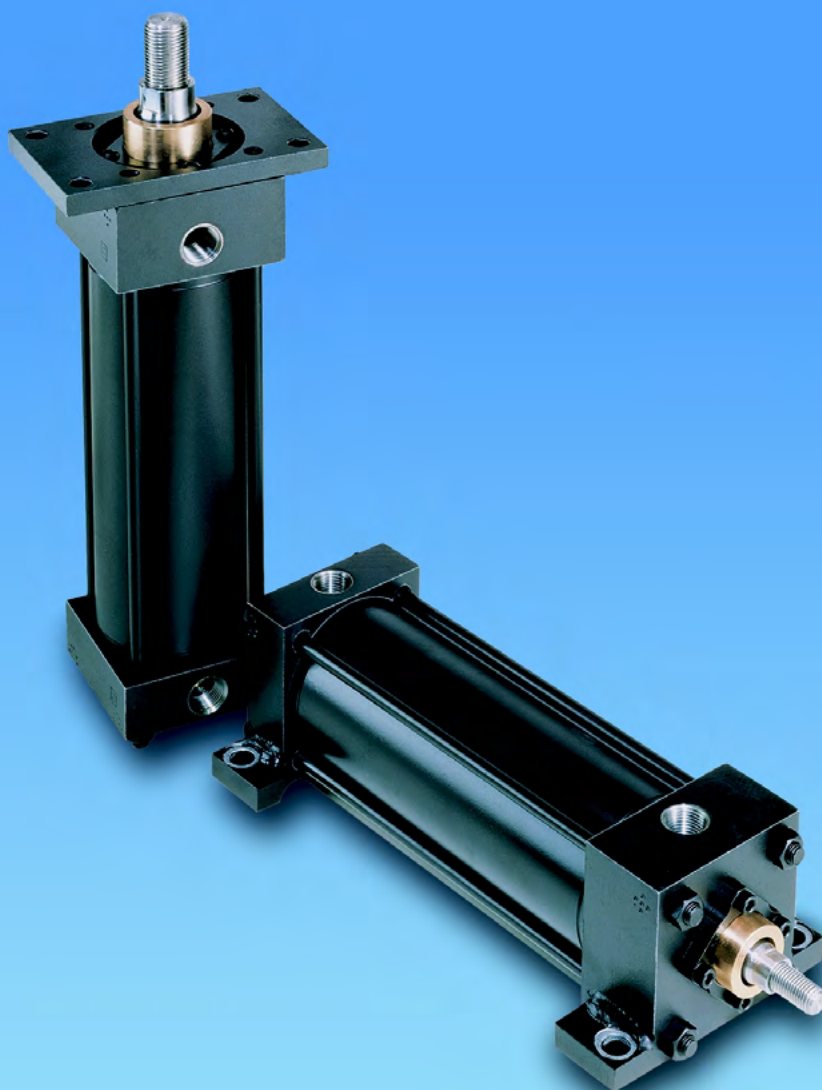


Lin-Act

Series LAA

*Industrial
Interchangeable
Pneumatic Cylinders*

Catalog LAA-1 05/00



Lin-Act Series LAA Heavy-Duty Air Cylinders

Model Numbers

Series LAA Model Numbers – How to Develop Them – How to “Decode” Them

Lin-Act Series LAA cylinders can be completely and accurately described by a model number consisting of coded symbols. For single rod cylinders a maximum of 16 places for digits and letters are used in a prescribed sequence to produce a model number. Only eight places are needed to completely describe a standard non-cushioned Series

LAA cylinder. To develop a model number, select only those symbols that represent the cylinder required, and place them in the sequence indicated below.

Feature	Description	Symbol	6" C K F P TB LAA T V S 1 4 2 A C 12"
Bore*	Specify in inches	—	↑
Cushion-Head	Used only if cushion required	C	↑
Double-Rod	Used only if double-rod cylinder is required	K	↑
Mounting* Style	Head Tie Rods Extended	TB (MX3)	↑
	Cap Tie Rods Extended	TC (MX2)	↑
	Both End Tie Rods Extended	TD (MX1)	↑
	Head Rectangular Flange	J (MF1)	↑
	Cap Rectangular Flange	H (MF2)	↑
	Head Square Flange	JB (MF5)	↑
	Cap Square Flange	HB (MF6)	↑
	Side Lugs	C (MS2)	↑
	Centerline Lugs	E	↑
	Side Tapped	F (MS4)	↑
	Side End Angles	CB (MS1)	↑
	Side End Lugs	G	↑
	Cap Fixed Clevis	BB (MP1)	↑
	Head Trunnion	D (MT1)	↑
	Cap Trunnion	DB (MT2)	↑
	Intermediate Fixed Trunnion	DD (MT4)	↑
	Cap Detachable Clevis	BC (MP2)	↑
Spherical Bearing	SB	↑	
Mounting Modifications	Thrust Key (Styles C, F, G, & CB only)	P	↑
	Manifold Port O-Ring Seal (Style C only)	M	↑
	Removable Trunnions	R	↑
Combination Mounting Style	Any Practical Mounting Style Listed Above	As listed above	↑
Series*	Used in all LAA Model Numbers	LAA	↑
Piston	Lipseal® Piston standard. No need for symbol in model number.	—	↑
Ports*	NPTF (Dry Seal Pipe Thread) is standard. Used only for SAE Straight Thread O-Ring Port	U	↑
	Used only for BSP (Parallel Thread)	T	↑
	Used only for BSPT (Taper Thread)	R	↑
	Used only for Metric Thread	B G	↑
Common Modifications	Nut Retained Piston	F	↑
	Fluorocarbon Seals	V	↑
	Water Service	W	↑
Special Modifications	Used only if special modifications are required: Oversize Ports Port Position Change Rod End Bellows Special Seals Stop Tube Stroke Adjuster Tie Rod Supports Water Service Modification	S	↑
Piston Rod* Number	For Single Rod Cylinders, select one only. Refer to Rod number listing	1 2 3 4 5 6 7 8 9 0	↑
Piston* Rod End	Select: Style 4 Small Male Style 8 Intermediate Male Style 9 Short Female Style 3 Special (Specify)	4 8 9 3	↑
Piston Rod Alternate Thread	Used only for stud two times longer than standard.	2	↑
Piston Rod* Threads	UNF Standard	A	↑
	BSF (British Fine)	W	↑
	Metric	M	↑
Cushion-Cap Stroke*	Used only if cushion required	C	↑
	Specify in inches	—	↑

*Required for basic cylinder model number.

Dark Arrows Indicate Basic Minimum Model Number

Cylinder serial numbers are factory production record numbers and are assigned to each cylinder, in addition to the model number.

Double Rod Cylinders
For double rod cylinders, specify rod number and rod end symbols for both piston rods. A typical double rod model number would be:
6" KJ-LAAU14A/14AX12"

Cylinder Division
500 S. Wolf Road
Des Plaines, IL 60016
847/298-2400

Regional Plants
 ■ Corona, CA
909/280-3800
 ■ Enfield, CT
860/749-2215
 ■ Atlanta, GA
770/819-3400

■ Goodland, IN
219/297-3182
 ■ Plymouth, MI
734/455-1700

■ Hillsborough, NC
919/732-9371
 ■ Akron, OH
330/253-4500
 ■ Portland, OR
503/285-0884

■ Owen Sound, Ont., Can.
519/376-2691
 ■ Toronto, Ont., Can.
416/255-4567
 ■ Dorval, Quebec, Can.
514/631-3995

Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

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Offer of Sale

The items described in this document are hereby offered for sale by the Company, 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'.

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Lin-Act

Lin-Act Series LAA Air Cylinder

Built so rugged it's for hydraulic use, too.

When the job calls for reliable, heavy-duty performance, specify Series LAA. A 100,000 psi yield strength chrome-plated, case-hardened piston rod. A 125,000 psi yield strength rod-end stud with rolled threads. 100,000 psi yield strength tie rods. With construction like this, it's no wonder Lin-Act Series LAA is rated not only for air service to 250 psi, but for 500 psi hydraulic service, too. This is one heavy-duty air cylinder that's really heavy duty.

They're truly premium quality cylinders, factory prelubricated for millions of maintenance-free cycles...with or without added lubrication. And to make sure every cylinder is premium quality, we subject each and every one – not just batch samples – to tough inspection and performance tests. See pages 18 and 19 for the inside story on all the features that make Series LAA the high performance, long lasting choice for all your heavy-duty air applications.

Note: Rod diameters over 2 1/2" will use a threaded nose gland.



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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Specifications Mounting Styles Ordering Notes

Standard Specifications

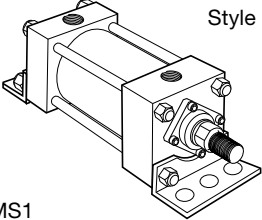
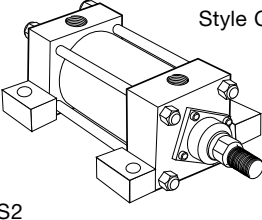
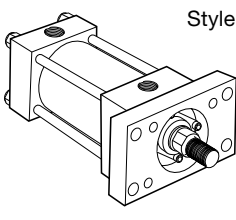
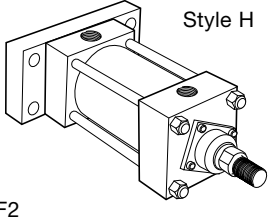
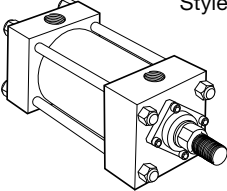
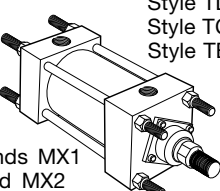
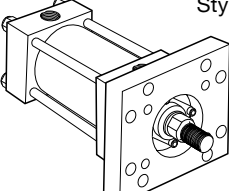
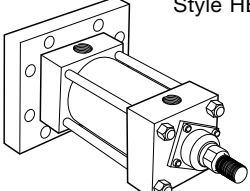
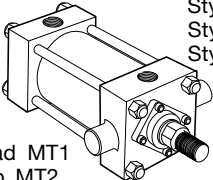
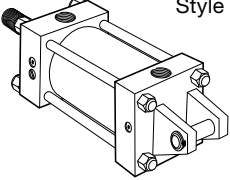
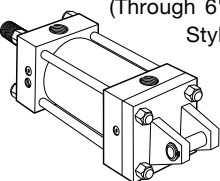
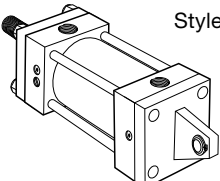
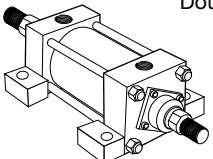
- Heavy Duty Service – Specifications and ANSI/(NFPA) T3.6.7R2-1996 Mounting Dimension Standards
- Standard Construction – Square Head – Tie Rod Design
- Nominal Pressure – Up to 250 PSI Air Service
- Standard Fluid – Filtered Air
- Standard Temperature – -10°F. to +165°F.*
- Bore Sizes – 1" through 14"
- Piston Rod Diameter – 1/2" through 5 1/2"

- Mounting Styles – 17 standard styles at various application ratings
- Strokes – Available in any practical stroke length
- Cushions – Optional at either end or both ends of stroke. "Float Check" at cap end.
- Rod Ends – Three Standard Choices – Specials to Order

*See page 69 for higher temperature service.

In line with our policy of continuing product improvement, specifications in this catalog are subject to change.

Mounting Styles and Ordering Notes

Available in all bore and rod combinations.		Available in all bore and rod combinations through 6" bore. 8"-14" bores supplied as Head Square (ME3) and Cap Square (ME4) mounts.																																																																																																																																																																																																													
<p>Side End Angles Style CB</p>  <p>MS1</p>	<p>Side Lug Style C</p>  <p>MS2</p>	<p>Head Rectangular Flange Style J</p>  <p>MF1</p>	<p>Cap Rectangular Flange Style H</p>  <p>MF2</p>	<p>Side Tapped Style F</p>  <p>MS4</p>	<p>Tie Rods Extended Both Ends Style TD Style TC Style TB</p> <p>Both Ends MX1 Cap End MX2 Head End MX3</p>  <p>MS4</p>	<p>Head Square Flange Style JB</p>  <p>MF5</p>	<p>Cap Square Flange Style HB</p>  <p>MF6</p>																																																																																																																																																																																																								
<p>Trunnion Mounts Style D Style DB Style DD</p>  <p>Head MT1 Cap MT2 Intermediate Fixed MT4</p>	<p>Cap Fixed Clevis Style BB</p>  <p>MP1 Pivot Pin Included</p>	<table border="1"> <thead> <tr> <th rowspan="2">Bore</th> <th rowspan="2">Rod Dia.</th> <th colspan="2">MX1 MX3 MX3 MX2 MS4 MS2 MF6 MF2 MT2</th> <th colspan="2">MF1 MF5 MS1</th> <th rowspan="2">ME3 ME4</th> </tr> <tr> <th>MT1 MPU3</th> <th>MP1</th> <th>MF5</th> <th>MS1</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1/2, 5/8</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>1 1/2</td> <td>5/8</td> <td></td> <td>R</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>2</td> <td>5/8</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1</td> <td></td> <td>R</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/8</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>5/8</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>2 1/2</td> <td>1</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/8</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/4</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>3 1/4</td> <td>1</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/8</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/4, 2</td> <td></td> <td>R</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>4</td> <td>1, 1 3/8</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>N/A</td> </tr> <tr> <td></td> <td>1 3/4, 2</td> <td></td> <td>R</td> <td>R</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>2 1/2</td> <td></td> <td>R</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>5</td> <td>1, 2</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>N/A</td> </tr> <tr> <td></td> <td>2 1/2, 3</td> <td></td> <td>R</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td></td> <td>3 1/2</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>6</td> <td>1 3/8, 2 1/2</td> <td></td> <td>R</td> <td>R</td> <td>R</td> <td>N/A</td> </tr> <tr> <td></td> <td>3, 4</td> <td></td> <td>T</td> <td>T</td> <td>T</td> <td>N/A</td> </tr> <tr> <td>7</td> <td>1 3/8, 1 3/4, 2</td> <td></td> <td>R</td> <td>N/A</td> <td>N/A</td> <td>R</td> </tr> <tr> <td>8*</td> <td>1 3/8, 4 1/2</td> <td></td> <td>R</td> <td>N/A</td> <td>R</td> <td>R</td> </tr> <tr> <td></td> <td>5, 5 1/2</td> <td></td> <td>R</td> <td>N/A</td> <td>N/A</td> <td>R</td> </tr> <tr> <td>10*</td> <td>1 3/4, 5 1/2</td> <td></td> <td>R</td> <td>N/A</td> <td>R</td> <td>R</td> </tr> <tr> <td>12*</td> <td>2, 5 1/2</td> <td></td> <td>R</td> <td>N/A</td> <td>R</td> <td>R</td> </tr> <tr> <td>14*</td> <td>2 1/2, 5 1/2</td> <td></td> <td>R</td> <td>N/A</td> <td>R</td> <td>R</td> </tr> </tbody> </table> <p>R = Removable Cartridge T = TieRod Retained Cartridge</p> <p>*MF5, MF6, MF1, MF2, MP2 not available in these bore sizes.</p>						Bore	Rod Dia.	MX1 MX3 MX3 MX2 MS4 MS2 MF6 MF2 MT2		MF1 MF5 MS1		ME3 ME4	MT1 MPU3	MP1	MF5	MS1	1	1/2, 5/8		T	T	T	N/A	1 1/2	5/8		R	T	T	N/A		1		T	T	T	N/A	2	5/8		R	R	T	N/A		1		R	T	T	N/A		1 3/8		T	T	T	N/A		5/8		R	R	T	N/A	2 1/2	1		R	R	T	N/A		1 3/8		T	T	T	N/A		1 3/4		T	T	T	N/A	3 1/4	1		R	R	T	N/A		1 3/8		R	R	T	N/A		1 3/4, 2		R	T	T	N/A	4	1, 1 3/8		R	R	R	N/A		1 3/4, 2		R	R	T	N/A		2 1/2		R	T	T	N/A	5	1, 2		R	R	R	N/A		2 1/2, 3		R	T	T	N/A		3 1/2		T	T	T	N/A	6	1 3/8, 2 1/2		R	R	R	N/A		3, 4		T	T	T	N/A	7	1 3/8, 1 3/4, 2		R	N/A	N/A	R	8*	1 3/8, 4 1/2		R	N/A	R	R		5, 5 1/2		R	N/A	N/A	R	10*	1 3/4, 5 1/2		R	N/A	R	R	12*	2, 5 1/2		R	N/A	R	R	14*	2 1/2, 5 1/2		R	N/A	R	R
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8*	1 3/8, 4 1/2		R	N/A	R	R																																																																																																																																																																																																									
	5, 5 1/2		R	N/A	N/A	R																																																																																																																																																																																																									
10*	1 3/4, 5 1/2		R	N/A	R	R																																																																																																																																																																																																									
12*	2, 5 1/2		R	N/A	R	R																																																																																																																																																																																																									
14*	2 1/2, 5 1/2		R	N/A	R	R																																																																																																																																																																																																									
<p>Cap Detachable Clevis (Through 6" Bore) Style BC</p>  <p>MP2 Pivot Pin Included</p>	<p>Cap Fixed Universal Clevis Style SB</p>  <p>MPU3</p>																																																																																																																																																																																																														
<p>Double End Construction Style KC Shown</p>  <p>Available in all bore and rod combinations in the following mounting styles: MDS1, MDS2, MDS4, MDX1, MDX3, MDT1, MDT4, and MDF1 (1"-6"). MDF5 (1"-6") and MDE3 (8"-14").</p>																																																																																																																																																																																																															

Cylinder Division
500 S. Wolf Road
Des Plaines, IL 60016
847/298-2400

Regional Plants

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Lin-Act

Advantages of the Lin-Act design

Piston Rod Stud – Furnished on 2" diameter rods and smaller when standard style #4 rod end threads are required or on 1 3/8" diameter rods and smaller when style #8 threads are required. Also available in 2 times the catalog "A" dimension length. Studs have rolled threads and are made from high strength steel. Anaerobic adhesive is used to permanently lock the stud to the piston rod.

Bolt-On Rod Cartridge – assures true concentricity and allows removal without tie rod disassembly.

Long Bearing Surface – is inboard of the seals, assuring positive lubrication from within the cylinder. An "O" ring is used as a seal between gland and head, and also serves as a prevailing torque-type lock.

Secondary Seal – Double-Service Wiperseal® Patent #2907596 – acts as a secondary pressure seal on the extend stroke and cleans the rod on the return stroke.

Rod Seal – The piston rod seal offers maximum sealing performance and efficiency with minimum friction. The highly resilient lips are pressure actuated and wear compensating, giving complete reliability after millions of cycles.

Steel Head – Bored and grooved to provide concentricity for mating parts.

Ports – NPTF ports are standard.

End Seals – Pressure-actuated cylinder body-to-head and cap "O" rings.

High Strength Tie Rods – Made from 100,000 psi minimum yield steel with rolled threads for added strength.

Adjustable Floating Cushions – Cushions are optional and can be supplied at head end, cap end, or both ends without change in envelope or mounting dimensions.

The Cylinder Body – Hard chrome-plated bore, steel tubing honed to a 15 micro inch finish on 1 1/2" through 14" bore sizes. 1" bore size is aluminum with hard-coated bore.

Adjustable floating cushions

Cushions are optional, and can be supplied at head end, cap end, or both ends without change in envelope or mounting dimensions. Cushions are adjustable.

The Series LAA cylinder design incorporates the longest cushion sleeve and cushion spear that can be provided in the standard envelope without decreasing the rod bearing and piston bearing lengths.

on the face opposite the needle valve except on mounting styles MT1, MT2, MT4 and MS3 where it is mounted on side number 3, next to the needle valve. It may be identified by the fact that it is slotted.

- (1) When a cushion is specified at the head end:
 - a. A self-centering sleeve is furnished on the piston rod assembly.
 - b. A needle valve is provided that is flush with the side of the head when wide open. It may be identified by the fact that it is socket-keyed. It is located on side number 2, in all mounting styles except MT1, MT2, MT4 and MS3. In these styles it is located on side number 3.
 - c. A springless check valve is provided that is also flush with the side of the head and is mounted

- d. The check and needle valves are interchangeable in the head.

- (2) When a cushion is specified at the cap end:
 - a. A cushion spear is provided on the piston rod assembly.
 - b. A "float check" self-centering bushing is provided which incorporates a large flow check valve for fast "out-stroke" action.
 - c. A socket-keyed needle valve is provided that is flush with the side of the cap when wide open. It is located on side number 2 in all mounting styles except MT1, MT2, MT4 and MS3. In these styles it is located on side number 3.

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Lin-Act

Piston Rod – Medium carbon steel, induction case-hardened to 54 R_c, hard chrome-plated and polished to 10 RMS finish. Piston rods are made from 90,000 to 100,000 psi minimum yield material in 1/2" through 4" diameters. Larger diameters vary between 57,000 and 90,000 psi minimum material, depending on rod diameter. The piston thread equals the catalog style #4 rod end thread for each rod diameter to assure proper piston-to-rod thread strength. Two wrench flats are provided for rod end attachment.

Ports – NPTF ports are standard.

Steel Cap – Bored and grooved to provide concentricity for mating parts.

Alloy Steel Tie Rod Nuts

Align-A-Groove – (Patent #3043639) – A 3/16" wide surface machined at each end of the cylinder body. Makes precise mounting quick and easy.

One-Piece Fine Grained Cast Iron Piston – The wide piston surface contacting cylinder bore reduces bearing loads, and a long thread engagement with rod provides greater shock absorption. Anaerobic adhesive is used to permanently lock and seal the piston to the rod.

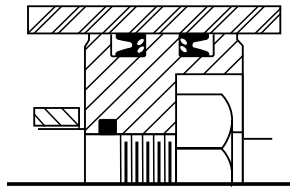
Piston Lipseal – Fully dynamic and self-compensating for variations in pressure, mechanical deflections and wear.

Prelubricated Wearing Surfaces

Lin-Act LAA Series Air Cylinders are factory prelubricated. Lube-A-Cyl applied to seals, piston, cylinder bore, piston rod and gland surfaces provides lubrication for normal operation.

Lube-A-Cyl has been field and laboratory tested, and is recommended by Lin-Act for air cylinders where lubricant should remain in the cylinder and not be expelled into the atmosphere.

Piston with Retainer Nut –



Optional at extra charge.

Note: Threaded rod glands are supplied on cylinders with rod diameters over 2 1/2".

Cushion Length

Cylinder Bore (Inches)	Rod Diameter* (Inches)	Rod Number	Cushion Length (Inches)	
			Head*	Cap
1 1/2	5/8	1	7/8	13/16
	1	2	7/8	13/16
2	5/8	1	7/8	13/16
	1 3/8	2	7/8	13/16
2 1/2	5/8	1	7/8	13/16
	1 3/4	2	7/8	13/16
3 1/4	1	1	1 1/8	1
	2	2	1 3/16	1
4	1	1	1 1/8	1
	2 1/2	2	1 3/16	1
5	1	1	1 1/8	1
	3 1/2	2	1 3/16	1

Cylinder Bore (Inches)	Rod Diameter* (Inches)	Rod Number	Cushion Length (Inches)	
			Head*	Cap
6	1 3/8	1	1 3/8	1 1/4
	4	2	1 1/16	1 1/4
7	1 3/8	1	1 1/16	1 1/4
	2	4	1 1/16	1 1/4
8	1 3/8	1	1 1/16	1 1/4
	5 1/2	2	1 5/16	1 1/4
10	1 3/4	1	1 5/16	1 3/4
	5 1/2	0	1 3/16	1 3/4
12	2	1	1 5/16	1 3/4
	5 1/2	9	1 3/16	1 3/4
14	2 1/2	1	1 3/4	2
	5 1/2	8	1 11/16	2

*Head end cushions for rod diameters not listed have cushion lengths with the limits shown.

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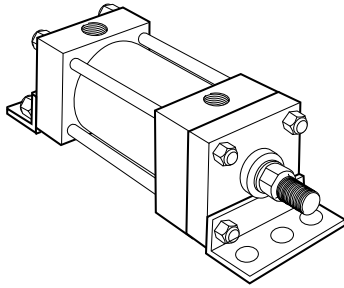
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Lin-Act

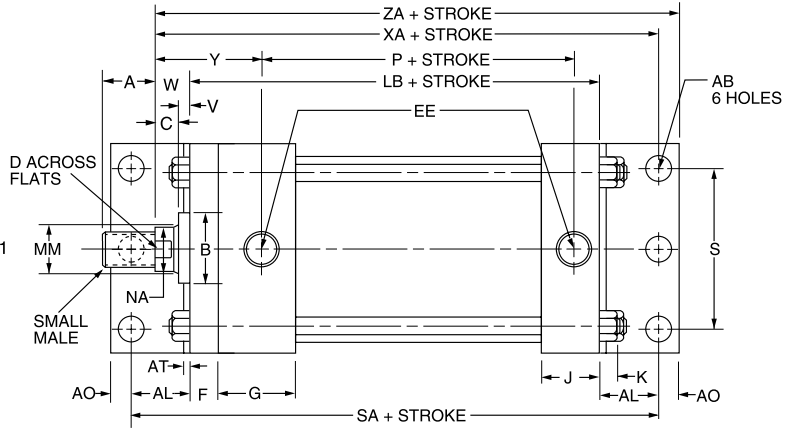
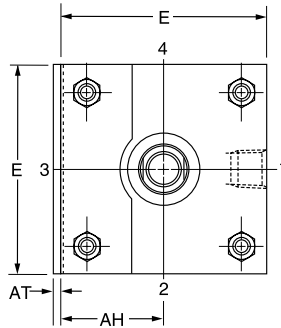
Side End Angle Mountings
1" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side End Angles
Style CB
(NFPA Style MS1)
1" - 6" Bore



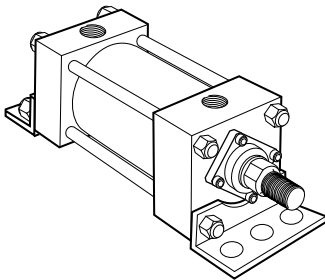
Tie Rod Retained Cartridge



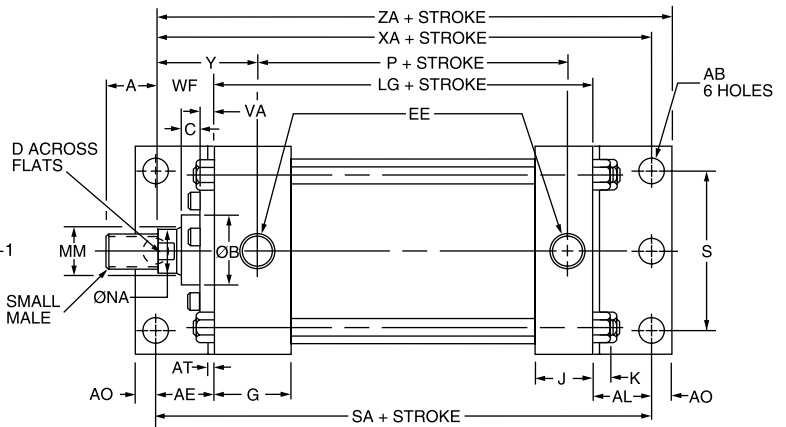
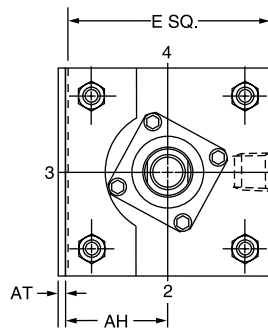
Caution: Check for interference between rod attachment and mounting angle. If necessary, specify longer than standard W or WF dimension.

Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Side End Angles
Style CB
(NFPA Style MS1)
4" - 6" Bore

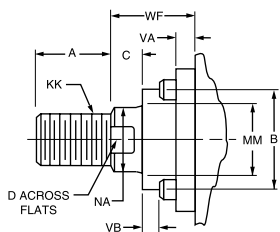


Removable Cartridge

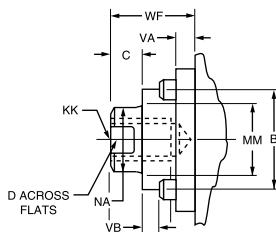


Rod End Dimensions — see table 2

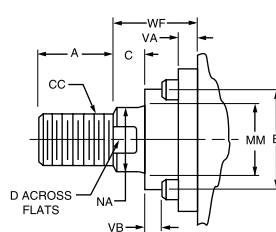
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 3/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod

shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side End Angle Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	AB (Bolt)	AE	AH	AL	AO	AT	E	EE NPTF	F	G	J	K	LB	LG	P	SA	S
1	3/8*	–	1	13/16	5/16	1/8	■	1/4	3/8	11/2	1	3/16	37/8	–	2 1/8	5 1/2	15/16
1 1/2	3/8	–	1 3/16	1	3/8	1/8	2	3/8†	3/8	11/2	1	1/4	4	35/8	2 1/4	6	1 1/4
2	3/8	–	1 7/16	1	3/8	1/8	2 1/2	3/8†	3/8	11/2	1	5/16	4	35/8	2 1/4	6	1 3/4
2 1/2	3/8	–	1 5/8	1	3/8	1/8	3	3/8†	3/8	11/2	1	5/16	4 1/8	3 3/4	2 3/8	6 1/8	2 1/4
3 1/4	1/2	–	1 15/16	1 1/4	1/2	1/8	3 3/4	1/2	5/8	1 3/4	1 1/4	3/8	4 7/8	4 1/4	2 5/8	7 3/8	2 3/4
4	1/2	1 7/8	2 1/4	1 1/4	1/2	1/8	4 1/2	1/2	5/8	1 3/4	1 1/4	3/8	4 7/8	4 1/4	2 5/8	7 3/8	3 1/2
5	5/8	2	2 3/4	1 3/8	5/8	3/16	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	5 1/8	4 1/2	2 7/8	7 7/8	4 1/4
6	3/4	2 1/8	3 1/4	1 3/8	5/8	3/16	6 1/2	3/4	3/4	2	1 1/2	7/16	5 3/4	5	3 1/8	8 1/2	5 1/4

†On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

*Mounting style CB for 1" bore only is furnished with four mounting holes (two each end). Center holes omitted.

■ 1" bore head dimension is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod Dimensions and Envelope Dimensions Affected by Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	NA	V	VA	VB	W	WF	XA	Y	ZA
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	5 5/16	1 15/16	5 5/8
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	–	1 15/16	–
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	1	5 5/8	1 15/16	6
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	6	2 5/16	6 3/8
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	5 5/8	1 15/16	6
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	6 1/4	2 9/16	6 5/8
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	6	2 5/16	6 3/8
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	5 3/4	1 15/16	6 1/8
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	6 5/8	2 13/16	7
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	6 1/8	2 9/16	6 1/2
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	6 3/8	2 9/16	6 3/4
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/4	–	–	3/4	–	6 7/8	2 7/16	7 3/8
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1/2	–	–	1 3/8	–	7 1/2	3 1/16	8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	3/8	–	–	1	–	7 1/8	2 11/16	7 5/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1/2	–	–	1 1/4	–	7 3/8	2 15/16	7 7/8
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	6 7/8	2 7/16	7 3/8
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5/8	–	–	1 5/8	–	7 3/4	3 5/16	8 1/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	1 5/8	7 1/8	2 11/16	7 5/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1/2	–	–	1 1/4	–	7 3/8	2 15/16	7 7/8
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1/2	–	–	1 1/4	1 3/8	–	7 1/2	3 1/16
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	7 1/4	2 7/16	7 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	8 1/8	3 5/16	8 3/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	1 5/8	7 1/2	2 11/16	8 1/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	7 3/4	2 15/16	8 3/8
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	7 7/8	3 1/16	8 1/2
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5/8	–	–	1 5/8	–	8 1/8	3 5/16	8 3/4
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	8 1/8	3 5/16	8 3/4
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	7/16	–	1 5/8	8	2 13/16	8 5/8
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	8 5/8	3 7/16	9 1/4
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	8 1/4	3 1/16	8 7/8
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	8 3/8	3 3/16	9
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	8 5/8	3 7/16	9 1/4
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	–	2 1/4	8 5/8	3 7/16	9 1/4
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	8 5/8	3 7/16	9 1/4

Note: Mounting holes shown are .062 larger than bolt size listed.

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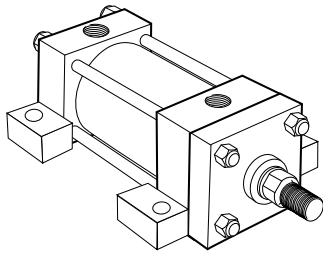
Side Lug Mountings – 1" to 6" Bore Sizes
Centerline Lug Mountings – 1 1/2" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

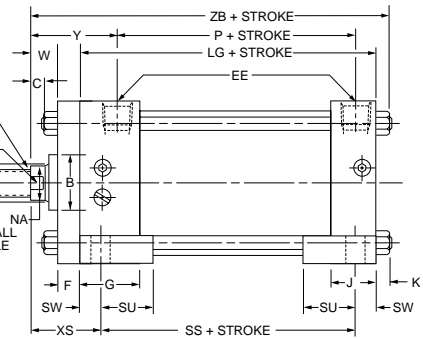
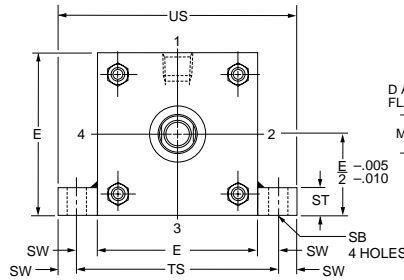
Side Lug

Style C (NFPA Style MS2)

1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
 With Maximum Oversize Rods



**Tie Rod
Retained Cartridge**

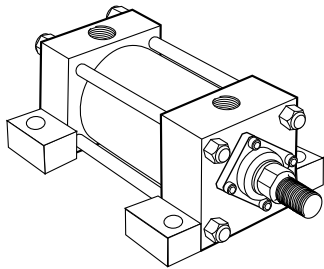


Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

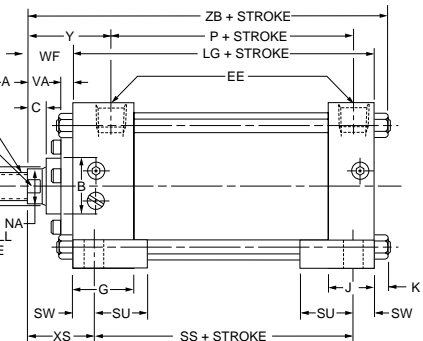
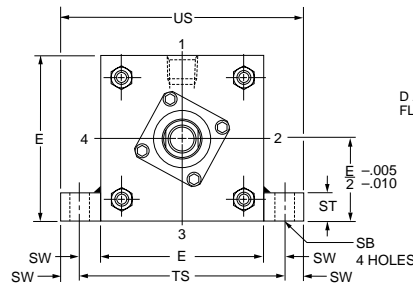
Side Lug

Style C (NFPA Style MS2)

1 1/2" - 6" Bore



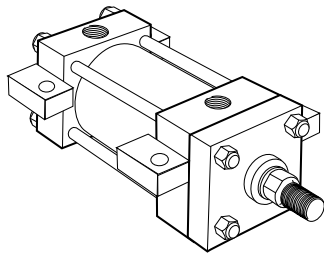
Removable Cartridge



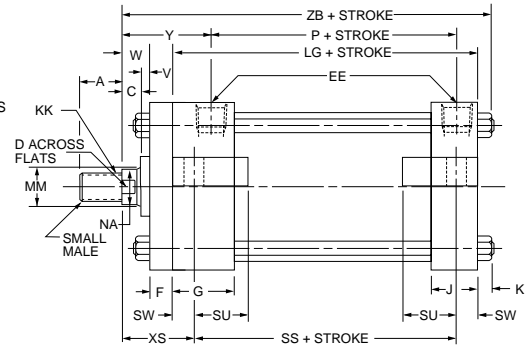
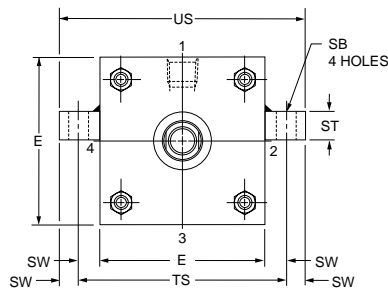
Centerline Lug

Style E (NFPA Style MS3)

1 1/2" - 2" - 2 1/2" - 5" and 6" Bore



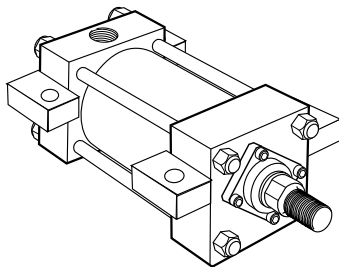
**Tie Rod
Retained Cartridge**



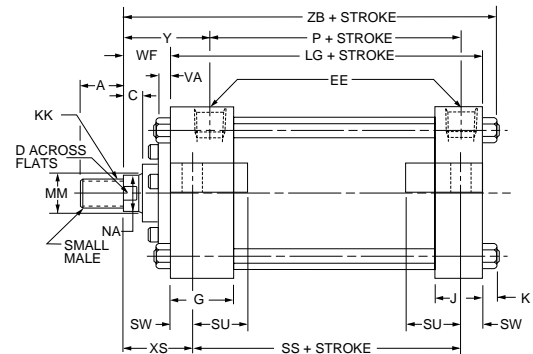
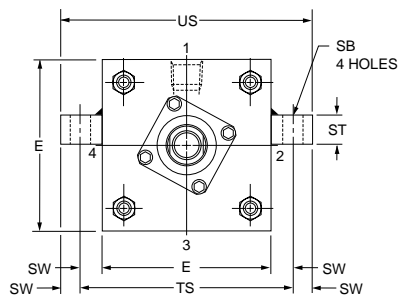
Centerline Lug

Style E (NFPA Style MS3)

1 1/2" - 6" Bore



Removable Cartridge



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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side Lug Mountings – 1" to 6" Bore Sizes
Centerline Lug Mountings – 1 1/2" to 6" Bore Sizes

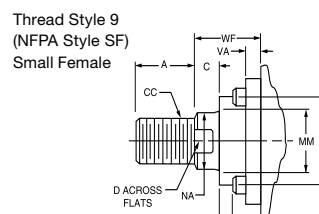
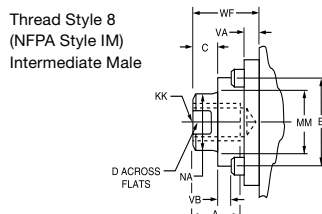
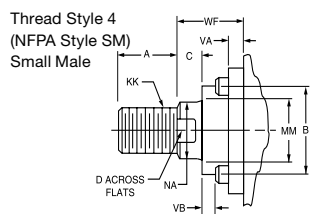
Bore	E	EE NPTF	F	G	J	K	LG	P	SB* (Bolt)	SS	ST	SU	SW	TS	US
1	1 1/2	1/4	3/8	1 1/2	1	3/16	3 1/2	2 1/8	1/4	27/8	5 1/16	3/4	5/16	2 1/8	2 3/4
1 1/2	2	3/8	3/8	1 1/2	1	1/4	3 5/8	2 1/4	3/8	27/8	1/2	15/16	3/8	2 3/4	3 1/2
2	2 1/2	3/8	3/8	1 1/2	1	5/16	3 5/8	2 1/4	3/8	27/8	1/2	15/16	3/8	3 1/4	4
2 1/2	3	3/8	3/8	1 1/2	1	5/16	3 3/4	2 3/8	3/8	3	1/2	15/16	3/8	3 3/4	4 1/2
3 1/4	3 3/4	1/2	—	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1/2	3 1/4	3/4	1 1/4	1/2	4 3/4	5 3/4
4	4 1/2	1/2	—	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1/2	3 1/4	3/4	1 1/4	1/2	5 1/2	6 1/2
5	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	4 1/2	2 7/8	3/4	3 1/8	1	1 9/16	11/16	6 7/8	8 1/4
6	6 1/2	3/4	3/4	2	1 1/2	7/16	5	3 1/8	3/4	3 5/8	1	1 9/16	11/16	7 7/8	8 1/4

*On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.
 ■ 1" bore head is 1 3/4" x 1 1/2". (See page 12.) • Upper surface spot-faced for socket head screws. ‡ MS3 Mounting Style not available in 1" Bore.

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	NA	V	VA	VB	W	WF	XS	Y	ZB	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	—	—	5/8	—	15/16	115/16	4 11/16	
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	—	—	5/8	—	15/16	115/16	4 11/16	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	—	1/4	3/16	—	1	13/8	115/16	4 7/8	
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	—	—	1	—	13/4	25/16	5 1/4	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	—	1/4	3/16	—	1	13/8	115/16	4 15/16	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2	29/16	5 9/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	—	1/4	3/8	—	1 3/8	13/4	25/16	5 9/16	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	—	1/4	3/16	—	1	13/8	115/16	5 1/16	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	—	—	1 1/2	—	2 1/4	2 13/16	5 15/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	—	1/4	3/8	—	1 3/8	13/4	25/16	5 7/16	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2	29/16	5 11/16	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	—	1/4	3/8	—	1 3/8	17/8	27/16	6	
	2	1 3/4	1 1/2-12	1 1/4-12	2 1/4	2.624	7/8	1 1/8	1 15/16	—	1/4	9/16	—	2	2 1/2	3 1/16	6 5/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	—	1/4	1/2	—	1 5/8	2 1/8	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	—	1/4	9/16	—	1 7/8	2 3/8	2 15/16	6 1/2	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	—	1/4	3/8	—	1 3/8	17/8	27/16	6	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	—	1/4	1 1/16	—	2 1/4	2 3/4	3 5/16	6 7/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	—	1/4	1/2	—	1 5/8	2 1/8	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	—	1/4	9/16	—	1 7/8	2 3/8	2 15/16	6 1/2	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 1/16	1 15/16	—	1/4	9/16	—	2	2 1/2	3 1/16	6 5/8	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	—	1/4	3/8	—	1 3/8	2 1/16	27/16	6 5/16	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	—	—	1 5/8	—	2 15/16	3 5/16	7 3/16	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	—	1/4	1/2	—	1 5/8	2 5/16	2 11/16	6 9/16	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	—	1/4	9/16	—	1 7/8	2 9/16	2 15/16	6 13/16	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 1/16	1 15/16	—	1/4	9/16	—	2	2 11/16	3 1/16	6 15/16	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	—	1/4	9/16	—	2 1/4	2 15/16	3 5/16	7 3/16	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	—	—	1 5/8	—	2 15/16	3 5/16	7 3/16	
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	—	1/4	7/16	—	1 5/8	2 5/16	2 13/16	7 1/16	
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	—	—	1 1/2	—	2 15/16	3 7/16	7 11/16	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	—	1/4	9/16	—	1 7/8	2 9/16	3 1/16	7 5/16	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 1/16	1 15/16	—	1/4	9/16	—	2	2 11/16	3 3/16	7 7/16	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	—	1/4	9/16	—	2 1/4	2 15/16	3 7/16	7 11/16	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	—	—	1 1/2	—	2 15/16	3 7/16	7 11/16	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	—	—	1 1/2	—	2 15/16	3 7/16	7 11/16	

Note: Mounting holes shown are .062 larger than bolt size listed.

Rod End Dimensions — see table 2



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod ends are required. If rod end is not specified, style 4 will be supplied.

"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Side Tapped Mountings
1" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

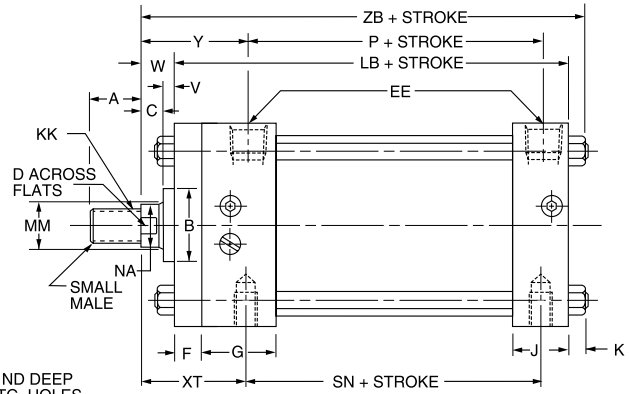
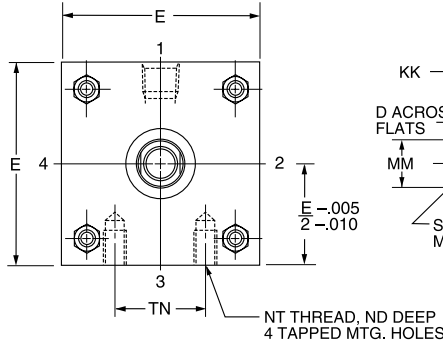
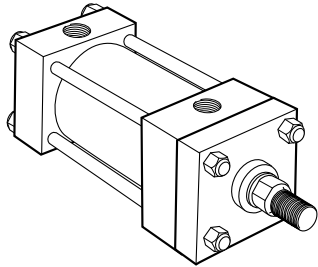
Side Tapped

Style F (NFPA Style MS4)

1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore

With Maximum Oversize Rods

Tie Rod Retained Cartridge



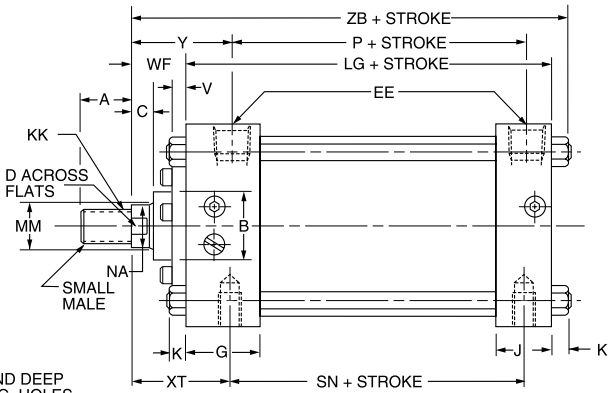
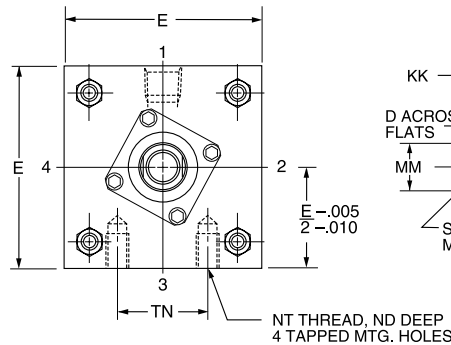
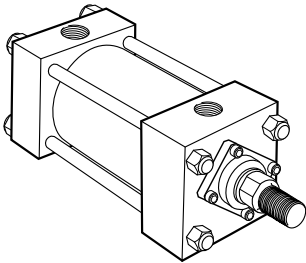
Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Side Tapped

Style F (NFPA Style MS4)

1 1/2" - 6" Bore

Removable Cartridge

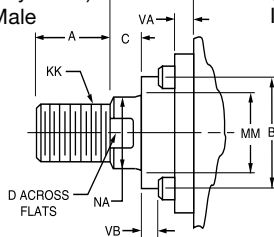


Rod End Dimensions – see table 2

Thread Style 4

(NFPA Style SM)

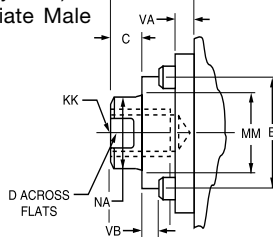
Small Male



Thread Style 8

(NFPA Style IM)

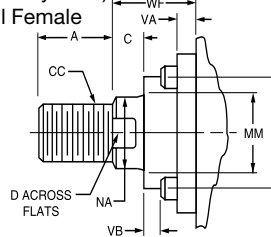
Intermediate Male



Thread Style 9

(NFPA Style SF)

Small Female



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 3/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When

the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side Tapped Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	LB	LG	NT	P	SN	TN
1	■	1/4	3/8	1 1/2	1	3/16	37/8	–	10-24	2 1/8	2 1/8	9/16
1 1/2	2	3/8†	3/8	1 1/2	1	1/4	4	3 5/8	1/4-20	2 1/4	2 1/4	5/8
2	2 1/2	3/8†	3/8	1 1/2	1	5/16	4	3 5/8	5/16-18	2 1/4	2 1/4	7/8
2 1/2	3	3/8†	3/8	1 1/2	1	5/16	4 1/8	3 3/4	3/8-16	2 3/8	2 3/8	1 1/4
3 1/4	3 3/4	1/2	–	1 3/4	1 1/4	3/8	–	4 1/4	1/2-13	2 5/8	2 5/8	1 1/2
4	4 1/2	1/2	–	1 3/4	1 1/4	3/8	–	4 1/4	1/2-13	2 5/8	2 5/8	2 1/16
5	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	5 1/8	4 1/2	5/8-11	2 7/8	2 7/8	2 11/16
6	6 1/2	3/4	3/4	2	1 1/2	7/16	–	5	3/4-10	3 1/8	3 1/8	3 1/4

†On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod Dimensions and Envelope Dimensions Affected by Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size														
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	NA	V	VA	VB	W	WF	XT	Y	ZB	ND	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	1 15/16	1 15/16	4 11/16	1/4	
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	1 15/16	1 15/16	4 11/16	1/4	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 15/16	1 15/16	4 7/8	3/8	
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	2 5/16	2 5/16	5 1/4	3/8	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 15/16	1 13/16	4 15/16	1 1/32	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	2 9/16	2 9/16	5 9/16	1 1/32	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 5/16	2 5/16	5 5/16	1 1/32	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 15/16	1 15/16	5 1/16	7/16	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	2 13/16	2 13/16	5 15/16	7/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 5/16	2 5/16	5 7/16	7/16	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	2 9/16	2 9/16	5 11/16	7/16	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 7/16	2 7/16	6	1/2	
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	3 1/16	3 1/16	6 5/8	1/2	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 11/16	2 11/16	6 1/4	1/2	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 15/16	2 15/16	6 1/2	1/2	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 7/16	2 7/16	6	5/8	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 5/16	3 5/16	6 7/8	5/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 11/16	2 11/16	6 1/4	5/8	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 15/16	2 15/16	6 1/2	5/8	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	3 1/16	3 1/16	6 5/8	5/8	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 7/16	2 7/16	6 5/16	3/4	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	3 5/16	3 5/16	7 3/16	3/4	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 11/16	2 11/16	6 9/16	3/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 15/16	2 15/16	6 13/16	3/4	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	3 1/16	3 1/16	6 15/16	3/4	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 5/16	3 5/16	7 3/16	3/4	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	3 5/16	3 5/16	7 3/16	3/4	
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	7/16	–	1 5/8	2 13/16	2 13/16	7 1/16	7/8	
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	3 7/16	3 7/16	7 11/16	7/8	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	3 1/16	3 1/16	7 5/16	7/8	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	3 3/16	3 3/16	7 7/16	7/8	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 7/16	3 7/16	7 11/16	7/8	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	3 7/16	3 7/16	7 11/16	7/8	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	3 7/16	3 7/16	7 11/16	7/8	

Note: Customer mounting holes should be .062 than nominal.

