3-3/8

FLUOROCARBON SEALS for operation to 250°F are available at extra cost. Specify model PLV or KPLV.

Model AP –
O-Ring Piston – Single Rod
1-1/8" Bore thru 3" Bore



Model APL –
Lipseal Piston – Single Rod
1-1/8" Bore thru 4" Bore



Mounting nuts not supplied with cylinder.

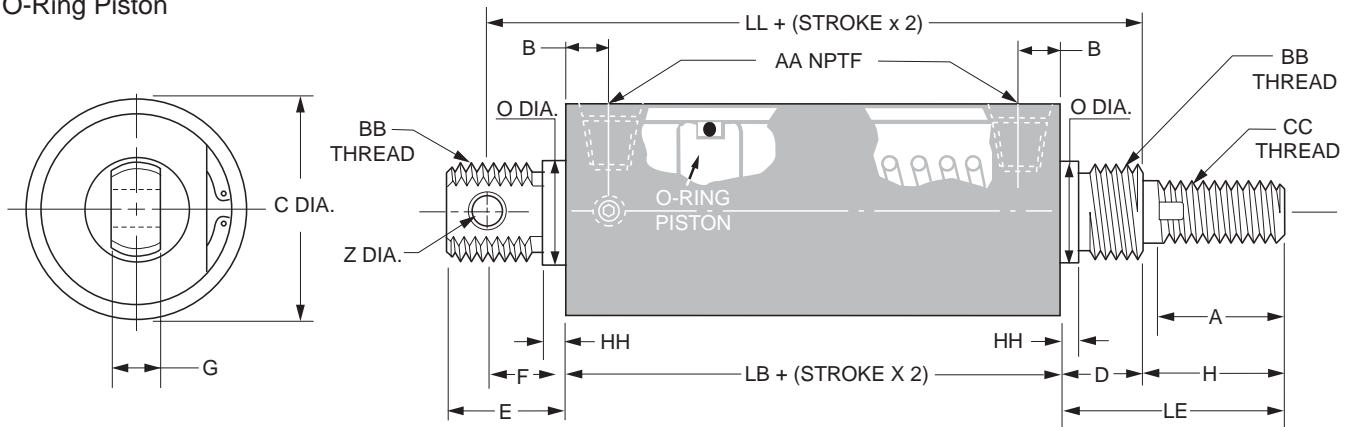
Dimensions – Models AP and APL only

Bore Size	Rod Dia.	LB	LB ₁	B	C	D	E	F	H	H ₁	A	K	L	M	M ₁	O	P	V	Z	AA	BB	CC	HH	LE	LE ₁
1-1/8	3/8	2-1/16	3-1/16	13/32	1-3/8	5/8	1	11/16	1	1	7/8	15/16	3/8	4-3/8	5-3/8	3/4	15/16	7/8	3/8	1/8	3/4-16	3/8-16	3/32	1-5/8	1-5/8
1-1/2	1/2	2-5/8	3-5/8	1/2	1-3/4	7/8	1-5/8	15/16	2-7/16	1-7/16	1-1/4	1-1/4	1/2	6-7/8	6-7/8	1-1/16	1-1/4	1-1/2	3/8	1/4	1-14	1/2-13	1/8	3-5/16	2-5/16
2	5/8	2-5/8	3-5/8	1/2	2-1/4	7/8	2-1/4	1-9/16	2-7/16	1-7/16	1-1/4	1-1/2	1/2	7-1/2	7-1/2	1-1/16	1-11/16	1-3/4	1/2	1/4	1-14	5/8-11	1/8	3-5/16	2-5/16
2-1/2	3/4	3	4	5/8	2-3/4	1	1-13/16	1-1/8	3-11/16	2-11/16	1-1/2	1-1/2	1/2	8-13/16	8-13/16	1-3/8	2-1/4	1-11/16	1/2	3/8	1-3/8-12	3/4-10	3/16	4-11/16	3-11/16
3	3/4	3	4	5/8	3-1/4	1	2-5/16	1-5/8	3-11/16	2-11/16	1-1/2	1-1/2	1/2	9-5/16	9-5/16	1-3/8	2-1/4	1-3/4	1/2	3/8	1-3/8-12	3/4-10	3/16	4-11/16	3-11/16
4	1	-	5-1/2	15/16	4-3/8	1-1/8	2-7/8	1-7/8	-	2-1/4	1-7/8	2-1/4	3/4	-	10-3/4	1-3/4	3	2-1/2	3/4	1/2	1-3/4-12	1-14	3/16	-	3-3/8

FLUOROCARBON SEALS for operation to 250°F are available at extra cost. Specify model ASPV or ASPLV.

