

# Pneumatic Valves and Cylinders

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Pneumatic & Hydraulic Tool Distributor

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# Get in the **IR ARO** ZONE

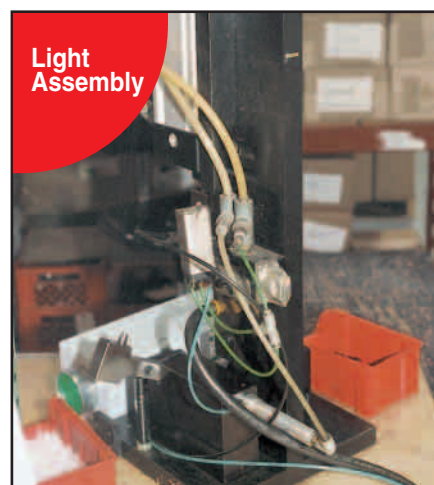
Where Process  
and Product  
Converge  
to Achieve  
Optimum  
Results.

## Welcome to the ARO® Zone.

The place where your production processes and our engineered products “converge to achieve optimum results”. But beyond process and product there is a third essential element that makes the “zone” a very real place: the ARO Fluid Power Distributor. To make the leap from acceptable to optimum results it takes in-depth, working knowledge of both process and product. Your ARO Fluid Power Distributor knows both, and it's this knowledge and expertise, not hype, that will usher you and your operation into this new dimension of productivity. The ARO-Zone. . . get into it!



Module/Air 2000 Regulator and Stacking ALPHA Valves control Provenair Cylinders in a metal fab shop



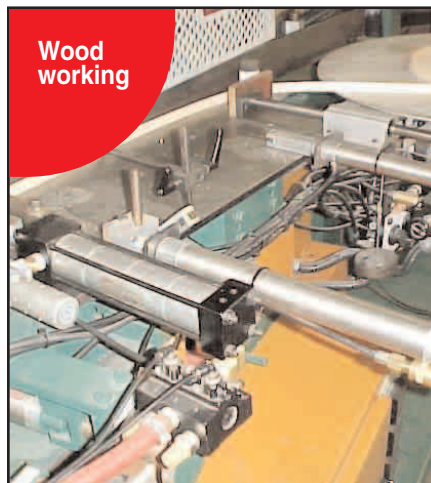
Provenair and Microair Cylinders used to join plastic components.





Secondary Operation

Device inserts metal bolts into plastic components



Wood working

Alpha Valves control cylinders on a banding mechanism



Operator Safety

Two-hand Anti-Tie Down keeps operators hands clear of clamp and press assembly operation



Commercial Laundry

Valves on a laundry sorter operate under high ambient heat/humidity conditions



Commercial Laundry



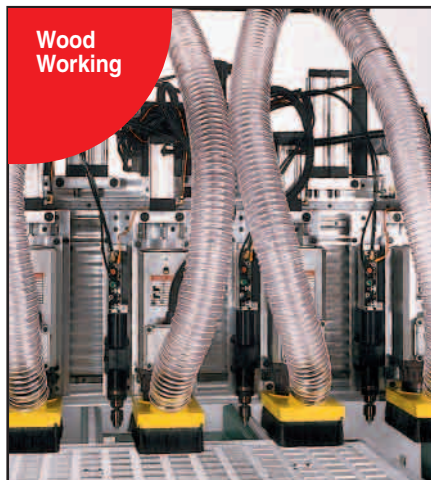
Packaging

Economair Cylinder (enclosed) removes underweight product from line.



Tube Bending

Provenair Cylinders used on a tube bending fixture



Wood Working

Provenair Cylinders advance routers on this automated machine



Flow Control

Model FO2 flow control is adjusted to control cylinder retract speed

# Numeric Index



Number	Page	Number	Page	Number	Page	Number	Page
<b>VALVES</b>		59760-XX	78	118597-XXX	79	CDW-30	73
103-X	64	59761-XX	78	<b>Number</b>	<b>Page</b>	<b>Number</b>	<b>Page</b>
105-X	64	59762-XX	78	118598-XXX	79	CHL-XXX	73
109-X	64	59764-4	78	11860X-X	29	CHL6-XXX	19
200	62	59765-XXX	78	118612	29	CHW	73
225-X	63	59801	77	118618	29	CHW6	19
400-X	65	59802	77	118778	35	CHW-30	73
401-X	65	59808	76	118785	35	CPXX-B	72
402-X	65	59809	76	118786	35	CSL-XXX	73
447	65	59836	77	118787	35	CSL6-XXX	19
448	65	59860	75	118790	37	CSN	73
449	65	59861	75	118791	37	CSN6	19
450	65	59903	78	11880X-X	35	CSN-30	73
46X-X	66	59905	78	118818-X	37	EXXXXX-XXX-X	49
600-X	72	59906	78	11882X-X	79	EV 30-A	67
5030-XX	45	59908	78	118823	79	EV 35-A	67
5040-XX	45	59917	75	118824	79	EV 125	67
7000	79	104094	71	118843-X	36	EV 250	67
7006	80	104096	71	119209	37	EV 375	67
7007	80	104104-XXX	71	119212-XX	79	FXX-BK	72
7008	80	114054	78	119213	79	GMN1X5	36
7010	80	1141XX-XX	19	119219-XXX	37	GP1XXX-XXX-X	34
7012	80	114772-XX	73	119230	29	GMP1XX-XXX-X	34
7102	80	115046-XX	73	119231	29	GSN125	36
7103	80	115064-XX	73	119243	45	GSN135	36
9600	67	115422-1	29	119244	45	GX1XXX-XXX-X	79
13111	45	115455-1	29	119245	45	HXXXXX-XXX-X	59
20167	50	116153	50	119306	29	KXXXXX-XXX-X	55
20172	50	116218-XX	73	119307-XXX	70	MKN	28
20192	68	116345-X	41	119308-XXX	70	MKP	28
20308-X	69	116464	29	119309-XXX	70	M2XXXX	25/64/131
20311-X	69	116572	80	119310-XXX	70	M21XXX-XXX-X	20
20312-X	69	116573	79	119350	14	M26M02-XX	21
20313-X	69	116574	80	119351	14	M30M03-XX	21
20370	68	116575	79	119352-X	14	M34M04-XX	21
20467	68	116578	79	119353-X	14	M5XXXX	25
20965-X	49	116579	79	119354	14	M81XXX-XXX-X	17
20973-X	66	116647-XX	73	119355	14	MP3651-2	45
20975	66	116702	79	119356	14	MXXMB	25
24125	67	116737	56	11936X	13	NXX-BK	72
24130	67	116738	56	119375	14	PTN	28
24135	67	116772	78	119376	14	PEN	28
37013	56	116773	78	119378-XX	73	PPN	28
37112	56	116737	56	119395	14	PR-10	67
59003-842	76	116738	56	119397	36	RK21X-XX	79
59095-X	77	116807	28	119398	37	S5XXXX	9/11
59191	76	116808	28	119416	37	SML51N-XX	9
59463-X	78	116809	28	119422	37	SMH51X-XX	11
59474-XXX	78	116862-1	29	119605	65	SML8W-XX	17
59482	78	116899-1	29	119690-XX	73	SSV2XX	127
59629	78	116904-1	29	119698-X	43	SV10-B	68
5963X-100	78	116916-1	29	119714-XX	11	SV20-B	68
59632-1	41	116917-1	29	119715-XX	11	<b>CYLINDERS</b>	
59634	78	116926-1	29	119743	35	01XX-X0XX-0XX	86
59636	78	117987	28	AXXXXX-XXX-X	27	2XXX-XXXX-XXX	102
59690-004	78	118154-XX	73	CATXXX-XXX-X	41	SXXX-XXX-XXX	89
59756-XXX	78	118563-X	37	CBW	73	ANXXX-XXXXX-XXX	107
59757-XXX	78	118565-X	37	CDN	73	SNXXX-XXXXX-XXX	110
59759-XX	78	118573-XX	37	CDL-XXX	73		
				CDW	73		



# Pneumatic Cylinders and Accessories

Get in the  
**Z**  **ONE**

# 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.

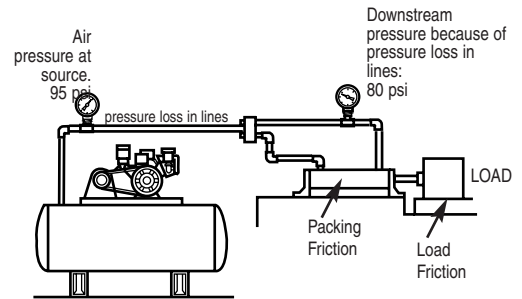
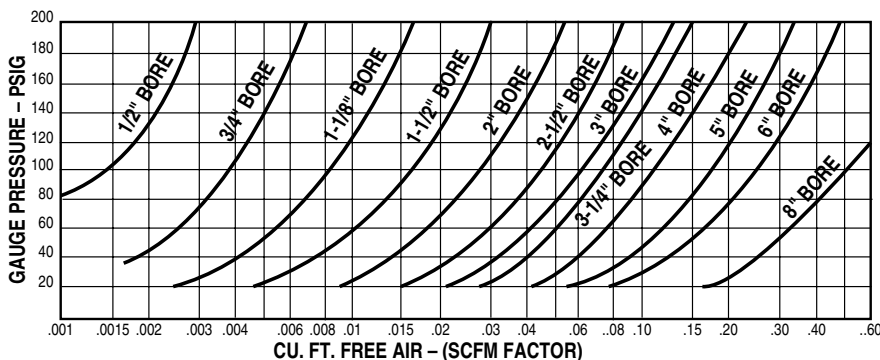
Now, at the top of the chart on page 83, find the column with the operating pressure calculated in "A" above (in this example, 80 psig). Go down that column until you find the force requirement calculated in "B", above (or the next higher value). Note that the force values in bold type represent the 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 84 to determine rod size requirements.

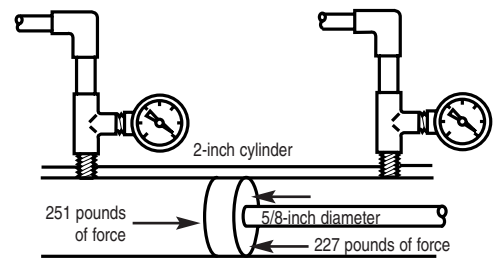
Air consumption for each cylinder bore size can be found in the chart below.

## 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.

# Bore Selection Sizes

EFFECTIVE PISTON AREA X OPERATING PRESSURE = 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>										
7/16	3/16	<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>
		.123	2.5	4.9	7.4	8.6	9.8	11	12.3	13.5	15.4	18.5	24.6
1/2	3/16	<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>
		.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
9/16	3/16	<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>
		.23	4.5	8.9	13.4	15.6	17.8	20	22	29.5	27.9	33.5	44.6
3/4	1/4	<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>
		.393	8	16	24	28	31	35	39	43	49	59	79
7/8	1/4	<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>
		.553	11	22	33	38	44	49	55	60	69	82	110
1-1/16	5/16	<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>
		.810	16	32	49	57	65	73	81	89	101	122	162
1-1/8	5/16	<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>
		.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
1-1/4	7/16	<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>
		1.077	22	43	65	75	86	97	108	118	135	162	215
1-1/2	7/16	<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>
		1.617	32	65	97	113	129	146	162	178	202	243	323
		1.571	31	63	94	110	126	141	157	173	196	236	314
		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
1-3/4	1/2	<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>
		2.209	44	88	133	155	177	199	221	243	276	331	442
2	5/8	<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>
		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
2-1/2	5/8	<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>
		4.602	92	184	276	322	368	414	460	506	575	690	920
		4.470	89	179	268	313	358	402	447	492	559	671	894
		4.123	82	165	247	289	330	371	412	454	515	618	825
3	3/4	<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>
		6.6268	133	265	398	464	530	596	663	729	828	994	1325
3-1/4	1	<b>8.296</b>	<b>166</b>	<b>332</b>	<b>498</b>	<b>581</b>	<b>664</b>	<b>747</b>	<b>830</b>	<b>913</b>	<b>1037</b>	<b>1244</b>	<b>1659</b>
		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
4	1	<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>
		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
5	1	<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>
		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
6	1-3/8	<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>
		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
8	1-3/8	<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>
		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
10	1-3/4	<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>
		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.



# 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.

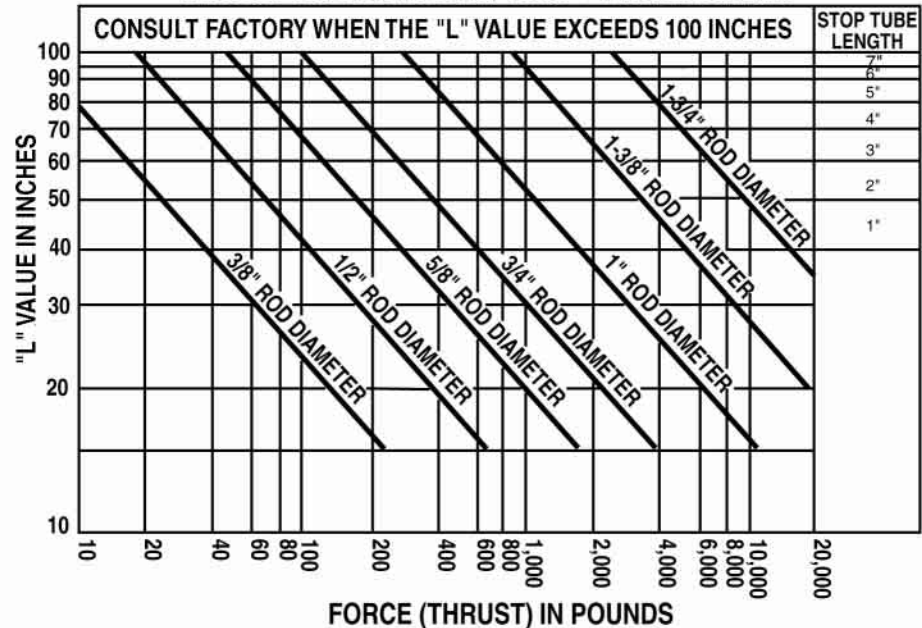
C) Use the piston rod diameter/ stop length chart to complete your cylinder specification. Find the approximate "L" value (determined in Steps A & B) on the left side of the chart. At the bottom of the chart, find the force (thrust) required for your cylinder. Reference the bore selection sizes table 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.