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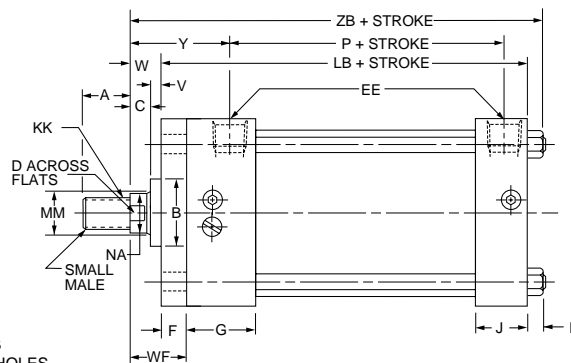
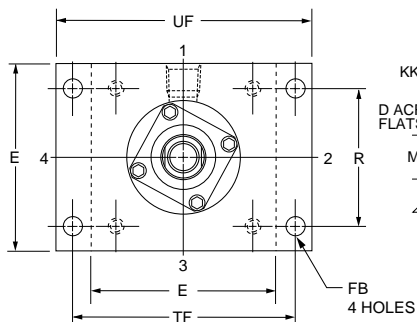
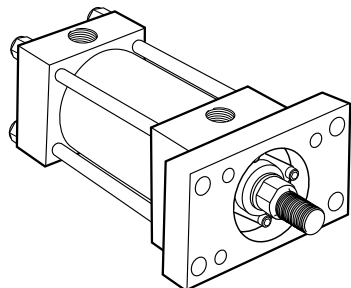
Lin-Act

**Head Rectangular Flange Mountings
1" to 6" Bore Sizes**

**Lin-Act Series LAA
Heavy-Duty Air Cylinders**

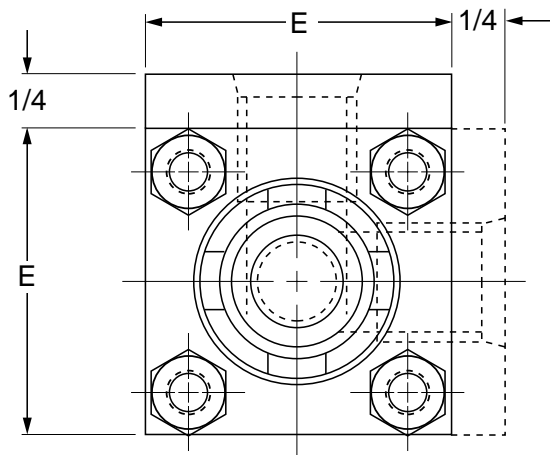
**Head Rectangular Flange
Style J (NFFA Style MF1)
1" - 6" Bore**

**Removable
Cartridge**



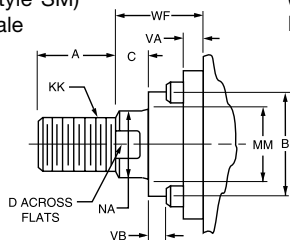
1" Bore Cylinder Only

**1" Bore Cylinder Only
Head End**

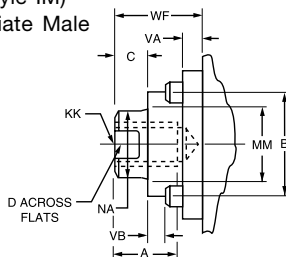


Rod End Dimensions – see table 2

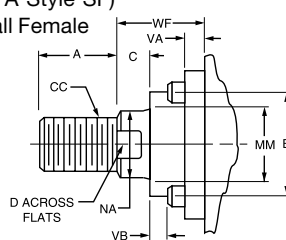
**Thread Style 4
(NFFA Style SM)
Small Male**



**Thread Style 8
(NFFA Style IM)
Intermediate Male**



**Thread Style 9
(NFFA Style SF)
Small Female**



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

**"Special" Thread
Style 3**

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Head Rectangular Flange Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	FB (Bolt) #10	G	J	K	LB	P	R	TF	UF
1	■	1/4	3/8	#10	1 1/2	1	3/16	37/8	2 1/8	1.08	2	2 1/2
1 1/2	2	3/8†	3/8	1/4	1 1/2	1	1/4	4	2 1/4	1.43	2 3/4	3 3/8
2	2 1/2	3/8†	3/8	5/16	1 1/2	1	5/16	4	2 1/4	1.84	3 3/8	4 1/8
2 1/2	3	3/8†	3/8	5/16	1 1/2	1	5/16	4 1/8	2 3/8	2.19	3 7/8	4 5/8
3 1/4	3 3/4	1/2	5/8	3/8	1 3/4	1 1/4	3/8	4 7/8	2 5/8	2.76	4 11/16	5 1/2
4	4 1/2	1/2	5/8	3/8	1 3/4	1 1/4	3/8	4 7/8	2 5/8	3.32	5 7/16	6 1/4
5	5 1/2	1/2	5/8	1/2	1 3/4	1 1/4	7/16	5 1/8	2 7/8	4.10	6 5/8	7 5/8
6	6 1/2	3/4	3/4	1/2	2	1 1/2	7/16	5 3/4	3 1/8	4.88	7 5/8	8 5/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod Dimensions and Envelope Dimensions Affected by Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size								
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	NA	V	W	Y	ZB
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	5/8	1 15/16	4 5/8
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	5/8	1 15/16	4 5/8
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	1/4	1 15/16	4 7/8
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	1	2 5/16	5 1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	5/8	1 15/16	4 15/16
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	1 1/4	2 9/16	5 9/16
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/2	1	2 5/16	5 5/16
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	5/8	1 15/16	5 1/16
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	1 1/2	2 13/16	5 15/16
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/2	1	2 5/16	5 7/16
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	1 1/4	2 9/16	5 11/16
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4	3/4	2 7/16	6
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1/2	1 3/8	3 1/16	6 5/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3/8	1	2 11/16	6 1/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1/2	1 1/4	2 15/16	6 1/2
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4	3/4	2 7/16	6
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5/8	1 5/8	3 5/16	6 7/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3/8	1	2 11/16	6 1/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1/2	1 1/4	2 15/16	6 1/2
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1/2	1 3/8	3 1/16	6 5/8
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4	3/4	2 7/16	6 5/16
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	1 5/8	3 5/16	7 3/16
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3/8	1	2 11/16	6 9/16
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1/2	1 1/4	2 15/16	6 13/16
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1/2	1 3/8	3 1/16	6 15/16
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5/8	1 5/8	3 5/16	7 3/16
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	1 5/8	3 5/16	7 3/16
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	1/4	7/8	2 13/16	7 1/16
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	1 1/2	3 7/16	7 11/16
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/8	1 1/8	3 1/16	7 5/16
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	3/8	1 1/4	3 3/16	7 7/16
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1/2	1 1/2	3 7/16	7 11/16
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	1 1/2	3 7/16	7 11/16
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	1 1/2	3 7/16	7 11/16

Note: Mounting holes shown are .062 larger than bolt size listed.

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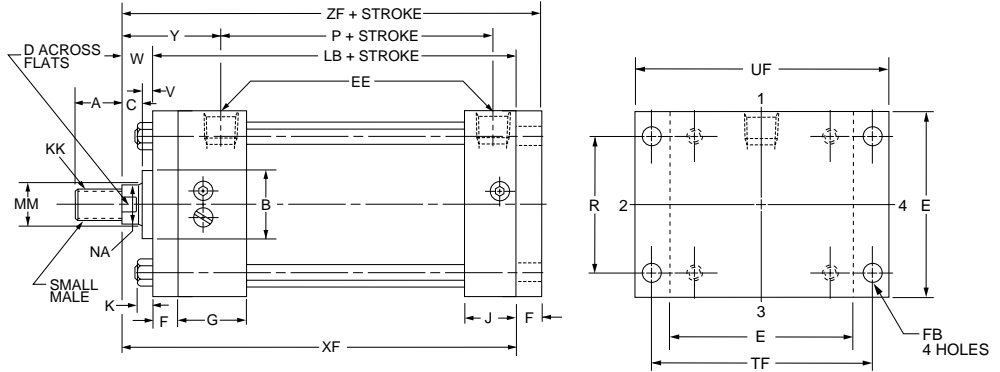
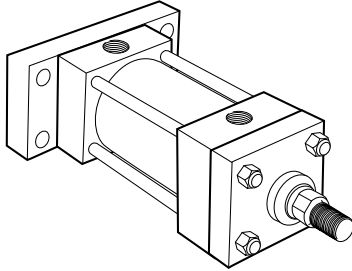
Lin-Act

Cap Rectangular Flange Mountings
1" to 6" Bore Sizes

Lin-Act Series LAA
Heavy Duty Air Cylinders

Cap Rectangular Flange
Style H (NFFPA Style MF2)
1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
With Maximum Oversize Rods

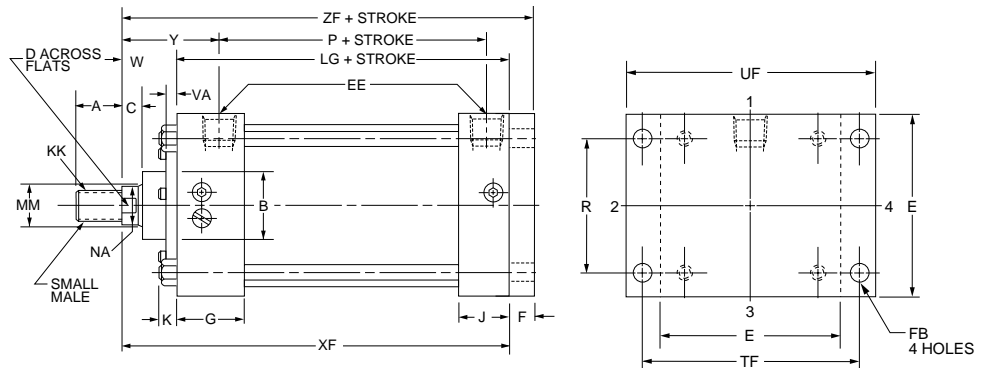
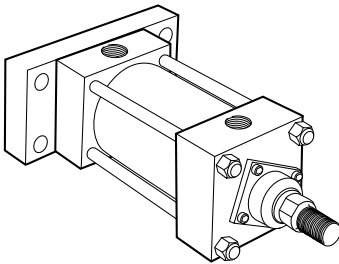
Tie Rod Retained Cartridge



Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

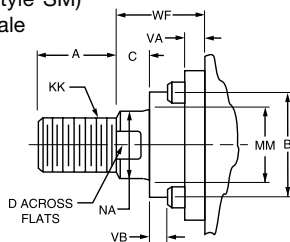
Cap Rectangular Flange
Style H (NFFPA Style MF2)
1 1/2" - 6" Bore

Removable Cartridge

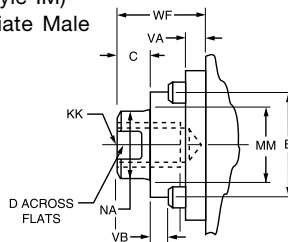


Rod End Dimensions – see table 2

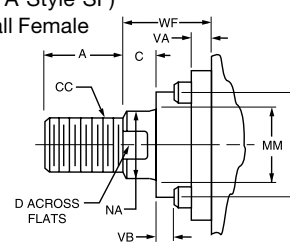
Thread Style 4
(NFFPA Style SM)
Small Male



Thread Style 8
(NFFPA Style IM)
Intermediate Male



Thread Style 9
(NFFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy Duty Air Cylinders

Cap Rectangular Flange Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	FB (Bolt #10)	G	J	K	LB	LG	P	R	TF	UF
1	■	1/4	3/8	#10	1 1/2	1	3/16	37/8	–	2 1/8	1.08	2	2 1/2
1 1/2	2	3/8†	3/8	1/4	1 1/2	1	1/4	4	3 5/8	2 1/4	1.43	2 3/4	3 3/8
2	2 1/2	3/8†	3/8	5/16	1 1/2	1	5/16	4	3 5/8	2 1/4	1.84	3 3/8	4 1/8
2 1/2	3	3/8†	3/8	5/16	1 1/2	1	5/16	4 1/8	3 3/4	2 3/8	2.19	3 7/8	4 5/8
3 1/4	3 3/4	1/2	5/8	3/8	1 3/4	1 1/4	3/8	–	4 1/4	2 5/8	2.76	4 11/16	5 1/2
4	4 1/2	1/2	5/8	3/8	1 3/4	1 1/4	3/8	–	4 1/4	2 5/8	3.32	5 7/16	6 1/4
5	5 1/2	1/2	5/8	1/2	1 3/4	1 1/4	7/16	–	4 1/2	2 7/8	4.10	6 5/8	7 5/8
6	6 1/2	3/4	3/4	1/2	2	1 1/2	7/16	–	5	3 1/8	4.88	7 5/8	8 5/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod Dimensions and Envelope Dimensions Affected by Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	NA	V	VA	VB	W	WF	Y	ZF	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	11 5/16	47/8	
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	11 5/16	47/8	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	11 5/16	5	
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	25/16	5 3/8	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	11 5/16	5	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	29/16	5 5/8	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	25/16	5 3/8	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	11 5/16	5 1/8	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	21 3/16	6	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	25/16	5 1/2	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	29/16	5 3/4	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	27/16	6 1/4	
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	31/16	6 7/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	1 5/8	21 11/16	6 1/2	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	21 5/16	6 3/4	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	27/16	6 1/4	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	35/16	7 1/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	1 5/8	21 11/16	6 1/2	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	21 5/16	6 3/4	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	31/16	6 7/8	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	27/16	6 1/2	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	35/16	7 3/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	1 5/8	21 11/16	6 3/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	21 5/16	7	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	31/16	7 1/8	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	35/16	7 3/8	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	35/16	7 3/8	
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	15/16	–	1/4	7/16	–	1 5/8	21 3/16	7 3/8	
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	37/16	8	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	31/16	7 5/8	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	33/16	7 3/4	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	37/16	8	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	37/16	8	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	37/16	8	

Note: Mounting holes shown are .062 larger than bolt size listed.

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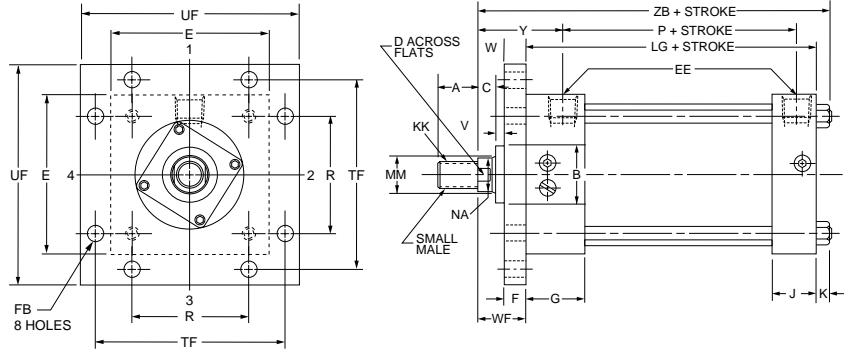
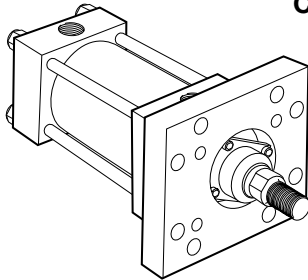
Lin-Act

Head Square Flange and Cap Square Flange Mountings 1" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

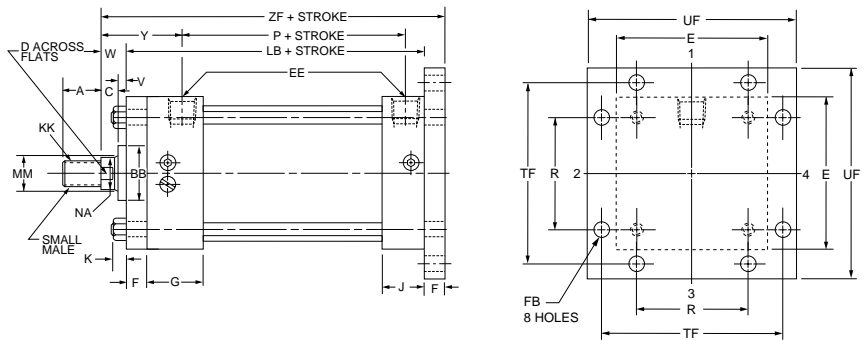
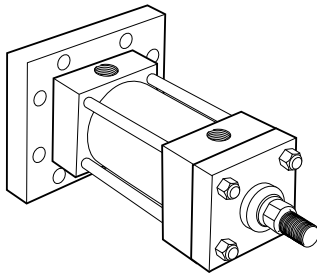
Head Square Flange Style JB (NFFPA Style MF5) 1" - 6" Bore

**Removable
Cartridge**



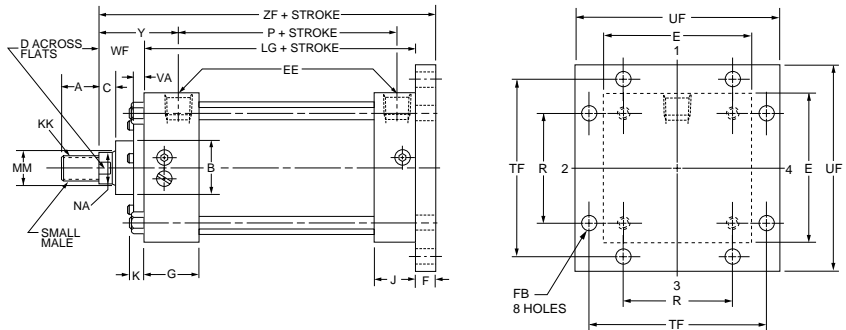
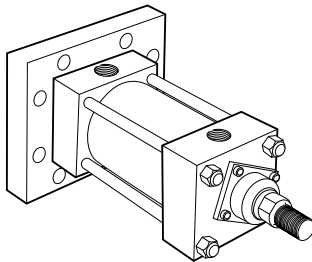
Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Cap Square Flange Style HB (NFFPA Style MF6) 1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore With Maximum Oversize Rods



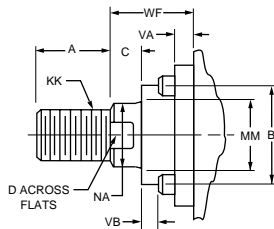
Cap Square Flange Style HB (NFFPA Style MF6) 1 1/2" - 6" Bore

Removable Cartridge

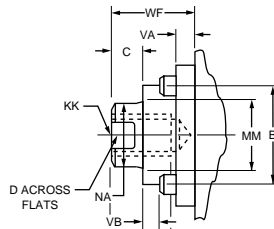


Rod End Dimensions — see table 2

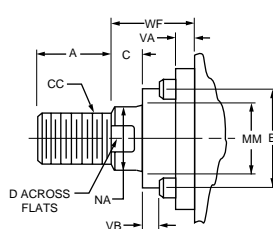
Thread Style 4 (NFFPA Style SM) Small Male



Thread Style 8 (NFFPA Style IM) Intermediate Male



Thread Style 9 (NFFPA Style SF) Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Head Square Flange and Cap Square Flange Mountings 1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	FB (Bolt #10)	G	J	K	LB	LG	P	R	TF	UF
1	■	1/4	3/8	#10	1 1/2	1	3/16	37/8	—	2 1/8	1.08	2	2 1/2
1 1/2	2	3/8†	3/8	1/4	1 1/2	1	1/4	4	3 5/8	2 1/4	1.43	2 3/4	3 3/8
2	2 1/2	3/8†	3/8	5/16	1 1/2	1	5/16	4	3 5/8	2 1/4	1.84	3 3/8	4 1/8
2 1/2	3	3/8†	3/8	5/16	1 1/2	1	5/16	4 1/8	3 3/4	2 3/8	2.19	3 7/8	4 5/8
3 1/4	3 3/4	1/2	5/8	3/8	1 3/4	1 1/4	3/8	4 7/8	4 1/4	2 5/8	2.76	4 11/16	5 1/2
4	4 1/2	1/2	5/8	3/8	1 3/4	1 1/4	3/8	4 7/8	4 1/4	2 5/8	3.32	5 7/16	6 1/4
5	5 1/2	1/2	5/8	1/2	1 3/4	1 1/4	7/16	5 1/8	4 1/2	2 7/8	4.10	6 5/8	7 5/8
6	6 1/2	3/4	3/4	1/2	2	1 1/2	7/16	5 3/4	5	3 1/8	4.88	7 5/8	8 5/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	NA	V	VA	VB	W	WF	Y	ZB	ZF
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	—	—	5/8	—	1 15/16	4 5/8	4 7/8
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	—	—	5/8	—	1 15/16	4 5/8	4 7/8
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4*	1/4	3/16	1/4	1	1 15/16	4 7/8	5
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	—	—	1	—	2 5/16	5 1/4	5 3/8
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4*	1/4	3/16	5/8	1	1 15/16	4 15/16	5
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2 9/16	5 9/16	5 5/8
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1 1/2*	1/4	3/8	1	1 3/8	2 5/16	5 5/16	5 3/8
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4*	1/4	3/16	5/8	1	1 15/16	5 1/16	5 1/8
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	—	—	1 1/2	—	2 13/16	5 15/16	6
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1 1/2*	1/4	3/8	1	1 3/8	2 5/16	5 7/16	5 1/2
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2 9/16	5 11/16	5 3/4
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4*	1/4	3/8	3/4	1 3/8	2 7/16	6	6 1/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1 1/2*	1/4	9/16	1 3/8	2	3 1/16	6 5/8	6 7/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3 3/8*	1/4	1/2	1	1 5/8	2 11/16	6 1/4	6 1/2
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1 1/2*	1/4	9/16	1 3/4	1 7/8	2 15/16	6 1/2	6 3/4
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4*	1/4	3/8	3/4	1 3/8	2 7/16	6	6 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5 5/8*	1/4	1 1/16	1 5/8	2 1/4	3 5/16	6 7/8	7 1/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3 3/8*	1/4	1/2	1	1 5/8	2 11/16	6 1/4	6 1/2
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1 1/2*	1/4	9/16	1 1/4	1 7/8	2 15/16	6 1/2	6 3/4
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1 1/2*	1/4	9/16	1 3/8	2	3 1/16	6 5/8	6 7/8
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	1/4*	1/4	3/8	3/4	1 3/8	2 7/16	6 5/16	6 1/2
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5 5/8	—	—	1 5/8	—	3 5/16	7 3/16	7 3/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	3 3/8*	1/4	1/2	1	1 5/8	2 11/16	6 9/16	6 3/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	1 1/2*	1/4	9/16	1 1/4	1 7/8	2 15/16	6 13/16	7
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1 1/2*	1/4	9/16	1 3/8	2	3 1/16	6 15/16	7 1/8
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	5 5/8*	1/4	1 1/16	1 5/8	2 1/4	3 5/16	7 3/16	7 3/8
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5 5/8	—	—	1 5/8	—	3 5/16	7 3/16	7 3/8
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	1/4	1/4	7/16	7/8	1 5/8	2 13/16	7 1/16	7 3/8
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	3 3/8	—	—	1 1/2	—	3 7/16	7 11/16	8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3 3/8*	1/4	9/16	1 1/8	1 7/8	3 1/16	7 5/16	7 5/8
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	1 1/2*	1/4	9/16	1 1/4	2	3 3/16	7 7/16	7 3/4
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1 1/2*	1/4	1 1/16	1 1/2	2 1/4	3 7/16	7 11/16	8
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	—	—	1 1/2	—	3 7/16	7 11/16	8
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	—	—	1 1/2	—	3 7/16	7 11/16	8

Note: Mounting holes shown are .062 larger than bolt size listed.

* For all MF5 mounts and MF6 mounts with maximum oversized rods.

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Tie Rod Extended Mountings 1" to 6" Bore Sizes

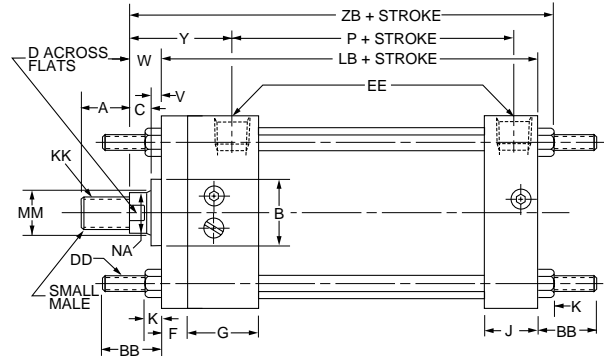
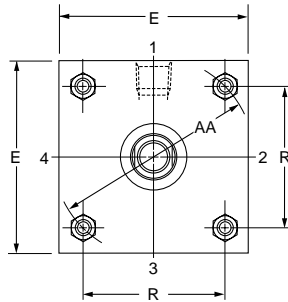
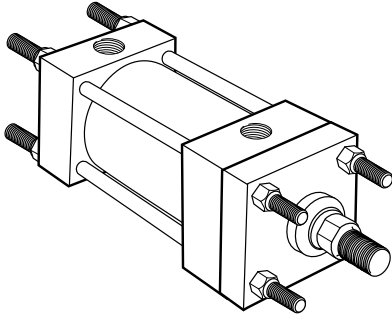
Lin-Act Series LAA Heavy-Duty Air Cylinders

Tie Rods Extended

Style TD (NFPA Style MX1)

1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
With Maximum Oversize Rods

Tie Rod Retained Cartridge



Tie Rods can be extended: Both Ends — Model MX1; Cap End — Model MX2; Head End — Model MX3.

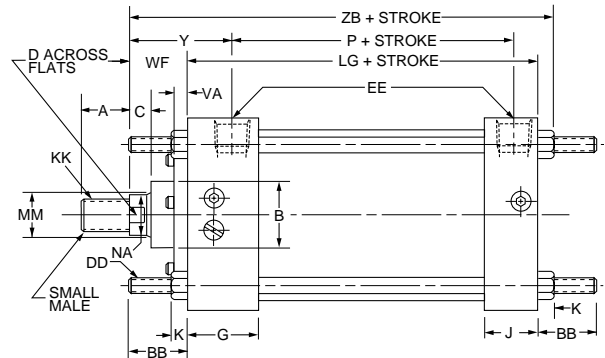
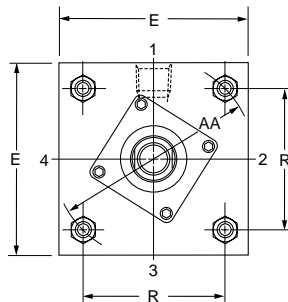
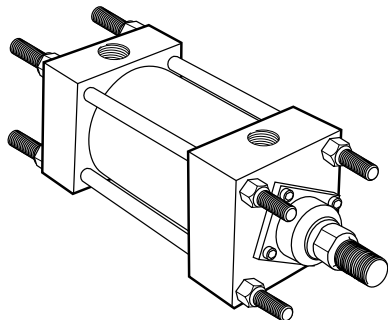
Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Tie Rods Extended

Style TD (NFPA Style MX1)

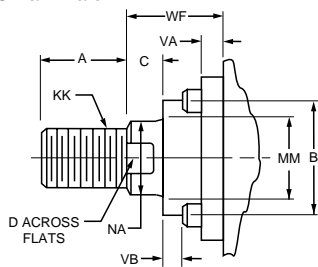
1 1/2" - 6" Bore

Removable Cartridge

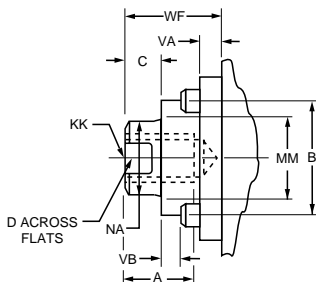


Rod End Dimensions — see table 2

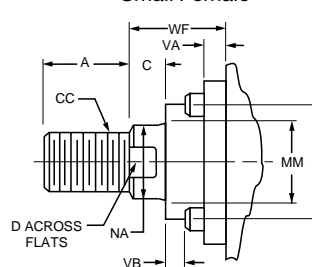
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Tie Rod Extended Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	AA	BB	DD	E	EE NPTF	F	G	J	K	LG	P	R
1	1.53	3/4	10-24	■	1/4	3/8	1 1/2	1	3/16	3 1/2	2 1/8	1.08
1 1/2	2.02	1	1/4-28	2	3/8†	3/8	1 1/2	1	1/4	3 5/8	2 1/4	1.43
2	2.6	1 1/8	5/16-24	2 1/2	3/8†	3/8	1 1/2	1	5/16	3 5/8	2 1/4	1.84
2 1/2	3.1	1 1/8	5/16-24	3	3/8†	3/8	1 1/2	1	5/16	3 3/4	2 3/8	2.19
3 1/4	3.9	1 3/8	3/8-24	3 3/4	1/2	-	1 3/4	1 1/4	3/8	4 1/4	2 5/8	2.76
4	4.7	1 3/8	3/8-24	4 1/2	1/2	-	1 3/4	1 1/4	3/8	4 1/4	2 5/8	3.32
5	5.8	1 13/16	1/2-20	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	4 1/2	2 7/8	4.10
6	6.9	1 13/16	1/2-20	6 1/2	3/4	3/4	2	1 1/2	7/16	5	3 1/8	4.88

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversized rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	BF	C	D	NA	V	VA	VB	W	WF	Y	ZB	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	-	3/8	3/8	7/16	1/4	-	-	5/8	-	1 15/16	4 11/16	
	2	5/8	1/2-20	7/16-20	3/4	1.124	-	3/8	1/2	9/16	1/4	-	-	5/8	-	1 15/16	4 11/16	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	1.968	3/8	1/2	9/16	-	1/4	3/16	-	1	1 15/16	4 7/8	
	2	1	7/8-14	3/4-16	1 1/8	1.499	-	1/2	7/8	15/16	1/2	-	-	1	-	2 5/16	5 1/4	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	1.968	3/8	1/2	9/16	-	1/4	3/16	-	1	1 15/16	4 15/16	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	-	5/8	1 1/8	1 5/16	5/8	-	-	1 1/4	-	2 9/16	5 9/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	-	1/4	3/8	-	1 3/8	2 5/16	5 5/16	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	2.468	3/8	1/2	9/16	-	1/4	3/16	-	1	1 15/16	5 1/16	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	-	3/4	1 1/2	1 11/16	3/4	-	-	1 1/2	-	2 13/16	5 15/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	-	1/4	3/8	-	1 3/8	2 5/16	5 7/16	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	5/8	-	-	1 1/4	-	2 9/16	5 11/16	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.968	1/2	7/8	1 5/16	-	1/4	3/8	-	1 3/8	2 7/16	6	
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	-	1/4	9/16	-	2	3 1/16	6 5/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	-	1/4	1/2	-	1 5/8	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.735	3/4	1 1/2	1 11/16	-	1/4	9/16	-	1 7/8	2 15/16	6 1/2	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.968	1/2	7/8	1 5/16	-	1/4	3/8	-	1 3/8	2 5/16	6	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	4.312	1	2 1/16	2 3/8	-	1/4	1 1/16	-	2 1/4	3 7/16	6 7/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	-	1/4	1/2	-	1 5/8	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.735	3/4	1 1/2	1 11/16	-	1/4	9/16	-	1 7/8	2 15/16	6 1/2	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	-	1/4	9/16	-	2	3 1/16	6 5/8	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.968	1/2	7/8	1 5/16	-	1/4	3/8	-	1 3/8	2 7/16	6 5/16	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	5.562	1	3	3 3/8	5/8	-	-	1 5/8	-	3 5/16	7 3/16	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	-	1/4	1/2	-	1 5/8	2 11/16	6 9/16	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.735	3/4	1 1/2	1 11/16	-	1/4	9/16	-	1 7/8	2 15/16	6 13/16	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	-	1/4	9/16	-	2	3 1/16	6 15/16	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	5.000	1	2 1/16	2 3/8	-	1/4	1 1/16	-	2 1/4	3 5/16	7 3/16	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	5.000	1	2 5/8	2 7/8	5/8	-	-	1 5/8	-	3 5/16	7 3/16	
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	3.625	5/8	1 1/8	1 5/16	-	1/4	7/16	-	1 5/8	2 13/16	7 1/16	
	2	4	3 3/4-12	3-12	4	4.749	6.062	1	3 3/8	3 7/8	1/2	-	-	1 1/2	-	3 7/16	7 11/16	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.625	3/4	1 1/2	1 11/16	-	1/4	9/16	-	1 7/8	3 1/16	7 5/16	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	4.312	7/8	1 11/16	1 15/16	-	1/4	9/16	-	2	3 3/16	7 7/16	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	4.312	1	2 1/16	2 3/8	-	1/4	1 1/16	-	2 1/4	3 7/16	7 11/16	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	5.562	1	2 5/8	2 7/8	1/2	-	-	1 1/2	-	3 7/16	7 11/16	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	5.562	1	3	3 3/8	1/2	-	-	1 1/2	-	3 7/16	7 11/16	

Note: Mounting holes shown are .062 larger than bolt size listed.

* For all MF5 mounts and MF6 mounts with maximum oversized rods.

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Lin-Act

**Head Trunnion Mountings
1" to 6" Bore Sizes**

**Lin-Act Series LAA
Heavy-Duty Air Cylinders**

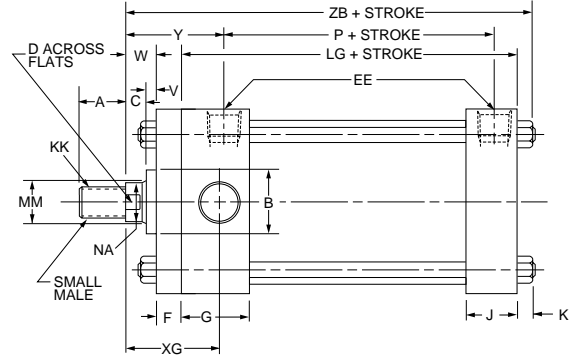
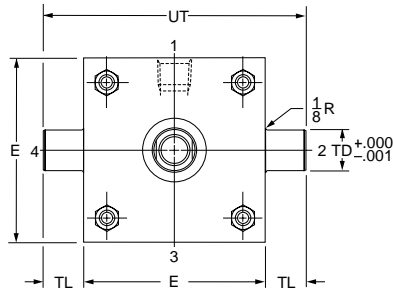
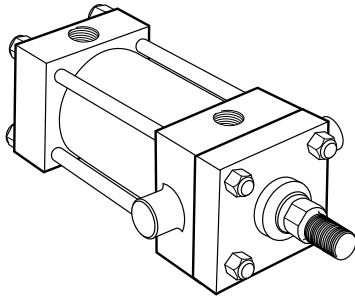
Head Trunnion

Style D (NFPA Style MT1)

1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore

With Maximum Oversize Rods

Tie Rod Retained Cartridge



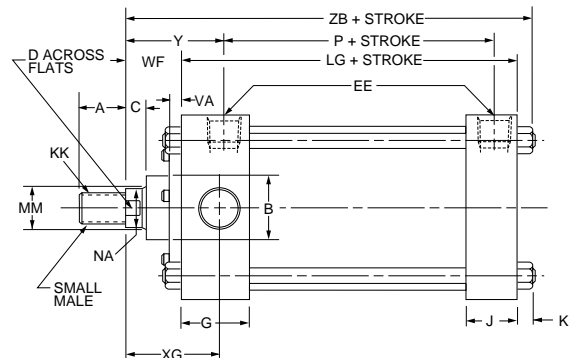
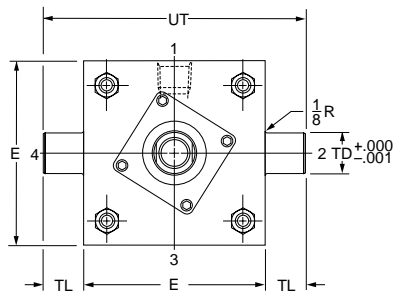
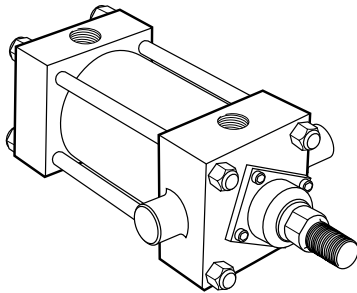
Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Head Trunnion

Style D (NFPA Style MT1)

1 1/2" - 6" Bore

Removable Cartridge

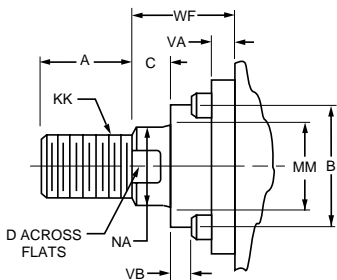


Rod End Dimensions – see table 2

Thread Style 4

(NFPA Style SM)

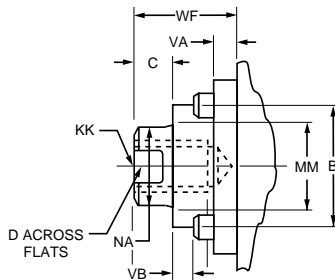
Small Male



Thread Style 8

(NFPA Style IM)

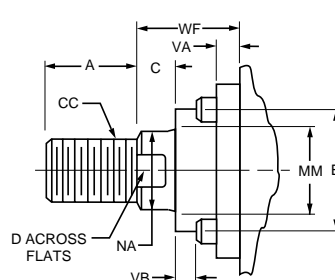
Intermediate Male



Thread Style 9

(NFPA Style SF)

Small Female



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Head Trunnion Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	LG	P	+0.000 TD -0.001	TL	UT
1	■	1/4	3/8	1 1/2	1	3/16	3 1/2	2 1/8	.750	3/4	3
1 1/2	2	3/8†	3/8	1 1/2	1	1/4	3 5/8	2 1/4	1.000	1	4
2	2 1/2	3/8†	3/8	1 1/2	1	5/16	3 5/8	2 1/4	1.000	1	4 1/2
2 1/2	3	3/8†	3/8	1 1/2	1	5/16	3 3/4	2 3/8	1.000	1	5
3 1/4	3 3/4	1/2	–	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	5 3/4
4	4 1/2	1/2	–	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	6 1/2
5	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	4 1/2	2 7/8	1.000	1	7 1/2
6	6 1/2	3/4	3/4	2	1 1/2	7/16	5	3 1/8	1.375	1 3/8	9 1/4

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	NA	V	VA	VB	W	WF	XG	Y	ZB
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	1 3/4	1 15/16	4 11/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	1 3/4	1 15/16	4 11/16
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 3/4	1 15/16	4 7/8
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	2 1/8	2 5/16	5 1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 3/4	1 15/16	4 5/16
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	2 3/8	2 9/16	5 9/16
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 1/8	2 5/16	5 5/16
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	1 3/4	1 15/16	5 1/16
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	2 5/8	2 13/16	5 15/16
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 1/8	2 5/16	5 7/16
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	2 3/8	2 9/16	5 11/16
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 1/4	2 7/16	6
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	2 7/8	3 1/16	6 5/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 1/2	2 11/16	6 1/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 3/4	2 15/16	6 1/2
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 1/4	2 7/16	6
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 1/8	3 5/16	6 7/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 1/2	2 11/16	6 1/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 3/4	2 15/16	6 1/2
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	2 7/8	3 1/16	6 5/8
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	2 1/4	2 7/16	6 5/16
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	3 1/8	3 5/16	7 3/16
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	2 1/2	2 11/16	6 9/16
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 3/4	2 15/16	6 13/16
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	2 7/8	3 1/16	6 15/16
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 1/8	3 5/16	7 3/16
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	3 1/8	3 5/16	7 3/16
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	7/16	–	1 5/8	2 5/8	2 13/16	7 1/16
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	3 1/4	3 7/16	7 11/16
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	2 7/8	3 1/16	7 5/16
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	3	3 3/16	7 7/16
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	3 1/4	3 7/16	7 11/16
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	3 1/4	3 7/16	7 11/16
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	3 1/4	3 7/16	7 11/16

Note: Mounting holes shown are .062 larger than bolt size listed.