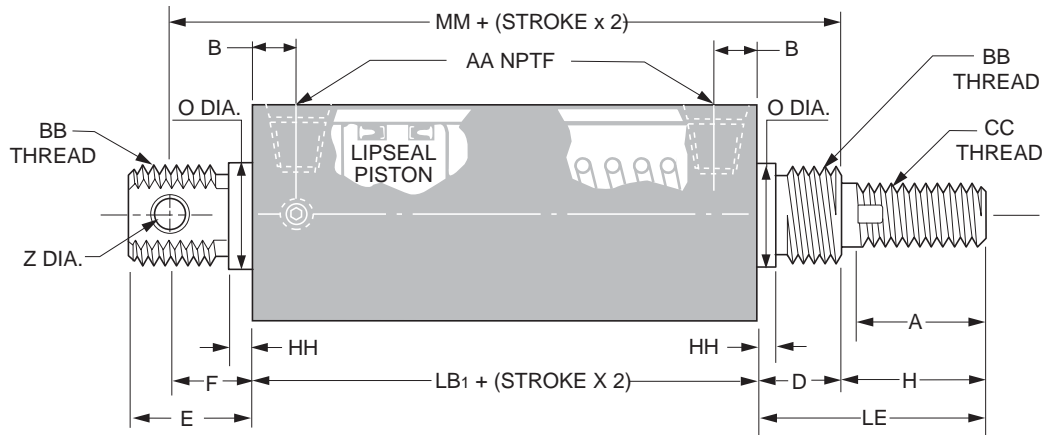


Model PR – Spring Return
Model PE – Spring Extend
O-Ring Piston



Spring return cylinders are available without tail section covered by dimension E minus HH at no extra charge. To order, add letter "N" to model number.

Model PLR – Spring Return
Model PLE – Spring Extend
Lipseal Piston



Mounting nuts not supplied with cylinder.

Dimensions – For Single Rod Spring Return Cylinders up to 6” Stroke (no load spring)

Bore Size	Rod Dia.	LB	LB ₁	B	C	D	E	F	G	H	A	O	Z	AA	BB	CC	HH	LL	MM	LE	Spring Force	
																					Pre-load (lbs.)	Max. Load (lbs.)
1-1/8	3/8	2-1/16	3-1/16	13/32	1-3/8	5/8	1	11/16	3/8	1	7/8	3/4	1/4	1/8	3/4-16	3/8-16	3/32	3-3/8	4-3/8	1-5/8	12	36
1-1/2	1/2	2-5/8	3-5/8	1/2	1-3/4	7/8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	1/2-13	1/8	4-3/8	5-3/8	2-5/16	14	45
2	5/8	2-5/8	3-5/8	1/2	2-1/4	7-8	1-1/4	7/8	1/2	1-7/16	1-1/4	1-1/16	5/16	1/4	1-14	5/8-11	1/8	4-3/8	5-3/8	2-5/16	18	48
2-1/2	3/4	3	4	5/8	2-3/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	3/16	5-3/8	6-3/8	2-11/16	30	64
3	3/4	3	4	5/8	31/4	1	2	1-3/8	5/8	1-11/16	1-1/2	1-3/8	7/16	3/8	1-3/8-12	3/4-10	3/16	5-3/8	6-3/8	2-11/16	30	64
4	1	▲	5-1/2	15/16	4-3/8	1-1/8	2-3/16	1-7/16	3/4	2-1/4	1-7/8	1-3/4	1/2	1/2	1-3/4-12	1-14	3/16	▲	8-1/16	3-3/8	50	148

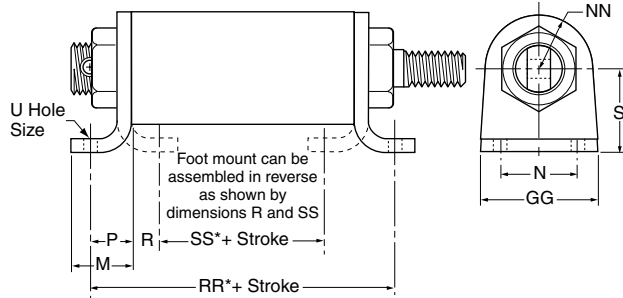
▲ 4" bore spring return cylinders, available only with Lipseal Type Piston.