## 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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# Features

## Series 01

Micro-Air Cylinders are ideal for small part positioning, clamping and ejecting. Also they're the perfect choice for applications where small bore, medium duty, repairable cylinders are preferred. Prelubed, they're suitable for operations without externally applied lubrication.

- Micro-Air Cylinders are repairable. Service kits are available to extend the useable life of the cylinder.
- Micro-Air Cylinders operate on air pressure to 200 p.s.i. (14 bar). A tough little cylinder that can handle the pressures!
- Superior performance over a wide temperature range – 0° to 180° F (-18° to 82° C), even to 300° F (149° C) when Viton seals are used (consult factory).
- Micro-Air Cylinders have superior wear characteristics, thanks to the hard coated aluminum tubing I.D. In addition to an internal hardness of 60 Rockwell C, the barrel has an internal finish of 16 microinches or better.
- Micro-Air Cylinders are equipped with Series 303 stainless steel piston rods for corrosion resistance. Also, the ground and polished finish on the rods minimizes friction, providing longer packing life.
- Micro-Air Cylinders provide greater durability than disposable cylinders.



# Performance Specifications

- Bore Sizes:** 1/2", 3/4", and 1-1/8"
- Maximum Output Force:** 199 pounds (1-1/8" bore)
- Standard Operating Temperature range:** 0° to 180° F (-18° to 82° C)
- Viton Seals Models:** For high heat applications. Consult factory.

Range of mounting styles and attachable mounts/ accessories to meet nearly any application requirement.

# Ordering

01 XX - X0 XX - 0 XX

**BORE SIZE**

51	1/2 in
76	3/4 in.
18	1-1/8 in.

**STROKE LENGTH**

WHOLE INCHES	FRACTIONS
0	= 0 in
1	= 1 in
2	= 2 in
3	= 3 in
4	= 4 in
5	= 5 in
6	= 6 in
7	= 7 in

**CYLINDER TYPE**

- 10 Double Acting, Double End Mount - use with 09 or 19 Mounting Styles
- 50 Double Acting, Nose Mount - use with 29 Mounting Style

**MOUNTING STYLE**

- 09 Basic - No Mounts - use with Type 10 Double Acting, Double End Mount Cylinder
- 19 Rear Pivot Mount - use with Type 10 Double Acting, Double End Mount Cylinder
- 29 Rear Port - use with Type 50 Double Acting, Nose Mount Cylinder

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

Maximum stroke length - 6-7/8-inches. Consult factory for the other stroke requirements.

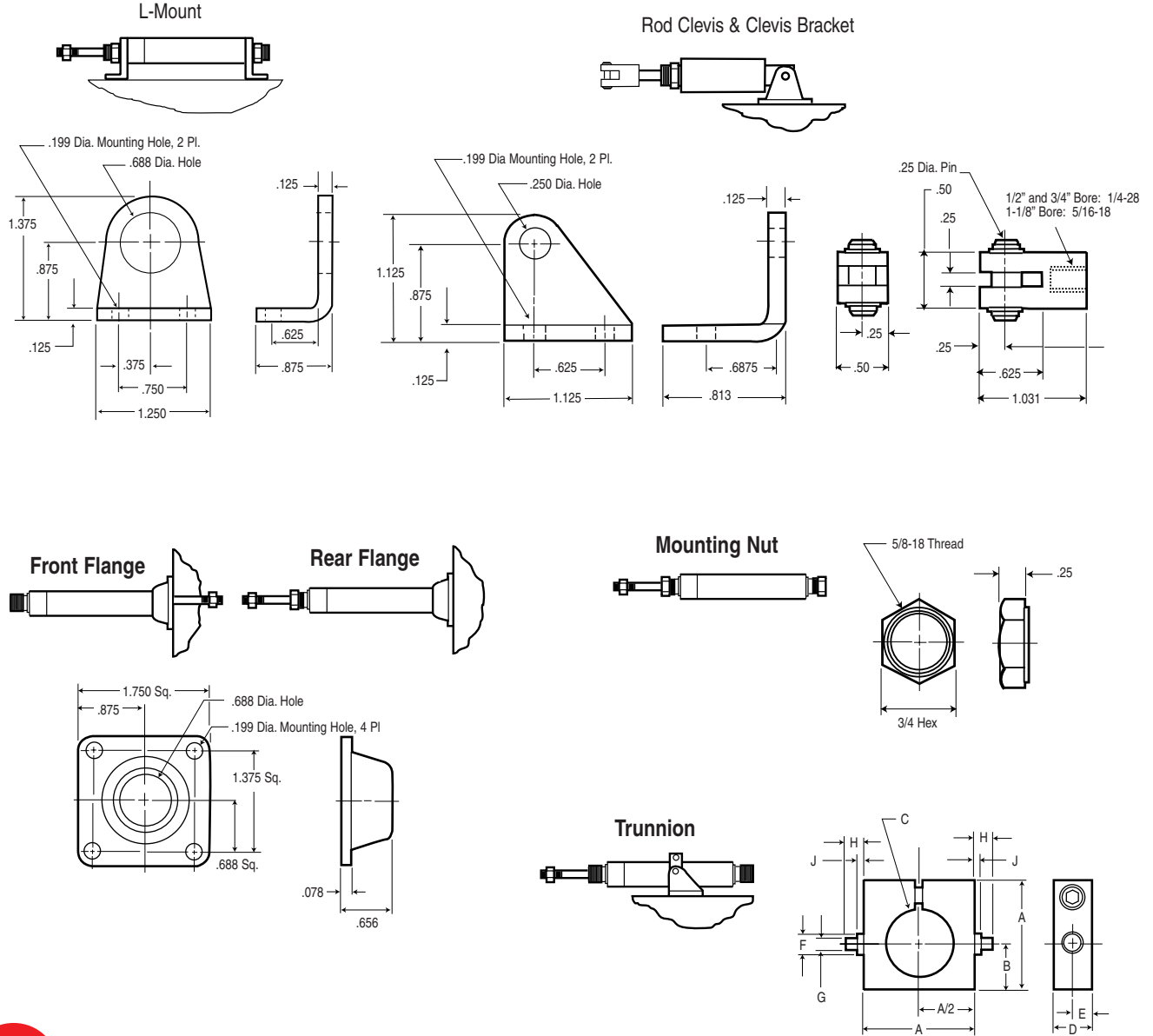
Mounts must be ordered separately. See page 87.

To order a cylinder with Viton seals, consult the factory.

NOTE: Highlighted selections denote most popular models.

# Dimensional Data

## Series 01



# Ordering

## Mounting Kit

	Cylinder Bore (Inches)		
	1/2	3/4	1-1/8
L-MOUNTS (2 Qty) *	20515	20515	20515
FLANGE MOUNT *	20516	20516	20516
MOUNTING NUT (2 Qty)	20514	20514	20514
CLEVIS BRACKET	20519	20519	20519
TRUNNION	20522	20523	20524
TRUNNION BRACKETS	20561	20561	-
ROD CLEVIS	20517	20517	20518

\* NOTE: Mounting nuts included.

## Cylinder Bore (Inches)

Reference	1/2	3/4	1-1/8
-----------	-----	-----	-------

Trunnion Dimensions			
A	1.50	1.50	2.25
B	.625	.625	.875
C Dia.	.703	.953	1.391
D	.500	.500	.750
E	.250	.250	.375
F Dia.	-	-	.563
G Dia. ± .002	.250	.250	.437
H ± .010	.250	.250	.438
J	-	-	.0625

\* 20561 Trunnion Bracket Kit (right and left brackets) is used for 20522 and 20523 Trunnions. Reference Clevis bracket dimensions.

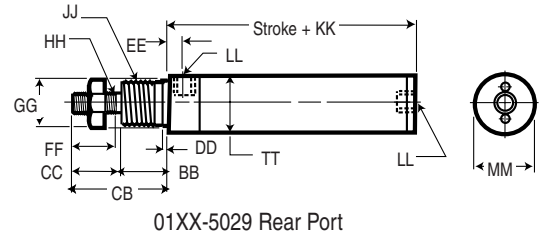
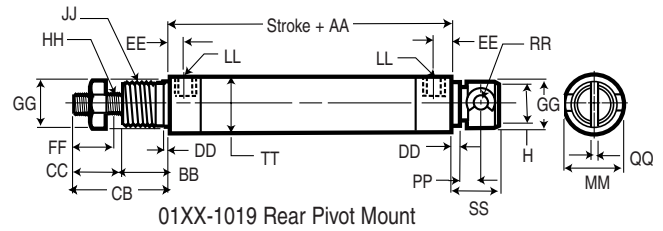
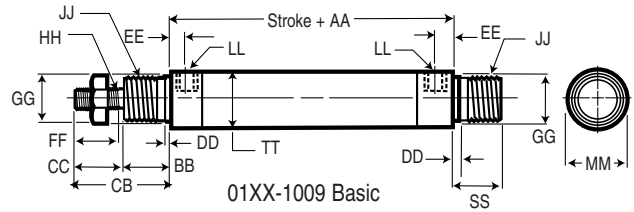
# Dimensional Data

## Series 01

Reference	CYLINDER BORE (INCHES)		
	1/2	3/4	1-1/8
Rod Diameter	1/4	1/4	5/16
AA	2.438	2.438	2.688
BB	.625	.625	.625
CC	.750	.750	.750
CB	1.375	1.375	1.375
DD	.047	.047	.047
EE	.281	.281	.281
FF*	.719	.719	.719
GG (± .002)	.682	.682	.682
HH	1/4-28 UNF	1/4-28 UNF	5/16-18 UNC
H	.625	.625	.625
JJ (UNF-2A)	5/8-18	5/8-18	5/8-18
KK	2	2	2
LL (NPTF)	1/8-27	1/8-27	1/8-27
MM	.787	.912	1.350**
PP	.375	.375	.375
QQ (SLOT) ± .002	.130	.130	.130
RR (PIN)	.250	.250	.250
SS	.625	.625	.625
TT DIA.	.700	.950	1.375

\* Note: FF shows total thread, including run out.

\*\* On rear head only of 5029 dimension is 1.291.



## 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.



SILVERAIR  
CYLINDERS

## Performance Specifications

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



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 sizes 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 91.*

**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
<b>00</b> = 0 in	<b>0</b> = None
<b>01</b> = 1 in	<b>1</b> = 1/8 in
<b>02</b> = 2 in	<b>2</b> = 1/4 in
<b>03</b> = 3 in	<b>3</b> = 3/8 in
<b>04</b> = 4 in	<b>4</b> = 1/2 in
<b>05</b> = 5 in	<b>5</b> = 5/8 in
<b>06</b> = 6 in	<b>6</b> = 3/4 in
<b>10</b> = 10 in	<b>7</b> = 7/8 in
<b>etc.</b>	

For recommended maximum stroke lengths, per type, see pages 93 through 99.

(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 100.*

# Ordering



## Series S (Mounting Kits)

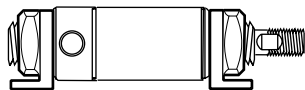
			CYLINDER BORE (INCHES)					
1/2	3/4	1-1/16	1-1/4	1-1/2	1-3/4	2	2-1/2	
<b>L-MOUNT (Single Acting)</b>								
Order Mounting Nut below.								
118108-05	118108-07	118108-11	118108-14	118108-14	118108-17	118108-20	118108-25	
<b>L-MOUNT (Double Acting)</b>								
Order Mounting Nut below.								
118108-50	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	-	-	

\* FOR DOUBLE END MOUNTING OF SINGLE-ACTING CYLINDERS, ORDER THE FOLLOWING:

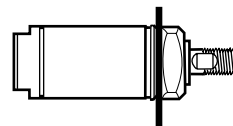
1/2-inch bore      One 118108-05 L-Mount and one 118109-05 Nut for rear mounting thread. One 118108-50 L-Mount and one 118109-50 Nut for front mounting thread.

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.

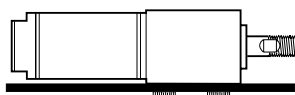
NOTE: Silverair accessories are bright zinc plated steel.



