



Valvair Manual Spool Valves

***Air Pilot, Manual &
Mechanically Actuated***

*Catalog VAL-MO-E/USA
April 2004*





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Offer of Sale

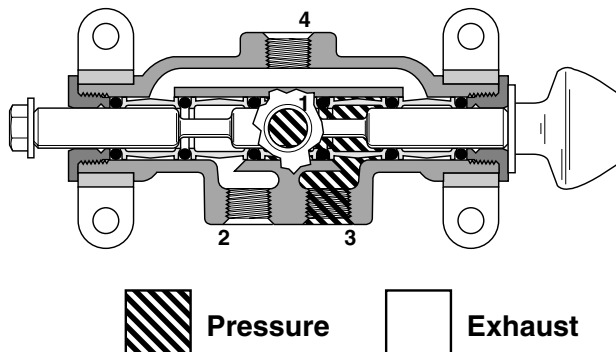
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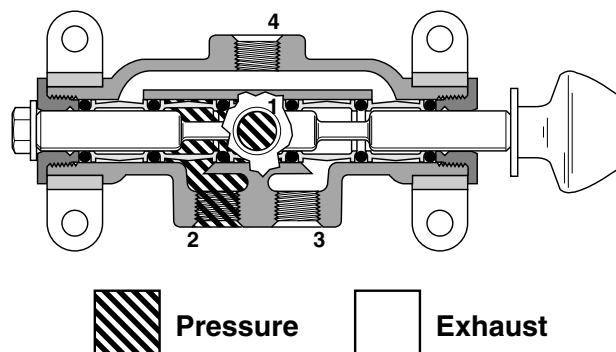
Features	2
Model Numbering System	3
Manually Operated Valves	
Knob Operated, Manual Return	4-5
Knob & Palm Button Operated, Spring Return	6-7
Panel Mounted Knob Operated, Manual Return	8-9
Panel Mounted Knob & Palm Button Operated, Spring Return	10-11
Lever Operated, Manual Return	12-13
Lever Operated, Spring Return	14-15
Treadle Operated, Manual Return	16-17
Pedal Operated, Spring Return	18-19
Mechanically Operated Valves	
Clevis Operated, Manual Return	20-21
Clevis Operated, Spring Return	22-23
Single Diaphragm, Spring Return	24-25
Double Diaphragm	26-27
Single Cylinder, Spring Return	28-29
Double Cylinder	30-31
Cam Operated	32-33
Detent Valves	
2-Position, Knob & Panel Mounted Knob Operated	34-35
2-Position Lever & Treadle Operated	36-37
3-Position Knob, Lever & Clevis Operated	38-39
Spring Centered Valves	
3-Position Knob, Lever & Clevis Operated	40-41
3-Position Treadle & Double Acting Cylinder Operated	42-43
Lockout Valves	
Electrical Enclosure (1/2" To 1" Ports)	44-45
Knob & Lever Operated (1/4" To 1" Ports)	46-47
Parts	
Manual & Mechanical Operators	48-49
Pneumatic Operators	50-51
End Sections	52-53
Body Sections	54-55
Electrical Lock-out Parts	56
Accessories & Service Kits	57
Engineering Data	58-60
MO Series Manual Valve Model Number Code	61-66
Offer Of Sale	67

- 1/4" to 1" NPTF ports (to 1-1/2" in lock-out).
- Corrosion resistant bronze body*.
- High flow brass spacers* position O-ring, permit reverse piping and vacuum service.
- Specially compounded O-rings suitable for non-lube air service and low pressure oil service.
- Floating stem of hard chrome plated stainless steel; no metal to metal contact.
- Closed at crossover design for air savings.
- Piped exhaust convenient for muffling.
- Interchangeable operators:
 - Knob
 - Palm button
 - Lever
 - Clevis
 - Treadle
 - Pedal
 - Diaphragm
 - Cylinder
 - Cam follower
- Interchangeable end sections:
 - Stem stop
 - Reversible enclosed spring
 - Ball detent
 - Lock-out
 - Spring centered
- Service without disturbing plumbing.
- Dual mounting brackets on most models.

Default Position



Actuated Position



* 1-1/2" lockout valves use cast aluminum bodies, aluminum spacers and hard anodized stems.

Model Number Index

Manual Valves

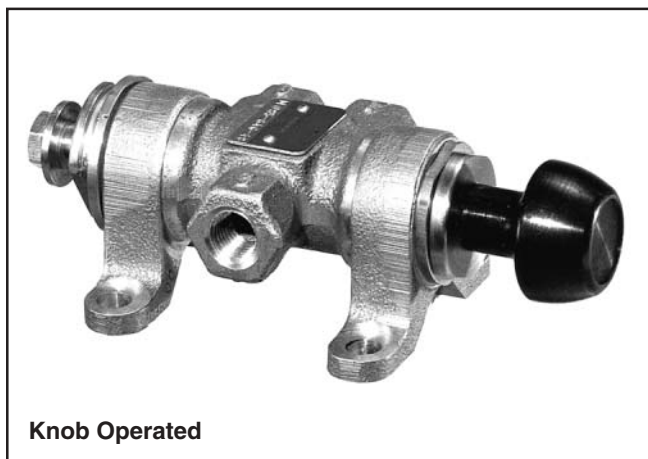
Air Pilot, Manual & Mechanical Valves

Valve Series	End Section (Non-Operating)	Size (Pipe)	Body / Function	End Section (Operating)																																																																																													
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Valve Series MO Basic Series	<table><tr><th>NPT</th><th>BSPP/G</th><th>BSPT/R</th><th>Port Size</th></tr><tr><td>2*</td><td>L*</td><td>A</td><td>1/4</td></tr><tr><td>3*</td><td>M*</td><td>B</td><td>3/8</td></tr><tr><td>4*</td><td>N*</td><td>C</td><td>1/2</td></tr><tr><td>6**</td><td>Q**</td><td>D</td><td>3/4</td></tr><tr><td>8**</td><td>S**</td><td>E</td><td>1</td></tr><tr><td>9</td><td>T</td><td>F</td><td>1-1/2</td></tr></table> * Not available with end section 60. ** Not available with end sections 16, 30, 31, 32, 33, 40, 42, 45, 47, 84, 88. Not available with 03 body section.	NPT	BSPP/G	BSPT/R	Port Size	2*	L*	A	1/4	3*	M*	B	3/8	4*	N*	C	1/2	6**	Q**	D	3/4	8**	S**	E	1	9	T	F	1-1/2		<table><tr><th colspan="2">Operating End Section</th></tr><tr><td>01</td><td>Ball Roller Cam</td></tr><tr><td>03</td><td>Cam follower</td></tr><tr><td>04</td><td>Clevis, large bracket</td></tr><tr><td>05</td><td>Clevis, small bracket</td></tr><tr><td>08</td><td>Male clevis eye, small bracket</td></tr><tr><td>13</td><td>Double acting cylinder</td></tr><tr><td>16</td><td>Double cylinder, large bracket</td></tr><tr><td>19</td><td>Double cylinder</td></tr><tr><td>23</td><td>Single cylinder, large bracket</td></tr><tr><td>26</td><td>Single cylinder</td></tr><tr><td>30*</td><td>Single diaphragm, std. spring</td></tr><tr><td>31*</td><td>Single diaphragm, heavy spring</td></tr><tr><td>32*</td><td>Single diaphragm, light spring</td></tr><tr><td>33*</td><td>Double diaphragm</td></tr><tr><td>35</td><td>Diaphragm, large top, std. spring</td></tr><tr><td>36</td><td>Diaphragm, large top, heavy spring</td></tr><tr><td>37</td><td>Diaphragm, large top light spring</td></tr><tr><td>39</td><td>Double diaphragm, large top</td></tr><tr><td>40*</td><td>Pedal</td></tr><tr><td>42**</td><td>Lever, inverted handle</td></tr><tr><td>43</td><td>Lever, mounting feet</td></tr><tr><td>45</td><td>Lever, in-line handle, foot bracket</td></tr><tr><td>46</td><td>Lever, in-line handle</td></tr><tr><td>47*</td><td>Knob, large bracket</td></tr><tr><td>48</td><td>Knob, small bracket</td></tr><tr><td>50</td><td>Knob less bracket</td></tr><tr><td>51</td><td>Knob, panel mounted</td></tr><tr><td>59</td><td>Palm button, panel mounted</td></tr><tr><td>70</td><td>Spring Center Neutral</td></tr><tr><td>88*</td><td>Treadle</td></tr><tr><td>90</td><td>Lever electrical enclosure lockout</td></tr><tr><td>99</td><td>Palm button</td></tr></table> * Not available with port sizes 6, Q, 8, S. ** Not available with port sizes 8, S.	Operating End Section		01	Ball Roller Cam	03	Cam follower	04	Clevis, large bracket	05	Clevis, small bracket	08	Male clevis eye, small bracket	13	Double acting cylinder	16	Double cylinder, large bracket	19	Double cylinder	23	Single cylinder, large bracket	26	Single cylinder	30*	Single diaphragm, std. spring	31*	Single diaphragm, heavy spring	32*	Single diaphragm, light spring	33*	Double diaphragm	35	Diaphragm, large top, std. spring	36	Diaphragm, large top, heavy spring	37	Diaphragm, large top light spring	39	Double diaphragm, large top	40*	Pedal	42**	Lever, inverted handle	43	Lever, mounting feet	45	Lever, in-line handle, foot bracket	46	Lever, in-line handle	47*	Knob, large bracket	48	Knob, small bracket	50	Knob less bracket	51	Knob, panel mounted	59	Palm button, panel mounted	70	Spring Center Neutral	88*	Treadle	90	Lever electrical enclosure lockout	99	Palm button
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Note: Shaded options have been discontinued. Refer to back of Catalog for Cross Reference Information.



CAUTION: Be sure to order end sections that are functionally effective with each other and with the body section selected. Model number combinations are possible which may not operate.



Function

Knob operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted and returned.
 2-Way valves are used for on-off control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Engineering Data.

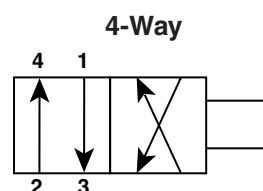
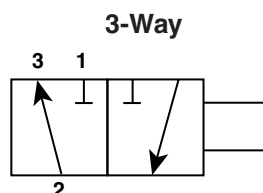
Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	200 (1380)	180 (1240)
	3/8	175 (1210)	170 (1170)
	1/2	160 (1100)	150 (1030)
	3/4	150 (1030)	150 (1030)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Symbols



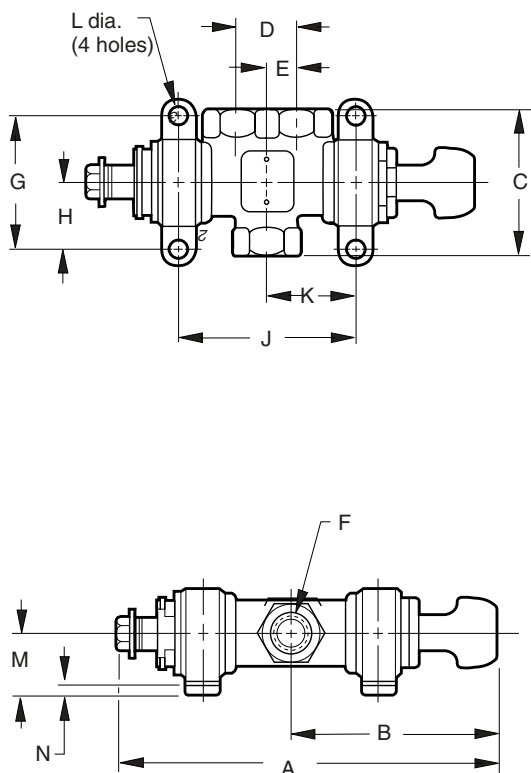
How to Order

Select valve model number from table for desired operation.

Example: Order M085 418 48 to obtain a 1/2" pipe ported 3-Way, 2 position, knob operated, manual return valve.

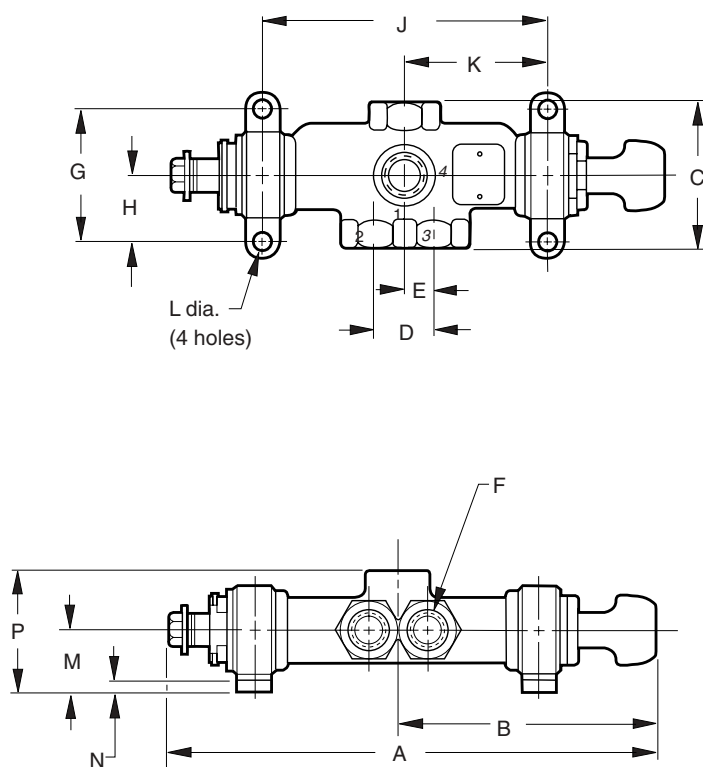
Description	Port Size	Model Number
3-Way Knob Manual Return	1/4	M085 218 48
	3/8	M085 318 48
	1/2	M085 418 48
	3/4	M085 618 48
4-Way Knob Manual Return	1/4	M085 246 48
	3/8	M085 346 48
	1/2	M085 446 48
	3/4	M085 646 48

3-Way

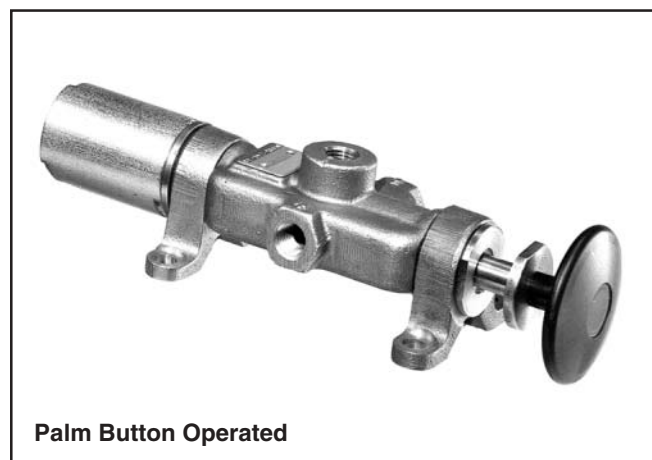


		1/4	3/8	1/2	3/4
A	inch	5.99	6.69	7.90	9.60
	mm	152.2	169.9	200.7	243.8
B	inch	3.32	3.64	4.17	4.99
	mm	84.3	92.5	105.9	126.8
C	inch	2.38	2.62	3.00	3.62
	mm	60.4	66.6	76.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25
	mm	57.2	60.4	66.6	82.6
H	inch	1.12	1.19	1.31	1.62
	mm	28.4	30.2	33.3	41.2
J	inch	2.64	3.14	3.73	4.67
	mm	67.1	79.8	94.7	118.6
K	inch	1.32	1.57	1.87	2.33
	mm	33.5	39.9	47.5	59.2
L	inch	.34	.34	.41	.41
	mm	8.6	8.6	10.4	10.4
M	inch	1.12	1.12	1.25	1.56
	mm	28.4	28.4	31.8	39.6
N	inch	.25	.25	.31	.31
	mm	6.4	6.4	7.9	7.9
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4

4-Way



		1/4	3/8	1/2	3/4
A	inch	7.49	8.53	10.01	12.31
	mm	190.2	216.7	254.2	312.7
B	inch	4.02	4.56	5.73	6.34
	mm	102.1	115.8	145.5	161.0
C	inch	2.38	2.62	3.12	3.62
	mm	60.4	66.6	79.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25
	mm	57.2	60.4	66.6	82.6
H	inch	1.12	1.19	1.31	1.62
	mm	28.4	30.2	33.3	41.2
J	inch	4.14	4.98	5.85	7.39
	mm	105.2	126.5	148.6	187.7
K	inch	2.07	2.49	2.93	3.69
	mm	52.6	63.2	74.4	93.7
L	inch	.34	.34	.41	.41
	mm	8.6	8.6	10.4	10.4
M	inch	1.12	1.12	1.25	1.56
	mm	28.4	28.4	31.8	39.6
N	inch	.25	.25	.31	.31
	mm	6.4	6.4	7.9	7.9
P	inch	2.12	2.18	2.63	3.06
	mm	53.8	55.4	66.8	77.7
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4



Palm Button Operated

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Engineering Data.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	200 (1380)	180 (1240)
	3/8	175 (1210)	170 (1170)
	1/2	160 (1100)	150 (1030)
	3/4	150 (1030)	150 (1030)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Knob or palm button operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control respectively. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

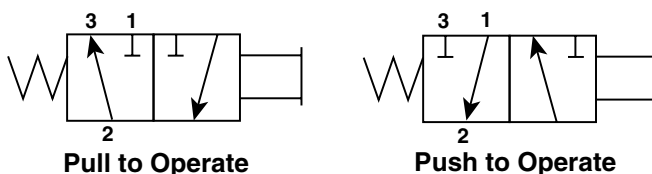
Features

Knob actuated valves are offered for Push or Pull to Operate. Palm button actuators are recommended for Push to Operate only. Enclosed spring end section is field convertible to opposite (Push or Pull) action.

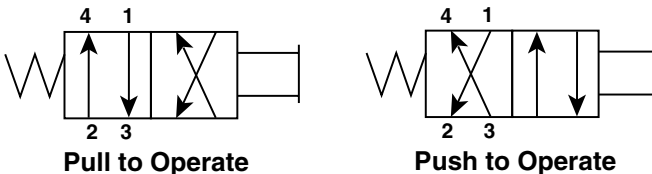
* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

Symbols

3-Way



4-Way



How to order

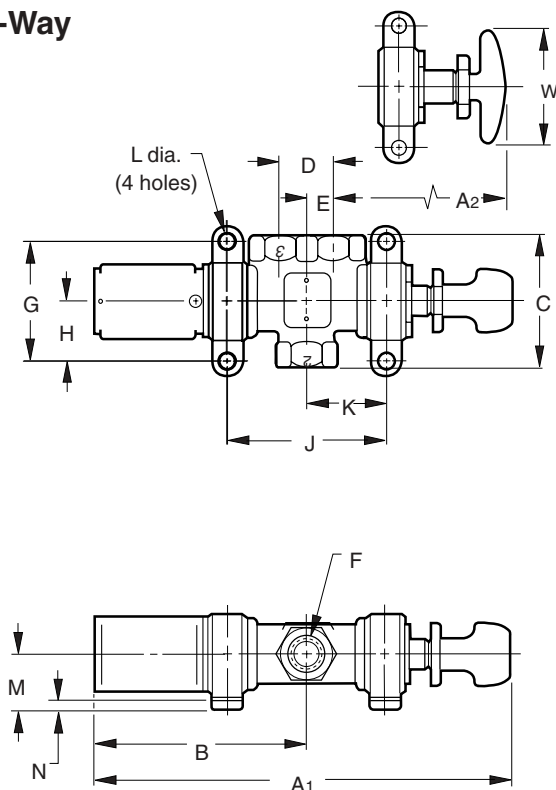
Select valve model number from tables for desired operation.

Example: Order M09734699 to obtain 3/8" pipe ported, 4-Way, 2-Position, palm button operated, spring return valve.