**Net Stroke plus Stop Tube = Gross Stroke.

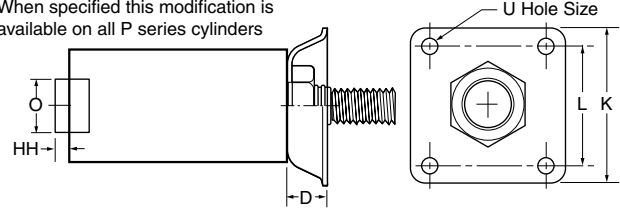
FLUOROCARBON SEALS for operation to 250°F are available at extra cost. Specify model PVR, PVE, PLVR or PLVE.

*Dimensions shown are for cylinder with no load spring. For heavier springs or double rod spring return cylinders, consult factory.

Foot and Flange Mounts



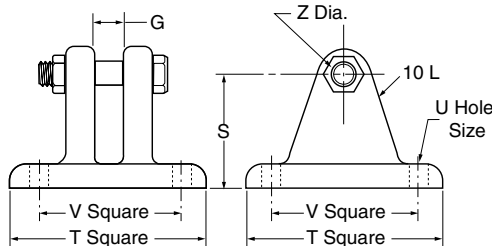
No tang type shown.
 When specified this modification is available on all P series cylinders



Foot Mount*	Flange Mount**	Bore Size	D	K	L	M	N	O	P	R	S	U	GG	HH	NN	RR	SS
L069190000	L069230000	1-1/8	5/8	2-1/2	2	1-3/8	1-11/16	3/4	7/8	5/8	1-9/32	9/32	2-11/16	3/32	11/16	3-13/16	13/16
L069200000	L069240000	1-1/2	7/8	3-1/4	2-1/2	1-9/32	1-5/8	1-1/16	7/8	9/16	1-3/4	9/32	2-7/16	1/8	1-1/8	4-3/8	1-1/2
L069200000	L069240000	2	7/8	3-1/4	2-1/2	1-9/32	1-5/8	1-1/16	7/8	9/16	1-3/4	9/32	2-7/16	1/8	1-1/8	4-3/8	1-1/2
L069210000	L069250000	2-1/2	1	4-1/2	3-3/8	1-29/32	2-1/4	1-3/8	1-1/4	7/8	2-3/8	13/32	3-9/16	3/16	1-5/8	5-1/2	1-1/4
L069210000	L069250000	3	1	4-1/2	3-3/8	1-29/32	2-1/4	1-3/8	1-1/4	7/8	2-3/8	13/32	3-9/16	3/16	1-5/8	5-1/2	1-1/4
L069220000	L069260000	4	1-1/8	5-1/4	4	2-17/32	3-1/4	1-3/4	1-3/4	1-5/16	3-3/16	15/32	4-13/16	3/16	2-3/16	9▲	2-7/8▲

▲Dimension shown is for Lipseal Piston Type.
 *Part number includes one foot mounting and one mounting nut.
 **Includes mounting nut.

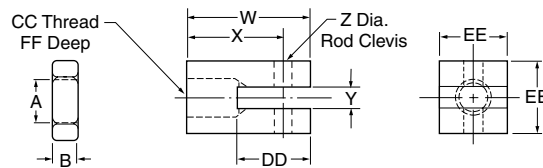
Clevis Bracket



Part Number	Cylinder Bore	G	S	T	U	V	Z
L067300000	1-1/8	3/8	1-9/32	2-1/4	9/32	1-3/4	1/4
L067310000	1-1/2	1/2	1-3/4	3	9/32	2-1/4	5/16
L067310000	2	1/2	1-3/4	3	9/32	2-1/4	5/16
L067320000	2-1/2	5/8	2-3/8	4	13/32	3	7/16
L067320000	3	5/8	2-3/8	4	13/32	3	7/16
L067330000	4	3/4	3-3/16	5	15/32	3-3/4	1/2

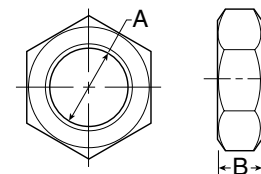
Connecting Pin and Locknut furnished with Clevis Bracket.