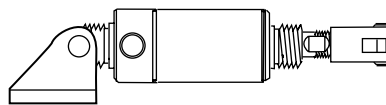
L-Mount



Mounting Nut



Block Front Mount

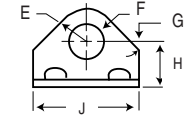
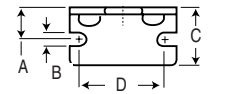


Pivot Bracket and Rod Clevis

# Dimensional Data

## Series S (Mounting Kit)

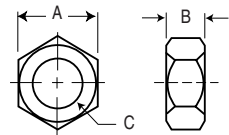
Dim Ref	CYLINDER BORE (INCHES)									
	1/2 Single Acting	1/2 Double Acting	3/4 Single Acting	3/4 Double Acting	1-1/16 All Types	1-1/4 All Types	1-1/2 All Types	1-3/4 All Types	2 All Types	2-1/2 All Types



L-Mount

### 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

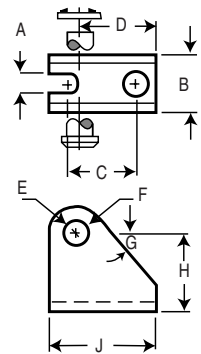
### MOUNTING NUT

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	1-1/4	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

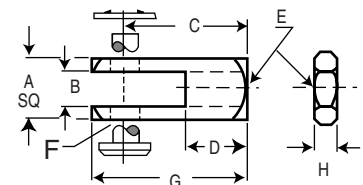
A	.20	.26	.26	.32	.39	.39	.45	.45
B	.52	.65	.65	.77	.96	.96	1.20	1.20
C	.43	.75	.75	.75	1.00	1.00	1.00	1.00
D	.54	.87	.87	.94	1.25	1.25	1.43	1.43
E	.22	.31	.31	.31	.38	.38	.38	.38
F	.16	.26	.26	.26	.38	.38	.38	.38
G	50°	53°	53°	53°	52°	52°	48°	48°
H	.64	.87	.87	1.06	1.37	1.37	1.68	1.68
J	.75	1.19	1.19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



Pivot Bracket

### 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



Rod Clevis

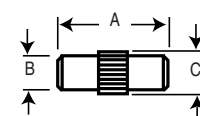
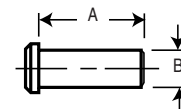
### PIVOT PIN

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	-	-



Pivot Pins



# 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)

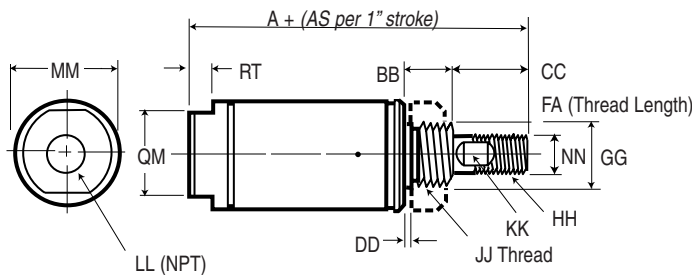
**Bore sizes:** 1/2", 3/4", 1-1/16", 1-1/4", 1-1/2", 1 3/4", 2"  
**Options:** Wearstrip (except on 1/2-inch bore), bumper, Viton  
**Accessories:** Pivot bracket, rod clevis, L-mount, mounting nut. Order mounting nuts as required.  
**Notes:** No rod bushing on 1/2-inch models - front head is hard anodized.

**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

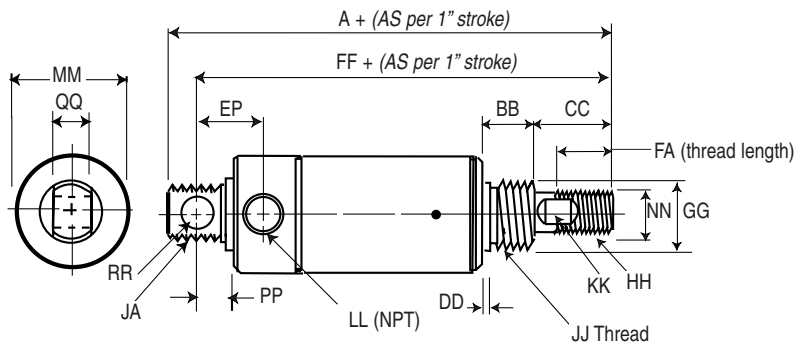
## Series S (Spring Return, Nose Mount)



## 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

## Series S (Spring Return, Universal Mount)



# 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	SHXXP4B4-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	SHXXP4B4-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 (Spring Return) (Max. Stroke - 4 inches)

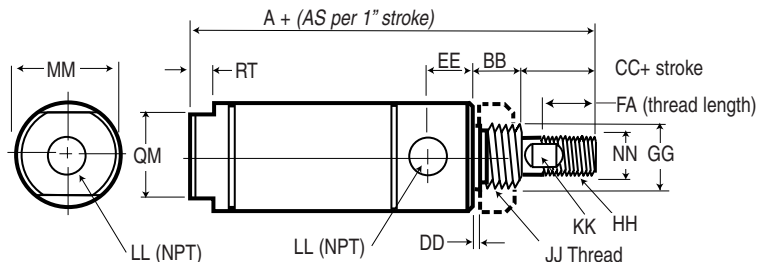
**Bore sizes:** 1/2", 3/4", 1-1/16"  
**Options:** Wearstrip (except on 1/2-inch bore), bumpers, Viton.  
**Accessories:** Rod clevis  
**Notes:** No rod bushing on 1/2-inch models - front head is hard anodized. head is hard anodized.

### Model SRXX-B4B4-XXX (Spring Extend, Illustrated) (Max. Stroke - 4 inches)

**Bore Sizes:** 1/2", 3/4", 1-1/16"  
**Options:** Bumpers, 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

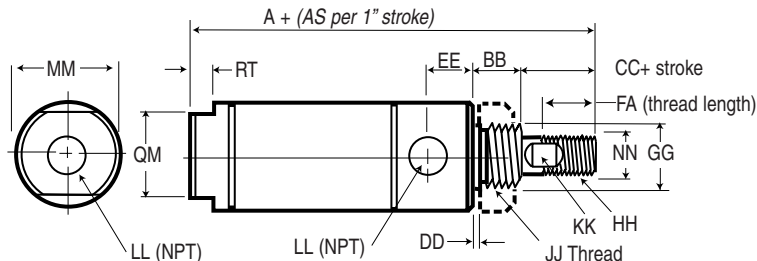
## Series S (Spring Extend, Nose Mount)



## 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

## Series S (Spring Extend, Universal Mount)

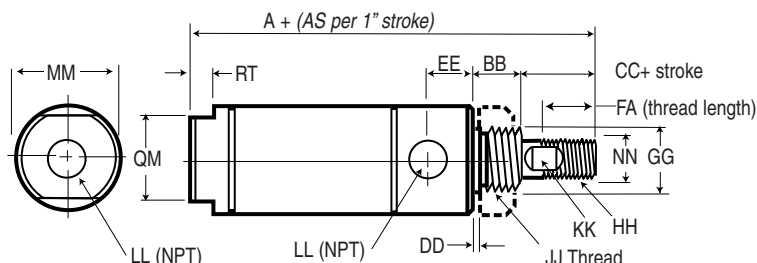


\* TT - Two thru holes drilled and counterbored on port side for cap screw size listed.

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

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

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



# 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	-	-
AS	SRXX-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-XXXX-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)

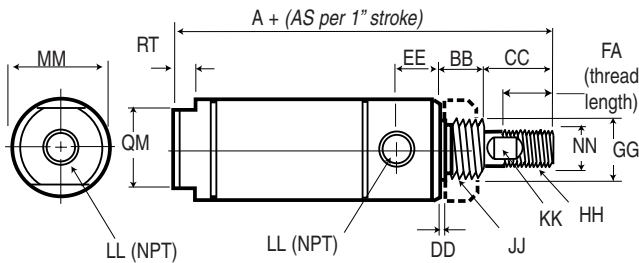
**Model SDXX-N4B4-XXX (Max. Stroke -12 inches)**  
**Bore sizes:** 1/2", 3/4", 1-1/16", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/2"  
**Hex Mounting Nut:** Standard (Except on 2- and 2-1/2-inch models).  
**Options:** Bumpers, Viton, Internal magnet  
**Accessories:** L-mount, rod clevis  
**Wearstrip:** Not 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.

## Series S (Universal Mount)

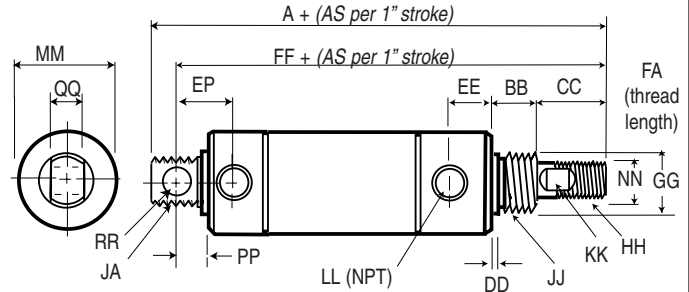
**Model SDXX-P4B4-XXX (Max. Stroke - 12 inches)**  
**Bore sizes:** 1/2", 3/4", 1-1/16", 1-1/4", 1-1/2", 1-3/4", 2", 2-1/2"  
**Options:** Bumpers, Viton, Internal magnet  
**Accessories:** Pivot bracket, rod clevis, L-mount, mounting nut  
**Wearstrip:** Not available on 1/2-inch bore.  
 Standard with 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)



### CYLINDER BORE (INCHES)

Dim Code	Cylinder Description	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)

### Model SDXX-D4B4-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) 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.

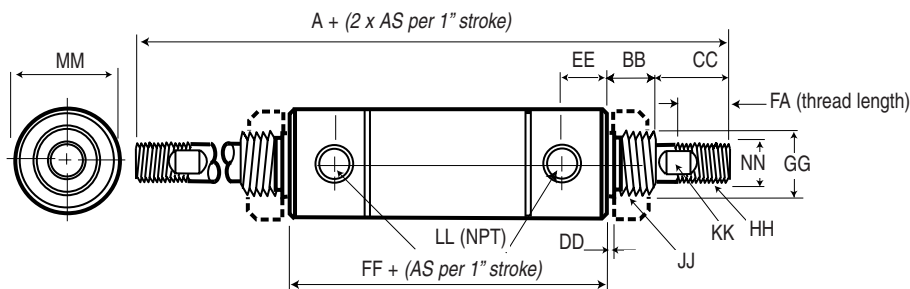
## Series S (Block Front Mount)

### Model SDXX-B4B4-XXX (Max. Stroke - 12 inches)

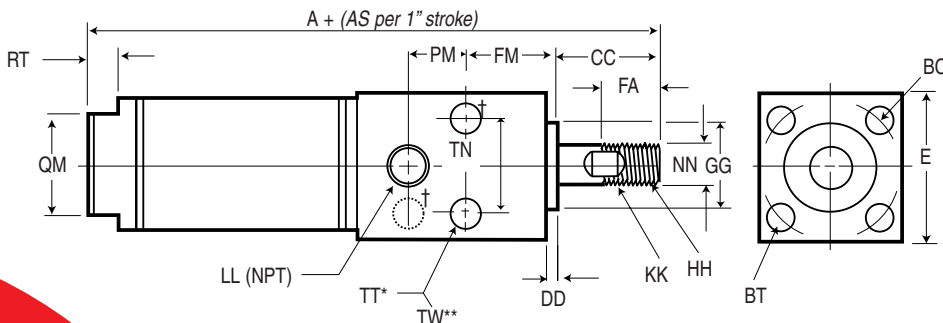
- Bore sizes:** 1/2", 3/4", 1-1/16"
- Options:** Internal magnet, bumpers, Viton, wearstrip
- Accessories:** Rod clevis
- Wearstrip:** Not available on 1/2-inch bore.  
Standard with 5 inches of stroke, or more (optional on shorter strokes).
- Notes:** No rod bushing on 1/2-inch models - front head is 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

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)

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

### Series S (Reed Switches)

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

## Ordering

### Series S (Hall Effect Switches)

<u>Model No.</u>	<u>Description</u>
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 Reed Switch

<u>Model No.</u>	<u>Description</u>
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





# Features

## Series S (Stainless Steel Volume 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.

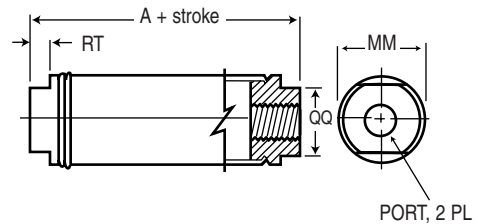
- Stainless steel body and aluminum endcaps offer excellent corrosion resistance in adverse environments.
- Available in lengths up to 24 inches, at 1/8-inch increments, providing a capability to meet very specific pneumatic accumulator applications.

# 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

# Dimensional Data

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



# Ordering

11811 X - X X X

## 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.

## VOLUME CHART

VOLUME (ci)	CYLINDER BORE			
	3/4"	1-1/16"	1-1/2"	2"
<b>Add per 1.0 inch of length</b>	.44	.89	1.77	3.14
<b>Basic Volume (add to total)</b>	.41	.92	1.80	4.44



## 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.



U-cup and Magnetic Piston Options

## Performance Specifications

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

# Ordering



Series 23, 24, & 28

Include dashes (-). The dashes are significant.

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

**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.*

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

**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.

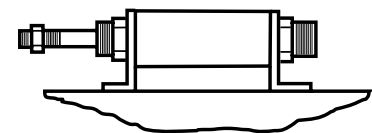
**PACKING**

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

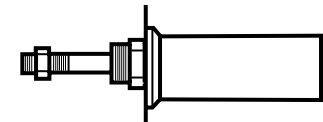
NOTE: Highlighted selections denote most popular models.

**Mounts**

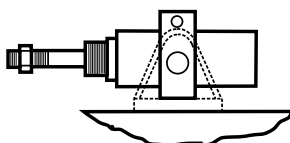
	1-1/8	1-1/2	CYLINDER BORE (INCHES)		3	4
			2	2-1/2		
<b>L-Mount</b> (2 qty.)	20533	20534	20534	20535	20535	20536
<b>Flange Mount</b>	20537	20538	20538	20539	20539	20540
<b>Clevis Bracket</b>	20546	20547	20547	20548	20548	20549
<b>Mounting Nut</b> (2 qty.)	20529	20530	20530	20531	20531	20532
<b>Trunnion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



L-Mount



Flange Mount



Trunnion



Rod Clevis & Clevis Bracket



Mounting Nut

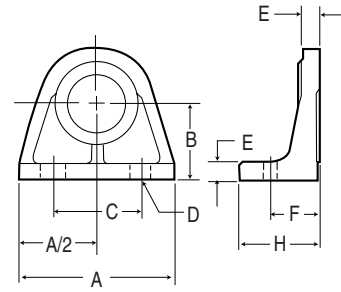
**NOTE:** Order cylinder, rod clevis and clevis bracket separately. Every Economair Cylinder includes rod nut. Trunnion Mount does not include pillow block.