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Lin-Act

Cap Trunnion Mountings
1" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

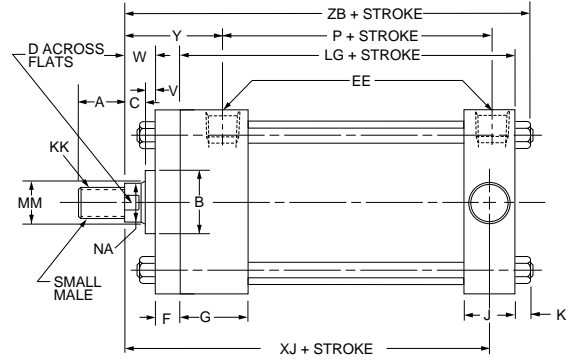
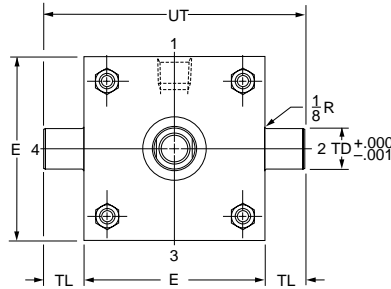
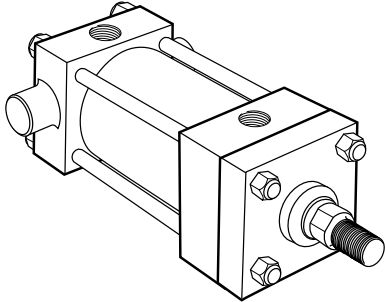
Cap Trunnion

Style DB (NFPA Style MT2)

1" - 1 1/2" - 2" 2 1/2" - 5" and 6" Bore

With Maximum Oversize Rods

Tie Rod Retained Cartridge



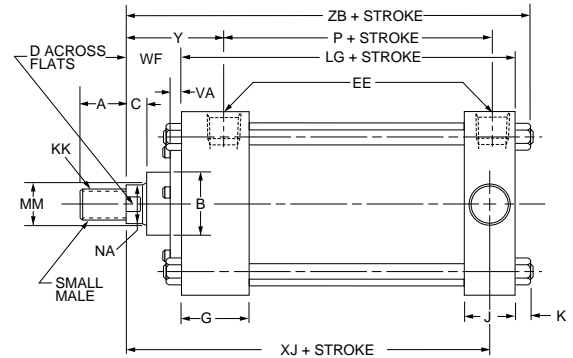
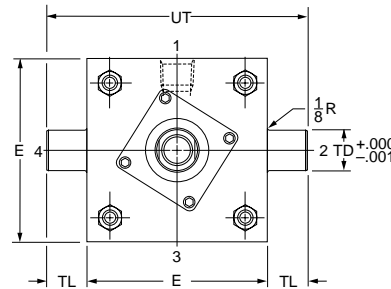
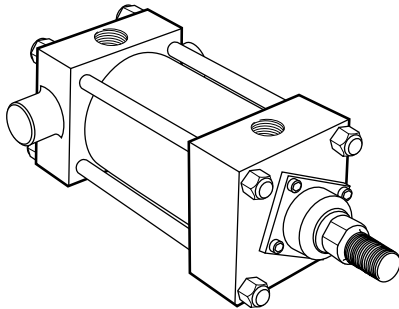
Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Cap Trunnion

Style DB (NFPA Style MT2)

1 1/2" - 6" Bore

Removable Cartridge

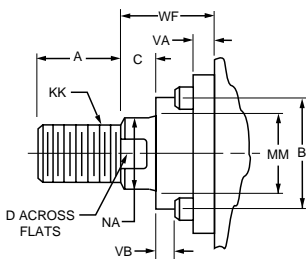


Rod End Dimensions — see table 2

Thread Style 4

(NFPA Style SM)

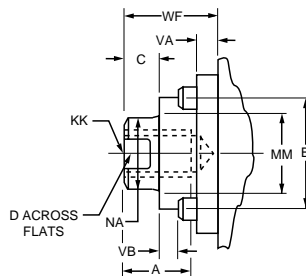
Small Male



Thread Style 8

(NFPA Style IM)

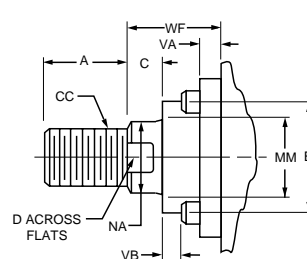
Intermediate Male



Thread Style 9

(NFPA Style SF)

Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/4" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Trunnion Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	LG	P	+ .000 TD - .001	TL	UT
1	■	1/4	3/8	1 1/2	1	3/16	3 1/2	2 1/8	.750	3/4	3
1 1/2	2	3/8†	3/8	1 1/2	1	1/4	3 5/8	2 1/4	1.000	1	4
2	2 1/2	3/8†	3/8	1 1/2	1	5/16	3 5/8	2 1/4	1.000	1	4 1/2
2 1/2	3	3/8†	3/8	1 1/2	1	5/16	3 3/4	2 3/8	1.000	1	5
3 1/4	3 3/4	1/2	–	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	5 3/4
4	4 1/2	1/2	–	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	6 1/2
5	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	4 1/2	2 7/8	1.000	1	7 1/2
6	6 1/2	3/4	3/4	2	1 1/2	7/16	5	3 1/8	1.375	1 3/8	9 1/4

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	C	D	NA	V	VA	VB	W	WF	XJ	Y	ZB	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	4	1 15/16	4 11/16	
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	4	1 15/16	4 11/16	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	4 1/8	1 15/16	4 7/8	
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	4 1/2	2 5/16	5 1/4	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	4 1/8	1 15/16	4 15/16	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	4 3/4	2 9/16	5 9/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	4 1/2	2 5/16	5 5/16	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	4 1/4	1 15/16	5 1/16	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	5 1/8	2 13/16	5 15/16	
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	4 5/8	2 5/16	5 7/16	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	1 5/8	4 7/8	2 5/16	5 11/16	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	5	2 7/16	6	
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	5 5/8	3 1/16	6 5/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	5 1/4	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	5 1/2	2 15/16	6 1/2	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	5	2 7/16	6	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	5 7/8	3 5/16	6 7/8	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	5 1/4	2 11/16	6 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	5 1/2	2 15/16	6 1/2	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	5 5/8	3 1/16	6 5/8	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	5 1/4	2 7/16	6 5/16	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	6 1/8	3 5/16	7 3/16	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	5 1/2	2 11/16	6 9/16	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	5 3/4	2 15/16	6 13/16	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	5 7/8	3 1/16	6 15/16	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	6 1/8	3 5/16	7 3/16	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	6 1/8	3 5/16	7 3/16	
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	7/16	–	1 5/8	5 7/8	2 13/16	7 1/16	
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	6 1/2	3 7/16	7 11/16	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	6 1/8	3 1/16	7 5/16	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	6 1/4	3 3/16	7 7/16	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	6 1/2	3 7/16	7 11/16	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	6 1/2	3 7/16	7 11/16	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	6 1/2	3 7/16	7 11/16	

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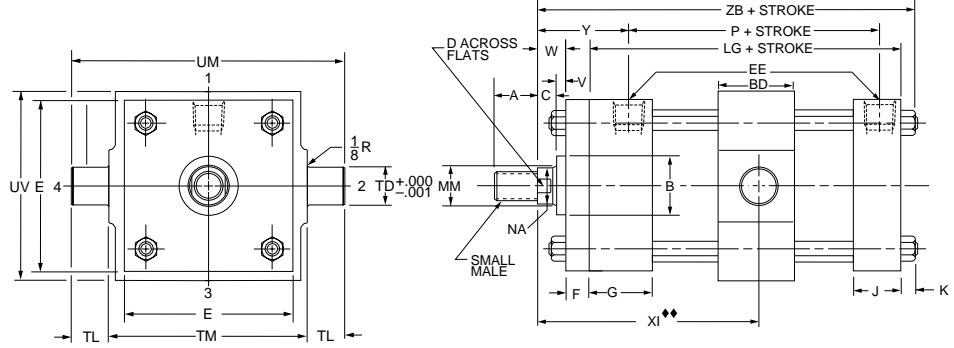
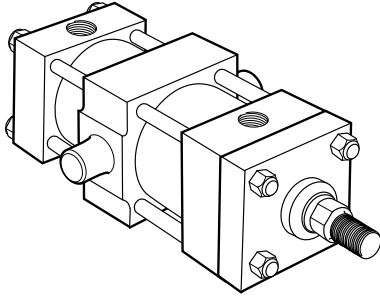
Lin-Act

Intermediate Fixed Trunnion Mountings
1 1/2" to 6" Bore Sizes

Lin-Act Series LAA
Heavy-Duty Air Cylinders

Intermediate Fixed Trunnion
 Style DD (NFFA Style MT4)
 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
 With Maximum Oversize Rods

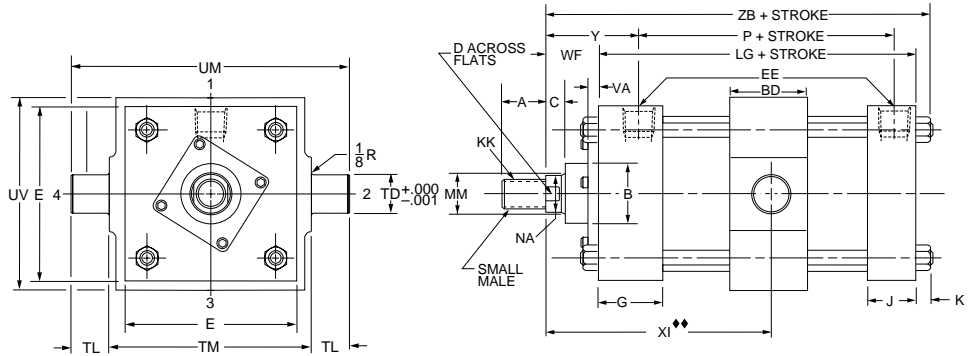
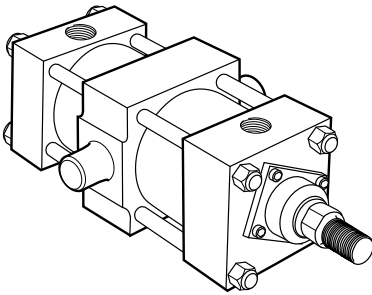
Tie Rod Retained Cartridge



Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

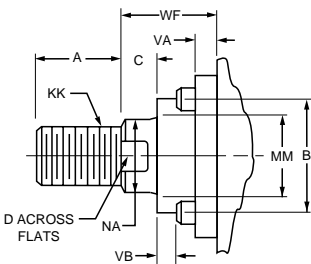
Intermediate Fixed Trunnion
 Style DD (NFFA Style MT4)
 1 1/2" - 6" Bore

Removable Cartridge

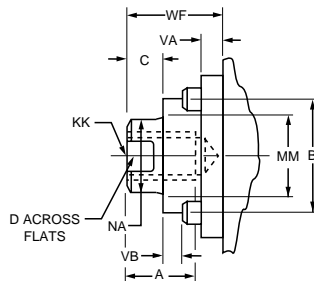


Rod End Dimensions – see table 2

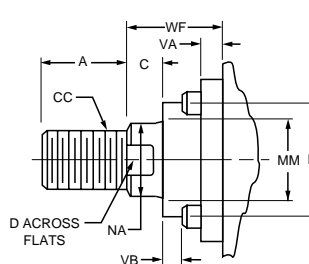
Thread Style 4
 (NFFA Style SM)
 Small Male



Thread Style 8
 (NFFA Style IM)
 Intermediate Male



Thread Style 9
 (NFFA Style SF)
 Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Intermediate Fixed Trunnion Mountings 1 1/2" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	BD	E	EE NPTF	F	G	J	K	LG	P	+0.000 TD -0.001	TL	TM	UM	UV	Minimum Stroke
1 1/2	1 1/4	2	3/8†	3/8	1 1/2	1	1/4	35/8	2 1/4	1.000	1	2 1/2	4 1/2	2 1/2	1/4
2	1 1/2	2 1/2	3/8†	3/8	1 1/2	1	5/16	35/8	2 1/4	1.000	1	3	5	3	1/2
2 1/2	1 1/2	3	3/8†	3/8	1 1/2	1	5/16	33/4	2 3/8	1.000	1	3 1/2	5 1/2	3 1/2	3/8
3 1/4	2	3 3/4	1/2	5/8	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	4 1/2	6 1/2	4 1/4	7/8
4	2	4 1/2	1/2	–	1 3/4	1 1/4	3/8	4 1/4	2 5/8	1.000	1	5 1/4	7 1/4	5	7/8
5	2	5 1/2	1/2	–	1 3/4	1 1/4	7/16	4 1/2	2 7/8	1.000	1	6 1/4	8 1/4	6	5/8
6	2 1/2	6 1/2	3/4	3/4	2	1 1/2	7/16	5	3 1/8	1.375	1 3/8	7 5/8	10 3/8	7	1 1/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	LL	A	+0.000 -0.002 B	C	D	NA	V	VA	VB	W	WF	Min.** XI	Y	ZB
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	1/2-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	33/16	115/16	47/8
	2	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	39/16	25/16	5 1/4
2	1(Std.)	5/8	1/2-20	7/16-20	1/2-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	35/16	115/16	415/16
	2	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	315/16	29/16	59/16
	3	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	311/16	25/16	55/16
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	1/2-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	35/16	115/16	51/16
	2	13/4	1 1/2-12	1 1/4-12	1 1/2-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	43/16	213/16	515/16
	3	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	311/16	25/16	57/16
	4	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	5/8	–	–	1 1/4	–	315/16	29/16	511/16
3 1/4	1(Std.)	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	43/16	27/16	6
	2	2	1 3/4-12	1 1/2-12	1 3/4-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	413/16	31/16	65/8
	3	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	15/8	47/16	211/16	61/4
	4	13/4	1 1/2-12	1 1/4-12	1 1/2-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	411/16	215/16	61/2
4	1(Std.)	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	43/16	27/16	6
	2	2 1/2	2 1/4-12	1 7/8-12	2 1/4-12	3	3.124	1	2 1/16	23/8	–	1/4	11/16	–	2 1/4	51/16	35/16	67/8
	3	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	15/8	47/16	211/16	61/4
	4	13/4	1 1/2-12	1 1/4-12	1 1/2-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	411/16	215/16	61/2
	5	2	1 3/4-12	1 1/2-12	1 3/4-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	413/16	31/16	65/8
5	1(Std.)	1	7/8-14	3/4-16	7/8-14	1 1/8	1.499	1/2	7/8	15/16	–	1/4	3/8	–	1 3/8	45/16	27/16	65/16
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/4-12	3 1/2	4.249	1	3	33/8	5/8	–	–	1 5/8	–	51/16	35/16	73/16
	3	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	–	1/4	1/2	–	15/8	47/16	211/16	69/16
	4	13/4	1 1/2-12	1 1/4-12	1 1/2-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	411/16	215/16	613/16
	5	2	1 3/4-12	1 1/2-12	1 3/4-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	413/16	31/16	615/16
	6	2 1/2	2 1/4-12	1 7/8-12	2 1/4-12	3	3.124	1	2 1/16	23/8	–	1/4	11/16	–	2 1/4	51/16	35/16	73/16
	7	3	2 3/4-12	2 1/4-12	2 3/4-12	3 1/2	3.749	1	2 5/8	27/8	5/8	–	–	1 5/8	–	51/16	35/16	73/16
6	1(Std.)	13/8	1 1/4-12	1-14	1 1/4-12	15/8	1.999	5/8	1 1/8	15/16	–	1/4	7/16	–	1 5/8	415/16	213/16	71/16
	2	4	3 3/4-12	3-12	3 3/4-12	4	4.749	1	33/8	37/8	1/2	–	–	1 1/2	–	59/16	37/16	711/16
	3	13/4	1 1/2-12	1 1/4-12	1 1/2-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	53/16	31/16	75/16
	4	2	1 3/4-12	1 1/2-12	1 3/4-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	55/16	33/16	77/16
	5	2 1/2	2 1/4-12	1 7/8-12	2 1/4-12	3	3.124	1	2 1/16	23/8	–	1/4	11/16	–	2 1/4	59/16	37/16	711/16
	6	3	2 3/4-12	2 1/4-12	2 3/4-12	3 1/2	3.749	1	2 5/8	27/8	1/2	–	–	1 1/2	–	59/16	37/16	711/16
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/4-12	3 1/2	4.249	1	3	33/8	1/2	–	–	1 1/2	–	59/16	37/16	711/16

Note: ♦♦ = Dimension "XI" to be specified by customer.

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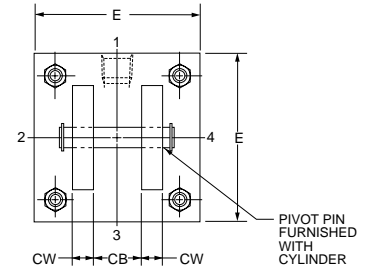
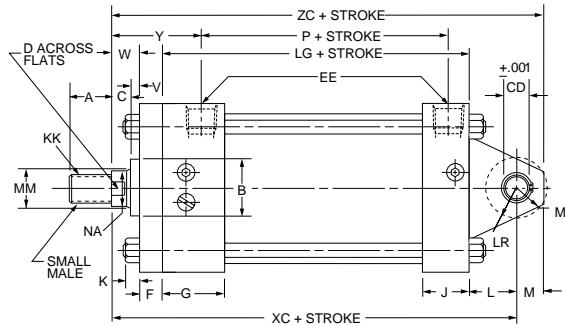
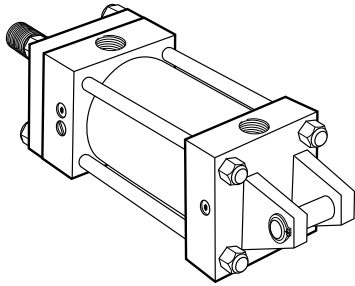
Lin-Act

Cap Fixed Clevis Mountings
1" to 6" Bore Sizes

Lin-Act Series LAA
Heavy-Duty Air Cylinders

Cap Fixed Clevis
Style BB (NFA Style MP1)
1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
With Maximum Oversize Rods

Tie Rod Retained Cartridge

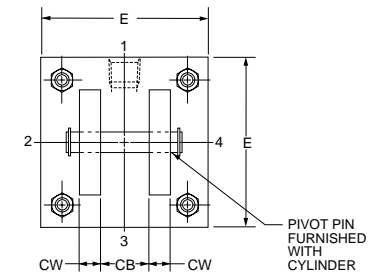
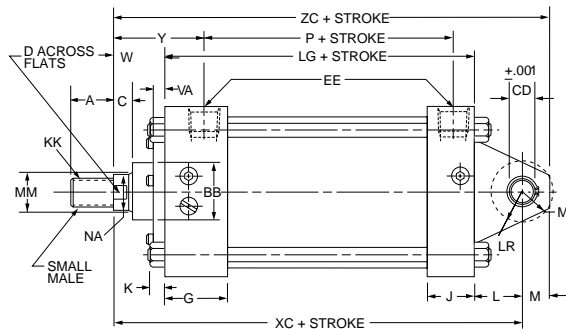
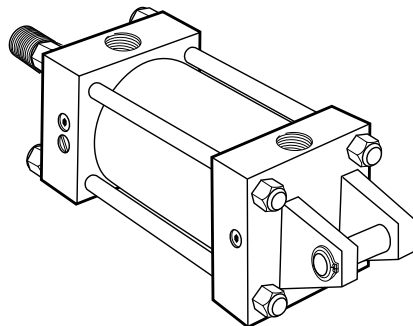


Note: Cap tie rod nuts not on 1 1/2" 2", 2 1/2" and 3 1/4" bores.

Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

Cap Fixed Clevis
Style BB (NFA Style MP1)
1 1/2" - 6" Bore

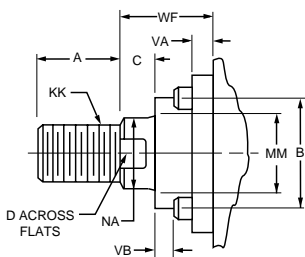
Removable Cartridge



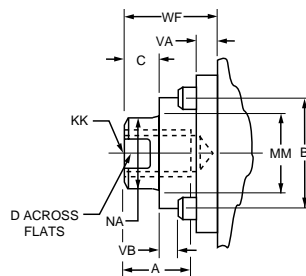
Note: Cap tie rod nuts not on 1 1/2" 2", 2 1/2" and 3 1/4" bores.

Rod End Dimensions — see table 2

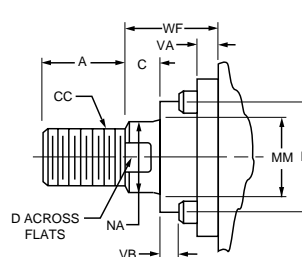
Thread Style 4
(NFA Style SM)
Small Male



Thread Style 8
(NFA Style IM)
Intermediate Male



Thread Style 9
(NFA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Fixed Clevis Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	CB	+0.000 CD • -0.02	CW	E	EE NPTF	F	G	J	K	L	LG	LR	M	MR	P
1	*	.441*	*	■	1/4	3/8	1 1/2	1	3/16	1/2*	3 1/2*	1/2*	7/16*	1/2*	2 1/8
1 1/2	3/4	.501	1/2	2	3/8†	3/8	1 1/2	1	1/4	3/4	3 5/8	3/4	1/2	5/8	2 1/4
2	3/4	.501	1/2	2 1/2	3/8†	3/8	1 1/2	1	5/16	3/4	3 5/8	3/4	1/2	5/8	2 1/4
2 1/2	3/4	.501	1/2	3	3/8†	3/8	1 1/2	1	5/16	3/4	3 3/4	3/4	1/2	5/8	2 3/8
3 1/4	1 1/4	.751	5/8	3 3/4	1/2	–	1 3/4	1 1/4	3/8	1 1/4	4 1/4	1	3/4	3/4	2 5/8
4	1 1/4	.751	5/8	4 1/2	1/2	–	1 3/4	1 1/4	3/8	1 1/4	4 1/4	1	3/4	3/4	2 5/8
5	1 1/4	.751	5/8	5 1/2	1/2	5/8	1 3/4	1 1/4	7/16	1 1/4	4 1/2	1	3/4	3/4	2 7/8
6	1 1/2	1.001	3/4	6 1/2	3/4	3/4	2	1 1/2	7/16	1 1/2	5	1 1/4	1	1	3 1/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

* In 1" bore size model only, a single eye mounting, 7/16" thick, is used. Dimension CD (.441") is hole diameter – pin not supplied.

• Dimension CD is pin diameter except in 1" bore.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.02 B	C	D	NA	V	VA	VB	W	WF	XC	Y	ZC
1	1(Std.)	1/2	7/16-20	5/16-20	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	5	1 15/16	5 7/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	5	1 15/16	5 7/16
1 1/2	1(Std.)	5/8	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	5 3/4	2 5/16	6 1/4
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	5 3/4	2 5/16	6 1/4
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	5 3/8	1 15/16	5 7/8
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	6	2 9/16	6 1/2
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	5 3/4	2 5/16	6 1/4
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	5 1/2	1 15/16	6
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	6 3/8	2 13/16	6 7/8
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	5 7/8	2 5/16	6 3/8
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	1 5/8	6 1/8	2 9/16	6 5/8
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	6 7/8	2 7/16	7 5/8
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	7 1/2	3 1/16	8 1/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	7 1/8	2 11/16	7 7/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	7 3/8	2 15/16	8 1/8
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	6 7/8	2 7/16	7 5/8
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	7 3/4	3 5/16	8 1/2
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	7 1/8	2 11/16	7 7/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	7 3/8	2 15/16	8 1/8
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	7 1/2	3 1/16	8 1/4
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	7 1/8	2 7/16	7 7/8
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	8	3 5/16	8 3/4
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	7 3/8	2 11/16	8 1/8
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	7 5/8	2 15/16	8 3/8
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	7 3/4	3 1/16	8 1/2
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	8	3 5/16	8 3/4
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	8	3 5/16	8 3/4
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	7/16	–	1 5/8	8 1/8	2 13/16	9 1/8
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	8 3/4	3 7/16	9 3/4
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	8 3/8	3 1/16	9 3/8
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 5/16	–	1/4	9/16	–	2	8 1/2	3 3/16	9 1/2
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	8 3/4	3 7/16	9 3/4
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	8 3/4	3 7/16	9 3/4
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	8 3/4	3 7/16	9 3/4

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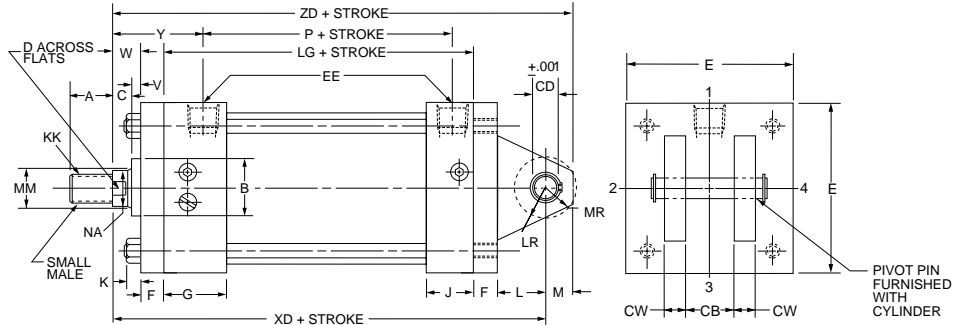
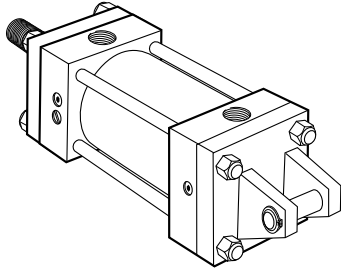
Cap Detachable Clevis Mountings 1" to 6" Bore Sizes

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Detachable Clevis

Style BC (NFPA Style MP2)

1" - 1 1/2" - 2" - 2 1/2" - 5" and 6" Bore
With Maximum Oversize Rods

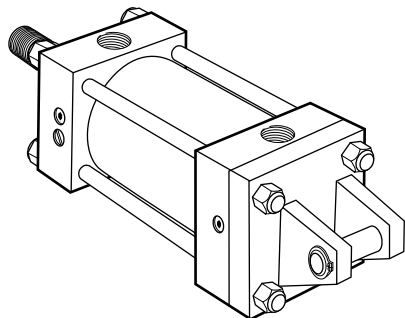


Before determining dimensions: See chart on page 3 for cylinder rod combinations that have removable cartridges.

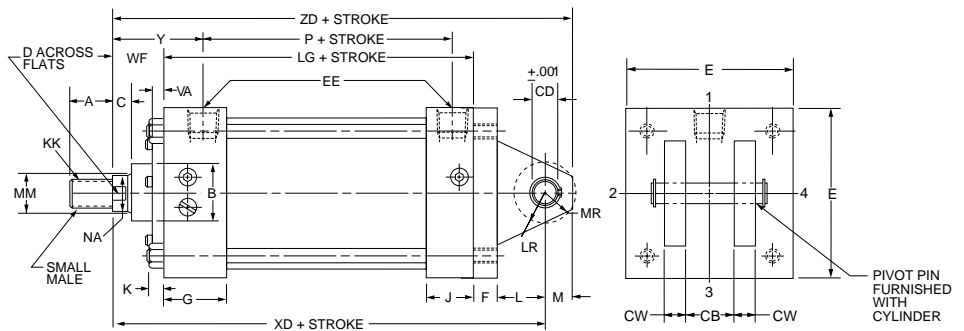
Cap Detachable Clevis

Style BC (NFPA Style MP2)

1 1/2" - 6" Bore

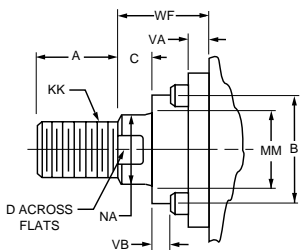


Removable Cartridge

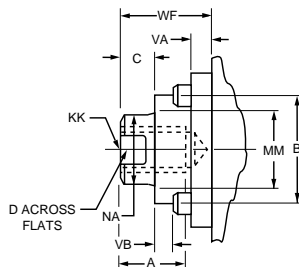


Rod End Dimensions — see table 2

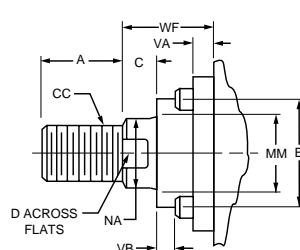
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Detachable Clevis Mountings
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	CB	+0.000 CD • -0.002	CW	E	EE NPTF	F	G	J	K	L	LG	LR	M	MR	P
1	*	.441*	*	■	1/4	3/8	1 1/2	1	3/16	1/2*	3 1/2*	1/2*	7/16*	1/2*	2 1/8
1 1/2	3/4	.501	1/2	2	3/8†	3/8	1 1/2	1	1/4	3/4	3 5/8	3/4	1/2	1/2	2 1/4
2	3/4	.501	1/2	2 1/2	3/8†	3/8	1 1/2	1	5/16	3/4	3 5/8	3/4	1/2	1/2	2 1/4
2 1/2	3/4	.501	1/2	3	3/8†	3/8	1 1/2	1	5/16	3/4	3 3/4	3/4	1/2	1/2	2 3/8
3 1/4	1 1/4	.751	5/8	3 3/4	1/2	5/8	1 3/4	1 1/4	3/8	1 1/4	4 1/4	1	3/4	3/4	2 5/8
4	1 1/4	.751	5/8	4 1/2	1/2	–	1 3/4	1 1/4	3/8	1 1/4	4 1/4	1	3/4	3/4	2 5/8
5	1 1/4	.751	5/8	5 1/2	1/2	–	1 3/4	1 1/4	7/16	1 1/4	4 1/2	1	3/4	3/4	2 7/8
6	1 1/2	1.001	3/4	6 1/2	3/4	3/4	2	1 1/2	7/16	1 1/2	5	1 1/4	1	1	3 1/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

* In 1" bore size model only, a single eye mounting, 7/16" thick, is used. Dimension CD (.441") is hole diameter — pin not supplied.

• Dimension CD is pin diameter except in 1" bore.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	NA	V	VA	VB	W	WF	XD	Y	ZD
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	3/8	3/8	7/16	1/4	–	–	5/8	–	5 3/8	1 15/16	5 13/16
	2	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	5 3/8	1 15/16	5 13/16
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	1/4	–	–	5/8	–	5 3/4	1 15/16	6 1/4
	2	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	15/16	1/2	–	–	1	–	6 1/8	2 5/16	6 5/8
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	5 3/4	1 15/16	6 1/4
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	–	6 3/8	2 9/16	6 7/8
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	6 1/8	2 5/16	6 5/8
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	3/8	1/2	9/16	–	1/4	3/16	–	1	5 7/8	1 15/16	6 3/8
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/4	–	–	1 1/2	–	6 3/4	2 13/16	7 1/4
	3	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	6 1/4	2 5/16	6 3/4
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	5/8	–	–	1 1/4	1 5/8	6 1/2	2 9/16	7
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	7 1/2	2 7/16	8 1/4
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	8 1/8	3 1/16	8 7/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	7 3/4	2 11/16	8 1/2
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	8	2 15/16	8 3/4
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	7 1/2	2 7/16	8 1/4
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	8 3/8	3 5/16	9 1/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	7 3/4	2 11/16	8 1/2
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	8	2 15/16	8 3/4
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	8 1/8	3 1/16	8 7/8
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	1/2	7/8	1 5/16	–	1/4	3/8	–	1 3/8	7 3/4	2 7/16	8 1/2
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	5/8	–	–	1 5/8	–	8 5/8	3 5/16	9 3/8
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	1/2	–	1 5/8	8	2 11/16	8 3/4
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	8 1/4	2 15/16	9
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	8 3/8	3 1/16	9 1/8
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	8 5/8	3 5/16	9 3/8
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	5/8	–	–	1 5/8	–	8 5/8	3 5/16	9 3/8
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	–	1/4	7/16	–	1 5/8	8 7/8	2 13/16	9 7/8
	2	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	–	–	1 1/2	–	9 1/2	3 7/16	10 1/2
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	–	1/4	9/16	–	1 7/8	9 1/8	3 1/16	10 1/8
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	–	1/4	9/16	–	2	9 1/4	3 3/16	10 1/4
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	–	1/4	1 1/16	–	2 1/4	9 1/2	3 7/16	10 1/2
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	–	–	1 1/2	–	9 1/2	3 7/16	10 1/2
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	–	–	1 1/2	–	9 1/2	3 7/16	10 1/2

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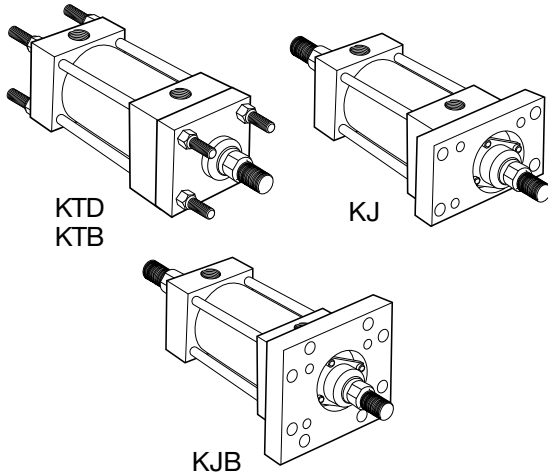
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Lin-Act

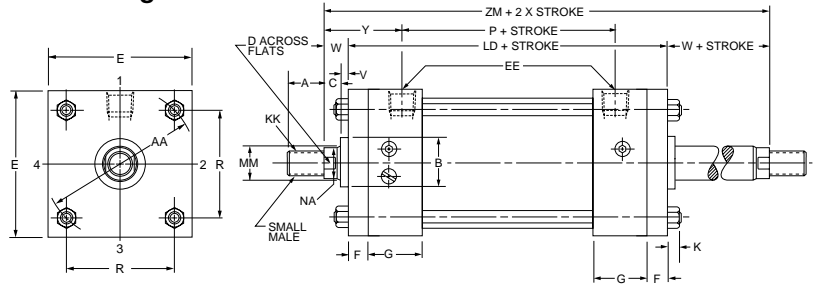
**Double Rod End Cylinders
1" to 6" Bore Sizes**

**Lin-Act Series LAA
Heavy-Duty Air Cylinders**

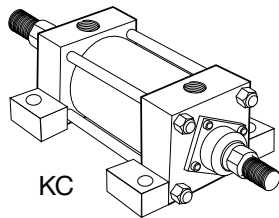
Double Rod End Cylinders



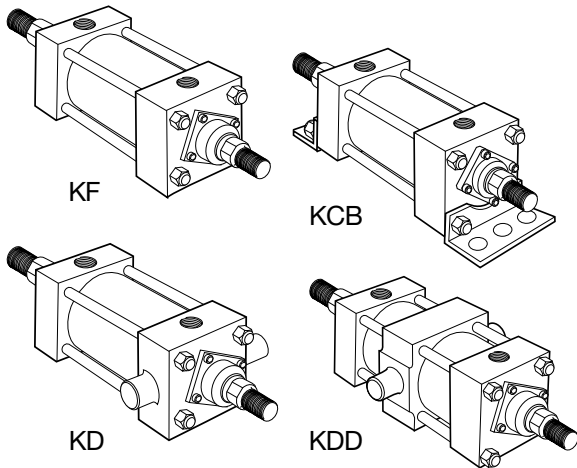
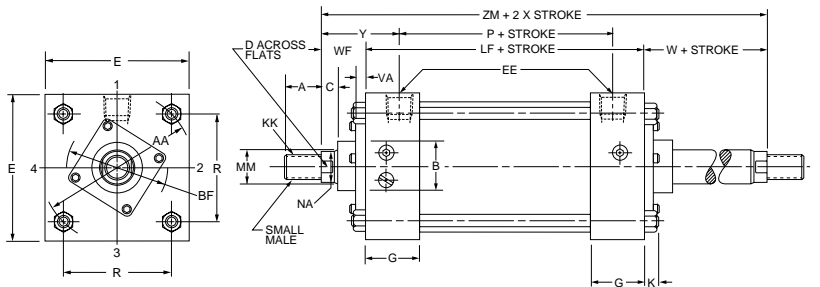
Tie Rod Retained Cartridge



Note: The basic double rod cylinder dimensions are shown on this and facing page. For specific mounting dimensions. Refer to pages for single rod cylinder. Exception: MDS1, "SA" and MDS2, "SS".

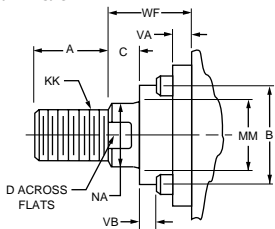


Removable Cartridge

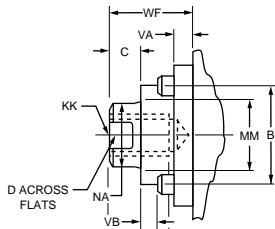


Rod End Dimensions – see table 2

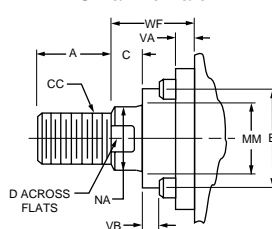
Thread Style 4
(NFFA Style SM)
Small Male



Thread Style 8
(NFFA Style IM)
Intermediate Male



Thread Style 9
(NFFA Style SF)
Small Female



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Double Rod End Cylinders
1" to 6" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	K	LD	LF	P	SA	SS
1	■	1/4	3/8	1 1/2	3/16	4 3/4	—	2 1/8	6 3/8	3 3/8
1 1/2	2	3/8†	3/8	1 1/2	1/4	4 7/8	4 1/8	2 1/4	6 7/8	3 3/8
2	2 1/2	3/8†	3/8	1 1/2	5/16	4 7/8	4 1/8	2 1/4	6 7/8	3 3/8
2 1/2	3	3/8†	3/8	1 1/2	5/16	5	4 1/4	2 3/8	7	3 1/2
3 1/4	3 3/4	1/2	5/8	1 3/4	3/8	6	4 3/4	2 5/8	8 1/2	3 3/4
4	4 1/2	1/2	5/8	1 3/4	3/8	6	4 3/4	2 5/8	8 1/2	3 3/4
5	5 1/2	1/2	5/8	1 3/4	7/16	6 1/4	5	2 7/8	9	3 5/8
6	6 1/2	3/4	3/4	2	7/16	7	5 1/2	3 1/8	9 3/4	4 1/8

† On 1", 1 1/2", 2" and 2 1/2" bore sizes, the head-end (only) pipe thread is not full depth on cylinders with maximum oversize rods. Minimum of three full threads available.

■ 1" bore head is 1 3/4" x 1 1/2". See page 12.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod Extensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	A	+ .000 - .002 B	BF	C	D	NA	V	VA	VB	W	WF	Y	ZM	
1	1(Std.)	1/2	7/16-20	5/16-24	5/8	.999	—	3/8	3/8	7/16	1/4	—	—	5/8	—	1 15/16	6	
	2	5/8	1/2-20	7/16-20	3/4	1.124	—	3/8	1/2	9/16	1/4	—	—	5/8	—	1 15/16	6	
1 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	1.968	3/8	1/2	9/16	—	1/4	3/16	5/8	1	1 15/16	6 1/8	
	2	1	7/8-14	3/4-16	1 1/8	1.499	—	1/2	7/8	15/16	1/2	—	—	1	—	2 5/16	6 7/8	
2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	1.968	3/8	1/2	9/16	—	1/4	3/16	5/8	1	1 15/16	6 1/8	
	2	1 3/8	1 1/4-12	1-14	1 5/8	1.999	—	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2 9/16	7 3/8	
	3	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	—	1/4	3/8	1	1 3/8	2 5/16	6 7/8	
2 1/2	1(Std.)	5/8	1/2-20	7/16-20	3/4	1.124	1.968	3/8	1/2	9/16	—	1/4	3/16	5/8	1	1 15/16	6 1/4	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	—	3/4	1 1/2	1 11/16	3/4	—	—	1 1/2	—	2 13/16	8	
	3	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	—	1/4	3/8	1	1 3/8	2 5/16	7	
	4	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	5/8	—	—	1 1/4	—	2 9/16	7 1/2	
3 1/4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	—	1/4	3/8	3/4	1 3/8	2 7/16	7 1/2	
	2	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	—	1/4	9/16	1 3/8	2	3 1/16	8 3/4	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	—	1/4	1/2	1	1 5/8	2 11/16	8	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.625	3/4	1 1/2	1 11/16	—	1/4	9/16	1 1/4	1 7/8	2 15/16	8 1/2	
4	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	—	1/4	3/8	3/4	1 3/8	2 7/16	7 1/2	
	2	2 1/2	2 1/4-12	1 7/8-12	3	3.124	4.312	1	2 1/16	2 3/8	—	1/4	1 1/16	1 5/8	2 1/4	3 5/16	9 1/4	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	—	1/4	1/2	1	1 5/8	2 11/16	8	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.625	3/4	1 1/2	1 11/16	—	1/4	9/16	1 1/4	1 7/8	2 15/16	8 1/2	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	—	1/4	9/16	1 3/8	2	3 1/16	8 3/4	
5	1(Std.)	1	7/8-14	3/4-16	1 1/8	1.499	2.468	1/2	7/8	1 5/16	—	1/4	3/8	3/4	1 3/8	2 7/16	7 3/4	
	2	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	—	1	3	3 3/8	5/8	—	—	1 5/8	—	3 5/16	9 1/2	
	3	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	—	1/4	1/2	1	1 5/8	2 11/16	8 1/4	
	4	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.625	3/4	1 1/2	1 11/16	—	1/4	9/16	1 1/4	1 7/8	2 15/16	8 3/4	
	5	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	—	1/4	9/16	1 3/8	2	3 1/16	9	
	6	2 1/2	2 1/4-12	1 7/8-12	3	3.124	4.312	1	2 1/16	2 3/8	—	1/4	1 1/16	1 5/8	2 1/4	3 5/16	9 1/2	
	7	3	2 3/4-12	2 1/4-12	3 1/2	3.749	—	1	2 5/8	2 7/8	5/8	—	—	—	—	—	3 5/16	9 1/2
6	1(Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	2.968	5/8	1 1/8	1 5/16	—	1/4	7/16	7/8	1 5/8	2 13/16	8 3/4	
	2	4	3 3/4-12	3-12	4	4.749	—	1	3 3/8	3 7/8	1/2	—	—	1 1/2	—	3 7/16	10	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3.625	3/4	1 1/2	1 11/16	—	1/4	9/16	1 1/8	1 7/8	3 1/16	9 1/4	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	3.735	7/8	1 11/16	1 15/16	—	1/4	9/16	1 1/4	2	3 3/16	9 1/2	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	4.312	1	2 1/16	2 3/8	—	1/4	1 1/16	1 1/2	2 1/4	3 7/16	10	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	—	1	2 5/8	2 7/8	1/2	—	—	—	—	—	3 7/16	10
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	—	1	3	3 3/8	1 1/2	—	—	—	—	—	3 7/16	10

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Lin-Act

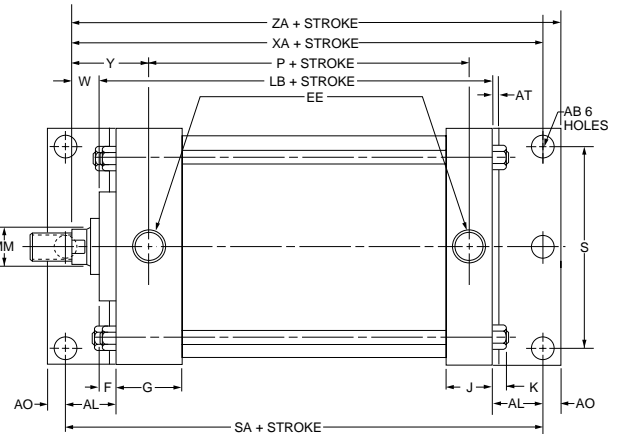
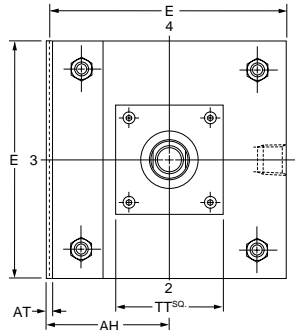
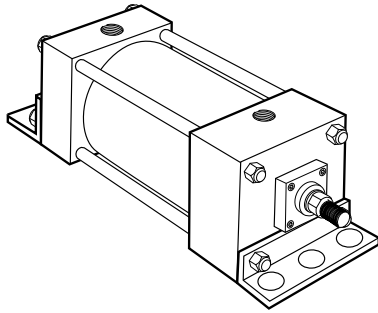
**Side End Angle – 8" to 14" Bore Sizes and
Side Tapped Mountings – 7" to 14" Bore Sizes**

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side End Angle

Style CB (NFPA Style MS1)

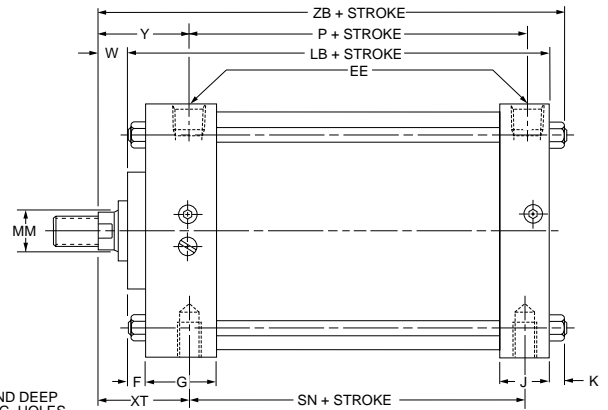
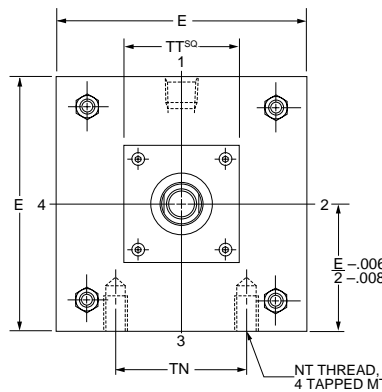
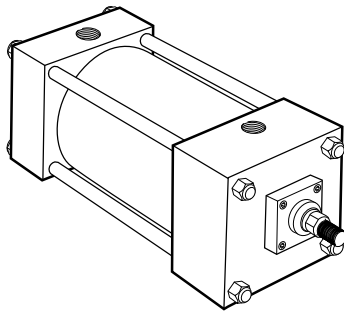
8" - 14" Bore



Side Tapped

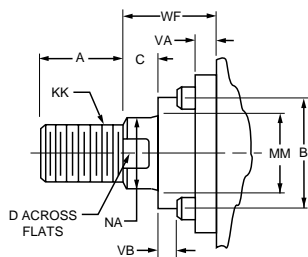
Style F (NFPA Style MS4)

7" - 14" Bore

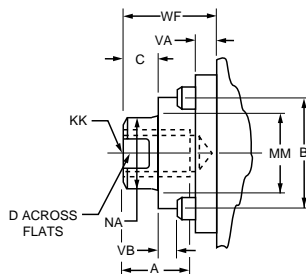


Rod End Dimensions – see table 2

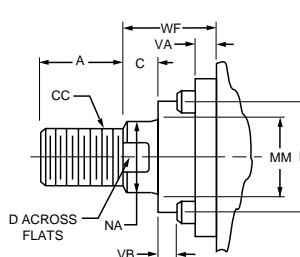
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 3/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side End Angle – 8" to 14" Bore Sizes and
Side Tapped Mountings – 7" to 14" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	AB (Bolt)	AH	AL	AO	AT	E	EE NPTF	F	G	J	K	LB	ND	NT	P	S	SA	SN	TN
7	—	—	—	—	—	7½	¾	¾	2	1½	9/16	57/8	1½	¾-10	¾	—	—	¾	¾
8	¾	4¼	113/16	11/16	¼	8½	¾	¾	2	1½	9/16	57/8	1½	¾-10	¾	7½	8¾	¾	4½
10	1	55/16	2½	7/8	¼	105/8	1	¾	2¼	2	11/16	7½	1½	1-8	4½	87/8	105/8	4½	5½
12	1	63/8	2½	7/8	¾	123/4	1	¾	2¼	2	11/16	75/8	1½	1-8	45/8	11	111/8	45/8	7¼
14	1¼	73/8	27/16	11/16	¾	143/4	1¼	¾	2¾	2¼	¾	87/8	17/8	1¼-7	5½	125/8	13	5½	83/8

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size														
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	TT	V	W	XA	XT	Y	ZA	ZB	
7	1 (Std.)	13/8	1¼-12	1-14	15/8	1.999	5/8	11/8	2½	15/16	4	¼	7/8	*	213/16	213/16	*	75/16	
	2	13/4	1½-12	1¼-12	2	2.374	¾	1½	3½	111/16	4	¾	1½	*	31/16	31/16	*	79/16	
	3	2	1¾-12	1½-12	2¼	2.624	7/8	111/16	3½	115/16	4	¾	1¼	*	33/16	33/16	*	711/16	
8	1 (Std.)	13/8	1¼-12	1-14	15/8	1.999	5/8	11/8	2½	15/16	4	¼	7/8	89/16	213/16	213/16	9¼	75/16	
	2	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	½	1½	*	37/16	37/16	*	715/16	
	3	13/4	1½-12	1¼-12	2	2.374	¾	1½	3½	111/16	4	¾	1½	813/16	31/16	31/16	9½	79/16	
	4	2	1¾-12	1½-12	2¼	2.624	7/8	111/16	3½	115/16	4	¾	1¼	815/16	33/16	33/16	95/8	711/16	
	5	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	½	1½	93/16	37/16	37/16	97/8	715/16	
	6	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	½	1½	*	37/16	37/16	*	715/16	
	7	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	½	1½	*	37/16	37/16	*	715/16	
	8	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	½	1½	*	37/16	37/16	*	715/16	
	9	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	½	1½	*	37/16	37/16	*	715/16	
10	1 (Std.)	13/4	1½-12	1¼-12	2	2.374	¾	1½	3½	111/16	4	¾	1½	103/8	31/8	31/8	11¼	815/16	
	3	2	1¾-12	1½-12	2¼	2.624	7/8	111/16	3½	115/16	4	¾	1¼	101/2	31/4	31/4	113/8	91/16	
	4	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	½	1½	103/4	31/2	31/2	115/8	95/16	
	5	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	½	1½	103/4	31/2	31/2	115/8	95/16	
	6	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	½	1½	103/4	31/2	31/2	115/8	95/16	
	7	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	½	1½	103/4	31/2	31/2	115/8	95/16	
	8	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	½	1½	*	31/2	31/2	*	95/16	
	9	5	4¾-12	3½-12	5	5.749	1	4¼	6½	47/8	7	½	1½	*	31/2	31/2	*	95/16	
12	1 (Std.)	2	1¾-12	1½-12	2¼	2.624	7/8	111/16	3½	115/16	4	½	1¼	11	31/4	31/4	117/8	99/16	
	3	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	½	1½	111/4	31/2	31/2	121/8	913/16	
	4	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	½	1½	111/4	31/2	31/2	121/8	913/16	
	5	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	½	1½	111/4	31/2	31/2	121/8	913/16	
	6	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	½	1½	111/4	31/2	31/2	121/8	913/16	
	7	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	½	1½	111/4	31/2	31/2	121/8	913/16	
	8	5	4¾-12	3½-12	5	5.749	1	4¼	6½	47/8	7	½	1½	111/4	31/2	31/2	121/8	913/16	
	9	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	½	1½	111/4	31/2	31/2	121/8	913/16	
14	1 (Std.)	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	½	1½	1213/16	313/16	313/16	137/8	111/8	
	3	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	½	1½	1213/16	313/16	313/16	137/8	111/8	
	4	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	½	1½	1213/16	313/16	313/16	137/8	111/8	
	5	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	½	1½	1213/16	313/16	313/16	137/8	111/8	
	6	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	½	1½	1213/16	313/16	313/16	137/8	111/8	
	7	5	4¾-12	3½-12	5	5.749	1	4¼	6½	47/8	7	½	1½	1213/16	313/16	313/16	137/8	111/8	
8	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	½	1½	1213/16	313/16	313/16	137/8	111/8		

Note: * Mounting style MS1 not offered in this rod size.