Rod Clevis



Part Number	Cyl. Bore	Rod Dia.	A	B	CC	DD	EE	FF	W	X	Y	Z
L067340000	1-1/8	3/8	3/8-16	7/32	3/8-16	1-1/8	3/4	5/8	1-3/4	1-3/8	5/16	1/4
L067350000	1-1/2	1/2	1/2-13	5/16	1/2-13	1-5/16	1	15/16	2-1/4	1-3/4	3/8	5/16
L067360000	2	5/8	5/8-11	3/8	5/8-11	1-5/16	1	15/16	2-1/4	1-3/4	3/8	5/16
L067370000	2-1/2	3/4	3/4-10	27/64	3/4-10	1-5/16	1-1/4	1-1/16	2-3/8	1-13/16	1/2	7/16
L067370000	3	3/4	3/4-10	27/64	3/4-10	1-5/16	1-1/4	1-1/16	2-3/8	1-13/16	1/2	7/16
L067380000	4	1	1-14	35/64	1-14	1-13/16	1-1/2	1-9/16	3-3/8	2-5/8	5/8	1/2

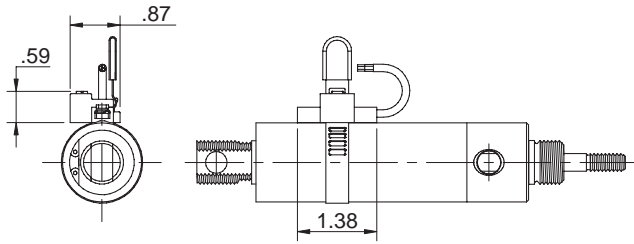
Mounting Nut for Cylinders**



Bore	Part Number	A	B
1-1/8	0833010048	3/4-16	27/64
1-1/2 & 2	0833010100	1-14	35/64
2-1/2 & 3	0833010124	1-3/8-12	25/32
4	0831830000	1-3/4-12	15/16

Note: Rod End Jam Nut furnished with Rod Clevis.

P Series Sensors



Bore	Piston Travel at Mid Stroke* (Sensor Activated)
1-1/8"	0.33
1-1/2"	0.37
2"	0.49
2-1/2"	0.44
3"	0.40
4"	0.33

* Sensing distance at "End of Stroke" can be adjusted from 'mid-stroke' sensing distance to zero. For sensor specifications and part numbers, see Electronic Sensors section.

†Piston travel ±.01".

D

How To Order P Series Sensors

P Series sensors are not mounted to the cylinder prior to shipment. When ordering a cylinder to accommodate a P Series sensor:

1. Derive a proper cylinder number as shown on the Ordering Information page.
2. Place an "S" in the Special column.
3. Place an "L" in the Piston column.
4. Underneath the model number specify:
 - 1) Cylinder prepared for sensor.
5. As a **separate** item specify the number of sensors required.*
6. As a **third** item specify the quantity of the proper clamp assembly.*

* For information regarding sensors, please refer to the Electronic Sensors section.

Example: To order a 1-1/2" x 6" cylinder with P Series sensors to sense the end of stroke at both head and cap end.

Item	Qty.	Description
A	(1)	1 1/2" PLUS 16 6 (1) Cylinder prepared for sensor
B	(2)	P8S-GPSHX Sensor
C	(2)	P8S-TMC02 Clamp Assembly

Table A		
Seal Kit for Series "P" Cylinders with O-Ring Piston Contains: 2 each Symbol #15 & 1 each Symbol #16, 24 & 25		
Bore Size	Standard Seal Kit Part Number	Hi - Temp Seal Kit Part Number
1-1/8"	L067680000	L067730000
1-1/2"	L067690000	L067740000
2"	L067700000	L067750000
2-1/2"	L067710000	L067760000
3"	L067720000	L067770000