# Dimensional Data

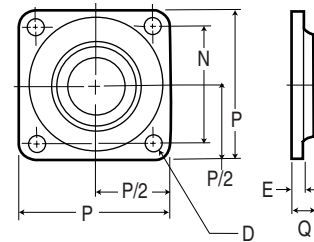
Series 23, 24, & 28



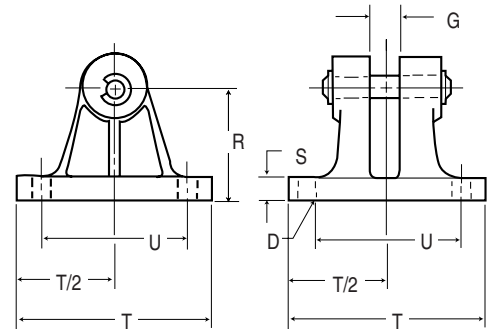
Reference	CYLINDER BORE (INCHES)					
	1-1/8	1-1/2	2	2-1/2	3	4
Rod dia.	0.38	0.50	0.63	0.75	0.75	1.00
A	1.625	3.00	3.00	4.00	4.00	5.00
B	1.281	1.50	1.50	2.00	2.00	2.625
C	1.0	1.688	1.688	2.25	2.25	3.00
D-dia*	.250	.250	.250	.375	.375	.438
E	.250	.313	.313	.375	.375	.438
F	.625	.906	.906	1.219	1.219	1.469
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



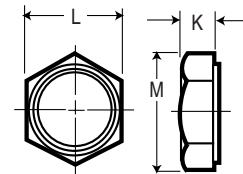
L-Type



Flange

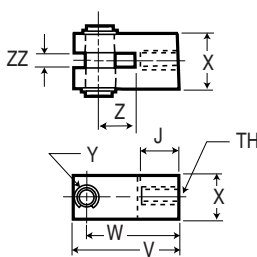


Clevis Bracket

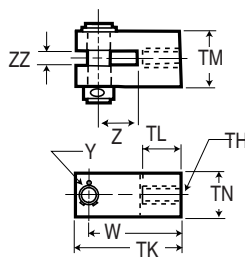


Mounting Nut

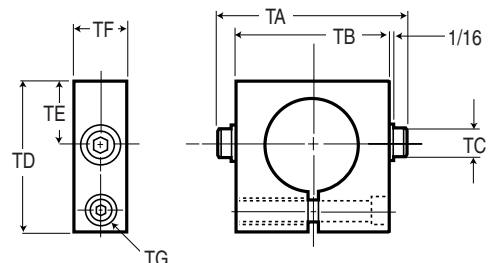
\*Bolt or pin diameter



Steel Rod Clevis



Aluminum Rod Clevis

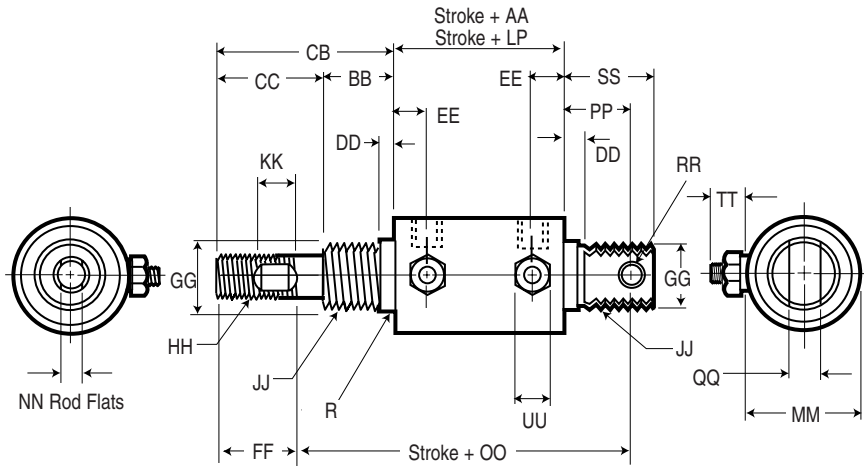


Trunnion



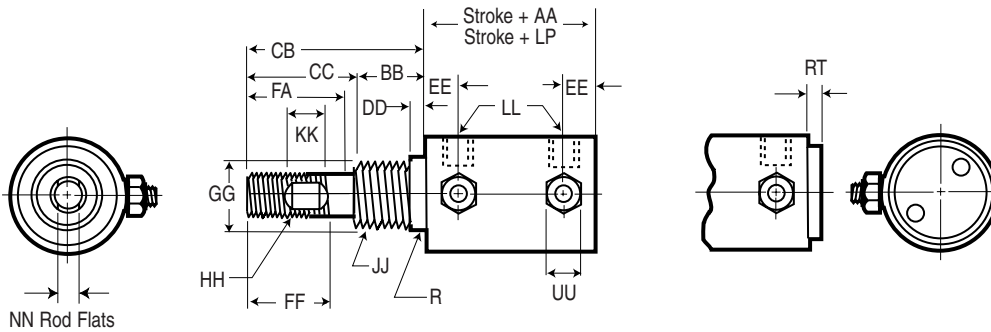
# Dimensional Data

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



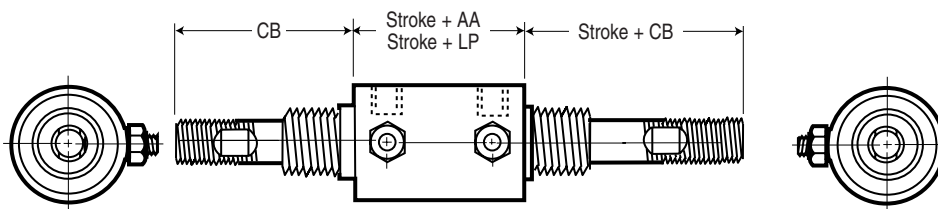
AA = Double acting with O-ring or low friction packing.  
 LP = Double acting with U cup packing.

## (Double Acting, No Tang)

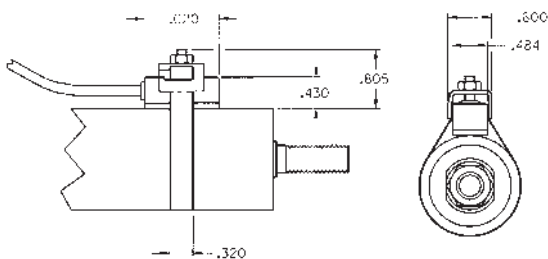


AA = Double acting with O-ring or low friction packing.  
 LP = Double acting with U cup packing.

## (Double Acting, Double Ended)



## (Switch Bracket)





# Dimensional Data

## Series 23, 24, & 28

### CYLINDER BORE INCHES

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

For more information on Position Sensors (Switches) see page 116.



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

## 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	<b>REED</b>			<b>PNP(SOURCING)</b>			<b>NPN (SINKING)</b>		
Input Voltage	100 VDC, 125 VAC Max.			10 - 30 VDC			5 - 30 VDC		
Operating Current	300mA (150mA Inductive)			7 - 100mA @ 12V			5 - 100mA @ 5V		
	-			14 - 200mA @ 24V			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.		

### 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

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



## Aluminum NFPA Interchangeable

- 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

## Stainless Steel NFPA Interchangeable

- 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

## Aluminum NFPA

Include dashes ( - ). Dashes are significant.

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

#### 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

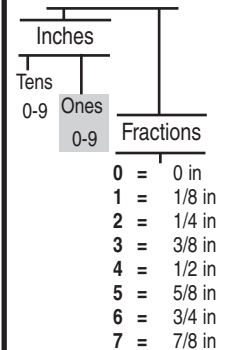
<b>B</b> Buna-N	<b>G</b> Buna-N + Magnetic Piston
<b>V</b> Viton	<b>H</b> Viton + Magnetic Piston
<b>S</b> Slippery	<b>J</b> Slippery + Magnetic Piston

#### 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



#### STROKE



NOTE:  
 Maximum stroke 99 7/8",  
 for longer strokes consult  
 factory. Stroke lengths 20"  
 and longer may require  
 stop tubes, see page 84.

#### MOUNT

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

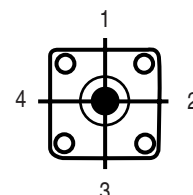
<b>A</b> MS1	<b>P</b> MT1
<b>B</b> MS4**	<b>Q</b> MX1
<b>C</b> MP1**	<b>T</b> MX2
<b>D</b> MP2**	<b>U</b> MX3
<b>F</b> MF1/ME3**	<b>X</b> No Mount
<b>H</b> MF2/ME4**	<b>1</b> FMB*
<b>K</b> MP4*	<b>2</b> FMC*
<b>L</b> MS7*	<b>3</b> FMH*
<b>M</b> MT2	

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



Determine  
 port location  
 looking at  
 rod end of  
 cylinder.

Note: Highlighted selections denotes most popular models.

See pages 113-119 for Dimensional Drawings

# Ordering

## Stainless Steel NFPA

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

NOTE: All SN Series Cylinders have tie rods.

### ACTUATORS

Stainless Steel actuators begin with A

### 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

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

Include dashes ( - ). Dashes are significant.



STROKE		
Inches		
Tens	Ones	Fractions
0-9	0-9	0-9
		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 84.

### 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

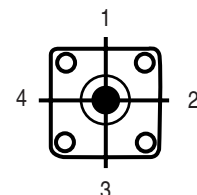
### PORT LOCATION

(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

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

See pages 113-119 for Dimensional Drawings



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
MS2 Side Lugs (Steel)	116362	116363	116364	116365	116366
MP1 Fixed Clevis (Alum.) *	115477	115478	115479	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	116359	116360	116361
MT2 Head Trunnion (Alum.)	116357	116358	116359	116360	116361



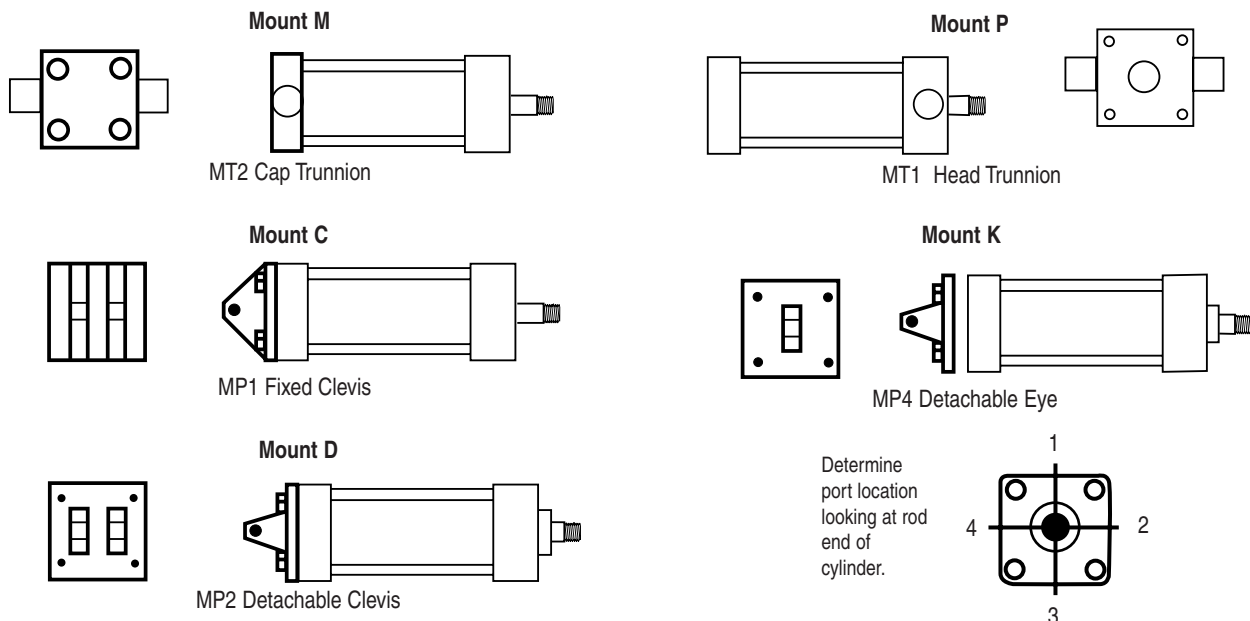
Above kits include all necessary hardware to complete mounting to Provenair cylinders. AN Series only.

\* 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



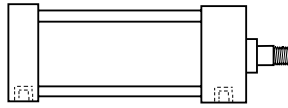
NOTE: Not all mounts are available on stainless steel models.