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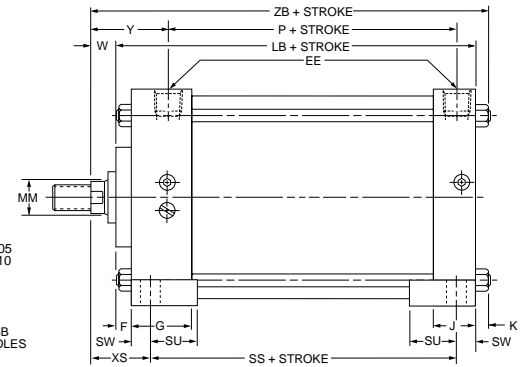
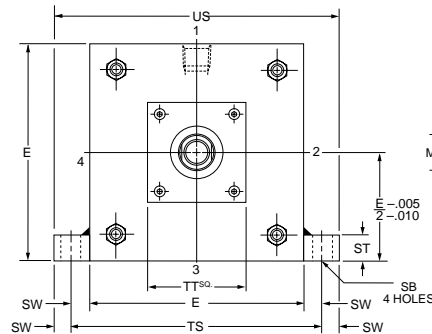
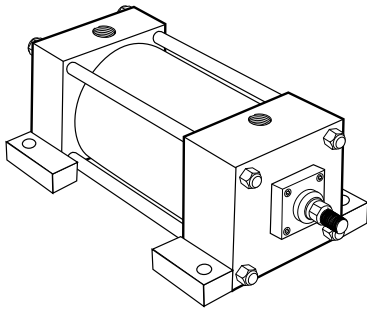
Lin-Act

**Side Lug – 7" to 14" Bore Sizes and
Centerline Lug Mountings – 8" to 14" Bore Sizes**

**Lin-Act Series LAA
Heavy-Duty Air Cylinders**

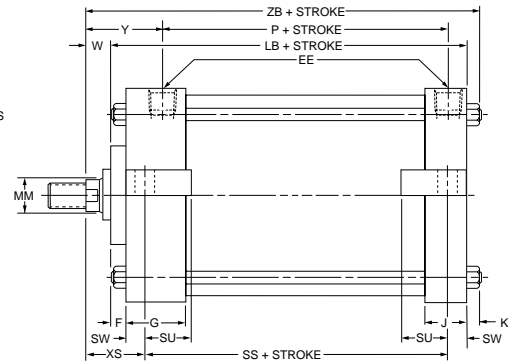
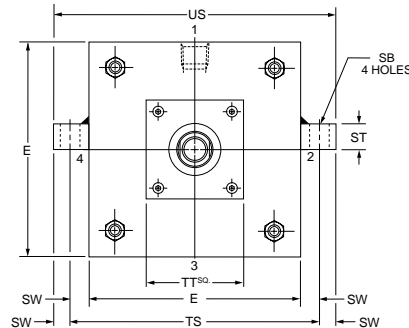
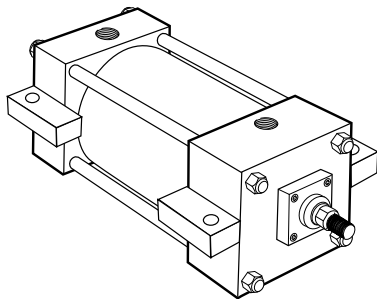
Side Lug

Style C (NFFPA Style MS2)
7" - 14" Bore



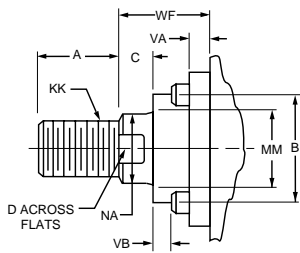
Centerline Lug

Style E (NFFPA Style MS3)
8" - 14" Bore

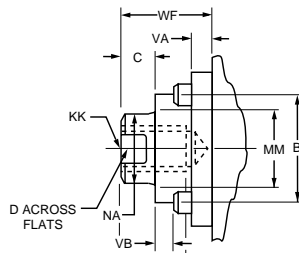


Rod End Dimensions – see table 2

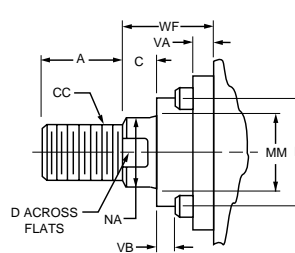
Thread Style 4
(NFFPA Style SM)
Small Male



Thread Style 8
(NFFPA Style IM)
Intermediate Male



Thread Style 9
(NFFPA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 3/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Side Lug – 7" to 14" Bore Sizes and
Centerline Lug Mountings – 8" to 14" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	J	K	LB	P	SB* (Bolt)	SS	ST	SU	SW	TS	US
7	7 1/2	3/4	3/4	2	1 1/2	9/16	5 7/8	3 1/4	3/4	3 3/4	1	1 9/16	1 1/16	8 7/8	10 1/4
8	8 1/2	3/4	3/4	2	1 1/2	9/16	5 7/8	3 1/4	3/4	3 3/4	1	1 9/16	1 1/16	9 7/8	11 1/4
10	10 5/8	1	3/4	2 1/4	2	1 1/16	7 1/8	4 1/8	1 1/16	4 5/8	1 1/4	2	7/8	12 3/8	14 1/8
12	12 3/4	1	3/4	2 1/4	2	1 1/16	7 5/8	4 5/8	1 1/16	5 1/8	1 1/4	2	7/8	14 1/2	16 1/4
14	14 3/4	1 1/4	3/4	2 3/4	2 1/4	3/4	8 7/8	5 1/2	1 5/16	5 7/8	1 1/2	2 1/2	1 1/8	17	19 1/4

*Upper surface spotfaced for socket head cap screw.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size												
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	TT	V	W	XS	Y	ZB	
7	1 (Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	4	1/4	7/8	2 5/16	2 13/16	7 5/16	
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	2 9/16	3 1/16	7 9/16	
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2 11/16	3 3/16	7 11/16	
8	1 (Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	4	1/4	7/8	2 5/16	2 13/16	7 5/16	
	2	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	2 9/16	3 1/16	7 9/16	
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2 11/16	3 3/16	7 11/16	
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
	8	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
	9	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	2 15/16	3 7/16	7 15/16	
10	1 (Std.)	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	2 3/4	3 1/8	8 5/16	
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2 7/8	3 1/4	9 1/16	
	4	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
	5	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
	6	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
	7	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
	8	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
	9	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	3 1/8	3 1/2	9 5/16	
12	1 (Std.)	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2 7/8	3 1/4	9 9/16	
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	5	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	6	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	7	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	8	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	9	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	3 1/8	3 1/2	9 13/16	
	14	1 (Std.)	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	3 3/8	3 13/16	11 1/8
3		3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	3 3/8	3 13/16	11 1/8	
4		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	3 3/8	3 13/16	11 1/8	
5		4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	3 3/8	3 13/16	11 1/8	
6		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	3 3/8	3 13/16	11 1/8	
7		5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	3 3/8	3 13/16	11 1/8	
8		5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	3 3/8	3 13/16	11 1/8	

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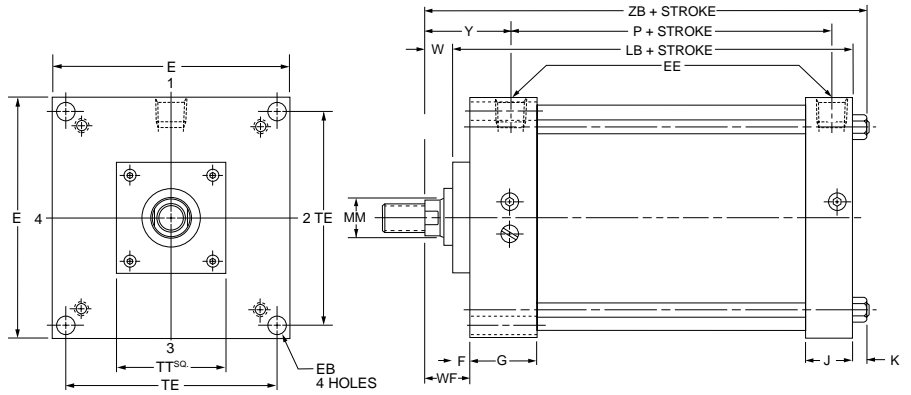
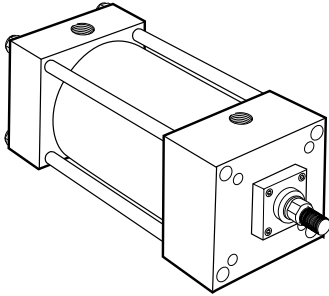
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Lin-Act

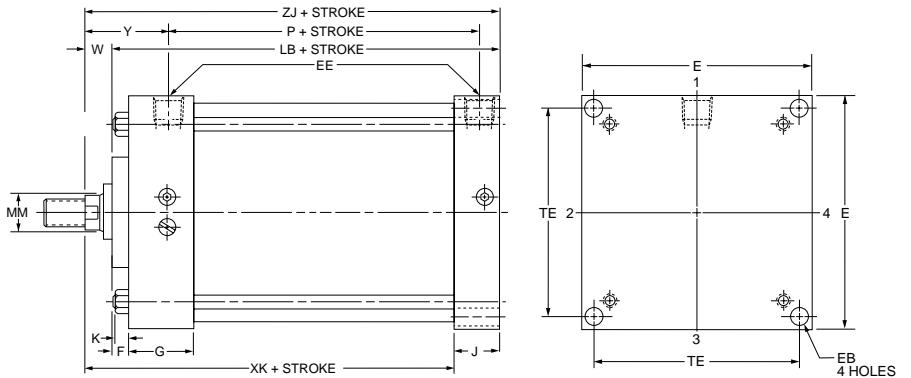
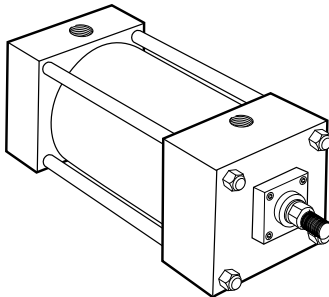
**Head Square Flange and
Cap Square Flange Mountings
7" to 14" Bore Size**

**Lin-Act Series LAA
Heavy-Duty Air Cylinders**

**Head Square Flange
Style JB (NFFPA Style ME3)
7" - 14" Bore**

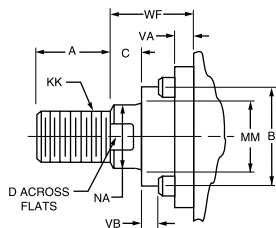


**Cap Square Flange
Style HB (NFFPA Style ME4)
7" - 14" Bore**

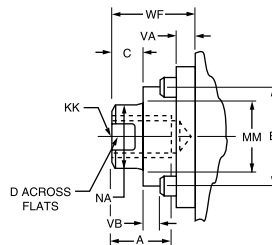


Rod End Dimensions – see table 2

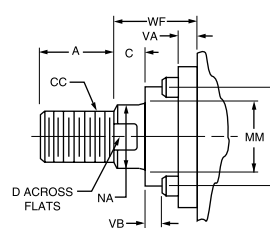
**Thread Style 4
(NFFPA Style SM)
Small Male**



**Thread Style 8
(NFFPA Style IM)
Intermediate Male**



**Thread Style 9
(NFFPA Style SF)
Small Female**



**“Special” Thread
Style 3**

Special thread, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/2" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Head Square Flange and
Cap Square Flange Mountings
7" to 14" Bore Size

Table 1 – Envelope and Mounting Dimensions

Bore	E	EB (Bolt)	EE NPTF	F	G	J	K	LB	P	TE
7	7 1/2	1/2	3/4	3/4	2	1 1/2	9/16	57/8	3 1/4	6.75
8	8 1/2	5/8	3/4	3/4	2	1 1/2	9/16	57/8	3 1/4	7.57
10	10 5/8	3/4	1	3/4	2 1/4	2	11/16	7 1/8	4 1/8	9.40
12	12 3/4	3/4	1	3/4	2 1/4	2	11/16	7 5/8	4 5/8	11.10
14	14 3/4	7/8	1 1/4	3/4	2 3/4	2 1/4	3/4	8 7/8	5 1/2	12.87

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size													
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	TT	V	W	WF	XK	Y	ZB	ZJ
7	1 (Std.)	13/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	4	1/4	7/8	1 5/8	5 1/4	2 13/16	7 5/16	6 3/4
	2	13/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	1 7/8	5 1/2	3 1/16	7 9/16	7
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2	5 7/8	3 3/16	7 11/16	7 1/8
8	1 (Std.)	13/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	2 1/2	1 5/16	4	1/4	7/8	1 5/8	5 1/4	2 13/16	7 5/16	6 3/4
	2	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
	3	13/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	1 7/8	5 1/2	3 1/16	7 9/16	7
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2	5 5/8	3 3/16	7 11/16	7 1/8
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
	8	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
	9	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8
0	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	2 1/4	5 7/8	3 7/16	7 15/16	7 3/8	
10	1 (Std.)	13/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	3 1/8	1 11/16	4	3/8	1 1/8	1 7/8	6 1/4	3 1/8	8 15/16	8 1/4
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2	6 3/8	3 1/4	9 1/16	8 3/8
	4	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	5	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	6	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	7	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	8	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	9	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
	0	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	2 1/4	6 5/8	3 1/2	9 5/16	8 5/8
12	1 (Std.)	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	3 1/2	1 15/16	4	3/8	1 1/4	2	6 7/8	3 1/4	9 9/16	8 7/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	5	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	6	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	7	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	8	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	9	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
	0	6	5 3/4-12	4 1/2-12	6	6.749	1	5 1/8	8	6 1/8	8	1/2	1 1/2	2 1/4	7 1/8	3 1/2	9 13/16	9 1/8
14	1 (Std.)	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	4 1/2	2 3/8	4	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
	3	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	5	2 7/8	5 1/2	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
	4	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	5	3 3/8	5 1/2	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
	5	4	3 3/4-12	3-12	4	4.749	1	3 3/8	5 1/2	3 7/8	5 1/2	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
	6	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	6	4 3/8	7	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
	7	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	6 1/2	4 7/8	7	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8
8	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	7	5 3/8	7	1/2	1 1/2	2 1/4	8 1/8	3 13/16	11 1/8	10 3/8	

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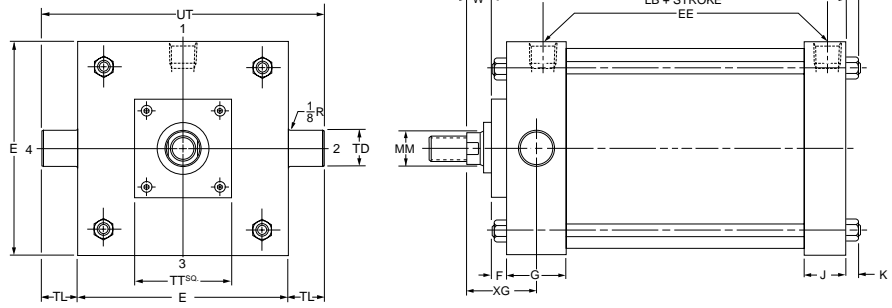
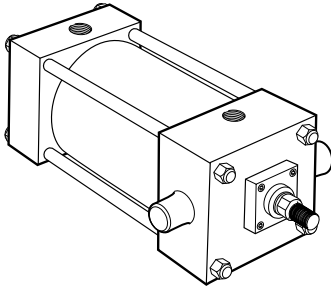
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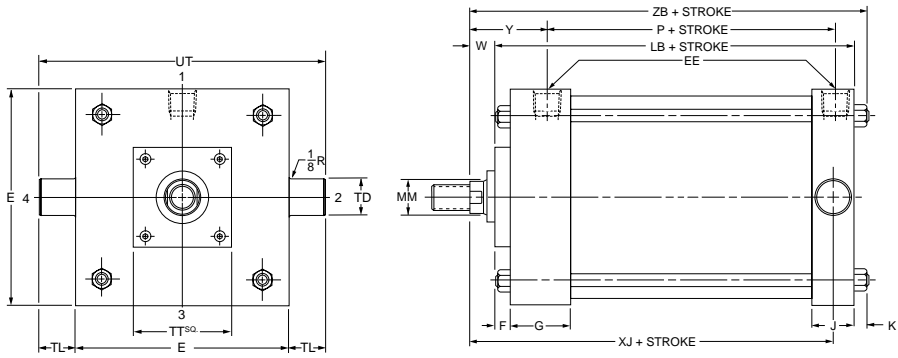
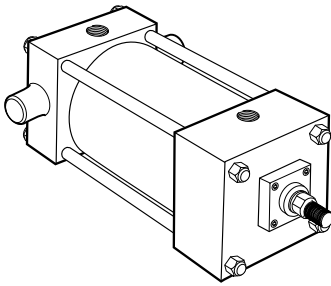
Trunnion Mountings
7" to 14" Bore Size

Lin-Act Series LAA Heavy-Duty Air Cylinders

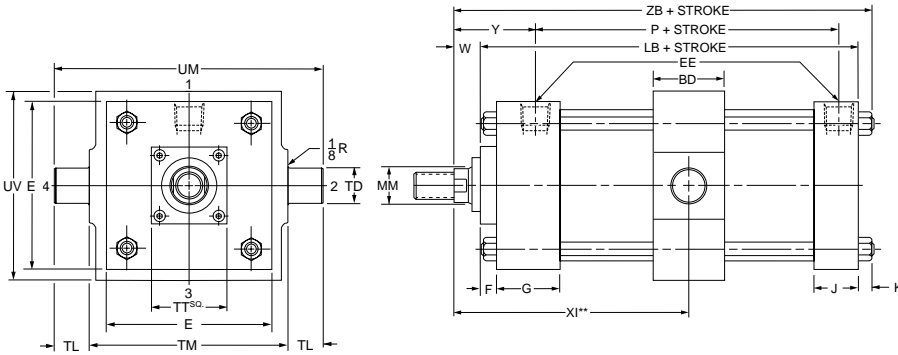
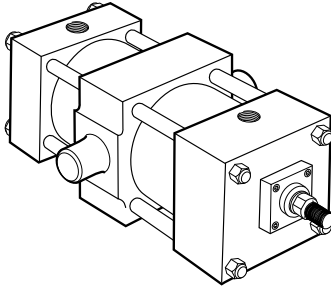
Head Trunnion
Style D (NFFA Style MT1)
7" - 14" Bore



Cap Trunnion
Style DB (NFFA Style MT2)
7" - 14" Bore

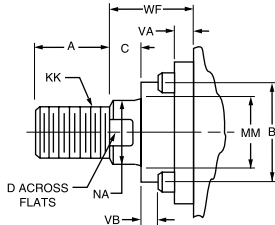


Intermediate Fixed Trunnion
Model DD (NFFA Style MT4)
8" - 14" Bore

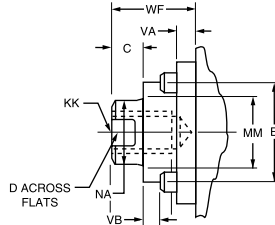


Rod End Dimensions – see table 2

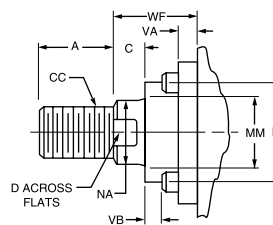
Thread Style 4
(NFFA Style SM)
Small Male



Thread Style 8
(NFFA Style IM)
Intermediate Male



Thread Style 9
(NFFA Style SF)
Small Female



“Special” Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify “Style 3” and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 1/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

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Lin-Act Series LAA Heavy-Duty Air Cylinders

Trunnion Mountings
7" to 14" Bore Size

Table 1 – Envelope and Mounting Dimensions

Bore	BD	E	EE NPTF	F	G	J	K	LB	P	+0.000 TD -0.001	TL	TM	UT	UM	UV
7	—	7½	¾	¾	2	1½	9/16	5/8	3/4	1.375	1¾	—	10¼	—	—
8	2½	8½	¾	¾	2	1½	9/16	5/8	3/4	1.375	1¾	9¾	11¼	12½	9½
10	3	10⅝	1	¾	2¼	2	11/16	7/8	4/8	1.750	1¾	12	14½	15½	11¾
12	3	12¾	1	¾	2¼	2	11/16	7/8	4/8	1.750	1¾	14	16¼	17½	13¾
14	3½	14¾	1¼	¾	2¾	2¼	¾	8/8	5/2	2.000	2	16¼	18¾	20¼	16

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size														
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	TT	V	W	XG	X1* (Min.)	XJ	Y	ZB	
7	1 (Std.)	13/8	11/4-12	1-14	15/8	1.999	5/8	11/8	21/2	15/16	4	1/4	7/8	25/8	—	6	213/16	75/16	
	2	13/4	11/2-12	11/4-12	2	2.374	3/4	11/2	31/8	111/16	4	3/8	11/8	27/8	—	6¼	31/16	79/16	
	3	2	13/4-12	11/2-12	2¼	2.624	7/8	111/16	31/2	115/16	4	3/8	11/4	3	—	63/8	33/16	711/16	
8	1(Std.)	13/8	11/4-12	1-14	15/8	1.999	5/8	11/8	21/2	15/16	4	1/4	7/8	25/8	415/16	6	213/16	75/16	
	2	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	1/2	11/2	31/4	59/16	65/8	37/16	715/16	
	3	13/4	11/2-12	11/4-12	2	2.374	3/4	11/2	31/8	111/16	4	3/8	11/8	27/8	53/16	61/4	31/16	79/16	
	4	2	13/4-12	11/2-12	2¼	2.624	7/8	111/16	31/2	115/16	4	3/8	11/4	3	55/16	63/8	33/16	711/16	
	5	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	1/2	11/2	31/4	59/16	65/8	37/16	715/16	
	6	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	1/2	11/2	31/4	53/16	65/8	37/16	715/16	
	7	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	1/2	11/2	31/4	59/16	65/8	37/16	715/16	
	8	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	1/2	11/2	31/4	59/16	65/8	37/16	715/16	
	9	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	1/2	11/2	31/4	59/16	65/8	37/16	715/16	
10	1(Std.)	13/4	11/2-12	11/4-12	2	2.374	3/4	11/2	31/8	111/16	4	3/8	11/8	3	51/16	71/4	31/8	815/16	
	3	2	13/4-12	11/2-12	2¼	2.624	7/8	111/16	31/2	115/16	4	3/8	11/4	31/8	53/16	73/8	31/4	91/16	
	4	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	5	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	6	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	7	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	8	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	9	5	4¾-12	3½-12	5	5.749	1	41/4	6½	47/8	7	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
	0	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	1/2	11/2	33/8	61/16	75/8	31/2	95/16	
12	1(Std.)	2	13/4-12	11/2-12	2¼	2.624	7/8	111/16	31/2	115/16	4	3/8	11/4	31/8	53/16	77/8	31/4	99/16	
	3	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
	4	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
	5	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
	6	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
	7	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
	8	5	4¾-12	3½-12	5	5.749	1	41/4	6½	47/8	7	1/2	11/2	33/8	61/16	81/8	31/2	913/16	
14	1(Std.)	2½	2¼-12	17/8-12	3	3.124	1	21/16	4½	23/8	4	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
	3	3	2¾-12	2¼-12	3½	3.749	1	25/8	5	27/8	5½	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
	4	3½	3¼-12	2½-12	3½	4.249	1	3	5	33/8	5½	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
	5	4	3¾-12	3-12	4	4.749	1	33/8	5½	37/8	5½	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
	6	4½	4¼-12	3¼-12	4½	5.249	1	37/8	6	43/8	7	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
	7	5	4¾-12	3½-12	5	5.749	1	41/4	6½	47/8	7	1/2	11/2	35/8	63/16	91/4	313/16	111/8	
8	5½	5¼-12	4-12	5½	6.249	1	45/8	7	53/8	7	1/2	11/2	35/8	63/16	91/4	313/16	111/8		

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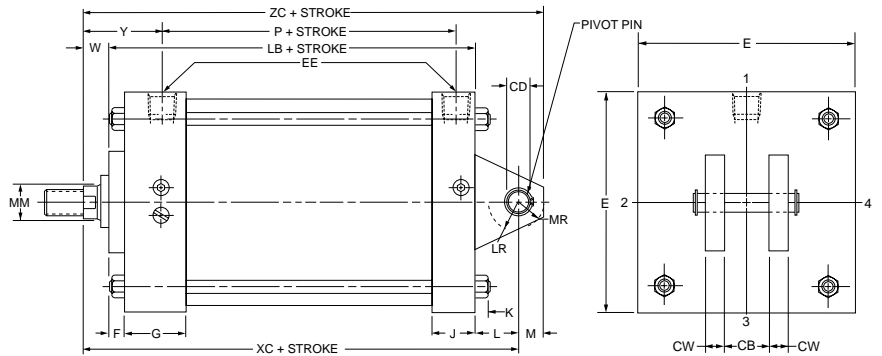
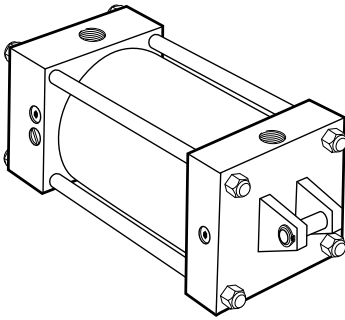
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Lin-Act

Cap Fixed Clevis and Tie Rod Extended Mountings
7" to 14" Bore Size

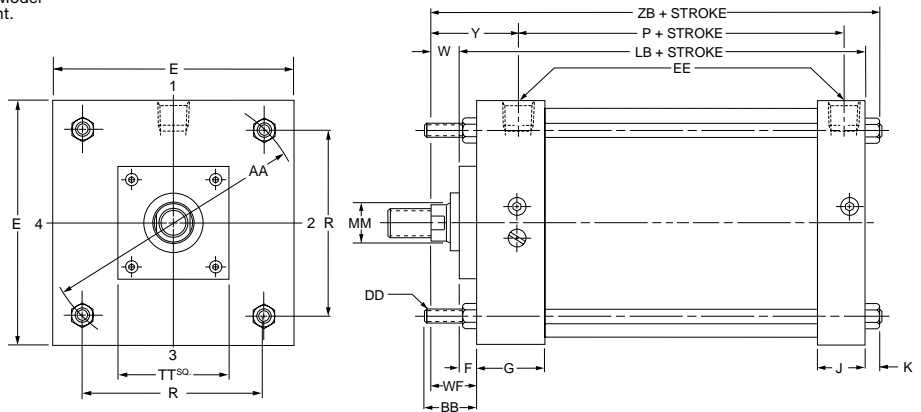
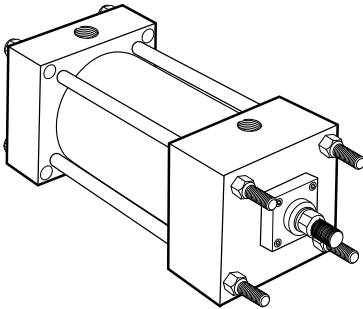
Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Fixed Clevis
Style BB (NFPA Style MP1)
7" - 14" Bore



Tie Rod Extended
Style TB (NFPA Style MX3)
7" - 14" Bore

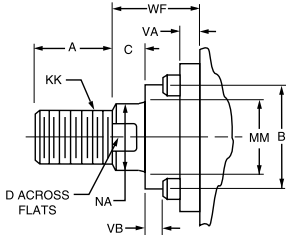
Model MX3 Head Tie Rods Extended, Illustrated. Model MX2 Cap Tie Rods Extended; and Model MX1, Both Ends Tie Rods Extended are also available. All Tie Rod Models can be dimensioned from Model MX3 drawing at right.



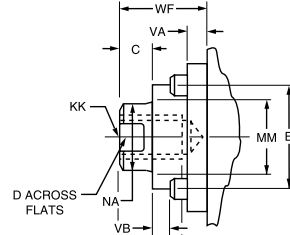
Models MX3 and MX1 not offered in 8" bore, rod diameters 4 1/2", 5" and 5 1/2".

Rod End Dimensions – see table 2

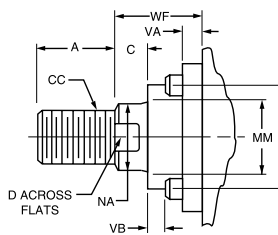
Thread Style 4
(NFPA Style SM)
Small Male



Thread Style 8
(NFPA Style IM)
Intermediate Male



Thread Style 9
(NFPA Style SF)
Small Female



A high strength rod end stud is supplied on thread style 4 through 2" diameter rods and on thread style 8 through 1 3/8" diameter rods. Larger sizes or special rod ends are cut threads. Style 4 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended

through 2" piston rod diameters and style 8 rod ends are recommended on larger diameters. Use style 9 for applications where female rod end threads are required. If rod end is not specified, style 4 will be supplied.

"Special" Thread Style 3

Special thread, extension, rod eye, blank, etc., are also available.

To order, specify "Style 3" and give desired dimensions for CC or KK, A, W or WF. If otherwise special, furnish dimensioned sketch.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cap Fixed Clevis and
Tie Rod Extended Mountings
7" to 14" Bore Size

Table 1 – Envelope and Mounting Dimensions

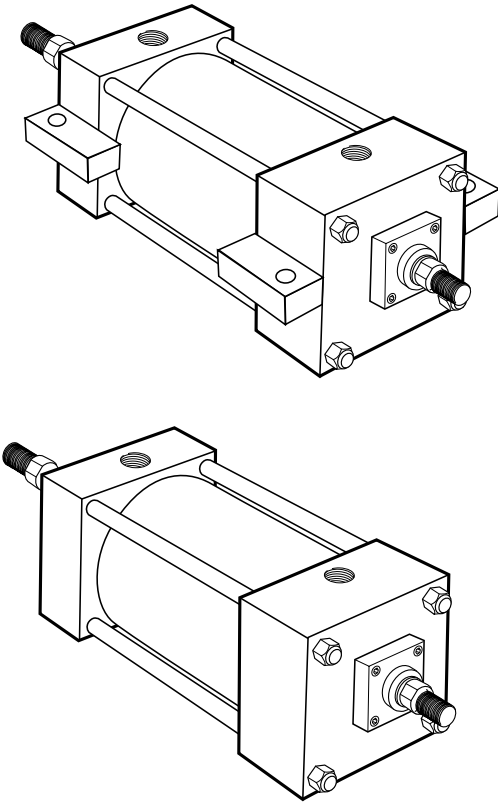
Bore	AA	BB	CB	+0.000 CD* -0.01	CW	DD	E	EE NPTF	F	G	J	K	L	LB	LR	M	MR	P	R
7	8.1	2 ⁵ / ₁₆	1 ¹ / ₂	1.000	3/4	5/8-18	7 ¹ / ₂	3/4	3/4	2	1 ¹ / ₂	9/16	1 ¹ / ₂	5 ⁷ / ₈	1 ¹ / ₄	1	1 ³ / ₁₆	3 ¹ / ₄	5.73
8	9.1	2 ⁵ / ₁₆	1 ¹ / ₂	1.000	3/4	5/8-18	8 ¹ / ₂	3/4	3/4	2	1 ¹ / ₂	9/16	1 ¹ / ₂	5 ⁷ / ₈	1 ¹ / ₄	1	1 ³ / ₁₆	3 ¹ / ₄	6.44
10	11.2	2 ¹¹ / ₁₆	2	1.375	1	3/4-16	10 ⁵ / ₈	1	3/4	2 ¹ / ₄	2	1 ¹ / ₁₆	2 ¹ / ₈	7 ¹ / ₈	1 ⁷ / ₈	1 ³ / ₈	1 ⁵ / ₈	4 ¹ / ₈	7.92
12	13.3	2 ¹¹ / ₁₆	2 ¹ / ₂	1.750	1 ¹ / ₄	3/4-16	12 ³ / ₄	1	3/4	2 ¹ / ₄	2	1 ¹ / ₁₆	2 ¹ / ₄	7 ⁵ / ₈	2 ¹ / ₈	1 ³ / ₄	2 ¹ / ₈	4 ⁵ / ₈	9.40
14	15.4	3 ³ / ₁₆	2 ¹ / ₂	2.000	1 ¹ / ₄	7/8-14	14 ³ / ₄	1 ¹ / ₄	3/4	2 ³ / ₄	2 ¹ / ₄	3/4	2 ¹ / ₂	8 ⁷ / ₈	2 ³ / ₈	2	2 ³ / ₈	5 ¹ / ₂	10.90

* CD is pin diameter.

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size														
			Style 8 CC	Style 4 & 9 KK	A	+0.000 -0.002 B	C	D	LA	NA	TT	V	W	WF	XC	Y	ZB	ZC	
7	1 (Std.)	1 ³ / ₈	1 ¹ / ₄ -12	1-14	1 ⁵ / ₈	1.999	5/8	1 ¹ / ₈	2 ¹ / ₂	1 ⁵ / ₁₆	4	1/4	7/8	1 ⁵ / ₈	8 ¹ / ₄	2 ¹³ / ₁₆	7 ⁵ / ₁₆	9 ¹ / ₄	
	2	1 ³ / ₄	1 ¹ / ₂ -12	1 ¹ / ₄ -12	2	2.374	3/4	1 ¹ / ₂	3 ¹ / ₈	1 ¹¹ / ₁₆	4	3/8	1 ¹ / ₈	1 ⁷ / ₈	8 ¹ / ₂	3 ¹ / ₁₆	7 ⁹ / ₁₆	9 ¹ / ₂	
	3	2	1 ³ / ₄ -12	1 ¹ / ₂ -12	2 ¹ / ₄	2.624	7/8	1 ¹¹ / ₁₆	3 ¹ / ₂	1 ¹¹ / ₁₆	4	3/8	1 ¹ / ₄	2	8 ⁵ / ₈	3 ³ / ₁₆	7 ¹¹ / ₁₆	9 ⁵ / ₈	
8	1 (Std.)	1 ³ / ₈	1 ¹ / ₄ -12	1-14	1 ⁵ / ₈	1.999	5/8	1 ¹ / ₈	2 ¹ / ₂	1 ⁵ / ₁₆	4	1/4	7/8	1 ⁵ / ₈	8 ¹ / ₄	2 ¹³ / ₁₆	7 ⁵ / ₁₆	9 ¹ / ₄	
	2	5 ¹ / ₂	5 ¹ / ₄ -12	4-12	5 ¹ / ₂	6.249	1	4 ⁵ / ₈	7	5 ³ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
	3	1 ³ / ₄	1 ¹ / ₂ -12	1 ¹ / ₄ -12	2	2.374	3/4	1 ¹ / ₂	3 ¹ / ₈	1 ¹¹ / ₁₆	4	3/8	1 ¹ / ₈	1 ⁷ / ₈	8 ¹ / ₂	3 ¹ / ₁₆	7 ⁹ / ₁₆	9 ¹ / ₂	
	4	2	1 ³ / ₄ -12	1 ¹ / ₂ -12	2 ¹ / ₄	2.624	7/8	1 ¹¹ / ₁₆	3 ¹ / ₂	1 ¹⁵ / ₁₆	4	3/8	1 ¹ / ₄	2	8 ⁵ / ₈	3 ³ / ₁₆	7 ¹¹ / ₁₆	9 ⁵ / ₈	
	5	2 ¹ / ₂	2 ¹ / ₄ -12	1 ⁷ / ₈ -12	3	3.124	1	2 ¹ / ₁₆	4 ¹ / ₂	2 ³ / ₈	4	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
	6	3	2 ³ / ₄ -12	2 ¹ / ₄ -12	3 ¹ / ₂	3.749	1	2 ⁵ / ₈	5	2 ⁷ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
	7	3 ¹ / ₂	3 ¹ / ₄ -12	2 ¹ / ₂ -12	3 ¹ / ₂	4.249	1	3	5	3 ³ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
	8	4	3 ³ / ₄ -12	3-12	4	4.749	1	3 ³ / ₈	5 ¹ / ₂	3 ⁷ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
	9	4 ¹ / ₂	4 ¹ / ₄ -12	3 ¹ / ₄ -12	4 ¹ / ₂	5.249	1	3 ⁷ / ₈	6	4 ³ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	8 ⁷ / ₈	3 ⁷ / ₁₆	7 ¹⁵ / ₁₆	9 ⁷ / ₈	
10	1 (Std.)	1 ³ / ₄	1 ¹ / ₂ -12	1 ¹ / ₄ -12	2	2.374	3/4	1 ¹ / ₂	3 ¹ / ₈	1 ¹¹ / ₁₆	4	3/8	1 ¹ / ₈	1 ⁷ / ₈	10 ³ / ₈	3 ¹ / ₈	8 ¹⁵ / ₁₆	11 ³ / ₄	
	3	2	1 ³ / ₄ -12	1 ¹ / ₂ -12	2 ¹ / ₄	2.624	7/8	1 ¹¹ / ₁₆	3 ¹ / ₂	1 ¹¹ / ₁₆	4	3/8	1 ¹ / ₄	2	10 ¹ / ₂	3 ¹ / ₄	9 ¹ / ₁₆	11 ⁷ / ₈	
	4	2 ¹ / ₂	2 ¹ / ₄ -12	1 ⁷ / ₈ -12	3	3.124	1	2 ¹ / ₁₆	4 ¹ / ₂	2 ³ / ₈	4	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	5	3	2 ³ / ₄ -12	2 ¹ / ₄ -12	3 ¹ / ₂	3.749	1	2 ⁵ / ₈	5	2 ⁷ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	6	3 ¹ / ₂	3 ¹ / ₄ -12	2 ¹ / ₂ -12	3 ¹ / ₂	4.249	1	3	5	3 ³ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	7	4	3 ³ / ₄ -12	3-12	4	4.749	1	3 ³ / ₈	5 ¹ / ₂	3 ⁷ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	8	4 ¹ / ₂	4 ¹ / ₄ -12	3 ¹ / ₄ -12	4 ¹ / ₂	5.249	1	3 ⁷ / ₈	6	4 ³ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	9	5	4 ³ / ₄ -12	3 ¹ / ₂ -12	5	5.749	1	4 ¹ / ₄	6 ¹ / ₂	4 ⁷ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
	0	5 ¹ / ₂	5 ¹ / ₄ -12	4-12	5 ¹ / ₂	6.249	1	4 ⁵ / ₈	7	5 ³ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	10 ³ / ₄	3 ¹ / ₂	9 ⁵ / ₁₆	12 ¹ / ₈	
12	1 (Std.)	2	1 ³ / ₄ -12	1 ¹ / ₂ -12	2 ¹ / ₄	2.624	7/8	1 ¹¹ / ₁₆	3 ¹ / ₂	1 ¹¹ / ₁₆	4	1 ¹ / ₄	1 ¹ / ₄	2	11 ¹ / ₈	3 ¹ / ₄	9 ⁹ / ₁₆	12 ⁷ / ₈	
	3	2 ¹ / ₂	2 ¹ / ₄ -12	1 ⁷ / ₈ -12	3	3.124	1	2 ¹ / ₁₆	4 ¹ / ₂	2 ³ / ₈	4	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	4	3	2 ³ / ₄ -12	2 ¹ / ₄ -12	3 ¹ / ₂	3.749	1	2 ⁵ / ₈	5	2 ⁷ / ₈	5 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	5	3 ¹ / ₂	3 ¹ / ₄ -12	2 ¹ / ₂ -12	3 ¹ / ₂	4.249	1	3	5	3 ³ / ₈	5 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	6	4	3 ³ / ₄ -12	3-12	4	4.749	1	3 ³ / ₈	5 ¹ / ₂	3 ⁷ / ₈	5 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	7	4 ¹ / ₂	4 ¹ / ₄ -12	3 ¹ / ₄ -12	4 ¹ / ₂	5.249	1	3 ⁷ / ₈	6	4 ³ / ₈	7	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	8	5	4 ³ / ₄ -12	3 ¹ / ₂ -12	5	5.749	1	4 ¹ / ₄	6 ¹ / ₂	4 ⁷ / ₈	7	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	9	5 ¹ / ₂	5 ¹ / ₄ -12	4-12	5 ¹ / ₂	6.249	1	4 ⁵ / ₈	7	5 ³ / ₈	7	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
	0	6	6-12	5-12	6	6.749	1	5	7	6	7	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	11 ³ / ₈	3 ¹ / ₂	9 ¹³ / ₁₆	13 ¹ / ₈	
14	1 (Std.)	2 ¹ / ₂	2 ¹ / ₄ -12	1 ⁷ / ₈ -12	3	3.124	1	2 ¹ / ₁₆	4 ¹ / ₂	2 ³ / ₈	4	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	12 ⁷ / ₈	3 ¹³ / ₁₆	11 ¹ / ₈	14 ⁷ / ₈	
	3	3	2 ³ / ₄ -12	2 ¹ / ₄ -12	3 ¹ / ₂	3.749	1	2 ⁵ / ₈	5	2 ⁷ / ₈	5 ¹ / ₂	1 ¹ / ₂	1 ¹ / ₂	2 ¹ / ₄	12 ⁷ / ₈	3 ¹³ / ₁₆	11 ¹ / ₈	14 ⁷ / ₈	
	4	3 ¹ / ₂	3 ¹ / ₄ -12	2 ¹ / ₂ -12	3 ¹ / ₂	4.249	1	3	5	3 ³ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	12 ⁷ / ₈	3 ¹³ / ₁₆	11 ¹ / ₈	14 ⁷ / ₈	
	5	4	3 ³ / ₄ -12	3-12	4	4.749	1	3 ³ / ₈	5 ¹ / ₂	3 ⁷ / ₈	5 ¹ / ₂	1/2	1 ¹ / ₂	2 ¹ / ₄	12 ⁷ / ₈	3 ¹³ / ₁₆	11 ¹ / ₈	14 ⁷ / ₈	
	6	4 ¹ / ₂	4 ¹ / ₄ -12	3 ¹ / ₄ -12	4 ¹ / ₂	5.249	1	3 ⁷ / ₈	6	4 ³ / ₈	7	1/2	1 ¹ / ₂	2 ¹ / ₄	12 ⁷ / ₈	3 ¹³ / ₁₆	11		

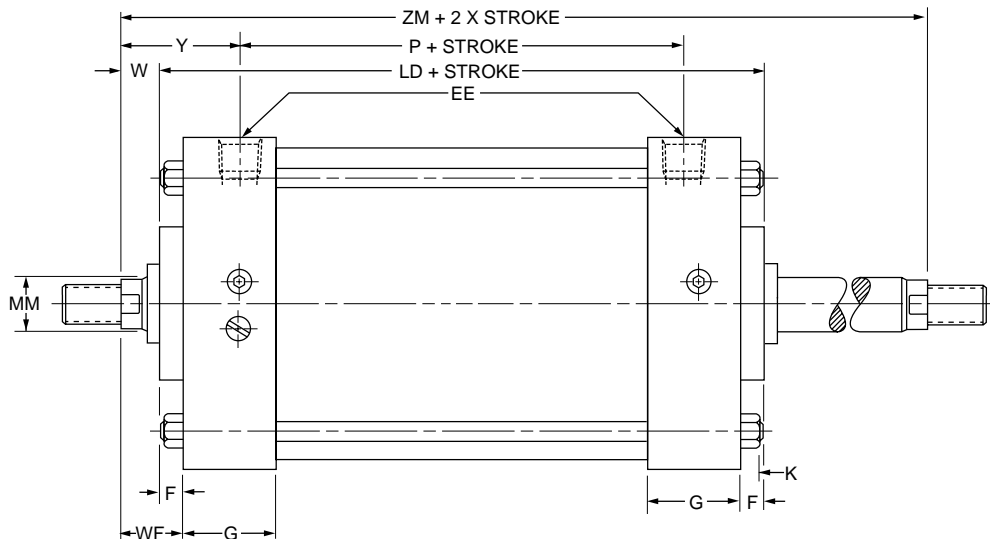
How to Use Double Rod Cylinder Dimensioned Drawings



To determine dimensions for a double rod cylinder, first refer to the desired single rod mounting style cylinder shown on preceding pages of this catalog. (See table at left.) After selecting necessary dimensions from that drawing, return to this page supplement the single rod dimensions with those shown on drawings at right and dimension table below. Note that double rod cylinders have a head (Dim. G) at both ends and that dimension LD replace LB and ZL replaces ZB, etc. The double rod dimensions differ from, or are in addition to those for single rod cylinders shown on preceding pages and provide the information needed to completely dimension a double rod cylinder.

On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from one end only.

7"- 14" Bores



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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Double Rod End Cylinders
7" to 14" Bore Sizes

Table 1 – Envelope and Mounting Dimensions

Bore	E	EE NPTF	F	G	K	LD	P	SA	SS
7	7 1/2	3/4	3/4	2	9/16	7 1/8	3 1/4	-	4 1/4
8	8 1/2	3/4	3/4	2	9/16	7 1/8	3 1/4	9 1/4	4 1/4
10	10 5/8	1	3/4	2 1/4	1 1/16	8 1/8	4 1/8	10 7/8	4 7/8
12	12 3/4	1	3/4	2 1/4	1 1/16	8 5/8	4 5/8	11 3/8	5 3/8
14	14 3/4	1 1/4	3/4	2 3/4	3/4	10 1/8	5 1/2	13 1/2	6 3/8

Table 2 – Rod End Dimensions and Envelope Dimensions Affected By Rod Size

Bore	Rod No.	Rod Dia. MM	Thread		Rod End Dimensions and Envelope Dimensions Affected By Rod Size									
			Style 8 CC	Style 4 & 9 KK	A	+ .000 -.002 B	C	D	NA	V	W	WF	Y	ZM
7	1 (Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	1/4	7/8	1 5/8	2 13/16	8 7/8
	2	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/8	1 1/8	1 7/8	3 1/16	9 3/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	3/8	1 1/4	2	3 3/16	9 5/8
8	1 (Std.)	1 3/8	1 1/4-12	1-14	1 5/8	1.999	5/8	1 1/8	1 5/16	1/4	7/8	1 5/8	2 13/16	8 7/8
	2	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	5 3/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
	3	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/8	1 1/8	1 7/8	3 1/16	9 3/8
	4	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	3/8	1 1/4	2	3 3/16	9 5/8
	5	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
	6	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
	7	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
	8	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
	9	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	4 3/8	1/2	1 1/2	2 1/4	3 7/16	10 1/8
10	1 (Std.)	1 3/4	1 1/2-12	1 1/4-12	2	2.374	3/4	1 1/2	1 11/16	3/8	1 1/8	1 7/8	3 1/8	10 3/8
	3	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	3/8	1 1/4	2	3 1/4	10 5/8
	4	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	5	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	6	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	7	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	8	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	4 3/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	9	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	4 7/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
	0	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	5 3/8	1/2	1 1/2	2 1/4	3 1/2	11 1/8
12	1 (Std.)	2	1 3/4-12	1 1/2-12	2 1/4	2.624	7/8	1 11/16	1 15/16	3/8	1 1/4	2	3 1/4	11 1/8
	3	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	4	3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	5	3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	6	4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	7	4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	4 3/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	8	5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	4 7/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	9	5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	5 3/8	1/2	1 1/2	2 1/4	3 1/2	11 5/8
	14	1 (Std.)	2 1/2	2 1/4-12	1 7/8-12	3	3.124	1	2 1/16	2 3/8	1/2	1 1/2	2 1/4	3 13/16
3		3	2 3/4-12	2 1/4-12	3 1/2	3.749	1	2 5/8	2 7/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8
4		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.249	1	3	3 3/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8
5		4	3 3/4-12	3-12	4	4.749	1	3 3/8	3 7/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8
6		4 1/2	4 1/4-12	3 1/4-12	4 1/2	5.249	1	3 7/8	4 3/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8
7		5	4 3/4-12	3 1/2-12	5	5.749	1	4 1/4	4 7/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8
8		5 1/2	5 1/4-12	4-12	5 1/2	6.249	1	4 5/8	5 3/8	1/2	1 1/2	2 1/4	3 13/16	13 1/8

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Lin-Act

Cylinder Accessories

Lin-Act Series LAA Heavy-Duty Air Cylinders



Cylinder Accessories

Lin-Act offers a complete range of cylinder accessories to assure you of greatest versatility in present or future cylinder applications.

Rod End Accessories

Accessories offered for the rod end of the cylinder include Rod Clevis, Eye Bracket, Knuckle, Clevis Bracket and Pivot Pin. To select the proper part number for any desired accessory, refer to Chart A below and look opposite the thread size of the rod end as indicated in the first column. The Pivot Pins, Eye Brackets and Clevis Brackets are listed opposite the thread size which their mating Knuckles or Clevises fit.

Chart A

Thread Size	Mating Parts			Mating Parts			Alignment Coupler
	Rod Clevis	Eye Bracket	Pin	Knuckle	Clevis Bracket	Pin	
5/16-24	51221	74077	—	74075	74076	74078	1347570031
7/16-20	50940	69195	68368	69089	69205	68368	1347570044
1/2-20	50941	69195	68368	69090	69205	68368	1347570050
3/4-16	50942	69196	68369	69091	69206†	68369	1347570075
3/4-16	133284	69196	68369	69091	69206	68369	1347570075
7/8-14	50943	*85361	68370	69092	69207	68370	1347570088
1-14	50944	*85361	68370	69093	69207	68370	1347570100
1-14	133285	*85361	68370	69093	69207	68370	1347570100
1 1/4-12	50945	69198	68371	69094	69208	68371	1337390125
1 1/4-12	133286	69198	68371	69094	69208	68371	1337390125
1 1/2-12	50946	*85362	68372	69095	69209	68372	Consult Factory
1 3/4-12	50947	*85363	68373	69096	69210	69215	
1 7/8-12	50948	*85363	68373	69097	69210	69215	
2 1/4-12	50949	*85364	68374	69098	69211	68374	
2 1/2-12	50950	*85365	68375	69099	69212	68375	
2 3/4-12	50951	*85365	68375	69100	69213	69216	
3 1/4-12	50952	73538	73545	73536	73542	73545	
3 1/2-12	50953	73539	73547	73537	73542	73545	
4-12	50954	73539	73547	73538	73543	82181	
4 1/2-12	—	—	—	73439	73544	73547	

†For alignment coupler dimensions, see page 46.

