

## Pneumatic Cylinders and Accessories

- Silverair
- Economair
- Provenair

# Pneumatic Cylinders

## Developing Specifications

### Calculating the Proper Bore Size

A cylinder's bore size determines the force it will produce at a given supply pressure. The weight of the load or the clamping force required will largely determine the force requirements of the cylinder, and hence, the bore size required. But before determining the appropriate bore size you must compensate for air pressure drop, packing friction and load variations using the following computation:

#### A) Compensating for Pressure Drop – Decrease the line pressure value by 15 p.s.i. This compensates for pressure drop in the system.

Operating pressure (psig) = Line pressure (psig) less 15 (psig pressure drop)

**Example:** If the line pressure is 95 (psig), subtract 15 (psig) to obtain 80 (psig) operating pressure (for sizing purposes).

#### B) Compensating for Packing Friction – Before you begin selecting a cylinder you already know the weight of the load you must move or the clamping force you must apply. **Multiply this force or load value by 1.25.** This compensates for packing friction and load variations. (If speed is of concern for your application, multiply the force value by 2.0.)

Force required (in pounds) = 1.25 x load (or required clamping force)

**Example:** If cylinder must move 100 pound load, multiplying 100 pounds by 1.25 = 125 pounds force required.

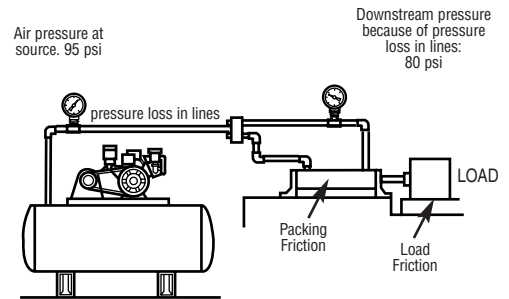
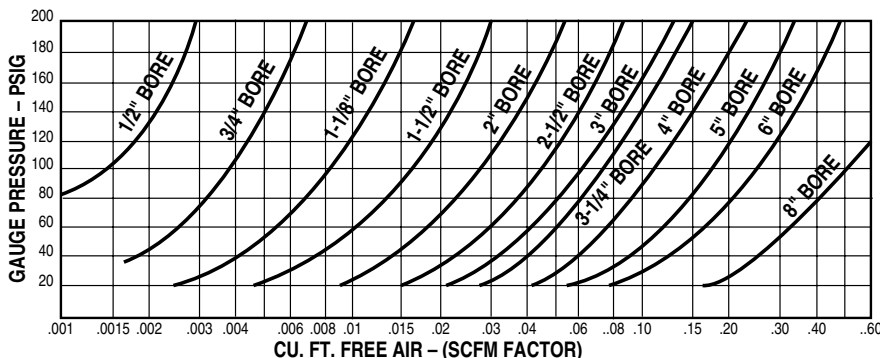
Now, at the top of the chart on the next page, find the column with the operating pressure calculated in "A" above (in this example, 80 psig). Go down that column until you find the force requirement calculated in "B", above (or the next higher value). Note that the force values in bold type represent the extend force while those in standard type represent retract force (retract force is lower because the rod reduces the effective piston area). Choose the appropriate value, then go to the Cylinder Bore column to find the bore requirements for your application.

Now that you know the cylinder bore size that will produce the force required for your application, go to page 97 to determine rod size requirements.

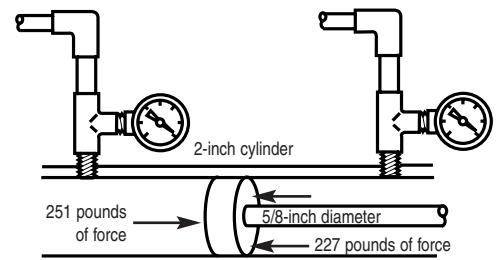
Air consumption for each cylinder bore size can be found in the chart below.

### Cylinder Air Consumption

To calculate the air consumption of a cylinder, multiply the total inches of stroke (extend plus retract) by the cycles per minute times the SCFM factor from the chart below. To find the SCFM factor, find your gauge pressure in the left hand column. Next, find your cylinder bore size in the chart. Where the two intersect, read down to the SCFM factor at the bottom of the chart.



This illustration shows a pressure loss of 15 PSI through the airlines and points out friction factors, both of which must be compensated for.



Given equal pressure on both sides of a piston, the surface area on the extend side will provide greater force.

# Pneumatic Cylinders

## Bore Selection Sizes

$$\text{EFFECTIVE PISTON AREA} \times \text{OPERATING PRESSURE} = \text{FORCE}$$

CYLINDER BORE (INCHES)	ROD DIAMETER (INCHES)	EFFECTIVE PISTON AREA (SQ. IN.)	OPERATING PRESSURE (PSI)										
			20	40	60	70	80	90	100	110	125	150	200
<b>SELECTING BORE SIZE</b>			<b>FORCE OR LOAD VALUE</b>										
<b>7/16</b>		<b>.15</b>	<b>3</b>	<b>6</b>	<b>9</b>	<b>10</b>	<b>12</b>	<b>13</b>	<b>15</b>	<b>16</b>	<b>18</b>	<b>22</b>	<b>30</b>
	3/16	.123	2.5	4.9	7.4	8.6	9.8	11	12.3	13.5	15.4	18.5	24.6
<b>1/2</b>		<b>.196</b>	<b>4</b>	<b>8</b>	<b>12</b>	<b>14</b>	<b>16</b>	<b>18</b>	<b>20</b>	<b>22</b>	<b>25</b>	<b>29</b>	<b>39</b>
	3/16	.169	3	7	10	12	14	15	17	19	21	25	34
	1/4	.147	3	6	9	10	12	13	15	16	18	22	29
<b>9/16</b>		<b>.25</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>17</b>	<b>20</b>	<b>22</b>	<b>25</b>	<b>27</b>	<b>31</b>	<b>37</b>	<b>50</b>
	3/16	.23	4.5	8.9	13.4	15.6	17.8	20	22	29.5	27.9	33.5	44.6
<b>3/4</b>		<b>.442</b>	<b>9</b>	<b>18</b>	<b>27</b>	<b>31</b>	<b>35</b>	<b>40</b>	<b>44</b>	<b>49</b>	<b>55</b>	<b>66</b>	<b>88</b>
	1/4	.393	8	16	24	28	31	35	39	43	49	59	79
<b>7/8</b>		<b>.604</b>	<b>12</b>	<b>24</b>	<b>36</b>	<b>42</b>	<b>48</b>	<b>54</b>	<b>60</b>	<b>66</b>	<b>75</b>	<b>90</b>	<b>120</b>
	1/4	.553	11	22	33	38	44	49	55	60	69	82	110
<b>1-1/16</b>		<b>.890</b>	<b>18</b>	<b>36</b>	<b>53</b>	<b>62</b>	<b>71</b>	<b>80</b>	<b>89</b>	<b>98</b>	<b>111</b>	<b>134</b>	<b>178</b>
	5/16	.810	16	32	49	57	65	73	81	89	101	122	162
<b>1-1/8</b>		<b>.994</b>	<b>20</b>	<b>40</b>	<b>60</b>	<b>70</b>	<b>80</b>	<b>89</b>	<b>99</b>	<b>109</b>	<b>124</b>	<b>149</b>	<b>199</b>
	5/16	.917	18	37	55	64	73	83	92	101	115	138	183
	3/8	.884	18	35	53	62	71	80	88	97	110	133	177
<b>1-1/4</b>		<b>1.227</b>	<b>25</b>	<b>49</b>	<b>74</b>	<b>88</b>	<b>98</b>	<b>110</b>	<b>123</b>	<b>135</b>	<b>153</b>	<b>184</b>	<b>245</b>
	7/16	1.077	22	43	65	75	86	97	108	118	135	162	215
<b>1-1/2</b>		<b>1.767</b>	<b>35</b>	<b>71</b>	<b>106</b>	<b>124</b>	<b>141</b>	<b>159</b>	<b>177</b>	<b>194</b>	<b>221</b>	<b>265</b>	<b>353</b>
	7/16	1.617	32	65	97	113	129	146	162	178	202	243	323
	1/2	1.571	31	63	94	110	126	141	157	173	196	236	314
	5/8	1.460	29	58	88	102	117	131	146	161	183	219	292
	1	1.325	27	53	80	93	106	119	133	146	166	199	265
<b>1-3/4</b>		<b>2.405</b>	<b>48</b>	<b>96</b>	<b>144</b>	<b>168</b>	<b>192</b>	<b>216</b>	<b>240</b>	<b>265</b>	<b>301</b>	<b>361</b>	<b>481</b>
	1/2	2.209	44	88	133	155	177	199	221	243	276	331	442
<b>2</b>		<b>3.142</b>	<b>63</b>	<b>126</b>	<b>189</b>	<b>220</b>	<b>251</b>	<b>283</b>	<b>314</b>	<b>346</b>	<b>393</b>	<b>471</b>	<b>628</b>
	5/8	2.835	57	113	170	198	227	255	284	312	354	425	567
	1	2.700	54	108	162	189	216	243	270	297	338	405	540
<b>2-1/2</b>		<b>4.910</b>	<b>98</b>	<b>196</b>	<b>295</b>	<b>344</b>	<b>393</b>	<b>442</b>	<b>491</b>	<b>540</b>	<b>614</b>	<b>737</b>	<b>982</b>
	5/8	4.602	92	184	276	322	368	414	460	506	575	690	920
	3/4	4.470	89	179	268	313	358	402	447	492	559	671	894
	1	4.123	82	165	247	289	330	371	412	454	515	618	825
<b>3</b>		<b>7.069</b>	<b>141</b>	<b>283</b>	<b>424</b>	<b>495</b>	<b>566</b>	<b>636</b>	<b>707</b>	<b>778</b>	<b>884</b>	<b>1060</b>	<b>1414</b>
	3/4	6.6268	133	265	398	464	530	596	663	729	828	994	1325
	1	7.510	150	300	451	526	601	676	751	826	939	1127	1502
	1-3/8	6.810	136	272	409	477	545	613	681	749	851	1021	1362
<b>4</b>		<b>12.566</b>	<b>251</b>	<b>503</b>	<b>754</b>	<b>880</b>	<b>1005</b>	<b>1131</b>	<b>1257</b>	<b>1382</b>	<b>1571</b>	<b>1885</b>	<b>2513</b>
	1	11.781	236	471	707	825	942	1060	1178	1296	1473	1767	2356
	13/8	11.081	222	443	665	776	886	997	1108	1219	1385	1662	2216
<b>5</b>		<b>19.635</b>	<b>393</b>	<b>785</b>	<b>1178</b>	<b>1374</b>	<b>1571</b>	<b>1767</b>	<b>1964</b>	<b>2160</b>	<b>2454</b>	<b>2945</b>	<b>3927</b>
	1	18.850	377	754	1131	1320	1508	1697	1885	2074	2356	2828	3770
	1-3/8	18.150	363	726	1089	1271	1452	1634	1815	1996	2269	2723	3630
<b>6</b>		<b>28.274</b>	<b>565</b>	<b>1131</b>	<b>1696</b>	<b>1979</b>	<b>2262</b>	<b>2545</b>	<b>2827</b>	<b>3110</b>	<b>3534</b>	<b>4241</b>	<b>5655</b>
	1-3/8	16.789	536	1072	1607	1875	2143	2411	2679	2947	3349	4018	5358
	13/4	25.870	517	1035	1552	1811	2070	2328	2587	2846	3234	3881	5174
<b>8</b>		<b>50.260</b>	<b>1005</b>	<b>2010</b>	<b>3016</b>	<b>3518</b>	<b>4021</b>	<b>4523</b>	<b>5026</b>	<b>5529</b>	<b>6283</b>	<b>7539</b>	<b>10052</b>
	1-3/8	48.770	975	1951	2926	3414	3902	4489	4877	5365	6096	7316	9754
	1-3/4	47.820	956	1913	2869	3347	3826	4304	4782	5260	5978	7173	9564
<b>10</b>		<b>78.54</b>	<b>1571</b>	<b>3142</b>	<b>4712</b>	<b>5497</b>	<b>6283</b>	<b>7068</b>	<b>7854</b>	<b>8639</b>	<b>9818</b>	<b>11781</b>	<b>15708</b>
	1-3/4	76.14	1523	3046	4568	5330	6091	6853	7614	8375	9518	11421	15228

VALUES IN BOLD TYPE REPRESENT EXTEND FORCE. Other values represent retract force (piston area, less area of piston rod). Check series order information for available rod diameters in each series.


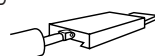
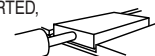
# Pneumatic Cylinders

## Rod Diameter

- A) use the stroke factor table to find the proper multiplier based on the mounting configuration and rod end connection used.
- B) Multiply your required working stroke length by the factor you found from the stroke factor table in Step A. Note: if you require a rod or thread extension in your application (Longer than standard) add the extra length(s) to your required working stroke length and then multiply by the stroke factor found in Step A, the result of this arithmetic is the "L" Value.

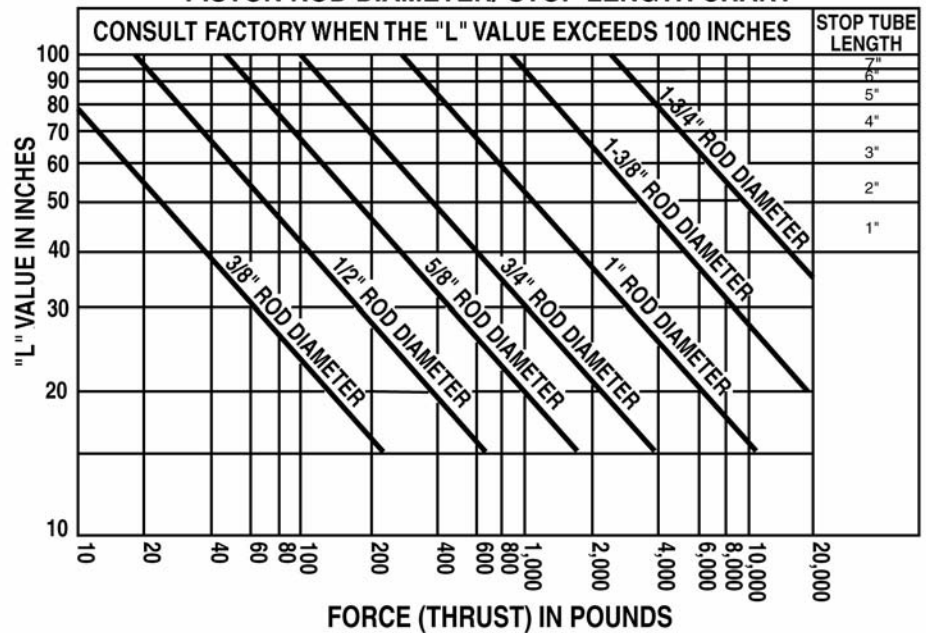
- C) Use the piston rod diameter/ stop length chart to complete your cylinder specification. Find the approximate "L" value (determined in Steps A & B) on the left side of the chart. At the bottom of the chart, find the force (thrust) required for your cylinder. Reference the bore selection sizes table on the previous page to determine bore size, rod diameter or force at various PSI. Find the intersection of the "L" value (Horizontal) line with the force in pounds (Vertical) line. The intersection should be on, or to-the-left of the diagonal (rod diameter) line. The diagonal (rod diameter) line indicates the correct piston rod diameter for your application. Note: If your "L" value-force lines intersect above, or to-the-right of a diagonal line, find a cylinder with the next larger piston rod diameter to avoid premature cylinder wear or failure.

## STROKE FACTOR

ROD END CONNECTION	CYLINDER RIGIDLY MOUNTED		CYLINDER PIVOT MOUNTED		
	L-MOUNTS, SIDE-TAPPED SIDE END LUGS	FRONT OR REAR FLANGE MOUNTING NUTS	FRONT-MOUNTED TRUNNION	CENTER-MOUNTED TRUNNION	CLEVIS EYE, OR REAR-MOUNTED TRUNNION
FIXED AND RIGIDLY GUIDED 	0.50	0.50	N/A	N/A	N/A
PIVOTED AND RIGIDLY GUIDED 	0.71	0.71	1.00	1.50	2.00
SUPPORTED, NOT RIGIDLY GUIDED 	1.00	1.00	N/A	N/A	N/A

**Note:** Remember, long, slim piston rods may buckle when subjected to a heavy push load.

## PISTON ROD DIAMETER/ STOP LENGTH CHART



**Note:** When a stop tube is needed, a minimum 2" length is required on all Economair cylinders with Lip packings, and in 4", 5", 6" and 8" Provenair cylinders.

## Stop Tube Requirements

*Available in Economair & Provenair Only*

Occasionally, an application will require a stop tube. Stop tube length is determined by "L" value. If your "L" value (from Step B) is 40 or greater, find the correct stop tube length for your cylinder on the right side of the piston rod diameter/stop length chart. The recommended stop-tube length is shown above the "L" value line.

**Note:** If "L" value is 39, no stop tube is required. If "L" value is 40-49, a 1" stop tube is recommended. If "L" value is 50-59, a 2" stop tube is recommended, etc.

# Pneumatic Cylinders

## Options

Additional options required will help determine which cylinder series will be selected:

**Stainless steel piston rods are beneficial in corrosive environments.** Stainless steel rods are standard on Micro-Air and Silverair Series. Stainless Steel rods are options on Economair and Provenair Series.

**Cylinder cushions** are designed to reduce the shock experienced at the end of the stroke by reducing piston speed the last fraction of an inch of stroke. Cylinder cushions are available in Economair and Provenair Series, only.

**Packing shape and material** affect cylinder performance:

- **O-Ring packings** are good, general purpose packings, but they require more breakaway force than other packing shapes.
- **O-Ring – Low Friction** packings provide the effective sealing characteristics of Buna N with the low friction characteristics of Teflon®. This design is effective where the cylinder must operate at low pressures.
- **U-Cup packings** offer low breakaway friction and better sealing characteristics at low pressure than O-Ring packings. U-cups are wear compensating seals; they offer longer wear life than O-rings.
- **U-Cup – Self Lube (“Slippery Seals”)** packings are ideal in applications where air line lubrication cannot be used. This packing design helps reduce cylinder “chatter” in low pressure applications and it offers the same sealing characteristics as Buna N.

## Packing Characteristics

	Material	Sealing Characteristics	Friction Characteristics	Temperature Tolerance	Availability
O-RING	Teflon over Buna N O-Ring Seal	Good	Medium	0° to 180° F	Economair
O-RING	Buna N	Good	High	0° to 180° F	Micro-Air, Economair
O-RING	Viton®	Good	High	Up to 300° F	Micro-Air, Economair
U-CUP-SELF-LUBE (“Slippery Seals”)	Nitrile	Very Good	Low	0° to 180° F	Economair, Provenair
U-CUP	Buna N	Very Good	Medium	0° to 180° F	Economair, Provenair
U-CUP	Viton	Very Good	Medium	Up to 300° F	Economair, Provenair

**Note:** When applying rod cylinders, there must be no side load or bending stress at any point along the rod. Applications which induce side load and/or bending stress will damage packings, bushings, piston barrels, piston rods and cushion bosses. When metal parts are damaged, seal and packing replacement is an inadequate repair. The elastomers will quickly become damaged. Inspect and replace all worn or damaged parts when rebuilding cylinders.