Description	Port Size	Model Number
3-Way Palm Button Push to Operate Spring Return	1/4	M098 218 99
	3/8	M098 318 99
	1/2	M098 418 99
	3/4	M098 618 99
4-Way Palm Button Push to Operate Spring Return	1/4	M098 246 99
	3/8	M098 346 99
	1/2	M098 446 99
	3/4	M098 646 99

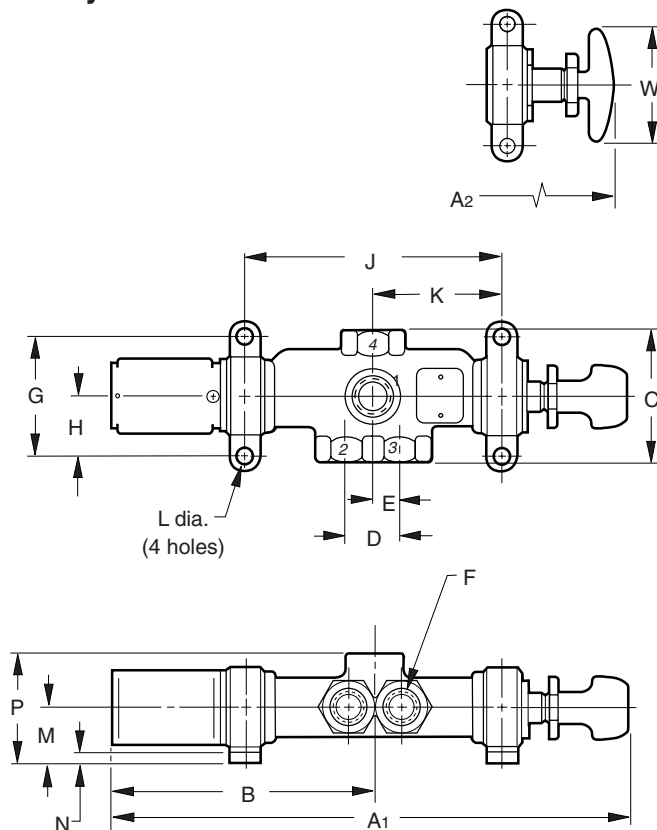
Description	Port Size	Model Number
3-Way Knob Push to Operate Spring Return	1/4	M098 218 48
	3/8	M098 318 48
	1/2	M098 418 48
	3/4	M098 618 48
4-Way Knob Push to Operate Spring Return	1/4	M098 246 48
	3/8	M098 346 48
	1/2	M098 446 48
	3/4	M098 646 48
3-Way Knob Pull to Operate Spring Return	1/4	M097 218 48
	3/8	M097 318 48
	1/2	M097 418 48
	3/4	M097 618 48
4-Way Knob Pull to Operate Spring Return	1/4	M097 246 48
	3/8	M097 346 48
	1/2	M097 446 48
	3/4	M097 646 48

3-Way

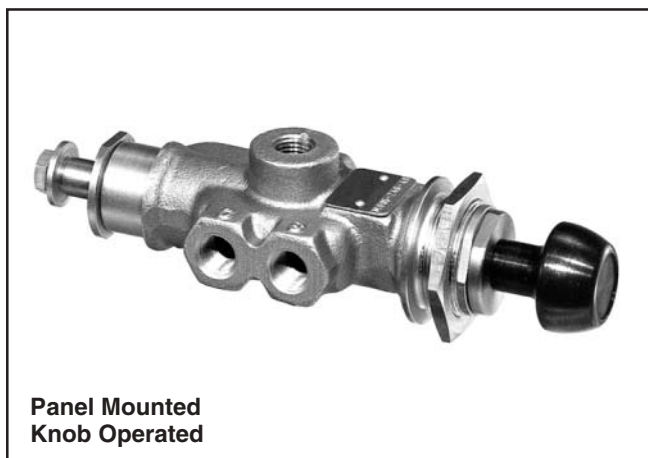


		1/4"	3/8"	1/2"	3/4"
A1	inch	7.86	8.55	10.36	13.01
	mm	199.8	217.2	263.1	330.4
A2	inch	7.55	8.24	10.05	12.70
	mm	191.8	209.3	255.3	322.6
B	inch	3.92	4.24	5.32	6.92
	mm	99.6	107.7	135.2	175.8
C	inch	2.38	2.62	3.00	3.62
	mm	60.4	66.6	76.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25
	mm	57.2	60.4	66.6	82.6
H	inch	1.12	1.19	1.31	1.62
	mm	28.4	30.2	33.3	41.2
J	inch	2.64	3.14	3.73	4.67
	mm	67.1	79.8	94.7	118.6
K	inch	1.32	1.57	1.87	2.33
	mm	33.5	39.9	47.5	59.2
L	inch	.34	.34	.41	.41
	mm	8.6	8.6	10.4	10.4
M	inch	1.12	1.12	1.25	1.56
	mm	28.4	28.4	31.8	39.6
N	inch	.25	.25	.31	.31
	mm	6.4	6.4	7.9	7.9
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4
W	inch	2.25	2.25	2.25	2.25
	mm	57.2	57.2	57.2	57.2

4-Way



		1/4"	3/8"	1/2"	1"
A1	inch	9.36	10.39	12.48	15.73
	mm	237.9	263.9	317.0	399.5
A2	inch	9.05	10.08	12.17	15.42
	mm	229.9	256.0	309.1	391.7
B	inch	4.67	5.15	6.37	8.27
	mm	118.5	130.8	161.8	210.1
C	inch	2.38	2.62	3.12	3.62
	mm	60.4	66.6	79.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25
	mm	57.2	60.4	66.6	82.6
H	inch	1.12	1.19	1.31	1.62
	mm	28.4	30.2	33.3	41.2
J	inch	4.14	4.98	5.85	7.39
	mm	105.2	126.5	148.6	187.7
K	inch	2.07	2.49	2.93	3.69
	mm	52.6	63.2	74.4	93.7
L	inch	.34	.34	.41	.41
	mm	8.6	8.6	10.4	10.4
M	inch	1.12	1.12	1.25	1.56
	mm	28.4	28.4	31.8	39.6
N	inch	.25	.25	.31	.31
	mm	6.4	6.4	7.9	7.9
P	inch	2.12	2.18	2.63	3.06
	mm	53.8	55.4	66.8	77.7
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4
W	inch	2.25	2.25	2.25	2.25
	mm	57.2	57.2	57.2	57.2



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Engineering Data.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	200 (1380)	180 (1240)
	3/8	175 (1210)	170 (1170)
	1/2	160 (1100)	150 (1030)
	3/4	150 (1030)	150 (1030)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Hole Size and Maximum Panel Thickness

Valve Size	Dia. Hole in Panel	Greenlee Chassis Punch Set No.		Max. Panel Thickness
		Control No.	Cat. No.	
1/4	1.50	500 2421.3	730	0.36
3/8	1.62	500 2422.1	730	0.48
1/2	1.88	500 2424.8	730	0.58
3/4	2.25	500 2427.2	730	0.76

NOTE: Punch set listed is recommended for up to 16 Ga. metal. Thicker panel should be bored or saw cut.

How to Order

Select valve model number from table for desired operation.

Example: Order M087 618 51 to obtain a 3/4" pipe ported, 3-Way, 2-Position, knob operated, manual return valve for panel mounting.

Function

Knob operated 2-Way*, 3-Way and 4-Way, 2-Position control valves for panel mounting, manually shifted and returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control respectively. For other functions, see Optional Functions page.



Install guards on all hand operated valves if accidental operation can cause personal injury.

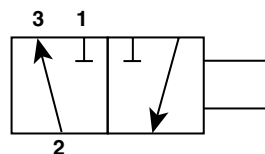
Features

Universal panel mounting adaptor adjusts to varying panel thickness to hold valve securely. Maximum panel thickness and appropriate Greenlee Punch Number are listed in table below left.

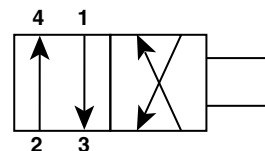
* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of chart on Optional Functions page.

Symbols

3-Way

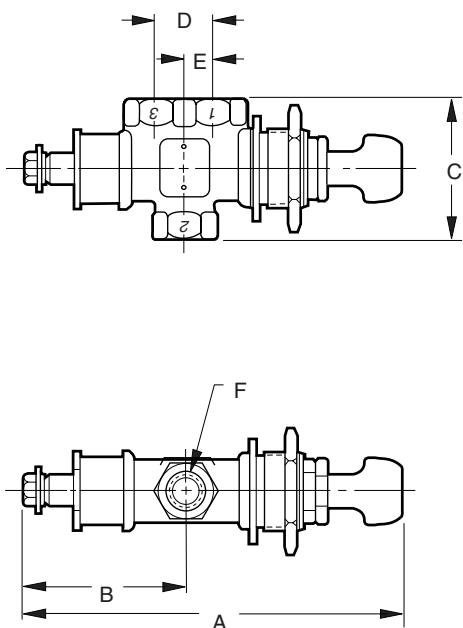


4-Way



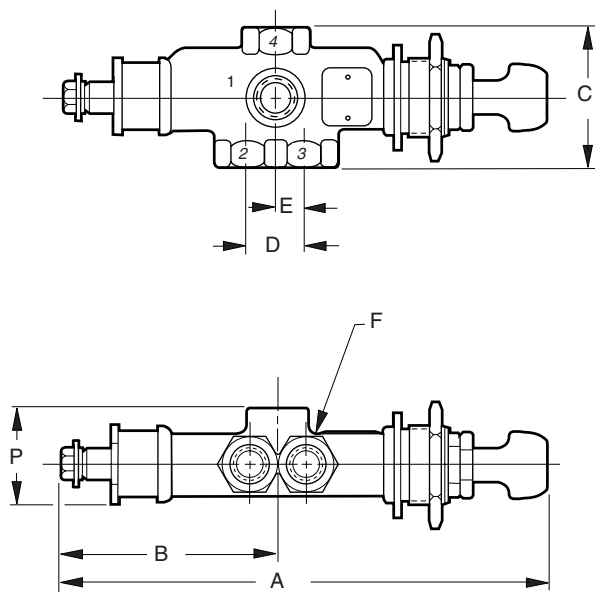
Description	Port Size	Model Number
3-Way Knob Operated Panel Mounted Manual Return	1/4	M087 218 51
	3/8	M087 318 51
	1/2	M087 418 51
	3/4	M087 618 51
4-Way Knob Operated Panel Mounted Manual Return	1/4	M087 246 51
	3/8	M087 346 51
	1/2	M087 446 51
	3/4	M087 646 51

3-Way

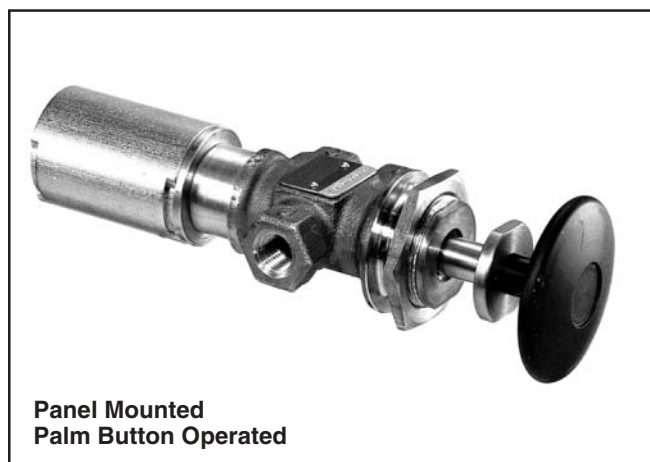


		1/4	3/8	1/2	3/4
A	inch	6.00	6.68	8.91	9.24
	mm	152.4	169.6	226.2	234.6
B	inch	2.68	3.06	4.85	4.62
	mm	68.1	77.7	123.2	117.3
C	inch	2.38	2.62	3.00	3.62
	mm	60.4	66.6	76.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
		Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4

4-Way



		1/4	3/8	1/2	3/4
A	inch	7.49	8.52	11.03	11.95
	mm	190.2	216.4	280.2	303.6
B	inch	3.42	3.97	5.91	5.97
	mm	86.9	100.8	150.1	151.6
C	inch	2.38	2.62	3.12	3.62
	mm	60.4	66.6	79.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
		Pipe	Pipe	Pipe	Pipe
P	inch	2.12	2.18	2.63	3.06
	mm	53.8	55.4	66.8	77.7
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Engineering Data.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	200 (1380)	180 (1240)
	3/8	175 (1210)	170 (1170)
	1/2	160 (1100)	150 (1030)
	3/4	150 (1030)	150 (1030)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Knob operated 2-Way*, 3-Way and 4-Way, 2-Position control valves for panel mounting, manually shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control respectively. For other functions, see Optional Functions page.



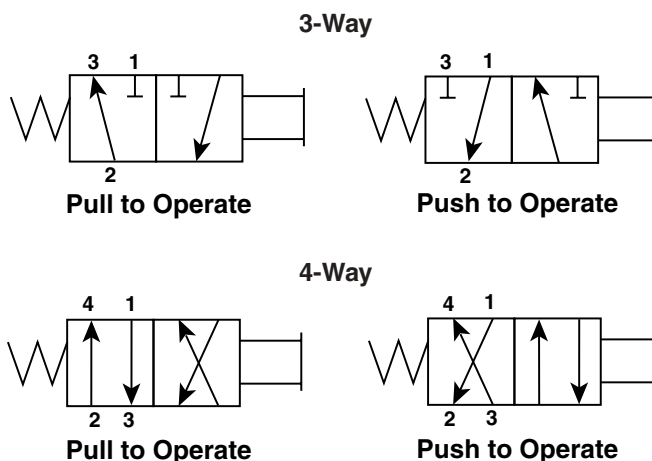
Install guards on all hand operated valves if accidental operation can cause personal injury.

Features

Enclosed spring end section is field convertible to opposite (Push or Pull) action. Universal panel mounting adaptor adjusts to varying panel thickness to hold valve securely. Maximum panel thickness and appropriate Greenlee Punch Number are listed in table on page 6.

*For 2-Way normally open or normally closed service, use 3-Way valve plugging appropriate port per Section A of chart on Optional Functions page for Push to Operate and Section B of the chart for Pull to Operate.

Symbols

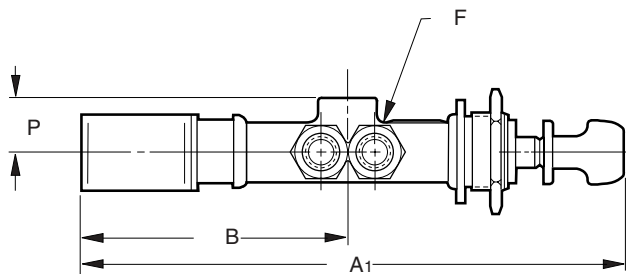
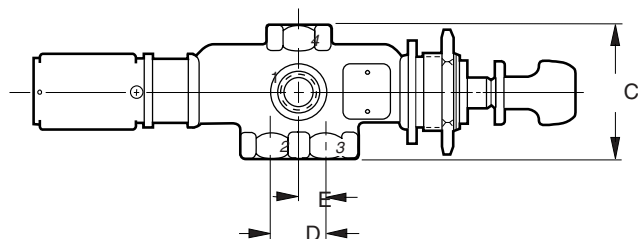
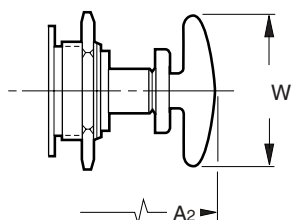
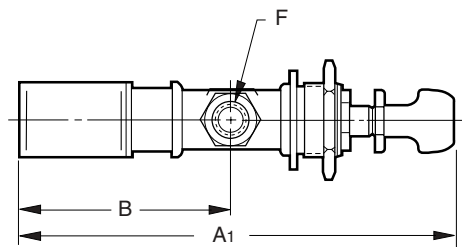
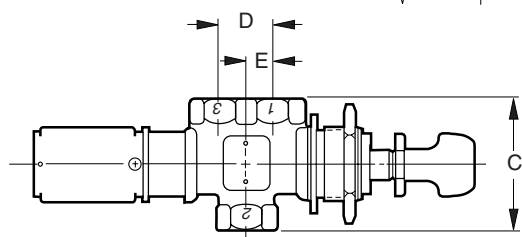
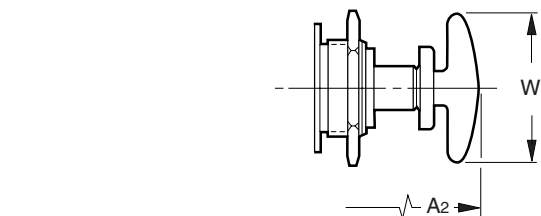


How to Order

Select valve model number from tables for desired operation. Example: M065 246 59 to obtain a 1/4" pipe ported, 4-Way, 2-Position, palm button operated, spring return valve for panel mounting.

Description	Port Size	Model Number
3-Way Palm Button Push to Operate Panel Mounted	1/4	M065 218 59
	3/8	M065 318 59
	1/2	M065 418 59
	3/4	M065 618 59
4-Way Palm Button Push to Operate Panel Mounted	1/4	M065 246 59
	3/8	M065 346 59
	1/2	M065 446 59
	3/4	M065 646 59

Description	Port Size	Model Number
3-Way Knob Push to Operate Panel Mounted	1/4	M065 218 51
	3/8	M065 318 51
	1/2	M065 418 51
	3/4	M065 618 51
4-Way Knob Push to Operate Panel Mounted	1/4	M065 246 51
	3/8	M065 346 51
	1/2	M065 446 51
	3/4	M065 646 51
3-Way Knob Pull to Operate Panel Mounted	1/4	M064 218 51
	3/8	M064 318 51
	1/2	M064 418 51
	3/4	M064 618 51
4-Way Knob Pull to Operate Panel Mounted	1/4	M064 246 51
	3/8	M064 346 51
	1/2	M064 446 51
	3/4	M064 656 51



		1/4	3/8	1/2	3/4
A1	inch	7.86	8.55	10.36	13.01
	mm	199.6	217.1	263.1	330.4
A2	inch	7.55	8.24	10.05	12.70
	mm	191.8	209.3	255.3	322.6
B	inch	3.96	4.23	5.31	6.91
	mm	99.5	107.4	134.9	175.5
C	inch	2.38	2.62	3.00	3.62
	mm	60.4	66.6	76.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
		Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4
W	inch	2.25	2.25	2.25	2.25
	mm	57.2	57.2	57.2	57.2

		1/4	3/8	1/2	3/4
A1	inch	9.36	10.39	12.48	15.73
	mm	237.7	263.9	317.0	399.5
A2	inch	9.05	10.08	12.17	15.42
	mm	229.9	256.0	309.1	391.7
B	inch	4.67	5.15	6.37	8.27
	mm	118.5	130.8	161.8	210.1
C	inch	2.38	2.62	3.12	3.62
	mm	60.4	66.6	79.2	92.0
D	inch	.94	1.06	1.25	1.62
	mm	23.9	26.9	31.8	41.2
E	inch	.47	.53	.62	.81
	mm	11.9	13.5	15.8	20.6
F		1/4"	3/8"	1/2"	3/4"
		Pipe	Pipe	Pipe	Pipe
P	inch	2.12	2.18	2.63	3.06
	mm	53.8	55.4	66.8	77.7
Travel	inch	.62	.69	.88	1.12
	mm	15.7	17.5	22.4	28.4
W	inch	2.25	2.25	2.25	2.25
	mm	57.2	57.2	57.2	57.2



Function

Lever operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

 *Install guards on all hand operated valves if accidental operation can cause personal injury.*

** For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on Optional Functions page.*

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

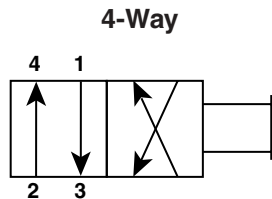
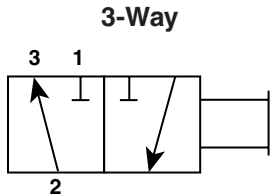
Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Symbols



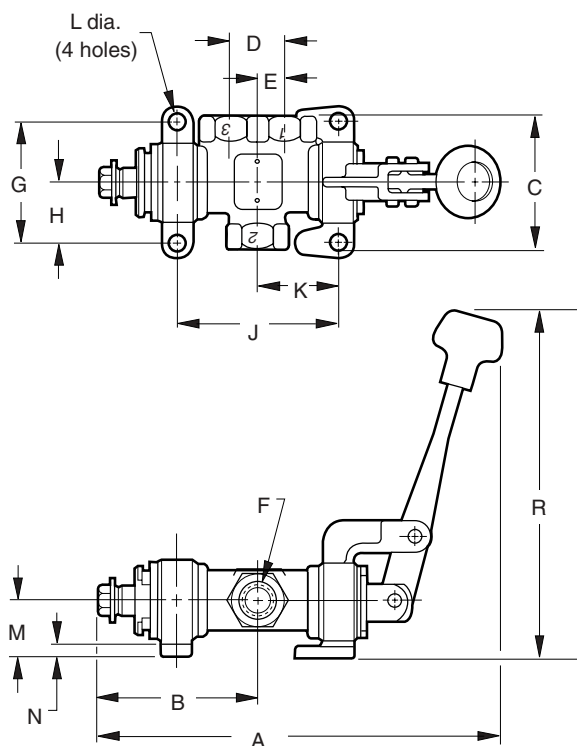
How to Order

Select valve model number from table for desired operation.

Example: Order M085 818 43 to obtain a 1" pipe ported 3-Way, 2-Position, lever operated, manual return valve.