*Cylinder accessory dimensions conform to NFPA recommended standard NFPA/T3.6.8 R1-1984, NFPA recommended standard fluid power systems — cylinder — dimensions for accessories for cataloged square head industrial types. Lin-Act adopted this standard in April, 1985. Eye Brackets or Mounting Plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style Eye Brackets or Mounting Plates consult Drawing #144805 or previous issues of this catalog.

NOTE: For economical accessory selection, it is recommended that rod end style 4 be specified on your cylinder order.

Accessory Load Capacity

The various accessories on Pages 44 and 45 have been load rated for your convenience. The load capacity in lbs. shown on page 45, is the recommended maximum load for that accessory based on a 4:1 design factor in tensions. (Pivot Pin is rated in shear.) Before specifying, compare the actual load or the tension (pull) force at maximum operating pressure of the cylinder with the load capacity of the accessory you plan to use. If load or pull force of cylinder exceeds load capacity of accessory, consult factory.

Mounting Plates

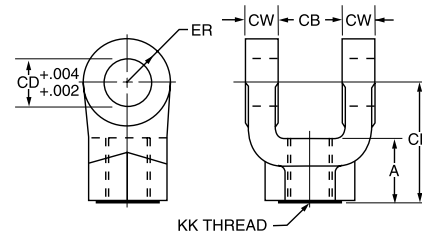
Mounting Plates for Style MP1 and Style MP2 (Clevis mounted) cylinders are offered. To select proper part number for your application, refer to Chart B, above right.

Chart B

Mtg. Plate	Series LAA
Part No.	Bore Size
74076‡	1"
69195	1 1/2", 2", 2 1/2"
69196	3 1/4", 4", 5"
*85361	6", 7", 8"
69198	10"
*85362	12"
*85363	14"

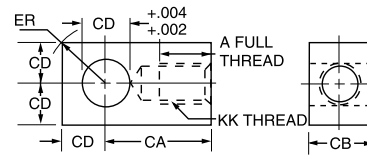
‡Mounting plate for 1" bore single lug MP2 & MP1 cylinder mounting style is Clevis Bracket P/N 74076.

② Female Rod Clevis



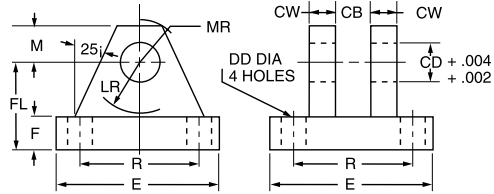
Order to fit thread size.

③ Knuckle (Female Rod Eye)



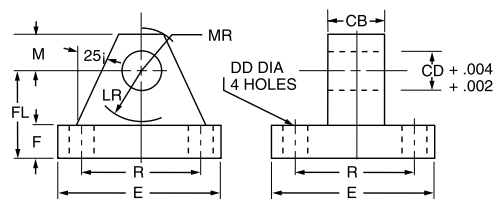
Order to fit thread size.

④ Clevis Bracket for Knuckle



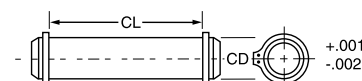
Order to fit Knuckle.

⑧ Mounting Plate or ⑤ Eye Bracket



1. When used to mate with the Rod Clevis, select from Chart A.
2. When used to mount the style MP1 or MP2 cylinders, select from the Mounting Plate Selection Table. See Chart B at lower left.

⑥ Pivot Pin



1. Pivot Pins are furnished with Clevis Mounted Cylinders as standard.
2. Pivot Pins are furnished with (2) Retainer Rings.
3. Pivot Pins must be ordered as a separate item if to be used with Knuckles, Rod Clevises, or Clevis Brackets.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cylinder Accessories

	Female Rod Clevis Part Number																		
	51221†	50940	50941	50942	133284	50943	50944	133285	50945	133286	50946	50947	50948	50949	50950	50951	50952	50953	50954
A	13/16	3/4	3/4	1 1/8	1 1/8	1 5/8	1 5/8	1 5/8	2	2	2 1/4	3	3	3 1/2	3 1/2	3 1/2	3 1/2†	4‡	4‡
CB	1 1/32	3/4	3/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2 1/2	2 1/2	2 1/2	3	3	3	4	4 1/2	4 1/2
CD	5/16	1/2	1/2	3/4	3/4	1	1	1	1 3/8	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4	4
CE	2 1/4	1 1/2	1 1/2	2 1/8	2 3/8	2 15/16	2 15/16	3 1/8	3 3/4	4 1/8	4 1/2	5 1/2	5 1/2	6 1/2	6 3/4	6 3/4	7 3/4	8 13/16	8 13/16
CW	13/64	1/2	1/2	5/8	5/8	3/4	3/4	3/4	1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2 1/4	2 1/4
ER	19/64	1/2	1/2	3/4	3/4	1	1	1	1 3/8	1 3/8	1 3/4	2	2	2 1/2	2 1/2	2 3/4	3 1/2	4	4
KK	5/16-24	7/16-20	1/2-20	3/4-16	3/4-16	7/8-14	1-14	1-14	1 1/4-12	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 1/2-12	2 3/4-12	3 1/4-12	3 1/2-12	4-12
LoadCapacityLbs.ⓔ	2600	4250	4900	11200	11200	18800	19500	19500	33500	33500	45600	65600	65600	98200	98200	98200	156700	193200	221200

	Knuckle Part Number																
	74075	69089	69090	69091	69092	69093	69094	69095	69096	69097	69098	69099	69100	73536	73437	73438	73439
A	3/4	3/4	3/4	1 1/8	1 1/8	1 5/8	2	2 1/4	2 1/4	3	3 1/2	3 1/2	3 5/8	4‡	5	5 1/2	5 1/2
CA	1 1/2	1 1/2	1 1/2	2 1/16	2 3/8	2 13/16	3 7/16	4	4 3/8	5	5 13/16	6 1/8	6 1/2	7 5/8	7 5/8	9 1/8	9 1/8
CB	7/16	3/4	3/4	1 1/4	1 1/2	1 1/2	2	2 1/2	2 1/2	2 1/2	3	3	3 1/2	4	4	4 1/2	5
CD	7/16	1/2	1/2	3/4	1	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	3 1/2	4	4
ER	19/32	23/32	23/32	1 1/16	1 7/16	1 7/16	1 31/32	2 1/2	2 27/32	2 27/32	3 9/16	4 1/4	4 1/4	4 31/32	4 31/32	5 11/16	5 11/16
KK	5/16-24	7/16-20	1/2-20	3/4-16	7/8-14	1-14	1 1/4-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/4-12	2 1/2-12	2 3/4-12	3 1/4-12	3 1/2-12	4-12	4 1/2-12
LoadCapacityLbs.ⓔ	3300	5000	5700	12100	13000	21700	33500	45000	53500	75000	98700	110000	123300	161300	217300	273800	308500

	Clevis Bracket for Knuckle Part Number												
	74076	69205	69206	69207	69208	69209	69210	69211	69212	69213	73542	73543	73544
CB	15/32	3/4	1 1/4	1 1/2	2	2 1/2	2 1/2	3	3	3 1/2	4	4 1/2	5
CD	7/16	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3	3 1/2	4	4
CW	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2
DD	17/64	13/32	17/32	2 1/32	2 1/32	2 29/32	1 1/16	1 3/16	1 5/16	1 5/16	1 13/16	2 1/16	2 1/16
E	2 1/4	3 1/2	5	6 1/2	7 1/2	9 1/2	12 3/4	12 3/4	12 3/4	12 3/4	15 1/2	17 1/2	17 1/2
F	3/8	1/2	5/8	3/4	7/8	7/8	1	1	1	1	1 11/16	1 15/16	1 15/16
FL	1	1 1/2	1 7/8	2 1/4	3	3 5/8	4 1/4	4 1/2	6	6	6 11/16	7 11/16	7 11/16
LR	5/8	3/4	1 3/16	1 1/2	2	2 3/4	3 3/16	3 1/2	4 1/4	4 1/4	5	5 3/4	5 3/4
M	3/8	1/2	3/4	1	1 3/8	1 3/4	2 1/4	2 1/2	3	3	3 1/2	4	4
MR	1/2	5/8	29/32	1 1/4	1 21/32	2 7/32	2 25/32	3 1/8	3 19/32	3 19/32	4 1/8	4 7/8	4 7/8
R	1.75	2.55	3.82	4.95	5.73	7.50	9.40	9.40	9.40	9.40	12.00	13.75	13.75
LoadCapacityLbs.ⓔ	3600	7300	14000	19200	36900	34000	33000	34900	33800	36900	83500	102600	108400

	Eye Bracket and Mounting Plate Part Number										
	74077	69195	69196	85361*	69198	85362*	85363*	85364*	85365*	73538	73539
CB	5/16	3/4	1 1/4	1 1/2	2	2 1/2	2 1/2	3	3	4	4 1/2
CD	5/16	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4
DD	17/64	13/32	17/32	2 1/32	2 1/32	2 29/32	1 1/16	1 3/16	1 5/16	1 13/16	2 1/16
E	2 1/4	2 1/2	3 1/2	4 1/2	5	6 1/2	7 1/2	8 1/2	9 1/2	12 5/8	14 7/8
F	3/8	3/8	5/8	7/8	7/8	1 1/8	1 1/2	1 3/4	2	1 11/16	1 15/16
FL	1	1 1/8	1 7/8	2 3/8	3	3 3/8	4	4 3/4	5 1/4	5 11/16	6 7/16
LR	5/8	3/4	1 1/4	1 1/2	2 1/8	2 1/4	2 1/2	3	3 1/4	4	4 1/2
M	3/8	1/2	3/4	1	1 3/8	1 3/4	2	2 1/2	2 3/4	3 1/2	4
MR	1/2	9/16	7/8	1 1/4	1 5/8	2 1/8	2 7/16	3	3 1/4	4 1/8	5 1/4
R	1.75	1.63	2.55	3.25	3.82	4.95	5.73	6.58	7.50	9.62	11.45
LoadCapacityLbs.ⓔ	1700	4100	10500	20400	21200	49480	70000	94200	121900	57400	75000

	Pivot Pin Part Number													
	74078	68368	68369	68370	68371	68372	68373	69215	68374	68375	69216	73545	82181	73547*
CD	7/16	1/2	3/4	1	1 3/8	1 3/4	2	2	2 1/2	3	3	3 1/2	4	4
CL	1 5/16	1 7/8	2 5/8	3 1/8	4 1/8	5 3/16	5 3/16	5 11/16	6 3/16	6 1/4	6 3/4	8 1/4	8 5/8	9
ShearCapacityLbs.ⓔ	6600	8600	19300	34300	65000	105200	137400	137400	214700	309200	309200	420900	565800	565800

1 1/16" Cylinder accessory dimensions conform to NFPA recommended standard NFPA/T3.6.8 R1-1984, NFPA recommended standard fluid power systems – cylinder – dimensions for accessories for cataloged square head industrial types. Eye brackets or mounting plates shipped before this date may have different dimensions and will not necessarily interchange with the NFPA standard. For dimensional information on older style eye brackets or mounting plates consult Drawing #144805 or previous issues of this catalog.

ⓔ See Accessory Load Capacity note on page 42.

*These sizes supplied with cotter pins.

†Includes pivot pin.

‡Consult appropriate cylinder rod end dimensions for compatibility.

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Lin-Act

Linear Alignment Couplers are available in 13 standard thread sizes...

Cost Saving Features and Benefits Include...

- Maximum reliability for trouble-free operation, long life and lower operating costs
- Increased cylinder life by reducing wear on piston and rod bearings
- Simplifying cylinder installation and reducing assembly costs
- Increase rod bearing and rod seal life for lower maintenance costs

Alignment Coupler

See Table 1 for Part Numbers and Dimensions

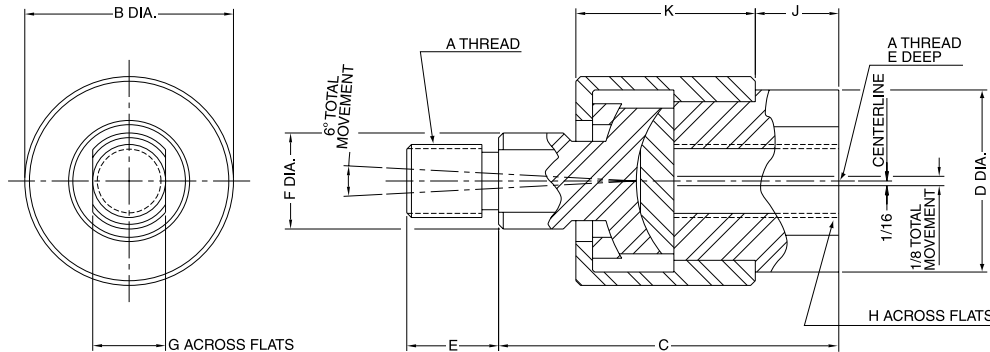


Table 1 — Part Numbers and Dimensions

Part No.	A	B	C*	D	E	F	G	H	J	K	Max. Pull Load (lbs.)	Approx. Weight (lbs.)
1347570031	5/16-24	1 1/8	1 3/4	15/16	1/2	1/2	3/8	3/4	3/8	15/16	1200	.35
1347570038	3/8-24	1 1/8	1 3/4	15/16	1/2	1/2	3/8	3/4	3/8	15/16	2425	.35
1347570044	7/16-20	1 3/8	2	1 1/8	3/4	5/8	1/2	7/8	3/8	1 3/32	3250	.55
1347570050	1/2-20	1 3/8	2	1 1/8	3/4	5/8	1/2	7/8	3/8	1 3/32	4450	.55
1347570063	5/8-18	1 3/8	2	1 1/8	3/4	5/8	1/2	7/8	3/8	1 3/32	6800	.55
1347570075	3/4-16	2	2 5/16	1 5/8	1 1/8	15/16	3/4	1 5/16	7/16	1 9/32	9050	1.4
1347570088	7/8-14	2	2 5/16	1 5/8	1 1/8	15/16	3/4	1 5/16	7/16	1 9/32	14450	1.4
1347570100	1-14	3 1/8	3	2 3/8	1 5/8	1 7/16	1 1/4	1 7/8	3/4	1 25/32	19425	4.8
1347570125	1 1/4-12	3 1/8	3	2 3/8	1 5/8	1 7/16	1 1/4	1 7/8	3/4	1 25/32	30500	4.8
1337390125	1 1/4-12	3 1/2	4	2	2	1 1/2	1 1/4	1 11/16	3/4	2 1/2	30500	6.9
1337390150	1 1/2-12	4	4 3/8	2 1/4	2 1/4	1 3/4	1 1/2	1 15/16	7/8	2 3/4	45750	9.8
1337390175	1 3/4-12	4	4 3/8	2 1/4	2 1/4	1 3/4	1 1/2	1 15/16	7/8	2 3/4	58350	9.8
1337390188	1 7/8-12	5	5 5/8	3	3	2 1/4	1 15/16	2 5/8	1 3/8	3 3/8	67550	19.8

* - The 'C' dimension - overall length - is the same as existing couplers except where noted. In these cases it is shorter than previous design.

How to Order Linear Alignment Couplers — When ordering a cylinder with a threaded male rod end, specify the coupler of equal thread size by part number as listed in Table 1, i.e.; Piston Rod "KK" or "LL" dimension is 3/4" - 16", specify coupler part number 1347570075.

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Lin-Act

Lin-Act

LAA Position Control Adjustable Reed Switch

Features

- **Adjustable Over Entire Stroke Length**
- **Magnetically Actuated**
- **Rapid Response Time**
- **LED Standard**
- **Rugged Single Tie Rod Mounting**

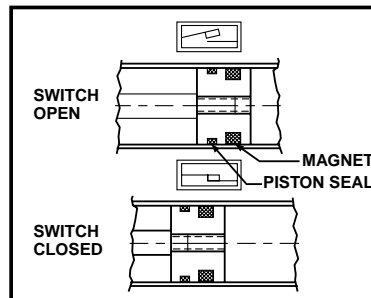
Lin-Act Series LAA Heavy-Duty Air Cylinders

Magnetically Actuated Switches

Magnetically Actuated Switches

The MA adjustable switch has been designed for use on LAA Series Pneumatic Cylinders. It is a normally open switch. The compact design of the switch causes a minimum interference with cylinder envelope dimensions. The MA switch will sense the magnetic piston through a non-ferrous cylinder barrel. Several MA switches may be mounted on a single cylinder to control or sequence several functions.

The MA switch is mounted on a single tie rod with an aluminum extrusion for easy adjustment. Its rugged construction will provide millions of trouble-free cycles. It is ideally suited as an input to programmable controllers or to activate an industrial relay.



Switch Specifications

	Reed Switch Assembly MAR-2 L074800000	Solid State Switch Assembly MAS-3PNP Sourcing L074490000 MAS-4NPN Sinking L074500000	Reed Switch Assembly L074800000	Solid State Switch Assembly MAS-3PNP Sourcing L074490000 MAS-4NPN Sinking L074500000
Switching Logic	Normally open, SPST (Form A)	NPN or PNP	14° to 140°F (-10° to 60°C)	14° to 140°F (-10° to 60°C)
Supply Voltage Range	85 to 125 VAC or 5-30 VDC ¹	10-30 VDC	-4° to 140°F (-20° to 60°C)	-4° to 158°F (-20° to 70°C)
On-State Voltage Drop	1.7V Maximum	See Circuits Below	Nema 6, IEC IP67	Nema 6, IEC IP67
Current Output Range	—	Up to 100 mA at 12 VDC Up to 200 mA at 24 VDC	2 conductor, 24 Gauge	3 conductor, 24 Gauge
Burden Current	—	7 mA at 12 VDC 16 mA at 24 VDC	39 inches, 1 Meter	39 inches, 1 Meter
Power Rating	10 Watts (Resistive) 5 Watts (Capacitive)	—	Color of Cable	See Below
Switching Current Range	30 mA to 200 mA (Resistive) 30 mA to 100 mA (Capacitive)	—	Switching Response	300 Hz Maximum
Leakage Current	0	10µA	Shock Resistance	30g
LED Function	Red, Target Present	Red, Target Present	Vibration Resistance	10-55 Hz, 1.5 mm Double Amplitude
Minimum Current to Light LED	18 mA	1 mA		not applicable

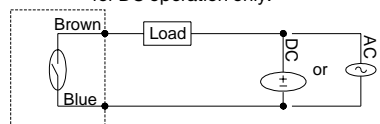
¹Polarity is restricted to DC operation: (+) to Brown (White*) (-) to Blue (Black*)
If these connections are reversed the contacts will close, but the LED will not light.

Circuits

Reed Switch (MAR-2)

Part No. L074480000

NOTE: Polarity must be observed for DC operation only.

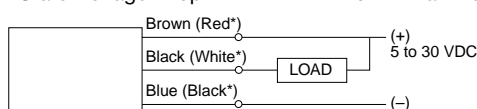


NPN Sinking Output (MAS-4)

Part No. L074500000

Color of Cable Black

"On" State Voltage Drop 0.7V Maximum

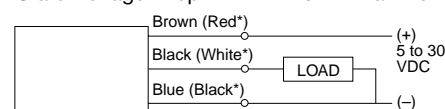


PNP Sourcing Output (MAS-3)

Part No. L074490000

Color of Cable Gray

"On" State Voltage Drop 0.2V Maximum

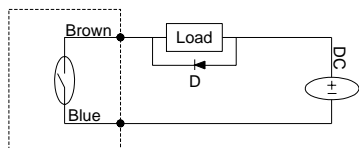


*Wire colors in parentheses pertain to switches manufactured before 10/15/93.

Circuit for Switching Contact Protection (Inductive Loads)

(Required for proper operation 24V DC)

Put Diode parallel to loads following polarity as shown below.



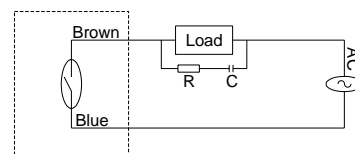
D: Diode: select a Diode with the breakdown voltage and current rating according to the load.

Typical Example — 100 Volt, 1 Amp Diode CR: Relay coil (under 0.5W coil rating)

(Recommended for longer life 125 VAC)

Put a resistor and capacitor in parallel with the load. Select the resistor and capacitor according to the load.

Typical Example:
CR: Relay coil (under 2W coil rating)
R: Resistor 1 KW - 5 KW, 1/4 W
C: Capacitor 0.1 mF, 600 V



Caution

- Use an ammeter to test reed switch current. Testing devices such as incandescent light bulbs may subject the reed switch to high in-rush loads.
- NOTE: When checking an unpowered reed switch for continuity with a digital ohmmeter the resistance reading will change from infinity to a very large resistance (2 M ohm) when the switch is activated. This is due to the presence of a diode in the reed switch.
- Anti-magnetic shielding is recommended for reed switches exposed to high external RF or magnetic fields.
- The magnetic field strength of the piston magnet is designed to operate with our switches. Other manufacturers' switches or sensors may not operate correctly in conjunction with these magnets.
- Current capabilities are relative to operational temperatures.
- Use relay coils for reed switch contact protection.
- The operation of some 120 VAC PLC's (especially some older Allen-Bradley PLC's) can overload the reed switch. The switch may fail to release after the piston magnet has passed. This problem may be corrected by the placement of a 700 to 1K OHM resistor between the switch and the PLC input terminal. Consult the manufacturer of the PLC for appropriate circuit.
- Switches with long wire leads (greater than 15 feet) can cause capacitance build-up and sticking will result. Attach a resistor in series with the reed switch (the resistor should be installed as close as possible to the switch). The resistor should be selected such that R (ohms) > E/0.3.

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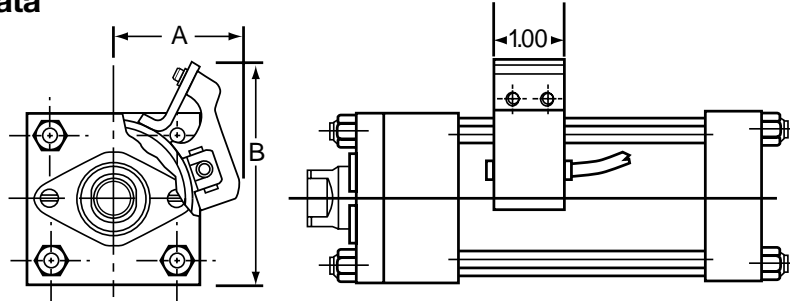
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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Magnetically Actuated
Switches

MA Switch Mounting Data



Bore	A	B	Piston Travel at Midstroke (Switch On) (±.01)	Minimum Activation Distance from End of Stroke	
				Head	Cap
1½	1.90	2.71	.37	.20	.20
2	2.10	3.25	.37	.20	.20
2½*	2.20	3.60	.37	.13	.13
3¼*	2.70	4.25	.37	.13	.13
4*	2.90	4.90	.37	.13	.13
5†	3.20	5.85	.37	0	0
6†	3.82	6.70	.37	0	0

Note:

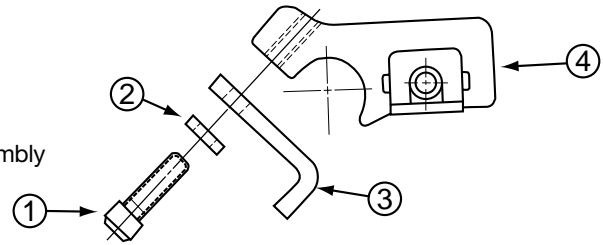
*To maintain minimum activation distance switch can only be mounted with "LED" against end plate because of cable interference on 'End of Stroke' applications.

†On 5.0" and 6.0" bore cylinders, end of stroke activation will occur without the switch physically touching the head or cap.

Standard Switch Assembly

Consists of:

- | | |
|--|--|
| 1. 0106280032 (2)
#8-32 Sh. Cap Screw | 3. 0854530000 (1)
Bracket Clamp |
| 2. 0108850008 (2)
Lockwasher | 4. (1) Switch & Bracket Sub-Assembly
MAR-2 – 0862580000
MAS-3 – 0862590000
MAS-4 – 0862600000 |



How to Order:

MA switches are not mounted to the cylinder prior to shipment. When ordering a cylinder to accommodate an MA switch:

- Derive a proper model number as shown in the table below.
- Place an "S" in the special features column.

- Underneath the model number specify: Cylinder prepared for MA switch.
- As a separate item specify the number of switch assemblies required.

Example	Bore Size	Cushion Head End	Double Rod	Mounting Style	Series	Special Features	Piston Rod Number	Piston Rod End	Piston Rod Alternate Threads	Thread Type	Cushion Cap End	Stroke
	6	C	K	J	LAA	S	1	4	2	A	C	x12
	Specify 1½" through 6"	Specify only if cushion head end is required	Use only if double rod cylinder is required	Specify mounting style: T, TB, TC, TD, J, H, C, F, BB, BC, D, DB, or DD	Specify Series LAA	Specify for cylinder prepared for switches and/or other modifications	Specify rod code number	Specify Style 4 Small male Style 8 Intermediate male Style 9 Short Female Style 3 Special Specify KK, A, LA, LAF, W, WF dimension	Use only for 2X longer than standard rod end thread	Specify A = UNF W = BSF M = Metric	Specify only if cushion cap end is required	Specify in inches show symbol X just ahead of stroke length

Example To order a 2½" x 10" LAA cylinder with MA switches to sense the end of stroke at the head and cap end specify:

Item A	Quantity (1)	Description 2.50 C J LAA 14A C x 10.000	#L074480000 – MAR-2
B	(2)	(1) Cylinder prepared for LAA Switch (*) Switch Assemblies	#L074490000 – MAS-3 #L074500000 – MAS-4

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Lin-Act



EPS-6 and EPS-7™ Proximity Switches

- Completely Solid State
- Low Leakage Current
- CE Rated
- Shock & Vibration Resistant

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The EPS is an inductive type proximity switch that will operate in either pneumatic or hydraulic cylinders, providing full extend or retract indication. The completely solid state electronics are epoxy potted in housings that meet enclosure types listed below. The non-contact probe senses the presence of the ferrous cushion spear or sleeve. There are no cams, plungers, mechanical switches or dynamic seals to wear out or go out of adjustment. By mounting the EPS proximity switches in the cylinder head or cap, costly design and set-up time associated with external limit switches is eliminated. Also, since the probe is sealed within the cylinder body the switches cannot be tampered with. The EPS meets CE requirements and is designed to operate within one inch of resistance welder tips carrying 20,000 Amperes.

Specify EPS-7 for General Purpose, heavy duty applications.

The standard EPS-7 is a 2-wire AC/DC switch which will operate from 50 to 220 VAC/DC. The low 1.7 mA off-state leakage current allows the EPS to operate relay coil loads or act as a direct input into a PC. The standard short circuit protection protects the switch from shorts in the load or line. Upon sensing a short condition (5 Amp or greater current) the switch assumes a non-conducting mode. The fault condition must be removed and the power removed to reset, preventing automatic restarts.

A ready LED indicator illuminates to indicate that the power is on and the switch is not conducting. The Target LED will illuminate when the switch is activated.

For more information or applications requiring intrinsically-safe switches contact the CylinderDivision.

Features

- Completely Solid State – no moving parts to wear out
- Pneumatic or Hydraulic Use – mounts directly to LAA, LAL and LAH Series cylinders
- Low Leakage Current – directly compatible with programmable controllers
- Meets enclosure types IEC IP67
- CE Marked
- Standard Short Circuit Protection – operates safely near high magnetic fields such as those in welding equipment and large electric motors
- Shock and Vibration Resistant – withstands up to 30g's vibration to 2000 Hz

Specifications: EPS-7

Pressure Rating: 3000 psi hydraulic
250 psi pneumatic

Operating Temperature: -4° to +150°F

Repeatability: ±.004"

Switching Speed: 33 ms ± 8 ms

Actuation Point: .12" from end of stroke; ± .12"

Hysteresis (Typ): .004"

Supply Voltage: 50-220 VAC/DC

Leakage Current: 1.7 mA max

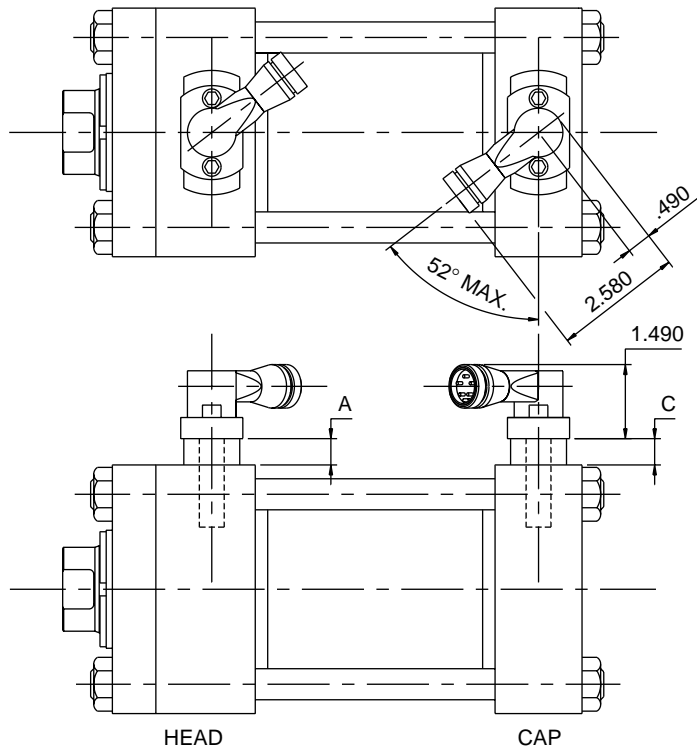
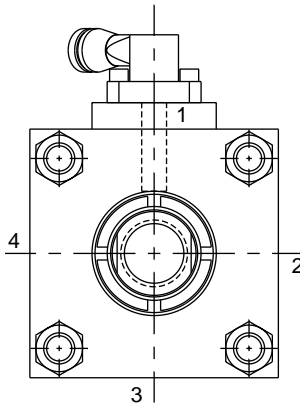
Inrush Current: 3 Amp

Load Current: 300 mA max; 5mA min

On State Voltage Drop: 10v @ 5-30 mA
<10v @ 31-500 mA

Features

- Low Leakage
- Short Circuit Protection
- PNP (Sourcing) and NPN (Sinking)
- Enclosure Rated IECIP67

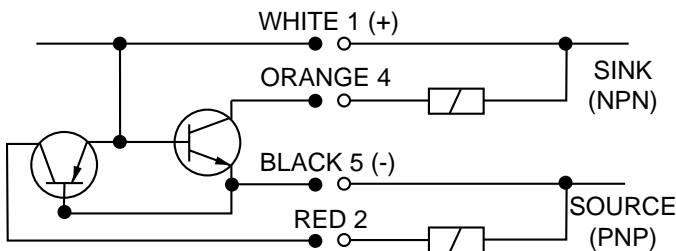


Specifications: EPS-6

Pressure Rating: 3000 psi
 Sensing Range: .080" ±10%
 Repeatability: + 10%
 Supply Voltage: 10 to 30 VDC
 Load Current Max.: 200 mA

Operating Temperature: -4° to 150°F
 "On-State" Voltage Drop: 0.8v @ 200 mA
 Hysteresis: 8% ±2% @ 20°C
 Switch Frequency: 15 Hz @ 50% Duty Cycle
 Switching Differential: 10%

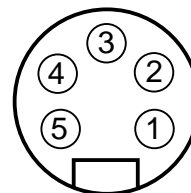
Wiring Diagrams and Information



Connectors

The male quick disconnect on the EPS-6 is a 5-pin mini connector, Lin-Act part number, 0859170006 (6-foot cable)

Plug Pin and Cable Identification



- 1) +10 to 30 VDC (White)
- 2) Source (Red)
- 3) Grounded not connected nor required
- 4) Sink (Orange)
- 5) Common (Black)

LED Function	"Ready"	"Target"
Power Applied (No Target)	ON	OFF
Target Present	OFF	ON
Short Circuit Condition	FLASH	FLASH

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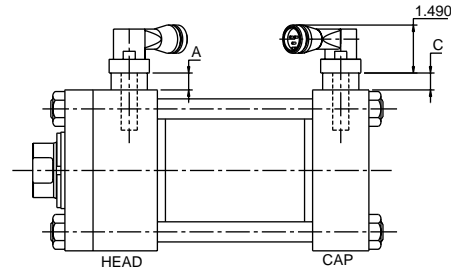
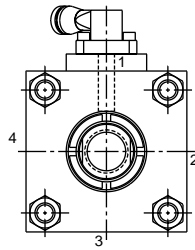
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Lin-Act Series LAA Heavy Duty Air Cylinders

EPS-6 and EPS-7
Proximity Switches
Dimensional Data

EPS-7 Heavy Duty Industrial Applications

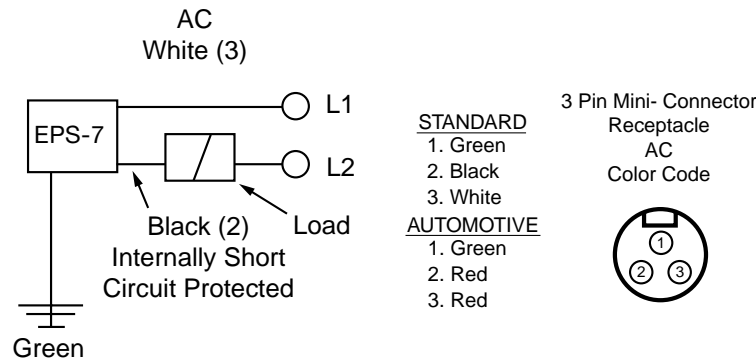


Series LAH — “A” will not exceed 0.86"
“C” will not exceed 1.75"

Series LAL — “A” will not exceed 1.55"
“C” will not exceed 1.05"

Series LAA — “A” will not exceed 1.55"
“C” will not exceed 1.30"

Wiring Diagrams and Information



Connectors

The male quick disconnect on the EPS-7 is a Brad Harrison 40909 connector.

Female connects must be purchased with one of the following cable lengths.

Cables for EPS Style Switches				
For Switch Style	Cable Length	Connector Style (Mini)	No. of Pins	Part Number
EPS 6	6 Ft.	Straight	5	0859170006
	12 Ft.			0859170012
EPS 7	6 Ft.	Straight	3	0853550006
	12 Ft.			0853550012
EPS 7	6 Ft.	90 degree	3	0875470006

Series and Parallel Wiring

When EPS-7 proximity switches are used as inputs to programmable controllers the preferred practice is to connect each switch to a separate input channel of the PC. Series or parallel operations may then be accomplished by the internal PC programming.

EPS-7 switches may be hard wired for series operation, but the voltage drop through the switches (see specifications) must not drop the available voltage level below what is needed to actuate the load.

EPS-7 switches may also be hard wired for parallel operation. However, the leakage current of each switch will pass through the load. The total of all leakage currents must not exceed the current required to actuate the load. In most cases, the use of two or more EPS-7 switches in parallel will require the use of a bypass (shunt) resistor. For more information on sizing a shunt resistor and wiring series and parallel operations, consult factory.

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Lin-Act

How to Order EPS-6 or EPS-7 Proximity Switches on Cylinders

EPS-6 or EPS-7 proximity switches may be ordered on Lin-Act Series LAA, LAL and LAH cylinders as follows:

- 1) Place a "S" in the model number to denote switches and/or special features.
- 2) Mounting styles E, D, DB, JB or HB should be used with caution because of possible mounting interferences. Consult factory for details.
- 3) Special modifications to cylinders other than switches must have a written description.

How to Specify EPS-7 Switches

4) Specify letter prefix "H" for EPS-7, and "D" for EPS-6, then fill in the four blanks specifying port location, switch orientation and actuation point for both head and cap. If only one switch is used, place "XXXX" in the unused blanks.

Example = HXXXX-42BGG denotes a switch on the cap end only, EPS-7

Head End

H	1	3	A	GG
Specify: "H" = EPS-7 "D" = EPS-6	Port Location See Figure 1.	Switch Location See Figure 1.	Switch Orientation See Figure 2 for EPS-7 and Eps-6 only.	Actuation Point GG = End of Stroke FF = Stroke to Go; See Bulletins 0840-TSD-1, 2 or 3 for stroke remaining.

Cap End

4	2	B	GG
Port Location See Figure 1.	Switch Location See Figure 1.	Switch Orientation* See Figure 2 for EPS-7 and Eps-6 only.	Actuation Point GG = End of Stroke FF = Stroke to Go; See Bulletins 0840-TSD-1, 2 or 3 for stroke remaining.

Note: All specified switch and port locations are as seen from rod end of cylinder.

Figure 1

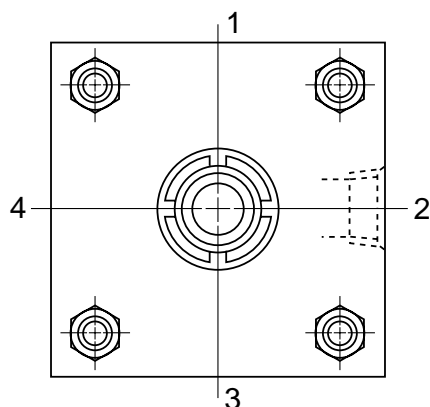
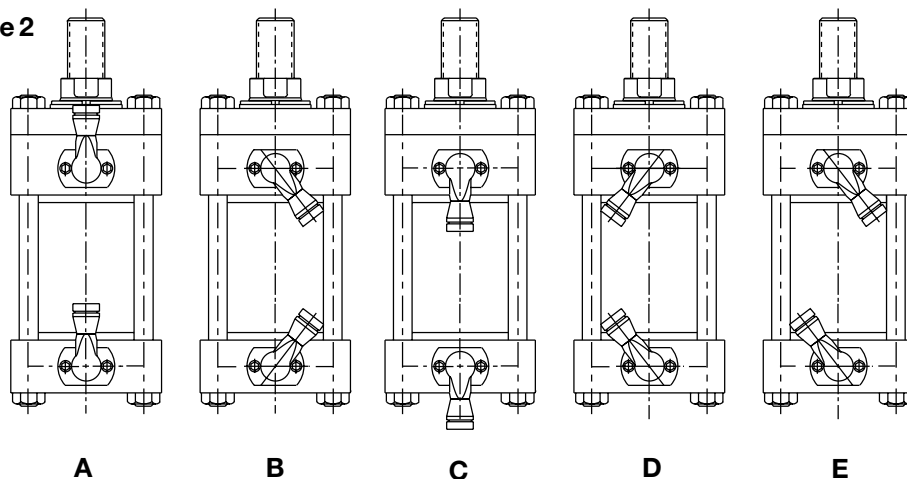


Figure 2



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Lin-Act

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

WARNING: ⚠ FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF CYLINDERS AND THEIR RELATED ACCESSORIES CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

Before selecting or using Lin-Act cylinders or related accessories, it is important that you read, understand and follow the following safety information.

User Responsibility

Due to very wide variety of cylinder applications and cylinder operating conditions, Lin-Act 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 catalogue are designed to Lin-Act's design guide lines and do not necessarily meet the design guide lines 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 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.

Seals

Part of the process of selecting a cylinder is the selection of seal compounds. Before making this selection read the Operating Fluids and Seals section in the Cylinder Application Engineering Data section of this catalogue.

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.

Piston Rods

Possible consequences of piston rod failure or separation of the piston rod from the piston, but not limited to are:

- Detachment of the machine member from the piston rod.
- 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.

Follow the recommendations of the Cylinder Stroke Chart found in the Cylinder Application Engineering Data section of this catalogue in the for piston rod diameter 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 piston rods. In some cases a stop is threaded onto one of the piston rods and used as an external stroke adjuster. The external stop will create a pinch point and the user should consider appropriate use of guards. If the external stop is not perpendicular to the contact surface it will place a bending moment on the piston rod which can lead to piston rod failure. An external stop will also negate the effect of a cushion and will subject the piston rod to impact loading. These two (2) conditions can cause piston rod failure. The use of an external stroke adjuster 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. Cylinder 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.

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.

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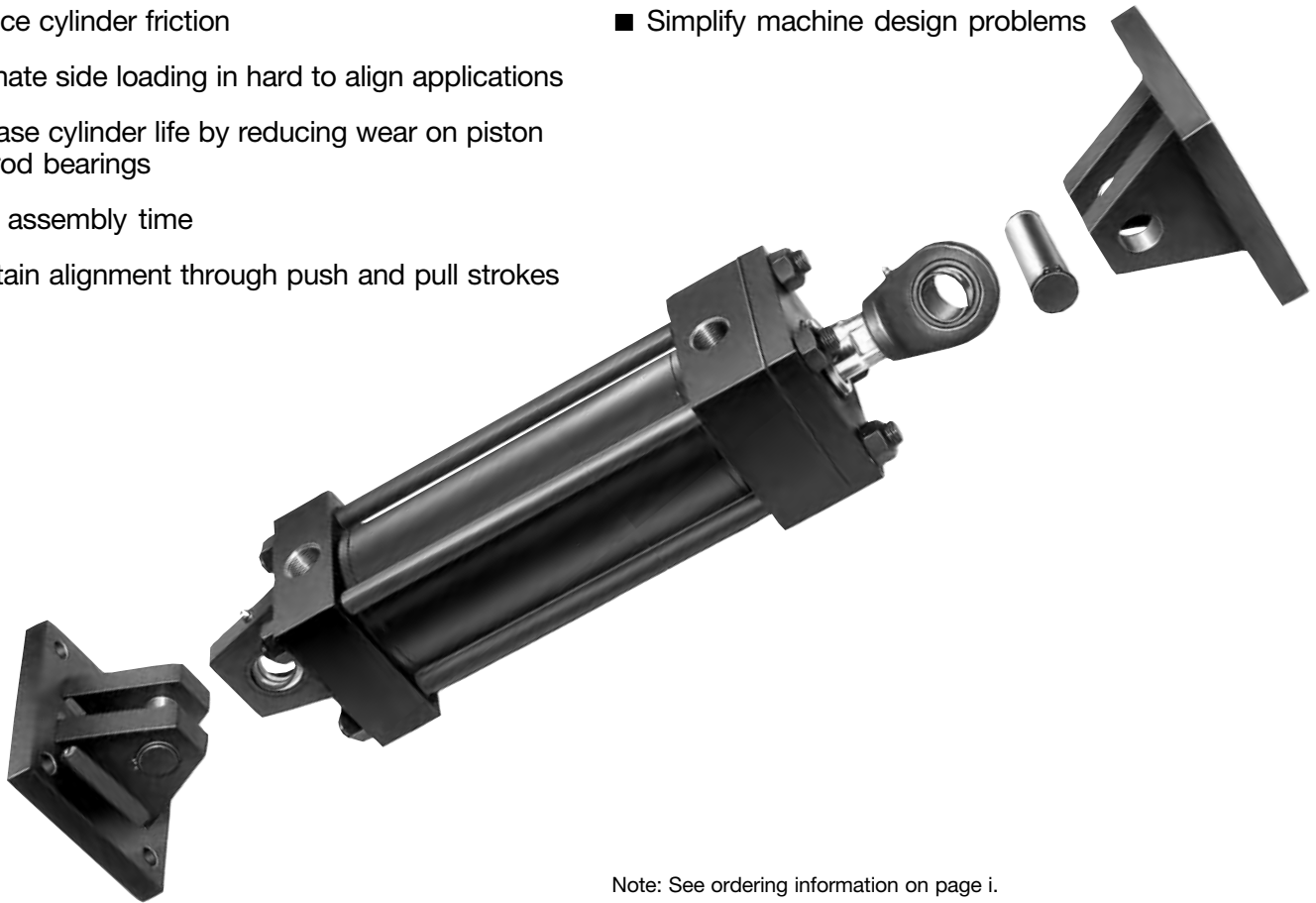


Spherical Bearings For Lin-Act Air and Hydraulic Cylinders

Spherical Bearing Mounts That Maintain Alignment Through Push and Pull Strokes.

Benefits Are...

- Simplify installation of cylinder
- Reduce cylinder friction
- Eliminate side loading in hard to align applications
- Increase cylinder life by reducing wear on piston and rod bearings
- Save assembly time
- Maintain alignment through push and pull strokes
- Increase rod bearing and rod seal life
- Simplify machine design problems



Note: See ordering information on page i.

LAA Series pneumatic cylinders are available with spherical bearing mounts at both ends or head and cap end only. The bearing at the cap end is housed in a single stud ear welded to the cap to form an integral structure. At the head end the bearing is mounted in a steel rod eye threaded to the piston rod. Grease fittings are provided for lubrication. The spherical bearing mount provides swivel connections at both ends of the cylinder to reduce

misalignment problems and to maintain alignment through push and pull strokes.

The bearing races are designed primarily for radial loads and moderate misalignment not to exceed angle "a" as shown in chart on page 58.

The accessories, rod eye, pivot pin and clevis brackets are all designed to take maximum loading of the cylinder as shown in table 1 on pages 59 and 60 respectively.

Application and Design Data

The spherical bearing life is influenced by many factors, i.e., bearing pressure, load direction oscillating angle and lubrication.

The maximum operating pressure ratings – by cylinder series and bore size – of the spherical bearing mountings are based on standard commercial bearing ratings. The 4:1 design factor rating is based on the tensile strength of the material. This data is included in the tables on pages 59 and 60.

The spherical bearings are dimensioned to ensure a satisfactory bearing life under normal operating conditions. The bearing races are made of through-hardened steel and are precision ground. They are phosphate treated and coated with dry film lubricant to minimize friction of contacting surfaces. In the case of a permanent

unidirectional load to the bearing, or other unusual operating conditions, the use of a large bearing may be required.

For longer bearing life, regular lubrication will protect the spherical plain bearing from premature wear and corrosion. Rust-inhibiting EP greases of lithium/lead base, preferably with molybdenum disulphide additives are particularly suited. The radial bearings have lubricating holes and grooves in the races permitting lubrication. The bearing housings at the cap and rod end are provided with grease fittings for lubrication.

Maximum angle of swivel in relation to the center line of the pivot pin is shown as angle *a* in the table below. It is recommended that this angle is not exceeded when mounting the cylinder.

Mounting Information

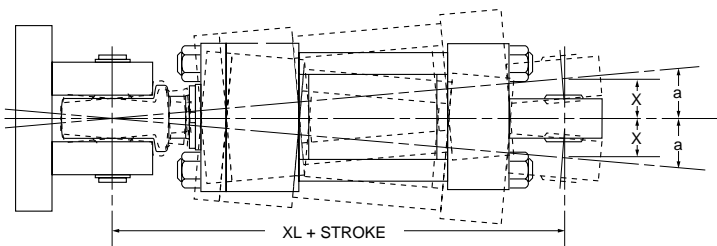
Head End Mounting

Recommended maximum swivel angle on each side of the cylinder centerline.

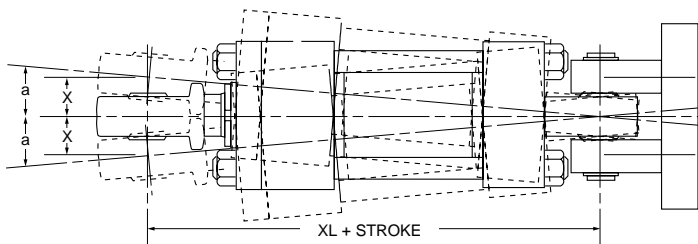
Table 1

Bore	Head End Mounted		Cap End Mounted	
	Angle <i>a</i>	Tan. of <i>a</i>	Angle <i>a</i>	Tan. of <i>a</i>
1½	2°	.035	2°	.035
2	2½°	.044	4½°	.079
2½	2½°	.044	4½°	.079
3¼	3°	.052	3°	.052
4	2½°	.044	3°	.052
5	3°	.052	3°	.052
6	3°	.052	3°	.052

Note: Dimension X is the maximum off center mounting of the cylinder. To determine dimension X for various stroke lengths multiply distance between pivot pin holes by tangent of angle *a*. For extended position use X = XL times 2X stroke.