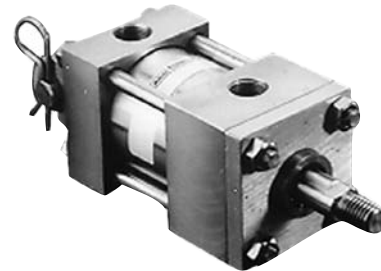
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# Pneumatic Cylinders

## Descriptions/Accessories

### Series 23, 24 & 28 Economair® Cylinders (1-1/8" thru 4" bore)

Economair Cylinders, round line repairable cylinders, are designed for medium to heavy-duty use in a wide range of applications. Available in 1-1/8 to 4-inch bore sizes. Operate on air pressure to 200 PSI, generating thrusts from 25 to 2,513 pounds. Available as double-acting, with optional cushions, magnetic pistons or double rod ends. O-ring seals are standard. U-cup or low friction seals are optional. A variety of mounts are available to meet a wide range of application requirements. For more information, see pages 113 through 118.



### Series AN & SN Provenair® Cylinders (1-1/2" thru 10" bore)

Provenair Cylinders are NFPA interchangeable square head cylinders designed for rugged use. Available in 1-1/2 to 10-inch bore sizes. They operate on air pressure up to 250 PSI, generating thrusts up to 3,141 pounds. They are available as double-acting, with optional cushions, magnetic pistons and/or with double rod ends. A broad selection of NFPA standard mounts makes them dimensionally interchangeable with other NFPA cylinders. For more information, see pages 119 through 133.

## Accessories

### Mounts

- Silverair™
- Economair®
- Provenair® (1-1/2 thru 10-inch bore)
- Provenair® Stainless Steel (1-1/2 thru 8-inch bore)



Rod End Accessories



Alignment Couplers



Mounts

### Rod End Accessories

- Silverair™
- Economair®
- Provenair® (1-1/2 thru 10-inch bore)

### Alignment Couplers

### Switches, Cylinder Mounted

### Flow Control Valves

### Volume Chambers

### Repair Kits



Electrical Switches



Right Angle Flow Controls

## Features

### Series S

Silverair round cylinders are designed for application in OEM and MRO applications where a disposable, light duty cylinder is preferred. Prelubed, they're suitable for operations without externally applied lubrication. Constructed of stainless steel and aluminum, they stand up to the attack of corrosive environments.

- Silverair cylinders feature stainless steel (Series 304) barrels. Drawn and polished internal diameters have superior lube-holding characteristics for a low friction surface that gives smooth performance and outstanding cycle life.
- Piston rods are centerless ground and polished Series 303 stainless steel, providing smooth rod movement.
- Lightweight aluminum heads feature full flow ports for maximum air flow and smooth response.
- Piston rod threads are roll formed to provide superior strength and durability.
- U-cup design on piston seals provides continuous cylinder barrel contact, minimizes blow-by and offers longer seal life than O-ring piston seals.
- The oil-permeated bronze rod bushing is precision ball sized for reduced friction and increased cylinder life.
- Return springs on single-acting cylinders are made from a high tensile alloy for exceptional performance and long service life.
- Silverair cylinders are prelubricated, so they're ideal in applications where external lubrication can't be supplied.



## Performance Specifications

Bore Sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2", 2" and 2-1/2"
Air Pressure:	to 200 p.s.i. (14 bar)
Operating Temperature Range:	-40° to 160° F (18° to 82° C)
Maximum Output Force:	982 pounds (2-1/2-inch bore cylinder)
Viton Seals Models:	For high heat applications. Consult factory.

Range of mounting styles and attachable mounts/accessories covers wide range of application requirements.

Magnetic pistons available for use with Hall Effect or Reed Switches.

## Ordering

See following page.

### Ordering

Include dashes. Dashes are significant.

**S X XX - X X X X - XXX**

#### SERIES

**S** Stainless Steel

#### CYLINDER TYPE

**S** Single Acting, Spring Return (Not available on 25 bore size)

**D** Double Acting

**R** Single Acting, Spring Extend (Not available on 25 bore size)

**H** Single Acting, Hex Rod (Non-rotating rod)  
(Spring return only) Not available on 14, 17, 20 or 25 bore sizes)

#### BORE SIZE

**05** 1/2 in

**07** 3/4 in.

**11** 1-1/16 in.

**14** 1-1/4 in. (Not available on type SH)

**15** 1-1/2 in.

**17** 1-3/4 in. (Not available on type SH)

**20** 2 in. (Not available on type SH)

**25** 2-1/2 in. (Not available on type SS, SR or SH)

#### MOUNTING STYLE

**B** Block Mount (Available on 05, 07, 11 and 15 bore size only)  
(Not available on type SH)

**D** Double Rod End (Double Acting Only)

**N** Nose Mount

**P** Universal Mount (Pivot or Double End)

*Silverair attachable mounts must be ordered separately.  
See page xx.*

#### Note A: Bumpers

- Not available with magnetic piston option.
- Standard on double rod ends.
- Do not affect external dimensions.

**Note B:** Wearstrip is standard on double-acting nose mount, universal mount and block front mount of 5" or more of stroke. Also on single acting, spring extend cylinders with 3" or more of stroke. Not available on 1/2" bore cylinders.

**Note:** Highlighted selections denote most popular models.

#### STROKE LENGTH

WHOLE INCHES	FRACTIONS
00 = 0 in	0 = None
01 = 1 in	1 = 1/8 in
02 = 2 in	2 = 1/4 in
03 = 3 in	3 = 3/8 in
04 = 4 in	4 = 1/2 in
05 = 5 in	5 = 5/8 in
06 = 6 in	6 = 3/4 in
10 = 10 in	7 = 7/8 in
etc.	

For recommended maximum stroke lengths, per type, see pages 109 through 110.

(1/2" increments, 1/2" through 6")

#### WEARSTRIP (Note B)

**4** None (standard)  
**W** Wearstrip

#### PACKING

**B** Buna N  
**V** Viton

#### MAGNET/ BUMPERS (Note A)

**4** No Bumpers, no magnet  
**B** Bumpers  
**M** Magnetic Piston (Not available in 1/2" bore or for single-acting cylinders).

For switch information, see page 111.

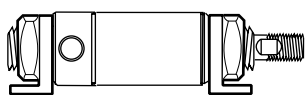
## Ordering

### Series S (Mounting Kits)

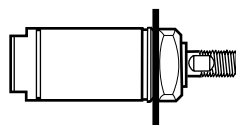
		CYLINDER BORE (INCHES)							
		1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2	2-1/2
<b>L-MOUNT (Single Acting)</b>									
Order Mounting Nut below.									
118108-05	118108-07	118108-11	118108-14	118108-14	118108-17	118108-20	118108-25		
<b>L-MOUNT (Double Acting)</b>									
Order Mounting Nut below.									
118108-50	118108-11	118108-11	118108-14	118108-14	118108-17	118108-20	118108-25		
<b>MOUNTING NUT (Single Acting*)</b>									
118109-05	118109-07	118109-11	118109-14	118109-14	118109-17	118109-20	118109-25		
<b>MOUNTING NUT (Double Acting)</b>									
118109-50	118109-11	118109-11	118109-14	118109-14	118109-17	118109-20	118109-25		
<b>PIVOT BRACKET (Pivot Pin Included)</b>									
117523-05	117523-07	117523-07	117523-14	117523-15	117523-15	117523-20	117523-20		
<b>ROD CLEVIS (Pivot Pin Included)</b>									
117555-05	117555-07	117555-11	117555-14	117555-14	117555-17	117555-17	117555-17		
<b>PIVOT PINS (Standard Equipment)</b>									
<b>Pin</b>									
118119-05	118119-07	118119-07	118119-14	118119-15	118119-15	118119-20	-		
<b>Retainer</b>									
118592-05	118592-05	118592-05	118592-05	118592-15	118592-15	118592-15	-		
<b>Optional Press Fit Pin</b>									
118121-05	118121-07	118121-07	118121-14	118121-15	118121-15	-	-		

<b>* FOR DOUBLE END MOUNTING OF SINGLE-ACTING CYLINDERS, ORDER THE FOLLOWING:</b>	
1/2-inch bore	One 118108-05 L-Mount and one 118109-05 Nut for rear mounting thread. One 118108-50 L-Mount and one 118109-50 Nut for front mounting thread.
3/4-inch bore	Two 118108-07 L-Mounts, one 118109-07 Nut for rear mounting thread and one 118109-11 Nut for front mounting thread.

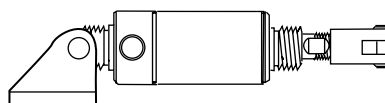
NOTE: Silverair accessories are bright zinc plated steel.



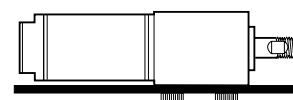
L-Mount



Mounting Nut



Pivot Bracket and Rod Clevis



Block Front Mount

### Dimensional Data

#### Series S (Mounting Kit)

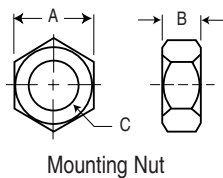
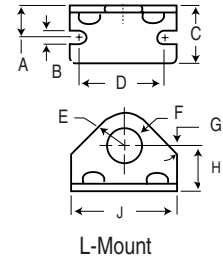
Dim Ref	CYLINDER BORE (INCHES)												
	1/2		3/4		1-1/16		1-1/4		1-1/2		2		2-1/2
	Single Acting	Double Acting	Single Acting	Double Acting	All Types	All Types	All Types	All Types	All Types	All Types	All Types	All Types	All Types

#### L-Mount Bracket

A	.31	.31	.44	.56	.56	.75	.75	.94	1.00	1.00
B	.19	.19	.19	.27	.27	.28	.28	.34	.34	.34
C	.62	.62	.75	1.00	1.00	1.50	1.50	1.50	1.62	1.62
D	1.00	1.00	1.25	1.50	1.50	1.89	1.89	2.25	2.25	2.88
E	.37	.37	.40	.56	.56	.75	.75	.88	1.00	1.25
F	.38	.44	.50	.63	.63	.76	.76	1.04	1.38	1.50
G	.56°	.56°	.45°	.45°	.45°	.49°	.49°	.52°	.60°	.63°
H	.57	.57	.69	.81	.81	1.00	1.00	1.25	1.50	1.75
J	1.38	1.38	1.63	1.88	1.88	2.50	2.50	3.00	3.00	3.75

#### Mounting Nut

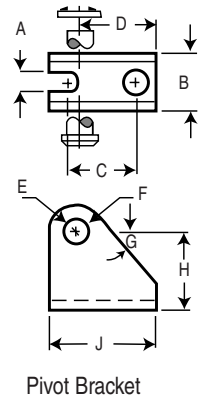
A	.56	.68	.75	.93	.93	1.12	1.12	1.50	1.85	2.06
B	.22	.25	.31	.37	.37	.42	.42	.56	.50	.50
C	3/8-24	7/16-20	1/2-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12	1-3/8-12



Dim Ref	CYLINDER BORE (INCHES)								
	1/2 All Types	3/4 All Types	1-1/16 All Types	1-1/4 All Types	1-1/2 All Types	1-3/4 All Types	2 All Types	2-1/2 All Types	

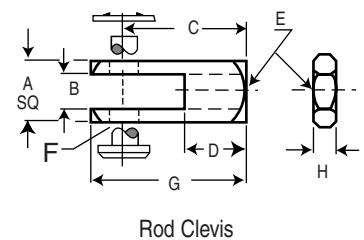
#### Pivot Bracket

A	.20	.26	.26	.32	.39	.39	.45	.45
B	.52	.65	.65	.77	.96	.96	1.20	1.20
C	.43	.75	.75	.75	1.00	1.00	1.00	1.00
D	.54	.87	.87	.94	1.25	1.25	1.43	1.43
E	.22	.31	.31	.31	.38	.38	.38	.38
F	.16	.26	.26	.26	.38	.38	.38	.38
G	.50°	.53°	.53°	.53°	.52°	.52°	.48°	.48°
H	.64	.87	.87	1.06	1.37	1.37	1.68	1.68
J	.75	1.19	1.19	1.25	1.63	1.63	1.81	1.81



#### Rod Clevis

A	.38	.50	.50	.75	.75	.75	.75	.75
B	.19	.25	.25	.38	.38	.38	.38	.38
C	.75	.94	.94	1.30	1.30	1.30	1.30	1.30
D	.38	.50	.50	.75	.75	.75	.75	.75
E	10-32	1/4-28	5/16-24	7/16-20	7/16-20	1/2-20	1/2-20	1/2-20
F	.19	.25	.25	.38	.38	.38	.38	.38
G	.94	1.20	1.20	1.70	1.70	1.70	1.70	1.70
H	.12	.16	.16	.25	.25	.31	.31	.31



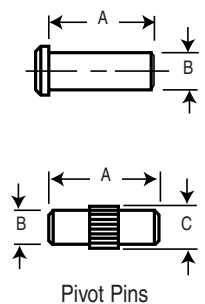
#### Pivot Pin

#### As supplied with Pivot Bracket:

A	.69	.81	.81	.94	1.13	1.13	1.44	1.44
B	.15	.25	.25	.25	.37	.37	.37	.37

#### For press fit into pivot hole:

A	.50	.75	.75	.87	1.12	1.12	-	-
B	.15	.24	.24	.24	.37	.37	-	-
C	.17	.26	.26	.26	.39	.39	-	-



### Performance Specifications

#### Series S (Spring Return, Nose Mount)

Model SSXX-N4B4-XXX - (Max. Stroke - 4 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2"
Hex Mounting Nut:	Standard (except on 2-inch models).
Options:	Wearstrip (except on 1/2-inch bore), bumper, Viton
Accessories:	L-mount, rod clevis
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

Model SHXX-N4B4-XXX - (Max. Stroke - 4 inches)	
Nonrotating	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/2"
Hex Mounting Nut:	Standard
Options:	Wearstrip (except on 1/2-inch bore),
Accessories:	L-mount, rod clevis
Notes:	No rod bushing - front head is hard anodized.

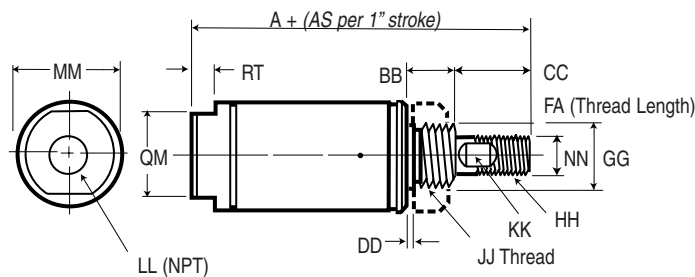
#### Series S (Spring Return, Universal Mount)

Model SSXX-P4B4-XXX - (Max. Stroke - 4 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2"
Options:	Wearstrip (except on 1/2-inch bore), bumper, Viton
Accessories:	Pivot bracket, rod clevis, L-mount, mounting nut. Order mounting nuts as required.
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

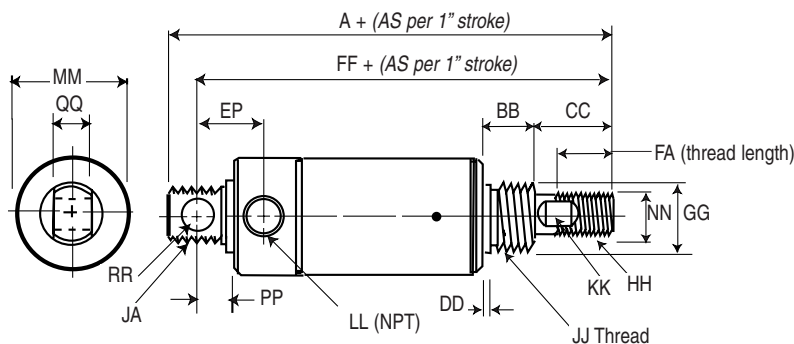
Model SHXX-P4B4-XXX - (Max. Stroke - 4 inches)	
Nonrotating	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/2"
Options:	Wearstrip (except on 1/2-inch bore), bumper, Viton
Accessories:	Pivot bracket, rod clevis, L-mount, mounting nut. Order mounting nuts as required.
Notes:	No rod bushing - front head is hard anodized.