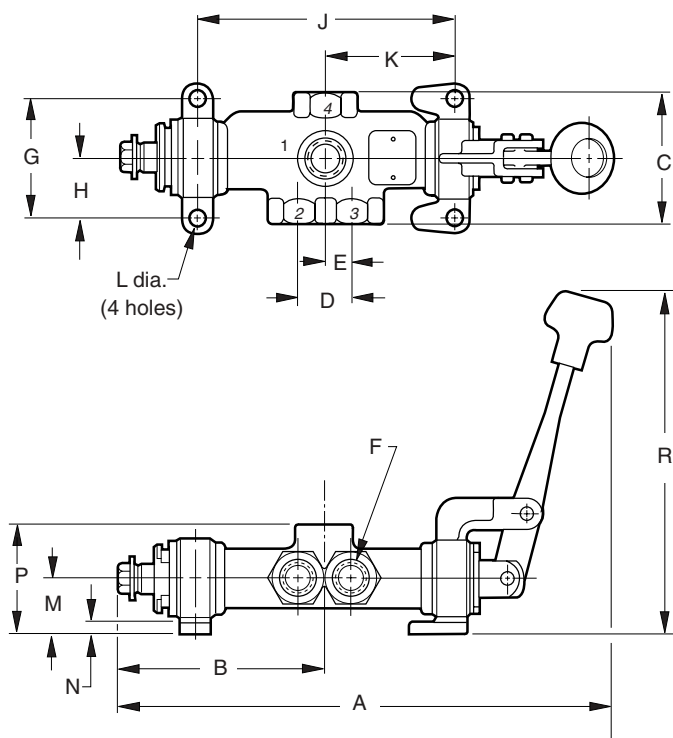
Description	Port Size	Model Number
3-Way Lever Operated Manual Return	1/4	M085 218 43
	3/8	M085 318 43
	1/2	M085 418 43
	3/4	M085 618 43
	1	M085 818 43
4-Way Lever Operated Manual Return	1/4	M085 246 43
	3/8	M085 346 43
	1/2	M085 446 43
	3/4	M085 646 43
	1	M085 846 43

3-Way

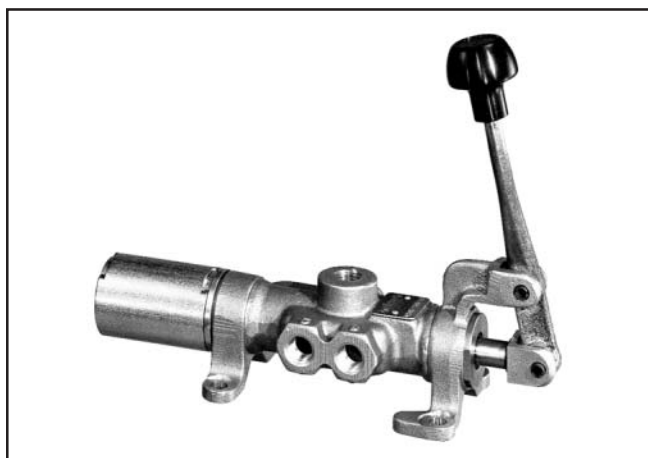


		1/4	3/8	1/2	3/4	1
A	inch	6.77	7.76	9.29	11.46	12.34
	mm	172.0	197.1	236.0	291.1	313.4
B	inch	2.67	3.05	3.72	4.61	5.13
	mm	67.8	77.5	94.5	117.1	130.3
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.7	17.5	22.4	28.4	31.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	8.28	9.60	11.08	14.17	15.52
	mm	210.3	243.8	281.4	359.9	394.2
B	inch	3.42	3.97	4.78	5.97	6.71
	mm	86.9	100.8	121.4	151.6	170.4
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.7	17.5	22.4	28.4	31.8



Function

Lever operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

Features

Lever operated valves are offered for Push or Pull to Operate. Enclosed spring end section is field convertible to opposite (Push or Pull) action.

** For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on Optional Functions page.*

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

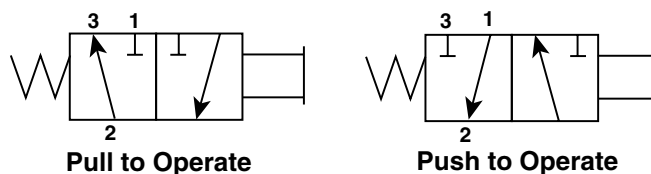
Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

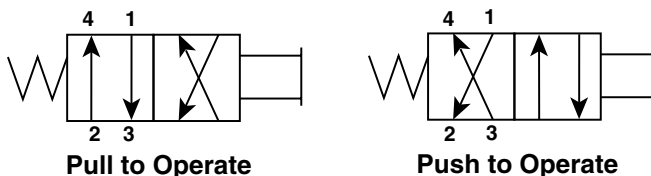
‡ For compatible inert gas and hydraulic media, see Engineering Data.

Symbols

3-Way



4-Way



How to Order

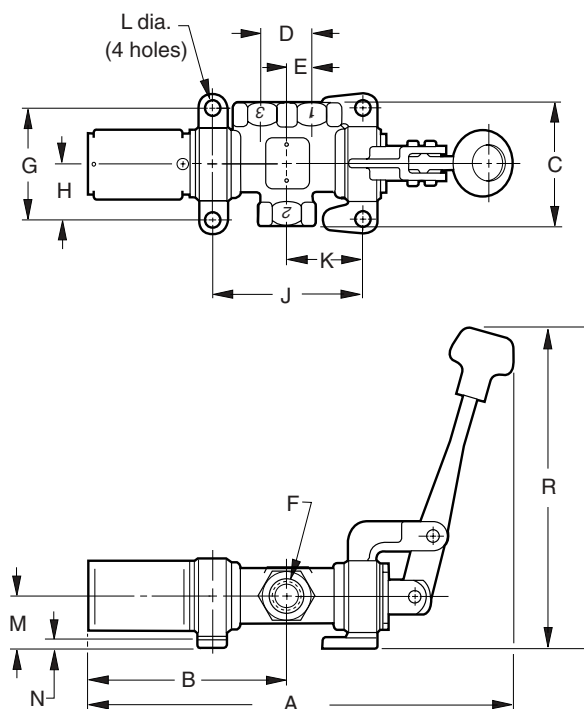
Select valve model number from table for desired operation.

Example: Order M095 418 43 to obtain a 1/2" pipe ported 3-Way, 2-Position, lever, Push to Operate, spring return valve.

Description	Port Size	Model Number
3-Way Lever Pull to Operate Spring Return	1/4	M096 218 43
	3/8	M096 318 43
	1/2	M096 418 43
	3/4	M096 618 43
	1	M096 818 43
4-Way Lever Pull to Operate Spring Return	1/4	M096 246 43
	3/8	M096 346 43
	1/2	M096 446 43
	3/4	M096 646 43
	1	M096 846 43

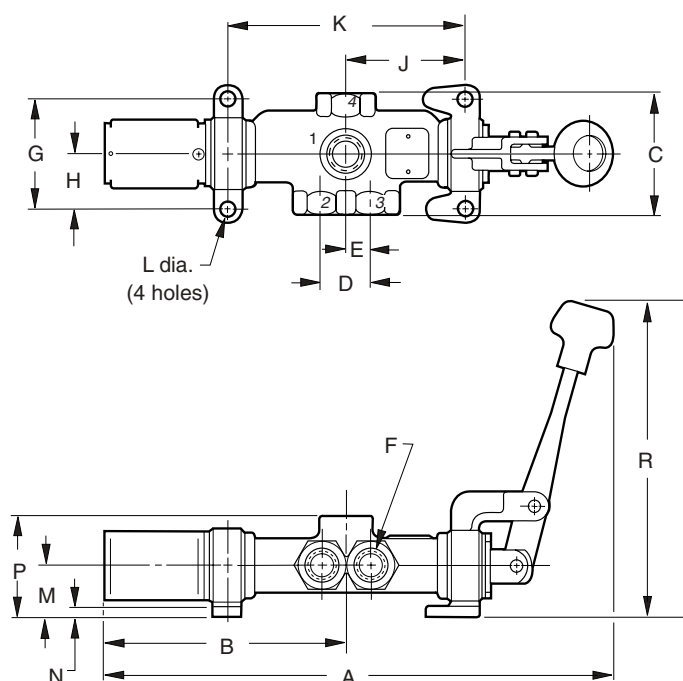
Description	Port Size	Model Number
3-Way Lever Push to Operate Spring Return	1/4	M095 218 43
	3/8	M095 318 43
	1/2	M095 418 43
	3/4	M095 618 43
	1	M095 818 43
4-Way Lever Push to Operate Spring Return	1/4	M095 246 43
	3/8	M095 346 43
	1/2	M095 446 43
	3/4	M095 646 43
	1	M095 846 43

3-Way

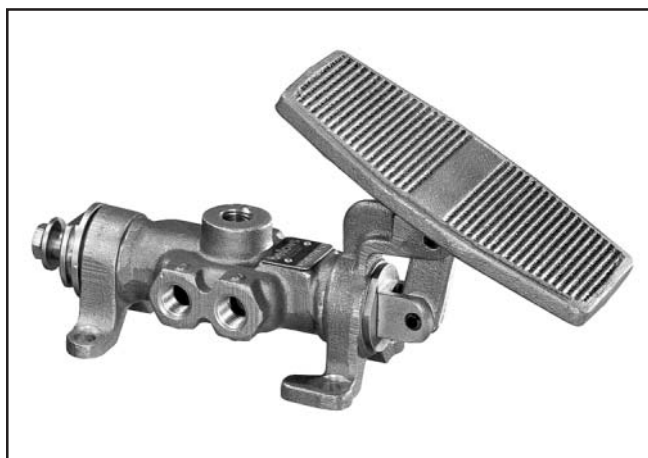


		1/4	3/8	1/2	3/4	1
A	inch	7.99	8.94	10.88	13.76	14.56
	mm	202.8	227.0	276.4	349.5	369.8
B	inch	3.92	4.24	5.31	6.92	7.35
	mm	99.5	107.6	134.9	175.8	186.7
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.7	17.5	22.4	28.4	31.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	9.53	10.78	12.67	16.47	17.74
	mm	242.1	273.8	321.8	418.3	450.6
B	inch	4.67	5.15	5.68	8.27	8.93
	mm	118.6	130.8	144.3	210.1	226.8
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.7	17.5	22.4	28.4	31.8



Function

Treadle operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, foot shifted and returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.



Foot operated valves must be protected against inadvertent operation that can cause serious bodily injury. Use of a guard is strongly recommended as it will reduce the likelihood of inadvertent operation.

Features

Treadle operator is designed for reduction in perceived operating force.

** For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.*

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

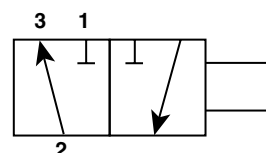


CAUTION:

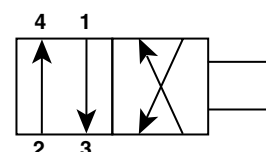
This valve shall not be used to actuate a punch press. Do not use this valve on punch presses or press brakes. See OSHA 1910.217.

Symbols

3-Way



4-Way



How to Order

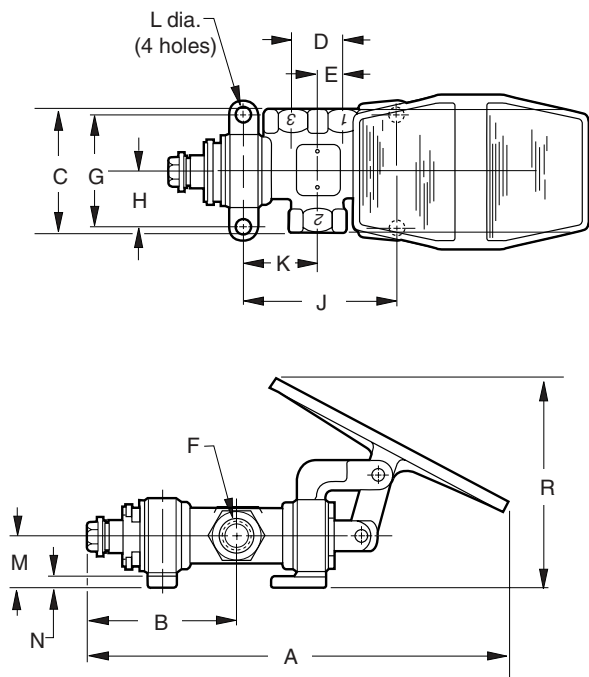
Select valve model number from table for desired operation.

Example: Order M085 246 88 to obtain a 1/4" pipe ported 4-Way, 2-Position, treadle operated valve.

Description	Port Size	Model Number
3-Way Treadle Operated Manual Return	1/4	M085 218 88
	3/8	M085 318 88
	1/2	M085 418 88
	3/4	M085 618 88
	1	M085 818 88
4-Way Treadle Operated Manual Return	1/4	M085 246 88
	3/8	M085 346 88
	1/2	M085 446 88
	3/4	M085 646 88
	1	M085 846 88

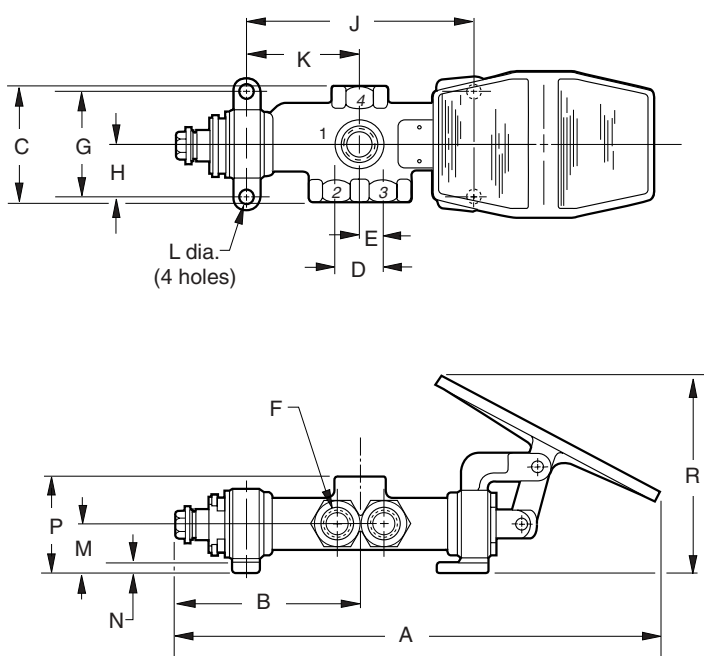
Note: Shaded units are no longer available.

3-Way

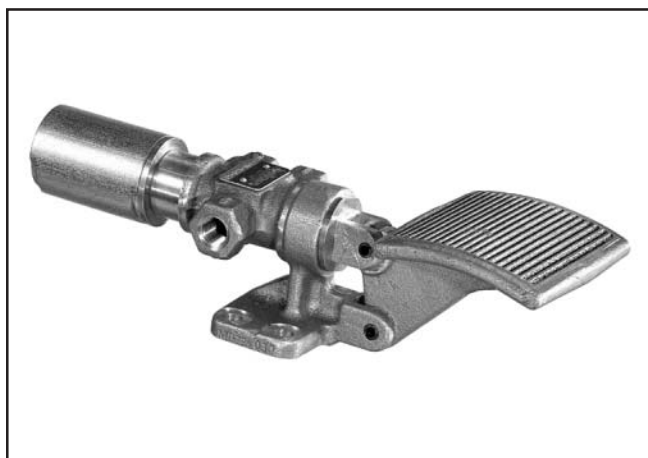


		1/4	3/8	1/2	3/4	1
A	inch	8.01	8.73	10.32	12.12	13.00
	mm	203.4	221.7	262.1	307.8	330.2
B	inch	2.67	3.06	4.06	4.63	5.13
	mm	68.8	77.7	103.1	117.6	130.3
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	4.51	4.65	4.85	6.03	6.03
	mm	114.6	118.1	123.2	153.2	153.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	9.52	10.57	12.11	14.83	16.18
	mm	241.8	268.5	307.6	376.7	411.0
B	inch	3.42	3.97	4.78	5.97	6.71
	mm	86.9	100.8	121.4	151.6	170.4
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	4.51	4.65	4.85	6.03	6.03
	mm	114.6	118.1	123.2	153.2	153.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

CAUTION:

This valve shall not be used to actuate a punch press. Do not use this valve on punch presses or press brakes. See OSHA 1910.217.

How to Order

Select valve model number from table for desired operation.

Example: Order M062 346 40 to obtain a 3/8" pipe ported 4-Way, 2-Position, pedal operated, spring return valve.

Description	Port Size	Model Number
3-Way Pedal Operated Spring Return	1/4	M062 218 40
	3/8	M062 318 40
	1/2	M062 418 40
	3/4	M062 618 40
	1	M062 818 40
4-Way Pedal Operated Spring Return	1/4	M062 246 40
	3/8	M062 346 40
	1/2	M062 446 40
	3/4	M062 646 40
	1	M062 846 40

Function

Pedal operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, foot shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.



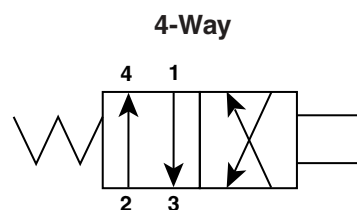
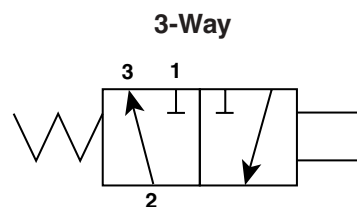
Foot operated valves must be protected against inadvertent operation that can cause serious bodily injury. Use of a pedal guard as described in Accessories is strongly recommended as it will reduce the likelihood of inadvertent operation. If this is not suitable in your application, utilize equivalent protection.

Features

Pedal operator is designed for minimum operating force. A pedal guard is available, with or without door, to prevent accidental operation of pedal valves. See chart below.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on Optional Functions page.

Symbols



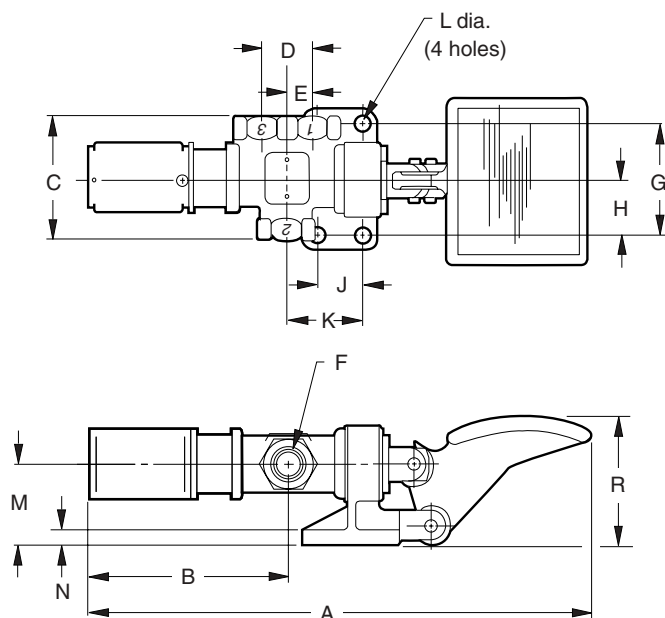
Pedal Guard (Fits all pedal operated valves)

Description	Model Number
Guard with door	M232 001
Guard without door	M232 002
• Guard with door for 1/4 and 3/8 valve	M232 003
• Guard without door for 1/4 and 3/8 valve	M232 004
• Guard with door for 1/2, 3/4 and 1" valve	M232 005
• Guard without door for 1/2, 3/4 and 1" valve	M232 006

• Includes mounting hardware.

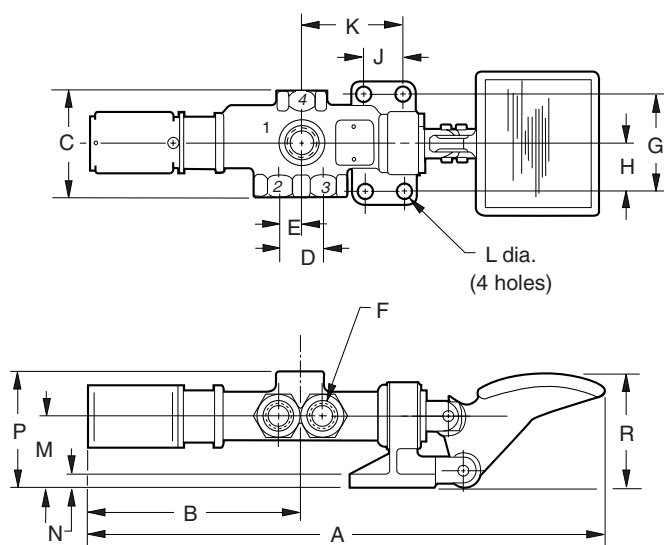
Note: Shaded units are no longer available.

3-Way

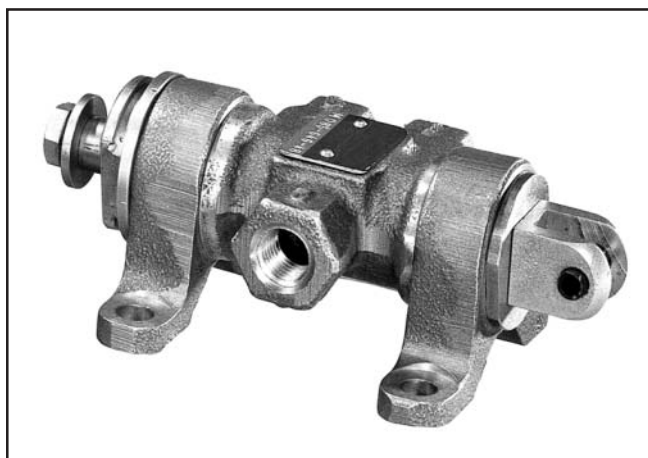


		1/4	3/8	1/2	3/4	1
A	inch	9.99	10.50	12.66	14.97	15.77
	mm	253.8	269.2	321.6	380.2	400.6
B	inch	3.92	4.23	5.31	6.91	7.35
	mm	99.5	107.4	134.9	175.5	186.7
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	.97	.97	1.12	1.38	1.38
	mm	24.6	24.6	28.4	35.0	35.0
K	inch	1.44	1.56	1.83	3.23	3.45
	mm	36.6	39.6	46.5	82.0	87.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.72	1.72	2.00	2.38	2.50
	mm	43.7	43.7	50.8	60.4	63.5
N	inch	.31	.31	.38	.38	.38
	mm	7.9	7.9	9.6	9.6	9.6
R	inch	2.66	2.71	2.74	3.42	3.42
	mm	67.6	68.8	69.6	86.9	86.9
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	11.50	12.44	14.45	17.68	18.95
	mm	292.1	315.9	367.0	449.1	481.3
B	inch	4.67	5.15	5.68	8.27	8.93
	mm	118.5	130.8	144.3	210.1	226.8
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	.97	.97	1.12	1.38	1.38
	mm	24.6	24.6	28.4	35.0	35.0
K	inch	2.19	2.48	2.89	4.59	5.20
	mm	55.6	63.0	73.4	116.6	132.1
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.72	1.72	2.00	2.38	2.50
	mm	43.7	43.7	50.8	60.4	63.5
N	inch	.31	.31	.38	.38	.38
	mm	7.9	7.9	9.6	9.6	9.6
P	inch	2.72	2.78	3.38	3.88	4.25
	mm	69.1	70.6	85.8	98.6	108.0
R	inch	2.66	2.71	2.74	3.42	3.42
	mm	67.6	68.8	69.6	86.9	86.9
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Clevis operated 2-Way*, 3-Way and 4-Way, 2-Position control valves are mechanically shifted and returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

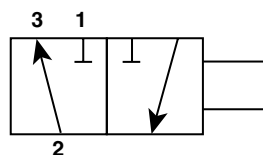
Features

Clevis operator provides an easily adaptable means of attaching valve to a mechanical operating control source, thereby providing automatic valve action. The clevis valve is also suitable for remote operation by connection to a solid rod control linkage.