# Mounting Data

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

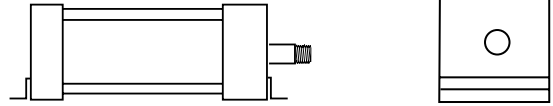
## Factory Installed Mounts

Mount B



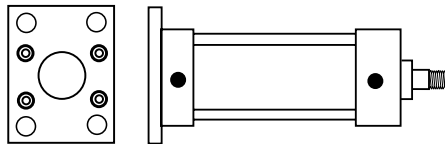
MS4 Side Tapped

Mount A

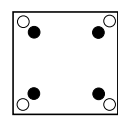


MS1 Side End Angle

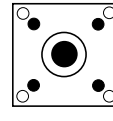
Mount H



MF2 Cap. Rec. Flange

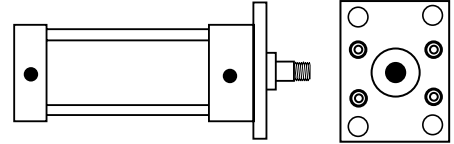


ME4 8" Bore



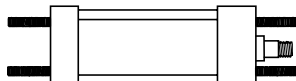
ME3 8" Bore

Mount F



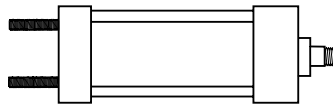
MF1 Head Rec. Flange

Mount Q



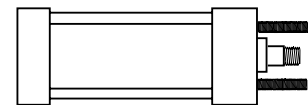
MX1 Cap and Head Ext. Tie Rod

Mount T



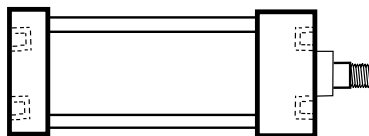
MX2 Cap Ext. Tie Rod

Mount U



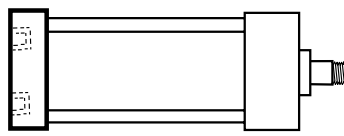
MX3 Head Ext. Tie Rod

Mount 1



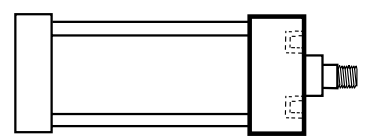
FMB Female retaining bolts, Both Ends

Mount 2



FMC Female retaining bolts, Cap

Mount 3



FMH Female retaining bolts, Head

**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)

# Dimensional Data



## Series AN, SN (Rod End)

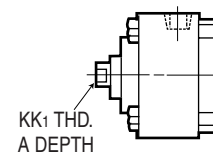
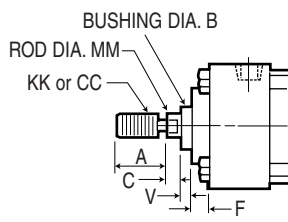
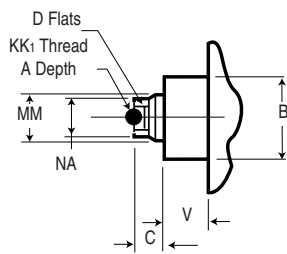
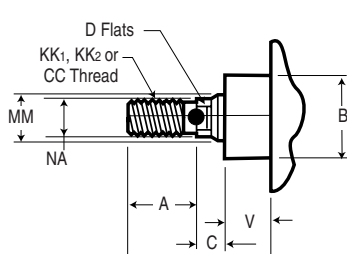
ROD DIAMETER (INCHES)	CYLINDER BORE (INCHES)							
	1-1/2, 2, 2-1/2	2, 2-1/2	3-1/4, 4	3-1/4, 4	5	5, 6, 8	6, 8, 10	10
5/8				1-3/8	1	1-3/8	1-3/4	2"

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

	7/16"-20	3/4"-16	3/4"-16	1"-14	3/4"-16	1"-14	1-1/4"-12	1-1/2"-12	1-3/4"-12
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	1-1/2"-12	1-3/4"-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	1-3/4"-12	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	2"-12	
A	.75	1.13	1.13	1.63	1.13	1.63	2.00	2.25	
B	1.13	1.50	1.50	1.50	1.50	2.00	2.38	2.38	
C	.38	.62	.48	.60	.50	.63	.75	.88	
D	.50	.88	.88	.81	.81	1.13	1.50	1.75	
F	.325	.325	.625	.625	.625	.625	.625	.75	
MM	.625	1.00	1.00	1.00	1.00	1.375	1.75	2.00	
V	.62	.75	.89	1.02	.25	.38	.38*	.38	

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

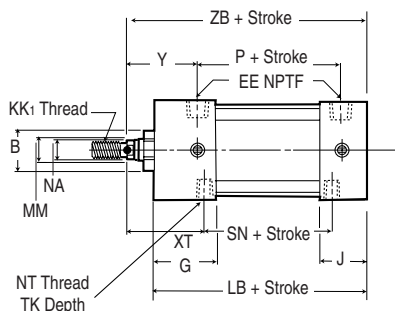
\* (.50 on 10")



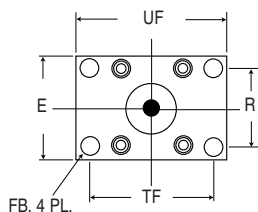
Series AN, TN Bore Sizes 1-1/2", 2", 2-1/2", 3-1/4", 4"

Series AN Bore Sizes 5", 6", 8", 10"  
 Series SN all Bore Sizes

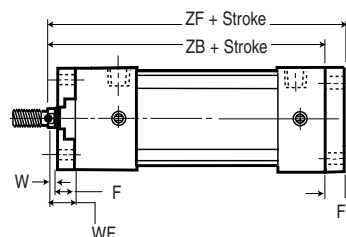
## Series AN, SN (With Standard Rod)



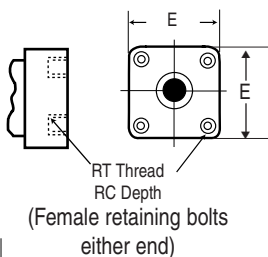
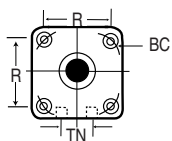
Side Tapped MS4  
**MOUNT B**



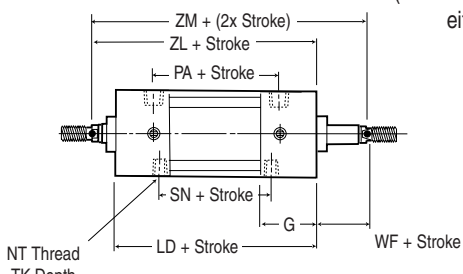
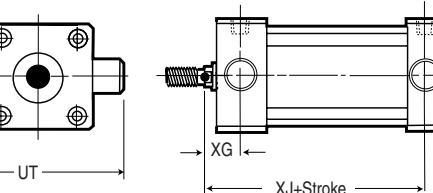
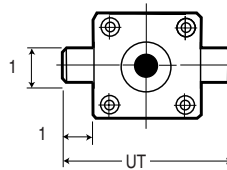
Rect. Flange - Head-MF1, Cap-MF2  
**MOUNT F & H (1 1/2" - 4" BORE ONLY)**



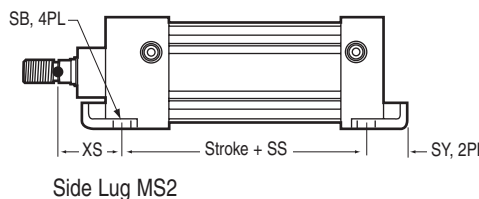
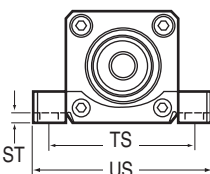
Head Trunnion MT1  
 Cap Trunnion MT2  
**MOUNT M & P**



(Female retaining bolts either end)



Double Rod End MS4  
**MOUNT B**



Side Lug MS2

# 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
KK <sub>1</sub> (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

### MEETING THE STANDARDS.

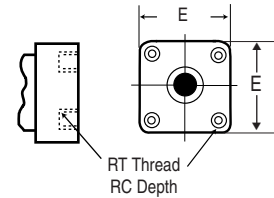
ARO Provenair Cylinders meet NFPA standards. Use valves that meet the highest standards – ARO Alpha and Genesis Valves. Alpha valves are available in body ported and sub-base configurations. Genesis valves are available in sub-base configuration only and have convenient “plug-into-the-base” electronics.



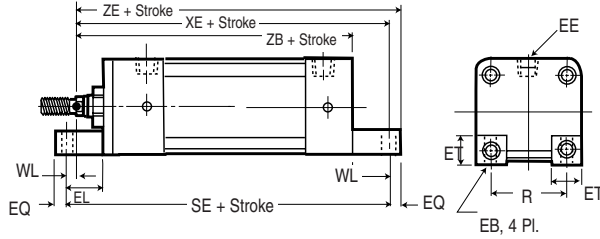
\* Oversize piston rod option affects these dimensions. See rod end dimensions.

# Dimensional Data

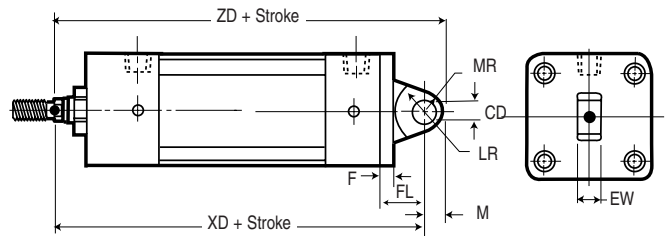
Series AN, SN (1-1/2" Thru 10" Bore w/standard rod)



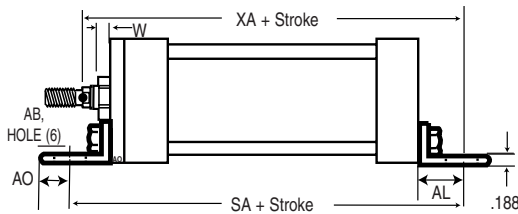
(Female retaining bolts either end)  
**MOUNTS 1,2,3,4**



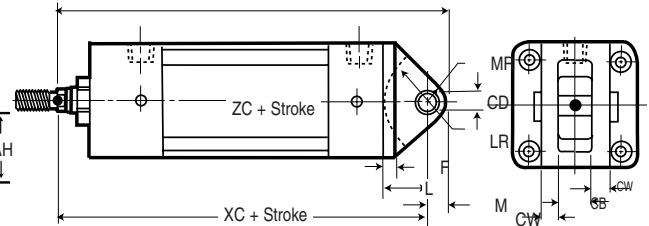
Side End Lugs MS7  
**MOUNT L**



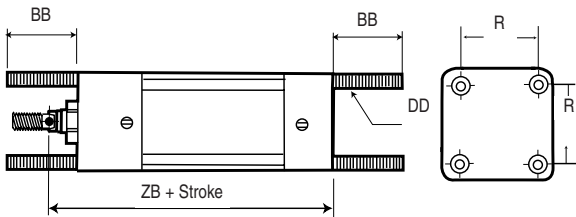
Detachable Eye MP4  
**MOUNT K**



Angle Mount MS1  
**MOUNT A**



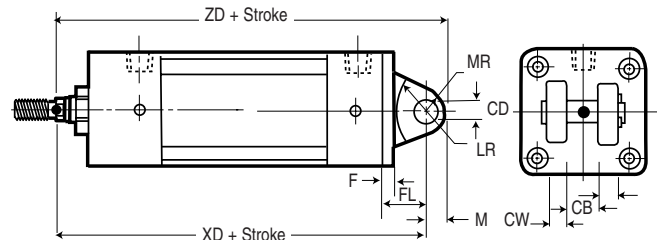
Fixed Clevis MP1  
**MOUNT C**



Tie Rod Mounts

MX1 Extended Both Ends

MX3 Extended Head End  
**MOUNT Q, T & U**

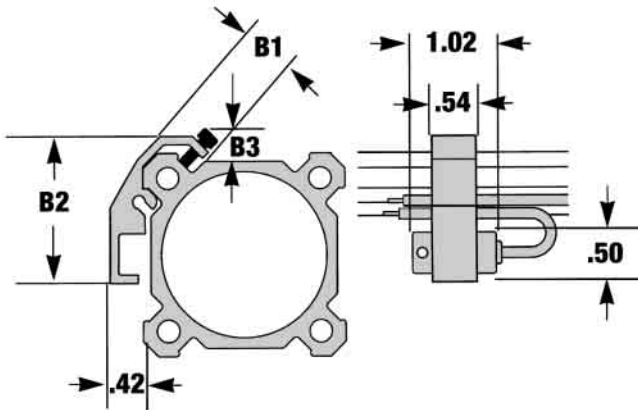


Detachable Clevis MP2  
**MOUNT P (AN Series only)**

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

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

\* Oversize piston rod option affects these dimensions.

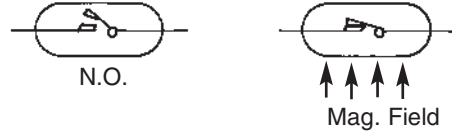


CYLINDER BORE (Inches)			
	1 1/2"	2 & 2 1/2"	3 1/4" & 4"
B1	.51	.60	.80
B2	1.50	1.77	2.45
B3	.26	.26	.33

## Position Sensors (Switches)

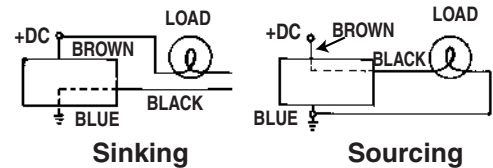
### Reed Switches

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.



### 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	<b>REED</b>			<b>PNP(SOURCING)</b>			<b>NPN(SINKING)</b>		
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.		