### Dimensional Data

#### Series S (Spring Return, Nose Mount)



#### Series S (Spring Return, Universal Mount)



### Spring Forces

Bore Size	Spring Force (lbs.)	
	Normal	Actuated
1/2"	1	2
3/4"	1.5	5
1-1/16"	4	8
1-1/4"	7	14
1-1/2"	6	12
1-3/4"	12	24
2"	15	30

**Dimensional Data**

**Series S**

Dim Code	Cylinder Description	CYLINDER BORE (INCHES)						
		1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2
<b>Single Acting</b>								
A	SSXX-N4B4-XXX	1.81	2.00	2.56	3.41	3.19	3.85	4.17
A	SHXX-N4B4-XXX	2.06	2.25	2.68	–	3.44	–	–
A	SSXX-P4B4-XXX	2.50	3.06	3.44	4.50	4.25	5.41	5.54
A	SHXX-P4B4-XXX	2.75	3.31	3.56	–	4.50	–	–
AS	SSXX-N4B4-XXX	1.88	1.69	1.56	1.81	1.69	2.00	2.00
AS	SHXX-N4B4-XXX	1.88	1.69	1.56	–	1.69	–	–
AS	SSXX-P4B4-XXX	1.88	1.69	1.56	1.81	1.69	2.00	2.00
AS	SHXX-P4B4-XXX	1.88	1.69	1.56	–	1.69	–	–
BB	SSXX-N4B4-XXX	.31	.44	.50	.62	.62	.75	.81
BB	SHXX-N4B4-XXX	.31	.44	.50	–	.62	–	–
BB	SSXX-P4B4-XXX	.31	.44	.50	.62	.62	.75	.81
BB	SHXX-P4B4-XXX	.31	.44	.50	–	.62	.75	.81
CC	SSXX-XXXX-XXX	.50	.50	.62	1.00	1.00	1.19	–
CC	SHXX-XXXX-XXX	.75	.75	.75	–	1.25	–	–
DD	All Types	.04	.07	.07	.07	.07	.09	.12
EP	All Types	.42	.66	.62	.91	.81	.98	1.00
FA	All Types	.50	.50	.50	.50	.75	.88	.88
FF	SSXX-X4B4-XXX	4.50	2.77	3.16	4.14	3.88	4.91	5.11
GG	All Types	.375	.500	.625	.750	.750	1.03	1.375
HH	All Types	10-32	1/4-28	5/16-24	7/16-20	7/16-20	1/2-20	1/2-20
JA	SSXX-N4B4-XXX	7/16-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12
JA	SHXX-N4B4-XXX	3/8-24	5/8-18	5/8-18	–	3/4-16	–	–
JJ	All Types	3/8-24	1/2-20	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12
KK	Wrench Flat	None	None	.25	.38	.38	.44	.50
LL	All Types	10-32	1/8	1/8	1/8	1/8	1/4	1/4
MM	All Types	.56	.81	1.12	1.31	1.55	1.81	2.07
NN	Standard Rod	.187	.250	.312	.437	.437	.500	.625
NN	Hex Flats	.187	.250	.375	–	.437	–	–
PP	All Types	.25	.34	.34	.41	.50	.50	.57
QM	All Types	.37	.62	.87	.87	.82	1.25	1.25
QQ	All Types	.31	.38	.38	.50	.62	.62	.75
RR	All Types	.16	.25	.25	.25	.38	.38	.38
RT	All Types	.12	.16	.25	.18	.25	.25	.31

### Performance Specifications

#### Series S (Spring Extend, Nose Mount)

Model SRXX-N4B4-XXX - (Max. Stroke - 4 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2"
Hex Mounting Nut:	Standard
Options:	Bumper, Viton
Accessories:	Rod clevis, L-mount
Wearstrip:	Not available on 1/2-inch bore. Standard with 3 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

#### Series S (Spring Extend, Universal Mount)

Model SRXX-P4B4-XXX - (Max. Stroke - 4 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2"
Options:	Bumper, Viton
Accessories:	Pivot bracket, rod clevis, L-mount, mounting nut.
Wearstrip:	Not available on 1/2-inch bore. Standard with 3 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

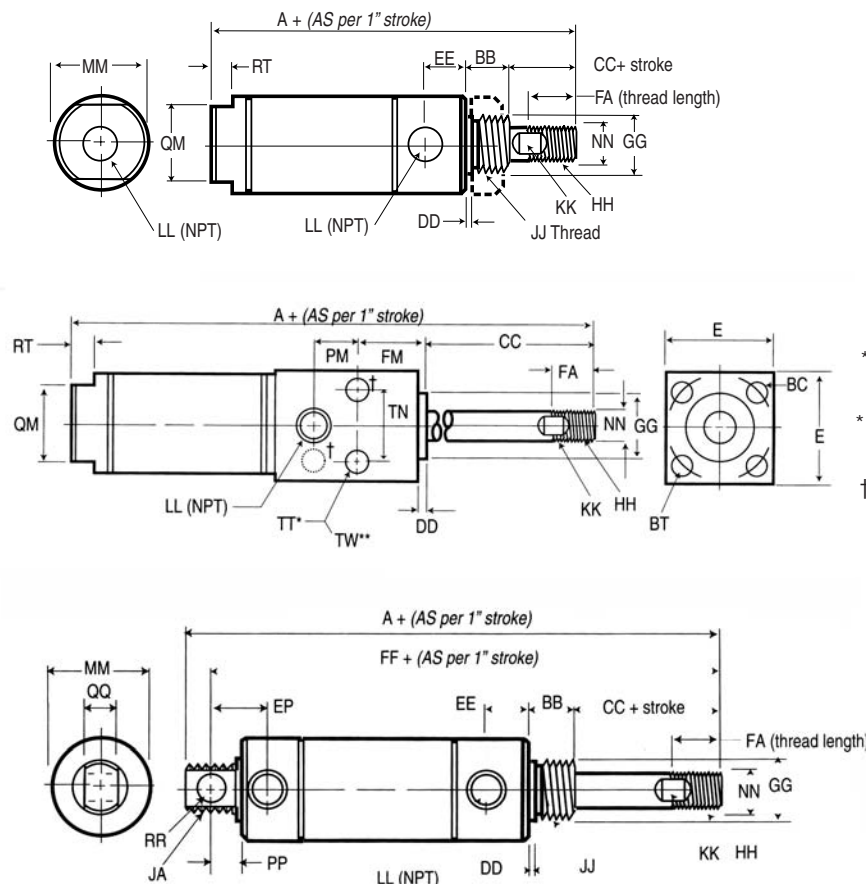
#### Series S (Block Front Mount - Spring Extend or Spring Return)

Model SSXX-B4B4-XXX - (Max. Stroke - 4 inches) (Spring Return)	
Bore sizes:	1/2", 3/4", 1-1/16"
Options:	Wearstrip (except on 1/2-inch bore), bumper, Viton
Accessories:	Rod clevis
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized. Head is hard anodized.

Model SRXX-B4B4-XXX (Spring Extend, Illustrated) (Max. Stroke - 4 inches)	
Bore sizes:	1/2", 3/4", 1-1/16"
Options:	Bumper, Viton
Accessories:	Rod clevis
Wearstrip:	Not available on 1/2-inch bore. Standard with 3 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

### Dimensional Data

#### Series S (Spring Extend, Nose Mount)



#### Spring Forces

Bore Size	Spring Force (lbs.)	
	Normal	Actuated
1/2"	1	2
3/4"	1.5	5
1-1/16"	4	8
1-1/4"	7	14
1-1/2"	6	12
1-3/4"	12	24
2"	15	30

\* TT - Two thru holes drilled and counterbored on port side for cap screw size listed.

\*\* TW - Above thru holes tapped on opposite side for additional mounting option.

† Mounting hole locations for 1/2-inch models.

**Dimensional Data**

**Series S**

Dim Code	Cylinder Description	CYLINDER BORE (INCHES)						
		1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2
<b>Single Acting</b>								
A	SRXX-N4B4-XXX	2.42	2.78	3.28	4.25	4.00	5.03	5.11
A	SRXX-P4B4-XXX	3.12	3.84	4.15	5.33	5.06	6.59	6.48
A	SSXX-B4B4-XXX	2.42	3.34	4.28	–	5.00	–	–
A	SRXX-B4B4-XXX	2.42	3.34	4.28	–	5.18	–	–
A	SSRX-N4B4-XXX	1.44	2.69	2.56	2.81	2.69	3.00	3.00
AS	SRXX-P4B4-XXX	1.44	2.69	2.56	2.81	2.69	3.00	3.00
AS	SSXX-B4B4-XXX	1.88	1.69	1.56	–	1.69	–	–
AS	SRXX-B4B4-XXX	2.88	2.69	2.56	–	2.69	–	–
BB	All Types	.41	.50	.50	.62	.62	.75	.81
BC	Bolt Circle Dia.	.75	1.00	1.25	–	1.75	–	–
BT	Threaded Hole	8-32(2)	10-32(2)	10-32(2)	–	1/4-20	–	–
CC	SRXX-N4B4-XXX	.50	.50	.62	1.00	1.00	1.19	1.25
CC	SRXX-P4B4-XXX	.50	.50	.62	1.00	1.00	1.19	1.25
CC	SRXX-B4B4-XXX	.50	1.06	1.12	–	1.50	–	–
CC	SSXX-B4B4-XXX	.50	1.06	1.12	–	1.50	–	–
DD	Block Front Mount	.06	.09	.09	–	.12	–	–
DD	All Others	.04	.07	.07	.07	.07	.09	.12
E	Block Front Mount	.75	1.00	1.25	–	1.75	–	–
EE	All Types	.37	.48	.52	.69	.62	.72	.69
EP	SRXX-P4B4-XXX	.42	.66	.62	.91	.81	.98	1.00
FA	Block Front	.50	.75	.75	–	1.25	–	–
FA	All Others	.50	.50	.50	.50	.75	.88	.88
FF	SRXX-P4B4-XXX	5.76	3.55	3.87	4.97	4.69	6.09	6.05
FM	Block Front Mount	.31	.48	.72	–	1.00	–	–
GG	Block Front Mount	.437	.625	.750	–	1.00	–	–
GG	SRXX-XXX-XXX	.437	.625	.625	.750	.750	1.03	1.375
HH	All Types	10-32	1/4-28	5/16-24	7/16-20	7/16-20	1/2-20	1/2-20
JA	SRXX-P4B4-XXX	7/16-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12
JJ	All Types	7/16-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12
KK	Wrench Flat	None	None	.25	.38	.38	.44	.50
LL	Block Front Mount	10-32	1/8	1/8	1/8	1/4	–	–
LL	All Others	10-32	1/8	1/8	1/8	1/8	1/4	1/4
MM	All Types	.62	.88	1.12	1.31	1.55	1.81	2.07
NN	All Types	.187	.250	.312	.437	.437	.500	.625
PM	Block Front Mount	.44	.51	.54	–	.66	–	–
PP	SRXX-P4B4-XXX	.25	.34	.34	.41	.50	.50	.57
QM	All Types	.37	.62	.87	.87	.82	1.25	1.25
QQ	SRXX-P4B4-XXX	.31	.38	.38	.50	.62	.62	.75
RR	SRXX-P4B4-XXX	.16	.25	.25	.25	.38	.38	.38
RT	All Types	.12	.16	.25	.18	.25	.25	.31
TN	Block Front Mount	.44	.62	.81	–	1.12	–	–
TT	Block Front Mount	8-32	10-32	10-32	–	1/4-20	–	–
TW	Block Front Mount	–	1/4-20	1/4-20	–	5/16-18	–	–

### Performance Specifications

#### Series S (Nose Mount)

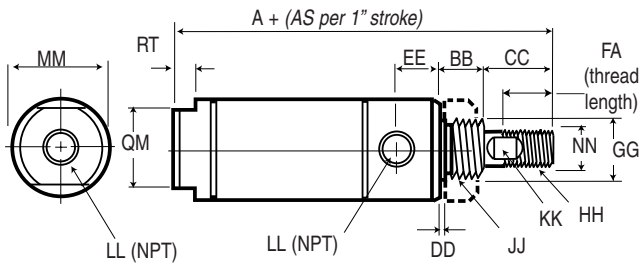
Model SDXX-N4B4-XXX - (Max. Stroke - 12 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2", 2-1/2"
Hex Mounting Nut:	Standard (Except on 2 and 2-1/2-inch models).
Options:	Bumper, Viton, Internal Magnet
Accessories:	Rod clevis, L-mount
Wearstrip:	Not available on 1/2-inch bore. Standard with 5 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

#### Series S (Universal Mount)

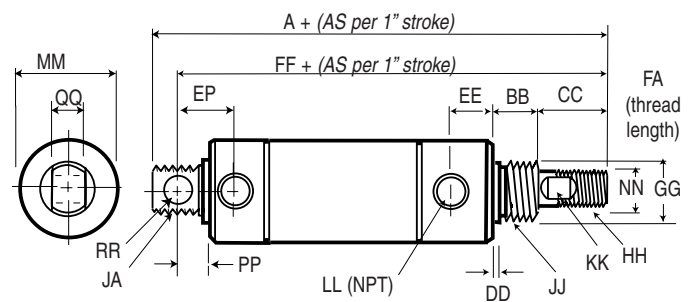
Model SDXX-P4B4-XXX - (Max. Stroke - 12 inches)	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2", 2-1/2"
Options:	Bumper, Viton, Internal Magnet
Accessories:	Pivot bracket, rod clevis, L-mount, mounting nut.
Wearstrip:	Not available on 1/2-inch bore. Standard with 5 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized.

### Dimensional Data

#### Series S (Nose Mount)



#### Series S (Universal Mount)



Dim Code	Cylinder Description	CYLINDER BORE (INCHES)							
		1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2	2-1/2
<b>Double Acting</b>									
A	SDXX-N4B4-XXX	2.62	3.47	3.75	4.75	4.44	5.57	5.56	5.56
A	SDXX-P4B4-XXX	3.31	4.54	4.62	5.83	5.50	7.13	6.93	6.93
AS	All Types	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BB	All Types	.41	.50	.50	.62	.62	.75	.81	.81
CC	All Types	.50	.50	.62	1.00	1.00	1.19	1.25	1.25
DD	All Types	.04	.07	.07	.07	.07	.09	.12	.12
EE	All Types	.37	.48	.52	.69	.62	.72	.69	.69
EP	SDXX-P4B4-XXX	.42	.66	.62	.91	.81	.98	1.0	1.0
FA	All Types	.50	.50	.50	.75	.75	.88	.88	.88
FF	SDXX-P4B4-XXX	6.12	4.25	4.34	5.47	5.12	6.63	6.50	6.50
GG	All Types	.437	.625	.625	.750	.750	1.030	1.50	1.50
HH	All Types	10-32	1/4-28	5/16-24	7/16-20	7/16-20	1/2-20	1/2-20	1/2-20
JJ	All Types	7/16-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12	1-3/8-12
KK	All Types	None	None	.25	.38	.38	.44	.50	.50
LL	All Types	10-32	1/8	1/8	1/8	1/8	1/4	1/4	1/4
MM	All Types	.62	.88	1.12	1.31	1.55	1.81	2.07	2.62
NN	All Types	.187	.250	.312	.437	.437	.500	.625	.625
PP	SDXX-P4B4-XXX	.25	.34	.34	.41	.50	.50	.57	.57
QM	SDXX-N4B4-XXX	.37	.62	.87	.87	.87	1.25	1.25	1.75
QQ	SDXX-P4B4-XXX	.31	.38	.38	.50	.62	.62	.75	.75
RR	SDXX-P4B4-XXX	.16	.25	.25	.25	.38	.38	.38	.38
RT	SDXX-N4B4-XXX	.12	.16	.25	.18	.25	.25	.31	.31

**Performance Specifications**

**Series S (Double Rod End, Double End Mount)**

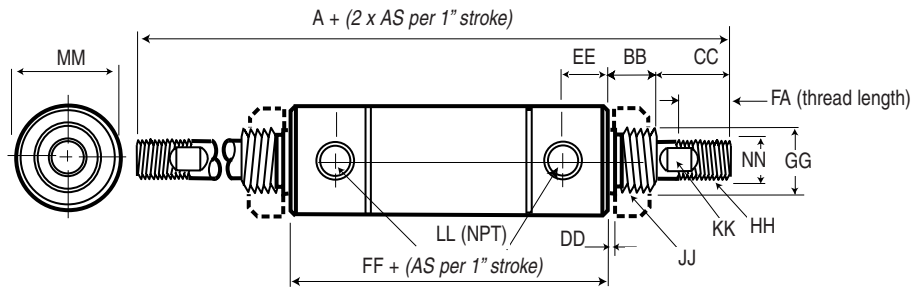
<b>Model SDXX-D4B4-XXX - (Max. Stroke - 12 inches)</b>	
Bore sizes:	1/2", 3/4", 1-1/16", 1-1/4", 1-1/2" 1-3/4", 2", 2-1/2"
Hex Mounting Nut:	Standard (Except on 2 and 2-1/2"-inch models) and bumpers.
Options:	Viton, wearstrip.
Accessories:	L-mount, rod clevis, mounting nut (2, 2-1/2"-inch models)
Notes:	No rod bushing on 1/2-inch models - heads are hard anodized.

**Series S (Block Front Mount)**

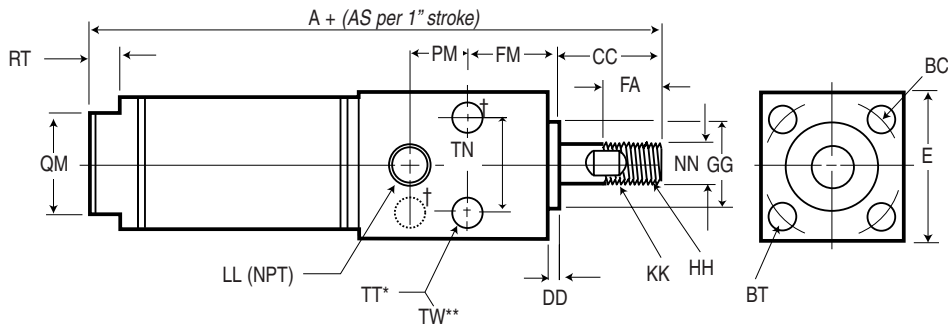
<b>Model SDXX-B4B4-XXX - (Max. Stroke - 12 inches)</b>	
Bore sizes:	1/2", 3/4", 1-1/16"
Options:	Wearstrip, Bumpers, Viton, Internal Magnet
Accessories:	Rod clevis
Wearstrip:	Not available on 1/2-inch bore. Standard with 5 inches of stroke, or more (optional on shorter strokes).
Notes:	No rod bushing on 1/2-inch models - front head is hard anodized. Wearstrip not available on 1/2-inch bore. Wearstrip is standard with 5 inches of stroke, or more (optional on shorter strokes).

**Dimensional Data**

**Series S (Double Rod End, Double End Mount)**



**Series S (Block Front Mount)**



\* TT - Two thru holes drilled and counterbored on port side for cap screw size listed.

\*\* TW - Above thru holes tapped on opposite side for additional mounting option.

† Mounting hole locations for 1/2-inch models.

**Dimensional Data**

**Series S**

Dim Code	Cylinder Description	CYLINDER BORE (INCHES)							
		1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2	2-1/2
<b>Double Acting</b>									
A	SDXX-D4B4-XXX	3.88	5.03	5.32	6.83	6.63	8.57	8.31	8.31
A	Block Front Mount	2.62	4.03	4.75	–	5.44	–	–	–
AS	Block Front Mount	1.00	1.00	1.00	–	1.00	–	–	–
AS	SDXX-D4B4-XXX	.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BB	SDXX-D4B4-XXX	.41	.50	.50	.62	.62	.75	.81	.81
BC	Bolt Circle Dia.	.75	1.00	1.25	–	1.75	–	–	–
BT	Threaded Hole	8-32	10-32	10-32	–	1/4-20	–	–	–
CC	Block Front Mount	.50	1.06	1.12	–	1.50	–	–	–
CC	SDXX-D4B4-XXX	.50	.50	.62	1.00	1.00	1.19	1.25	1.25
DD	Block Front Mount	.06	.09	.09	–	.12	–	–	–
DD	SDXX-D4B4-XXX	.04	.07	.07	.07	.07	.09	.12	.12
E	Block Front Mount	.75	1.00	1.25	–	1.75	–	–	–
EE	SDXX-D4B4-XXX	.37	.48	.52	.69	.62	.72	.69	.69
FA	Block Front Mount	.50	.75	.75	–	1.25	–	–	–
FA	SDXX-D4B4-XXX	.50	.50	.50	.75	.75	.88	.88	.88
FF	SDXX-D4B4-XXX	2.07	3.03	3.07	3.58	3.39	4.69	4.19	4.19
FM	Block Front Mount	.31	.48	.72	–	1.00	–	–	–
GG	Block Front Mount	.437	.625	.750	–	1.00	–	–	–
GG	SDXX-D4B4-XXX	.437	.625	.625	.750	.750	1.030	1.50	1.50
HH	All Types	10-32	1/4-28	5/16-24	7/16-20	7/16-20	1/2-20	1/2-20	1/2-20
JJ	SDXX-D4B4-XXX	7/16-20	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1-1/4-12	1-3/8-12
KK	All Types	None	None	.25	.38	.38	.44	.50	.50
LL	All Types	10-32	1/8	1/8	1/8	1/8	1/4	1/4	1/4
MM	SDXX-D4B4-XXX	.62	.88	1.12	1.31	1.55	1.81	2.07	2.62
NN	All Types	.187	.250	.312	.437	.437	.500	.625	.625
PM	Block Front Mount	.44	.51	.54	–	.66	–	–	–
QM	Block Front Mount	.37	.62	.87	–	.87	–	–	–
RT	Block Front Mount	.12	.16	.25	–	.25	–	–	–
TN	Block Front Mount	.44	.62	.81	–	1.12	–	–	–
TT	Block Front Mount	8-32	10-32	10-32	–	1/4-20	–	–	–
TW	Block Front Mount	–	1/4-20	1/4-20	–	5/16-18	–	–	–

## Features

### Series S (Hall Effect Switches)

Hall Effect Sensors are typically used in conjunction with computers, programmable controllers or other solid state devices to sense and process cylinder rod proximity. The solid state circuitry in this sinking switch (NPN) provides clean, fast output without “bounce.” The 300 mW power capability restricts its use to low power loads. One switch kit fits all Silverair cylinders for reduced and simplified inventory. 3/8 inch effective area per switch. For two switches, a minimum of 1-inch stroke is recommended.