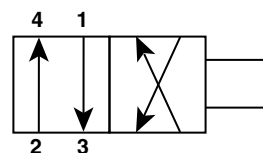
* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

Symbols

3-Way



4-Way



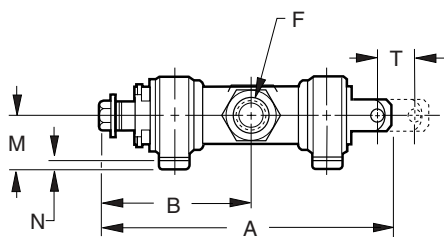
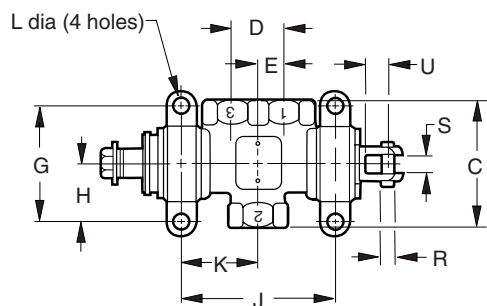
How to Order

Select valve model number from table for desired operation.

Example: Order M085 246 05 to obtain a 1/4" pipe ported 4-Way, 2-Position, clevis operated, mechanical return valve.

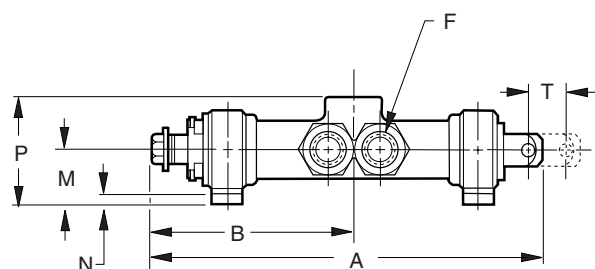
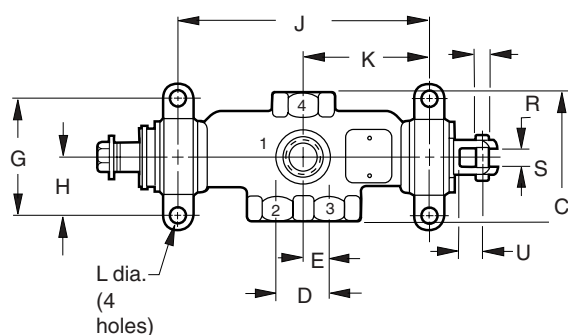
Description	Port Size	Model Number
3-Way Clevis Operated Mechanical Return	1/4	M085 218 05
	3/8	M085 318 05
	1/2	M085 418 05
	3/4	M085 618 05
	1	M085 818 05
4-Way Clevis Operated Mechanical Return	1/4	M085 246 05
	3/8	M085 346 05
	1/2	M085 446 05
	3/4	M085 646 05
	1	M085 846 05

3-Way

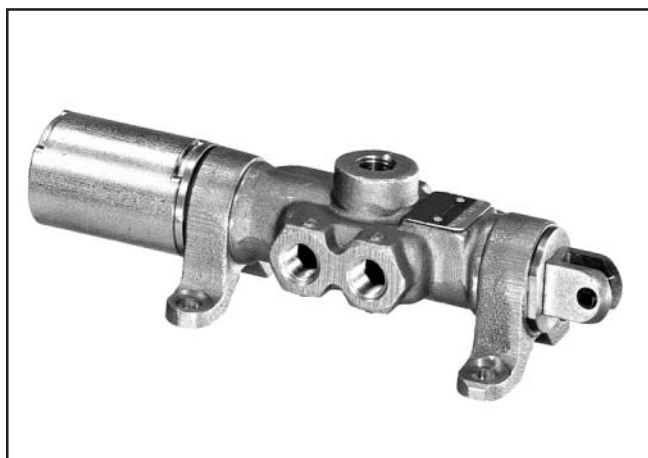


		1/4	3/8	1/2	3/4	1
A	inch	5.31	6.01	7.36	8.92	9.80
	mm	134.9	152.6	186.9	226.6	248.9
B	inch	2.68	3.06	4.85	4.62	4.61
	mm	68.1	77.7	123.2	117.3	117.1
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.64	3.14	3.73	4.67	5.42
	mm	67.1	79.8	94.7	118.6	137.7
K	inch	1.32	1.57	1.87	2.33	2.71
	mm	33.5	39.9	47.5	59.2	68.8
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	.25	.25	.31	.31	.31
	mm	6.4	6.4	7.9	7.9	7.9
S	inch	.38	.38	.44	.44	.44
	mm	9.6	9.6	11.2	11.2	11.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
U	inch	.47	.47	.56	.62	.62
	mm	11.9	11.9	14.2	15.8	15.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	6.81	7.85	9.48	11.64	12.99
	mm	173.0	199.4	240.8	295.7	330.0
B	inch	3.42	3.97	5.91	5.97	5.96
	mm	86.9	100.8	150.1	151.6	151.4
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	.25	.25	.31	.31	.31
	mm	6.4	6.4	7.9	7.9	7.9
S	inch	.38	.38	.44	.44	.44
	mm	9.6	9.6	11.2	11.2	11.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
U	inch	.47	.47	.56	.62	.62
	mm	11.9	11.9	14.2	15.8	15.8



Function

Clevis operated 2-Way*, 3-Way and 4-Way, 2-Position control valves are mechanically shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

Features

Clevis actuated valves are offered for Push or Pull to Operate. Enclosed spring end section is field convertible to opposite (Push or Pull) action.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

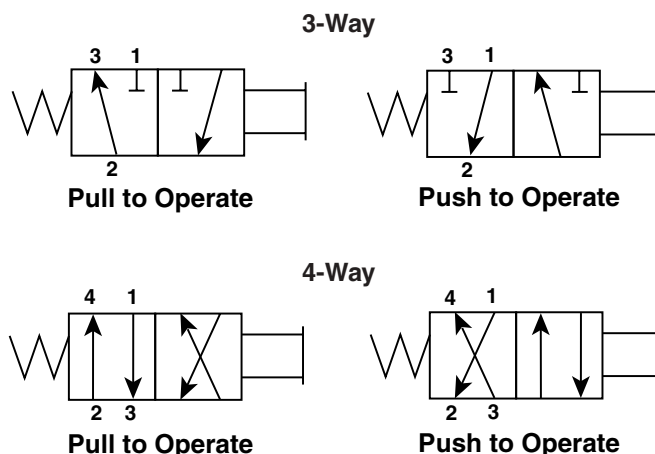
Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Symbols



How to Order

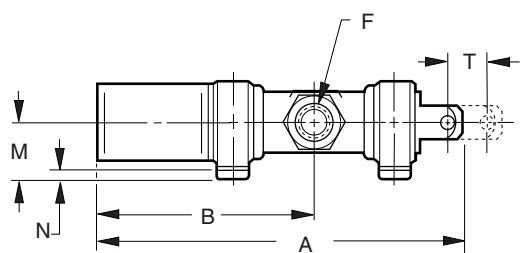
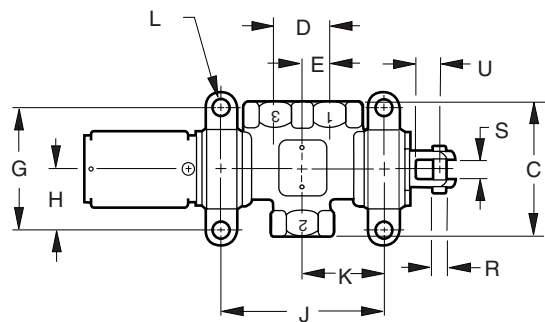
Select valve model number from table for desired operation.

Example: Order M095 618 05 to obtain a 3/4" pipe ported 3-Way, 2-Position, clevis Pull to Operate, spring return valve.

Description	Port Size	Model Number
3-Way Clevis Push to Operate Spring Return	1/4	M096 218 05
	3/8	M096 318 05
	1/2	M096 418 05
	3/4	M096 618 05
	1	M096 818 05
4-Way Clevis Push to Operate Spring Return	1/4	M096 246 05
	3/8	M096 346 05
	1/2	M096 446 05
	3/4	M096 646 05
	1	M096 846 05

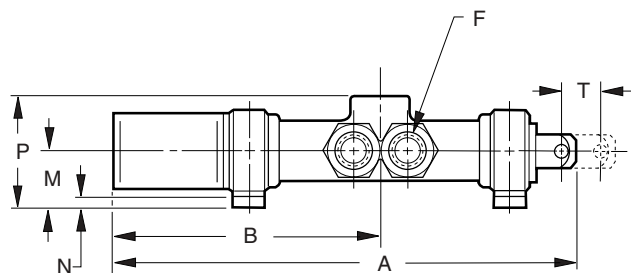
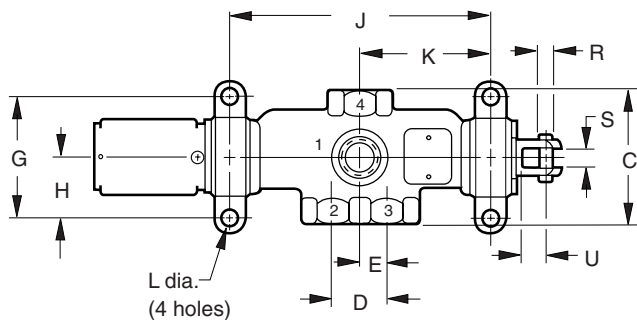
Description	Port Size	Model Number
3-Way Clevis Pull to Operate Spring Return	1/4	M095 218 05
	3/8	M095 318 05
	1/2	M095 418 05
	3/4	M095 618 05
	1	M095 818 05
4-Way Clevis Pull to Operate Spring Return	1/4	M095 246 05
	3/8	M095 346 05
	1/2	M095 446 05
	3/4	M095 646 05
	1	M095 846 05

3-Way



		1/4	3/8	1/2	3/4	1
A	inch	6.56	7.19	8.95	11.22	12.02
	mm	166.5	182.6	227.3	285.0	305.3
B	inch	3.92	4.24	5.31	6.92	7.35
	mm	99.5	107.6	134.9	175.8	186.7
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	.25	.25	.31	.31	.31
	mm	6.4	6.4	7.9	7.9	7.9
S	inch	.38	.38	.44	.44	.44
	mm	9.6	9.6	11.2	11.2	11.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
U	inch	.47	.47	.56	.62	.62
	mm	11.9	11.9	14.2	15.8	15.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	8.06	9.03	11.07	13.94	15.30
	mm	204.6	229.3	281.2	354.1	388.6
B	inch	4.67	5.15	5.68	8.27	8.93
	mm	118.6	130.8	144.3	210.1	226.8
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	.25	.25	.31	.31	.31
	mm	6.4	6.4	7.9	7.9	7.9
S	inch	.38	.38	.44	.44	.44
	mm	9.6	9.6	11.2	11.2	11.2
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
U	inch	.47	.47	.56	.62	.62
	mm	11.9	11.9	14.2	15.8	15.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

How to Order

Select valve model number from table for desired operation.

Example: Order M032 218 84 to obtain a 1/4" pipe ported 3-Way, 2-Position, diaphragm operated, instrument air signal, spring return valve.

Description	Port Size	Model Number	
		With Bracket	Less Bracket
3-Way Single Diaphragm 20-60 psi Pilot Pressure Spring Return	1/4	M084 218 30	M087 218 30
	3/8	M084 318 30	M087 318 30
	1/2	M084 418 30	M087 418 30
	3/4	M084 618 30	M087 618 30
	1	M084 818 30	M087 818 30
4-Way Single Diaphragm 20-60 psi Pilot Pressure Spring Return	1/4	M084 246 30	M087 246 30
	3/8	M084 346 30	M087 346 30
	1/2	M084 446 30	M087 446 30
	3/4	M084 646 30	M087 646 30
	1	M084 846 30	M087 846 30

Function

Single diaphragm operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, pneumatic pilot signal shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

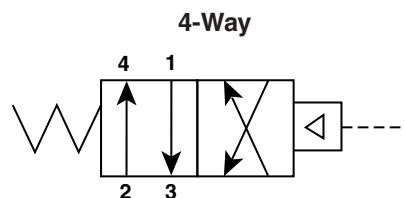
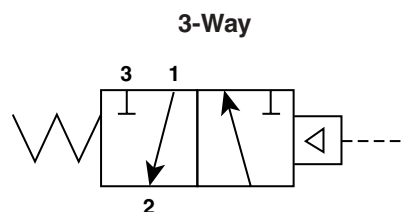
Features

Standard single diaphragm operator is used for maintained pilot signal pressures of 20 to 60 psi (140 to 410 kPa)†. Optional operators feature a light-load spring for 15 psi (100 kPa) minimum air signal pressure. Single diaphragm operated valves may be controlled by a 3-Way pilot valve from a remote location.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

† For pilot signal pressure greater than 60 psi (410 kPa), use cylinder operated valves.

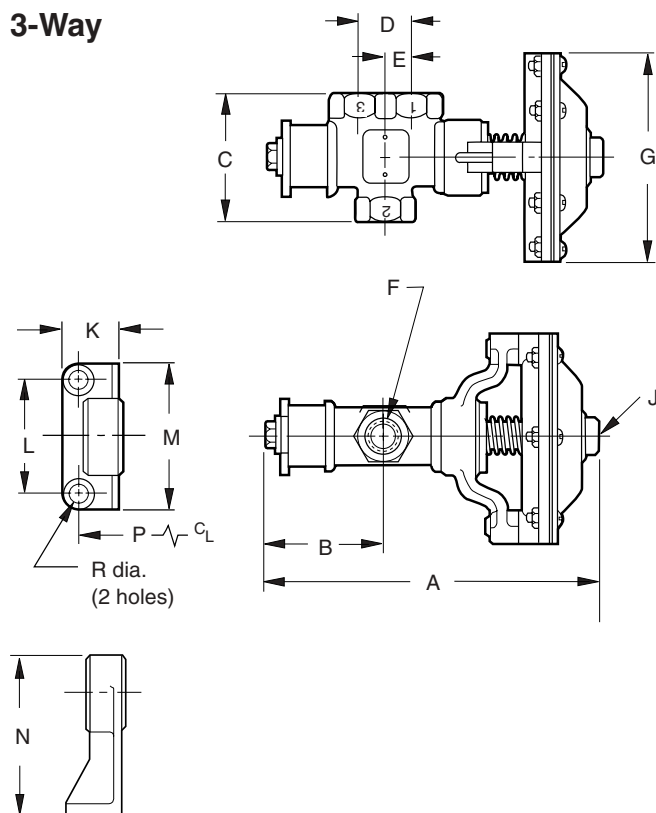
Symbols



Note: Shaded units are no longer available.

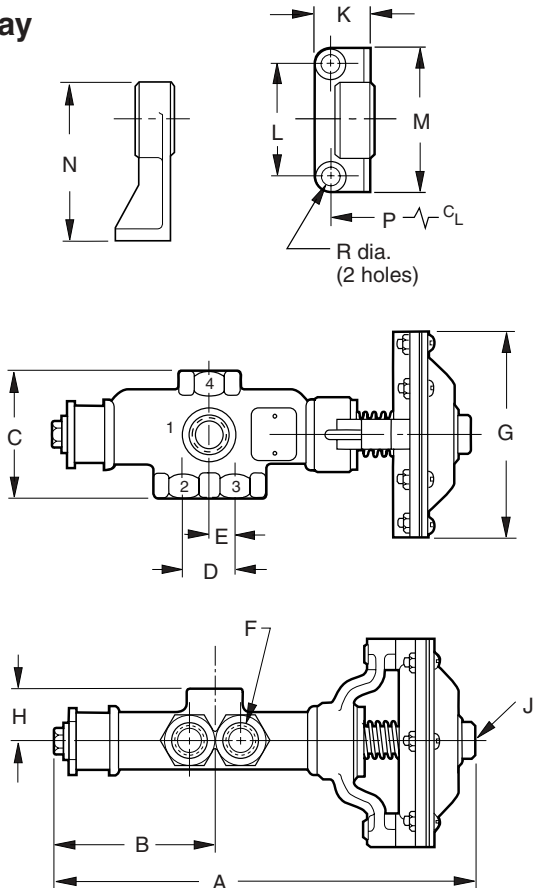
Description	Port Size	Model Number	
		With Bracket	Less Bracket
3-Way Single Diaphragm Instrument Air 15 psi Min. Pilot Pressure Spring Return	1/4	M084 218 32	M087 218 32
	3/8	M084 318 32	M087 318 32
	1/2	M084 418 32	M087 418 32
	3/4	M084 618 32	M087 618 32
	1	M084 818 32	M087 818 32
4-Way Single Diaphragm Instrument Air 15 psi Min. Pilot Pressure Spring Return	1/4	M084 246 32	M087 246 32
	3/8	M084 346 32	M087 346 32
	1/2	M084 446 32	M087 446 32
	3/4	M084 646 32	M087 646 32
	1	M084 846 32	M087 846 32

3-Way

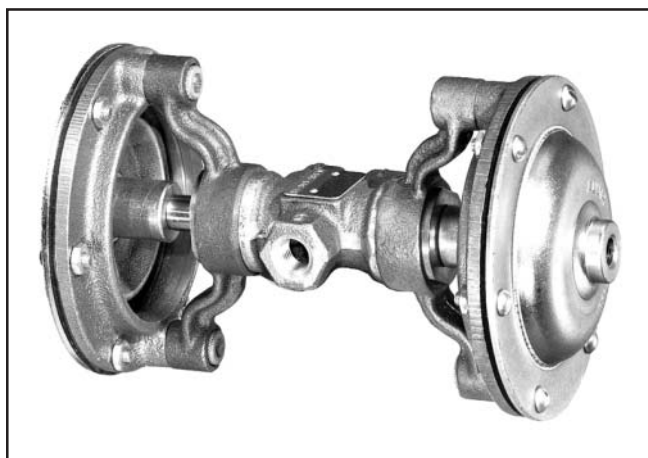


		1/4	3/8	1/2	3/4	1
A	inch	6.14	6.85	8.03	9.89	10.77
	mm	156.0	174.0	204.0	251.2	273.6
B	inch	2.03	2.36	2.83	3.48	3.86
	mm	51.6	59.9	71.9	88.4	98.0
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	4.34	4.34	4.34	5.27	5.27
	mm	110.2	110.2	110.2	133.9	133.9
J		1/8	1/8	1/8	1/8	1/8
		Pipe	Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
K	inch	1.12	1.12	1.75	2.00	2.00
	mm	28.4	28.4	44.4	50.8	50.8
L	inch	2.00	2.38	2.00	3.25	3.62
	mm	50.8	60.4	50.8	82.6	92.0
M	inch	2.75	3.00	3.00	4.19	4.56
	mm	69.8	76.2	76.2	106.4	115.8
N	inch	3.22	3.28	3.40	4.00	4.22
	mm	81.8	83.3	86.4	101.6	107.2
P	inch	1.81	2.03	2.74	3.18	3.55
	mm	46.0	51.6	69.6	80.8	90.2
R	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	7.65	8.69	9.82	12.60	13.95
	mm	194.3	220.7	249.4	320.0	354.3
B	inch	2.79	3.28	3.89	4.84	5.45
	mm	70.9	83.3	98.8	122.9	138.4
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	4.34	4.34	4.34	5.27	5.27
	mm	110.2	110.2	110.2	133.9	133.9
H	inch	1.00	1.06	1.38	1.50	1.75
	mm	25.4	26.9	30.0	38.1	44.4
J		1/8	1/8	1/8	1/8	1/8
		Pipe	Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8
K	inch	1.12	1.12	1.75	2.00	2.00
	mm	28.4	28.4	44.4	50.8	50.8
L	inch	2.00	2.38	2.00	3.25	3.62
	mm	50.8	60.4	50.8	82.6	92.0
M	inch	2.75	3.00	3.00	4.19	4.56
	mm	69.8	76.2	76.2	106.4	115.8
N	inch	3.22	3.28	3.40	4.00	4.22
	mm	81.8	83.3	86.4	101.6	107.2
P	inch	2.57	2.95	3.80	4.54	5.15
	mm	65.3	74.9	96.5	115.3	130.8
R	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Double diaphragm operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, pneumatic signal shifted and returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

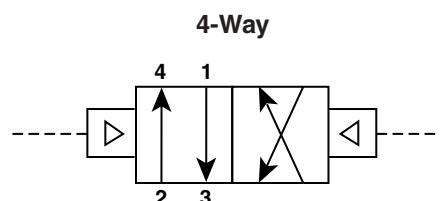
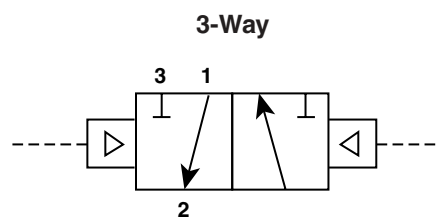
Features

Double diaphragm operators are suitable for use with standard or low pressure momentary or maintained air pilot signals from 5 to 60 psi (30 to 410 kPa)†. Double diaphragm valves may be controlled by a single 4-Way pilot valve, or two coordinated 3-Way pilots.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

† For pilot signal pressure greater than 60 psi (410 kPa), use cylinder operated valves.