Table B		
Seal Kit for Series "P" Cylinders with Lipseal Piston Contains: 2 each Symbol #15 & 23 & 1 each Symbol #24 & 25		
Bore Size	Standard Seal Kit Part Number	Hi - Temp Seal Kit Part Number
1-1/8"	L067780000	L067840000
1-1/2"	L067790000	L067850000
2"	L067800000	L067860000
2-1/2"	L067810000	L067870000
3"	L067820000	L067880000
4"	L067830000	L067890000

Table C		
Cushion Seal Kit for Series "P" Cylinders Contains: 2 each Symbol #19 & 21 (Symbol #21 not required or supplied for 1 1/8" & 1 1/2" bore size cylinders)		
Bore Size	Standard Seal Kit Part Number	Hi - Temp Seal Kit Part Number
1-1/8"	L067900000	L067950000
1-1/2"	L067910000	L067960000
2"	L067920000	L067970000
2-1/2"	L067930000	L067980000
3"	L067930000	L067980000
4"	L067940000	L067990000

D

SR/SRM, SRD/SRDM

SRX

P1L

P

Safety Guide for Selecting and Using Hydraulic, Pneumatic Cylinders and Their Accessories

WARNING: ⚠ FAILURE OF THE CYLINDER, ITS PARTS, ITS MOUNTING, ITS CONNECTIONS TO OTHER OBJECTS, OR ITS CONTROLS CAN RESULT IN:

- Unanticipated or uncontrolled movement of the cylinder or objects connected to it.
- Falling of the cylinder or objects held up by it.
- Fluid escaping from the cylinder, potentially at high velocity.

THESE EVENTS COULD CAUSE DEATH OR PERSONAL INJURY BY, FOR EXAMPLE, PERSONS FALLING FROM HIGH LOCATIONS, BEING CRUSHED OR STRUCK BY HEAVY OR FAST MOVING OBJECTS, BEING PUSHED INTO DANGEROUS EQUIPMENT OR SITUATIONS, OR SLIPPING ON ESCAPED FLUID.

Before selecting or using Parker (The Company) cylinders or related accessories, it is important that you read, understand and follow the following safety information. Training is advised before selecting and using The Company's products.

1.0 General Instructions

1.1 Scope – This safety guide provides instructions for selecting and using (including assembling, installing, and maintaining) cylinder products. This safety guide is a supplement to and is to be used with the specific Company publications for the specific cylinder products that are being considered for use.

1.2 Fail Safe – Cylinder products can and do fail without warning for many reasons. All systems and equipment should be designed in a fail-safe mode so that if the failure of a cylinder product occurs people and property won't be endangered.

1.3 Distribution – Provide a free copy of this safety guide to each person responsible for selecting or using cylinder products. Do not select or use The Company's cylinders without thoroughly reading and understanding this safety guide as well as the specific Company publications for the products considered or selected.

1.4 User Responsibility – Due to very wide variety of cylinder applications and cylinder operating conditions, The Company does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to The Company's design guidelines and do not necessarily meet the design guideline of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

1.5 Additional Questions – Call the appropriate Company technical service department if you have any questions or require any additional information. See the Company publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2.0 Cylinder and Accessories Selection

2.1 Seals – Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection, consult the "seal information page(s)" of the publication for the series of cylinders of interest.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

2.2 Piston Rods – Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Follow the recommendations of the "Piston Rod Selection Chart and Data" in the publication for the series of cylinders of interest. The suggested piston rod diameter in these charts must be followed in order to avoid piston rod buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

On occasion cylinders are ordered with double rods (a piston rod extended from both ends of the cylinder). In some cases a stop is threaded on to one of the piston rods and used as an external stroke adjuster. On occasions spacers are attached to the machine member connected to the piston rod and also used as a stroke adjuster. In both cases the stops will create a pinch point and the user should consider appropriate use of guards. If these external stops are not perpendicular to the mating contact surface, or if debris is trapped between the contact surfaces, a bending moment will be placed on the piston rod, which can lead to piston rod failure. An external stop will also negate the effect of cushioning and will subject the piston rod to impact loading. Those two (2) conditions can cause piston rod failure. Internal stroke adjusters are available with and without cushions. The use of external stroke adjusters should be reviewed with our engineering department.

The piston rod to piston and the stud to piston rod threaded connections are secured with an anaerobic adhesive. The strength of the adhesive decreases with increasing temperature. Cylinders which can be exposed to temperatures above +250°F (+121°C) are to be ordered with a non studded piston rod and a pinned piston to rod joint.