### Series S (Reed Switches)

Epoxy encapsulated reed switches are ideal for harsh environments. One switch kit fits all Silverair cylinders for reduced and simplified inventory. 50 watt reed is common in all sensors. Model 117045-300 lights up during reed engagement in low voltage applications. Model 117045-500 lights up over wide voltage range. Model 117045-100 is a basic sensor with no LED.



## Performance Specifications

### Series S (Hall Effect Switches)

Input Voltage:	5 to 24 VDC
Input Current:	25 mA maximum
Output Voltage Drop:	0.4 VDC maximum
Output Current:	330 mA maximum
Power Dissipation:	300 mW maximum
Temperature Range:	-20° to 185°F (-29° to 85°C)

### Series S (Reed Switches)

Contacts:	Normally open
Contact Rating:	50 W maximum
Switching Current:	1 A maximum
Initial Contact Resistance:	1 Ohm
Minimum Break Down Voltage:	225 VDC, 275 VAC
Temperature Range:	-40° to 200°F (-40° to 93°C)

## Ordering

### Series S (Hall Effect Switches)

Model No.	Description
118123-100	w/LED, 5-24 VDC, 24 inch leads (includes 118124 Mounting Kit)
118123-200	w/LED, 5-24 VDC, 144 inch leads (includes 118124 Mounting Kit)

### Series S (Reed Switches)

One 118124 Mounting Kit is included with each Seed Switch

Model No.	Description
117045-100	No LED, 120 VAC or 200 VDC max., 24 inch leads
117045-200	No LED, 120 VAC or 200 VDC max., 144 inch leads
117045-300	w/LED, 5-24 VAC/DC max., 24 inch leads
117045-400	w/LED, 5-24 VAC/DC max., 144 inch leads
117045-500	w/LED, 120 VAC or 200 VDC max., 24 inch leads
117045-600	w/LED, 120 VAC or 200 VDC max., 144 inch leads

# Pneumatic Cylinders

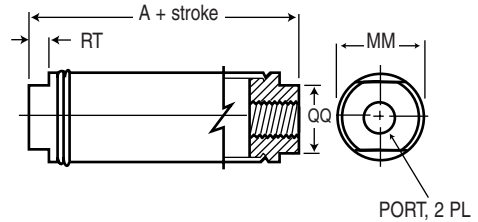
## Silverair™ Volume Chambers

### Features

#### Series S (Stainless Steel Volumn Chambers)

Volume chambers are used wherever there is the need to accumulate or store a volume of air or vacuum, such as a time delay in a circuit.

- Stainless steel body and aluminum endcaps offer excellent corrosion resistance in adverse environments.
- Available in lengths up to 24 inches, at 1/8-inch increments, providing a capability to meet very specific pneumatic accumulator applications.



### Performance Specifications

Operating Pressures:	0 - 200 PSIG (14 bar)
Temperatures Ranges:	-40° to 160°F, ambient (-40° to 71°C)
Operation:	Compressed air or with vacuum

### Ordering

Reference	Cylinder Bore (Inches)			
	3/4	1-1/16	1-1/2	2
A	1.91	2.18	2.26	2.81
MM	.81	1.11	1.55	2.07
QQ	.62	.88	.88	1.25
RT	.16	.25	.25	.32
PORT	.125	.125	.125	.25

Volume (ci)	Cylinder Bore (Inches)			
	3/4	1-1/16	1-1/2	2
Add per 1.0 inch of length	.44	.89	1.77	3.14
Basic Volume (add to total)	.41	.92	1.80	4.44

11811 X - XXX

#### BORE SIZE

- 5 3/4 inch
- 6 1-1/16 inch**
- 7 1-1/2 inch
- 8 2 inch

#### CHAMBER LENGTH

(1" Increments, 1" through 4")

#### WHOLE INCHES FRACTIONS

- |            |            |
|------------|------------|
| 00 = 0 in  | 0 = None   |
| 01 = 1 in  | 1 = 1/8 in |
| 02 = 2 in  | 2 = 1/4 in |
| 03 = 3 in  | 3 = 3/8 in |
| 04 = 4 in  | 4 = 1/2 in |
| 05 = 5 in  | 5 = 5/8 in |
| 06 = 6 in  | 6 = 3/4 in |
| 10 = 10 in | 7 = 7/8 in |
- etc.

- Under 1" stroke, use 00 and fraction designation.

Example: 1/2" stroke = 004

**Note:** Highlighted selections denotes most popular models.

**Features**

**Series 23, 24, & 28**

Economair round cylinders are medium to heavy-duty units that can be installed anywhere that a repairable cylinder is desired. Prelubed, they're suitable for operation without externally applied lubrication. Unique endcap retention design provides a concentric assembly, resulting in a service life superior to tie rod cylinder construction.

- Cylinder heads are high tensile strength aluminum alloy, retained by a feed ring wire, a simple design that eliminates excess cylinder weight and bulk.
- The barrel I.D. is hard-coated aluminum with a Rockwell C60 hardness. A finish of 16 microinches or better insures low friction and smooth operation.
- Piston rod is ground and polished, hard-chrome plated steel for minimum friction and maximum packing life. Optional 303 stainless steel is excellent for corrosion resistance and washdown applications (303 stainless steel is standard on 1-1/8-inch bore cylinders).
- Adjustable cushions provide excellent control of cylinder deceleration. Full range adjustability (except fixed cushions on 1-1/8-inch bore).
- High grade, self-lubricating bronze rod bearing reduces friction and promotes smooth operation.
- Piston seal selection insures job-matched performance - Buna N O-ring, Low Friction U-cup and self-lubricating packings available.
- Wear compensating rod wiper protects internal seals and parts from dirt, grit and debris.
- NPTF dry seal pipe threads on ports.
- Optional self-lubricating U-cup seals reduce drag and promote extra cylinder life.
- Cylinder is repairable so instead of buying complete new units, repair kits can be used.



**Performance Specifications**

Bore Sizes:	1-1/8", 1-1/2", 2", 2-1/2", 3" and 4"
Maximum Output Force:	2,513 pounds (4-inch bore).
Air Pressure:	To 200 p.s.i. (14 bar). May be operated hydraulically (200 p.s.i., nonshock).
Operating Temperature Range:	0° to 180° F (-18° to 82° C).
Seals:	Viton seals available for high heat applications. Consult factory.
Notes:	Wide range of mounting styles and attachable mounting hardware/ accessories allows cylinders to be applied in nearly any pneumatic application.



**U-cup and Magnetic Piston Options**

# Pneumatic Cylinders Economair®

## Ordering

Series 23, 24, & 28

Include dashes (-). The dashes are significant.

**2X XX - X X X9 - XXX**

(1" Increments, 1" through 10" plus 1 1/2", 2 1/2" and 3 1/2")

### SERIES NO.

- 23 Noncushioned
  - 24 Cushioned, Both Ends
  - 28 Magnetic Piston, Cushioned Both Ends
- NOTE: 1-1/8 inch bore not available

### BORE SIZE

- 18 1-1/8 in
- 15 1-1/2 in
- 20 2 in
- 25 2-1/2 in
- 30 3 in
- 40 4 in

### CYLINDER TYPE

- 1 Double Acting, Rear Tang
- 5 Double Acting, No Rear Tang
- 2 Double Acting, Double Rod

NOTE: Not Available in Series 28

**Economair mounts must be ordered separately, see below.**

### STROKE LENGTH

WHOLE INCHES	FRACTIONS
00 = 0 in	0 = 0 in
01 = 1 in	1 = 1/8 in
02 = 2 in	2 = 1/4 in
03 = 3 in	3 = 3/8 in
04 = 4 in	4 = 1/2 in
05 = 5 in	5 = 5/8 in
06 = 6 in	6 = 3/4 in
◇ ◇	7 = 7/8 in
to to	
99 99 in	

### OPTIONS

- 09 Standard Rod
- 89 303 Stainless Steel Rod — Standard on 1-1/8" bore cylinder.

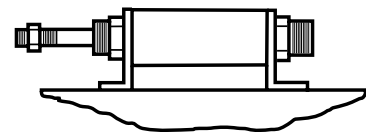
### PACKING

- 0 O-Ring, Nitrile
  - 2 O-Ring, Low Friction
  - 3 O-Ring, Viton
  - 4 Lip, Nitrile (pneumatic)
  - 5 Lip, Self-Lubricating (low friction)
  - 6 Lip, Viton
- Not available in Series 28
- These packings add one inch to cylinder length.  
Vitons not available in Series 28

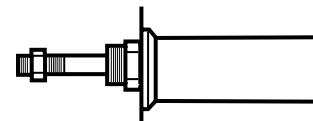
**Note:** Highlighted selections denote most popular models.

## Mounts

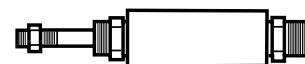
	Cylinder Bore (Inches)					
	1-1/8	1-1/2	2	2-1/2	3	4
L-Mount (2 qty.)	20533	20534	20534	20535	20535	20536
Flange Mount	20537	20538	20538	20539	20539	20540
Clevis Bracket	20546	20547	20547	20548	20548	20549
Mounting Nut (2 qty.)	20529	20530	20530	20531	20531	20532
Trunnion	20524	20556	20557	20558	20559	20560
Alum. Rod Clevis	—	20542	20543	20544	20544	20545
Steel Rod Clevis	20541	115906	115907	115908	115908	115909



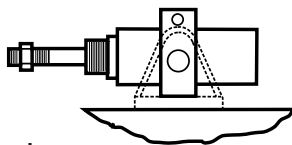
L-Mount



Flange Mount



Mounting Nut



Trunnion



Rod Clevis & Clevis Bracket

**Note:** Order cylinder, rod clevis and clevis bracket separately.  
Every Economair Cylinder includes rod nut.  
Trunnion Mount does not include pillow block.

## Switches (Specifications / Ordering)

### Switch

Model Number	119581-1	119581-2	119581-3	119582-1	119582-2	119582-3	119583-1	119583-2	119583-3
Lead Length/Type	1m bare	3m bare	Plug	1m bare	3m bare	Plug	1m bare	3m bare	Plug
Lead Color	Black			Grey			Black		
Switch Type	REED			PNP(SOURCING)			NPN (SINKING)		
Input Voltage	100 VDC, 125 VAC Max.			10 - 30 VDC			5 - 30 VDC		
	-			-			5 - 100mA @ 5V		
Operating Current	300mA (150mA Inductive)			7 - 100mA @ 12V			10 - 200mA @ 12V		
	-			14 - 200mA @ 24V			20 - 200mA @ 24V		
Detecting Distance	2.5 mm			1.5 mm			1.5 mm		
Detecting Width	-			3.0 mm			3.0 mm		
Response Time	1 mSec. Min.			-			-		
LED Function	18mA Min.			1mA Min.			1mA Min.		



### Switch Mounting Brackets

Bore	Model Number
1-1/8"	119897-18
1-1/2"	119897-15
2"	119897-20
2-1/2"	119897-25
3"	119897-30
4"	119897-40

**Note:** Order bracket and switch separately.

# Pneumatic Cylinders

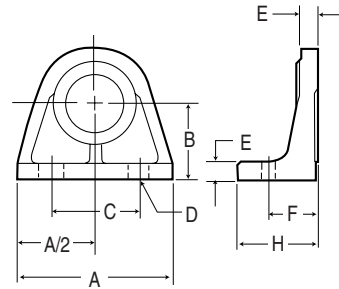
## Economair® - Dimensional Data

### Dimensional Data

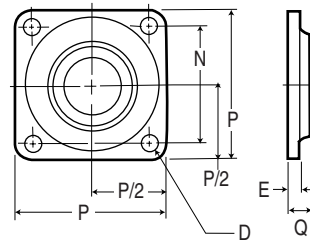
Series 23, 24, & 28

Reference	Cylinder Bore (Inches)					
	1-1/8	1-1/2	2	2-1/2	3	4
Rod dia.	0.38	0.50	0.63	0.75	0.75	1.00
A	1.625	3.00	3.00	4.00	4.00	5.00
B	1.281	1.50	1.50	2.00	2.00	2.625
C	1.0	1.688	1.688	2.25	2.25	3.00
D-dia.*	.250	.250	.250	.375	.375	.438
E	.250	.313	.313	.375	.375	.438
F	.625	.906	.906	1.219	1.219	1.469
G	.375	.500	.500	.625	.625	.750
H	1.00	1.531	1.531	2.094	2.094	2.531
J	.750	1.00	1.00	1.25	1.25	1.188
K	.375	.469	.469	.781	.781	.781
L-HEX	1.0625	1.438	1.438	2.0625	2.0625	2.50
M-dia.	1.25	1.75	1.75	2.438	2.438	2.938
N	2.00	2.50	2.50	3.375	3.375	4.00
P	2.50	3.25	3.25	4.50	4.50	5.188
Q	.688	.594	.594	.719	.719	.844
R	1.219	1.750	1.750	2.375	2.375	3.00
S	.313	.313	.313	.375	.375	.438
T	2.250	3.00	3.00	4.00	4.00	5.00
U	1.75	2.25	2.25	3.00	3.00	3.75
V	1.75	2.25	2.25	2.688	2.688	3.375
W	1.406	1.75	1.75	2.0625	2.0625	2.625
X	.750	1.00	1.00	1.25	1.25	1.50
Y-dia.*	.250	.3125	.3125	.438	.4375	.625
Z	.656	.688	.688	.875	.875	1.063
ZZ	.3125	.375	.375	.500	.500	.625
TA	3.125	4.125	4.125	5.375	5.625	7.125
TB	2.250	3.00	3.00	3.75	4.25	5.50
TC-dia.	.438	.500	.500	.750	.750	.750
TD	2.00	2.625	3.125	4.00	4.500	5.750
TE	.875	1.125	1.375	1.875	2.125	2.688
TF	.750	1.250	1.250	1.50	1.50	1.50
TG-dia.*	.250	.3125	.3125	.4375	.4375	.500
TH-Thd.	3/8-16	1/2-13	5/8-11	3/4-10	3/4-10	1-8
TK	-	2.0625	2.0625	2.50	2.50	3.250
TL	-	.875	.875	1.00	1.00	1.325
TM	-	1.0625	1.0625	1.438	1.438	1.938
TN	-	1.813	1.00	1.813	1.813	1.50

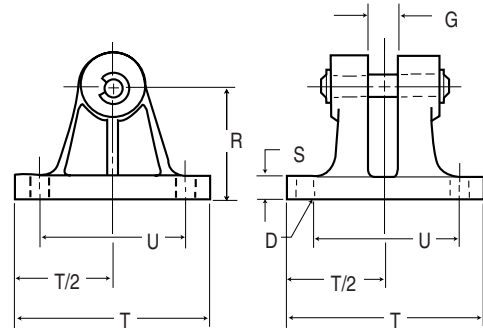
\*Bolt or pin diameter



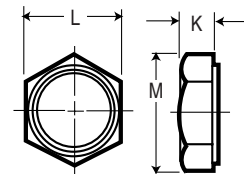
L-Type



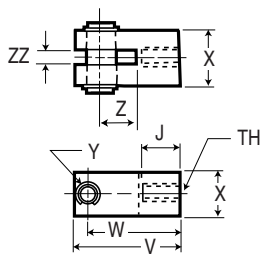
Flange



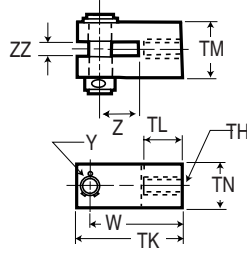
Clevis Bracket



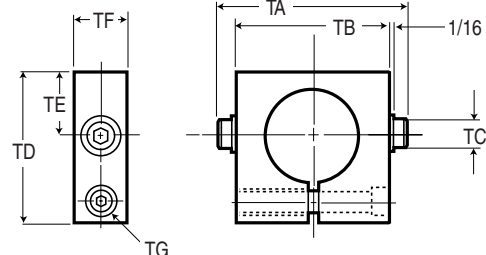
Mounting Nut



Steel Rod Clevis



Aluminum Rod Clevis



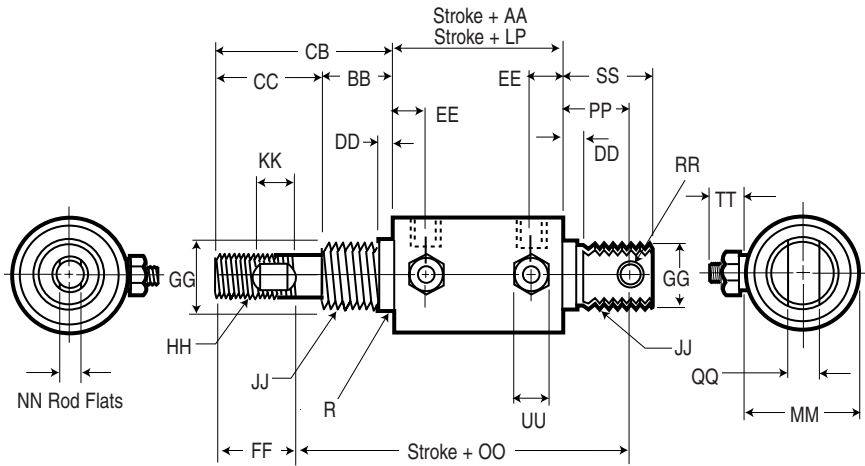
Trunnion

# Pneumatic Cylinders

## Economair® - Dimensional Data

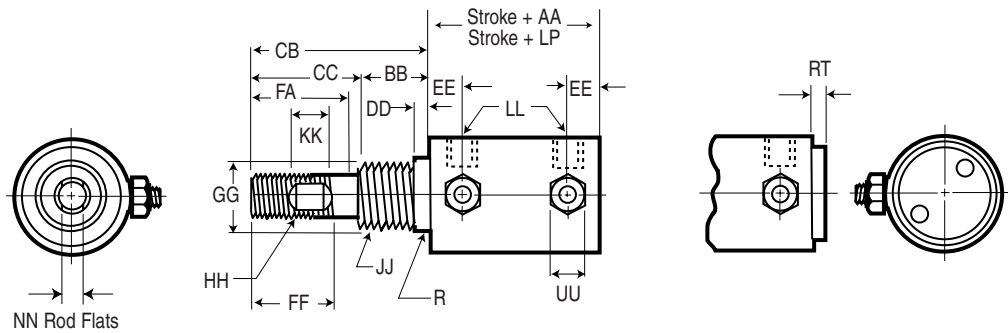
### Dimensional Data

#### Series 23, 24, & 28 (Double Acting with Tang)



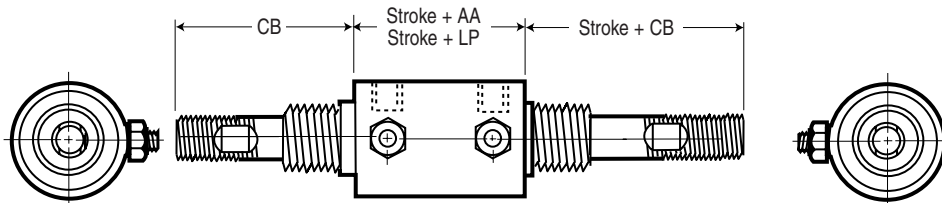
AA = Double acting with O-ring or low friction packing.  
 LP = Double acting with U cup packing.