Symbols



How to Order

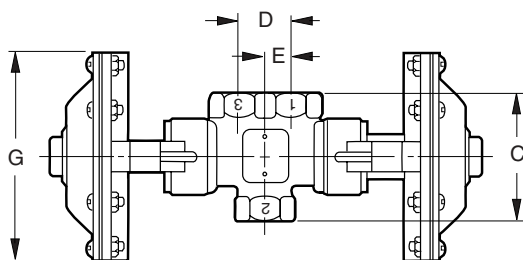
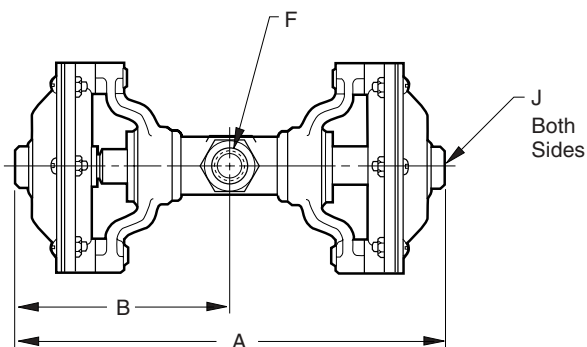
Select valve model number from table for desired operation.

Example: Order M033 346 33 to obtain a 3/8" pipe ported 4-Way, 2-Position, double diaphragm operated valve.

Note: Shaded units are no longer available.

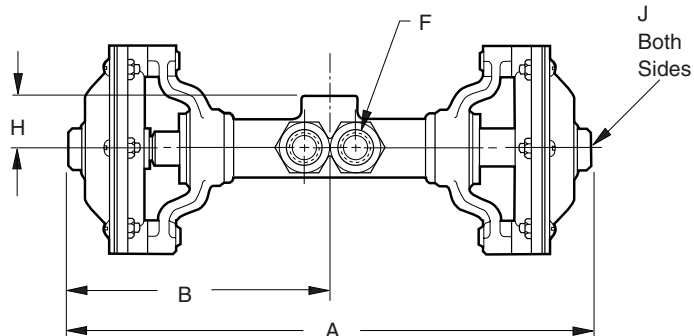
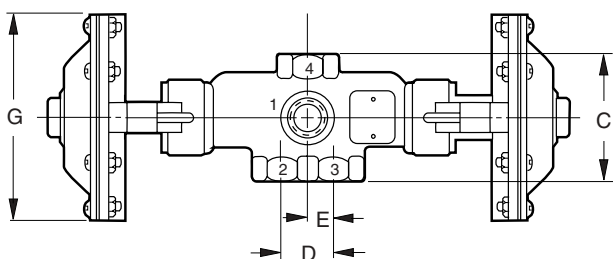
Description	Port Size	Model Number
3-Way Double Diaphragm	1/4	M033 218 33
	3/8	M033 318 33
	1/2	M033 418 33
	3/4	M033 618 33
	1	M033 818 33
4-Way Double Diaphragm	1/4	M033 246 33
	3/8	M033 346 33
	1/2	M033 446 33
	3/4	M033 646 33
	1	M033 846 33

3-Way

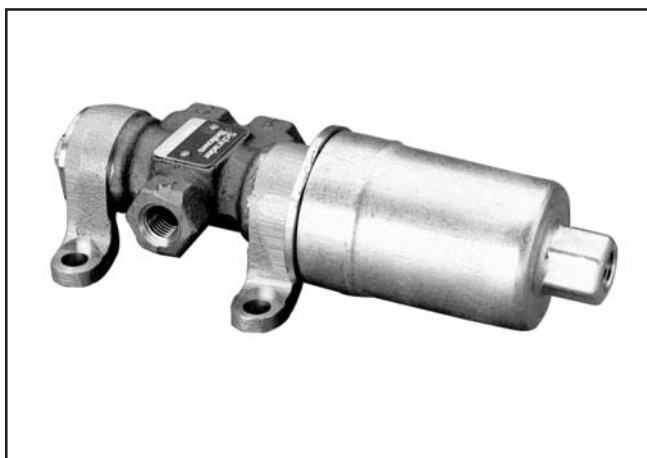


		1/4	3/8	1/2	3/4	1
A	inch	8.22	8.98	10.40	12.82	13.82
	mm	208.8	228.1	264.2	325.6	351.0
B	inch	4.11	4.49	5.20	6.41	6.91
	mm	104.4	114.0	132.1	162.8	175.5
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	4.34	4.34	4.34	5.27	5.27
	mm	110.2	110.2	110.2	133.9	133.9
J		1/8	1/8	1/8	1/8	1/8
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	9.72	10.82	11.86	15.52	17.00
	mm	246.9	274.8	301.2	394.2	431.8
B	inch	4.86	5.41	5.93	7.76	8.50
	mm	123.4	137.4	150.6	197.1	215.9
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	4.34	4.34	4.34	5.27	5.27
	mm	110.2	110.2	110.2	133.9	133.9
H	inch	1.00	1.06	1.38	1.50	1.75
	mm	25.4	26.9	30.0	38.1	44.4
J		1/8	1/8	1/8	1/8	1/8
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Single cylinder operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, pneumatic pilot signal shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

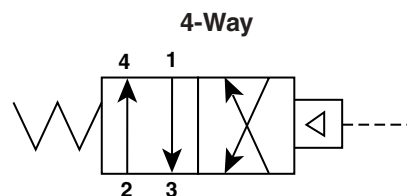
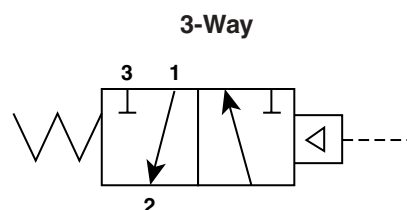
Features

Single cylinder operator is suitable for use with maintained pilot signal pressure of 45 to 250 psi (310 to 1720 kPa)† for exceptionally high cyclic rates and very rugged service. Single cylinder operated valves may be controlled by a 3-Way pilot valve from a remote location.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

† For air pilot signal pressure less than 45 psi (310 kPa), use diaphragm operated valves.

Symbols



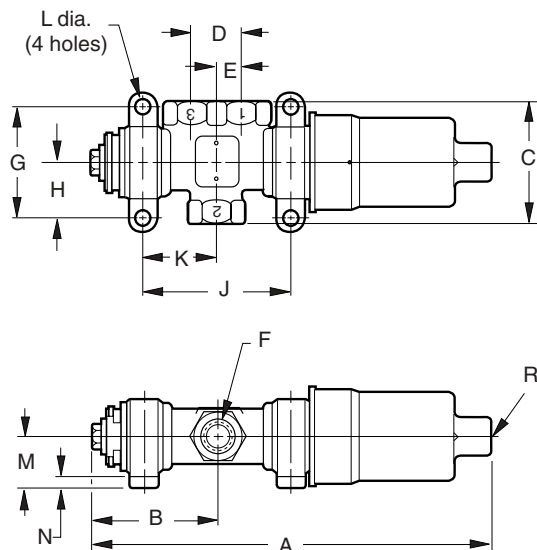
How to Order

Select valve model number from table for desired operation.

Example: Order M026 818 85 to obtain a 1" pipe ported 3-Way, 2-Position, cylinder operated, spring return valve.

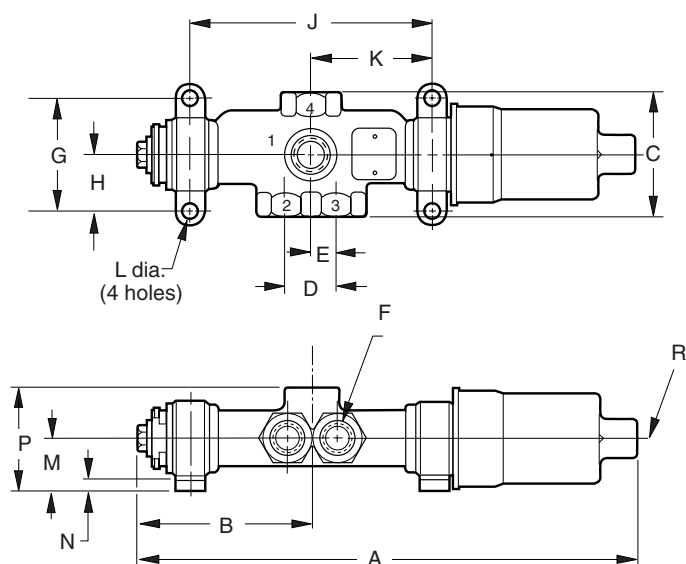
Description	Port Size	Model Number
3-Way Single Cylinder Spring Return	1/4	M085 218 26
	3/8	M085 318 26
	1/2	M085 418 26
	3/4	M085 618 26
	1	M085 818 26
4-Way Single Cylinder Spring Return	1/4	M085 246 26
	3/8	M085 346 26
	1/2	M085 446 26
	3/4	M085 646 26
	1	M085 846 26

3-Way

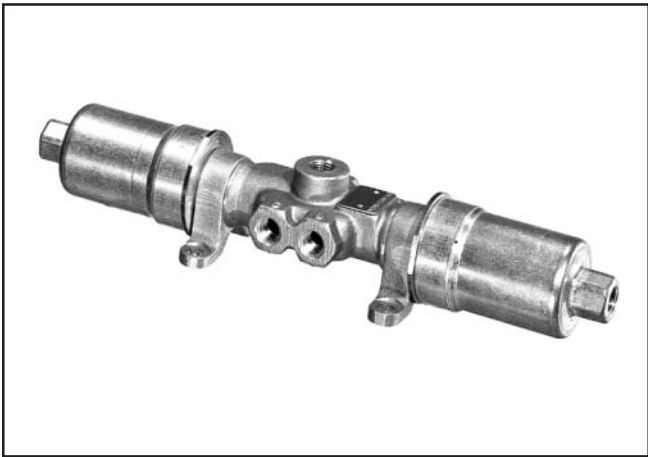


		1/4	3/8	1/2	3/4	1
A	inch	7.50	8.14	9.03	11.18	11.93
	mm	190.5	206.8	229.4	284.0	303.0
B	inch	2.03	2.36	2.83	3.48	3.86
	mm	51.6	59.9	71.9	88.4	98.0
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.64	3.14	3.73	4.67	5.42
	mm	67.1	79.8	94.7	118.6	137.7
K	inch	1.32	1.57	1.87	2.33	2.71
	mm	33.5	39.9	47.5	59.2	68.8
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R		1/4"	1/4"	1/4"	1/4"	1/4"
		Pipe	Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.7	17.5	22.4	28.4	31.8

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	9.00	9.98	11.15	13.90	15.12
	mm	228.6	253.5	283.2	353.1	384.0
B	inch	2.79	3.28	3.89	4.84	5.45
	mm	70.9	83.3	98.8	122.9	138.4
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R		1/4"	1/4"	1/4"	1/4"	1/4"
		Pipe	Pipe	Pipe	Pipe	Pipe
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Double cylinder operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, pneumatic pilot signal shifted and returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

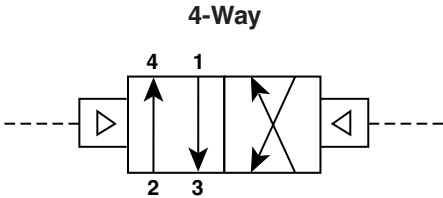
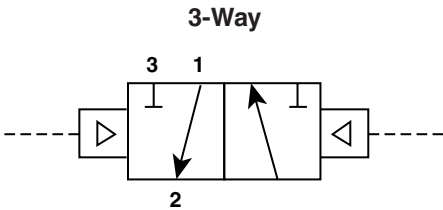
Features

Double cylinder operators are suitable for use with momentary or maintained pilot signal pressure of 20 to 250 psi (140 to 1720 kPa)† for exceptionally high cyclic rates and very rugged service. Double cylinder operated valves may be controlled by a single 4-Way pilot valve or two coordinated 3-Way pilots.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

† For air pilot signal pressure less than 20 psi (140 kPa), use diaphragm operated valves.

Symbols



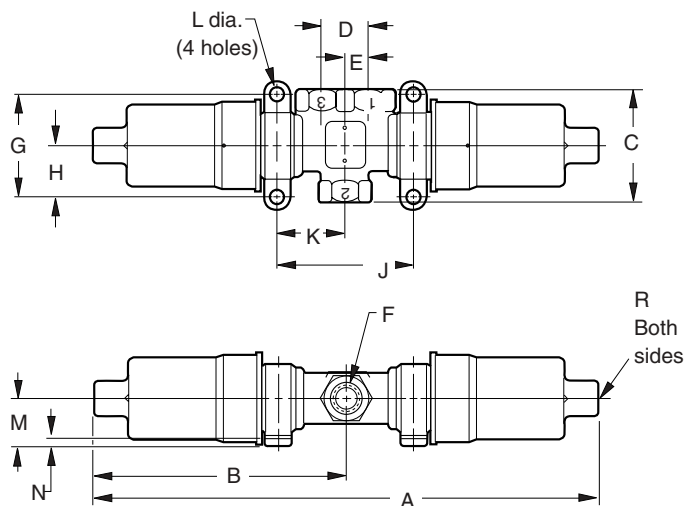
How to Order

Select valve model number from table for desired operation.

Example: Order M019 646 19 to obtain a 3/4" pipe ported 4-Way, 2-Position, double cylinder operated valve.

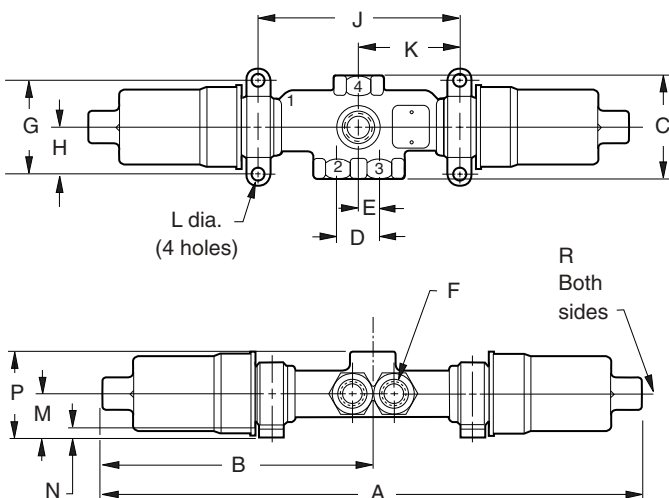
Description	Port Size	Model Number
3-Way Double Cylinder	1/4	M019 218 19
	3/8	M019 318 19
	1/2	M019 418 19
	3/4	M019 618 19
	1	M019 818 19
4-Way Double Cylinder	1/4	M019 246 19
	3/8	M019 346 19
	1/2	M019 446 19
	3/4	M019 646 19
	1	M019 846 19

3-Way

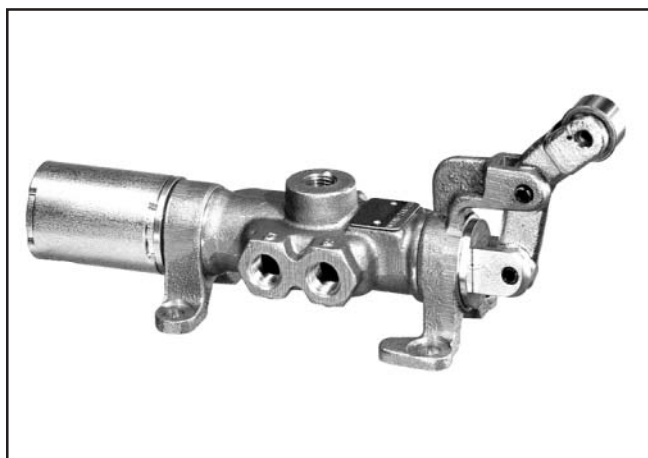


		1/4	3/8	1/2	3/4	1
A	inch	10.94	11.56	12.40	15.40	16.14
	mm	277.9	293.6	315.0	391.2	410.0
B	inch	5.47	5.78	6.20	7.70	8.07
	mm	138.9	146.8	157.5	195.6	205.0
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.64	3.14	3.73	4.67	5.42
	mm	67.1	79.8	94.7	118.6	137.7
K	inch	1.32	1.57	1.87	2.33	2.71
	mm	33.5	39.9	47.5	59.2	68.8
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R		1/4"	1/4"	1/4"	1/4"	1/4"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	12.42	13.40	14.52	18.12	19.34
	mm	315.5	340.4	368.8	460.2	491.2
B	inch	6.21	6.70	7.26	9.06	9.67
	mm	157.7	170.2	184.4	230.1	245.6
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R		1/4"	1/4"	1/4"	1/4"	1/4"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Cam operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, mechanically shifted and spring returned. 2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

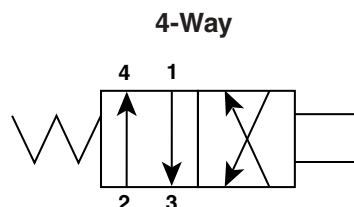
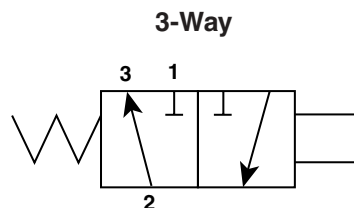
Features

Cam follower operating arm is a heat treated steel forging, and the wide-faced roller is of needle bearing type to guarantee long trouble-free operation in severe service.

Cam roller is .88" (22.4 mm) diameter x .50" (12.7 mm) wide for 1/4" and 3/8" valves and 1.00" (25.4 mm) diameter x .62" (15.7 mm) wide for 1/2", 3/4" and 1" valves.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

Symbols



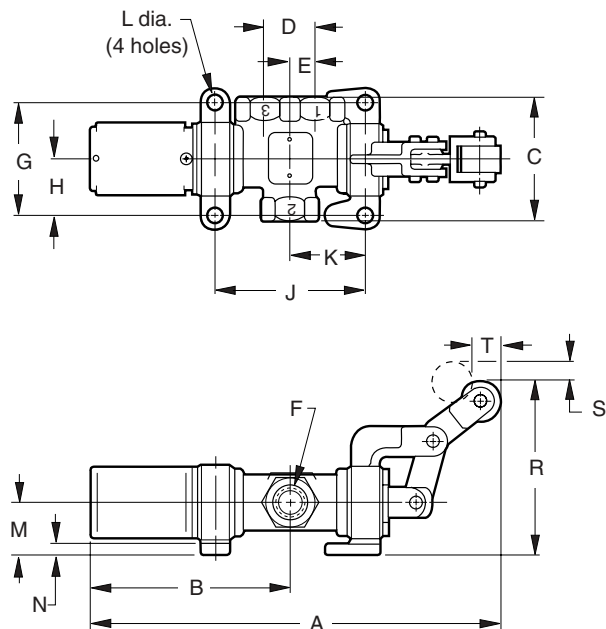
How to Order

Select valve model number from table for desired operation.

Example: Order M095 246 03 to obtain a 1/4" pipe ported 4-Way, 2-Position, cam operated, spring return valve.