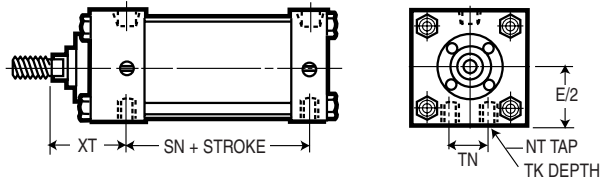
### Switch Mounting Brackets

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

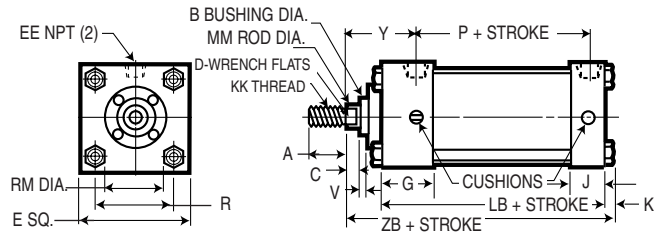


# Dimensional Data

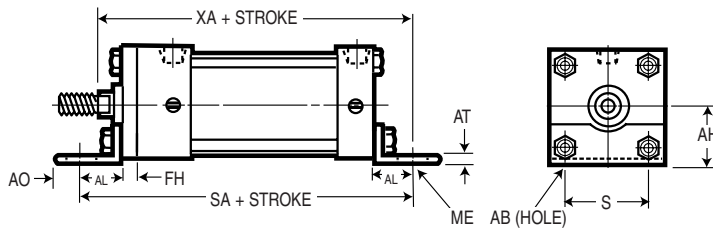
Series AN, SN (5", 6", 8" and 10" Bore)



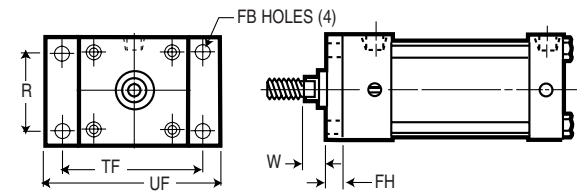
Side Tapped MS4



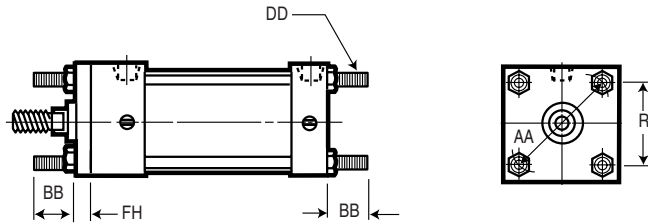
Basic Cylinder Dimensions



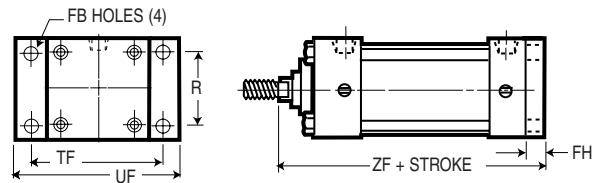
End Angle MS1



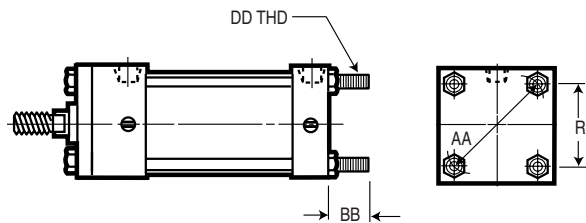
Head Rectangular Flange MF1



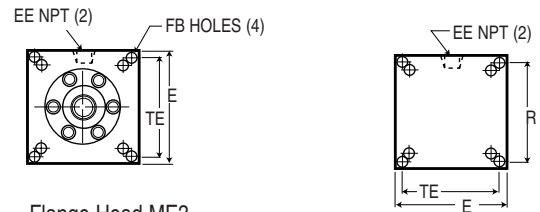
Tie Rods Extended Both Ends MX1



Cap Rectangular Flange MF2

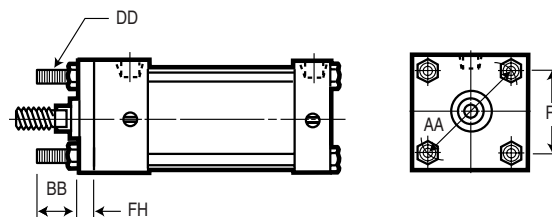


Tie Rods Extended, Cap End MX2



Flange Head ME3

Flange Cap ME4



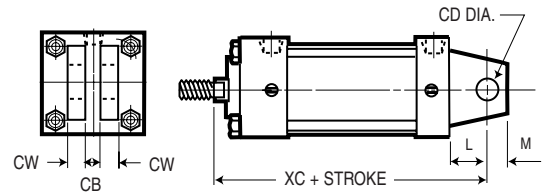
Tie Rods Extended, Head End MX3

PROVENAIR  
CYLINDERS

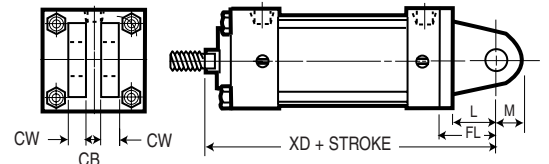
# Dimensional Data

## 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	7.92	
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	-	
TE	-	-	-	-	7.57	7.57	9.40	
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	

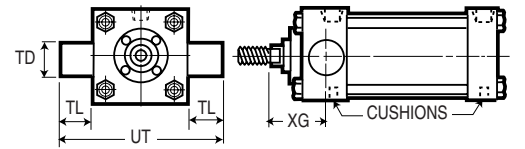


Fixed Clevis MP1

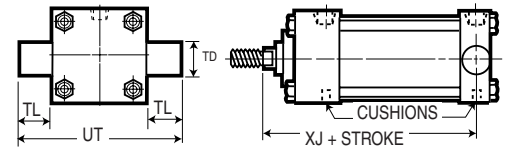


Detachable Clevis MP2  
(Not available on 6 or 8-inch bore)

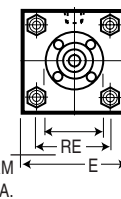
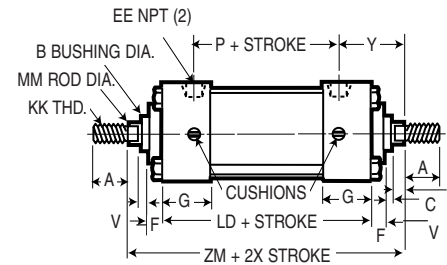
Cap Rectangular Flange MF2



Head Trunnion MT1



Cap Trunnion MT2



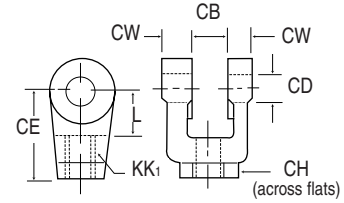
Double Rod End



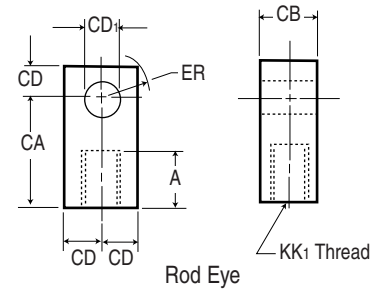
# Accessories

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

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



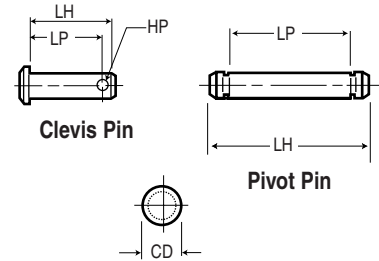
Rod Clevis



Rod Eye

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

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



Clevis Pin

Pivot Pin

Use for Both Pins

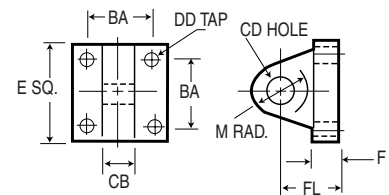
## Dimensional Data

### Rod Eye, Rod Clevis and Pin

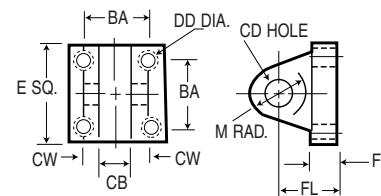
A	.75	1.13	1.63	2.00
CA	1.50	2.06	2.81	3.44
CB	.75	1.25	1.50	2.00
CD	.50	.75	1.00	1.38
CD <sub>1</sub>	.44	.75	-	-
CE	1.50	2.38	3.13	4.13
CH	1.00	1.25	1.50	2.00
CW	.50	.63	.75	1.00
ER	.72	1.06	1.00	1.38
HP	.156	.156	-	-
KK <sub>1</sub>	7/16-20	3/4-16	1-14	1 1/4-12
L	.75	1.25	1.50	2.13
LH	2.25	3.13	3.75	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	-



Eye Bracket\*



Clevis Bracket\*

\* These accessory brackets attach to mating cylinder mounts. See Cylinder Mounting Dimensions on page 118.

# Ordering



Sight glass available in Style A only

## 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.



Air/Oil Tank  
250 P.S.I.



Air Reservoir

Include dashes (-). Dashes are significant.

**ACTUATORS**  
All actuators begin with A  
**SERIES (N)**  
All Provenair Cylinders are Series N

**TYPE**  
T Tank

**BORE SIZE**

Q	1- 1/2"	W	3-1/4"
S	2"	4	4"
T	2- 1/2"		

**ENTER X IN THIS POSITION**

**TANK STYLE**  
A Air / Oil      T Air Reservoir

**SEALS**  
B Buna-N      V Viton

**SIGHT GLASS LOCATION**  
X = None      A = 1      B = 2      C = 4  
(X must be used with Tank Style T)

**PORT LOCATION** MS4 mounts: Port locations other than "A", call factory.

A	H1, C1	B	H1, C2	F	H2, C1	J	H2, C4
(Std.)		D	H1, C4	G	H2, C2	U	H4, C4

**MOUNT**

A	MS1	B	MS4	L	MS7	X	No Mount
---	-----	---	-----	---	-----	---	----------

**STROKE**

Inches

Tens  
0-9

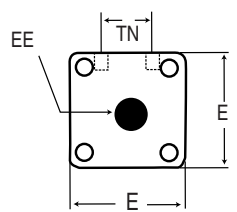
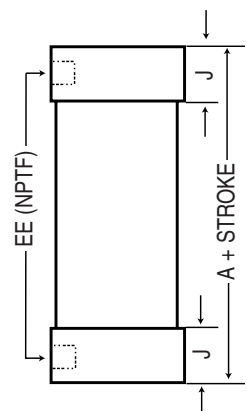
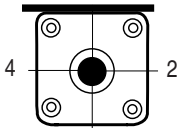
Ones  
0-9

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.  
**Style T** Minimum stroke 2".  
**Style A** Note: Sight glass (required) Minimum 5" stroke.

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



Fill Port available in Style A only

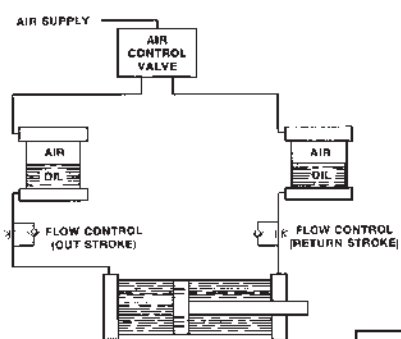
### Useable Volume Finder

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.



Typical Air Oil Circuit

### 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	1.5	3.75	1/2-14
4	4"	2.505	1.19	2.06	4.5	1/2-14



**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		Order two kits for double rod end cylinders.
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	

**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.: \_\_\_\_\_ Only these numbers are used.

**RK 24 20 - 1 3**

For All Models Write in RK

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

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

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

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

**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.: \_\_\_\_\_ Only these numbers are used.

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

For All Models Write in RA

**STROKE**

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

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

**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

**ROD MATERIAL PACKING**  
 0 Standard Chrome  
 8 Stainless Steel

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

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.

# Ordering

## Repair Kits

**Cylinder Model Number**

**Repair Kit Model Number**

To order a repair kit, use the model number from the cylinder label. Provenair repair kits start with the letters "RKN", "SKN" or "TKN" and appear in the first three positions. Using the numbers from the cylinder label, construct the remainder of the Repair Kit or number as directed below.

**Repair Kit Designators**

S or R and K for Repair Kit, N for Provenair.

**Type**

Double-Acting Single Rod = A  
 Double Acting Double Rod = B

**Bore Size**

1 1/2" Q    2" S    2 1/2" T    3 1/4" W    4" 4    5" 5    6" 6    8" 8    10" Y

**Rod Diameter**

5/8" K    1" M    1-3/8" P    1-3/4" Q    2" S

**Rod Style Not Used**

**Replacement Seals**

Buna-N	B	Buna-N + Mag. Pist.	G (Use B)
Viton	V	Viton + Mag. Pist.	H (Use V)
Self-Lube	S	Self-Lube Slippery + Mag. Pist.	J (Use S)

**Replacement Cushion Seals (All Seal Kits Use "B")**

No Cushion Seals	X
Cushions Both Ends	B
Cushion Cap	C
Cushion Head	H

EXAMPLE REPAIR KIT MODEL:

**R K N A W M - V B**

Supplies all Viton seals for a single rod end, 3 1/4" bore, 1" diameter piston rod cylinder. Kit includes Teflon wearband and Viton cushion seals for both ends.

Port Location Not Used, Mounts Not Used, Stroke Not Used

**Cylinder Model Number**

**Reciprocating Assembly No.**

**Reciprocating Assembly designators**

**Type**

Double-Acting Single Rod = A  
 Double Acting Double Rod = B

**Bore Size**

1 1/2" Q    2" S    2 1/2" T    3 1/4" W    4" 4    5" 5    6" 6    8" 8    10" Y

**Rod Diameter**

5/8" K    1" M    1-3/8" P    1-3/4" Q    2" S

**Rod Style**

A	Chrome, Std Male (KK1)	G	S.S., Standard Male (KK1)
B	Chrome, Intermed. Male (KK2)	H	S.S., Intermediate Male (KK2)
C	Chrome, Full Male (CC)	J	S.S., Full Male (CC)
D	Chrome, Female (KK1)	K	S.S., Female (KK1)
F	Chrome, No Threads	L	S.S., No Threads

**Seals Not Used**

**Replacement Cushioned or Non Cushioned**

No Cushion Seals	X
Cushions Both Ends	B

EXAMPLE RECIPROCATING ASSEMBLY MODEL:

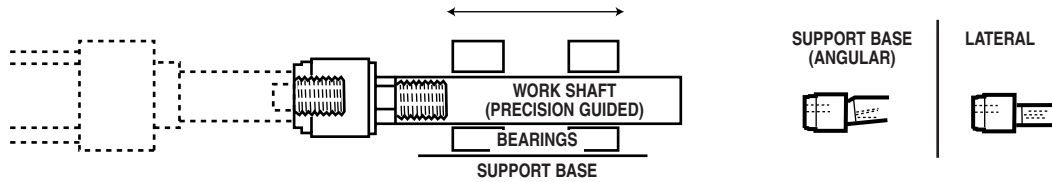
**R A N A S K - A H - 1 2 0**

Port Location Not Used, Mounts Not Used

Supplies 5/8" diameter chrome rod, KK1 threads, cushion head end, 12" stroke and 2" diameter piston for single rod end cylinder.