#### (Double Acting, No Tang)

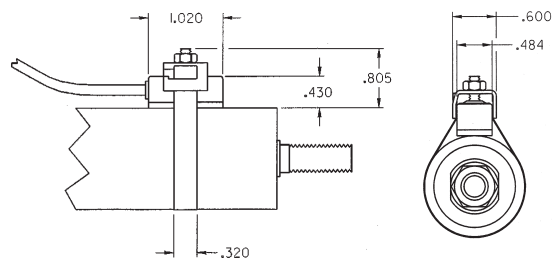


AA = Double acting with O-ring or low friction packing.  
 LP = Double acting with U cup packing.

#### (Double Acting, Double Ended)



#### (Switch Bracket)



# Pneumatic Cylinders

## Economair® - Dimensional Data

### Dimensional Data

#### Series 23, 24, & 28

Dimensional Reference	Cylinder Bore (Inches)					
	1-1/8	1-1/2	2	2-1/2	3	4
Rod Diameter	.38	.50	.63	.75	.75	1.00
Stroke Factor AA*	2.031	2.625	2.625	2.875	2.875	4.00
Stroke Factor LP**	3.031	3.625	3.625	3.875	3.875	5.00
BB	.750	1.00	1.00	1.250	1.250	1.250
CB	1.750	2.438	2.438	2.938	2.938	3.500
CC	1.00	1.438	1.438	1.688	1.688	2.250
DD	.125	.219	.219	.344	.344	.406
EE	.422	.516	.516	.563	.563	.813
FA	.781	1.156	1.156	1.375	1.375	1.750
FFs	.875	1.250	1.250	1.50	1.50	1.875
(± .002) GG	.748	1.057	1.057	1.432	1.432	1.777
(UNC-2A) HH	3/8-16	1/2-13	5/8-11	3/4-10	3/4-10	1-8
JJ	3/4-16	1-1/16-18	1-1/16-18	1-3/8-12	1-3/8-12	1-3/4-12
	UNF-2A	UNEF-2A	UNEF-2A	UNF-2A	UNF-2A	UN-2A
KK	.313	.500	.500	.500	.500	.500
(NPTF) LL	1/8-27	1/4-18	1/4-18	3/8-18	3/8-18	1/2-14
MM	1.375	1.750	2.250	2.750	3.250	4.250
NN	.313	.406	.500	.625	.625	.875
OO	3.594	4.688	4.688	5.688	5.688	7.063
PP	.688	.875	.875	1.375	1.375	1.438
QQ	.375	.500	.500	.625	.625	.750
(RAD.) R	.016	.016	.016	.094	.094	.094
RR	.250	.313	.313	.438	.438	.500
RT	–	.172	–	.438	.438	.438
SS	.969	1.25	1.25	2.00	2.00	2.188
TT	–	.438	.438	.438	.438	.438
UU	–	.500	.500	.500	.625	.625

\* Double acting with O-ring or low friction packing

\*\* Double acting with U-cup packing

FF shows total thread, including run out.

**Provenair®...**

**The Most Flexible Cylinder for New or Retrofit Designs**

Your best creations are only as good as their parts. Ensure performance to your customer's expectations by including ARO Provenair Cylinders in your original specifications. They are precision built using the latest extrusion technologies and feature a profiled barrel that is not only good looking, but eliminates cumbersome and dirt-catching tie rods. At the same time, the profiled barrel provides superior strength compared to traditional tie rod constructed cylinders. Provenair end caps, mounts, and rod end accessories - even our position sensor brackets, are protected against corrosion. To maximize cycle life, every Provenair has a factory-installed Teflon® wearband on the piston. A "Floating" rod bushing provides smooth strokes and maximized wear; reduced galling compared to bronze bushings.

Maintenance and repair of ARO Provenair Cylinders is very simple and fast. The rod bushing is retained by a stainless steel spiro retaining ring and is easily removed with a small screwdriver. The retaining ring slides off the rod along with the bushing and its captive seals. There are no small screws to lose on the floor or under your machine, and no seals to fall inside the cylinder. Replacement of the reciprocating assembly and its seals is equally simple and, unlike tie rod cylinders, you needn't worry about equalizing torque on the Provenair tie bolts!

Provenair is flexible, you can change it to fit most of your application requirements. Factory installed mounts save you time, but you may easily change your Provenair Cylinder mount with an ARO



mounting kit. If you require an oversized rod diameter, Provenair converts easily - right on your machine! Simply specify the piston rod diameter, thread style, and material (chrome steel or stainless steel) when ordering the replacement reciprocating assembly; order a rod bushing for the new piston rod diameter and you're ready to install. Your original Provenair now needs a magnetic piston? Order a magnet and easily install it and you can select from three types of attachable position sensors.

- Tie bolt construction eliminates rod binding and tie rod torque problems. (Series AN and TN, up to 4" bore)
- Series SN all stainless steel cylinders are corrosion resistant and have tie rods.
- Rugged thick walled tubes resist denting.
- NFPA repairable and interchangeable.
- 15 NFPA mounting styles.
- Factory lubricated grease that won't wash out.
- Optional 303 S.S. piston rods provide corrosion resistance. (STD. Series SN and TN)
- Optional oversized rods available to provide extra column strength. (Series AN and SN)
- Optional slippery seals enhance smooth operation and are self-lubricating. (STD. Series TN)
- Available in 1-1/2", 2", 2-1/2", 3-1/4" and 4" bore sizes with extruded barrel (as shown). (Series AN and TN)
- Larger bore sizes 5", 6", 8" and 10" bores have prestressed steel tie rods. (Series AN)
- Series SN, all stainless steel cylinders available in 1-1/2, 2, 2-1/2, 3-1/4, 4, 5, 6 and 8" bores.
- SN series cylinders have S.S. tie rods.
  - Operates on air pressure up to 250 p.s.i.
  - Output forces up to 19,635 lbs. (10" bore at 250 p.s.i.).
  - Std. operating temp: 0° to 185°(F), -18° to 82° (C).
  - Rotated ports are optional.
  - Viton seals for high heat applications (up to 300° F, 149° C)

**Performance Specifications**

<b>Aluminum NFPA Interchangeable</b>	
Bore sizes:	1/2", 2", 2-1/2", 3-1/4", 4", 5", 6", 8" and 10"
Seals:	Buna-N, Viton or Slippery (Aluminum alloy piston with lip-type seals)
Barrel:	Profiled Extrusion (5", 6", 8" and 10" have tie rods.) (Patented)
Bushings:	"Floating" Rod bushings for low friction, superior wear and side load resistance
Switches:	Metal Jacketed
Piston Rods:	Chrome plated ground and polished high tensile steel
Options:	Optional Piston Magnet Double Rod End 303 S.S. Piston Rods Studded male rods for 50% stronger threads than cold rolled thread rod ends
<b>Stainless Steel NFPA Interchangeable</b>	
Bore sizes:	1/2", 2", 2-1/2", 3-1/4", 4", 5", 6", and 8"
Rod Bushing:	Bronze
Rod Wiper:	Teflon®
External Components:	303/304 – End caps, tie rods, piston rods, mounts (barrel is 316)
Mounting Styles:	15 NFPA
Options:	Optional adjustable cushions Piston Magnet Viton Seals (Wiper Teflon) Double rod ends

**"GripRidge" gives a better bracket fastening surface. Brackets and switches stay-put.**

**Retained cushion adjustment needles**



**End caps and mounts resist common coolants, cleaners, lubricants and corrosion.**

**Lightweight aluminum body resists dents.**

### Ordering

#### Series AN (1-1/2' thru 10" Bore)

### Aluminum NFPA

Include dashes ( - ). Dashes are significant.

A N X X X - X X X X X - X X X

#### ACTUATORS

Aluminum actuators begin with A

#### SERIES (NFPA)

All Provenair Cylinders are Series N

#### TYPE

- A** Double Acting, Single Rod
- B** Double Acting, Double Rod

#### BORE SIZE

NOTE: 5", 6", 8" & 10" bores have tie rods.

<b>Q</b> 1- 1/2"	<b>W</b> 3-1/4"	<b>6</b> 6"
<b>S</b> 2"	<b>4</b> 4"	<b>8</b> 8"
<b>T</b> 2- 1/2"	<b>5</b> 5"	<b>Y</b> 10"

#### ROD DIAMETER

- K** 5/8" Note: Available in 1-1/2", 2" and 2-1/2" bores only.
- M** 1" Note: Available in 2", 2-1/2", 3-1/4", 4" and 5" bores only.
- P** 1 3/8" Note: Available in 3-1/4", 4", 5", 6" and 8" bores only.
- Q** 1 3/4" Note: Available in 6", 8" and 10" bores only.
- S** 2" Note: Available in 10" bores only.

#### ROD STYLE

<b>A</b> Chrome, Std Male (KK <sub>1</sub> )	<b>K</b> S.S., Female (KK <sub>1</sub> )
<b>B</b> Chrome, Intermed. Male(KK <sub>2</sub> )	<b>L</b> S.S., No Threads
<b>C</b> Chrome, Full Male (CC)	<b>1</b> KK <sub>1</sub> Chrome, Studded
<b>D</b> Chrome, Female (KK <sub>1</sub> )	<b>2</b> KK <sub>2</sub> Chrome, Studded
<b>F</b> Chrome, No Threads	<b>3</b> CC Chrome, Studded
<b>G</b> S.S., Standard Male (KK <sub>1</sub> )	<b>4</b> KK <sub>1</sub> SS, Studded
<b>H</b> S.S., Intermediate Male (KK <sub>2</sub> )	<b>5</b> KK <sub>2</sub> SS, Studded
<b>J</b> S.S., Full Male (CC)	<b>6</b> CC SS, Studded

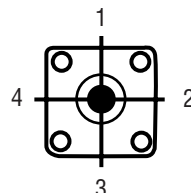
#### SEALS

<b>B</b> Buna-N	<b>G</b> Buna-N + Magnetic Piston
<b>V</b> Viton	<b>H</b> Viton + Magnetic Piston
<b>S</b> Slippery	<b>J</b> Slippery + Magnetic Piston

#### CUSHIONS

<b>X</b> No Cushions	<b>H</b> Cushion Head End (Rod End)
<b>B</b> Cushion Both Ends	<b>C</b> Cushion Cap End

Note: Highlighted selections denotes most popular models.



Determine port location looking at rod end of cylinder.

#### STROKE

Inches	
Tens 0-9	Ones 0-9
Fractions	
0	= 0 in
1	= 1/8 in
2	= 1/4 in
3	= 3/8 in
4	= 1/2 in
5	= 5/8 in
6	= 3/4 in
7	= 7/8 in

#### Note:

Maximum stroke 99 7/8", for longer strokes consult factory. Stroke lengths 20" and longer may require stop tubes, see page 85.

#### MOUNT

(8" and 10" Bore ME3, ME4)  
(Mounts must be factory installed on 5", 6", 8" and 10" Bore)

<b>A</b> MS1	<b>P</b> MT1
<b>B</b> MS4**	<b>Q</b> MX1
<b>C</b> MP1**	<b>T</b> MX2
<b>D</b> MP2**	<b>U</b> MX3
<b>F</b> MF1/ME3**	<b>X</b> No Mount
<b>H</b> MF2/ME4**	<b>1</b> FMB*
<b>K</b> MP4*	<b>2</b> FMC*
<b>L</b> MS7*	<b>3</b> FMH*
<b>M</b> MT2	

All mounts available through 8" Bore except:

\* 1 1/2" - 4" Bore Only

\*\* Available 1 1/2" - 10" Bore

#### PORT LOCATION

(MS4 mounts: Port locations other than "A", call factory. Trunnion mounts: ports "A" or "C" only.)

<b>A</b> H1, C1 (Std.)	<b>F</b> H2, C1
<b>B</b> H1, C2	<b>G</b> H2, C2
<b>C</b> H1, C3	<b>H</b> H2, C3
<b>D</b> H1, C4	<b>J</b> H2, C4

### Ordering

#### Series SN (1-1/2' thru 8" Bore)

NOTE: All SN Series Cylinders have tie rods.

### Stainless Steel NFPA

Include dashes ( - ). Dashes are significant.

S N X X X - X X X X X - X X X

#### ACTUATORS

Stainless Steel actuators begin with S

#### SERIES (NFPA)

All Provenair Cylinders are Series N

#### TYPE

- A** Double Acting, Single Rod
- B** Double Acting, Double Rod Note: Not available in 8" bore.

#### BORE SIZE

<b>Q</b>	1- 1/2"	<b>W</b>	3-1/4"	<b>6</b>	6"
<b>S</b>	2"	<b>4</b>	4"	<b>8</b>	8"
<b>T</b>	2- 1/2"	<b>5</b>	5"		

#### ROD DIAMETER

- K** 5/8" Note: Available in 1-1/2", 2" and 2-1/2" bores only.
- M** 1" Note: Available in 2", 2-1/2", 3-1/4", 4" and 5" bores only.
- P** 1 3/8" Note: Available in 3-1/4", 4", 5", 6" and 8" bores only.
- Q** 1 3/4" Note: Available in 6" and 8" bores only.

#### ROD STYLE

- G** S.S., Standard Male (KK<sub>1</sub>)
- H** S.S., Intermediate Male (KK<sub>2</sub>)
- J** S.S., Full Male (CC)
- K** S.S., Female (KK<sub>1</sub>)
- L** S.S., No Threads

#### SEALS

- B** Buna-N
- V** Viton
- S** Slippery
- G** Buna-N + Magnetic Piston Note: Teflon Wiper Std.
- H** Viton + Magnetic Piston
- J** Slippery + Magnetic Piston

#### CUSHIONS

- X** No Cushions
- B** Cushion Both Ends
- H** Cushion Head End (Rod End)
- C** Cushion Cap End

NOTE: S.S. Cylinders are made to order, contact factory for lead time.

#### STROKE

Inches		Fractions
Tens	Ones	
0-9	0-9	
		<b>0</b> = 0 in
		<b>1</b> = 1/8 in
		<b>2</b> = 1/4 in
		<b>3</b> = 3/8 in
		<b>4</b> = 1/2 in
		<b>5</b> = 5/8 in
		<b>6</b> = 3/4 in
		<b>7</b> = 7/8 in

**Note:**  
Maximum stroke 99 7/8", for longer strokes consult factory. Stroke lengths 20" and longer may require stop tubes, see page 97.

#### MOUNT

(8" Bore ME3, ME4)  
(Mounts must be factory installed.)

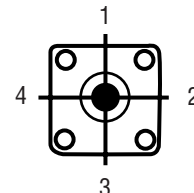
- A** MS1
- B** MS4\*\*
- C** MP1\*\*
- F** MF1/ME3\*\*
- H** MF2/ME4\*\*
- K** MP4\*
- M** MT2
- P** MT1
- Q** MX1
- T** MX2
- U** MX3
- X** No Mount

\* 1 1/2" - 6" Bore Only  
\*\* 1 1/2" - 4" Bore Only

#### PORT LOCATION

(MS4 mounts: Port locations other than "A", call factory. Trunnion mounts: ports "A" or "C" only.)

- A** H1, C1 (Std.)
- B** H1, C2
- C** H1, C3
- D** H1, C4
- F** H2, C1
- G** H2, C2
- H** H2, C3
- J** H2, C4



Determine port location looking at rod end of cylinder.

### Attachable Mounting Kits for Series AN

#### Series AN (1-1/2" Thru 4" Bore)

##### Mounting Kits with Long Screws

Mount styles B (MS4) and X (No mounts) use mounting kits with long screws to attach through cap into barrel of cylinders.

	1 1/2"	2"	2 1/2"	3 1/4"	4"
MS7 Side End Lugs (Steel)	119618	119619	119620	119621	119622
MF1 Rect. Flange (Steel)	119633	119634	119635	119636	119637
MF2 Rect. Flange (Steel)	119646	119647	119648	119649	119650
MP2 HD Clevis (Iron) *	119623	119624	119625	119626	119627
MP4 HD Eye (Iron)	119628	119629	119630	119631	119632
MS2 Side Lugs (Alum.)	119638	119639	119640	119641	119642
MP1 Fixed Clevis (Alum.) *	119796	119797	119798	119799	119800



##### Mounting Kits with Short Screws

Mount styles 1 (FMB), 2 (FMC) and 3 (FMH) use mounting kits with short screws to attach to female sleeve bolts.

	1 1/2"	2"	2 1/2"	3 1/4"	4"
MS7 Side End Lugs (Steel)	115277	115278	115279	115280	115281
MP2 HD Clevis (Steel) *	118696	118697	118698	118699	118700
MP4 HD Eye (Steel)	118701	118702	118703	118704	118705
MF1, MF2 Flange (Steel)	115282	115283	115284	115285	115286
MP1 Fixed Clevis (Alum.) *	115477	115478		115480	115481
MP2 Det. Clevis (Alum.) *	115287	115288	115289	115290	115291
MP4 Det. Clevis (Alum.) *	115292	115293	115294	115295	115296
MT1 Head Trunnion (Alum.)	116357	116358			116361
MT2 Head Trunnion (Alum.)	116357	116358			116361



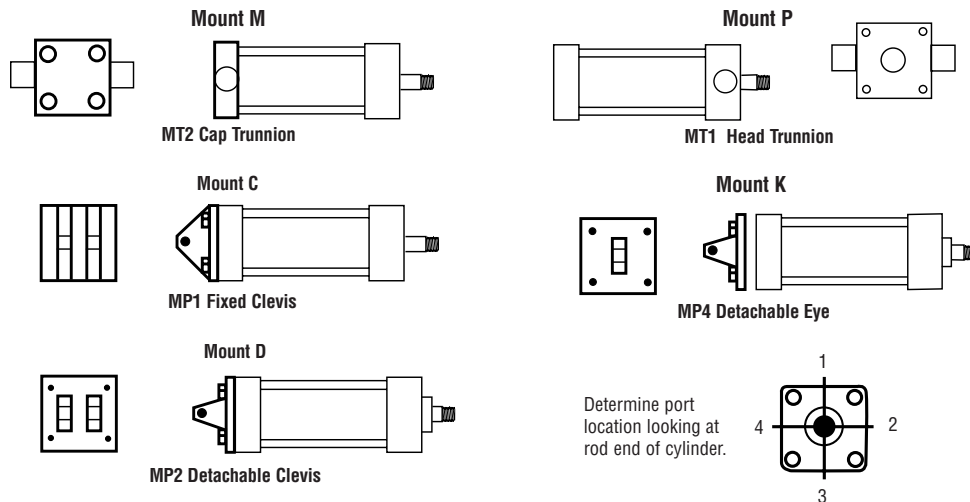
Above kits include all necessary hardware to complete mounting to Provenair cylinders. AN Series only.