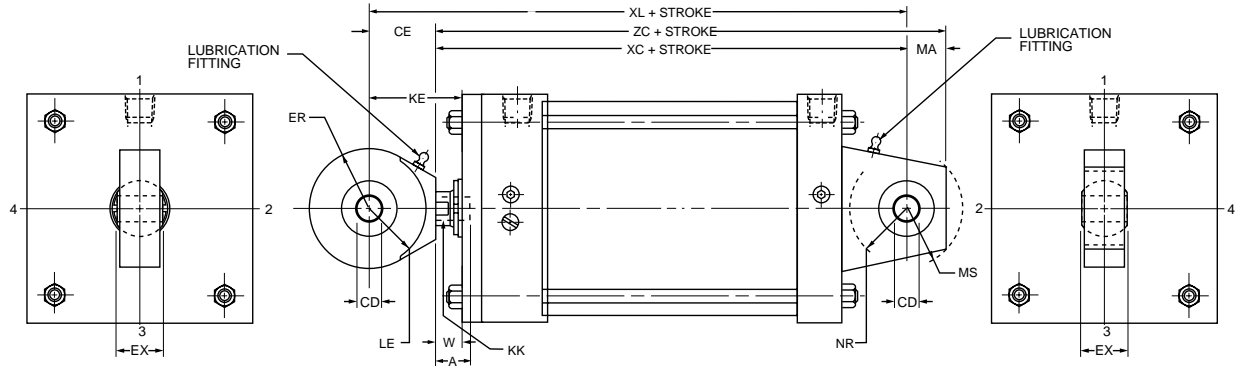
Cap End Mounting



Note: See ordering information on page i.

Lin-Act Series LAA Heavy-Duty Air Cylinders

Spherical Bearing Mounting
Style MPU3
1½" to 6" Bore Sizes



Bore	Rod No.	Rod Dia. MM	Thread		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max. Oper. PSI		
			Style 9 KK	Style 7 KK			XC	XL	ZC										LAA	LAL	
1½	1 (Std.)	5/8	7/16-20	-	3/4	5/8	5 3/8	6 1/4	6 1/8	11 1/2	.0005										
	2	1	**	7/16-20	3/4	1	5 3/4	6 5/8	6 1/2	17/8	.5000	7/8	13/16	7/16	3/4	3/4	15/16	5/8		250	1750
2	1 (Std.)	5/8	7/16-20	-	3/4	5/8	5 3/8	6 1/4	6 1/8	11 1/2	.0005										
	2	1 3/8	**	7/16-20	3/4	1 1/4	6	6 7/8	6 3/4	2 1/8	.5000	7/8	13/16	7/16	3/4	3/4	15/16	5/8		250	980
	3	1	**	7/16-20	3/4	1	5 3/4	6 5/8	6 1/2	17/8											
2½	1 (Std.)	5/8	7/16-20	-	3/4	5/8	5 1/2	6 3/8	6 1/4	11 1/2	.0005										
	2	1 3/8	**	7/16-20	3/4	1 1/2	6 3/8	7 1/4	7 1/8	2 3/8	.5000	7/8	13/16	7/16	3/4	3/4	15/16	5/8		250	630
	3	1	**	7/16-20	3/4	1	5 7/8	6 3/4	6 5/8	17/8											
	4	1 3/8	**	7/16-20	3/4	1 1/4	6 1/8	7	6 7/8	2 1/8											
3¼	1 (Std.)	1	3/4-16	-	1 1/8	3/4	6 7/8	8 1/8	7 7/8	2	.0005										
	2	2	**	3/4-16	1 1/8	1 3/8	7 1/2	8 3/4	8 1/2	2 5/8	.7500	1 1/4	1 1/8	2 1/32	1 1/16	1	1 3/8	1		250	830
	3	1 3/8	**	3/4-16	1 1/8	1	7 1/8	8 3/8	8 1/8	2 1/4											
	4	1 3/4	**	3/4-16	1 1/8	1 1/4	7 3/8	8 5/8	8 3/8	2 1/2											
4	1 (Std.)	1	3/4-16	-	1 1/8	3/4	6 7/8	8 1/8	7 7/8	2	.0005										
	2	2 1/2	**	3/4-16	1 1/8	1 5/8	7 3/4	9	8 3/4	2 7/8	.7500	1 1/4	1 1/8	2 1/32	1 1/16	1	1 3/8	1		250	550
	3	1 3/8	**	3/4-16	1 1/8	1	7 1/8	8 3/8	8 1/8	2 1/4											
	4	1 3/4	**	3/4-16	1 1/8	1 1/4	7 3/8	8 5/8	8 3/8	2 1/2											
	5	2	**	3/4-16	1 1/8	1 3/8	7 1/2	8 3/4	8 1/2	2 5/8											
5	1 (Std.)	1	3/4-16	-	1 1/8	3/4	7 1/8	8 3/8	8 1/8	2	.0005										
	2	3 1/2	**	3/4-16	1 1/8	1 5/8	8	9 1/4	9	2 7/8	.7500	1 1/4	1 1/8	2 1/32	1 1/16	1	1 3/8	1		250	350
	3	1 3/8	**	3/4-16	1 1/8	1	7 3/8	8 5/8	8 3/8	2 1/4											
	4	1 3/4	**	3/4-16	1 1/8	1 1/4	7 5/8	8 7/8	8 5/8	2 1/2											
	5	2	**	3/4-16	1 1/8	1 3/8	7 3/4	9	8 3/4	2 5/8											
	6	2 1/2	**	3/4-16	1 1/8	1 5/8	8	9 1/4	9	2 7/8											
	7	3	**	3/4-16	1 1/8	1 5/8	8	9 1/4	9	2 7/8											
6	1 (Std.)	1 3/8	1-14	-	1 5/8	7/8	8 1/8	10	9 3/8	2 3/4	.0005										
	2	4	**	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8	1.0000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4		250	440
	3	1 3/4	**	1-14	1 5/8	1 1/8	8 3/8	10 1/4	9 5/8	3											
	4	2	**	1-14	1 5/8	1 1/4	8 1/2	10 3/8	9 3/4	3 1/8											
	5	2 1/2	**	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8											
	6	3	**	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8											
	7	3 1/2	**	1-14	1 5/8	1 1/2	8 3/4	10 5/8	10	3 3/8											

Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings.

* Dimension CD is hole diameter.

** Corresponding rod eye pin diameter may not match pin diameter of cap.

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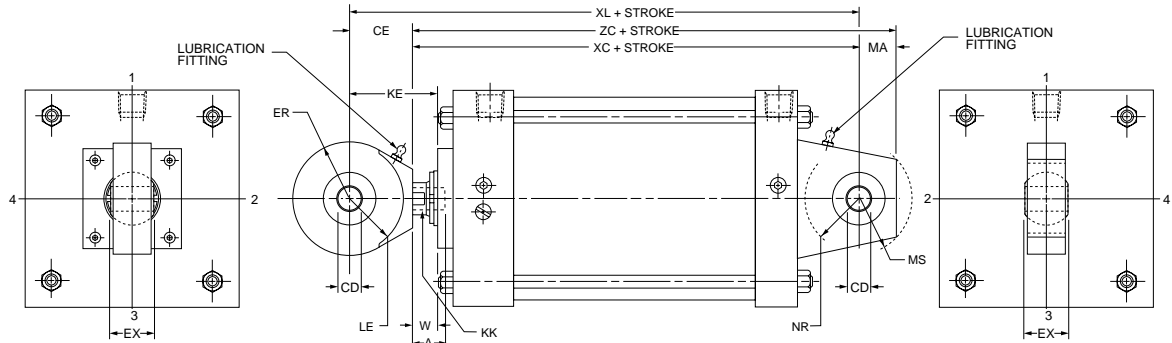
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Bore	Rod No.	Rod Dia. MM	Thread		A	W	Add Stroke			KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max. Oper. PSI	
			Style 9 KK	Style 7 KK			XC	XL	ZC										LAA	LAL
8	1(Std.)	13/8	1-14	-	15/8	7/8	8 1/4	10 1/8	9 1/2	2 3/4	-0005 10000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	250	250
	2	5 1/2	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	3	13/4	**	1-14	15/8	1 1/8	8 1/2	10 3/8	9 3/4	3										
	4	2	**	1-14	15/8	1 1/4	8 5/8	10 1/2	9 7/8	3 1/8										
	5	2 1/2	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	6	3	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	7	3 1/2	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	8	4	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
	9	4 1/2	**	1-14	15/8	1 1/2	8 7/8	10 3/4	10 1/8	3 3/8										
10	1(Std.)	13/4	1 1/4-12	-	2	1 1/8	10 3/8	12 1/2	12 1/4	3 1/4	-0005 13750	2 1/8	1 11/16	1 3/16	1 7/8	1 7/8	2 7/16	1 5/8	-	250
	3	2	**	1 1/4-12	2	1 1/4	10 1/2	12 5/8	12 3/8	3 3/8										
	4	2 1/2	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
	5	3	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
	6	3 1/2	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
	7	4	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
	8	4 1/2	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
	9	5	**	1 1/4-12	2	1 1/2	10 3/4	12 7/8	12 5/8	3 5/8										
12	1(Std.)	2	1 1/2-12	-	2 1/4	1 1/4	11 1/8	13 5/8	13 5/8	3 3/4	-0005 17500	2 1/2	2 1/16	1 17/32	2 1/8	2 1/2	2 7/8	2 1/16	-	250
	3	2 1/2	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
	4	3	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
	5	3 1/2	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
	6	4	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
	7	4 1/2	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
	8	5	**	1 1/2-12	2 1/4	1 1/2	11 3/8	13 7/8	13 7/8	4										
14	1(Std.)	2 1/2	1 7/8-12	-	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4	-0005 20000	2 3/4	2 1/2	1 3/4	2 1/2	2 1/2	3 5/16	2 3/8	-	250
	3	3	**	1 7/8-12	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4										
	4	3 1/2	**	1 7/8-12	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4										
	5	4	**	1 7/8-12	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4										
	6	4 1/2	**	1 7/8-12	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4										
	7	5	**	1 7/8-12	3	1 1/2	12 7/8	15 5/8	15 3/8	4 1/4										

Maximum operating pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings.

* Dimension CD is hole diameter.

** Corresponding rod eye pin diameter may not match pin diameter of cap.

Rod No. 1 is standard.

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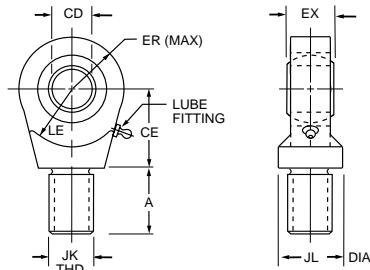
Lin-Act Series LAA Heavy-Duty Air Cylinders

Spherical Bearing Mounting Style MPU3 Cylinder Accessories

Lin-Act offers a complete range of Cylinder Accessories to assure you of the greatest versatility in present or future cylinder applications. Accessories offered for the

respective cylinder include the Rod Eye, Pivot Pin and Clevis Bracket. To select the proper part number for any desired accessory refer to the charts below.

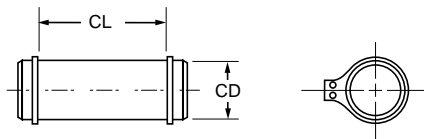
Spherical Rod Eye



Order to fit Piston Rod Thread Size.

Bore Sizes	SeriesLAA	1 1/2, 2 & 2 1/2	3 1/4, 4 & 5	6 & 8	10	12	14
Rod Eye	Part No.	132290	132291	132292	132293	132294	132295
	CD	.5000-.0005	.7500-.0005	1.0000-.0005	1.3750-.0005	1.7500-.0005	2.0000-.0005
	A	1 1/16	1	1 1/2	2	2 1/8	2 7/8
	CE	7/8	1 1/4	1 7/8	2 1/8	2 1/2	2 3/4
	EX	7/16	2 1/32	7/8	1 3/16	1 17/32	1 3/4
	ER	7/8	1 1/4	1 3/8	1 13/16	2 3/16	2 5/8
	LE	3/4	1 1/16	1 7/16	1 7/8	2 1/8	2 1/2
	JK	7/16-20	3/4-16	1-14	1 1/4-12	1 1/2-12	1 7/8-12
	JL	7/8	1 5/16	1 1/2	2	2 1/4	2 3/4
	LOAD CAPACITY LBS.	2644	9441	16860	28562	43005	70193

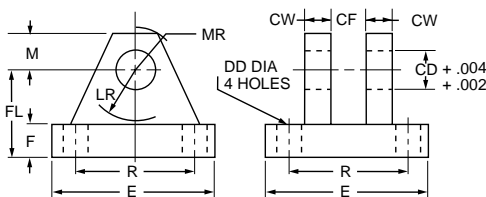
Pivot Pin



Pivot Pins are furnished with (2) Retainer Rings.

Bore Sizes	SeriesLAA	1 1/2, 2 & 2 1/2	3 1/4, 4 & 5	6 & 8	10	12	14
Pivot Pin	Part No.	83962	83963	83964	83965	83966	83967
	CD	.4997-.0004	.7497-.0005	.9997-.0005	1.3746-.0006	1.7596-.0006	1.9996-.0007
	CL	1 9/16	2 1/32	2 1/2	3 5/16	4 7/32	4 15/16
	LOAD CAPACITY LBS.	8600	19300	34300	65000	105200	137400

Clevis Bracket



Order to fit Mounting Plate or Rod Eye.

Bore Sizes	SeriesLAA	1 1/2, 2 & 2 1/2	3 1/4, 4 & 5	6 & 8	10	12	14
Clevis Bracket	Part No.	83947	83948	83949	83950	83951	83952
	CD	1/2	3/4	1	1 3/8	1 3/4	2
	CF	7/16	2 1/32	7/8	1 3/16	1 17/32	1 3/4
	CW	1/2	5/8	3/4	1	1 1/4	1 1/2
	DD	1 3/32	1 3/32	1 7/32	2 1/32	2 9/32	2 9/32
	E	3	3 3/4	5 1/2	6 1/2	8 1/2	10 5/8
	F	1/2	5/8	3/4	7/8	1 1/4	1 1/2
	FL	1 1/2	2	2 1/2	3 1/2	4 1/2	5
	LR	1 5/16	1 3/8	1 11/16	2 7/16	2 7/8	3 5/16
	M	1/2	7/8	1	1 3/8	1 3/4	2
	MR	5/8	1	1 3/16	1 5/8	2 1/16	2 3/8
	R	2.05	2.76	4.10	4.95	6.58	7.92
	LOAD CAPACITY LBS.	5770	9450	14300	20322	37800	50375

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Lin-Act

Lin-Act Non-Lube Heavy-Duty Air Cylinders

LAN Series



For millions of trouble free cycles

- Nominal pressure — 250 PSI — Air Service
- Standard Bore Sizes — 1½" through 10"
- Piston Rod Diameters — 5/8" through 2"
- 17 Standard Mounting Styles
- NFPA Interchangeable
- Exceeds Automotive Specifications

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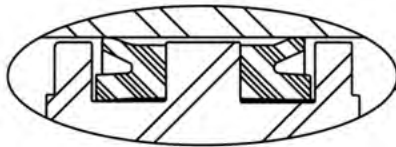
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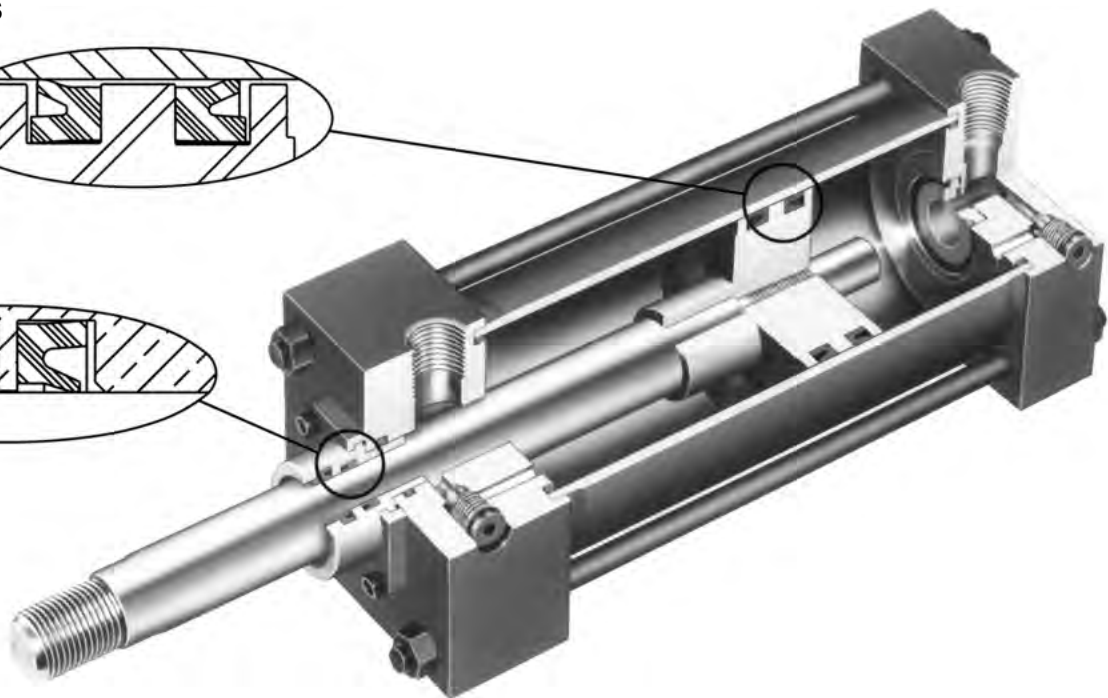
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The LAN Series Non-Lube Air Cylinder with Proven Performance Over 21 million trouble free cycles with... **ZERO LEAKAGE.**

Piston Lipseals



Gland Lipseal



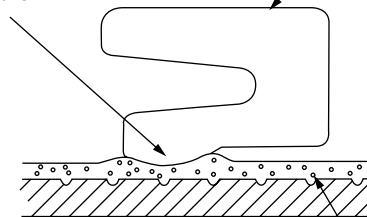
Increased Market Demand and continuous research and testing efforts inspired the development of LAN Series Non-Lubricated Air Cylinder. The LAN Series piston rod and cylinder barrel surfaces act as highly efficient lubricant reservoirs, maintaining their own lubricant film. Other manufacturers pack grease into grooves and pockets and call them reservoirs. The fact of the matter is that as those grooves empty out over time; grease is being transported out of the cylinder and into the control system components and the atmosphere. The LAN Series concept eliminates that problem by maintaining the lubricant film where it belongs: on the seals, bearing surfaces, piston rod and cylinder bore.

Benefits include...long seal and bearing life and since no oil is added through the use of lubricators – no oil is expelled into the atmosphere with the exhaust air as the cylinder strokes.

Anatomy of LAN Series Sealing and Lubricant Retention Systems

Rounded sealing lip glides over lubricant film instead of scraping it off. Reduces friction, increases life and eliminates the need for added lubrication.

Increased heel thickness and outer lip extension improve stability, resist rolling.



Drawing not to scale.

High integrity lubricant film with suspended PTFE particles.

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In the LAN Series you get all the cost saving benefits and features of the popular heavy-duty LAA Series air cylinder including...

- Bolt-On Rod Gland Assembly for positive no leak sealing
- Steel tube cylinder body with chrome-plated micro finish bore...
- Piston rod, hard chrome-plated and case-hardened steel
- Plus the innovative “Non-Lube” feature which further increases your benefits of lower operating and maintenance costs.
- High strength rolled thread Piston Rod Stud

Standard Specifications

- Heavy-Duty Service — NFPA specifications and ANS1 B93, 15-1981 Mounting Dimension Standards
- Standard Fluid — Filtered Air
- Standard Construction — Square Head — Tie Rod Design
- Strokes — Available in any practical stroke length
- Standard Temperature — 10°F to +165°F
- Cushions — Optional at either end or both ends of stroke. “Float Check” at cap end

In line with our policy of continuing product improvement, specifications in this bulletin are subject to change.

Available Bore and Rod Sizes

Bore Size	1 1/2		2		2 1/2				3 1/4				4				5				6				8				10			
Rod Dia.	5/8	1	5/8	1	1 3/8	5/8	1	1 3/8	1 3/4	1	1 3/8	1 3/4	2	1	1 3/8	1 3/4	2	1	1 3/8	1 3/4	2	1 3/8	1 3/4	2	1 3/8	1 3/4	2	1 3/8	1 3/4	2	1 3/4	2

How to Order LAN Series Non-Lube Air Cylinders

Data Required on All LAN Cylinder Orders

When ordering LAN Series cylinders, be sure to specify each of the following requirements:

(Note: Duplicate cylinders can be ordered by giving the SERIAL NUMBER from the nameplate of the original cylinder. Factory records supply a quick, positive identification.)

a) Bore Size

b) Mounting Style

Specify your choice of mounting style — as shown in this catalog. If double rod is wanted, specify “with double rod.”

c) Series Designation (LAN)

d) Length of Stroke

e) Piston Rod Diameter

Specify rod diameter in LAN Series cylinders, standard rod diameters will be furnished if not otherwise specified, unless length of stroke makes the application questionable.

f) Piston Rod End Thread Style

Give thread style number or specify dimensions. Thread style number 4 will be supplied if not otherwise specified.

g) Cushions (if required)

Specify “Cushion-head end,” “Cushion-cap end” or “Cushion-both ends” as required. If cylinder is to have a double rod and only one cushion is required, be sure to specify clearly which end of the cylinder is to be cushioned.

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Cylinder Operation

Cylinders are used in the majority of applications to convert fluid energy into straight line motion. For this reason, they are often called linear actuators.

Cylinders are manufactured in a variety of diameters, stroke lengths, and mounting styles. They may be classified, according to construction, into four types: tie-rod, threaded, welded, and flanged. Cylinders are also made using retaining rings.

$$\text{Area} = \frac{\rho D^2}{4} \text{ or } \text{Area} = .7854 \times D^2$$

When calculating force developed on the return stroke, pressure does not act on the rod area of the piston, therefore the rod area must be subtracted from the total piston area.

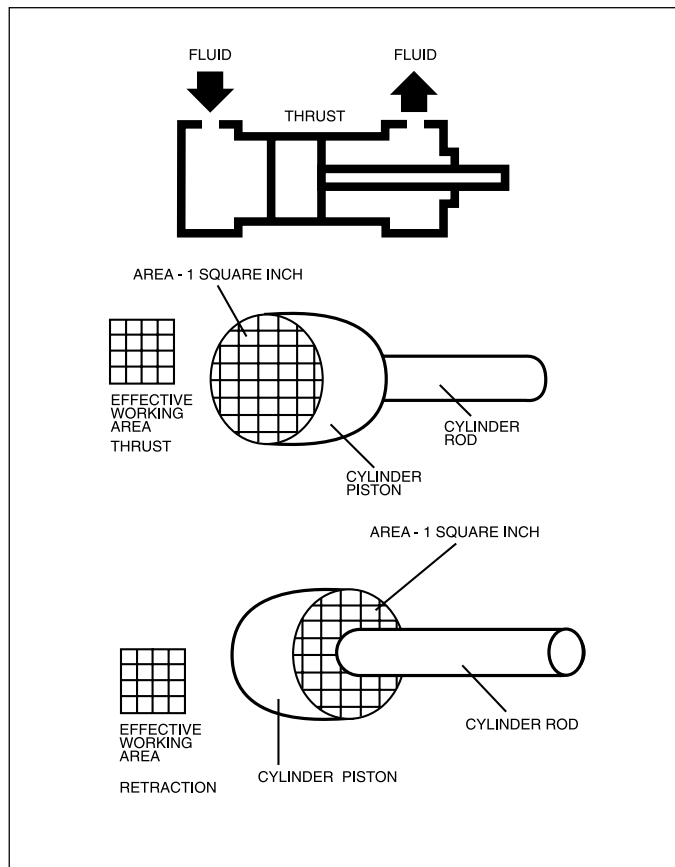
Basic Construction

The major components of a cylinder are the head, cap, tube tie rods, piston, piston rod, rod bearing and seals.

Cylinder Heads and Caps are usually made from rolled steel or cast iron. Some are also from aluminum or bronze.

Cylinder Tubes are usually brass, steel or aluminum. The inside, and sometimes the outside, is plated or anodized to improve wear characteristics and reduce corrosion.

Illustration B-28



Pistons vary in design and materials used. Most are made of cast iron or steel. Several methods of attaching the piston to the rod are used. Cushions, are an available option on most cylinders and most often, can be added with no change in envelope dimensions.

Piston Rods are generally high strength steel, case-hardened, ground, polished and hard chrome plated for wear and corrosion resistance. Corrosive atmosphere conditions usually require rods of stainless steel, which may be chrome-plated for wear resistance.

Rod Glands or Bearings are used on the head end of most industrial cylinders to support the piston rod as it travels back and forth. The gland also acts as a retainer for the rod packing and seals. Most are made of ductile iron or bronze and usually are removable without disassembling the entire cylinder.

The gland usually contains a piston rod wiper or scraper on the outboard side to remove dirt and contamination from the rod, and prevent foreign material from being drawn into the packings. A primary seal is used to seal the cylinder pressure.

Seals are generally made from Nitrile or fluoro carbon elastomers, polyurethane, leather or PTFE. The Lipseal® shape is commonly used for both piston and piston rod seals. Generally, O-Rings are used for static applications such as head to tube, piston to rod, and head to gland. Cup or V-packings are used for sealing piston and piston rod. Piston rings are usually cast iron.

Tie-Rods are usually high tensile steel with either cut or rolled threads, prestressed during assembly. Prestressing with proper torque prevents separation of parts when subjected to pressure and reduces the need for locknuts, although locknuts are sometimes used.

Fundamental Cylinders

Standard Double-Acting Cylinders

Power stroke is in both directions and is used in the majority of applications.

Single-Acting Cylinders

When thrust is needed in only one direction, a single-acting cylinder may be used. The inactive end is vented to atmosphere through a breather/filter for pneumatic applications, or vented to reservoir below the oil level in hydraulic application.

Double-Rod Cylinders

Used when equal displacement is needed on both sides of the piston, or when it is mechanically advantageous to couple a load to each end. The extra end can be used to mount cams for operating limit switches, etc.

Spring Return, Single-Acting Cylinders

Usually limited to very small, short stroke cylinders used for holding and clamping. The length needed to contain the return spring makes them undesirable when a long stroke is needed.

Ram Type, Single-Acting Cylinders

Containing only one fluid chamber, this type of cylinder is usually mounted vertically. The weight of the load retracts the cylinder. They are sometimes know as “displacement cylinders”, and are practical for long strokes.

Telescoping Cylinders

Available with up to 4 or 5 sleeves; collapsed length is shorter than standard cylinders. Available either single or double-acting, they are relatively expensive compared to standard cylinders.

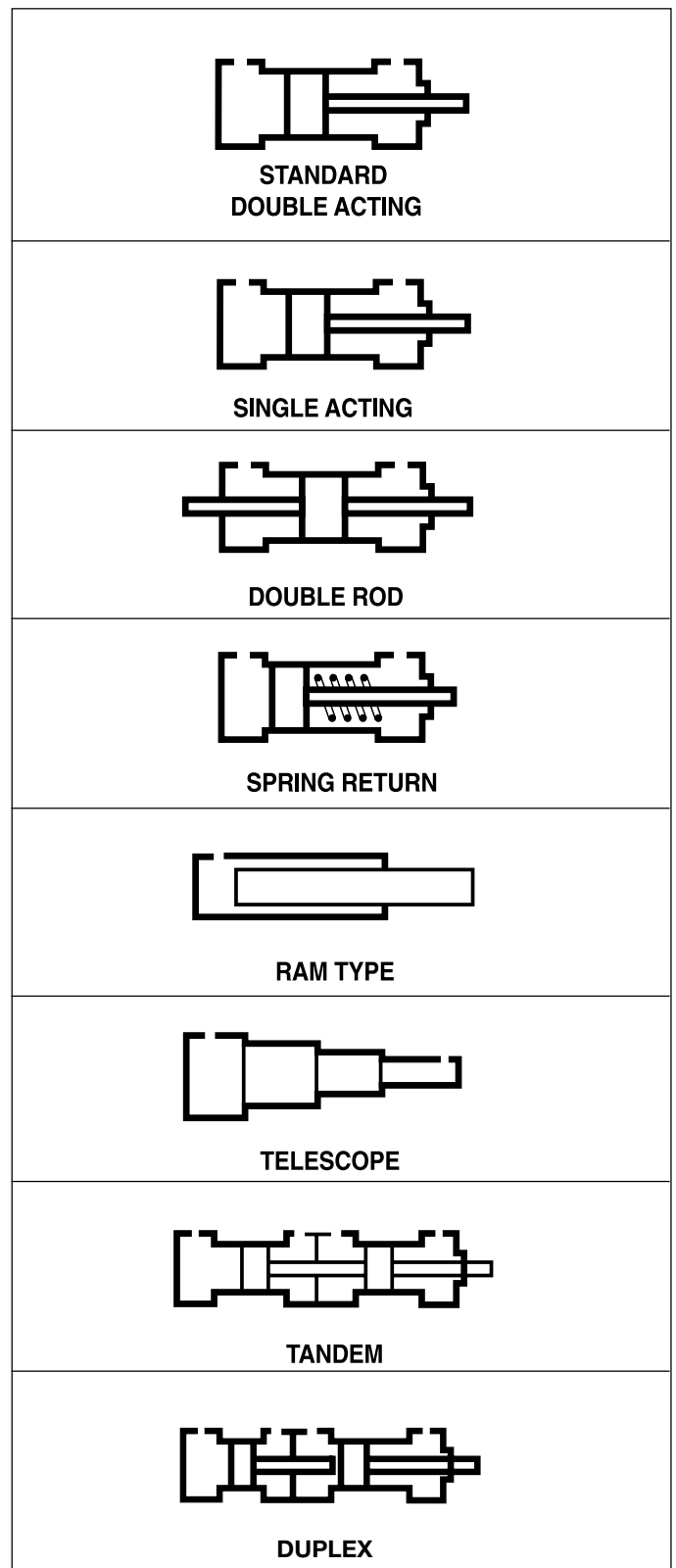
Tandem Cylinders

A tandem cylinder is made up of two cylinders mounted in line with pistons connected by a common piston rod and rod seals installed between the cylinders to permit double acting operation of each. Tandem cylinders allow increased output force when mounting width or height are restricted.

Duplex Cylinders

A duplex cylinder is made up of two cylinders mounted in line with pistons not connected with rod seals installed between the cylinders to permit double acting operation of each. Cylinders may be mounted with piston rod to piston (as shown) or back to back and are generally used to provide three position operation.

Illustration B29



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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Push and Pull Forces

Theoretical Push and Pull Forces for Pneumatic and Hydraulic Cylinders Push Force and Displacement

Cyl. Bore Size (Inches)	Piston Area (Sq. In.)	Cylinder Push Stroke Force In Pounds At Various Pressures										Cu. Ft. Free Air At 80 Lbs. Pressure, Required To Move Max. Load 1 Inch	Displacement Per Inch Of Stroke (Gallons)
		25	50	65	80	100	250	500	1000	2000	3000		
1	.785	20	39	51	65	79	196	392	785	1570	2355	.00293	.0034
1½	1.767	44	88	115	142	177	443	885	1770	3540	5310	.00659	.00765
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	.01171	.0136
2½	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	.01830	.0213
3¼	8.30	208	415	540	664	830	2075	4150	8300	16600	24900	.03093	.0359
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	.04685	.0544
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	.07320	.0850
6	28.27	707	1414	1838	2262	2827	7068	14135	28270	56540	84810	.10541	.1224
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	.14347	.1666
8	50.27	1257	2513	3268	4022	5027	12568	25135	50270	100540	150810	.18740	.2176
10	78.54	1964	3927	5105	6283	7854	19635	39270	78540	157080	235620	.29280	.3400
12	113.10	2828	5655	7352	9048	11310	28275	56550	113100	226200	339300	.42164	.4896
14	153.94	3849	7697	10006	12315	15394	38485	76970	153940	307880	461820	.57389	.6664

Deductions for Pull Force and Displacement

Piston Rod Dia. (Inches)	Piston Area (Sq. In.)	Piston Rod Diameter Force In Pounds At Various Pressures										Cu. Ft. Free Air At 80 Lbs. Pressure, Required To Move Max. Load 1 Inch	Displacement Per Inch Of Stroke (Gallons)
		To determine Cylinder Pull Force or Displacement, deduct the following Force or Displacement corresponding to Rod Size, from selected Push Stroke Force or Displacement corresponding to Bore Size in table above.											
		25	50	65	80	100	250	500	1000	2000	3000		
½	.196	5	10	13	16	20	49	98	196	392	588	.00073	.0009
5/8	.307	8	15	20	25	31	77	154	307	614	921	.00114	.0013
1	.785	20	39	51	65	79	196	392	785	1570	2355	.00293	.0034
1⅜	1.49	37	75	97	119	149	373	745	1490	2980	4470	.00554	.0065
1¾	2.41	60	121	157	193	241	603	1205	2410	4820	7230	.00897	.0104
2	3.14	79	157	204	251	314	785	1570	3140	6280	9420	.01171	.0136
2½	4.91	123	245	319	393	491	1228	2455	4910	9820	14730	.01830	.0213
3	7.07	177	354	460	566	707	1767	3535	7070	14140	21210	.02635	.0306
3½	9.62	241	481	625	770	962	2405	4810	9620	19240	28860	.03587	.0416
4	12.57	314	628	817	1006	1257	3143	6285	12570	25140	37710	.04685	.0544
4½	15.90	398	795	1033	1272	1590	3975	7950	15900	31800	47708	.05929	.0688
5	19.64	491	982	1277	1571	1964	4910	9820	19640	39280	58920	.07320	.0850
5½	23.76	594	1188	1544	1901	2376	5940	11880	23760	47520	71280	.08857	.1028
7	38.49	962	1924	2502	3079	3849	9623	19245	38490	76980	115470	.14347	.1666
8½	56.75	1419	2838	3689	4540	5675	14187	28375	56750	113500	170250	.21157	.2455

General Formula

The cylinder output forces are derived from the formula:

$$F = P \times A$$

Where F = Force in pounds.

P = Pressure at the cylinder in pounds per square inch, gauge.

A = Effective area of cylinder piston in square inches.

Free Air refers to normal atmospheric conditions of the air at sea level (14.7 psi). Use above cu. ft. free air required data to compute

CFM required from a compressor at 80 psi. cu. ft. of free air required at other pressures can be calculated using formula below.

$$V_1 = \frac{(P_2 + 14.7) V_2}{14.7}$$

Where V1 = Free air consumption per inch of stroke (cubic feet).

V2 = Cubic feet displaced per inch of stroke.

P2 = Gauge pressure required to move maximum load.

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Operating Fluids and Temperature Range/Water Service/Warranty Pre-Lubricated, Non-Lubricated Cylinders

Operating Fluids and Temperature Range

Fluidpower cylinders are designed for use with pressurized air, hydraulic oil and fire resistant fluids, in some cases special seals are required.

Class 1 Seals

Class 1 seals are the standard seals provided in a cylinder assembly. They are intended for use with fluids such as: air, nitrogen, mineral base hydraulic oil or MIL-H-5606 within the temperature range of -10°F (-23°C) to +165°F (+74°C). The individual seals may be nitrile (Buna-N), enhanced polyurethane, polymyte, PTFE or filled PTFE.

Class 2 (Nitrile) Seals

Class 2 seals are intended for use with water base fluids within the temperature of -10°F (-23°C) to +165°F (+74°C) except for High Water Content Fluids (HWCF) in which case Class 6 seals should be used. Typical water base fluids compatible with Class 2 seals are: Water, Water-Glycol, Water-in Emulsion, Houghto-Safe 27, 620 5040, Mobil Pyrogard D, Shell Iru 905, Ucon Hydrolube J-4. Class 2 seals are nitrile. Lipseal will have polymyte or PTFE back-up washer when required. O-rings will have nitrile back-up washers when required.

Class 3 Seals — Ethylene Propylene (E.P.R.) Seals

Class 3 seals are intended for use with some Phosphate Ester Fluids between the temperatures of -10°F (-23°C) to +130°F (+54°C). Typical fluids compatible with Class 3 seals are Skydrol 500 and 700. Class 3 seals are Ethylene Propylene. Lipseals will have a PTFE back-up washer when required. O-rings will have EPR back-up washers when required. **Note:** Class 3 seals are not compatible with mineral base hydraulic oil or greases. Even limited exposure to these fluids will cause severe swelling. PTFE back-up washer may not be suitable when used in a radiation environment.

Class 4 Seals — Nitrile Seals

Class 4 seals are intended for low temperature service with the same type of fluids as used with Class 1 seals within the temperature range of -50°F (-46°C) to +150°F (+66°C). Class 4 seals are nitrile seals. Lipseals will have leather, polymyte or PTFE back-up washers when required. O-rings will have nitrile back-up washers when required.

Class 5 Seals — Fluorocarbon Seals

Class 5 seals are intended for elevated temperature service or for some Phosphate Ester Fluids such as Houghto-Safe 1010, 1055, 1120; Fryquel 150, 220, 300, 350; Mobil Pyrogard 42, 43, 53, and 55. **Note:** In addition, Class 5 seals can be used with fluids listed below under Class 1 or Class 2 service. However, they are not compatible with Phosphate Ester Fluids such as Skydrols. Class 5 seals can operate with a temperature range of -10°F (-23°C) to +250°F (+121°C). Fluorocarbon seals may be operated to +400°F (+204°C) with limited service life. For temperatures above +250°F (-121°C) the cylinder must be manufactured with non-studded piston rod thread and a pinned piston to rod connection. Class 5 seals are fluorocarbon seals. Lipseals will have PTFE back-up washers when required. O-rings will have fluorocarbon back-up when required.

Class 6 Seals

Class 6 seals are intended for High Water Content Fluids (HWCF) such as Houghto Hydrolubic 120B and Sonsol Lubrizol within the temperature range of +40°F (+4°C) to +120°F (+49°C). Class 6 seals are special nitrile compound dynamic seals. Lipseals will have PTFE and/or polymyte back-up washers when required. O-rings will have nitrile back-up washers when required. Because of the viscosity of these fluids, cylinders specified with Class 6 seals, will also be modified to have lipseal piston seals and straight cushions.

Hi-Load Seals

Hi-Load seals consist of one or two filled PTFE dynamic piston seals with an elastomer expander underneath. Hi-Load piston arrangement normally consists of a wear ring on each end of the piston with the seals in the middle. These types of seals are virtually leak free seals under static conditions and can tolerate high pressure. The wear rings on the piston can also tolerate high side loads. The dynamic portion of the seal is bronze filled PTFE and compatible with all six classes of service. However, carbon filled PTFE will provide better seal life when used with Class 6 fluids. A nitrile expander will be provided unless Class 3 or 5 seals are specified. In those cases the expander will be of EPR or Fluorocarbon respectively. **Note:** It may be necessary to cycle the piston seals 40 or 50 times before achieving leakage free performance.

Lipseal Pistons

Under most conditions lipseals provide the best all around service for pneumatic applications. Lipseals with a back-up washers are often used for hydraulic applications when virtually zero

static leakage is required. Lipseals will function properly in these applications when used in conjunction with moderate hydraulic pressures. A high load piston option is recommended when operating at high pressures and especially with large bore hydraulic cylinders.

Warning!

The piston rod stud and the piston rod to piston threaded connections are secured with an anaerobic adhesive which is temperature sensitive. Cylinders specified with fluorocarbon seals are assembled with anaerobic adhesive having a maximum temperature rating of +250°F (+121°C). Cylinders specified with all other seal compounds are assembled with anaerobic adhesive have a maximum operating temperature rating +165°F (+74°C). These temperature limitations are necessary to prevent the possible loosening of the threaded connections. Cylinders originally manufactured with Class 1 seals (Nitrile) that will be exposed to ambient temperatures above +165°F (+74°C) must be modified for higher temperature service. Contact the factory immediately and arrange for the piston to rod and the stud to piston rod connections to be properly reassembled to withstand the higher temperature service.

Low Friction Hydraulic Seals

Low Friction hydraulic seals are available as an option for both piston and piston rod seals for LAH and LAL Series cylinders. They are sometimes used when a cylinder is controlled by servo or proportional valve. The seal assembly itself is a two piece assembly consisting of a filled PTFE dynamic seal with an elastomer expander. A piston seal assembly consists of one seal assembly in the middle of the piston with a filled PTFE wear ring on each side of the piston. The piston rod seal assembly consists of two seal assemblies and an elastomer wiper seal. The filled PTFE seals are compatible with Class 1, 2, 3, 4 & 5 fluids and provide virtually leak free sealing. The expanders and rod wiper will be nitrile unless Class 3 or 5 seals are specified. In those cases the expanders and wiper will be EPR and fluorocarbon respectively. When specifying low friction seals specify if piston, piston rod seals or both are required. **Note:** It may be necessary to cycle these seals 40 or 50 times before achieving leakage free performance.

Cast Iron Piston Rings

Cast iron rings are the standard piston seals for LAH and LAL Series cylinders. They offer the widest operating conditions by tolerating high operating pressures, wide temperature range and are compatible with most fluids. The only drawback of cast iron rings is that they allow a small amount of leakage. The leakage for a 4" bore cylinder, operating at 2000 psi, with mineral base hydraulic fluid will be less than 10in³/min. Leakage will increase as pressure, bore size and viscosity of the operating hydraulic fluid increases. For these reasons cast iron rings are not recommended when using water or Class 6 fluids.

Water Service

For pressures up to 250 psi Series LAA and LAL cylinders can be modified to make them more nearly suitable for use with water as the operating medium. The modifications include chrome-plated cylinder bore; cadmium-plated head, cap and piston; chrome-plated 17-4 stainless steel piston rod; chrome plated cushion sleeve or cushion spear.

Modified cylinders may also be used for higher operating pressures, up to 2000 psi, depending on bore size. (See pressure rating for Hydraulic Cylinders. Series LAH and LAL hydraulic cylinders can also be modified for water operation and supplied with chrome-plated cylinder bore; cadmium-plated head, cap and piston; chrome-plated precipitation hardened stainless steel piston rod, chrome-plated cushion sleeve or cushion spear. When high water base fluids are the operating medium, hydraulic cylinders are usually supplied with high water base rod wiper and seals. Water and high water base fluid operated cylinders are best used on short stroke applications or where high pressure is applied only to clamp the load.

Warranty

Lin-Act will warrant cylinders modified for water or high water content fluid service to be free of defects in materials or workmanship, but cannot accept responsibility to premature failure due to excessive wear due to lack of lubricity or where failure is caused by corrosion, electrolysis or mineral deposits within the cylinder.

Pre-Lubricated Air Cylinders

Lin-Act air cylinders are factory pre-lubricated with Lube-A-Cyl applied to seals, piston, cylinder bore, piston rod and gland surfaces, provides for normal cylinder operations with lubricated air.

Non-Lubricated Air Cylinders

For heavier duty operation, Series LAN is recommended for non-lubricated air service. Series LAN cylinders include an innovative special composite material wick and ring reservoir assembly in each seal groove to retain the extreme pressure lubricant applied at time of assembly. This lubricant coats the cylinder bore and piston rod and mating surfaces.

Class No.	Typical Fluids	Temperature Range
1 Standard Nitrile Polyurethane	Air, Nitrogen Hydraulic Oil, Mil-H-5606 Oil	-10°F (-23°C) to +165°F (+74°C)
2* Optional Water base fluid seal Nitrile	Water, Water-Glycol, HWCF — See Class 6 below. Water-in-Oil Emulsion Houghto-Safe, 271, 620, 5040 Mobil Pyrogard D, Shell Iru 905 Ucon Hydrolube J-4	-10°F (-23°C) to +165°F (+74°C)
3 Special (EPR) (At extra cost) Note: Class 3 seals are not compatible with hydraulic oil.	Some Phosphate Ester Fluids Skydrol 500, 7000	-10°F (-23°C) to +130°F (+54°C)
4 Special (Nitrile) (At extra cost)	Low Temperature Air or Hydraulic Oil	-50°F (-46°C) to +150°F (+66°C)
5 Optional (At extra cost) (Fluorocarbon Seals) Note: Class 5 seals are not suitable for use with Skydrol fluid, but can be used with hydraulic oil if desired	High Temperature Houghto-Safe 1010, 1055, 1120 Fryquel 150, 220, 300, 550 Mobil Pyrogard 42,43,53,55	See above paragraph on Fluorocarbon seals for recommended temperature range.
6 Optional (HWCF) (At extra cost)	Houghton, Hydrolubic 120B Sonsol Lubrizol, for other HWCF — consult factory.	+40°F (+4°C) to +120°F (+49°C)

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■ Portland, OR
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■ Owen Sound, Ont., Can.
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■ Toronto, Ont., Can.
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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Cylinder Pressure Ratings

Application Data

The proper application of a fluid power cylinder requires consideration of the operating pressure, the fluid medium, the mounting style, the length of stroke, the type of piston rod connection to the load, thrust or tension loading on the rod,

mounting attitude, the speed of stroke, and how the load in motion will be stopped. Information given here provides pressure rating data for pneumatic and hydraulic cylinders.

Pneumatic Cylinders

Standard operating fluid — filtered air which is free of moisture. LAA Series cylinders are recommended for maximum 250 psi heavy-duty service.

Pressure Ratings Fluid Medium Air

Bore Size (Inches)	Standard Piston Rod Diameters (Inches)	LAA Series Max. Heavy-Duty Operating Pressure (PSI)
1	1/2	250
1 1/2	5/8	250
2	5/8	250
2 1/2	5/8	250
3 1/4	1	250
4	1	250
5	1	250
6	1 3/8	250
8	1 3/8	250
10	1 3/4	250
12	2	250
14	2 1/2	250

Hydraulic Cylinders (Heavy-Duty)

Standard operating fluid — clean, filtered hydraulic oil. Pressure ratings for heavy-duty hydraulic cylinders are shown in the following table:

Pressure Ratings

LAH Series hydraulic cylinders are recommended for pressures to 3000 psi for heavy-duty service with hydraulic oil. The 4:1 design factor ratings shown are based on tensile strength of material and are for standard rod diameter only. The rating is conservative for continuous severe applications. Design factors at other pressures can be calculated from this rating. In addition, mounting styles, stroke, etc., should be considered because of the limiting effect they may have on these ratings.

Maximum Pressure Ratings

Bore Size (Inches)	Rod Diameter (Inches)	4:1* Design Factor (Tensile) (PSI)	Heavy-Duty Service (PSI)
1 1/2	5/8	2530	3000
2	1	2950	3000
2 1/2	1	2340	3000
3 1/4	1 3/8	2250	3000
4	1 3/4	2130	3000
5	2	2170	3000
6	2 1/2	2270	3000
7	3	2030	3000
8	3 1/2	2040	3000

*Applies to all mountings except MF1 and MF2.

Hydraulic Cylinders (Medium-Duty)

Pressure ratings for LAL Series hydraulic cylinders vary by bore size and rod size as shown in table below. For pressures higher than those indicated, LAH Series heavy-duty cylinders should be used.

LAL Series Hydraulic Cylinders Maximum Pressure Rating

Bore Size (Inches)	Rod Diameters (Inches)	Pressure Rating At 4:1 Design* Factor (On Tensile)
1	1/2	1960
	5/8	1960
1 1/2	5/8	2280
	1	2500
2	5/8	1235
	1	1925
	1 3/8	1925
2 1/2	5/8	775
	1	1550
	1 3/8	1550
	1 3/4	1550
3 1/4	1	1030
	1 3/8	1200
	1 3/4	1200
	2	1200
4	1	670
	1 3/8	845
	1 3/4	845
	2	845
	2 1/2	845
5	1	545
	1 3/8	700
	1 3/4	780
	2	780
	2 1/2	780
	3	780
6	3 1/2	780
	1 3/8	500
	1 3/4	600
	2	660
	2 1/2	660
	3	660
	3 1/2	660
8	4	660
	1 3/8	310
	1 3/4	400
	2	450
	2 1/2	630
	3	630
	3 1/2	630
	4	630
	4 1/2	630
	5	630
5 1/2	630	

*Applies to all mountings except MF1.