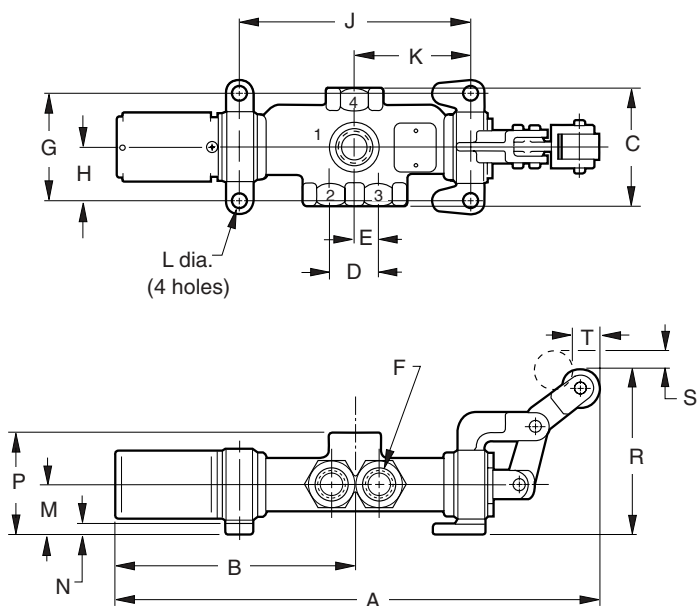
Description	Port Size	Model Number
3-Way Cam Operated Spring Return	1/4	M095 218 03
	3/8	M095 318 03
	1/2	M095 418 03
	3/4	M095 618 03
	1	M095 818 03
4-Way Cam Operated Spring Return	1/4	M095 246 03
	3/8	M095 346 03
	1/2	M095 446 03
	3/4	M095 646 03
	1	M095 846 03

3-Way



		1/4	3/8	1/2	3/4	1
A	inch	7.98	8.72	10.77	13.54	14.34
	mm	202.6	221.5	273.6	343.9	364.2
B	inch	3.92	4.24	5.31	6.92	7.35
	mm	99.6	107.7	134.9	175.8	186.7
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	38.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R	inch	3.88	3.88	4.23	4.88	4.88
	mm	98.6	98.6	107.4	124.0	124.0
S	inch	.43	.47	.70	.67	.76
	mm	10.9	11.9	17.8	17.0	19.3
Travel	inch	.53	.59	.75	.81	.91
	mm	13.5	15.0	19.0	20.6	23.1

4-Way



		1/4	3/8	1/2	3/4	1
A	inch	9.48	10.56	12.89	16.26	17.53
	mm	204.7	268.2	327.4	413.0	445.3
B	inch	4.67	5.15	5.68	8.27	8.93
	mm	118.6	130.8	144.3	210.1	226.8
C	inch	2.38	2.62	3.12	3.62	4.38
	mm	60.4	66.6	79.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	3.88	3.88	4.23	4.88	4.88
	mm	98.6	98.6	107.4	124.0	124.0
S	inch	.43	.47	.70	.67	.76
	mm	10.9	11.9	17.8	17.0	19.3
Travel	inch	.53	.59	.75	.81	.91
	mm	13.5	15.0	19.0	20.6	23.1



Function

Detented manual operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted and returned. The spring-loaded ball detent locates the spool in last position used.

2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

Features

Ball detent positions and locates the valve spool in either operating position.

** For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.*

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

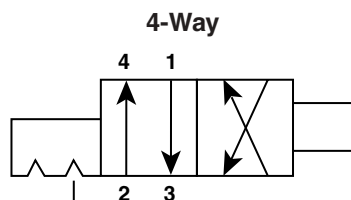
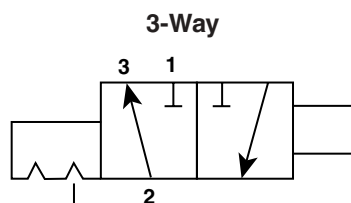
Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Symbols



How to Order

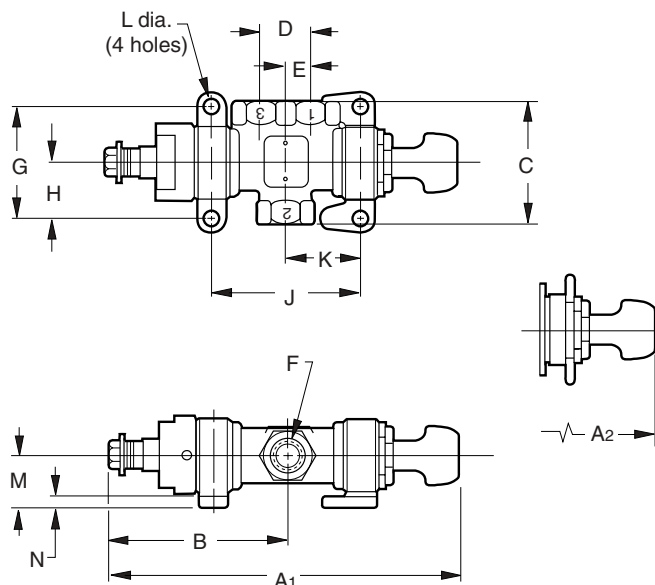
Select valve model number from table for desired operation.

Example: Order M054 324 48 to obtain a 3/8" pipe ported 3-Way, 2-Position, knob operated, manual return valve with detents.

Description	Port Size	Model Number
3-Way Knob Operated Detent	1/4	M054 224 48
	3/8	M054 324 48
	1/2	M054 424 48
	3/4	M054 624 48
4-Way Knob Operated Detent	1/4	M054 254 48
	3/8	M054 354 48
	1/2	M054 454 48
	3/4	M054 654 48

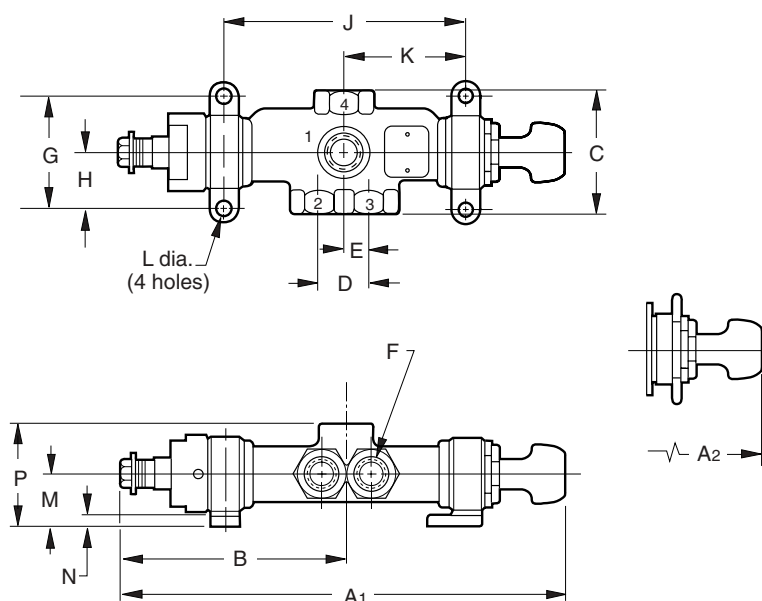
Description	Port Size	Model Number
3-Way Knob Operated Panel Mounted Detent	1/4	M058 224 51
	3/8	M058 324 51
	1/2	M058 424 51
	3/4	M058 624 51
4-Way Knob Operated Panel Mounted Detent	1/4	M058 254 51
	3/8	M058 354 51
	1/2	M058 454 51
	3/4	M058 654 51

3-Way

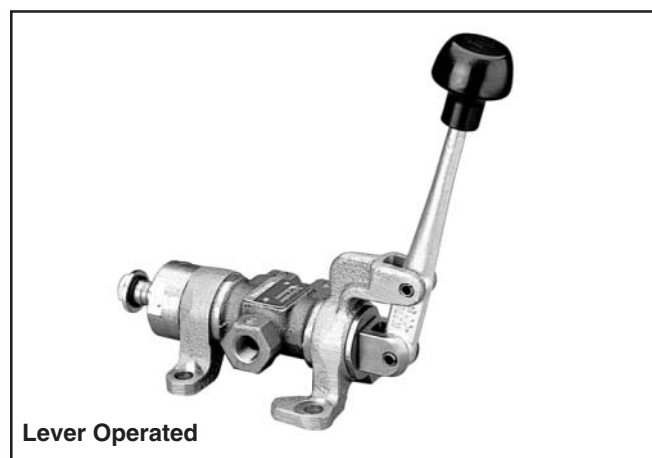


		1/4	3/8	1/2	3/4
A1	inch mm	6.57 166.9	7.30 185.4	8.56 217.4	10.40 264.2
A2	inch mm	6.57 166.9	7.30 185.4	8.56 217.4	10.40 264.2
B	inch mm	3.25 82.6	3.66 93.0	4.39 111.5	5.41 137.4
C	inch mm	2.38 60.4	2.62 66.6	3.00 76.2	3.62 92.0
D	inch mm	.94 23.9	1.06 26.9	1.25 31.8	1.62 41.2
E	inch mm	.47 11.9	.53 13.5	.62 15.8	.81 20.6
F		1/4" Pipe	3/8" Pipe	1/2" Pipe	3/4" Pipe
G	inch mm	2.25 57.2	2.38 60.4	2.62 66.6	3.25 82.6
H	inch mm	1.12 28.4	1.19 30.2	1.31 33.3	1.62 41.2
J	inch mm	2.63 66.8	3.13 79.5	3.72 94.5	4.56 115.8
K	inch mm	1.31 33.3	1.56 39.6	1.86 47.2	2.28 57.9
L	inch mm	.34 8.6	.34 8.6	.41 10.4	.41 10.4
M	inch mm	1.12 28.4	1.12 28.4	1.25 31.8	1.56 39.6
N	inch mm	.25 6.4	.25 6.4	.31 7.9	.31 7.9

4-Way



		1/4	3/8	1/2	3/4
A1	inch mm	8.02 203.7	9.13 231.9	11.17 283.7	13.10 332.7
A2	inch mm	8.02 203.7	9.13 231.9	11.17 283.7	13.10 332.7
B	inch mm	4.00 101.6	4.57 116.1	5.44 138.2	6.76 171.7
C	inch mm	2.38 60.4	2.62 66.6	3.00 76.2	3.62 92.0
D	inch mm	.94 23.9	1.06 26.9	1.25 31.8	1.62 41.2
E	inch mm	.47 11.9	.53 13.5	.62 15.8	.81 20.6
F		1/4" Pipe	3/8" Pipe	1/2" Pipe	3/4" Pipe
G	inch mm	2.25 57.2	2.38 60.4	2.62 66.6	3.25 82.6
H	inch mm	1.12 28.4	1.19 30.2	1.31 33.3	1.62 41.2
J	inch mm	4.14 105.2	4.98 126.5	5.85 148.6	7.39 187.7
K	inch mm	2.07 52.6	2.49 63.2	2.92 74.2	3.69 93.7
L	inch mm	.34 8.6	.34 8.6	.41 10.4	.41 10.4
M	inch mm	1.12 28.4	1.12 28.4	1.25 31.8	1.56 39.6
N	inch mm	.25 6.4	.25 6.4	.31 7.9	.31 7.9
P	inch mm	2.12 53.8	2.18 55.4	2.63 66.8	3.06 77.7



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

CAUTION:

This valve shall not be used to actuate a punch press. Do not use this valve on punch presses or press brakes. See OSHA 1910.217.

How to Order

Select valve model number from table for desired operation.

Example: Order M054 654 43 to obtain a 3/4" pipe ported 4-Way, 2-Position, lever operated, manual return valve with detents.

Description	Port Size	Model Number
3-Way Lever Operated Detent	1/4	M054 224 43
	3/8	M054 324 43
	1/2	M054 424 43
	3/4	M054 624 43
	1	M054 824 43
4-Way Lever Operated Detent	1/4	M054 254 43
	3/8	M054 354 43
	1/2	M054 454 43
	3/4	M054 654 43
	1	M054 854 43

Function

Detented manual operated 2-Way*, 3-Way and 4-Way, 2-Position control valves, manually shifted and returned. The spring-loaded ball detent locates the spool in last position used.

2-Way valves are used for ON-OFF control; 3-Way and 4-Way valves are used for single-acting and double-acting cylinder control, respectively. For other functions, see Optional Functions.

⚠ *Install guards on all hand operated valves if accidental operation can cause personal injury.*

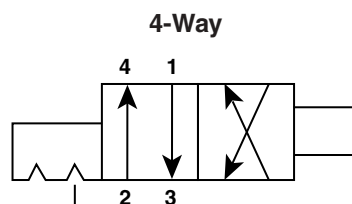
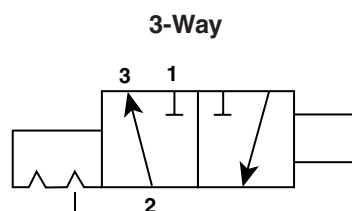
⚠ *Foot operated valves must be protected against inadvertent operation that can cause serious bodily injury. Use of a guard or equivalent protection is strongly recommended as it will reduce the likelihood of inadvertent operation.*

Features

Ball detent positions and locates the valve spool in either operating position.

* For 2-Way, normally open or normally closed service, use 3-Way valve plugging appropriate port, per Section B of the chart on the Optional Functions page.

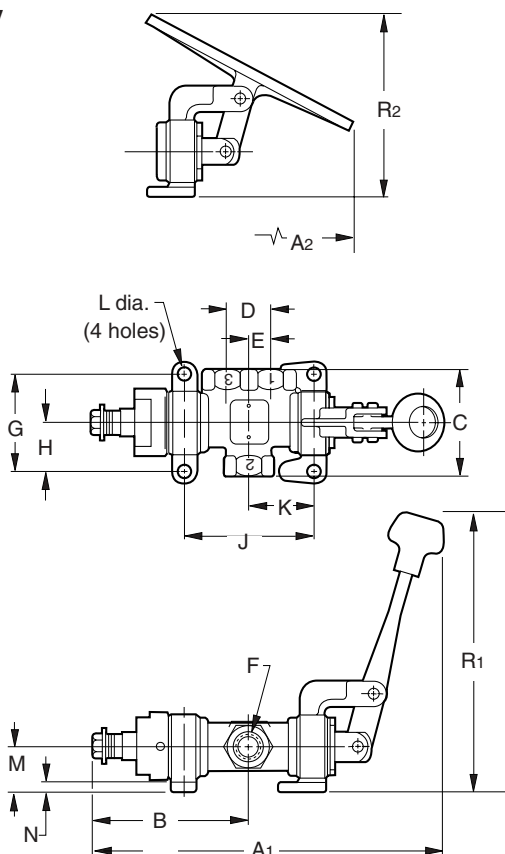
Symbols



Note: Shaded units are no longer available.

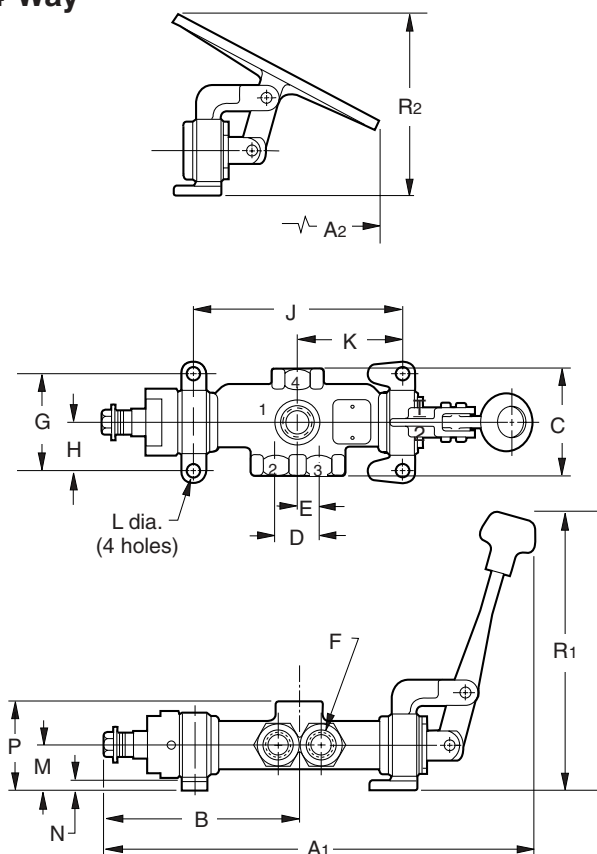
Description	Port Size	Model Number
3-Way Treadle Operated Detent	1/4	M054 224 88
	3/8	M054 324 88
	1/2	M054 424 88
	3/4	M054 624 88
	1	M054 824 88
4-Way Treadle Operated Detent	1/4	M054 254 88
	3/8	M054 354 88
	1/2	M054 454 88
	3/4	M054 654 88
	1	M054 854 88

3-Way

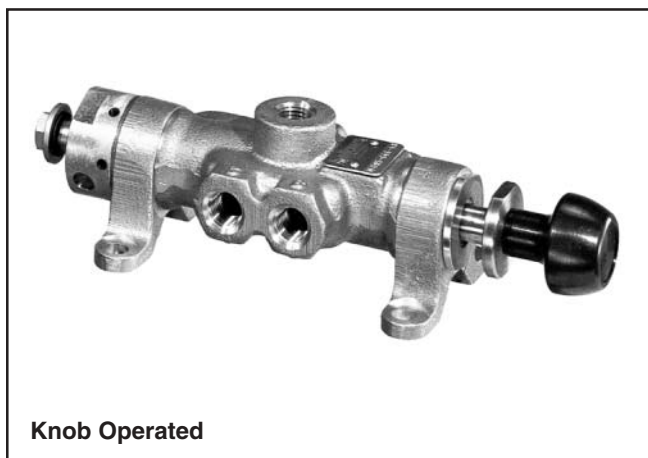


		1/4	3/8	1/2	3/4	1
A1	inch	7.35	8.36	9.95	12.25	13.12
	mm	186.7	212.3	252.7	311.2	333.2
A2	inch	8.59	9.33	10.65	12.90	13.77
	mm	218.2	237.0	270.5	327.7	349.8
B	inch	3.25	3.66	4.39	5.41	5.90
	mm	82.6	93.0	111.5	137.4	149.9
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4" Pipe	3/8" Pipe	1/2" Pipe	3/4" Pipe	1" Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	2.63	3.13	3.72	4.56	5.41
	mm	66.8	79.5	94.5	115.8	137.4
K	inch	1.31	1.56	1.86	2.28	2.70
	mm	33.3	39.6	47.2	57.9	68.6
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
R1	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
R2	inch	4.51	4.65	4.85	6.03	6.03
	mm	114.6	18.1	123.2	153.2	153.2

4-Way



		1/4	3/8	1/2	3/4	1
A1	inch	8.86	10.20	11/74	14/96	16.30
	mm	225.0	259.1	298.2	380.0	414.0
A2	inch	10.01	11.17	12.77	15.62	16.96
	mm	254.2	283.7	324.4	396.8	430.8
B	inch	4.00	4.57	5.44	6.76	7.49
	mm	101.6	116.1	138.2	171.7	190.2
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4" Pipe	3/8" Pipe	1/2" Pipe	3/4" Pipe	1" Pipe
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R1	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5
R2	inch	4.51	4.65	4.85	6.03	6.03
	mm	114.6	18.1	123.2	153.2	153.2



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Detented manually and mechanically operated 3-Way* and 4-Way, 3-Position valves, manually or mechanically shifted and returned. The spring-loaded ball detent retains the spool in the last position used.

Three-way and 4-Way, 3-Position valves are used for single-acting and double-acting cylinder control, respectively, where positioning the cylinder in intermediate stroke, or "inching", is required. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

Features

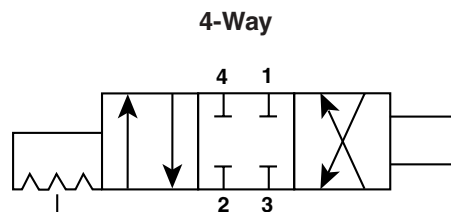
All ports blocked center position provides a means to stop or momentarily delay the movement of an air device. Ball detent accurately positions and retains the valve spool preventing drift for valves subjected to severe vibration.

NOTE: Three position valves are available on special order with the following optional flow conditions in the center position:

- Inlet port (#1) blocked and both outlet ports (#2 & #3) open to exhaust port (#4)
- Inlet open to both outlet ports and exhaust blocked.

* For 3-Way, normally open or normally closed service, use 4-Way valve plugging appropriate port. See Optional Functions.

Symbol



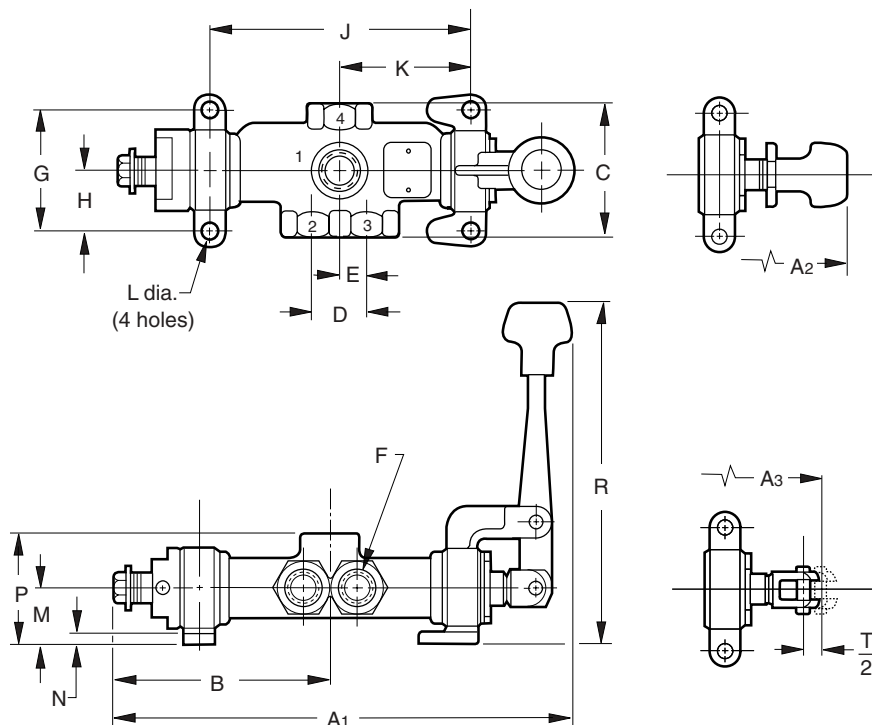
How to Order

Select valve model number from table for desired operation.