\*Pivot pin included in kit. (Kits not available for 5", 6", 8", or 10" Bores) **(Kits not available for SN Models)**

#### MX1, 2 or 3 Tie Rod Extensions 117822-1 117822-2 117822-2 117822-3 117822-3

MX1 requires two tie rod extension bolt kits (four extension studs per kit). Extension bolts can only be used in female retaining bolt mounts: Use mounts 1, 2, 3 or contact factory for conversion kits.

#### Factory Installed Mounts

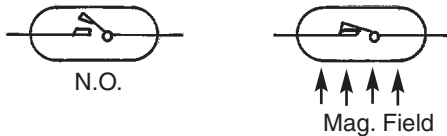


**Note:** Not all mounts are available on stainless steel models.

## Position Sensors (Switches)

### Reed Switches

Switch is normally open, load can be attached to BROWN or BLUE lead. The BROWN lead is the higher potential side of the switch. In a magnetic field, the two reeds are brought into contact to “make” the circuit. Reed switches have black, ‘two wire’ leads.

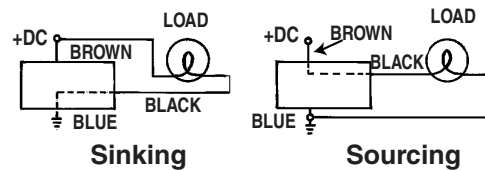


### Switch Mounting Brackets

Bore	Model Number
1-1/2"	119584
2", 2-1/2"	119585
3-1/4" & 4"	119586

### Hall Effect Switches

It is important to note that Hall Effect switches must always have current through them to work. In a magnetic field, the semiconductor generates a voltage across the sense leads. Removing the magnetic field returns the switch to its normally open state. Hall effect switches have ‘three wire’ leads. Black leads are sinking (NPN). Grey leads are sourcing (PNP). Load is controller.



There are two types of Hall Effect switches. Each is connected differently. Check your PLC for the input method used. Sinking (NPN) will sink current to ground. Sourcing (PNP) will provide current from the +VDC.

**Note:** Operating temperature is 14 - 140° F and the environmental rating is IEC IP 67 in all three switch types. Std. Red LED requires min 18 mA.

## Switch Specifications

Model Number	119581-1	119581-2	119581-3	119582-1	119582-2	119582-3	119583-1	119583-2	119583-3
Lead Length/Type	1m bare	3m bare	Plug	1m bare	3m bare	Plug	1m bare	3m bare	Plug
Lead Color	Black			Grey			Black		
Switch Type	REED			PNP(SOURCING)			NPN (SINKING)		
Input Voltage	100 VDC, 125 VAC Max.			10 - 30 VDC			5 - 30 VDC		
Operating Current	300mA (150mA Inductive)			7 - 100mA @ 12V 14 - 200mA @ 24V			5 - 100mA @ 5V 10 - 200mA @ 12V 20 - 200mA @ 24V		
Detecting Distance	2.5 mm			1.5 mm			1.5 mm		
Detecting Width	-			3.0 mm			3.0 mm		
Response Time	1 mSec. Min.			-			-		
LED Function	18mA Min.			1mA Min.			1mA Min.		

# Pneumatic Cylinders

## Provenair®

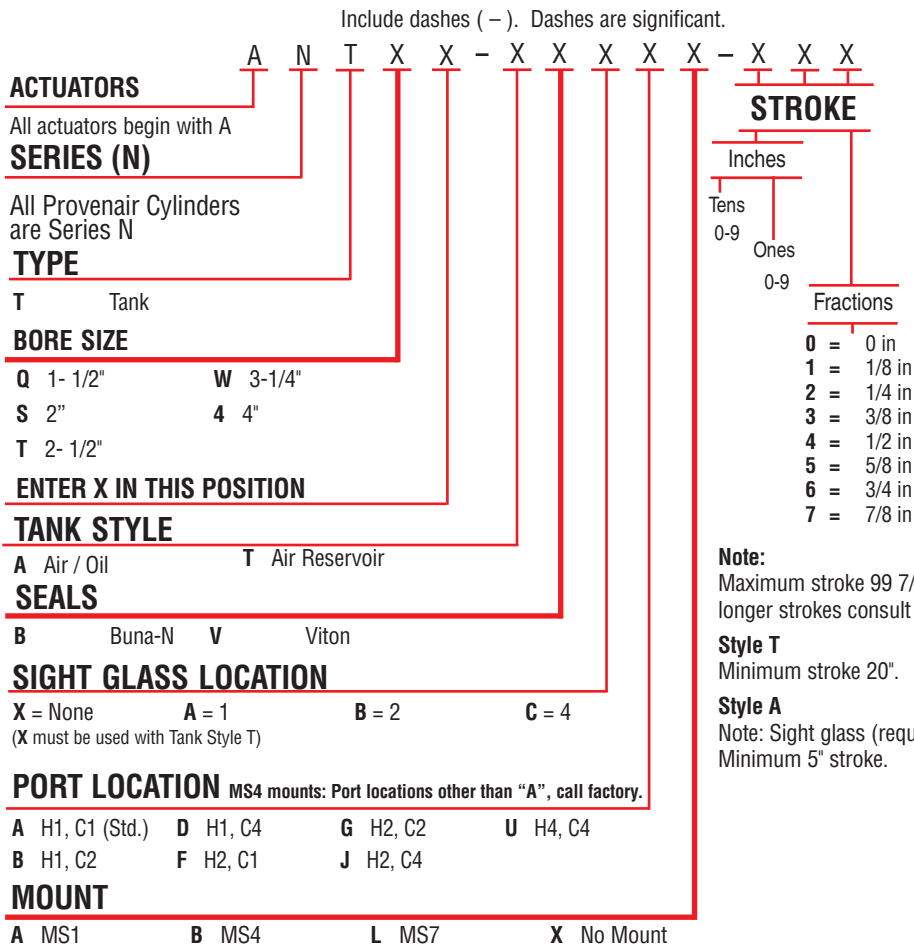
### Ordering

#### Tanks & Reservoirs (1-1/2" thru 4" Bore)

Two Provenair tank styles provide unique capabilities for your applications.

Style A, air-over-oil tanks provide the smooth control hydraulic systems are known for, without the expense, using shop air.

Style T reservoirs provide a supply of air near the point of use, allowing your system to use a smaller compressor or smaller system supply lines.



Sight glass available in Style A only



**Air/Oil Tank**  
250 P.S.I.



**Air Reservoir**

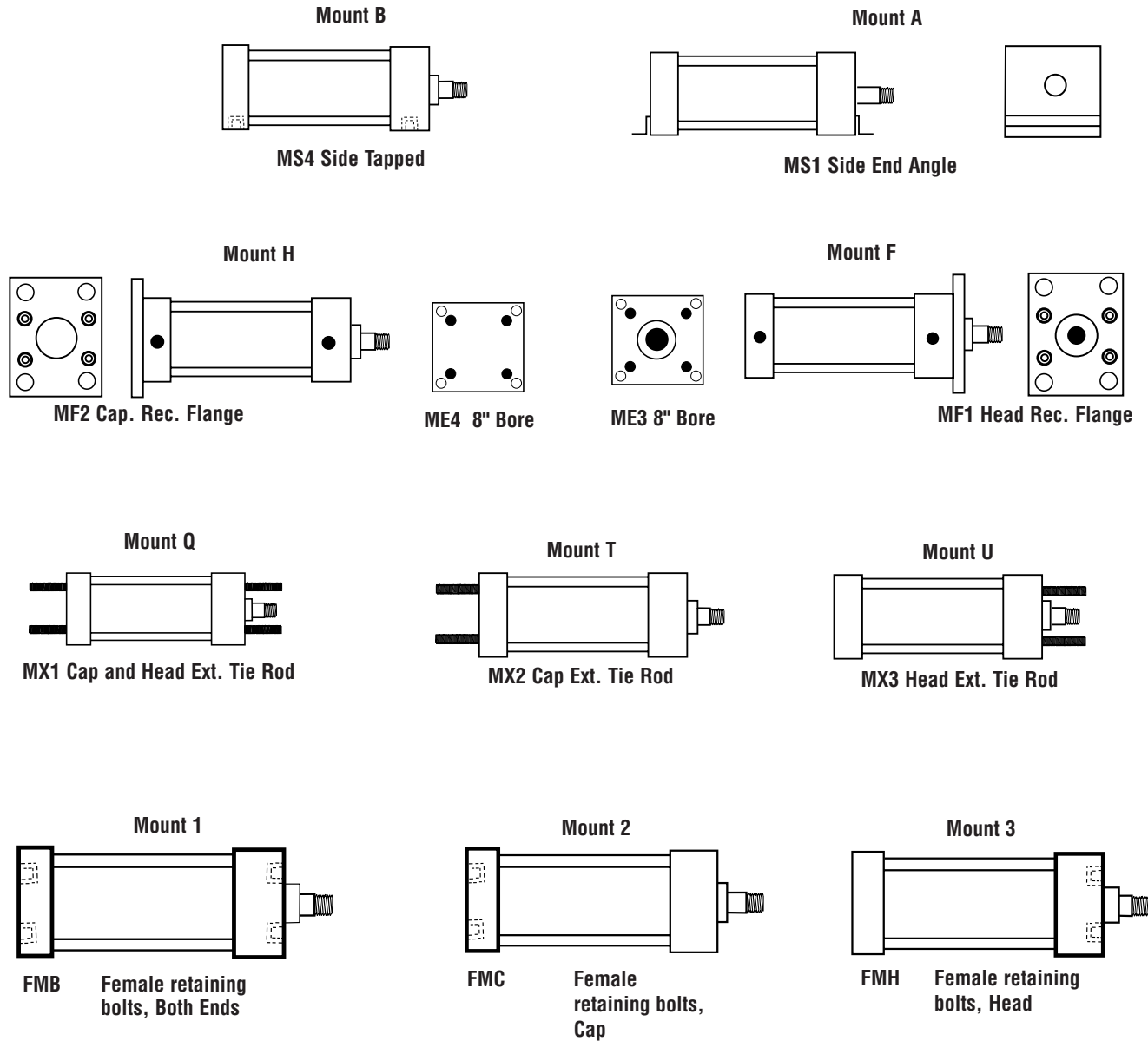
# Pneumatic Cylinders

## Provenair® - Dimensional Data

### Mounting Data

Series AN, SN (1-1/2" Thru 10" Bore)

Factory Installed Mounts



**Note:** Mounts H & F 8" and 10" bore cylinders use oversized end cap as shown (ME3 or ME4). A steel rectangular flange plate is used for all MF1 or MF2 (1 1/2 thru 6" bore).

**Note:** Not all mounts are available on stainless steel models (Series SN)

# Pneumatic Cylinders

## Provenair® - Dimensional Data

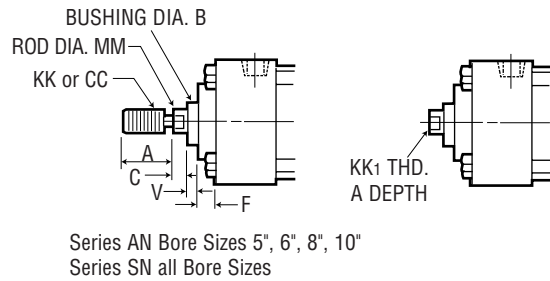
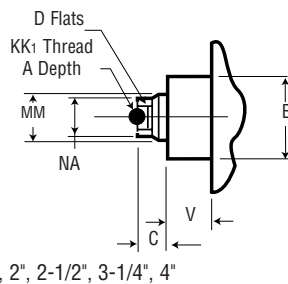
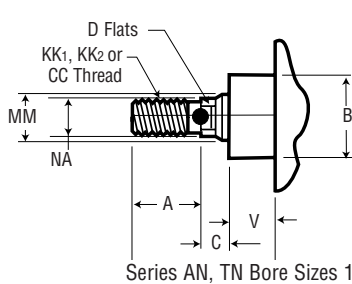
### Dimensional Data

Series AN, SN (Rod End)

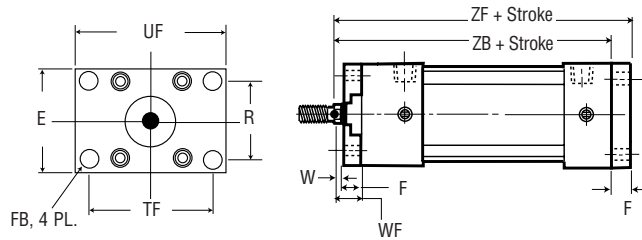
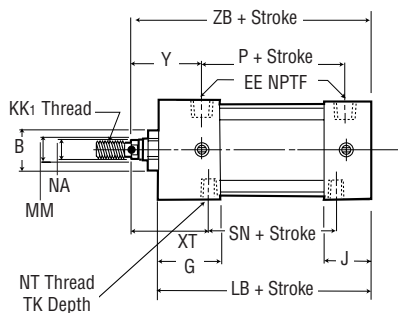
Rod End Dimensions for 1-1/2" – 10" Bore Sizes

	Cylinder Bore (Inches)						
	1-1/2, 2, 2-1/2	2, 2-1/2	3-1/4, 4	3-1/4, 4	5	5, 6, 8	6, 8, 10
Rod Diameter (Inches)	5/8	1	1	1-3/8	1	1-3/8	1-3/4
KK1 THD. ( M OR F)	7/16"-20	3/4"-16	3/4"-16	1"-14	3/4"-16	1"-14	1-1/4"-12
KK2 THD. (MALE)	1/2"-20	7/8"-14	7/8"-14	1-1/4"-12	7/8"-14	1-1/4"-12	1-1/2"-12
CC (MALE)	5/8"-18	1"-14	1"-14	1-3/8"-12	1"-14	1-3/8"-12	1-3/4"-12
A	.75	1.13	1.13	1.63	1.13	1.63	2.00
B	1.13	1.50	1.50	1.50	1.50	2.00	2.38
C	.38	.62	.48	.60	.50	.63	.75
D	.50	.88	.88	.81	.81	1.13	1.50
F	.325	.325	.625	.625	.625	.625	.625
MM	.625	1.00	1.00	1.00	1.00	1.375	1.75
V	.62	.75	.89	1.02	.25	.38	.38 *
	-	-	-	-	-	-	*(.50 on 10")

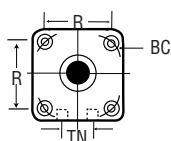
Selection of oversize piston rod affects the following dimensions: ZB, ZC, ZD, ZE, ZF, ZL, ZM, XC, XD, XE, XG, XJ, XS, XT, V, W, WF, C, V, LA. See rod end dimensions.



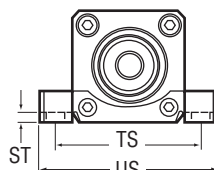
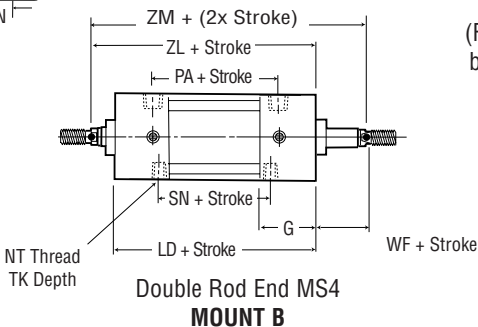
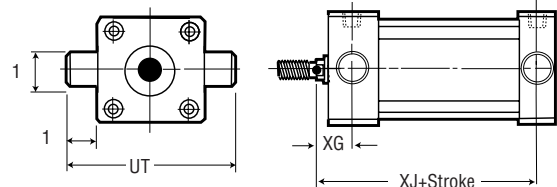
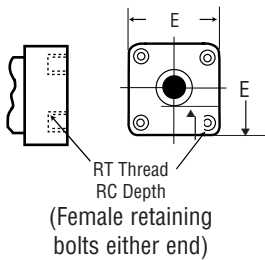
### Series AN, SN (With Standard Rod)



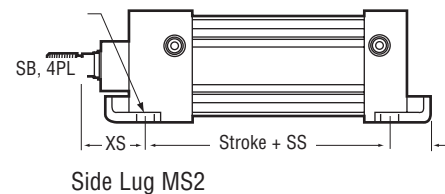
Rect. Flange – Head-MF1, Cap-MF2  
MOUNT F & H (1 1/2" - 4" BORE ONLY)



Side Tapped MS4  
MOUNT B



Head Trunnion MT1  
Cap Trunnion MT2  
MOUNT M & P



# Pneumatic Cylinders

## Provenair® - Dimensional Data

### Dimensional Data

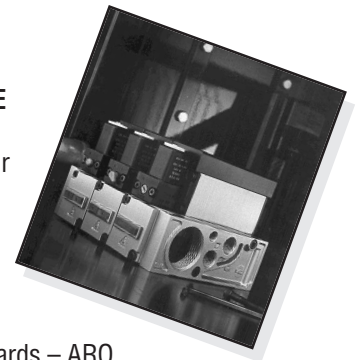
Series AN, SN (1-1/2" Thru 4" Bore w/standard rod)

	Cylinder Bore (Inches)				
	1-1/2	2	2-1/2	3-1/4	4
B	1.13	1.13	1.13	1.50	1.50
BC	2.02	2.60	3.10	3.90	4.70
E	2.00	2.50	3.00	3.75	4.50
EE	3/8-18	3/8-18	3/8-18	1/2-14	1/2-14
F	.38	.38	.38	.63	.63
FB	.31	.38	.38	.44	.44
G	1.44	1.44	1.44	1.69	1.69
J	.94	.94	.94	1.19	1.19
KK1 (thread)	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16
LB	3.62	3.62	3.75	4.25	4.25
LD	4.12	4.12	4.25	4.75	4.75
MM (rod dia.)	5/8	5/8	5/8	1.00	1.00
NA	.59	.59	.59	.97	.97
NT	1/4-20	5/16-18	3/8-16	1/2-13	1/2-13
P	2.25	2.25	2.38	2.62	2.62
PA	2.75	2.75	2.88	3.12	3.12
R	1.43	1.84	2.19	2.76	3.32
RC	.41	.538	.41	.599	.44
RT	1/4-28	5/16-24	5/16-24	3/8-24	3/8-24
SB	.38	.38	.38	.50	.50
SN	2.25	2.25	2.38	2.63	2.63
SS	2.88	2.88	3.00	3.25	3.25
ST	.56	.69	.81	1.00	1.19
SX	.34	.34	.34	.47	.47
SY1	1.34	1.53	1.53	2.13	2.19
SY2	.94	1.13	1.13	1.50	1.56
TF	2.75	3.38	3.88	4.69	5.44
TK	.38	.43	.69	.75	.75
TN	.63	.88	1.25	1.50	2.06
TS	2.75	3.25	3.75	4.75	5.50
UF	3.38	4.13	4.63	5.50	6.25
US	3.50	3.69	4.50	5.75	6.5
UT	4.00	4.50	5.00	5.75	6.50
W	.62	.62	.62	.75	.75
WF*	1.00	1.00	1.00	1.38	1.38
XG*	1.75	1.75	1.75	2.25	2.25
XJ*	4.12	4.12	4.25	5.00	5.00
XS*	1.38	1.38	1.38	1.88	1.88
XT*	1.94	1.94	1.94	2.44	2.44
Y*	1.94	1.94	1.94	2.44	2.44
ZB*	4.63	4.63	4.75	5.63	5.63
ZF*	5.00	5.00	5.12	6.25	6.25
ZL*	5.12	5.12	5.25	6.12	6.12
ZM*	6.15	6.15	6.27	7.52	7.52

\* Oversize piston rod option affects these dimensions.  
See rod end dimensions.