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Lin-Act

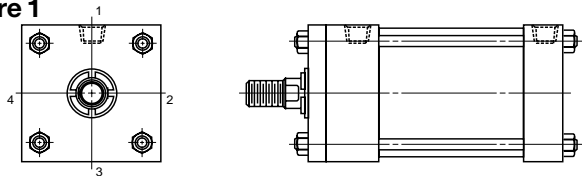
Lin-Act Series LAA Heavy-Duty Air Cylinders

Ports

Lin-Act hydraulic and pneumatic cylinders can be supplied with SAE straight O-ring ports or NPTF pipe thread ports. For the type of port recommended and port size, see respective product catalogs. If specified on your order, extra ports can be provided on the sides of heads or caps that are not occupied by mountings or cushion valve.

Standard port location is position 1 as shown on line drawings in product catalog and Figure 1 below. Cushion adjustment needle and check valves are at positions 2 and 4 (or 3), depending on mounting style. Heads or caps which do not have an integral mounting can be rotated and assembled with ports at 90° or 180° from standard position. Mounting styles on which head or cap can be rotated at no extra charge are shown in Table A below. To order, specify by position number. In such assemblies the cushion adjustment needle and check valve rotate accordingly since their relationship with port position does not change.

Figure 1



Head (Rod) End

Head

Cap

Table A

Mounting Style	Port Position Available	
	Head End	Cap End
MX0, MX3, MX2, MX1, MP2, MS1, MF2, MF6, MF1, MF5, MT4	1, 2, 3 or 4	1, 2, 3 or 4
MP1, MT2, ME6	1,2, 3 or 4	1 or 3
MT1, ME5	1 or 3	1, 2, 3 or 4
MS2, MS3, MS4	1	1

Applies to LAA, LAL and LAH Series

Ports can be supplied at positions other than those shown in Table A at an extra charge. To order, specify port position as shown in Figure 1.

Straight Thread Ports

The SAE straight thread O-ring port is recommended for hydraulic applications. Lin-Act will furnish this port configuration at positions shown in Table A. This port can also be provided at positions other than those shown in Table A at an extra charge. SAE port size numbers are listed next to the NPTF pipe thread counterparts for each bore size in the respective product catalogs. Size number tube O.D. and port thread size for SAE ports are listed in Table C.

Table C

SAE Straight Thread O-Ring Ports

Size No.	Tube O.D. (In.)	Thread Size	Size No.	Tube O.D. (In.)	Thread Size
2	1/8	5/16 - 24	12	3/4	1 1/16 - 12
3	3/16	3/8 - 24	—	—	—
4	1/4	7/16 - 20	16	1	15/16 - 12
5	5/16	1/2 - 20	20	1 1/4	15/8 - 12
6	3/8	9/16 - 18	24	1 1/2	17/8 - 12
8	1/2	3/4 - 16	32	2	2 1/2 - 12
10	5/8	7/8 - 14	—	—	—

Note: For the pressure ratings of individual connectors, contact your connector supplier. Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at the cylinder piston rod end. The rod end pressure is approximately equal to:

$$\frac{\text{Effective Cap End Piston Area}}{\text{Effective Rod End Piston Area}} \times \text{Operating Pressure}$$

International Ports

Other port configurations to meet international requirements are available at extra cost. Lin-Act cylinders can be supplied, on request, with British standard taper port (BSPT). Such port has a taper of 1 in 16 measured on the diameter (1/16" per inch). The thread form is Whitworth System, and size and number of threads per inch are as follows:

Table D

British Standard Pipe Threads

Nominal Pipe Size	No. Threads Per Inch	Pipe O.D.
1/8	28	.383
1/4	19	.518
3/8	19	.656
1/2	14	.825
3/4	14	1.041
1	11	1.309
1 1/4	11	1.650
1 1/2	11	1.882
2	11	2.347

British standard parallel internal threads are designated as BSP and have the same thread form and number of threads per inch as the BSPT type and can be supplied, on request, at extra cost. Unless otherwise specified, the BSP or BSPT port size supplied will be the same nominal pipe size as the NPTF port for a given bore size cylinder.

Metric ports can also be supplied to order at extra cost. Consult factory.

Rod End Data

Rod end dimension symbols as shown comply with the NFPA dimensional code. The following chart indicates the symbols used in this catalog.

Description	Symbol
Thread diameter and pitch	KK or CC
Length of thread	A
Length of rod extension from face of gland retainer to end of retracted rod	LA or LAF (Male Thread) W (Female Thread)

Three rod ends for cylinders are offered as shown on the dimension pages of this catalog. They are styles 4, 8 and 9, and all three are optional without price penalty. If a rod end style is not specified, style 4 (NFPA Style SM) will be supplied. Styles 4 and 8 are supplied with high strength rolled thread studs on piston rods through 2" diameter. Longer studs are available; see table below.

Warning!

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 end to fail. If these types of additional loads are expected to be imposed on the piston rods, their magnitude should be made known to our engineering department so they may be properly addressed. Additionally, cylinder users should always make sure that the piston rod is securely attached to the machine member.

Piston Rod End Threads

Standard piston rod end thread lengths are shown as dimension "A" in catalog dimension pages. Special rod end threads which are two times standard length can be supplied at a small extra cost. Available thread lengths are shown in the table below.

Optional Piston Rod End Studs Two Times Standard Length

Piston Rod Dia.	Rod End Thread Style 4		Rod End Thread Style 8	
	Thread Dia. & Pitch (KK)	Length (2 x A)	Thread Dia. & Pitch (CC)	Length (2 x A)
5/8	7/16 - 20	1 1/2	1/2 - 20	1 1/2
1	3/4 - 16	2 1/4	7/8 - 14	2 1/4
1 3/8	1 - 14	3 1/4	1 1/4 - 12	3 1/4
1 3/4	1 1/4 - 12	4	1 1/2 - 12	4
2	1 1/2 - 12	4 1/2	1 3/4 - 12	4 1/2

International Rod End Threads

Piston rod threads to meet international requirements are available at extra cost, with British standard fine (W) or metric (M). To order consult factory.

Special Rod Ends

If a rod end configuration other than the standard styles 4, 8 and 9 is required, such special rod ends can be provided. The designation "Style 3" is assigned to such specials and is incorporated in the cylinder model number. To order, specify "Style 3" and give desired dimensions for CC or KK, A, LA or LAF, or W if female end. If otherwise special, send a dimensioned sketch.

Special Assemblies from Standard Parts

Each dimensioned drawing in this catalog has position numbers shown on the end view to identify the four sides of the cylinder. These aid in communications and simplify the writing of specifications that cover changes in port positions, etc. Following are several suggested special assemblies that can be made up from standard parts.

A) By calling out the position numbers for the desired locations for head and cap ports, many mounting styles can be assembled with ports located at 90° or 180° from standard. In such special assemblies, the cushion needle and check valves are also repositioned since their relation with the port position does not change.

B) The cushion needle valve is interchangeable with the check valve in the cylinder heads. The cushion needle valve can be assembled on side position 4 with the check valve on side 2 for most mounting styles when the port is in the standard side position 1.

On mounting styles MT1, MT2 and MT4 the cushion needle valves are provided only on the side position 3 on the head or cap which accommodates the mounting. The opposite head or cap can be rotated.

C) Standard mountings in different combinations can be provided: for example Style MF1 mounting on head end with Style MS2 on the cap end.

Single-Acting Cylinders

Double-acting cylinders are supplied as standard. They can also be used as single-acting cylinders where fluid force is applied to only one side of the piston, with the load or other external forces acting to "return" the piston after pressure is exhausted.

Spring-Returned, Single-Acting Cylinders Single-acting, spring-returned models can also be provided. Load conditions and friction factors must be considered in supplying the proper spring for the application. In addition, it is necessary that information be supplied as to which side of the piston the spring should act upon. Specify "Spring to return piston rod" or "Spring to advance piston rod."

On longer stroke spring-returned cylinders, it is recommended that tie rod extensions be specified on the cylinder end in which the spring is located so that the cap or head against which the spring is acting can be "backed-off" slowly until compression of the spring is relieved. In such cases it should also be specified that the tie rod nuts be welded to the tie rods at the opposite end of the cylinder to further insure safe disassembly.

Consult factory when ordering spring-returned cylinders.

Lin-Act Series LAA Heavy-Duty Air Cylinders

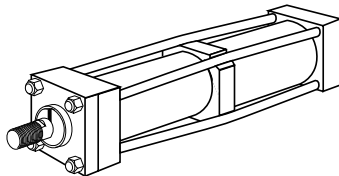
Stroke Data Tie Rod Supports Stroke Adjusters — Thrust Key Mountings

Stroke Data

Lin-Act cylinders are available in any practical stroke length. The following information should prove helpful to you in selecting the proper stroke for your cylinder application.

Stroke Tolerances Stroke length tolerances are required due to buildup of tolerances of piston, head, cap and cylinder body. Standard production stroke tolerances run $+1/32"$ to $-1/64"$ up to 20" stroke, $+1/32"$ to $-.20"$ for 21" to 60" and $+1/32"$ to $-1/32"$ for greater than 60" stroke. For closer tolerances on stroke length, it is necessary to specify the required tolerance plus the operating pressure and temperature at which the cylinder will operate. Stroke tolerances smaller than .015" are not generally practical due to elasticity of cylinders. If machine design requires such close tolerances, use of a stroke adjuster (below) may achieve the desired result.

Tie Rod Supports



Rigidity of Envelope The prestressed tie rod construction of cylinders has advantages in rigidity within the limits of the cylinder tube to resist buckling. For long stroke cylinders within practical limits. Tie rod supports (see table below) which move the tie rod centerlines radially outward (patent number 3011844) are used.

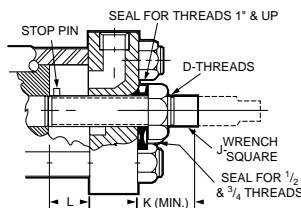
Standard tie rod supports are kept within the envelope dimensions of the head and cap, and generally do not interfere with mounting a long cylinder.

Number of Supports Required	Stroke (Inches)													
	Bore	36	48	60	72	84	96	108	120	132	144	156	168	
1	—	1	1	1	2	Consult Factory								
1 1/2	—	—	1	1	1	2	2	2	3	3	3	4		
2	—	—	—	1	1	1	1	2	2	2	2	3		
2 1/2	—	—	—	—	—	1	1	1	1	1	2	2		
3 1/4	—	—	—	—	—	—	—	1	1	1	1	1		
4	—	—	—	—	—	—	—	—	—	—	1	1	1	

Note: 5" through 14" bore sizes — no supports required.

Stroke Adjusters

Stroke Adjusters For the requirement where adjusting the stroke is specified. Lin-Act has several designs to offer, one of which is illustrated below. This is suitable for infrequent adjustment and is economical.



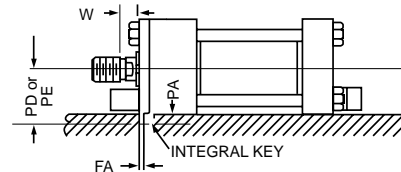
Here a "retracting stroke adjuster" must be called for in specifications, and the length of the adjustment must be specified.

Where frequent adjustment or cushions at the cap end are required, other designs are available according to application needs.

LAA LAL SERIES	LAH SERIES	Bore Size		D	J	K	L (Max.)
		D	J				
1 1/2, 2	1 1/2	1/2 - 20	5/16	15/16	5		
2 1/2, 3 1/4, 4	2	3/4 - 16	7/16	1 1/4	8		
5, 6	2 1/2, 3 1/4	1 - 14	9/8	1 11/16	9		
8	4	1 1/2 - 12	15/16	2 1/8	18		
10	5	2 - 12	1 5/16	2 11/16	20		
12, 14	6	2 1/2 - 12	1 11/16	3 1/8	20		
—	7	3 - 12	2	3 1/4	20		
—	8	3 1/2 - 12	2 3/8	3 1/2	20		

Thrust Key Mountings

Thrust key mountings eliminate the need of using fitted bolts or external keys on side mounted cylinders. Cylinders in mounting styles MS2, MS4, and MS1 can be provided with the gland retainer plate extended below the mounting side of the cylinder (see illustration below). This extended retainer plate can then be fitted into a keyway milled into the mounting surface of the machine member.

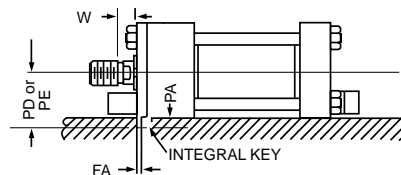


LAA, LAN and LAL Series

Bore	Dim. FA	Dim. PA	Dim. PD Mtg. Styles MS2, MS4	Dim. PD Mtg. Styles MS1*
1	.361 +.000 -.002	3/16	15/16	1 3/16
1 1/2			1 3/16	1 3/8
2			1 7/16	1 5/8
2 1/2			1 11/16	1 13/16
3 1/4	.562 +.000 -.002	5/16	2 3/16	2 1/4
4			2 9/16	2 9/16
5			3 1/16	3 1/16
6	.687 +.000 -.002	3/8	3 5/8	3 5/8

*1" bore MS1 Mounting available with 1/2" diameter rod only.

Thrust Key Mountings



LAH Series

Bore	+ .000" - .001" Dim. FA	Dim. PA	Dim. PD Mtg. Styles MS2, MS4
1 1/2	.361	3/16	1 7/16
2	.611	5/16	1 13/16
2 1/2	.611	5/16	2 1/16
3 1/4	.736	3/8	2 5/8
4	.861	7/16	2 15/16
5	.861	7/16	3 11/16
6	.986	1/2	4 1/4
8	.986	1/2	5 1/4

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Lin-Act

Lin-Act Series LAA Heavy-Duty Air Cylinders

Acceleration Deceleration Data

Acceleration and Deceleration Force Determination

The uniform acceleration force factor chart and the accompanying formula can be used to rapidly determine the forces required to accelerate and decelerate a cylinder load. To determine these forces, the following factors must be known: total weight to be moved, maximum piston speed, distance available to start or

stop the weight (load), direction of movement, horizontal or vertical, and load friction. By use of the known factors and the "g" factor from chart, the force necessary to accelerate or decelerate a cylinder load may be found by solving the formula (as shown in chart below) application to a given set of conditions.

Nomenclature

- V = Velocity in feet per minute
- S = Distance in inches
- F = Force in lbs.
- W = Weight of load in lbs.
- g = Force factor
- f = Friction of load on machine ways in pounds

To determine the force factor "g" from the chart, locate the intersection of the maximum piston velocity line and the line representing the available distance. Project downward to locate "g" on the horizontal axis. To calculate the "g" factor for distances and velocities exceeding those shown on the chart, the following formula can be used:

$$g = v^2/s \times .0000517$$

Example: Horizontal motion of a free moving 6000 lb. load is required with a distance of 1/2" to a maximum speed of 120 feet per minute.

Formula (1) $F = Wg$ should be used.

$$F = 6000 \text{ pounds} \times 1.50 \text{ (from chart)} = 9000 \text{ lbs.}$$

Assuming a maximum available pump pressure of 1000 psi, a 4" bore cylinder should be selected, operating on push stroke at approximately 750 psi pressure at the cylinder to allow for pressure losses from the pump to the cylinder.

Assume the same load to be sliding on ways with a coefficient of friction of 0.15. The resultant friction load would be $6000 \times 0.15 = 900$ lbs.

Formula (2) $F = Wg + f$ should be used.

$$F = 6000 \text{ lbs.} \times 1.5 \text{ (from chart)} + 900 = 9900 \text{ lbs.}$$

Again allowing 750 psi pressure at the cylinder, a 5" bore cylinder is indicated.

Example: Horizontal deceleration of a 5000 lb. load is required by using a 1" long cushion in a 5" bore cylinder having a 1 3/4" diameter piston rod. Cylinder bore area (19.64 sq. in.) minus the rod area results in a minor area of 17.23 sq. in. at head end of cylinder. A pump delivering 750 psi at the cylinder is used to push the load at 120 feet per minute. Friction coefficient is 0.15 or 750 lbs.

In this example, the total deceleration force is the sum of the force needed to decelerate the 5000 lbs. load, and the force required to counteract the thrust produced by the pump.

- W = Load in lbs. = 5000
- S = Deceleration distance in inches = 1"
- V = Maximum piston speed in feet per minute = 120
- g = .74 (from chart)
- f = 750 lbs.

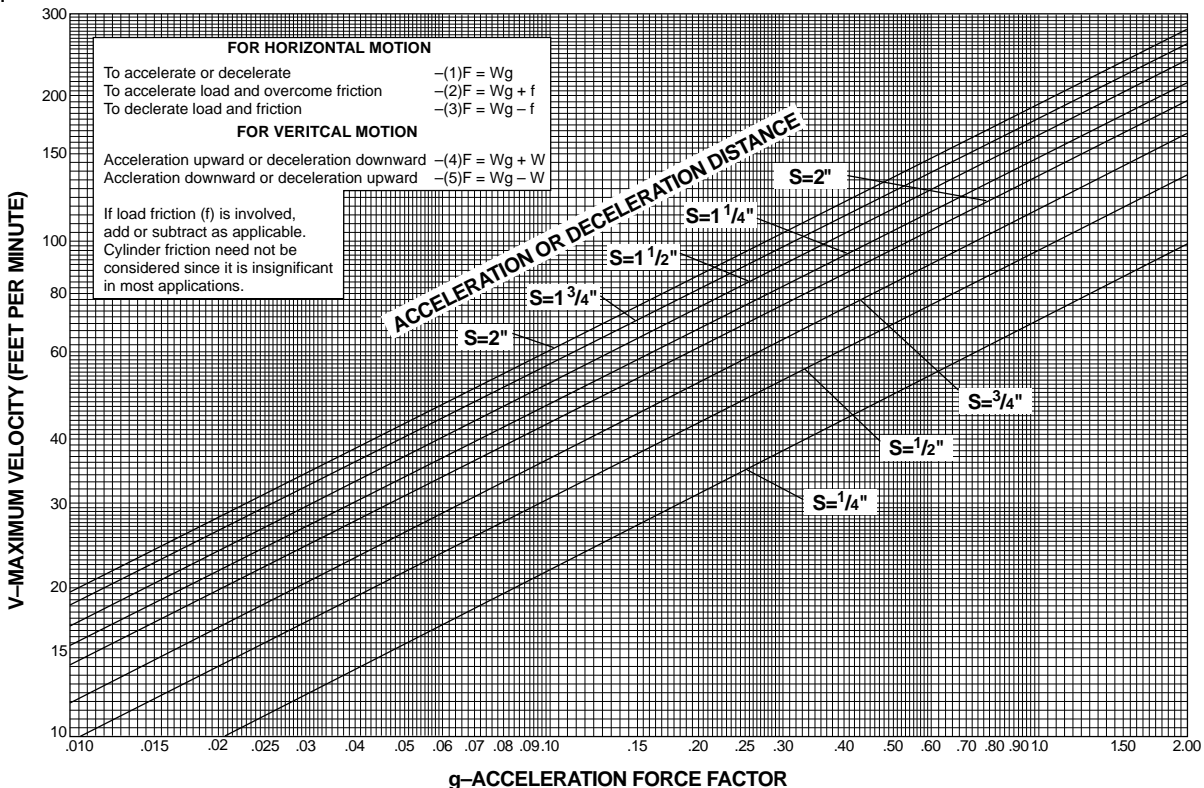
Use formula (3) $F = Wg - f$

$$(F = Wg - f) = (F = 5000 \times .74 - 750) = 2950 \text{ lbs.}$$

The pump is delivering 500 psi acting on the 19.64 sq. in. piston area producing a force (F₂) of 9820 lbs. This force must be included in our calculations. Thus $F + F_2 = 2950 + 9820 = 12770$ lbs. total force to be decelerated.

The total deceleration force is developed by the fluid trapped between the piston and the head. The fluid pressure is equal to the force (12770 lbs.) divided by the minor area (17.23 sq. in.) equals 741 psi. This pressure should not exceed the non-shock rating of the cylinder.

Cushioning practice is to select a "g" factor between .2 and 1.5.



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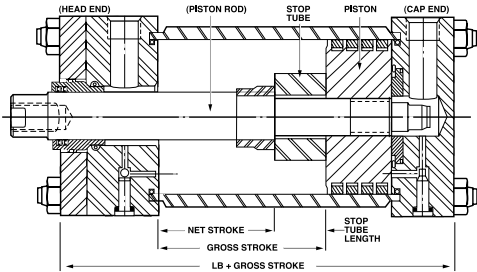
Lin-Act Series LAA Heavy-Duty Air Cylinders

Stop Tubing Mounting Classes

Stop Tubing

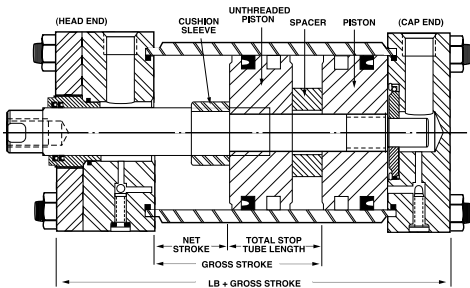
Long stroke cylinders, fixed or pivot mounted, tend to jackknife or buckle on push load applications, resulting in high bearing loading at the rod gland or piston. Use of a stop tube to lengthen the distance between the gland and piston when cylinder rod is fully extended is recommended to reduce these bearing loads. The drawing below shows stop tube construction for fluid power cylinders. Refer to page 70 to determine stop tube length.

Drawing A



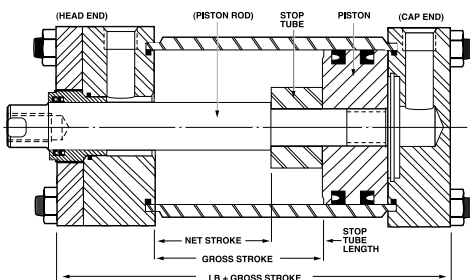
When specifying cylinders with long stroke and stop tube, be sure to call out the net stroke and the length of the stop tube. Machine design can be continued without delay by laying in a cylinder equivalent in length to the NET STROKE PLUS STOP TUBE LENGTH, which is referred to as GROSS STROKE.

Drawing B



Double piston design is supplied on air cylinders with cushion head end or both ends.

Drawing C



This design is supplied on all non-cushion cylinders.

LAA, LAL and LAH Series Cylinders

Mounting Classes

Standard mountings for fluid power cylinders fall into three basic groups. The groups can be summarized as follows:

Group 1 Straight Line Force Transfer with fixed mounts which absorb force on cylinder centerline.

Group 2 Pivot Force Transfer. Pivot mountings permit a cylinder to change its alignment in one plane.

Group 3 Straight Line Force Transfer with fixed mounts which do not absorb force on cylinder centerline.

Because a cylinder's mounting directly affects the maximum pressure at which the cylinder can be used, the chart below should be helpful in selection of the proper mounting combination for your application. Stroke length, piston rod connection to load, extra piston rod length over standard, etc., should be considered for thrust loads. Alloy steel mounting bolts are recommended for all mounting styles, and thrust keys are recommended for Group 3.

Group 1 FIXED MOUNTS which absorb force on cylinder centerline.	
Heavy-Duty Service For Thrust Loads For Tension Loads	Mtg. Styles MF6, MX2, MS3 Mtg. Styles MF5, MX3, MS3
Medium-Duty Service For Thrust Loads For Tension Loads	Mtg. Styles MF2, MF5 Mtg. Styles MF1, MF6
Light-Duty Service For Thrust Loads For Tension Loads	Mtg. Style MF1 Mtg. Style MF2
Group 2 PIVOT MOUNTS which absorb force on cylinder centerline.	
Heavy-Duty Service For Thrust Loads For Tension Loads	Mtg. Styles MT4, MT1 Mtg. Styles MP1, MP2, MT4, MT1, MT2
Medium-Duty Service For Thrust Loads For Tension Loads	Mtg. Styles MP1, MP2 Mtg. Styles MP1, MP2
Light-Duty Service For Thrust Loads For Tension Loads	
Group 3 FIXED MOUNTS which do not absorb force on the centerline.	
Heavy-Duty Service For Thrust Loads For Tension Loads	Mtg. Style MS2 Mtg. Style MS2
Medium-Duty Service For Thrust Loads For Tension Loads	Mtg. Style MS4 Mtg. Style MS4
Light-Duty Service For Thrust Loads For Tension Loads	Mtg. Style MS1* Mtg. Style MS1*

*Mounting style MS1 recommended for maximum pressure of 150 psi.

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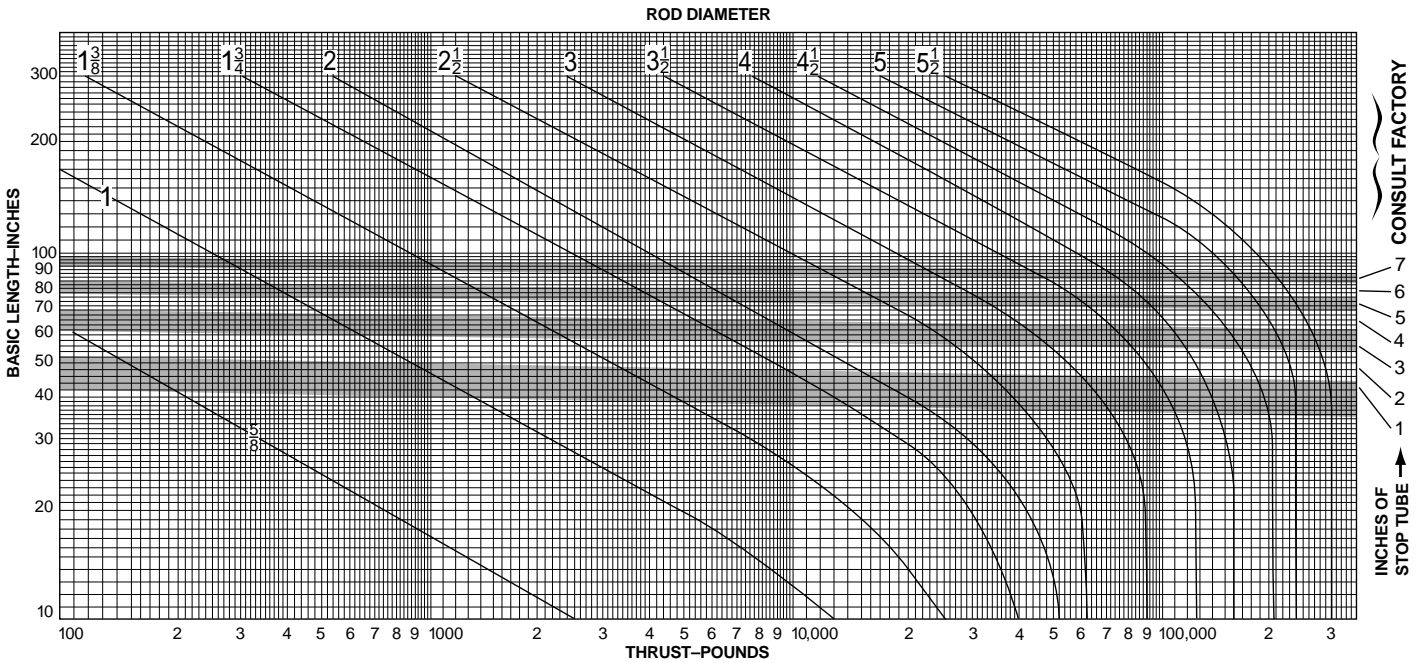
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Cylinder Stroke Length

Piston Rod — Stroke Selection Chart



How to Use the Chart

The selection of a piston rod for thrust (push) conditions requires the following steps:

1. Determine the type of cylinder mounting style and rod end connection to be used. Then consult the chart below and find the "stroke factor" that corresponds to the conditions used.
2. Using this stroke factor, determine the "basic length" from the equation:

$$\text{Basic Length} = \frac{\text{Actual Stroke}}{\text{Stroke Factor}}$$

The graph is prepared for standard rod extensions beyond the face of the gland retainers. For rod extensions greater than standard, add the increase to the stroke in arriving at the "basic length."

3. Find the load imposed for the thrust application by multiplying the full bore area of the cylinder by the system pressure.
4. Enter the graph along the values of "basic length" and "thrust" as found above and note the point of intersection:

A) The correct piston rod size is read from the diagonally curved line labeled "Rod Diameter" next above the point of intersection.

B) The required length of stop tube is read from the right of the graph by following the shaded band in which the point of intersection lies.

C) If required length of stop tube is in the region labeled "consult factory," submit the following information for an individual analysis:

- 1) Cylinder mounting style.
- 2) Rod end connection and method of guiding load.
- 3) Bore, required stroke, length of rod extension (Dim. "LA") if greater than standard, and series of cylinder used.
- 4) Mounting position of cylinder. (Note: If at an angle or vertical, specify direction of piston rod.)
- 5) Operating pressure of cylinder if limited to less than standard pressure for cylinder selected.

Recommended Mounting Styles for Maximum Stroke and Thrust Loads	Rod End Connection	Case	Stroke Factor
Groups 1 or 3 Long stroke cylinders for thrust loads should be mounted using a heavy-duty mounting style at one end, firmly fixed and aligned to take the principal force. Additional mounting should be specified at the opposite end, which should be used for alignment and support. An intermediate support may also be desirable for long stroke cylinders mounted horizontally. See catalog page no. 73 under "Tie Rod Supports — Rigidity of Envelope" for a guide. Machine mounting pads can be adjustable for support mountings to achieve proper alignment.	Fixed and Rigidly Guided	I	.50
	Pivoted and Rigidly Guided	II	.70
	Supported but not Rigidly Guided	III	2.00
Group 2 MT1 — Trunnion on Head	Pivoted and Rigidly Guided	IV	1.00
MT4 — Intermediate Trunnion	Pivoted and Rigidly Guided	V	1.50
MT2 — Trunnion on Cap or MP1 — Clevis on Cap	Pivoted and Rigidly Guided	VI	2.00

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Hydraulic Cylinder Port Sizes and Piston Speed

One of the factors involved in determining the speed of a hydraulic cylinder piston is fluid flow in connecting lines, generally measured in gallons per minute, introduced to, or expelled from, cap end cylinder port. (Due to piston rod displacement, the flow at head end port will be less than at cap end.) Fluid velocity, however, is measured in feet per second. In connecting lines this velocity should generally be limited to 15 feet per second to minimize fluid turbulence, pressure loss and hydraulic shock.

Piston speed for cylinders can be calculated from data shown below. The table shows fluid velocity flow for major cylinder

areas as well as for the net area at the rod end for cylinders 1" through 14" bore size.

If desired piston speed results in fluid flow in excess of 15 feet per second in connecting lines, consider the use of larger lines up to cylinder port, using either oversized ports or two ports per cap.

If heavy loads are involved or piston speeds are in excess of 20 feet per minute and the piston will make a full stroke, cushions are recommended. Cushions increase cylinder life and reduce undesirable noise.

Cylinder Bore (Inches)	Piston Rod		Cylinder Net Area (Sq. In.)	Fluid Displacement at 10 Ft. Per Min. Piston Velocity		Fluid Velocity (In Feet Per Second) Through Extra Heavy Pipe at 10 FPM Piston Speed.								
	Dia. (Inches)	Area (Sq. In.)		GPM	CFM	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
1	0	0	.785	.41	.054	1.82	.92	.56	.30	.183	.102	.074	.045	—
	1/2	.196	.589	.3	.041	1.33	.68	.41	.21	.134	.075	.055	.033	—
	5/8	.307	.478	.16	.033	.71	.36	.22	.12	.071	.04	.029	.017	—
1 1/2	0	.0	1.77	.92	.123	4.09	2.09	1.259	.680	.41	.23	.167	.1	—
	5/8	.307	1.46	.76	.101	3.38	1.73	1.04	.562	.338	.19	.138	.082	—
	1	.785	.98	.51	.068	2.27	1.16	.699	.378	.228	.128	.093	.055	—
2	0	0	3.14	1.63	.218	7.27	3.71	2.238	1.209	.728	.408	.296	.177	—
	5/8	.307	2.84	1.48	.197	6.56	3.35	2.019	1.091	.657	.368	.267	.160	—
	1	.785	2.36	1.23	.164	5.45	2.79	1.678	.907	.546	.306	.222	.133	—
2 1/2	1 3/8	1.485	1.66	.86	.115	3.84	1.96	1.180	.638	.384	.215	.156	.094	—
	0	0	4.91	2.55	.341	11.36	5.8	3.496	1.89	1.138	.638	.463	.277	—
	5/8	.307	4.6	2.39	.319	10.65	5.44	3.278	1.771	1.067	.598	.434	.260	—
3 1/4	1	.785	4.12	2.14	.286	9.54	4.87	2.937	1.587	.956	.536	.389	.233	—
	1 3/8	1.485	3.42	1.78	.237	7.93	4.05	2.439	1.318	.794	.445	.323	.193	—
	1 3/4	2.405	2.5	1.3	.174	5.96	2.96	1.783	.963	.58	.325	.236	.141	—
4	0	0	8.3	4.31	.576	19.2	9.81	5.909	3.193	1.923	1.078	.783	.468	—
	1	.785	7.51	3.9	.521	17.38	8.88	5.349	2.891	1.741	.976	.708	.424	—
	1 3/8	1.485	6.81	3.54	.473	15.77	8.05	4.851	2.622	1.579	.885	.642	.384	—
5	1 3/4	2.405	5.89	3.06	.409	13.64	6.96	4.196	2.268	1.366	.765	.556	.333	—
	2	3.142	5.15	2.68	.357	11.93	6.09	3.671	1.984	1.195	.67	.486	.291	—
	0	0	12.57	6.53	.872	29.09	14.85	8.95	4.84	2.91	1.63	1.19	.709	—
6	1	.785	11.78	6.12	.818	27.27	13.93	8.39	4.54	2.73	1.53	1.11	.665	—
	1 3/8	1.485	11.08	5.76	.769	25.65	13.1	7.89	4.27	2.57	1.44	1.05	.625	—
	1 3/4	2.405	10.16	5.28	.705	23.52	12.01	7.24	3.91	2.36	1.32	.96	.574	—
7	2	3.142	9.42	4.89	.654	21.82	11.14	6.71	3.63	2.19	1.22	.89	.532	—
	2 1/2	4.909	7.66	3.98	.532	17.73	9.05	5.45	2.95	1.78	1.0	.72	.432	—
	0	0	19.64	10.2	1.363	45.45	23.21	13.99	7.56	4.55	2.55	1.85	1.108	—
8	1	.785	18.85	9.79	1.308	43.64	22.28	13.43	7.26	4.37	2.45	1.78	1.064	—
	1 3/8	1.485	18.15	9.43	1.26	42.01	21.45	12.93	6.99	4.21	2.36	1.71	1.024	—
	1 3/4	2.405	17.23	8.95	1.196	39.88	20.37	12.27	6.63	3.99	2.24	1.63	.973	—
9	2	3.142	16.49	8.57	1.144	38.18	19.5	11.75	6.35	3.82	2.14	1.56	.931	—
	2 1/2	4.909	14.73	7.65	1.022	34.09	17.41	10.49	5.67	3.41	1.91	1.39	.831	—
	3	7.069	12.57	6.53	.872	29.09	14.85	8.95	4.84	2.91	1.63	1.19	.709	—
10	3 1/2	9.621	10.01	5.21	.695	23.18	11.84	7.13	3.86	2.32	1.3	.95	.565	—
	0	0	28.27	14.69	1.962	65.45	33.42	20.14	10.88	6.55	3.67	2.67	1.596	—
	1 3/8	1.485	26.79	13.92	1.859	62.01	31.67	19.08	10.31	6.21	3.48	2.53	1.512	—
11	1 3/4	2.405	25.87	13.44	1.795	59.88	30.58	18.43	9.96	5.6	3.36	2.44	1.46	—
	2	3.142	25.13	13.06	1.744	58.18	29.71	17.9	9.67	5.83	3.27	2.37	1.418	—
	2 1/2	4.909	23.37	12.14	1.622	54.1	27.6	16.64	8.99	5.42	3.04	2.2	1.32	—
12	3	7.069	21.21	11.02	1.472	49.1	25.1	15.10	8.16	4.92	2.76	2.0	1.2	—
	3 1/2	9.621	18.65	9.69	1.294	43.2	22.1	13.29	7.18	4.32	2.42	1.76	1.05	—
	4	12.566	15.71	8.16	1.09	36.4	18.6	11.19	6.05	3.64	2.04	1.48	.89	—

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Hydraulic Cylinder Port Sizes and Piston Speed

Cylinder Bore (Inches)	Piston Rod		Cylinder Net Area (Sq. In.)	Fluid Displacement at 10 Ft. Per Min. Piston Velocity		Fluid Velocity (In Feet Per Second) Through Extra Heavy Pipe at 10 FPM Piston Speed.								
	Dia. (Inches)	Area (Sq. In.)		GPM	CFM	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
7	0	0	38.49	20.00	2.671	89.1	45.5	27.41	14.81	8.92	5.00	3.63	2.17	—
	1 ³ / ₈	1.485	37.00	19.22	2.568	85.7	43.7	26.35	14.24	8.58	48.1	3.49	2.09	—
	1 ³ / ₄	2.405	36.08	18.74	2.504	83.5	42.7	25.70	13.89	8.36	4.69	3.40	2.04	—
	2	3.142	35.34	18.36	2.453	81.8	41.8	25.17	13.60	8.19	4.59	3.33	2.00	—
	2 ¹ / ₂	4.909	33.58	17.44	2.330	77.7	39.7	23.92	12.92	7.78	4.36	3.17	1.90	—
	3	7.069	31.42	16.32	2.181	72.7	37.1	22.38	12.09	7.28	4.08	2.96	1.77	—
	3 ¹ / ₂	9.621	28.86	14.99	2.003	66.8	34.1	20.56	11.11	6.69	3.75	2.72	1.63	—
	4	12.566	25.92	13.47	1.799	60.0	30.6	18.46	9.98	6.01	3.37	2.45	1.46	—
	4 ¹ / ₂	15.904	22.58	11.73	1.567	52.3	26.7	16.08	8.69	5.23	2.93	2.12	1.28	—
5	19.635	18.85	9.79	1.308	43.6	22.3	13.43	7.26	4.37	2.45	1.78	1.06	—	
8	0	0	50.27	26.12	3.489	116.4	59.4	35.80	19.35	11.65	6.53	4.74	2.84	1.977
	1 ³ / ₈	1.485	48.78	25.34	3.385	112.9	57.7	34.74	18.78	11.31	6.34	4.60	2.75	1.918
	1 ³ / ₄	2.405	47.86	24.86	3.321	110.8	56.6	34.09	18.42	11.09	6.22	4.51	2.70	1.882
	2	3.142	47.12	24.48	3.270	109.1	55.7	33.56	18.14	10.92	6.12	4.45	2.66	1.853
	2 ¹ / ₂	4.909	45.36	23.57	3.149	105.0	53.61	32.31	17.46	10.51	5.892	4.278	2.560	1.784
	3	7.069	43.20	22.44	2.998	100.0	51.06	30.77	16.63	10.01	5.612	4.074	2.438	1.699
	3 ¹ / ₂	9.621	40.65	21.12	2.821	94.1	48.04	28.95	15.65	9.42	5.279	3.834	2.294	1.598
	4	12.566	37.70	19.59	2.616	87.3	44.56	26.85	14.51	8.74	4.897	3.556	2.128	1.483
	4 ¹ / ₂	15.904	34.36	17.85	2.385	79.5	40.62	24.47	13.23	8.20	4.464	3.241	1.939	1.351
	5	19.635	30.63	15.91	2.126	70.9	36.21	21.82	11.79	7.10	3.979	2.889	1.729	1.205
5 ¹ / ₂	23.758	26.51	13.77	1.840	61.4	31.33	18.88	10.20	6.15	3.444	2.500	1.496	1.043	
10	0	0	78.54	40.80	5.451	181.8	92.84	55.94	30.23	18.21	10.203	7.408	4.433	3.089
	1 ³ / ₄	2.405	76.14	39.56	5.284	176.2	89.99	54.23	29.31	17.65	9.890	7.181	4.297	2.994
	2	3.142	75.40	39.17	5.233	174.5	89.12	53.70	29.02	17.48	9.795	7.112	4.255	2.965
	2 ¹ / ₂	4.909	73.63	38.25	5.110	170.4	87.03	52.44	28.34	17.07	9.565	6.945	4.156	2.896
	3	7.069	71.47	37.13	4.960	165.4	84.48	50.91	27.51	16.57	9.284	6.741	4.034	2.811
	3 ¹ / ₂	9.621	68.92	35.80	4.783	159.5	81.47	49.09	26.53	15.98	8.953	6.501	3.890	2.710
	4	12.566	65.97	34.27	4.578	152.7	77.98	46.99	25.39	15.29	8.570	6.223	3.724	2.595
	4 ¹ / ₂	15.904	62.64	32.54	4.347	145.0	74.04	44.61	24.11	14.52	8.137	5.908	3.535	2.463
	5	19.635	58.91	30.60	4.088	136.4	69.63	41.96	22.67	13.65	7.652	5.556	3.325	2.317
	5 ¹ / ₂	23.758	54.78	28.46	3.802	126.8	64.75	39.02	21.09	12.70	7.116	5.167	3.092	2.154
	6	28.274	50.27	26.12	3.489	116.4	59.42	35.80	19.35	11.65	6.53	4.741	2.837	1.977
6 ¹ / ₂	33.183	45.36	23.57	3.148	105.0	53.6	32.31	17.46	10.52	5.89	4.278	2.560	1.784	
7	38.485	40.06	20.81	2.780	92.7	47.4	28.53	15.42	9.29	5.20	3.778	2.261	1.575	
12	0	0	113.10	58.76	7.849	261.8	133.7	80.55	43.53	26.22	14.69	10.668	6.383	4.448
	2	3.142	109.96	57.12	7.631	254.5	130.0	78.32	42.32	25.49	14.28	10.371	6.206	4.324
	2 ¹ / ₂	4.909	108.19	56.21	7.508	250.4	127.9	77.06	41.64	25.08	14.05	10.205	6.106	4.255
	3	7.069	106.03	55.08	7.359	245.4	125.3	75.52	40.81	24.58	13.77	10.001	5.984	4.170
	3 ¹ / ₂	9.621	103.48	53.76	7.182	239.5	122.3	73.70	39.83	23.99	13.44	9.760	5.840	4.069
	4	12.566	100.53	52.23	6.977	232.7	118.8	71.60	38.70	23.30	13.06	9.482	5.674	3.954
	4 ¹ / ₂	15.904	97.19	50.49	6.745	225.0	114.9	69.23	37.41	22.53	12.63	9.168	5.486	3.822
	5	19.635	93.46	48.55	6.486	216.4	110.5	66.57	35.98	21.67	12.14	8.816	5.275	3.676
	5 ¹ / ₂	23.758	89.34	46.41	6.200	206.8	105.6	63.63	34.39	20.71	11.61	8.427	5.042	3.513
	6	28.274	84.82	44.06	5.887	196.4	100.3	60.42	32.65	19.66	11.02	8.001	4.787	3.336
	6 ¹ / ₂	33.183	79.92	41.52	5.547	185.0	94.5	56.92	30.76	18.53	10.38	7.538	4.510	3.143
	7	38.485	74.61	38.77	5.179	172.7	88.2	53.14	28.72	17.30	9.69	7.038	4.211	2.934
	7 ¹ / ₂	44.179	68.92	35.80	4.783	159.5	81.5	49.09	26.53	15.98	8.95	6.501	3.890	2.710
8	50.266	62.83	32.64	4.360	145.4	74.3	44.75	24.19	14.57	8.16	5.926	3.546	2.471	
8 ¹ / ₂	56.745	56.35	29.27	3.911	130.5	66.6	40.14	21.69	13.06	7.32	5.315	3.181	2.216	
14	0	0	153.94	79.97	10.683	356.3	182.0	109.6	59.25	35.68	20.00	14.52	8.688	6.054
	2 ¹ / ₂	4.909	149.03	77.42	10.343	345.0	176.2	106.2	57.36	34.55	19.36	14.06	8.411	5.861
	3	7.069	146.87	76.30	10.193	340.0	173.6	104.6	56.53	34.05	19.08	13.85	8.289	5.776
	3 ¹ / ₂	9.621	144.32	74.97	10.016	334.1	170.6	102.8	55.55	33.45	18.75	13.61	8.145	5.676
	4	12.566	141.37	73.44	9.811	327.3	167.1	100.7	54.42	32.77	18.37	13.33	7.979	5.560
	4 ¹ / ₂	15.904	138.03	71.71	9.579	319.5	163.2	98.3	53.13	32.00	17.93	13.02	7.791	5.428
	5	19.635	134.30	69.77	9.320	310.9	158.8	95.7	51.70	31.13	17.45	12.67	7.580	5.282
5 ¹ / ₂	23.758	130.18	67.63	9.035	301.3	153.9	92.7	50.11	30.18	16.91	12.28	7.347	5.120	

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Deceleration Force and Air Requirements

Cushion ratings for **air cylinders only** are described in Table B-7 and Graph B-3. To determine whether a cylinder will adequately stop a load without damage to the cylinder, the weight of the load (including the weight of the piston and the piston rod from Table B-6) and the maximum speed of the piston rod must first be determined. Once these two factors are known, the Kinetic Energy Graph may be used. Enter the graph at its base for the value of weight determined, and project vertically to the required speed value. The point of intersection of these two lines will be the cushion rating number required for the application.

To determine the total load to be moved, the weight of the piston and rod must be included.

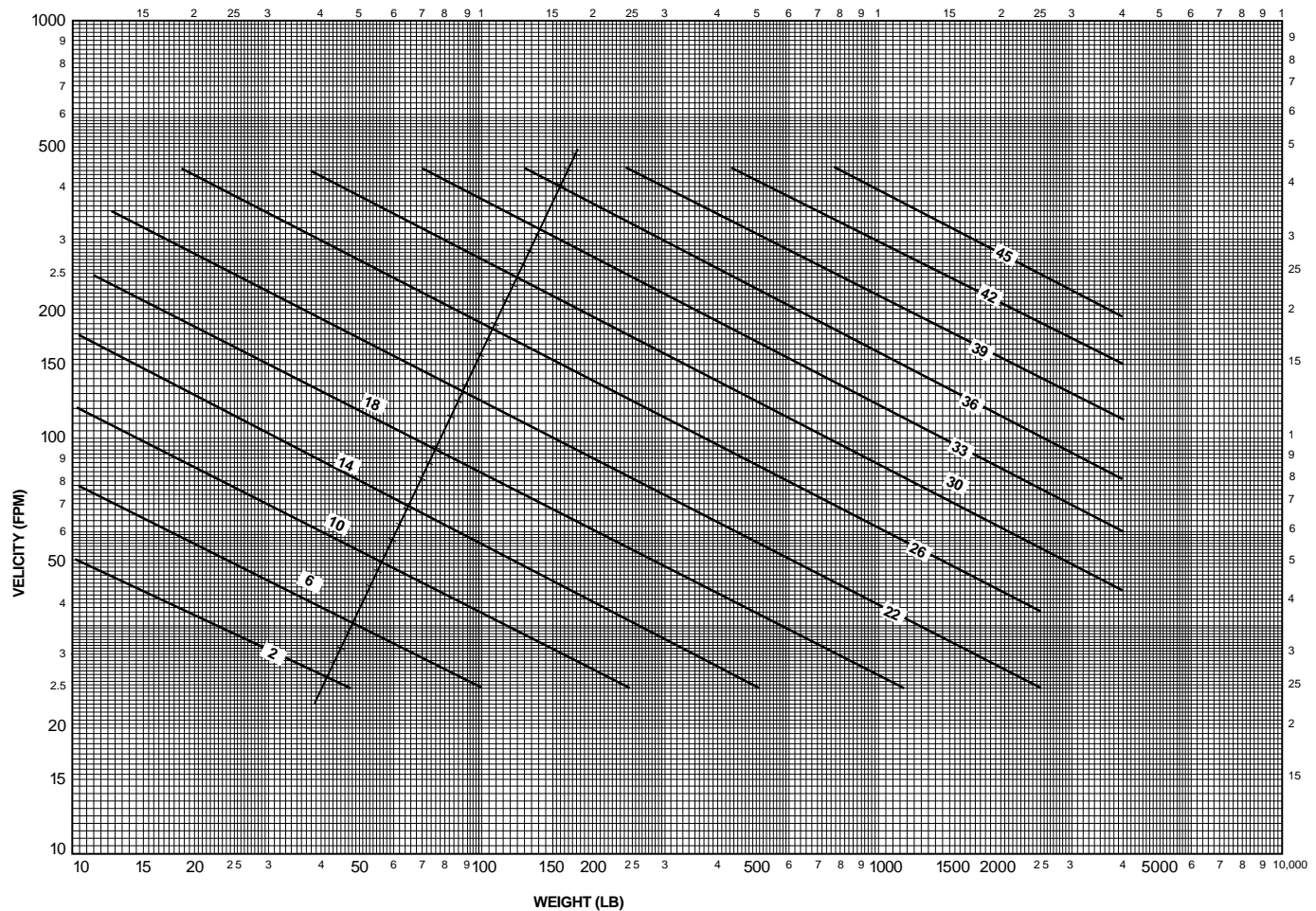
Total Weight = Weight of the piston and non-stroke rod length (Column 1) + weight of the rod per inch of stroke x the inches of stroke (Column 2) + the load to be moved.