# Features

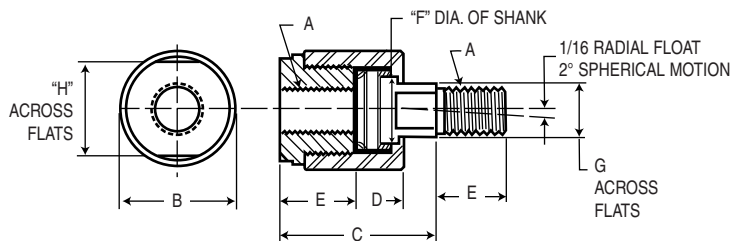
- Slide applications no longer require costly precision cylinder machining for mounting fixed or rigid guide.
- Friction due to misalignment is eliminated, increasing cylinder efficiency.
- An angular error of 2° and 1/16 inch lateral misalignment on push and pull stroke is compensated.
- Cylinder and 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



# Features

Proper conditioning of compressed air is essential to ensure maximum performance and service life for pneumatic power tools and equipment. The small initial investment for installation of air preparation units in an air line system will pay long-term dividends in increased productivity, consistent quality and decreased maintenance costs.

Ingersoll-Rand's extensive line of air line filters, regulators and lubricators, including individual units, piggyback and combos, have been designed to meet every air preparation requirement.

## Filters

Ingersoll-Rand compressed air filters are designed to remove airborne solid and liquid contaminants which may plug small orifices and hinder performance, or cause excessive wear and premature equipment failure. Several filter elements are offered, including models with coalescing elements for removal of oil aerosols and particles down to .3 micron.

- Available pipe sizes from 1/8" thru 2" NPT

## Regulators

Ingersoll-Rand air line regulators provide controlled, consistent air pressure as required for specific pneumatic equipment when connected to the complete compressed air system.

- Available pipe sizes from 1/8" thru 1-1/2" NPT
- Flows to 440 CFM
- Maximum Inlet pressures to 250 PSIG

## F-R-L Product Selection

When selecting an FRL or individual filter, regulator and lubricator units, the air consumption of the tools or equipment to be serviced should be correlated with the flow capacity of the FRL. Please reference flow capacity chart below.

Series	Net Port Size	FLOW CAPACITY (CFM)					Pressure Range PSIG
		Filter (Particulate)	Filter (Coalescing)	Regulator	Piggy Back	Lubricator	
Module	1/8"	28	15	13	12	41	0-125
Air 1000	1/4"	38	17	13	12	60	0-125
Module/ Air 2000	1/4"	54	40	100	93	75	0-200
	3/8"	100	51	135	135	100	0-200
	1/2"	122	53	140	140	110	0-200
Super-Duty	3/4"	345	50	180	-	150	0-250
	1"	345	150	200	-	300	0-250



C28121-800



C28221-810



C28453-810



# Ordering



## Standard Filters

Designed to remove rust, scale, condensed water and other debris from compressed air lines which may cause wear and premature failure of tools, valves, cylinders and other pneumatic equipment.

Port Size	Model	Filter Element	Flow* cfm	Bowl	Bowl Size	Drain	Max. Inlet Pressure
<b>1/8" &amp; 1/4" Port - ARO Module/Air 1000 Series</b>							
1/8"	F25111-200	20 Micron	28	Polycarbonate/Guard	1.0 oz.	Manual	200 PSIG
1/4"	F25121-200	20 Micron	38	Polycarbonate/Guard	1.0 oz.	Manual	200 PSIG
<b>1/4" &amp; 3/8" &amp; 1/2" Port - ARO Module/Air 2000 Series</b>							
1/4"	F25221-110	40 Micron	54	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
3/8"	F25231-110	40 Micron	100	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
1/2"	F25241-110	40 Micron	122	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
<b>3/4" &amp; 1" Port - ARO Super-Duty Series</b>							
3/4"	F25451-110	40 Micron	345	Metal w/sight glass	32 oz.	Manual	250 PSIG
1"	F25461-110	40 Micron	345	Metal w/sight glass	32 oz.	Manual	250 PSIG

\* Air Flow is at 90 PSI Inlet and 5 PSI pressure drop.



F25121-200

## Coalescing Filters

Designed for paint spraying, instrumentation, controls and other applications where the delivered air must be free of oil and fine particles. Effective in removing 99.9% of oil aerosols. Also effective in removing debris particles down to .3 micron. Recommended for use in conjunction with an upstream filter to maximize the life of replacement element.

Port Size	Model	Filter Element	Flow* cfm	Bowl	Bowl Size	Drain	Max. Inlet Pressure
<b>1/8" &amp; 1/4" Port - ARO Module/Air 1000 Series</b>							
1/8"	F25111-300	Coalescing	15	Polycarbonate	1.0 oz.	Manual	200 PSIG
1/4"	F25121-300	Coalescing	17	Polycarbonate	1.0 oz.	Manual	200 PSIG
<b>1/4" &amp; 3/8" &amp; 1/2" Port - ARO Module/Air 2000 Series</b>							
1/4"	F25221-310	Coalescing	40	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
3/8"	F25231-310	Coalescing	51	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
1/2"	F25241-310	Coalescing	53	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
<b>3/4" &amp; 1" Port - ARO Super-Duty Series</b>							
3/4"	F25452-310	Coalescing	50	Metal w/sight glass	32 oz.	Manual	250 PSIG
1"	F25462-310	Coalescing	150	Metal w/sight glass	32 oz.	Manual	250 PSIG

\* Air Flow is at 90 PSI Inlet and 5 PSI pressure drop.



F25221-110



F25451-020

# Accessories

Part Number	Description	Part Number	Description
<b>ARO Module/Air 1000 Series</b>		<b>ARO Module/Air 2000 Series</b>	
29660-2	20 Micron Element	100031-1	40 Micron Element
29586	Coalescing Element	100032	Coalescing Element
104257	Service Kit	104068	Auto Drain Kit
104264	Auto Drain Kit	104204	Metal w/sight glass
104258	Polycarbonate Bowl	104176	Service Kit
104259	Composite Bowl	<b>ARO Super/Duty Series</b>	
		104119	40 Micron Element
		10423	Coalescing Element
		104116	Service Kit
		104068	Auto Drain
		104163	Sight Glass Kit

# Ordering



## Piggyback Filter/Regulators

Combined air filtration and regulation in a single, compact unit. Saves space for added system design flexibility. Piggyback Filter Regulators supplied with pressure gauge.

Port Size	Model	Pressure Range	Filter Element	Flow* cfm	Bowl	Bowl Size	Drain	Max. Inlet Pressure
<b>1/8" &amp; 1/4" Port - ARO Module/Air 1000 Series</b>								
1/8"	P29112-600	5-125 PSIG	20 Micron	12	Polycarbonate/Guard	1.0 oz.	Manual	200 PSIG
1/4"	P29122-600	5-125 PSIG	20 Micron	12	Polycarbonate/Guard	1.0 oz.	Manual	200 PSIG
<b>1/4" &amp; 3/8" &amp; 1/2" Port - ARO Module/Air 2000 Series</b>								
1/4"	P29221-610	5-125 PSIG	40 Micron	93	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
3/8"	P29231-610	5-125 PSIG	40 Micron	135	Metal w/sight glass	6.0 oz.	Manual	175 PSIG
1/2"	P29241-610	5-125 PSIG	40 Micron	140	Metal w/sight glass	6.0 oz.	Manual	175 PSIG

\* Air Flow is at 90 PSI Inlet and 5 PSI pressure drop.



P29122-600

P29221-610

# Accessories

## ARO Module/Air 2000 FRL Components

### A. Threaded Pipe Adapters - Model 104168 ( )

Pipe adapters allow a single component or assembled combo to be removed for service without disturbing hard piping. Also allows for different pipe diameters (in and out) in the plumbing installation. Kit includes two adapters and two spacer kits.

Port Size	Model
1/4"	104168-2
3/8"	104168-3
1/2"	104168-4
3/4"	104168-5



### B. Safety Shutoff, Lockout Valve - Model 104174 ( )

Exhaust-type safety shutoff valve can be used in either amodular arrangement, with out FRLs or as a stand alone unit. Should be installed upstream from the FRL, and is ideal for isolating and depressurizing a downstream unit requiring maintenance. Valve may be locked in the exhaust position.

Port Size	Model
1/4"	104174-2
3/8"	104174-3
1/2"	104174-4



104174-2

### C. Modular Spacer Kit - Model 104167

One spacer kit is required to connect any two components or accessories. Kit includes the spacer block, two clamps and two O-rings. Fits all port sizes.

104167



104171



### D. T-Type Wall Mounting Bracket - Model 104171

T-Type Brackets provide heavy duty wall mounting of a single unit or multiple units in a modular arrangement. Kit includes a spacer, bracket and clamp.

### E. Modular Manifold Block - Model 104170

Provides four additional 1/4" NPT ports for greater circuit design flexibility. Kit includes manifold, two spacer kits and three hole plugs.



104170



104172

### F. Wall Mounting Kit - Model 104172

May be used to mount FRL combo units which include a regulator, "Piggyback" Filter/Regulator units, or individual regulators. Kit includes Model 29623 Bracket and Model 104173 Panel Mounting Nut. Bracket and Nut may be ordered individually.

# Air Line Relieving Regulators

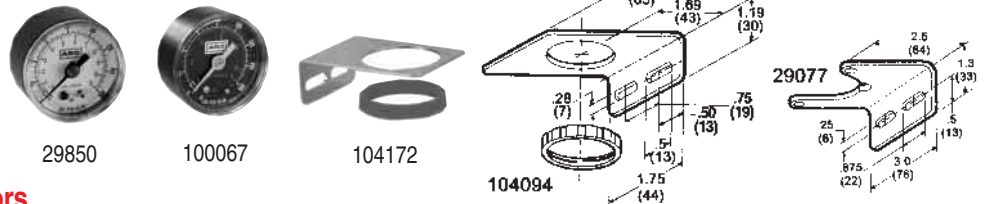
Provide controlled, consistent air pressure as required for specific pneumatic equipment connected to the compressed air system. Relieving models vent downstream overpressure. Available spring options enable convenient pressure range conversions as requirements change. Unit supplied with gauge.



Port Size	Model	Pressure Range	Flow* cfm	Gauge Port	Max. Inlet Pressure
<b>1/8" &amp; 1/4" Port - ARO Module/Air 1000 Series</b>					
1/8"	R27111-600	0-125 PSIG	13	1/8"	250 PSIG
1/4"	R27121-600	0-125 PSIG	13	1/8"	250 PSIG
<b>1/4" &amp; 3/8" &amp; 1/2" Port - ARO Module/Air Series</b>					
1/4"	R27221-600	5-125 PSIG	105	1/4"	200 PSIG
3/8"	R27231-600	5-125 PSIG	106	1/4"	200 PSIG
1/2"	R27241-600	5-125 PSIG	125	1/4"	200 PSIG
<b>1/2" &amp; 3/4" &amp; 1" Port - ARO Heavy-Duty Series</b>					
1/2"	27344-600	5-125 PSIG	256	1/4"	250 PSIG
3/4"	27354-600	5-125 PSIG	287	1/4"	250 PSIG
1"	27364-600	5-125 PSIG	293	1/4"	250 PSIG

\* Air Flow is at 90 PSI Inlet and 5 PSI pressure drop.

# Accessories



## Air Line Relieving Regulators

### ARO Module/Air 1000 Series

Part Number	Description
29846	Gauge, 0-15 PSIG
29863	Gauge, 0-60 PSIG
29850	Gauge, 0-160 PSIG
100095-160	Gauge, 0-150 PSIG
29668	Mounting Bracket
104094	Panel Mounting Nut
104255	Service Kit, Relieving Models

### ARO Module/Air 2000 Series

Part Number	Description
100067	Gauge, 0-160 PSIG
104172	Wall Mount Kit (Includes Bracket & Panel Nut)
104173	Panel Mounting Nut
104175	Tamper Resistant Kit
104178	Service Kit, Relieving Models
29728	Gauge, 0-160 PSIG

### ARO Super-Duty Series

Part Number	Description
100067	Gauge, 0-160 PSIG
100083	Gauge, 0-300 PSIG
104020	Service Kit
29077	Wall Mounting Bracket

# Soft Start Valve

- Extends Component Life** - The new Soft Starts remove the banging and component damage that air supply surge causes.
- Enhanced Operator Safety** - With the Module/Air Quick-Relief feature, machine component shut-down (planned or emergency) is immediate and complete-avoiding unexpected motion and resulting operator harm or component damage.
- Module/Air 2000™ - Ready:** The ARO Soft Start Valves are designed for quick and easy in-line installation with our Module/Air 2000 air prep units.
- Solenoid Soft Start With Quick-Relief Exhaust:** Solenoid actuation and manual override features are coupled with a Quick-Relief exhaust capability that instantly releases pressure to atmosphere through the bottom of the valve permitting rapid system shut-down.