### MEETING THE STANDARDS.

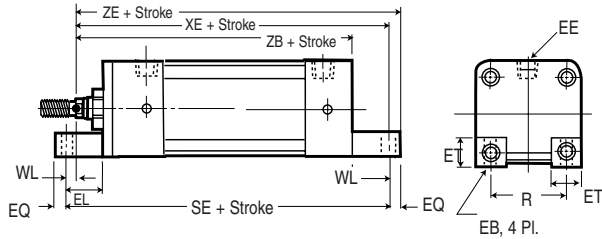
ARO Provenair Cylinders meet NFPA standards. Use valves that meet the highest standards – ARO Alpha and Genesis Valves. Alpha valves are available in body ported and sub-base configurations. Genesis valves are available in sub-base configuration only and have convenient “plug-into-the-base” electronics.



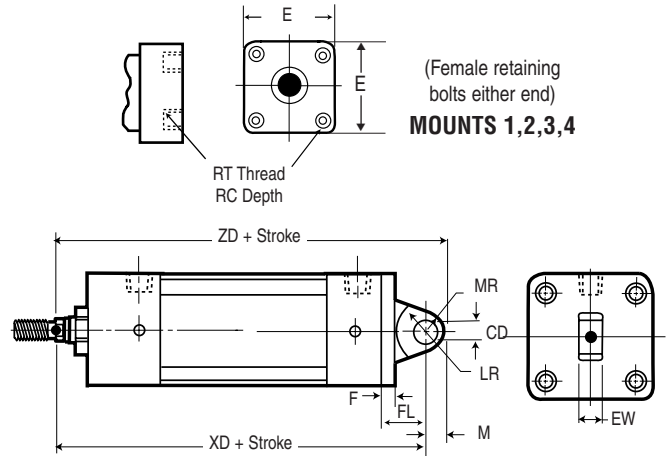
# Pneumatic Cylinders Provenair® - Dimensional Data

## Dimensional Data

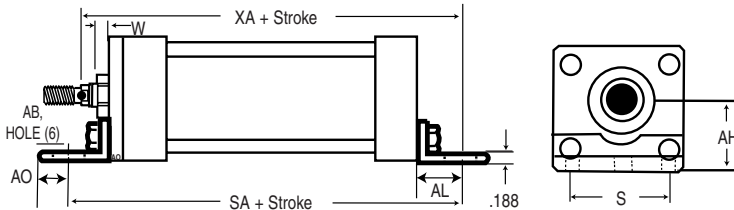
Series AN, SN (1-1/2" Thru 10" Bore w/standard rod)



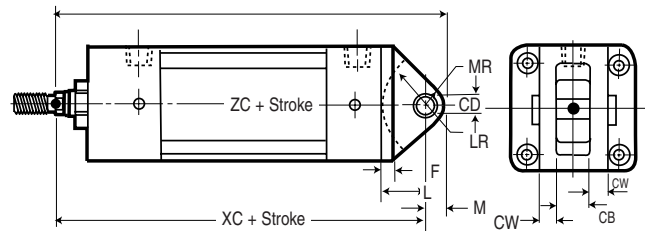
**Side End Lugs MS7  
MOUNT L**



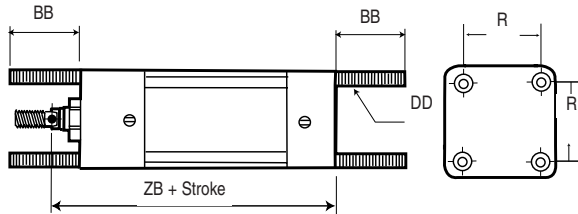
**Detachable Eye MP4  
MOUNT K**



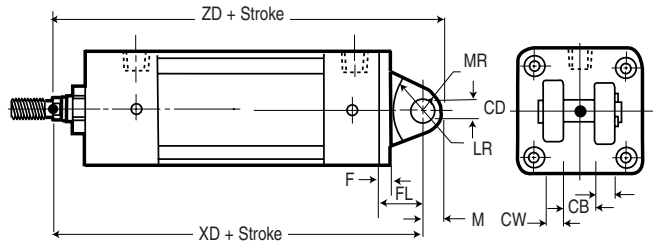
**Angle Mount MS1  
MOUNT A**



**Fixed Clevis MP1  
MOUNT C**



**Tie Rod Mounts  
MX1 Extended Both Ends      MX3 Extended Head End  
MOUNT Q, T & U**



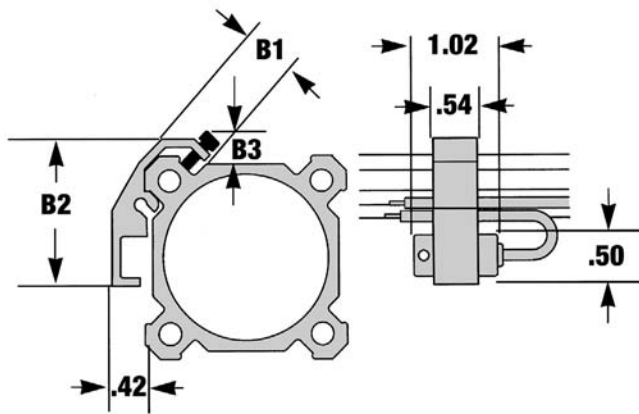
**Detachable Clevis MP2  
MOUNT D (AN Series only)**

## Dimensional Data Series AN (1-1/2" Thru 4" Bore w/standard rod)

	Cylinder Bore (Inches)					Cylinder Bore (Inches)					Cylinder Bore (Inches)						
	1-1/2	2	2-1/2	3-1/4	4	1-1/2	2	2-1/2	3-1/4	4	1-1/2	2	2-1/2	3-1/4	4		
AB	.38	.38	.38	.50	.50	EQ	.25	.31	.31	.38	.38	SE	5.50	5.88	6.25	6.63	6.88
AH	1.18	1.44	1.62	1.94	2.25	ET	.56	.69	.81	1.00	1.19	W*	.62	.62	.62	.75	.75
AL	1.00	1.00	1.00	1.25	1.25	EW	.75	.75	.75	1.25	1.25	WL	.14	.33	.45	.13	.25
AO	.38	.38	.38	.50	.50	F	.38	.38	.38	.63	.63	XA	5.62	5.62	5.75	6.88	6.88
BB	1.00	1.13	1.13	1.38	1.38	KK1 (Thread)	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16	XC*	5.38	5.38	5.50	6.88	6.88
CB	.75	.75	.75	1.25	1.25	FL	1-1/8	1-1/8	1-1/8	1-7/8	1-7/8	XD*	5.75	5.75	5.88	7.50	7.50
CD	.50	.50	.50	.75	.75	L	3/4	3/4	3/4	1-1/4	1-1/4	XE*	5.38	5.56	5.81	6.50	6.63
CW	.50	.50	.50	.63	.63	LR	3/4	3/4	3/4	1-1/4	1-1/4	ZB*	4.63	4.63	4.75	5.63	5.63
DD	1/4-28	5/16-24	5/16-24	3/8-24	3/8-24	M	5/8	5/8	5/8	7/8	7/8	ZC*	5.84	5.88	6.00	7.63	7.63
E	2.00	2.50	3.00	3.75	4.50	MR	.47	.50	.50	.75	.75	ZD*	6.22	6.25	6.38	8.25	8.25
EB	.28	.34	.34	.38	.38	R	1.43	1.84	2.19	2.76	3.32	ZE*	5.63	5.84	6.13	6.88	7.00
EE (NPTF)	3/8-18	3/8-18	3/8-18	1/2-14	1/2-14	S	1.25	1.75	2.25	2.75	3.50	* Oversize piston rod option affects these dimensions.					
EL	.75	.94	1.06	.88	1.00	SA	6.00	6.00	6.12	7.38	7.38						

# Pneumatic Cylinders Provenair® - Dimensional Data

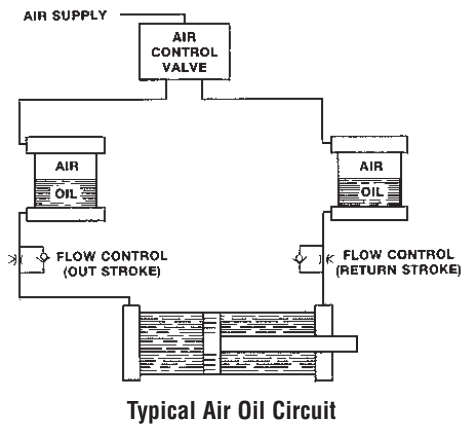
## Dimensional Data



Cylinder Bore (Inches)

	1 1/2"	2 & 2 1/2"	3 1/4" & 4"
B1	.51	.60	.80
B2	1.50	1.77	2.45
B3	.26	.26	.33

## Useable Volume Finder



Useable Volume Finder

	Bore	Style A	Style T
Q	1-1/2"	1.33	1.77
S	2"	2.36	3.14
T	2-1/2"	3.68	4.91
W	3-1/4"	6.22	8.29
4	4"	9.42	12.56

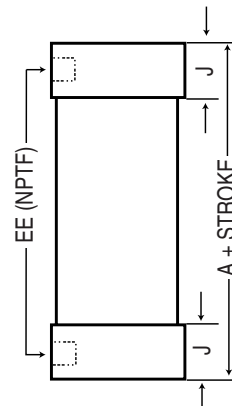
### Style T or A

Derive required circuit volume (V) in Cu. In.

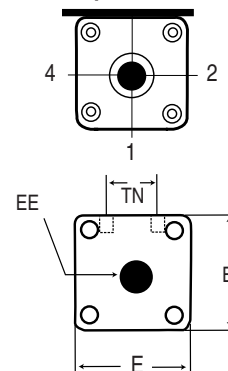
Divide (V) by factor from chart above to determine stroke (enter stroke value into model number).

Find unit length by adding stroke to dimension A from tank dimension table.

## Tank Dimensions



Determine port and sight glass locations looking at top of tank.



Fill Port available in Style A only

Tank Dimensions

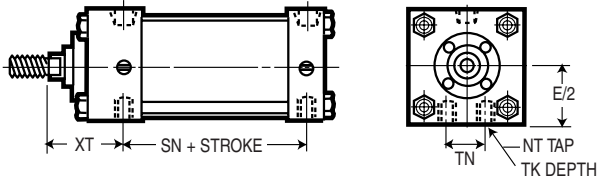
	BORE	A	J	TN	E	EE NPTF
Q	1-1/2"	2.005	0.94	0.63	2	3/8-18
S	2"	2.005	0.94	0.88	2.5	3/8-18
T	2-1/2"	2.005	0.94	1.25	3	3/8-18
W	3-1/4"	2.505	1.19	1.50	3.75	1/2-14
4	4"	2.505	1.19	2.06	4.5	1/2-14

# Pneumatic Cylinders

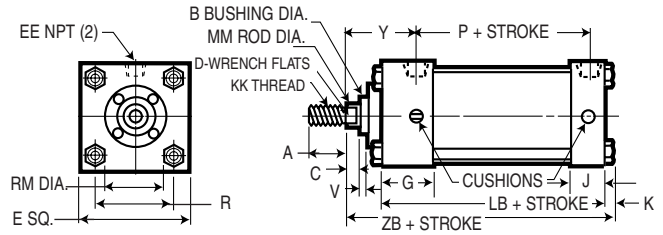
## Provenair® - Dimensional Data

### Dimensional Data

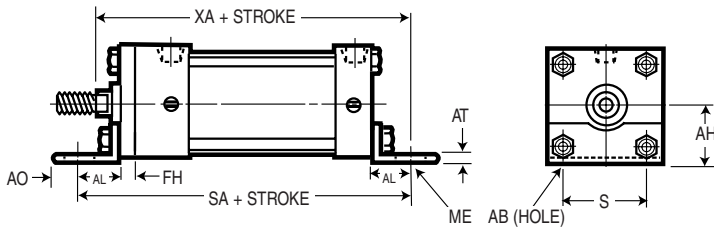
Series AN, SN (5",6",8" and 10" Bore)



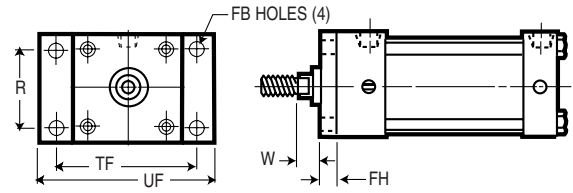
Side Tapped MS4



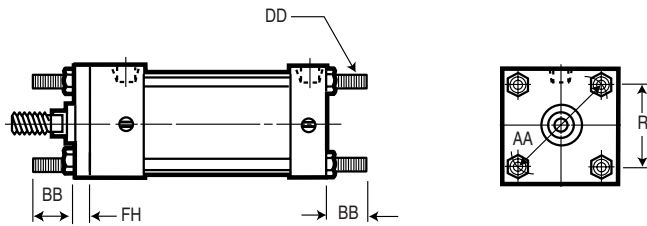
Basic Cylinder Dimensions



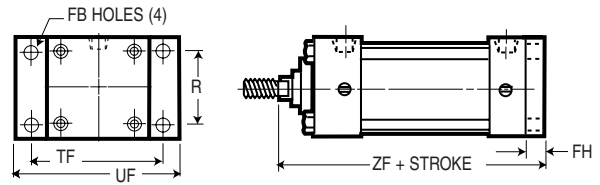
End Angle MS1



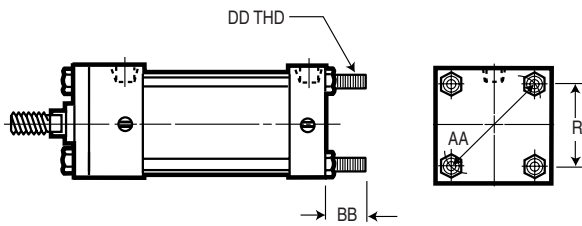
Head Rectangular Flange MF1



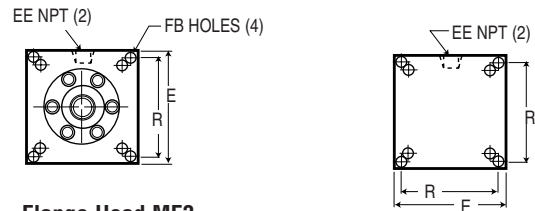
Tie Rods Extended Both Ends MX1



Cap Rectangular Flange MF2

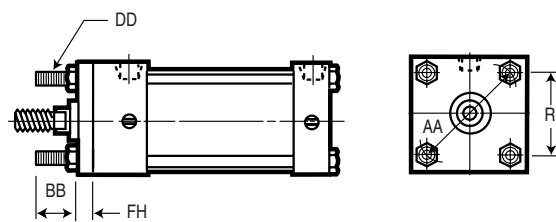


Tie Rods Extended, Cap End MX2



Flange Head ME3

Flange Cap ME4



Tie Rods Extended, Head End MX3

# Pneumatic Cylinders

## Provenair® - Dimensional Data

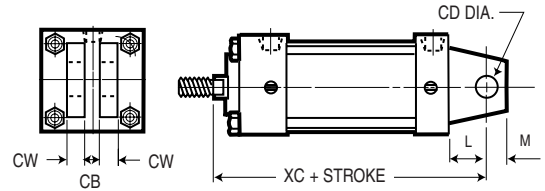
### Dimensional Data

#### Provenair Mounts

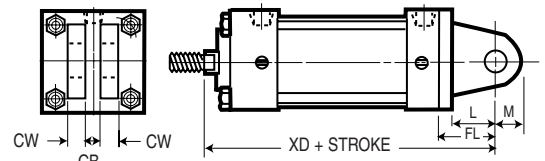
#### Series AN, SN (5", 6", 8", & 10" Bore)

ROD	CYLINDER BORE (INCHES)						
	5 1	5 1-3/8	6 1-3/8	6 1-3/4	8 1-3/8	8 1-3/4	10 1-3/4
A	1.13	1.63	1.63	2.00	1.63	2.00	2.00
AA	5.18	5.18	6.90	6.90	9.1	9.1	11.2
AB	.69	.69	.81	.81	.81	.81	—
AH	2.88	2.88	3.25	3.25	4.25	4.25	—
AL	1.38	1.38	1.38	1.38	1.81	1.81	—
AO	.63	.63	.63	.63	.69	.69	—
AT	.19	.19	.19	.19	.25	.25	—
B	1.50	2.00	2.00	2.38	2.00	2.38	2.38
BB	1.81	1.81	1.81	1.81	2.31	2.31	2.69
C	.50	.63	.63	.75	.63	.75	.75
CB	1.25	1.25	1.50	1.50	1.50	1.50	2.00
CD	.75	.75	1.00	1.00	1.00	1.00	1.38
CW	.63	.63	.75	.75	.75	.75	1.00
D	.81	1.13	1.13	1.50	1.13	1.50	1.50
DD	1/2"-20	1/2"-20	1/2"-20	1/2"-20	5/8"-18	5/8"-18	3/4"-16
E	5.50	5.50	6.50	6.50	8.50	8.50	10.63
EE(NPTF)	1/2	1/2	3/4	3/4	3/4	3/4	1.00
F	.63	.63	.63	.75	.63	.75	.63
FB	.56	.56	.56	.56	.69	.69	.81
FH	.63	.63	.75	.75	—	—	.63
FL	2.13	2.13	2.25	2.25	—	—	—
G	1.75	1.75	2.00	2.00	2.00	2.00	2.25
J	1.25	1.25	1.50	1.50	1.50	1.50	2.00
K	.44	.44	.50	.50	.63	.63	.69
KK1 THREAD	3/4-16	1-14	1-14	1-1/4-12	1-14	1-1/4-12	1-1/4-12
L	1.25	1.25	1.50	1.50	1.50	1.50	2.13
LB	4.25	4.25	5.00	5.00	5.13	5.13	6.38
LD	4.75	4.75	5.50	5.50	5.63	5.63	6.63
M	.88	.88	1.00	1.00	1.00	1.00	1.38
MM	1	1-3/8	1-3/8	1-3/4	1-3/8	1-3/4	1-3/4
NT	5/8"-11	5/8"-11	3/4"-10	3/4"-10	3/4"-10	3/4"-10	1-8
P	2.63	2.63	3.00	3.00	3.13	3.13	4.31
R	4.10	4.10	4.88	4.88	7.57	7.57	9.92
RM	2.63	3.38	3.38	3.50	3.38	3.50	3.50
S	4.25	4.25	5.25	5.25	7.13	7.13	7.13
SA	7.63	7.63	8.50	8.50	8.75	8.75	—
SN	2.88	2.88	3.13	3.13	3.25	3.25	4.13
TD	1.00	1.00	1.38	1.38	1.38	1.38	—
TF	6.63	6.63	7.63	7.63	7.57*	7.57*	—
TK	1.00	1.00	1.13	1.13	1.13	1.13	1.50
TL	1.00	1.00	1.38	1.38	1.38	1.38	—
TN	2.69	2.69	3.25	3.25	4.50	4.50	5.50
UF	7.63	7.63	8.63	8.63	—	—	—
UT	7.50	7.50	9.25	9.25	11.25	11.25	—
V	.25	.38	.38	.38	.38	.38	.50
W	.75	1.00	.88	1.13	1.63	1.88	1.88
XA	7.00	7.25	8.00	8.25	8.56	8.81	—
XC	6.88	7.13	8.13	8.38	8.25	8.50	10.38
XD	7.75	8.00	8.88	9.13	—	—	—
XG	2.25	2.50	2.63	2.88	2.63	2.88	—
XJ	5.00	5.25	5.88	6.13	6.00	6.25	—
XT	2.31	2.56	2.81	3.06	2.81	3.06	3.13
Y	2.44	2.44	2.88	2.88	2.88	2.88	3.00
ZB	6.06	6.31	7.13	7.38	7.38	7.63	8.94
ZF	6.50	6.75	7.38	7.63	6.75	7.00	8.25
ZM	7.75	8.25	8.75	9.25	8.88	9.38	10.63

\* R Dimension on 8" bore.