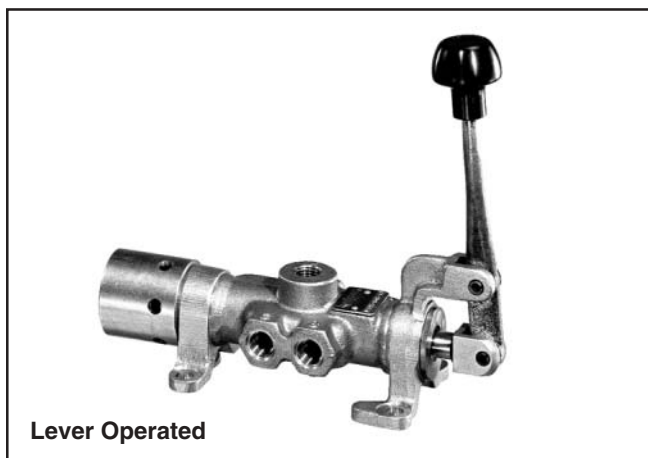
Example: Order M54 651 48 to obtain a 3/4" pipe ported 4-Way, 3-Position, knob operated, manual return valve with detents.

Description	Port Size	Model Number
4-Way, 3-Position Knob Operated Detent (All Ports Blocked)	1/4	M054 251 48
	3/8	M054 351 48
	1/2	M054 451 48
	3/4	M054 651 48

Description	Port Size	Model Number
4-Way, 3-Position Lever Operated Detent (All Ports Blocked)	1/4	M054 251 43
	3/8	M054 351 43
	1/2	M054 451 43
	3/4	M054 651 43
	1	M054 851 43
4-Way, 3-Position Clevis Operated Detent (All Ports Blocked)	1/4	M054 251 05
	3/8	M054 351 05
	1/2	M054 451 05
	3/4	M054 651 05
	1	M054 851 05



		1/4	3/8	1/2	3/4	1
A1	inch	7.79	8.86	10.27	12.63	13.94
	mm	197.9	225.0	260.9	320.8	354.1
A2	inch	8.15	9.20	11.18	13.10	—
	mm	206.9	233.6	283.9	332.8	—
A3	inch	7.94	8.91	11.06	13.04	14.54
	mm	201.7	226.3	280.9	331.2	369.3
B	inch	3.75	4.26	5.01	6.20	6.90
	mm	95.2	108.2	127.2	157.5	175.3
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	.325	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	38.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	6.80	6.84	8.12	10.88	10.88
	mm	172.7	173.7	206.2	276.4	276.4



Lever Operated

Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

Manually and mechanically operated 3-Way* and 4-Way, 3-Position valves, manually or mechanically shifted and spring centered. The valve spool automatically centers when operating force is removed.

Three-way and 4-Way, 3-Position valves are used for single and double-acting cylinder control, respectively, where positioning the cylinder in intermediate stroke, or "inching", is required. For other functions, see Optional Functions.



Install guards on all hand operated valves if accidental operation can cause personal injury.

Features

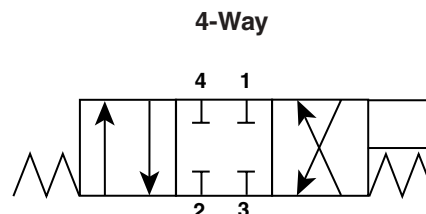
All ports blocked center position provides a means to stop or momentarily delay the movement of an air device.

NOTE: Three position valves are available on special order with the following optional flow conditions in the center position:

- Inlet port (#1) blocked and both outlet ports (#2 & #3) open to exhaust port (#4)
- Inlet open to both outlet ports and exhaust blocked.

* For 3-Way, normally open or normally closed service, use 4-Way valve plugging appropriate port. See Optional Functions.

Symbol



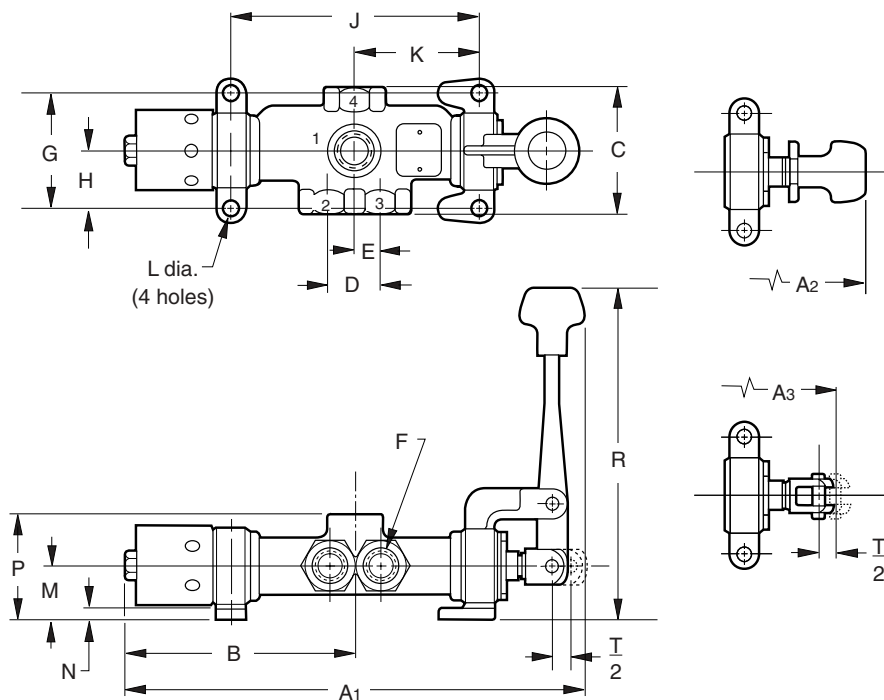
How to Order

Select valve model number from tables for desired operation.

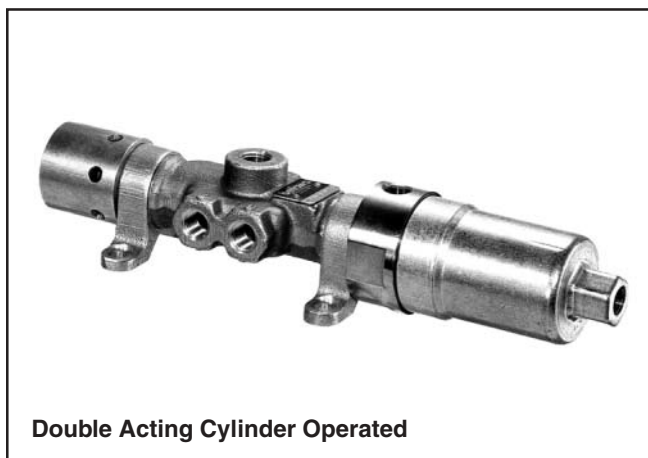
Example: Order M074 249 43 to obtain a 1/4" pipe ported, 4-Way, 3-Position, lever operated, spring centered valve.

Description	Port Size	Model Number
4-Way, 3-Position Knob Operated Spring Centered (All Ports Blocked)	1/4	M076 249 48
	3/8	M076 349 48
	1/2	M076 449 48
	3/4	M076 649 48

Description	Port Size	Model Number
4-Way, 3-Position Lever Operated Spring Centered (All Ports Blocked)	1/4	M074 249 43
	3/8	M074 349 43
	1/2	M074 449 43
	3/4	M074 649 43
	1	M074 849 43
4-Way Clevis Operated Spring Centered (All Ports Blocked)	1/4	M074 249 05
	3/8	M074 349 05
	1/2	M074 449 05
	3/4	M074 649 05
	1	M074 849 05



		1/4	3/8	1/2	3/4	1
A1	inch	8.21	9.25	10.49	13.24	14.55
	mm	208.5	235.0	266.4	336.3	369.6
A2	inch	8.57	9.59	11.40	13.71	—
	mm	217.6	243.5	289.6	348.3	—
A3	inch	7.94	8.91	11.06	13.04	14.54
	mm	201.7	226.3	280.9	331.2	369.3
B	inch	4.17	4.65	5.23	6.81	7.51
	mm	105.9	118.1	132.8	173.0	190.8
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	.325	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	38.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R	inch	6.80	6.84	8.12	10.88	10.88
	mm	172.7	173.7	206.2	276.4	276.4
Travel	inch	.62	.69	.88	1.12	1.25
	mm	15.8	17.5	22.4	28.4	31.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg of perfect	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.



CAUTION:

This valve shall not be used to actuate a punch press. Do not use this valve on punch presses or press brakes. See OSHA 1910.217.

Function

Manually and mechanically operated 3-Way* and 4-Way, 3-Position valves, manually or mechanically shifted and spring centered. The valve spool automatically centers when operating force is removed.

Three and 4-Way, 3-Position valves are used for single and double-acting cylinder control, respectively, where positioning the cylinder in intermediate stroke, or "inching", is required. For other functions, see Optional Functions.



Foot operated valves must be protected against inadvertent operation that can cause serious bodily injury. Use of a guard or equivalent protection is strongly recommended as it will reduce the likelihood of inadvertent operation.

Features

All ports blocked center position provides a means to stop or momentarily delay the movement of an air device.

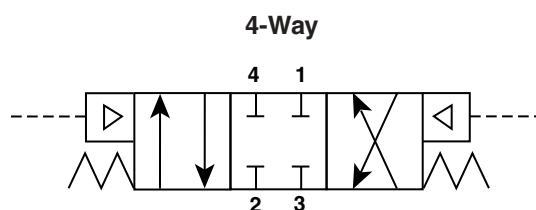
Double-acting cylinder operators are suitable for use with a remote maintained pilot signal pressure of 40 to 250 psi (2.8 to 17.2 bar) from a single 4-Way pilot valve or two coordinated 3-Way pilots.

NOTE: Three position valves are available on special order with the following optional flow conditions in the center position:

- Inlet port (#1) blocked and both outlet ports (#2 & #3) open to exhaust port (#4)
- Inlet open to both outlet ports and exhaust blocked.

* For 3-Way, normally open or normally closed service, use 4-Way valve plugging appropriate port. See Optional Functions.

Symbol



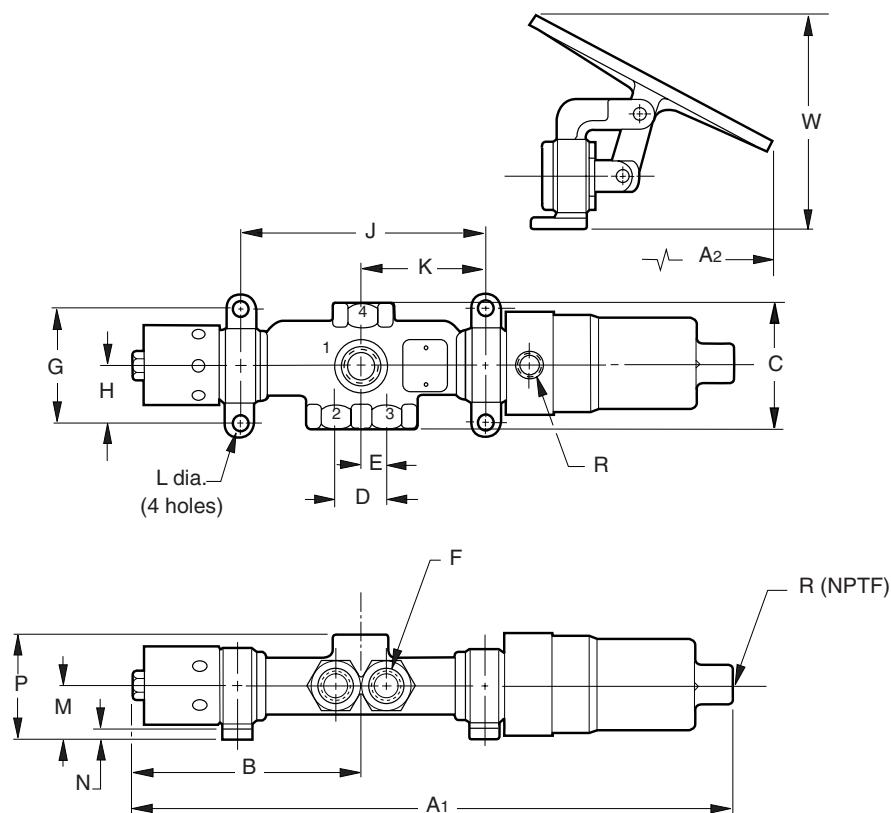
How to Order

Select valve model number from table for desired operation.

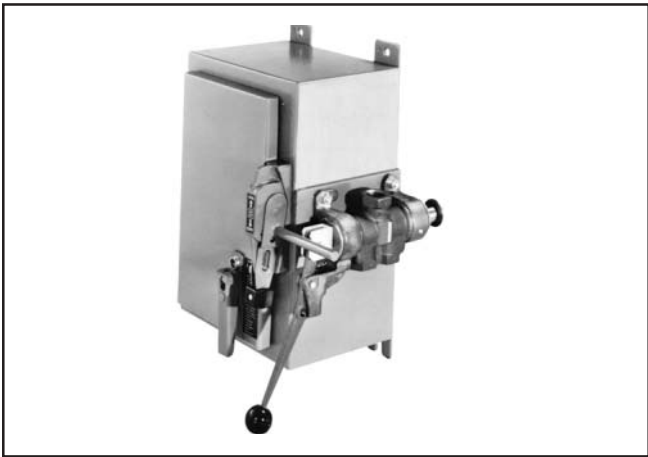
Example: Order M074 449 88 to obtain a 1/2" pipe ported 4-Way, 3-Position, treadle operated, spring centered valve.

Note: Shaded units are no longer available.

Description	Port Size	Model Number
4-Way, 3-Position Treadle Operated Spring Centered (All Ports Blocked)	1/4	M074 249 88
	3/8	M074 349 88
	1/2	M074 449 88
	3/4	M074 649 88
	1	M074 849 88
4-Way, 3-Position Double Acting Cylinder Spring Centered (All Ports Blocked)	1/4	M078 247 13
	3/8	M078 347 13
	1/2	M078 447 13
	3/4	M078 647 13
	1	M078 847 13



		1/4	3/8	1/2	3/4	1
A1	inch	10.37	11.33	12.47	15.85	17.16
	mm	263.4	287.8	316.7	402.6	435.9
A2	inch	10.30	11.31	12.62	16.02	17.33
	mm	261.6	287.3	320.6	406.9	440.2
B	inch	4.17	4.65	5.23	6.81	7.51
	mm	105.9	118.1	132.8	173.0	190.8
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D	inch	.94	1.06	1.25	1.62	2.00
	mm	23.9	26.9	31.8	41.2	50.8
E	inch	.47	.53	.62	.81	1.00
	mm	11.9	13.5	15.8	20.6	25.4
F		1/4"	3/8"	1/2"	3/4"	1"
		Pipe	Pipe	Pipe	Pipe	Pipe
G	inch	2.25	2.38	2.62	.325	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	4.14	4.98	5.85	7.39	8.61
	mm	105.2	126.5	148.6	187.7	218.7
K	inch	2.07	2.49	2.92	3.69	4.30
	mm	52.6	63.2	74.2	93.7	109.2
L	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
M	inch	1.12	1.12	1.25	1.56	1.56
	mm	38.4	28.4	31.8	39.6	39.6
N	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
P	inch	2.12	2.18	2.63	3.06	3.31
	mm	53.8	55.4	66.8	77.7	84.1
R		1/4	1/4	1/4	1/4	1/4
		Pipe	Pipe	Pipe	Pipe	Pipe
w	inch	3.90	3.90	4.20	5.23	5.23
	mm	99.1	99.1	106.7	132.8	132.8



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg Vacuum	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

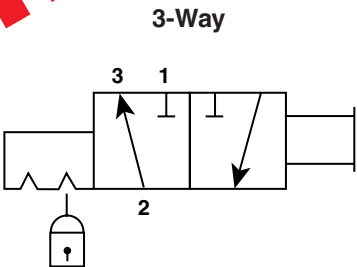
Function

Lever operated 3-Way, 2-Position lock-out valves, manually shifted and returned. Three-way electrical enclosure lock-out valves are used in safety interlock electric/pneumatic for machine power control. Valves are specifically designed to mount on NEMA type 12 enclosures, of the style shown, for disconnects of up to 200 amperes. When valve is in the "Off" position, all down stream air in system is vented to atmosphere. This air is exhausted through a tapped port allowing easy muffling.

Features

Enclosure lock-outs feature high flow characteristics which do not limit performance of supplied pneumatic equipment. Valve handle has a padlock eye which permits locking the pneumatic system "off" independently of the electrical control, for maintenance and setup work. Additionally, the blocking pin attached to enclosure's master electrical control switch insures that the lock-out valve is automatically locked in "off" position any time the electrical power is locked "off". The valve may be obtained separately or with a special mounting plate designed to be welded to the enclosure. Electrical code requirements prohibit drilling through enclosure for valve mounting.

Symbol



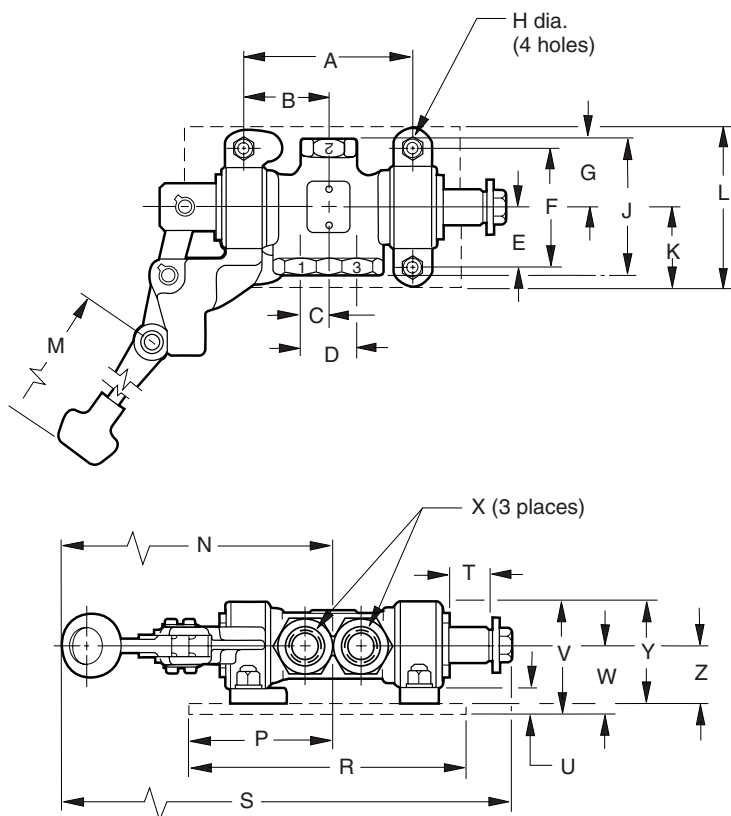
How to Order

Select valve model number and mounting plate number, if required, from table for desired operation.

Example: Order valve M090 918 85 and mounting plate M112 003 to obtain a 1-1/2" pipe ported 3-Way, 2 position, lever operated lock-out valve for electrical enclosure mounting.

Description	Port Size	Model Number
3-Way Piped Exhaust Lever Operated Lock-out	1/2	M085 418 90
	3/4	M085 618 90
	1	M085 818 90
Mounting Plate	1/2	M112 004
	3/4	M112 001
	1	M112 002

1/2, 3/4 & 1 Inch



		1/2	3/4	1	1-1/2
A	inch mm	3.72 94.5	4.676 118.4	5.42 137.7	5.44 138.2
B	inch mm	1.86 47.2	2.33 49.2	2.70 68.6	2.72 69.1
C	inch mm	.62 15.8	.81 20.6	1.00 25.4	—
D	inch mm	1.25 31.8	1.62 41.2	2.00 50.8	—
E	inch mm	1.31 33.3	1.62 41.2	1.81 46.0	2.62 66.6
F	inch mm	2.62 66.6	3.25 82.6	3.62 92.0	5.25 133.4
G	inch mm	1.50 38.1	1.81 46.0	2.19 55.6	3.56 90.4
H	inch mm	.41 10.4	.41 10.4	.41 10.4	.53 13.5
J	inch mm	3.00 76.2	3.62 92.0	4.38 111.2	7.12 180.8
K	inch mm	1.75 44.4	2.12 53.8	2.25 47.2	3.22 81.8
L	inch mm	3.50 88.9	4.25 108.0	4.50 114.3	6.41 163.6
M	inch mm	3.78 96.0	6.00 152.4	6.00 152.4	7.03 178.6
N	inch mm	6.31 160.3	8.12 206.2	8.50 215.9	9.05 229.9
R	inch mm	6.08 154.4	7.33 186.2	8.00 203.2	10.00 254.0
S	inch mm	10.03 254.8	12.73 323.3	13.59 345.2	14.58 370.3
T	inch mm	.88 22.4	1.12 28.4	1.25 31.8	1.31 33.3
U	inch mm	.31 7.9	.31 7.9	.38 9.6	.75 19.0
V	inch mm	2.41 61.2	2.94 74.76	3.16 80.3	6.50 165.1
W	inch mm	1.50 38.1	1.81 46.0	1.81 46.0	2.69 68.3
X		1/2 Pipe	3/4 Pipe	1 Pipe	1-1/2 Pipe
Y	inch mm	2.16 54.9	2.69 68.3	2.91 73.9	6.25 158.8
Z	inch mm	1.25 31.8	1.56 39.6	1.56 39.6	2.44 62.0



Engineering Data

Temperature rating: -15°F to 200°F (-26° to 93°C)

Cv flow rating: See Flow Capacities.

Lubrication: For best results and service life use clean, moisture-free lubricated air.