2.3 Cushions – Cushions should be considered for cylinder applications when the piston velocity is expected to be over 4 inches/second.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be review by our engineering department.

2.4 Cylinder Mountings – Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

2.5 Port Fittings – Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end. The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure} \times \text{effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

3.0 Cylinder and Accessories Installation and Mounting

3.1 Installation

3.1.1 – Cleanliness is an important consideration, and cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations.

3.1.2 – Cylinders operating in an environment where air drying materials are present such as fast-drying chemicals, paint, or weld splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

3.1.3 – Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear. On fixed mounting cylinders attaching the piston rod while the rod is retracted will help in achieving proper alignment.

3.1.4 – Sometimes it may be necessary to rotate the piston rod in order to thread the piston rod into the machine member. This operation must always be done with zero pressure being applied to either side of the piston. Failure to follow this procedure may result in loosening the piston to rod-threaded connection. In some rare cases the turning of the piston rod may rotate a threaded piston rod gland and loosen it from the cylinder head. Confirm that this condition is not occurring. If it does, re-tighten the piston rod gland firmly against the cylinder head.

For double rod cylinders it is also important that when attaching or detaching the piston rod from the machine member that the torque be applied to the piston rod end of the cylinder that is directly attaching to the machine member with the opposite end unrestrained. If the design of the machine is such that only the rod end of the cylinder opposite to where the rod attaches to the machine member can be rotated, consult the factory for further instructions.

3.2 Mounting Recommendations

3.2.1 – Always mount cylinders using the largest possible high tensile alloy steel socket head screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

3.2.2 – Side-Mounted Cylinders – In addition to the mounting bolts, cylinders of this type should be equipped with thrust keys or dowel pins located so as to resist the major load.

3.2.3 – Tie Rod Mounting – Cylinders with tie rod mountings are recommended for applications where mounting space is limited. The standard tie rod extension is shown as BB in dimension tables. Longer or shorter extensions can be supplied. Nuts used for this mounting style should be torqued to the same value as the tie rods for that bore size.

3.2.4 – Flange Mount Cylinders – The controlled diameter of the rod gland extension on head end flange mount cylinders can be used as a pilot to locate the cylinders in relation to the machine. After alignment has been obtained, the flanges may be drilled for pins or dowels to prevent shifting.

3.2.5 – Trunnion Mountings – Cylinders require lubricated bearing blocks with minimum bearing clearances. Bearing blocks should be carefully aligned and rigidly mounted so the trunnions will not be subjected to bending moments. The rod end should also be pivoted with the pivot pin in line and parallel to axis of the trunnion pins.

3.2.6 – Clevis Mountings – Cylinders should be pivoted at both ends with centerline of pins parallel to each other. After cylinder is mounted, be sure to check to assure that the cylinder is free to swing through its working arc without interference from other machine parts.

4.0 Cylinder and Accessories Maintenance, Troubleshooting and Replacement

4.1 Storage – At times cylinders are delivered before a customer is ready to install them and must be stored for a period of time. When storage is required the following procedures are recommended.

4.1.1 – Store the cylinders in an indoor area which has a dry, clean and noncorrosive atmosphere. Take care to protect the cylinder from both internal corrosion and external damage.

4.1.2 – Whenever possible cylinders should be stored in a vertical position (piston rod up). This will minimize corrosion due to possible condensation which could occur inside the cylinder. This will also minimize seal damage.

4.1.3 – Port protector plugs should be left in the cylinder until the time of installation.

4.1.4 – If a cylinder is stored full of hydraulic fluid, expansion of the fluid due to temperature changes must be considered. Installing a check valve with free flow out of the cylinder is one method.

4.1.5 – When cylinders are mounted on equipment that is stored outside for extended periods, exposed unpainted surfaces, e.g. piston rod, must be coated with a rust-inhibiting compound to prevent corrosion.

4.2 Cylinder Trouble Shooting

4.2.1 – External Leakage

4.2.1.1 – Rod seal leakage can generally be traced to worn or

damaged seals. Examine the piston rod for dents, gouges or score marks, and replace piston rod if surface is rough.