# Ordering

Used for Solenoid Type Only

S
S
V
2
X
X
-
X
X
X
-
X

<p><b>Module/Air Soft Start Valve</b></p> <p><b>Port Size</b></p> <p>2 - 1/4"</p> <p>3 - 3/8"</p> <p>4 - 1/2"</p>	<p><b>Valve Type</b></p> <p>1 - Pilot*</p> <p>2 - Solenoid</p> <p>3 - Solenoid w/ Exhaust</p>	<p><b>Voltage</b></p> <p>012 - 12 Volt</p> <p>024 - 24 Volt</p> <p>120 - 120 Volt</p> <p>240 - 240 Volt</p> <p>000 - No Coil</p>	<p><b>Current</b></p> <p>A - AC</p> <p>D - DC</p> <p>N - No Coil</p>
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\* Model number ends here on pilot model



# Ordering

## Fog-Type Lubricators

Help ensure that pneumatic devices receive the required lubrication to maintain operating performance, reduce wear and prolong service life. They are designed to provide the correct amount of oil needed for most general applications in a pneumatic system, delivering a constant ratio of oil to CFM. Precise oil feed adjustment allows the proper oil delivery rate.

Lubricators should be installed close to the downstream application to ensure effective distribution of oil to the pneumatic components.

Port Size	Model	Flow* cfm	Bowl	Bowl Size	Max. Inlet Pressure
<b>1/8" &amp; 1/4" Port - ARO Module/Air 1000 Series</b>					
1/8"	L26111-100	41	Polycarbonate/Guard	1.0 oz.	200 PSIG
1/4"	L26121-100	60	Polycarbonate/Guard	1.0 oz.	200 PSIG
<b>1/4" &amp; 3/8" &amp; 1/2" Port - ARO Module/Air Series</b>					
1/4"	L26221-110	75	Metal w/sight glass	6.0 oz.	175 PSIG
3/8"	L26231-110	100	Metal w/sight glass	6.0 oz.	175 PSIG
1/2"	L26241-110	110	Metal w/sight glass	6.0 oz.	175 PSIG
<b>3/4" &amp; 1" Port - ARO Super-Duty Series</b>					
3/4"	L26451-110	190	Metal w/sight glass	32 oz.	250 PSIG
1"	L26461-110	200	Metal w/sight glass	32 oz.	250 PSIG

\* Air Flow is at 90 PSI Inlet and 5 PSI pressure drop.



L26121-100



L26221-110



L26451-110

# Accessories

## Lubricator

Part Number	Description
<b>ARO Module/Air 1000 Series</b>	
104181	Service Kit
104260	Polycarbonate Bowl
104261	Composite Bowl
104262	Mounting Bracket
<b>ARO Module/Air 2000 Series</b>	
104176	Service Kit
104205	Metal Bowl w/sight Glass
<b>ARO Super-Duty Series</b>	
104023	Service Kit
104163	Sight Glass Kit

## Air Line Lubricator Oil

ARO Lubricating Oil is recommended for use with pneumatic power tools, motors, valves, cylinders and hoists. It is specially formulated for use in air line lubricators. Proper and regular lubrication helps ensure longer, trouble-free operation by reducing wear, saving power and cutting equipment maintenance costs.

ARO Lubricating Oil is available in 1-quart containers and may be ordered by specifying part number 29665. (Available in cases of 12).

- Viscosity:** 100-200 S.S.U. @ 100°F (38° C) min. aniline point of 200°F (93°C)
- Class:** II Lubricant
- Approx. SEA No:** Light SAE 10, non-detergent.



29665

# Accessories

## OSHA Approved Safety Blow Guns

Safety Blow Guns are designed to prevent pressure buildup above 29 PSIG if the nozzle is obstructed which meets OSHA requirement 29 CFR1910.242 (b).

Body	Model	Tip	Throttle	Max. Inlet Pressure	Temperature Range	Inlet NPT	Weight
Composite	8440	Standard	Lever	180 PSI	32° to 175° F	1/4"	2.7 oz.
Metal	8451-1	Standard	Lever	180 PSI	32° to 175° F	1/4"	2.7 oz.



8440



8451-1

## Tool Suspension Balancer

Compact, rugged balancer features center-pull design for smooth performance. Adjustable spring tension to accommodate weight of suspended equipment. Adjustable cable clamp sets length of travel. Ideal for use with small to medium power tools, small fixtures, pendent stations and air hoses.

Model	Capacity	Working Cable Length	Dimensions	
			Hook to Hook	Width
7472	3 to 5 lbs.	8.0 ft.	10.5 in.	5.4 in.
7072	6 to 10 lbs.	8.0 ft.	14.0 in.	8.1 in.
7072-15	11 to 15 lbs.	8.0 ft.	14.0 in.	8.1 in.



7072 / 7072-15



7472

## 5 Year Warranty

IR/ARO warrants to the user purchaser of the ARO products depicted in this catalog that the products be free of defects in material and workmanship for a period of five (5) years from the date of purchase.

ARO will repair or replace, at its election, any product which is found upon its inspection to be defective during the period prescribed above. The product must be shipped prepaid to ARO factory or ARO Customer Service Center together with proof of purchase.

This warranty does not apply to failures or defects occurring as a result of abuse, misuse, negligent repairs, corrosion, erosion and normal wear and tear.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT TITLE), EXPRESSED OR IMPLIED, AND THERE ARE NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE IS INTENDED OR MADE .

THE REMEDIES OF THE USER PURCHASER SET FORTH UNDER THE WARRANTY OUTLINED ABOVE ARE EXCLUSIVE AND THE TOTAL LIABILITY OF ARO WITH RESPECT TO THIS TRANSACTION, WHETHER BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE SHALL NOT EXCEED THE PURCHASE PRICE OF THE PRODUCT.

ARO SHALL IN NO EVENT BE LIABLE TO THE USER PURCHASER FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR PUNITIVE DAMAGES ARISING OUT OF THIS TRANSACTION, OR ANY BREACH THEREOF, WHETHER OR NOT SUCH LOSS OR DAMAGE IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE.



# 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

Cellulube No. 150 & 220  
 Haskel No. 568-023  
 Houghton & Co. Oil No. 1120,  
 No. 1130, No. 1055  
 Houtosafe 1000  
 Kano Kroil  
 Keystone Penetrating Oil No. 2  
 & No. 500 Oils  
 Marvel Mystery Oil

### COMPRESSOR OILS

Phrano  
 Pydraul AC  
 Sears Regular Motor Oil  
 Sinclair Oil "Lily White"  
 Skydrol  
 Tenneco Anderol No. 495

### OTHER MATERIALS

Garlock No. 98403 (Polyurethane)  
 Parco No. 3106 (Neoprene)  
 Some Loctite Compounds  
 Stillman No. SR269-75  
 (Polyurethane)  
 Stillman No. SR513-70 (Neoprene)

**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

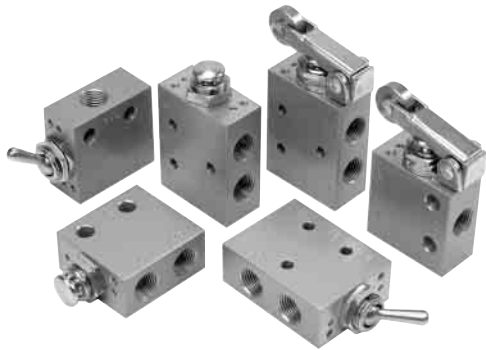
To obtain information or to receive technical literature for specific valves: contact ARO Customer Service at (800) 495-0276 or contact your nearest Aro distributor. Refer to the Service Kit Director for Valves and Cylinders form #9326-M, available from Aro. Selected parts are provided in kit form. The 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.

<u>Operator's Manual</u>	<u>Part Number</u>
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



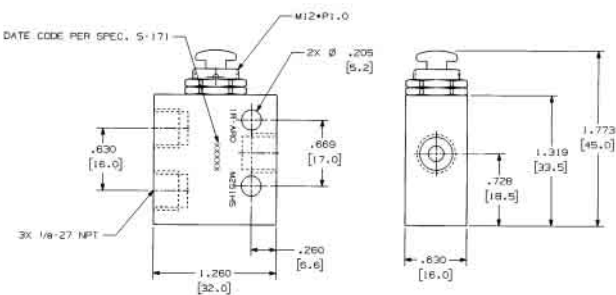
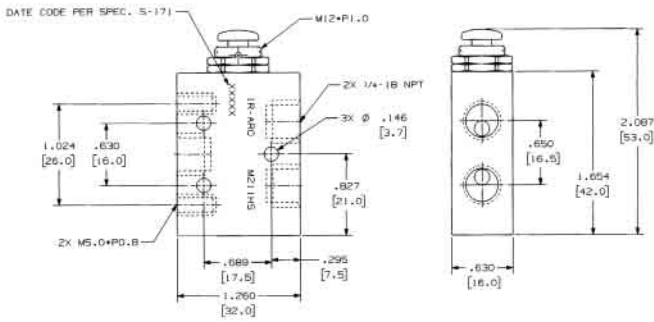


# Dimensional Information



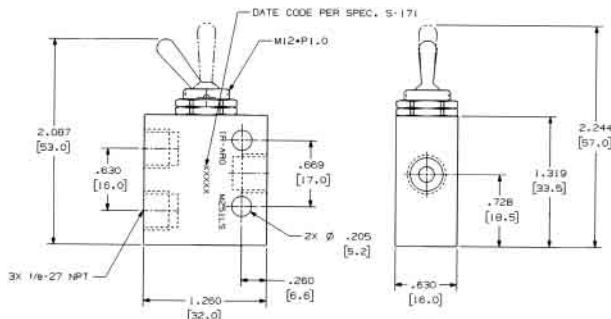
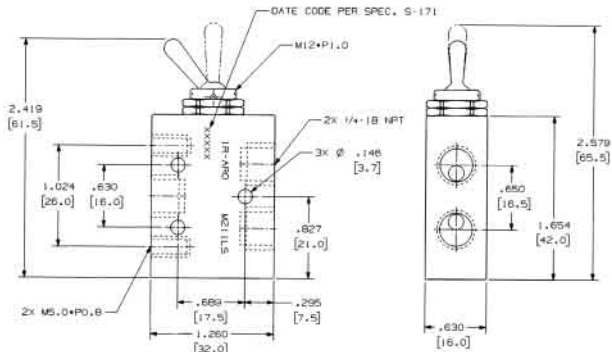
**M211HS** 4-Way, Push Button, Spring Return

**M251HS** 3-Way, Push button, Spring Return



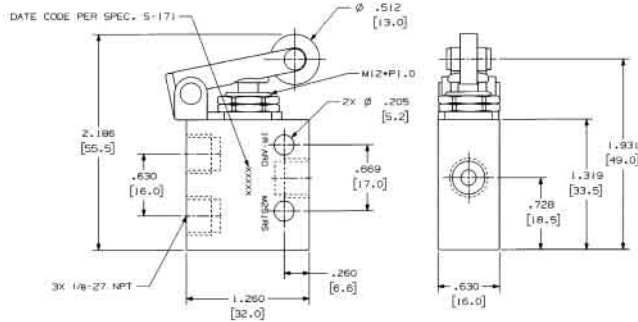
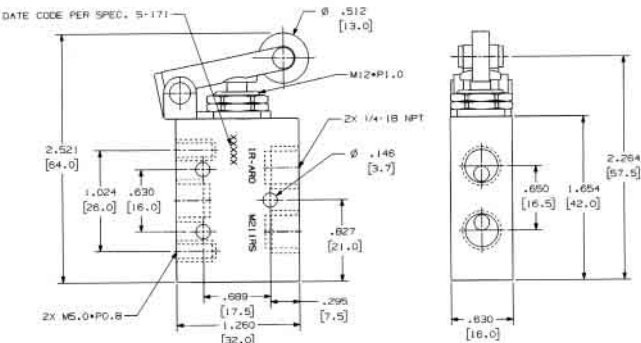
**M211LS** 4-Way, Toggle, Maintained

**M251LS** 3-Way, Toggle, Maintained



**M211RS** 4-Way, Roller, Spring Return

**M251RS** 3-Way, Roller, Spring Return

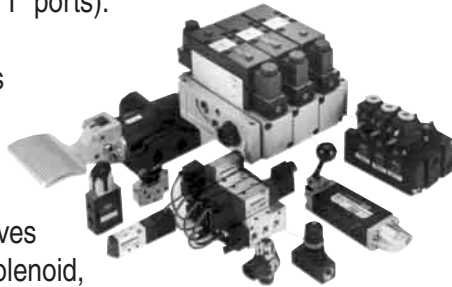


# ***Notes***



## **Pneumatic Valves**

- ISO valves - 1/4" and 3/8" ports.
- In-line Manifold valves and spool valves (Body, sub-base, and stacking styles 10/32" to 1" ports).  
Genesis EasyWire Valve  
Communication Systems  
(Parallel, Serial, and DeviceNet).
- Miniature, Flow Control Valves, and Circuitry Valves - mechanical, manual, solenoid, and pilot operated.



## **Pneumatic Cylinders**

- Repairable NFPA-Interchangeable Cylinders (1-1/2" to 8" bore sizes) and Round Line Cylinders (1-1/2" to 4" bore sizes).
- Disposable Cylinder - 1/2" to 1-1/2" bore sizes.
- A wide selection of attachable mounts.



## **Pneumatic Logic Controls**

- Self-contained for sequentially controlled machines and custom-designed Circuit Board Construction from stock components.
- Wide selection of panel-mounted controls, indicators, counters and timers, sensing devices and enclosures.



## **Air Line Accessories**

- Air line filters, regulators, and lubricator 1/8" to 1-1/2" ports.
- Module/Air 1000 1/8" - 1/4".
- Module/Air 2000 1/4", 3/8" - 1/2".
- Heavy Duty 1/2", 3/4" - 1".
- Super Duty 3/4", 1", 1 1/4", 1 1/2", 2".
- Safety blow guns.
- Tool suspension balancers and coil hose.



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