Table B-6 — Weight

Bore Dia.	Column 1 Basic Wgt. (Lbs.) for Piston & Non-Stroke Rod	Rod Dia.	Column 2 Basic Wgt. (Lbs.) for 1" Stroke
1 1/2	1.5	5/8	.087
2	3.0	1	.223
2 1/2	5.4	1 3/8	.421
3 1/4	8.3	1 3/4	.682
4	14.2	2	.89
5	29	2 1/2	1.39
6	41	3	2.0
8	89	3 1/2	2.73
10	115	4	3.56
12	161	5	5.56
14	207	5 1/2	6.73

Example: A 3-1/4" bore cylinder, having a 1" diameter rod and 25" stroke; load to be moved is 85 lbs. Total load to be moved is then 8.3 lbs. + .223 lbs./in. x 25 in. + 85 lbs. or a total of 99 lbs.

Graph B3 — Kinetic Energy — Air Cylinders



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Now refer to Table B-7 and find the cushion ratings, using bore size and rod diameter of the cylinder selected. If a simple circuit is used, with no meter out or speed control, use the "no back pressure, Column A" values. If a meter out or speed control is to be used, use the back pressure column values, If the cushion rating found in Table B-7 (below) is **greater** than the number determined in Graph

B-3, then the cylinder will stop the load adequately. If the cushion rating in Table B-7 is **smaller** than the number found in Graph B-3, then a larger bore cylinder should be used. In those applications where back pressures exist in the exhaust lines, it is possible to exceed the cushion ratings shown in Table B-7. In these cases, consult the factory and advise the amount of back pressure.

Table B-7 – Air Cylinder Cushion Ratings

Bore Diameter	Rod Diameter	Rating with No Back Pressure	Rating with Back Pressure
1 1/2	Cap End	12	17
	5/8	8	14
	1	3	8
2	Cap End	14	20
	5/8	12	18
	1	9	15
	1 3/8	6	11
2 1/2	Cap End	17	23
	5/8	14	20
	1	14	19
	1 3/8	12	18
	1 3/4	8	13
3 1/4	Cap End	21	26
	5/8	18	24
	1 3/8	17	23
	1 3/4	16	22
	2	13	19
4	Cap End	23	28
	1	20	27
	1 3/8	20	26
	1 3/4	19	25
	2	17	23
	2 1/2	17	22
	2 3/4	15	20
5	Cap End	26	31
	1	23	28
	1 3/8	23	28
	1 3/4	22	28
	2	20	26
	2 1/2	19	25
	3	18	24
	3 1/2	15	20
6	Cap End	26	31
	1 3/8	26	31
	1 3/4	26	31
	2	24	29
	2 1/2	24	29
	3	22	28
	3 1/2	21	27
	4	20	26
7	Cap End	28	33
	1 3/8	28	33
	1 3/4	28	33
	2	26	31
	2 1/2	25	30

Bore Diameter	Rod Diameter	Rating with No Back Pressure	Rating with Back Pressure
7	3	24	30
	3 1/2	24	30
	4	23	29
	4 1/2	22	28
	5	21	27
8	Cap End	29	35
	1 3/8	29	35
	1 3/4	29	34
	2	27	33
	2 1/2	26	32
	3	26	32
	3 1/2	26	32
	4	25	31
	5	23	29
	5 1/2	22	28
10	Cap End	33	39
	1 3/4	32	38
	2	31	37
	2 1/2	31	36
	3	30	36
	3 1/2	30	36
	4	30	36
	5	28	34
	5 1/2	27	33
	6	25	31
12	Cap End	35	41
	2	33	39
	2 1/2	33	38
	3	33	38
	3 1/2	32	38
	4	32	38
	5	31	36
14	Cap End	38	43
	2 1/2	37	42
	3	36	42
	3 1/2	36	41
	4	36	41
	5	35	40
	5 1/2	34	40

Air Requirement per Inch of Cylinder Stroke

The amount of air required to operate a cylinder is determined from the volume of the cylinder and its cycle in strokes per minute. This may be determined by use of the following formulae which apply to a single-acting cylinder.

$$V = \frac{3.1416 LD^2}{4}$$

$$C = \frac{fV}{1728}$$

Where: V = Cylinder volume, cu. in.
L = Cylinder stroke length, in.
D = Internal diameter of cylinder in.
C = Air required, cfm
f = Number of strokes per minute

The air requirements for double-acting cylinder is almost double that of a single-acting cylinder, except for the volume of the piston rod.

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Lin-Act Series LAA Heavy-Duty Air Cylinders

The air flow requirements of a cylinder in terms of cfm should not be confused with compressor ratings which are given in terms of free air. If compressor capacity is involved in the consideration of cylinder air requirements it will be necessary to convert cfm values to free air values. This relationship varies for different gauge pressures.

Thrust (lbs.) = Operating Pressure x Area of Cylinder Bore

Note: On the “out” stroke the air pressure is working on the entire piston area, but on the “in” stroke the air pressure works on the piston area less the rod area.

Graph B-4 and B-5 offer a simple means to select pneumatic components for dynamic cylinder applications. It is only necessary to know the force required, the desired speed and the pressure which can be maintained at the inlet to the F-R-L “Combo.” The graphs assume average

conditions relative to air line sizes, system layout, friction, etc. At higher speeds, consider appropriate cushioning of cylinders.

The general procedure to follow when using these graphs is:

1. Select the appropriate graph depending upon the pressure which can be maintained to the system — Graph B-4 for 100 psig and Graph B-5 for 80 psig.
2. Determine appropriate cylinder bore. Values underneath the diagonal cylinder bore lines indicate the maximum recommended dynamic thrust developed while the cylinder is in motion. The data in the table at the bottom of each graph indicates available static force for applications in which clamping force is a prime consideration in determining cylinder bore.

Graph B-4 — This graph is determined by having 100 psig available under flowing conditions.

THIS GRAPH IS DETERMINED BY HAVING 100 PSIG AVAILABLE UNDER FLOWING CONDITIONS.

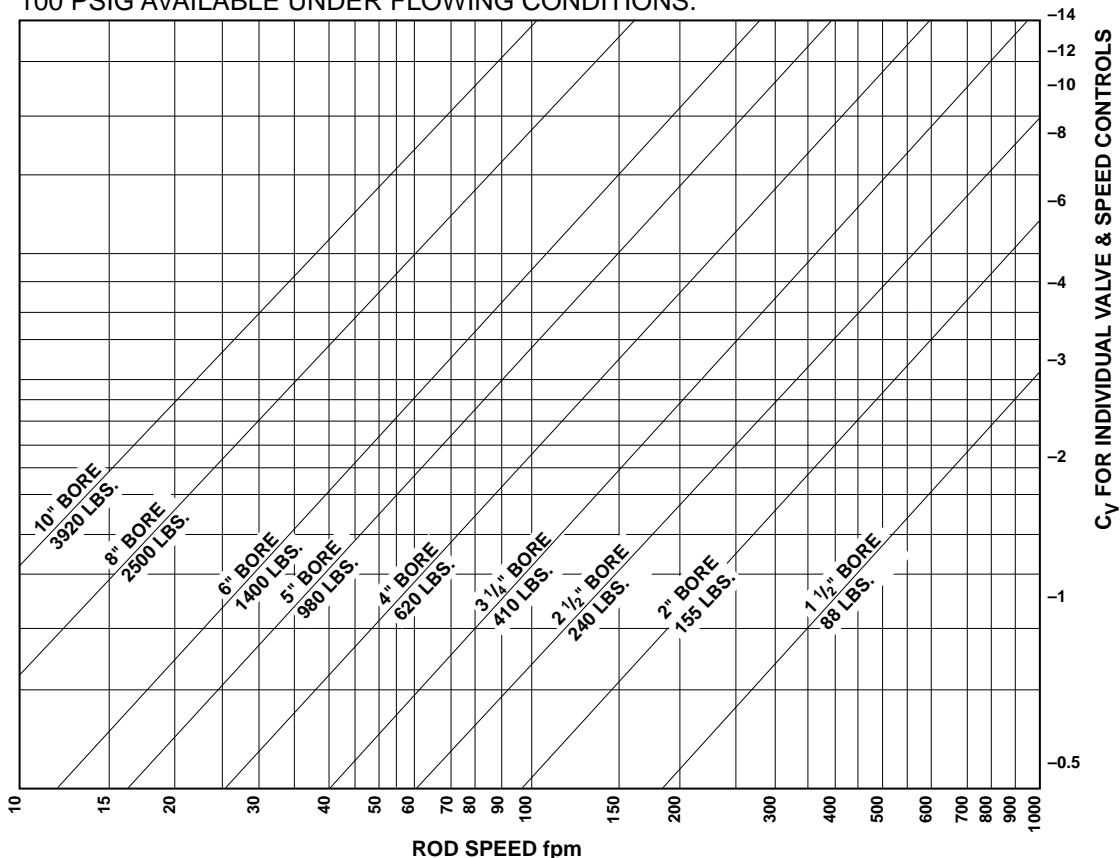


Table B-8 — Thrust Developed

Bore Size	1½	2	2½	3¼	4	5	6	8	10
Dynamic Thrust (lbs.)	88	155	240	410	620	980	1400	2500	3920
Static Thrust (lbs.)	177	314	491	830	1250	1960	2820	5020	7850

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Air Requirements

3. Read upward on appropriate rod speed line to intersection with diagonal cylinder bore line. Read right from intersection point to determine the required C_v of the valve and the speed controls. Both the valve and speed controls must have this C_v .

The following examples illustrate use of the graphs:

Example 1: Assume it is necessary to raise a 900 lb. load 24 inches in two seconds. With 100 psig maintained at the inlet to the F-R-L, use Graph B-4. The 5-inch bore cylinder is capable of developing the required thrust while in motion. Since 24 inches in two seconds is equal to 60 fpm, read upward on the 60 fpm line to the intersection of the 5-inch bore diagonal line. Reading to the right indicates that the required valve and speed controls must each have a C_v of over 1.9.

Example 2: Assume similar conditions to Example 1, except that only 80 psig will be available under flowing conditions. Using Graph B-5, a 6-inch bore cylinder is indicated. Read upward on the 60 fpm line to the intersection point. Interpolation of the right-hand scale indicates a required valve and speed control C_v of over 2.8.

Example 3: Assume similar conditions to Example 1, except that the load is being moved in a horizontal plane with a coefficient of sliding friction of 0.2. Only a 180 lb. thrust is now required (900 lb. x 0.2). Consult Graph B-4. The 2½ inch bore cylinder will develop sufficient thrust, and at 60 fpm requires a valve and speed control C_v of about 0.5.

Graph B-5 — This graph is determined by having 80 psig available under flowing conditions.

THIS GRAPH IS DETERMINED BY HAVING 80 PSIG AVAILABLE UNDER FLOWING CONDITIONS.

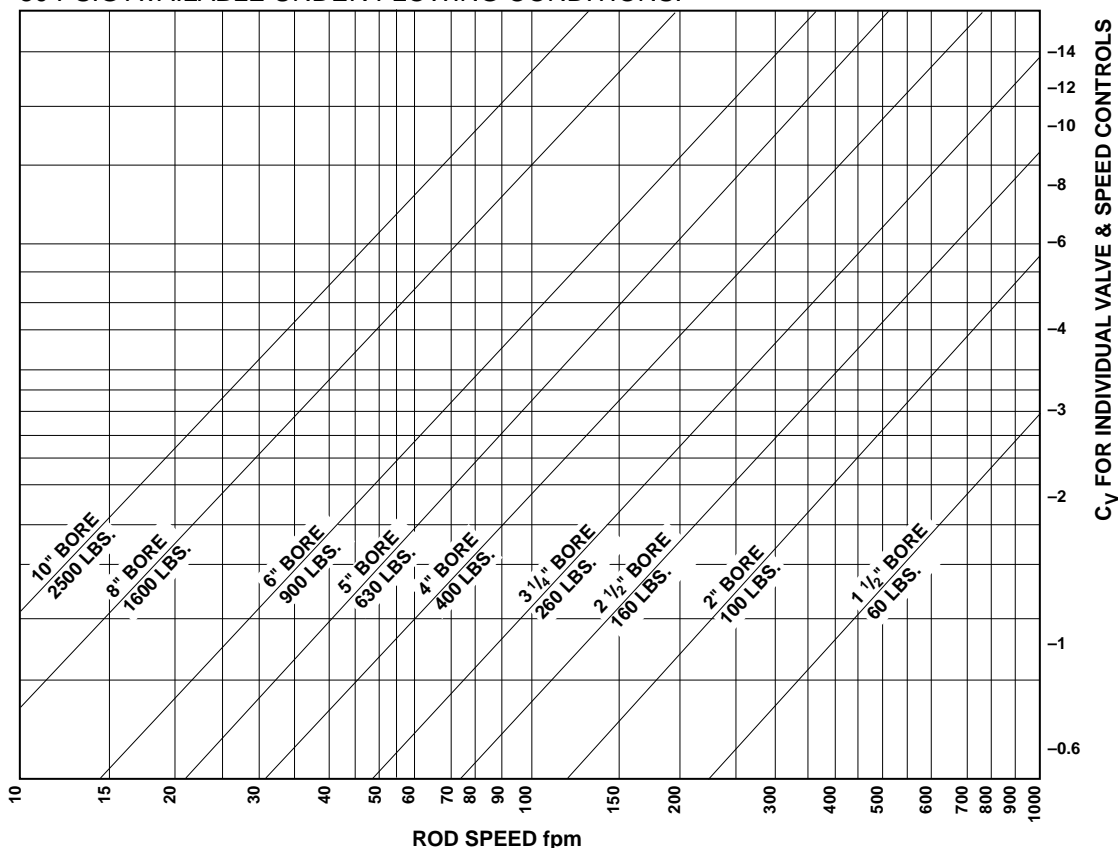


Table B-9 — Thrust Developed

Bore Size	1½	2	2½	3¼	4	5	6	8	10
Dynamic Thrust (lbs.)	60	100	160	260	400	630	900	1600	2500
Static Thrust (lbs.)	141	251	393	663	1000	1570	2260	4010	6280

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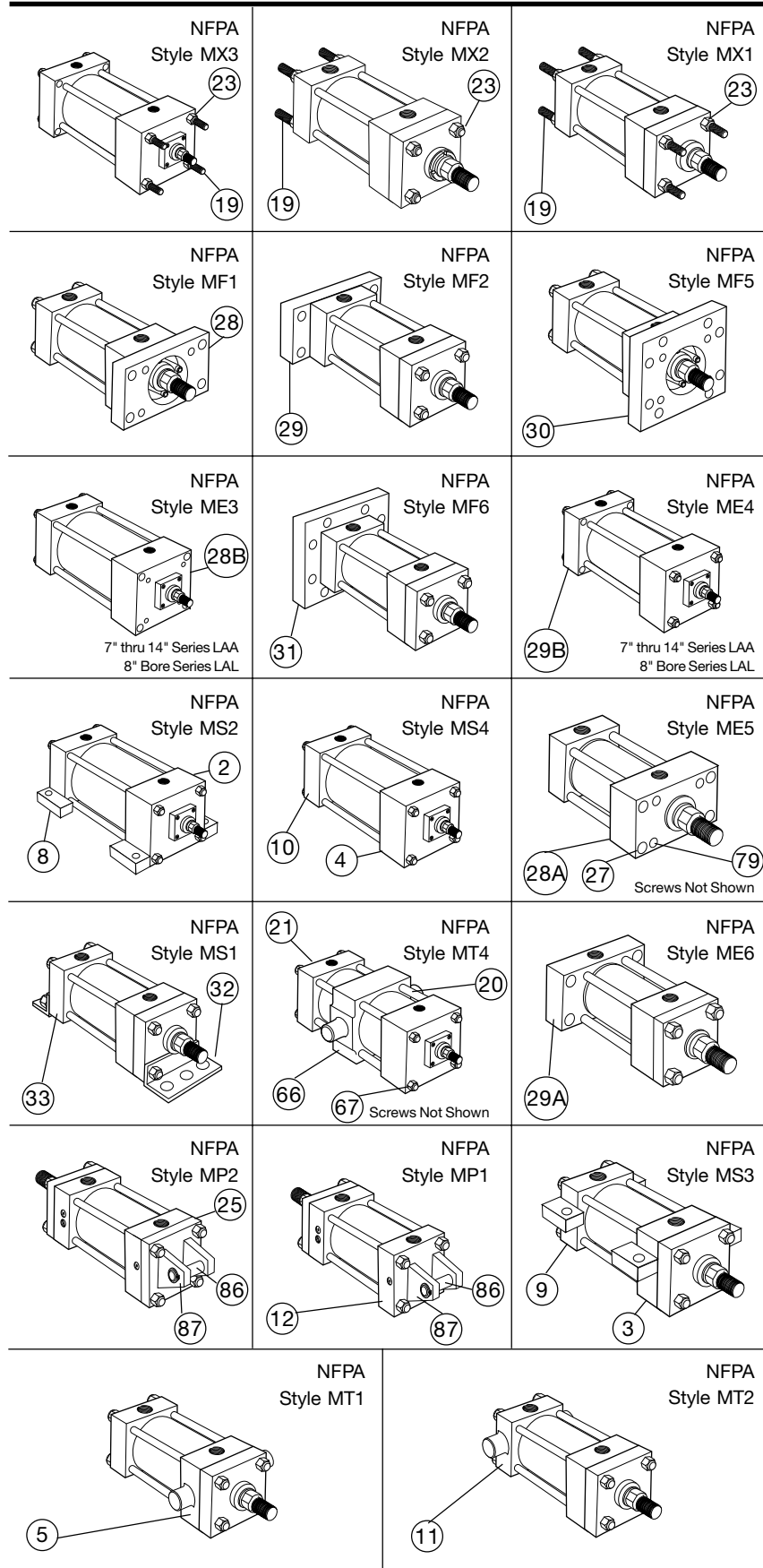
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Lin-Act

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Mounting Parts Identification



Replacement Mountings & Hardware

Note: For items not shown see pages 84 and 85.

Symbol	Description
2	Head, side lug mounting
3	Head, centerline lug mounting
4	Head, side tapped mounting
5	Head, trunnion mounting
8	Cap, side lug mounting
9	Cap, centerline lug mounting
10	Cap, side tapped mounting
11	Cap, trunnion mounting
12	Cap, fixed clevis mounting
19	Tie rod
20	Tie rod, head end mounting
21	Tie rod, cap end mounting
23	Tie rod nut
25	Detachable clevis, mounting
27	Retainer
28	Flange, rectangular mounting
28A	Head, rectangular mounting
28B	Head, square mounting
29	Flange, rectangular mounting
29A	Cap, rectangular mounting
29B	Cap, square mounting
30	Flange, square mounting
31	Flange, square mounting
32	Mounting angle, head end
33	Mounting angle, cap end
66	Intermediate trunnion
67	Screws, intermediate trunnion mtg.
79	Socket head cap screws
86	Clevis pin mounting
87	Retaining ring mounting

How to Order

Give cylinder model number, bore, stroke, serial number and symbol number shown above to insure proper replacement.

Note: All mounting styles may not be available.

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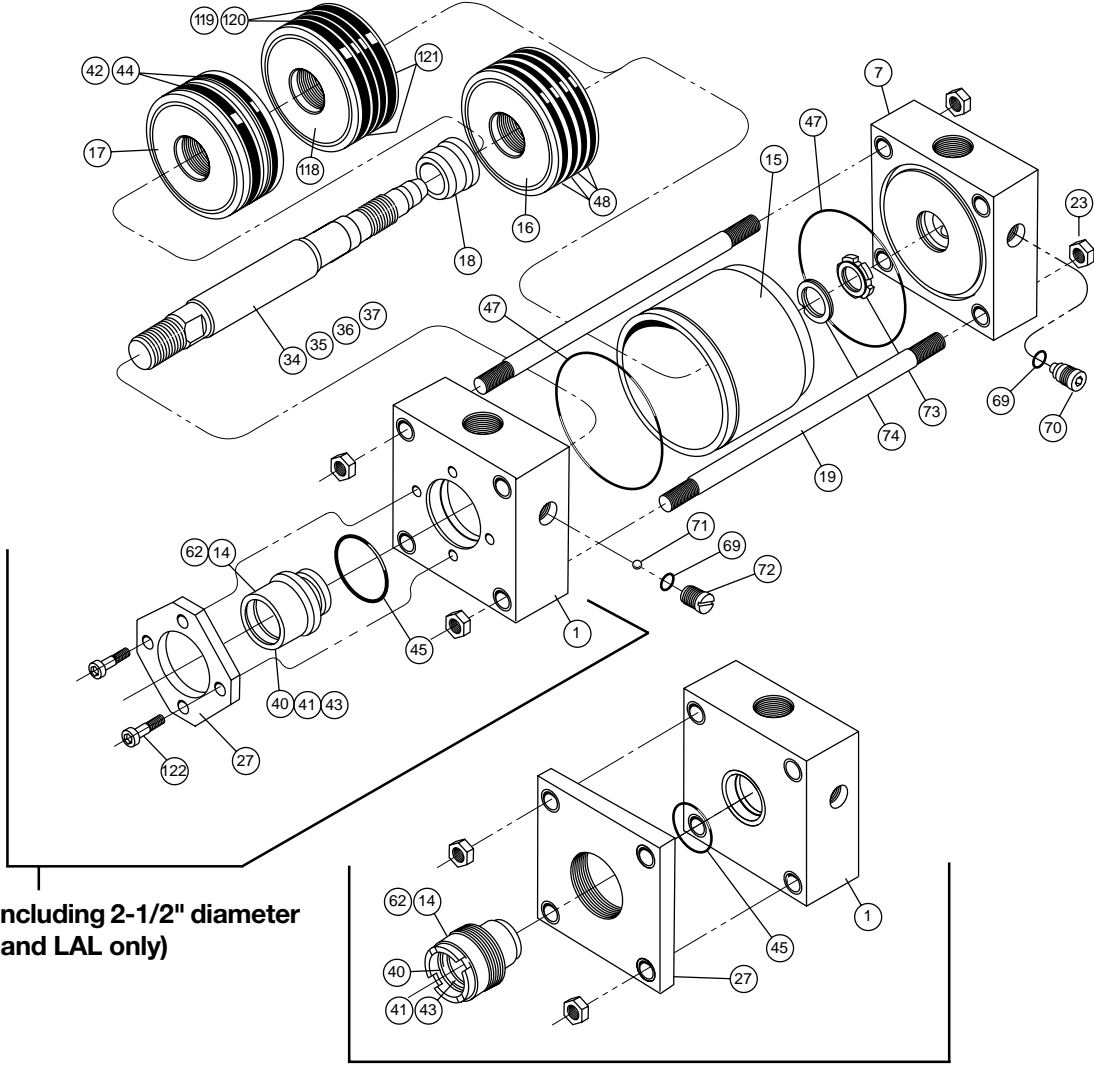
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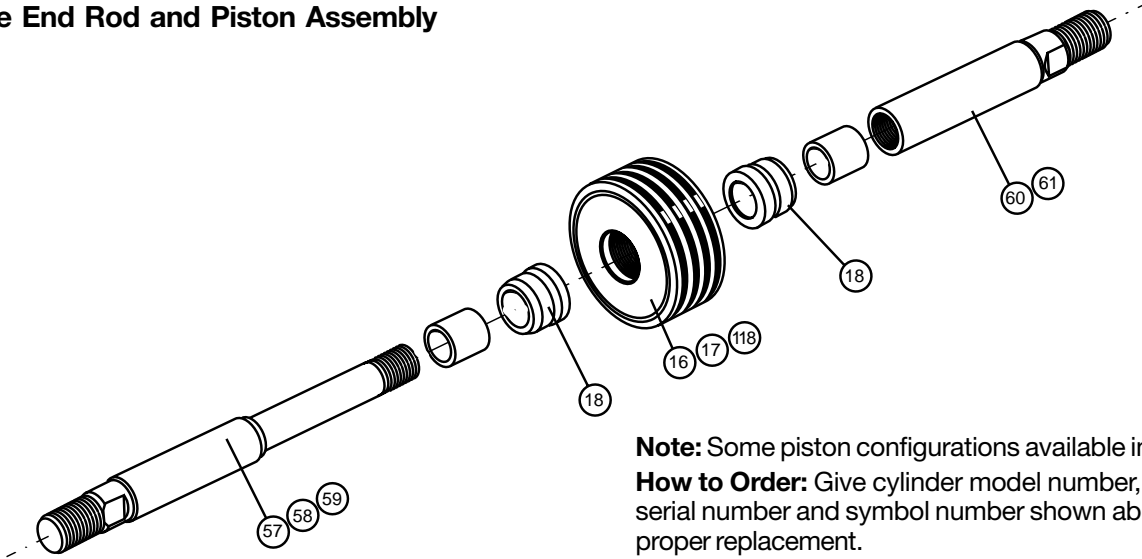
Parts Identification



Up to and including 2-1/2" diameter rods (LAA and LAL only)

3" diameter rods and over (LAA and LAL only)

Double End Rod and Piston Assembly



Note: Some piston configurations available in LAH only.
How to Order: Give cylinder model number, bore, stroke, serial number and symbol number shown above to insure proper replacement.

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Lin-Act Series LAA Heavy-Duty Air Cylinders

Parts Identification Cushion Kits

Note: For specific mounting styles see page 81.

Parts		Assemblies (Includes Symbol Numbers Shown)				
Symbol	Description	Symbol	Description	Ring Type Piston	Lipseal Type Piston	Hi-Load Type Piston
1	Head, ported, non-cushioned	C1 SA	Head, ported, cushioned		1, 69, 70, 71 & 72	
7	Cap, ported, non-cushioned	C7 SA	Cap, ported, cushioned		7, 69, 70, 73 & 74	
14	Gland	62	Gland cartridge kit		14, 40, 41, 43 & 45	
15	Cylinder body	-	-		-	
16	Piston body, ring type	-	-		-	
17	Piston body, lipseal type	-	-		-	
18	Cushion sleeve, cushioned cylinder only	-	-		-	
19	Tie rod	-	-		-	
23	Tie rod nut	-	-		-	
27	Retainer	-	-		-	
34	Piston rod, single rod type, non-cushioned	34 SA	Piston & rod assembly, single rod type — non-cushioned	16, 34 & 48	17, 34, 42 & 44*	34, 118, 119, 120 & 121*
35	Piston rod, single rod type, cushioned head end	35 SA	Piston & rod assembly, single rod type — cush. head end	16, 18, 35 & 48	17, 18, 35, 42 & 44*	35, 118, 119, 120 & 121
36	Piston rod, single rod type, cushioned cap end	36 SA	Piston & rod assembly, single rod type — cush. cap end	16, 36 & 48	17, 36, 42 & 44*	36, 118, 119, 120 & 121
37	Piston rod, single rod type, cushioned both ends	37 SA	Piston & rod assembly, single rod type — cush. both ends	16, 18, 37 & 48	17, 18, 37, 42 & 44*	37, 118, 119, 120 & 121
40	Wiperseal, gland	-	-		-	
41	Lipseal, gland	-	-		-	
42	Lipseal, piston	-	-		-	
43	Back-up washer, gland	-	-		-	
44	Back-up washer, piston	-	-		-	
45	O-ring, gland to head seal	-	-		-	
47	O-ring, cylinder body end seal	-	-		-	
48	Piston ring	-	-		-	
57	Piston rod, double rod type, non-cushioned	57 SA	Piston & Rod assembly, double rod type — non-cush.	16, 48, 57 & 60	17, 42, 44*, 57 & 60	57, 60, 118, 119, 120 & 121
58	Piston rod, double rod type, cushioned one end	58 SA	Piston & rod assembly, double rod type — cush. one end	16, 18, 48, 58 & 60	17, 18, 42, 44*, 58 & 60	18, 58, 60, 118, 119, 120 & 121
59	Piston rod, double rod type, cushioned both ends	59 SA	Piston & rod assembly, double rod type — cush. both ends	16, 18, 48, 58 & 61	17, 18, 42, 44*, 58 & 61	18, 58, 61, 118, 119, 120 & 121
60	Piston rod extension, double rod type — non-cushioned	-	-		-	
61	Piston Rod extension, double rod type — cushioned	-	-		-	
69	O-ring, cushion adjustment & check valve screw	-	-		-	
70	Needle valve, cushion adjustment	-	-		-	
71	Ball, check valve	-	-		-	
72	Plug screw, check valve	-	-		-	
73	Cushion bushing, cap end floating check valve	-	-		-	
74	Retaining ring, floating cushion bushing	-	-		-	
75	Seal, cushion sleeve	-	-		-	
118	Piston, hi-load type	-	-		-	
119	Outerring	-	-		-	
120	Innerring	-	-		-	
121	Wearing	-	-		-	
122	Socket cap screws	-	-		-	

Standard Cushion Hardware Kits

Bore Size	For Head Assemblies	For Cap Assemblies	For Head Assemblies	For Cap Assemblies
	Order Kits By Number Below: (Kits include Symbols 69, 70, 71 & 72 for One Head)	Order Kits By Number Below: (Kits include Symbols 69, 70, 73 & 74 for One Cap)	Order Kits By Number Below: (Kits include Symbols 69, 70, 71 & 72 for One Head)	Order Kits By Number Below: (Kits include Symbols 69, 70, 73 & 74 for One Cap)
	Series LAA	Series LAA	Series LAL	Series LAL
1	None	None	LCHK00009	LCKK00013
1 1/2	LCHK00001	LCKK00004	LCHK00010	LCKK00014
2	LCHK00001	LCHK00004	LCHK00010	LCKK00014
2 1/2	LCHK00001	LCKK00004	LCHK00010	LCKK00014
3 1/4	LCHK00002	LCKK00005	LCHK00011	LCKK00015
4	LCHK00002	LCKK00005	LCHK00011	LCKK00015
5	LCHK00002	LCKK00005	LCHK00011	LCKK00015
6	LCHK00003	LCKK00006	LCHK00012	LCKK00016
7	LCHK00003	LCKK00006	-	-
8	LCHK00003	LCKK00006	LCHK00012	LCKK00017
10	LCHK00003	LCKK00007	-	-
12	LCHK00003	LCKK00008	-	-
14	LCHK00003	LCKK00009	-	-

Fluorocarbon Cushion Hardware Kits

Bore Size	For Head Assemblies	For Cap Assemblies	For Head Assemblies	For Cap Assemblies
	Order Kits By Number Below: (Kits include Symbols 69, 70, 71 & 72)	Order Kits By Number Below: (Kits include Symbols 69, 70, 73 & 74)	Order Kits By Number Below: (Kits include Symbols 69, 70, 71 & 72)	Order Kits By Number Below: (Kits include Symbols 69, 70, 73 & 74)
	Series LAA	Series LAA	Series LAL	Series LAL
1	None	None	VCHK00028	VCHK00032
1 1/2	VCHK00018	VCHK00022	VCHK00029	VCHK00033
2	VCHK00018	VCHK00022	VCHK00029	VCHK00033
2 1/2	VCHK00018	VCHK00022	VCHK00029	VCHK00033
3 1/4	VCHK00019	VCHK00023	VCHK00030	VCHK00034
4	VCHK00019	VCHK00023	VCHK00030	VCHK00034
5	VCHK00019	VCHK00023	VCHK00030	VCHK00034
6	VCHK00021	VCHK00024	VCHK00031	VCHK00035
7	VCHK00021	VCHK00024	-	-
8	VCHK00021	VCHK00024	VCHK00031	VCHK00036
10	VCHK00021	VCHK00025	-	-
12	VCHK00021	VCHK00026	-	-
14	VCHK00021	VCHK00027	-	-

Cylinder Division
500 S. Wolf Road
Des Plaines, IL 60016
847/298-2400

Regional Plants
■ Corona, CA
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■ Goodland, IN
219/297-3182
■ Plymouth, MI
734/455-1700

■ Hillsborough, NC
919/732-9371
■ Akron, OH
330/253-4500
■ Portland, OR
503/285-0884

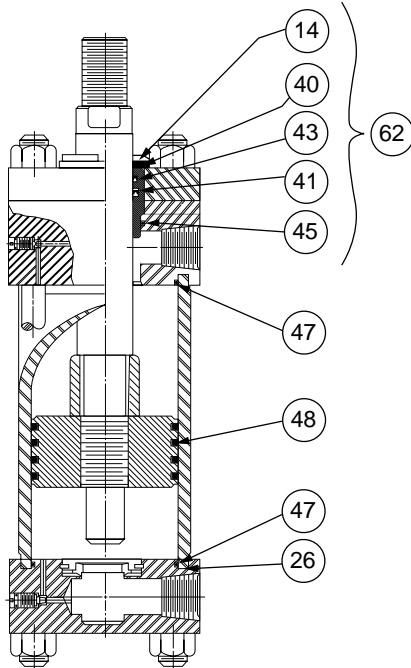
■ Owen Sound, Ont., Can.
519/376-2691
■ Toronto, Ont., Can.
416/255-4567
■ Dorval, Quebec, Can.
514/631-3995

Lin-Act

Parts Identification
Seal Kits
Standard Seals

Lin-Act Series LAA Heavy Duty Air Cylinders

Symbol	Description
14	Gland cartridge
40	Gland wiperseal
41	Gland lipseal
42	Piston lipseal
43	Gland back-up washer
44	Piston back-up washer
45	Gland to head o-ring
47	End seal o-ring
48	Piston ring
62	Gland cartridge kit



Seal Kits for Class 1 & 2 Service

Material: Buna-N (Nitrile)

For operating temperature and fluid compatibility, see page 69.

Gland and spanner wrenches are available to ease (rod) seal or gland cartridge removal without disassembly of the cylinder. **(For rod diameters over 2 1/2").**

For detailed seal replacement instructions see service bulletin LA0995-M1, M2 and M3.

Rod Dia.	LAA Cylinders Only		Gland Wrench	Spanner Wrench
	Gland (Symbol 62) Cartridge Kits Contains Symbols 14, 40, 41, 43 & 45	Rod Seal Kits Contains Symbols 40, 41, 43 & 45		
1/2	LGCL00037	LRSL00050	Not Required	Not Required
5/8	LGCL00038	LRSL00051		
1	LGCL00039	LRSL00052		
1 3/8	LGCL00040	LRSL00053		
1 3/4	LGCL00041	LRSL00054		
2	LGCL00042	LRSL00055		
2 1/2	LGCL00043	LRSL00056		
3	LGCL00044	LRSL00057	069596 0000	011677 0000
3 1/2	LGCL00045	LRSL00058	069597 0000	011677 0000
4	LGCL00046	LRSL00059	069598 0000	011678 0000
4 1/2	LGCL00047	LRSL00060	083877 0000	011678 0000
5	LGCL00048	LRSL00061	069599 0000	011678 0000
5 1/2	LGCL00049	LRSL00062	069600 0000	011678 0000

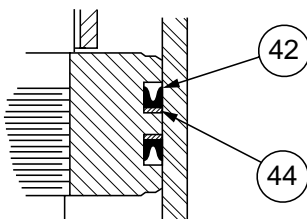
Bore Size	Piston Seal Kits	Piston Seal Kits	Piston Ring Kits
	LAA Series Contains 2 Each Symbols: 42 & 47	LAL Series Contains 2 Each Symbols: 42, 44 & 47	LAL Series Contains 2 Each Symbols 47 & 4 Each Symbol 48
1	LPSK00063	LPSK00076	LPRK00085
1 1/2	LPSK00064	LPSK00077	LPRK00086
2	LPSK00065	LPSK00078	LPRK00087
2 1/2	LPSK00066	LPSK00079	LPRK00088
3 1/4	LPSK00067	LPSK00080	LPRK00089
4	LPSK00068	LPSK00081	LPRK00090
5	LPSK00069	LPSK00082	LPRK00091
6	LPSK00070	LPSK00083	LPRK00092
7	LPSK00071	-	-
8	LPSK00072	LPSK00084	LPRK00093
10	LPSK00073	-	-
12	LPSK00074	-	-
14	LPSK00075	-	-

Piston Seal Options

Ring Type Piston

(as shown above)
 Supplied as standard on LAL series hydraulic cylinders.

Lipseal Type Piston



Supplied as standard on LAA series air cylinders. Optional for LAL series hydraulic cylinders.

Bore Size	Cylinder Body Seal Kits		Tie Rod Torque Specifications (Ft. Lbs.)	
	LAA Series Contains 2 Each Symbol 47	LAL Series Contains 2 Each Symbol 47	LAA Series Steel Cylinder Body	LAL Series
1	LCBK00094	LCBK00107	2	2
1 1/2	LCBK00095	LCBK00108	5	5
2	LCBK00096	LCBK00109	11	11
2 1/2	LCBK00097	LCBK00110	11	11
3 1/4	LCBK00098	LCBK00111	25	25
4	LCBK00099	LCBK00112	25	25
5	LCBK00100	LCBK00113	60	60
6	LCBK00101	LCBK00114	60	60
7	LCBK00102	-	90	-
8	LCBK00103	LCBK00115	110	110
10	LCBK00104	-	150	-
12	LCBK00105	-	172	-
14	LCBK00106	-	275	-

How to Order

Individual seals contained in the kits are available separately; however, we recommend purchasing complete kits because of convenience and lower replacement cost. When ordering seal kits, give part number listed above. To be sure of exact replacement, give serial number of cylinder when ordering replacement kits or seals.

Cylinder Division
 500 S. Wolf Road
 Des Plaines, IL 60016
 847/298-2400

Regional Plants
 ■ Corona, CA
 909/280-3800
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 ■ Atlanta, GA
 770/819-3400

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 219/297-3182
 ■ Plymouth, MI
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■ Hillsborough, NC
 919/732-9371
 ■ Akron, OH
 330/253-4500
 ■ Portland, OR
 503/285-0884

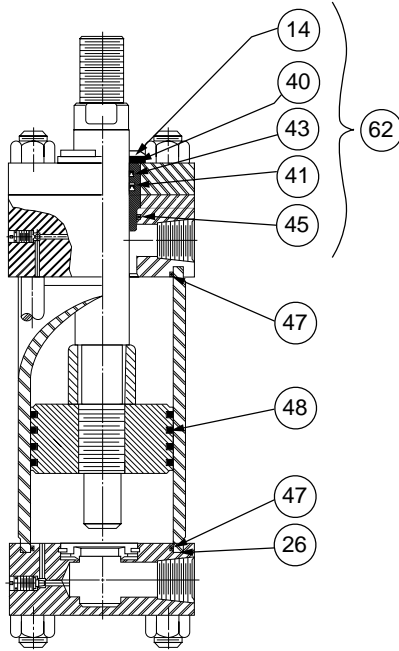
■ Owen Sound, Ont., Can.
 519/376-2691
 ■ Toronto, Ont., Can.
 416/255-4567
 ■ Dorval, Quebec, Can.
 514/631-3995

Lin-Act

Lin-Act Series LAA Heavy Duty Air Cylinders

Parts Identification
Seal Kits
Group 5 Service

Symbol	Description
14	Gland cartridge
40	Gland wiperseal
41	Gland lipseal
42	Piston lipseal
43	Gland back-up washer
44	Piston back-up washer
45	Gland to head o-ring
47	End seal o-ring
48	Piston ring
62	Gland cartridge kit



Seal Kits for Class 5 Service

Material: Fluorocarbon

For operating temperature and fluid compatibility, see page 69.

Gland and spanner wrenches are available to ease (rod) seal or gland cartridge removal without disassembly of the cylinder. **(For rod diameters over 2 1/2").**

For detailed seal replacement instructions see service bulletin LA0995-M1, M3 and M5.

Rod Dia.	LAA Series Cylinders		Gland Wrench	Spanner Wrench
	Gland (Symbol 62) Cartridge Kits Contains Symbols 14, 40, 41, 43 & 45	Rod Seal Kits Contains Symbols 40, 41, 43 & 45		
1/2	LGCL00116	LRS00129	Not Required	Not Required
5/8	LGCL00117	LRS00130		
1	LGCL00118	LRS00131		
1 3/8	LGCL00119	LRS00132		
1 3/4	LGCL00120	LRS00133		
2	LGCL00121	LRS00134		
2 1/2	LGCL00122	LRS00135		
3	LGCL00123	LRS00136	069596 0000	011677 0000
3 1/2	LGCL00124	LRS00137	069597 0000	011677 0000
4	LGCL00125	LRS00138	069598 0000	011678 0000
4 1/2	LGCL00126	LRS00139	083877 0000	011678 0000
5	LGCL00127	LRS00140	069599 0000	011678 0000
5 1/2	LGCL00128	LRS00141	069600 0000	011678 0000

Bore Size	Piston Seal Kits	Piston Seal Kits	Piston Ring Kits
	LAA Series Contains 2 Each Symbols: 42 & 47	LAL Series Contains 2 Each Symbols: 42, 44 & 47	LAL Series Contains 2 Each Symbols 47 & 4 Each Symbol 48
1	LPSK00142	LPSK00155	LPRK00164
1 1/2	LPSK00143	LPSK00156	LPRK00165
2	LPSK00144	LPSK00157	LPRK00166
2 1/2	LPSK00145	LPSK00158	LPRK00167
3 1/4	LPSK00146	LPSK00159	LPRK00168
4	LPSK00147	LPSK00160	LPRK00169
5	LPSK00148	LPSK00161	LPRK00170
6	LPSK00149	LPSK00162	LPRK00171
7	LPSK00150	-	-
8	LPSK00151	LPSK00163	LPRK00172
10	LPSK00152	-	-
12	LPSK00153	-	-
14	LPSK00154	-	-

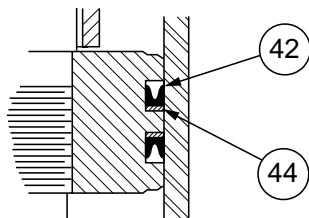
Piston Seal Options

Ring Type Piston

(as shown above)

Supplied as standard on LAL series hydraulic cylinders.

Lipseal Type Piston



Supplied as standard on LAA series air cylinders. Optional for LAL series hydraulic cylinders.

Bore Size	Cylinder Body Seal Kits		Tie Rod Torque Specifications (Ft. Lbs.)	
	LAA Series Contains 2 Each Symbol 47	LAL Series Contains 2 Each Symbol 47	LAA Series Steel Cylinder Body	LAL Series
1	LCBK00173	LCBK00186	2	2
1 1/2	LCBK00174	LCBK00187	5	5
2	LCBK00175	LCBK00188	11	11
2 1/2	LCBK00176	LCBK00189	11	11
3 1/4	LCBK00177	LCBK00190	25	25
4	LCBK00178	LCBK00191	25	25
5	LCBK00179	LCBK00192	60	60
6	LCBK00180	LCBK00193	60	60
7	LCBK00181	-	90	-
8	LCBK00182	-	110	110
10	LCBK00183	-	150	-
12	LCBK00184	-	172	-
14	LCBK00185	-	275	-

How to Order

Individual seals contained in the kits are available separately; however, we recommend purchasing complete kits because of convenience and lower replacement cost. When ordering seal kits, give part number listed above. To be sure of exact replacement, give serial number of cylinder when ordering replacement kits or seals.

Cylinder Division
500 S. Wolf Road
Des Plaines, IL 60016
847/298-2400

Regional Plants
 ■ Corona, CA
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416/255-4567
 ■ Dorval, Quebec, Can.
514/631-3995

Lin-Act

Available Bore and Rod Sizes

Bore Size	1 1/2		2		2 1/2		3 1/4		4		5		6		8		10	
Rod Dia.	5/8	1	5/8	1	1 3/8	5/8	1	1 3/8	1 3/4	2	1	1 3/8	1 3/4	2	1	1 3/8	1 3/4	2

Service kits of expendable parts for LAN Series fluid power cylinders are stocked in principal industrial locations across the U.S.A. and other countries. For prompt delivery and complete information, contact your nearest distributor.

Standard Seals — Class 1 Service Kits are standard. In addition to

standard seals, each kit includes the special composite components ready for installation. These seals are suitable for use when air is the operating medium

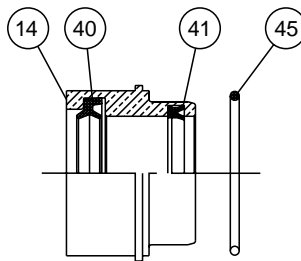
The recommended operating temperature range for Class 1 seals is -10° F to + 165°F.

Seal Kits

Series LAN

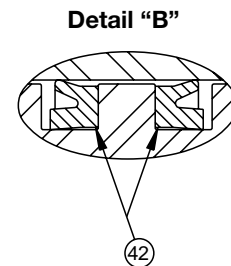
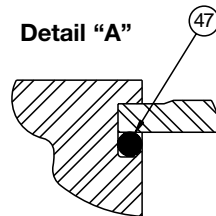
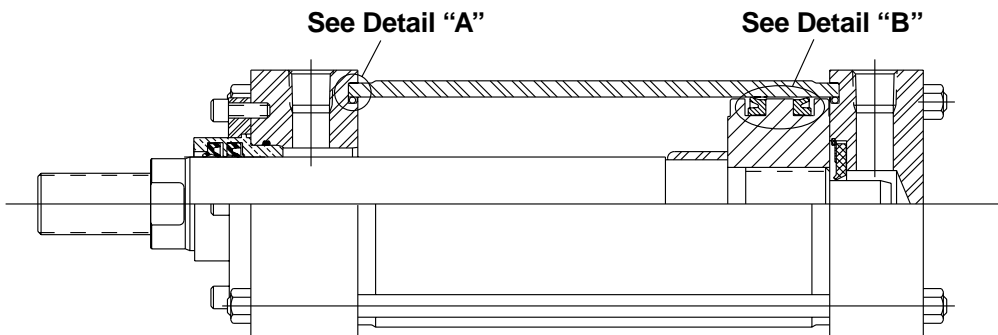
Gland Cartridge Kit

Rod Size	Consisting of Symbol 14, 40, 41 & 45
5/8	LGCK00194
1	LGCK00195
1 3/8	LGCK00196
1 3/4	LGCK00197
2	LGCK00198



Rod Seal Kit

Rod Size	Consisting of Symbol 40, 41 & 45
5/8	LRSK00199
1	LRSK00200
1 3/8	LRSK00201
1 3/4	LRSK00202
2	LRSK00203



Bore Size	Piston Seal Kit Consisting of Consisting of 2 Ea. Symbol 42, & 47	Cylinder Body Seal Kit Consisting of 2 Ea. Symbol 47
1 1/2	LPSK0204	LPSK0214
2	LPSK0205	LPSK0215
2 1/2	LPSK0206	LPSK0216
3 1/4	LPSK0207	LPSK0217
4	LPSK0208	LPSK0218
5	LPSK0209	LPSK0219
6	LPSK0210	LPSK0220
7	LPSK0211	LPSK0221
8	LPSK0212	LPSK0222
10	LPSK0213	LPSK0223

Offer of Sale

The items described in this document and other documents or descriptions provided by the Company, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by the Company, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such item, when communicated to the Company, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from the Company. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. 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 items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. 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, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are 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. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity for Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "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 an item sold pursuant to this contract 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 an item sold hereunder 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 said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items 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 item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

Lin-Act

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Canada N4K 5P1
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05/00