Rod seal leakage could also be traced to gland wear. If clearance is excessive, replace rod bushing and seal. Rod seal leakage can also be traced to seal deterioration. If seals are soft or gummy or brittle, check compatibility of seal material with lubricant used if air cylinder, or operating fluid if hydraulic cylinder. Replace with seal material, which is compatible with these fluids. If the seals are hard or have lost elasticity, it is usually due to exposure to temperatures in excess of 165°F. (+74°C). Shield the cylinder from the heat source to limit temperature to 350°F. (+177°C.) and replace with fluorocarbon seals.

4.2.1.2 – Cylinder body seal leak can generally be traced to loose tie rods. Torque the tie rods to manufacturer's recommendation for that bore size.

Excessive pressure can also result in cylinder body seal leak. Determine maximum pressure to rated limits. Replace seals and retorque tie rods as in paragraph above. Excessive pressure can also result in cylinder body seal leak. Determine if the pressure rating of the cylinder has been exceeded. If so, bring the operating pressure down to the rating of the cylinder and have the tie rods replaced.

Pinched or extruded cylinder body seal will also result in a leak. Replace cylinder body seal and retorque as in paragraph above.

Cylinder body seal leakage due to loss of radial squeeze which shows up in the form of flat spots or due to wear on the O.D. or I.D. – Either of these are symptoms of normal wear due to high cycle rate or length of service. Replace seals as per paragraph above.

4.2.2 – Internal Leakage

4.2.2.1 – Piston seal leak (by-pass) 1 to 3 cubic inches per minute leakage is considered normal for piston ring construction. Virtually no static leak with lipseal type seals on piston should be expected. Piston seal wear is a usual cause of piston seal leakage. Replace seals as required.

4.2.2.2 – With lipseal type piston seals excessive back pressure due to over-adjustment of speed control valves could be a direct cause of rapid seal wear. Contamination in a hydraulic system can result in a scored cylinder bore, resulting in rapid seal wear. In either case, replace piston seals as required.

4.2.2.3 – What appears to be piston seal leak, evidenced by the fact that the cylinder drifts, is not always traceable to the piston. To make sure, it is suggested that one side of the cylinder piston be pressurized and the fluid line at the opposite port be disconnected. Observe leakage. If none is evident, seek the cause of cylinder drift in other component parts in the circuit.

4.2.3 – Cylinder Fails to Move the Load

4.2.3.1 – Pneumatic or hydraulic pressure is too low. Check the pressure at the cylinder to make sure it is to circuit requirements.

4.2.3.2 – Piston Seal Leak – Operate the valve to cycle the cylinder and observe fluid flow at valve exhaust ports at end of cylinder stroke. Replace piston seals if flow is excessive.

4.2.3.3 – Cylinder is undersized for the load – Replace cylinder with one of a larger bore size.

4.3 Erratic or Chatter Operation

4.3.1 – Excessive friction at rod gland or piston bearing due to load misalignment – Correct cylinder-to-load alignment.

4.3.2 – Cylinder sized too close to load requirements – Reduce load or install larger cylinder.

4.3.3 – Erratic operation could be traced to the difference between static and kinetic friction. Install speed control valves to provide a back pressure to control the stroke.

4.4 Cylinder Modifications, Repairs, or Failed Component – Cylinders as shipped from the factory are not to be disassembled and/or modified. If cylinders require modifications, these modifications must be done at company locations or by The Company's certified facilities. The Cylinder Division Engineering Department must be notified in the event of a mechanical fracture or permanent deformation of any cylinder component (excluding seals). This includes a broken piston rod, tie rod, mounting accessory or any other cylinder component. The notification should include all operation and application details. This information will be used to provide an engineered repair that will prevent recurrence of the failure.

It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies. However, this work must be done by strictly following all the instructions provided with the seal kits.

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2. Price; Payment. Prices stated on Seller's Quote are valid for thirty (30) days, except as explicitly otherwise stated therein, and do not include any sales, use, or other taxes or duties unless specifically stated. Seller reserves the right to modify prices to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified by Seller's Credit Department). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferral of shipment at Buyer's request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of normal use, whichever occurs first. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the defect is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

7. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs

(including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Cancellations and Changes. Buyer may not cancel or modify or cancel any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability.

13. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. Waiver and Severability. Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. Termination. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a) breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.

20. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act") and the U.S. Food Drug and Cosmetic Act ("FDCA"), each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U. K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.

05/14