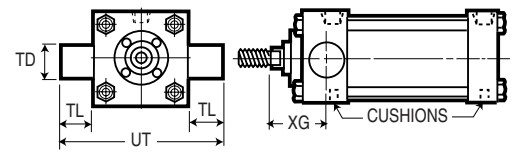


**Fixed Clevis MP1**

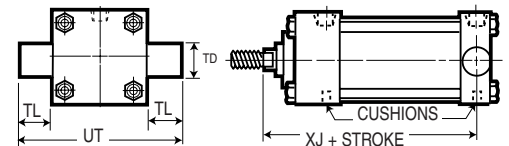


**Detachable Clevis MP2**  
(Not available on 6 or 8-inch bore)

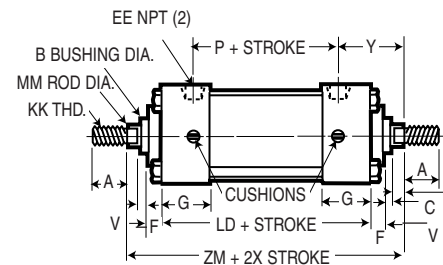
**Cap Rectangular Flange MF2**



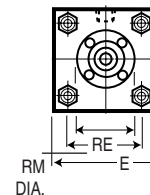
**Head Trunnion MT1**



**Cap Trunnion MT2**



**Double Rod End**



# Pneumatic Cylinders

## Provenair® - Dimensional Data

### Accessories

Series AN (5/8" thru 1-3/4" Rod)

#### Socket Head Rod Studs

	ROD DIAMETER (INCHES)			
	5/8	1	1-3/8	1-3/4
	Stud Thread	Stud Thread	Stud Thread	
	Part Number	Part Number	Part Number	
KK1	7/16"-20 x 3/4"	3/4"-16 x 1-1/8"	1"-14 x 1-1/8"	-
	117812-101	117812-201	117812-301	
KK1 (2 x length)	7/16"-20 x 1-1/2"	3/4"-16 x 2-1/4"	1"-14 x 2-1/4"	-
	117812-121	117812-221	117812-321	
KK2 (1st oversize)	1/2"-20 x 3/4"	7/8"-14 x 1-1/8"	1-1/4"-12 x 1-5/8"	-
	117812-102	117812-202	117812-302	
CC Full (2nd oversize)	5/8"-18 x 3/4"	1"-14 x 1-1/8"	1-3/8"-12 x 1-5/8"	-
	117812-103	117812-203	117812-303	

	Rod Thread			
	7/16-20	3/4-16	1-14	1-1/4-12
ROD CLEVIS KIT (includes pin)	116183	116046	116049	116052
ROD EYE KIT	116184	116047	116050	116053
CLEVIS PIN	115299	115300	-	-
PIVOT PIN	-	-	116048	116051

**Mating parts to rod end accessories and mounting brackets**

Clevis Bracket (Iron)	-	117206-5	117206-6	-
Eye Bracket (Iron)	-	117205-5	117205-6	-

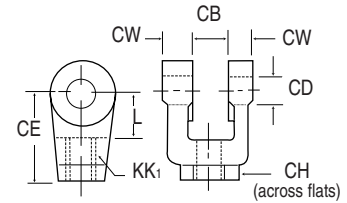
### Dimensional Data

#### Rod Eye, Rod Clevis and Pin

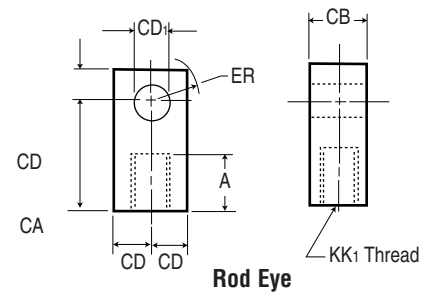
A	.75	1.13	1.63	2.00
CA	1.50	2.06	2.81	3.44
CB	.75	1.25	1.50	2.00
CD	.50	.75	1.00	1.38
CD1	.44	.75	-	-
CE	1.50	2.38	3.13	4.13
CH	1.00	1.25	1.50	2.00
CW	.50	.63	.75	1.00
ER	.72	1.06	1.00	1.38
HP	.156	.156	-	-
KK1	7/16-20	3/4-16	1-14	1 1/4-12
L	.75	1.25	1.50	2.13
LH	2.25	3.13	3.75	5.00
LP	2.1	2.75	3.25	4.50

#### Mating parts to rod end accessories and mounting brackets

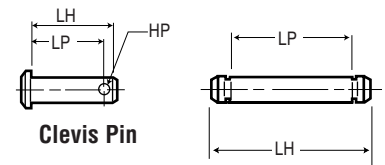
BA	-	2.56	3.25	-
CB	-	1.25	1.50	-
CD	-	.75	1.00	-
CW	-	.63	.75	-
DD DIA.	-	.53	.66	-
DD TAP	-	1/2-20	5/8-18	-
E	-	3.50	4.50	-
F	-	.63	.75	-
FL	-	1.88	2.25	-
M	-	.75	1.00	-



Rod Clevis



Rod Eye

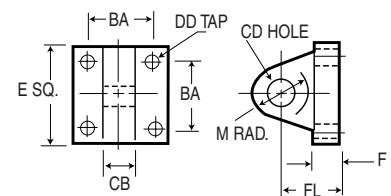


Clevis Pin

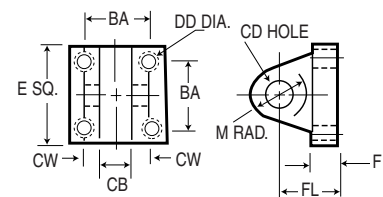


Pivot Pin

Use for Both Pins



Eye Bracket\*



Clevis Bracket\*

\* These accessory brackets attach to mating cylinder mounts. See Cylinder Mounting Dimensions on page 129.

# Pneumatic Cylinders

## Repair Kits

### Ordering

#### Repair Kits (Single Rod End Rod Bushings)

	Cylinder Bore Size (Inches)								
	1-1/2	2	2	2-1/2	2-1/2	3-1/4	3-1/4	4	4
Rod Diameter	5/8	5/8	1	5/8	1	1	1-3/8	1	1-3/8
Series AN Bushing	119454	119455	119456	119455	119456	119457	119458	119457	119458
Series SN Bronze Bushing	114171	114171	114172	114171	114172	114172	114173	114172	114173

	Cylinder Bore Size (Inches)								
	5	5	6	6	8	8	10	10	
Rod Diameter	-	1	1-3/8	1-3/8	1-3/4	1-3/8	1-3/4	1-3/4	2
Series AN Bushing	-	115074	115075	115075	115076	115075	115076	115076	114130
Series SN Bronze Bushing	-	114172	114173	114172	114173	114173	114174	114174	114175

Order two kits for double rod end cylinders.

#### Micro-Air Series 01 (Seal Kits)

Bore Size	1/2	3/4	1-1/8
	7150	7151	7152

#### Seal Kits (Economair Series)

##### Cylinder Model Number

EXAMPLE: **28 20 - 5 3 09-040**

To order a repair kit, 1) Obtain model number from label on cylinder. 2) Write "RK" for Repair Kit and 3) Using number from cylinder label, construct proper kit number as directed below.

Order Kit No.:

**RK 24 20 - 1 3**

Only these numbers are used.

For All Models Write in RK

##### BORE SIZE

Take bore size from model number:  
**18, 15, 20, 25, 30 or 40.**

##### CYLINDER TYPE

If 1, 3, 4, 5, 6, or 7, write **1**.  
If 2, write **2**.

##### PACKING

Take packing identifier from model number: **0, 2, 3, 4, 5, 6, or 8**

##### SERIES NUMBER

If 23, (Noncushion), write **23**  
If 24 (Cushion), 27 (Cushion, Pin Actuated), or 28 (Cushion, Magnetic) write **24**

#### Reciprocating Assembly (Economair Series)

##### Cylinder Model Number

EXAMPLE: **28 20 - 2 3 8 9-040**

To order a reciprocating assembly, 1) Obtain model number from label on cylinder. 2) Write "RA" for reciprocating assembly and 3) Using number from cylinder label, construct proper assembly number as directed below.

Order Assembly No.:

**RA 24 20 - 2 0 8 - X X X**

Only these numbers are used.

For All Models Write in RA

##### BORE SIZE

Take bore size from model number: **18, 15, 20, 25, 30 or 40.**

##### CYLINDER TYPE

If 1, 3, 4, 5, 6, or 7, write **1**.  
If 2, write **2**.

##### PACKING

Take packing identifier from model number: if **0 or 3** write **0**  
if **2**, write **2**  
if **4, 5 or 6** write **4**

##### ROD MATERIAL PACKING

0 Standard Chrome  
8 Stainless Steel

##### SERIES NUMBER

If 23, (Noncushion), write **23**  
If 24 (Cushion), 27 (Cushion, Pin Actuated), write **24**  
If 25 (Bumper) or 29 (Bumper, Magnetic), write **25**  
If 28 (Magnetic), write **28**

EXAMPLE RECIPROCATING ASSEMBLY MODEL NUMBER:

**RA 24 20 - 2 0 8 - 0 4 0**

Supplies a stainless steel rod with 2" O-ring piston for a double rod end, 4" stroke.

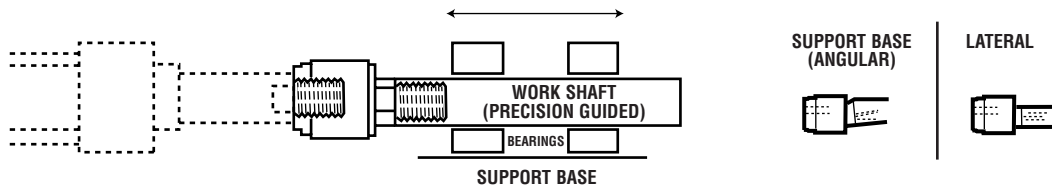


# Pneumatic Cylinders

## Rod Alignment Cylinders

### Features

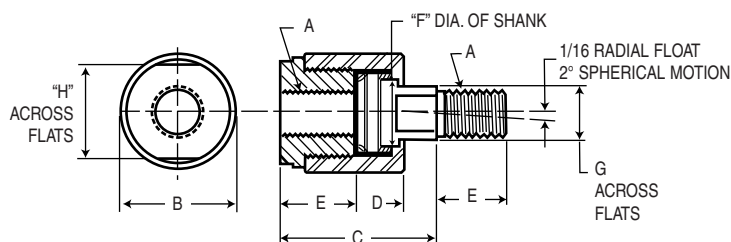
- Slide applications no longer require costly precision cylinder machining for mounting fixed or rigid guide.
- Friction due to misalignment is eliminated, increasing cylinder efficiency.
- An angular error of 2° and 1/16 inch lateral misalignment on push and pull stroke is compensated.
- Cylinder and component wear is reduced, providing increased reliability.
- Field alignment problems are rectified.
- All components are heat treated for improved corrosion resistance, wear resistance, and fatigue properties.



### Ordering

Coupler Number	Dimensions								Max. Pull At Yields (Pounds)
	A	B	C	D	E	F	G	H	
118683	3/8-16	.875	1.25	.25	.625	.313	.313	.75	5,000
118684	7/16-20	1.25	2.00	.50	.75	.625	.50	1.00	10,000
118685	1/2-20	1.25	2.00	.50	.75	.625	.50	1.00	14,000
118686	1/2-13	1.25	2.00	.50	.75	.625	.50	1.00	14,000
118687	5/8-18	1.25	2.00	.50	.75	.625	.50	1.00	19,000
118688	3/4-16	1.75	2.31	.50	1.125	.97	.813	1.50	34,000
118689	3/4-10	1.75	2.31	.50	1.125	.97	.813	1.50	34,000
118690	7/8-14	1.75	2.31	.50	1.125	.97	.813	1.50	39,000
118691	1-14	2.50	2.94	.50	1.625	1.375	1.16	2.25	64,000
118692	1-8	2.50	2.94	.50	1.625	1.375	1.16	2.25	64,000
118693	1-1/4-12	2.50	2.94	.50	1.625	1.375	1.16	2.25	78,000
118694	1-3/8-12	2.50	2.94	.50	1.625	1.375	1.16	2.25	78,000
118695	1-1/2-12	3.25	4.375	.812	2.25	1.375	1.50	3.00	134,000

### Dimensional Data



# Warnings

## General Information

### Warnings

#### Harmful Compressor Oils & Other Materials

Some oils used in air compressors contain chemicals harmful to Buna-N seals, if not adequately filtered at the compressor. The most common of these oils, in addition to other harmful material, are listed below.

COMPRESSOR OILS	COMPRESSOR OILS	OTHER MATERIALS
Cellulube No. 150 & 220	Phrano	Garlock No. 98403 (Polyurethane)
Haskel No. 568-023	Pydraul AC	Parco No. 3106 (Neoprene)
Houghton & Co. Oil No. 1120, No. 1130, No. 1055	Sears Regular Motor Oil	Some Loctite Compounds
Houtosafe 1000	Sinclair Oil "Lily White" (Polyurethane)	Stillman No. SR269-75
Kano Kroil	Skydrol	Stillman No. SR513-70 (Neoprene)
Keyston Penetrating Oil No. 2 & No. 500 Oils	Tenneco Anderol No. 495	
Marvel Mystery Oil		

**CAUTION: Compounded oils containing graphite and fillers are not recommended for use with cylinders.**

#### Air & Lubrication Requirement

**AIR PRESSURE:** Limited to 200 psig (14 bar) **FILTRATION:** 40 Micron. Proper moisture removal and filtration of contaminates will promote good service life and operation. Install an air regulator to control the operating pressure, insure smooth operation and conserve energy.

**LUBRICATION:** All valve components have been lubricated at the factory and can be operated without additional air line lubrication. Minimal lubrication may extend the life of the valve. 50 Series, E-Series and K-Series Valves use o-ring seals. For maximum performance and life expectancy, standard air line lubrication should be used. If air line cylinders or other air line devices, used in conjunction with ARO valve, require lubrication, be sure the lubricating oils used are compatible with the valve seals and are of sufficient viscosity to assure adequate lubrication.

ARO recommends an oil lubricant with a viscosity of 100-200 SUS at 100° F and an airline point above 200° F.

**NOTICE:** The use of compound oils containing graphite filters, extremely low viscosities and other non-fluid lubricants is not recommended. **RECOMMENDED:** ARO 29665 air line lubricator oil is available in one quart containers.

#### Warning

The following are hazards or unsafe practices which could result in severe personal injury, death or substantial property damage. Heed the following. Use safeguards. Insure that provisions are made to prevent the valve from being accidentally operated (actuated.)

**Hazardous Air Pressure.** Shut off, disconnect and relieve any trapped air pressure from system before performing service or maintenance.

**Hazardous Voltage.** Do not attempt any service without disconnecting all electrical supply sources.

**NOTICE:** Genesis Series Valves must be grounded.

Do not use the valve as a safety device or to operate or control the operation of full revolution clutch systems or brake systems on power presses or similar equipment. These valves are not intended for such applications. Do not subject the valve to any condition that exceeds the limits set forth in the specifications for a particular valve model. Keep all hoses, electrical wiring, fittings and connections in good working condition. Damaged air pressure hoses, electrical wiring, or connections, could cause accidental valve operation (actuation). Only allow qualified technicians to install or maintain the valve system. It is necessary to have a thorough understanding of the operation and application of all valves being used in a particular system and how they interact with the other components of the system.

#### General Information

To obtain information or to receive technical literature for specific valves: contact ARO Customer Service at (800) 495-0276 or contact your nearest ARO distributor. Selected parts are provided in kit form. The ARO Parts List/Service Instructions contain Repair Kit information and complete Service

Parts information and are available upon request. Order Manuals as shown. The following Operator's Manuals are available.

Operator's Manual	Part Number
ALPHA SERIES	119999-015
CAT SERIES	119999-036
E SERIES	119999-034
GENESIS SERIES	119999-021
H SERIES	119999-037
K SERIES	119999-035
50 SERIES	119999-045

# Cylinders Warranty

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## Five Year Product Warranty

The ARO Cylinders, in this catalog are backed up by our famous 5-year warranty, as a measure of the confidence we place in the quality of these products. A confidence that you can share.

### **FIVE-YEAR WARRANTY**

IR/ARO warrants to the original use purchaser of IR/ARO manufactured cylinders that IR/ARO will repair or replace, free of charges, including return shipping costs within the Continental United States of America, any such product which under normal use and service proves defective in material or workmanship, as determined by IR/ARO Inspection, within FIVE YEARS from date of shipment from IR/ARO, provided the claimed defective product, or part thereof, is promptly returned to the IR/ARO factory or IR/ARO authorized warranty repair center with transportation prepaid.

This warranty does not cover failure of parts or components due to normal wear or damage, which in the judgment of IR/ARO, arises from misuse, abrasion, corrosion, negligence, accident, substitution of non-IR/ARO parts, faulty installation or tampering.

If IR/ARO Inspection discloses no defect in material or workmanship, repair or replacement and return will be made at customary charges.

This warranty covers IR/ARO manufactured products shipped on or after July 4, 1988.

Equipment not covered by IR/ARO warranty: accessories or components of equipment sold by IR/ARO that are not manufactured by IR/ARO (such as switches, hoses, gasoline engines, etc.) are subject to the warranty, if any, of their manufacturer. IR/ARO will provide the purchaser with reasonable assistance in making such claims.

The foregoing warranty supersedes, voids and is in lieu of all or any other warranties, express or implied, and no warranty or merchantability or fitness for particular purpose is intended or made. IR/ARO's sole obligation and the original use purchaser's sole remedy is as stated above and in no event shall IR/ARO be liable for any special, direct, indirect, incidental, consequential or other damages, or expenses of any nature including, without limitation, loss of profits or production time incurred by the original use purchaser or any other party.