Pressure Limitations

Media	Port Size	PSI (kPa)	
		3-Way	4-Way
Air and Hydraulic ‡	1/4	225 (1550)	225 (1550)
	3/8	225 (1550)	225 (1550)
	1/2	215 (1480)	215 (1480)
	3/4	200 (1380)	200 (1380)
	1	200 (1380)	200 (1380)
Vacuum	All	Within 1" Hg Vacuum	
Other		Consult Factory	

‡ For compatible inert gas and hydraulic media, see Engineering Data.

Function

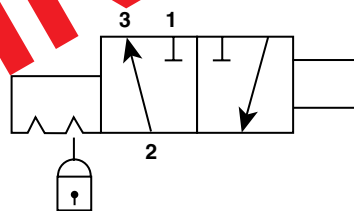
Knob and lever operated 3-Way, 2-Position lock-out valves with detent, manually shifted and returned. Three-way lock-out valves are used in safety and air savings applications for control of main supply air entering machine(s). In the "On" position, valve directs supply air to pneumatic machinery; in the "Off" position, valve blocks pressure to equipment and vents downstream air to atmosphere. Spring-loaded detent retains the spool in last position used.

 **Install guards on all hand operated valves if accidental operation can cause personal injury.**

Features

Valve may be padlocked "Off" for safety to avoid accidental equipment operation during maintenance, or for air savings to avoid air loss from leaky piping connections when machinery is not in use. Lock-out valves have inlet and outlet ports "in-line" for ease of piping, and an open exhaust with diffuser for venting downstream air.

Symbols



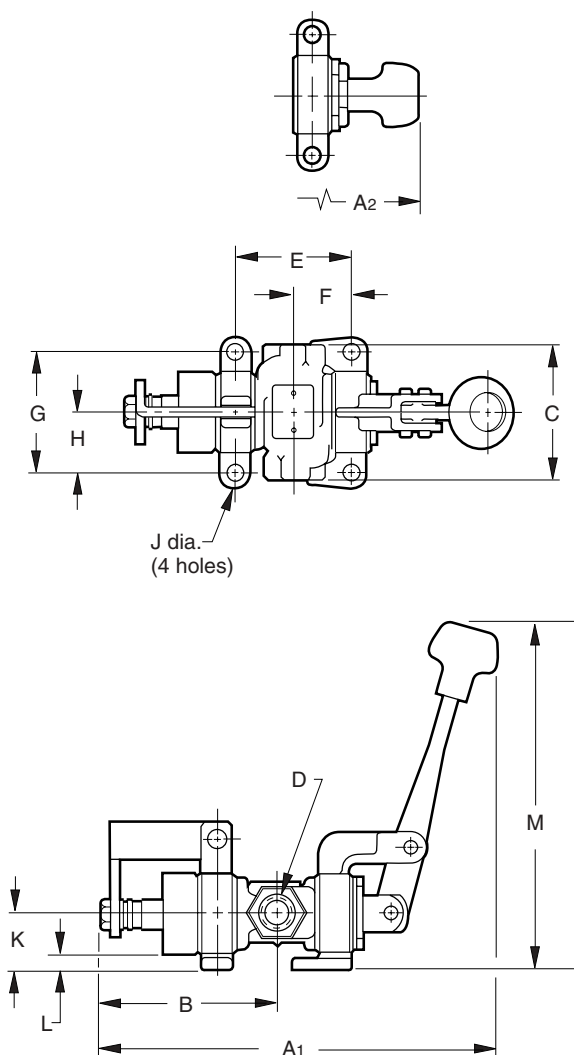
How to Order*

Select valve model number from table for desired operation.

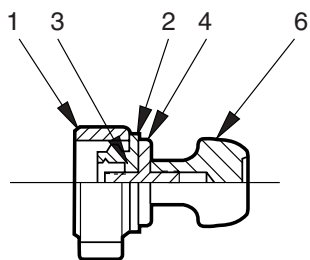
Example: Order M060 814 43 to obtain a 1" pipe ported 3-Way, 2-Position, lever operated, lock-out valve with detents.

* Lockout end sections may be ordered on any 3 or 4-Way valve if required. See Model Number page.

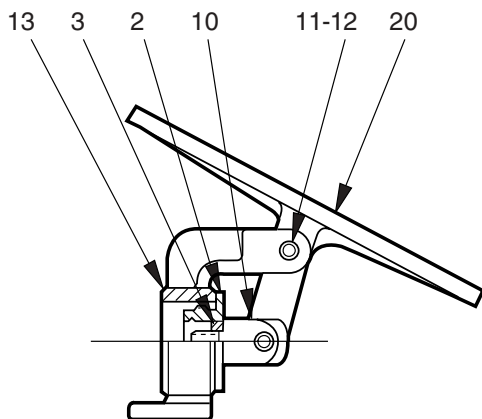
Description	Port Size	Model Number
3-Way Open Exhaust Knob Operated Lock-out/Detent	1/4	M060 214 48
	3/8	M060 314 48
	1/2	M060 414 48
	3/4	M060 614 48
3-Way Open Exhaust Lever Operated Lock-out/Detent	1/4	M060 214 43
	3/8	M060 314 43
	1/2	M060 414 43
	3/4	M060 614 43
	1	M060 814 43



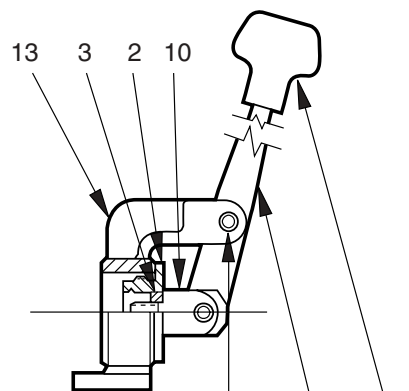
		1/4	3/8	1/2	3/4	1
A1	inch	6.74	7.59	8.66	10.99	11.64
	mm	171.2	192.8	220.0	279.2	295.7
A2	inch	5.97	6.53	7.60	9.13	—
	mm	151.6	165.9	193.0	231.9	—
B	inch	3.02	3.35	3.96	4.84	5.23
	mm	76.7	85.1	100.7	123.0	132.9
C	inch	2.38	2.62	3.00	3.62	4.38
	mm	60.4	66.6	76.2	92.0	111.2
D		1/4"	3/8"	1/2"	3/4"	1"
	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe
E	inch	1.88	2.21	2.67	3.30	3.82
	mm	47.8	56.2	67.7	83.8	97.0
F	inch	.94	1.10	1.33	1.64	1.91
	mm	23.9	27.9	33.8	41.7	48.5
G	inch	2.25	2.38	2.62	3.25	3.62
	mm	57.2	60.4	66.6	82.6	92.0
H	inch	1.12	1.19	1.31	1.62	1.81
	mm	28.4	30.2	33.3	41.2	46.0
J	inch	.34	.34	.41	.41	.41
	mm	8.6	8.6	10.4	10.4	10.4
K	inch	1.12	1.12	1.25	1.56	1.56
	mm	28.4	28.4	31.8	39.6	39.6
L	inch	.25	.25	.31	.31	.38
	mm	6.4	6.4	7.9	7.9	9.6
M	inch	6.78	6.78	8.10	10.73	10.73
	mm	172.2	172.2	205.7	272.5	272.5



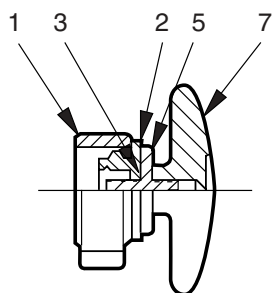
Knob
M062 *48



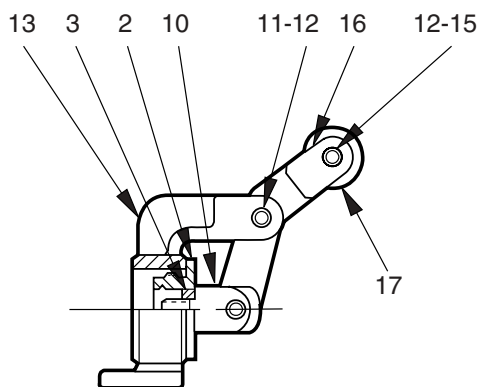
Treadle
M062 *88



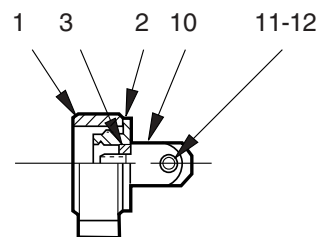
Lever
M062 *43



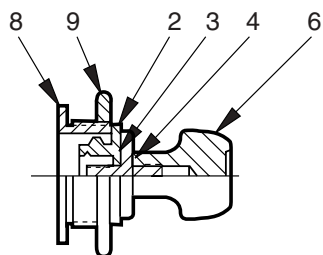
Palm Button
M062 *99



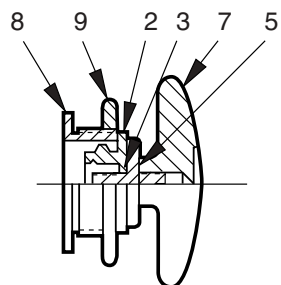
Cam
M062 *03



Clevis
M062 *05

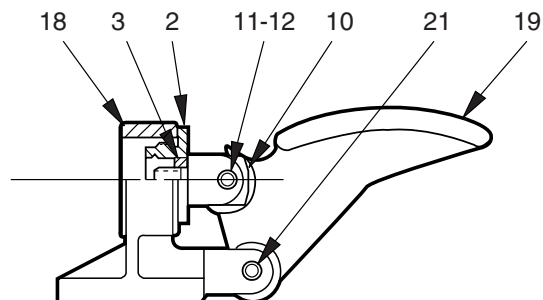


Panel Mounted Knob
M062 *51



Panel Mounted Palm Button
M062 *59

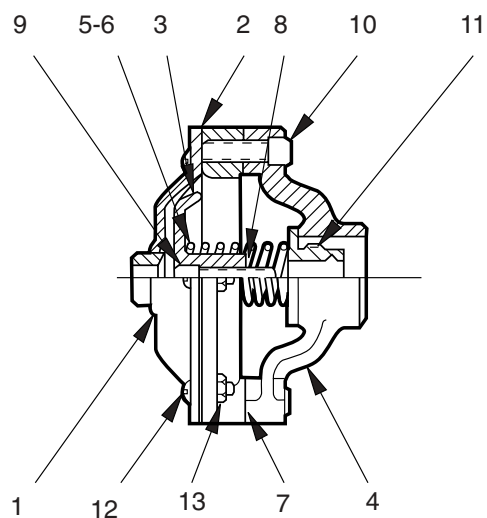
Port Size	Use No. *
1/4	2
3/8	3
1/2	4
3/4	6
1	8



Pedal
M062 *40

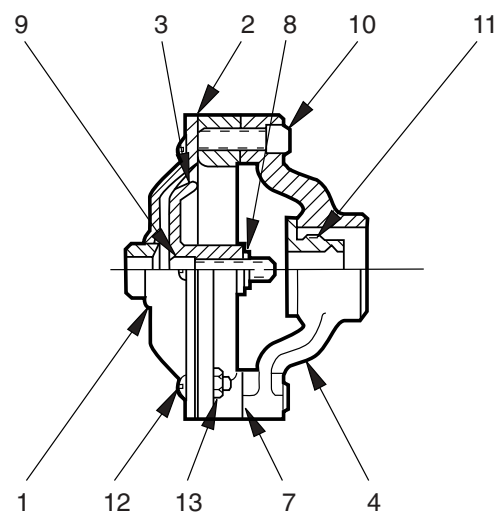
Item No.	Part Number					Description
	1/4"	3/8"	1/2"	3/4"	1"	
1	M073 016	M073 026	M073 037	M073 046	M073 065	Bracket
2	M103 012	M103 047	M103 066	M103 108	M103 104	End Bearing
3	H177 05	H177 05	H177 06	H174 08	H174 08	Lockwasher
4	M013 011	M013 011	M013 012	M013 013	—	Knob Adapter
5	M013 011	M013 011	M013 012	M013 013	—	Palm Knob Adapter
6	H050 28	H050 28	H050 28	H050 28	H050 28	Knob
7	H050 29	H050 29	H050 29	H050 29	—	Palm Button
8	M013 014	M013 015	M013 016	M013 017	—	Panel Adapter
9	M303 005	M303 006	M303 007	M303 008	—	Jam Nut
10	M133 003	M133 003	M133 012	M133 018	M133 018	Clevis
11	H072 29	H072 29	M333 013	M333 013	M333 013	Pivot Pin (2)
12	—	—	H089 03	H089 03	H089 03	Retaining Ring (4)
13	M073 009	M073 022	M073 033	M073 042	M073 054	Bracket
14	M273 022	M273 022	M273 023	M273 024	M273 024	Lever
15	H072 30	H072 30	M333 016	M333 016	M333 016	Roller Trunnion
16	M273 002	M273 002	M273 006	M273 007	M273 007	Cam Arm
17	M443 003	M443 003	M443 002	M443 002	M443 002	Roller
18	M073 003	M073 019	M073 030	M073 040	M073 053	Bracket
19	M323 005	M323 005	M323 006	M323 007	M323 007	Pedal
20	M553 004	M553 004	M553 005	M553 006	M553 006	Treadle
21	H072 29	H072 29	M333 013	M333 014	M333 014	Pivot Pin

NOTE: () denotes quantity required when more than one.

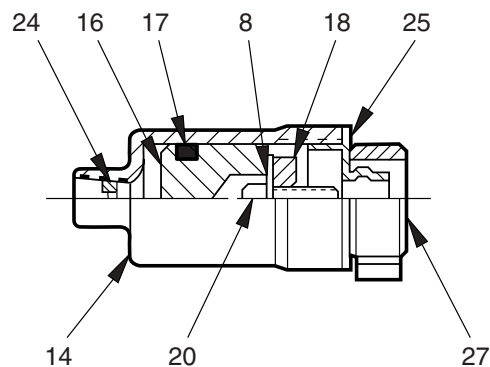


**Single Diaphragm
M062 *30**

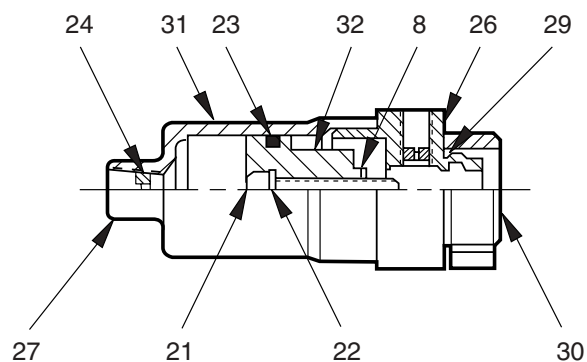
**Inst. Air Single Diaphragm
M062 *32**



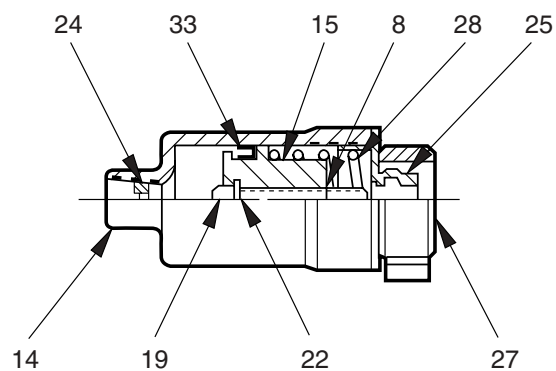
**Double Diaphragm
M062 *33**



**Double Cylinder
M062 *19**



**Double Acting Cylinder
M062 *13**

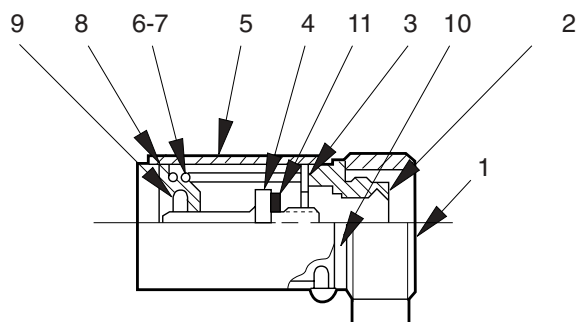


**Single Cylinder
M062 *26**

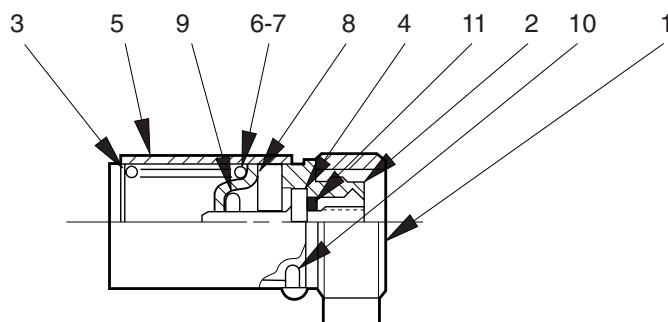
Port Size	Use No. *
1/4	2
3/8	3
1/2	4
3/4	6
1	8

Item No.	Part Number					Description
	1/4"	3/8"	1/2"	3/4"	1"	
1	M163 005	M163 005	M163 005	M163 012	M163 012	Cover
2	M193 002	M193 002	M193 002	M193 005	M193 005	Diaphragm
3	M343 038	M343 038	M343 032	M343 039	M343 039	Piston
4	M573 004	M573 003	M573 001	M573 011	M573 012	Yoke
5	M493 024	M493 024	M493 010	M493 023	M493 023	Spring
6	M493 022	M493 022	M493 009	M493 028	M493 028	Spring (Inst. Air)
7	M423 002	M423 002	M423 002	M423 004	M423 004	Ring
8	H177 05	H177 05	H177 06	H174 08	H174 08	Lockwasher
9	H101 19	H101 19	H101 45	H102 17	H102 17	Screw
10	H101 15	H101 15	H101 15	H101 15	H101 17	Screw (2)
11	M103 012	M103 047	M103 066	M103 108	M103 104	End Bearing
12	H113 33	H113 33	H113 33	H113 33	H113 33	Screw (6)
13	H064 16	H064 16	H064 16	H064 16	H064 16	Nut (6)
14	M243 028	M243 028	M243 028	M243 036	M243 036	Housing
15	M343 019	M343 019	M343 018	M343 027	M343 027	Piston – Single Act.
16	M343 022	M343 022	M343 022	M343 028	M343 028	Piston – Double Cyl.
17	H145 15	H145 15	H145 15	H145 20	H145 20	Packer
18	M013 005	M013 005	M013 007	M013 009	M013 009	Adapter
19	H101 21	H101 21	H101 47	H102 19	H102 19	Screw – Single Act.
20	H101 17	H101 17	H101 45	H102 15	H102 15	Screw – Double Act.
21	H101 21	H101 21	H101 47	H102 18	H102 18	Screw – Double Act.
22	H175 14	H175 14	H175 19	H175 24	H175 24	Lockwasher
23	H136 33	H136 33	H136 33	H137 18	H137 18	O-Ring
24	M363 002	M363 002	M363 002	M363 002	M363 002	Restrictor
25	M383 007	M383 011	M383 018	M383 029	M383 030	Retainer
26	M383 009	M383 017	M383 015	M383 024	M383 026	Retainer – Dbl. Act.
27	M073 016	M073 026	M073 037	M073 046	M073 065	Bracket
28	M493 015	M493 015	M493 015	M493 020	M493 020	Spring
29	H135 27	H135 39	H136 05	H136 39	H137 16	O-Ring
30	M223 006	M223 006	M223 006	M223 007	M223 007	Gasket
31	M243 012	M243 012	M243 012	M243 040	M243 040	Housing – Dbl. Act.
32	M343 021	M343 021	M343 017	M343 029	M343 029	Piston – Dbl. Act. Cyl.
33	H222 32	H222 32	H222 32	H145 20	H145 20	Packer

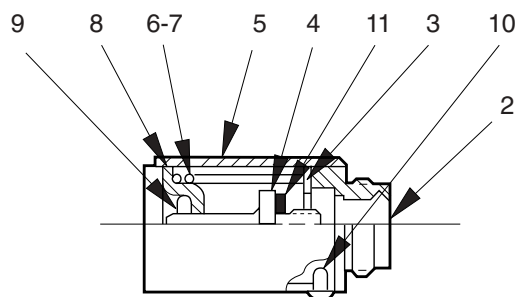
NOTE: () denotes quantity required when more than one.



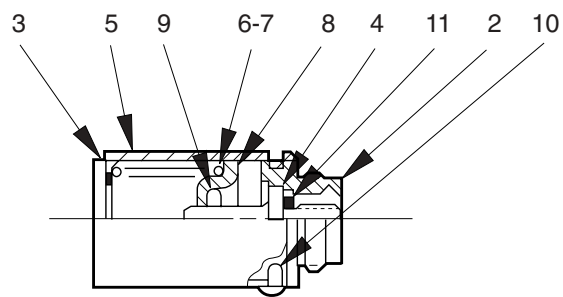
Direct Acting Spring Return with Bracket
M062 *95 Push Lever
M062 *97 Pull Knob



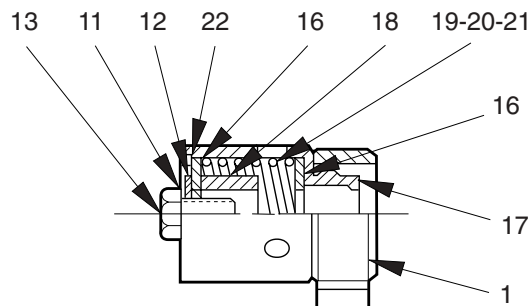
Reverse Acting Spring Return with Bracket
M062 *96 Pull Lever
M062 *98 Push Knob



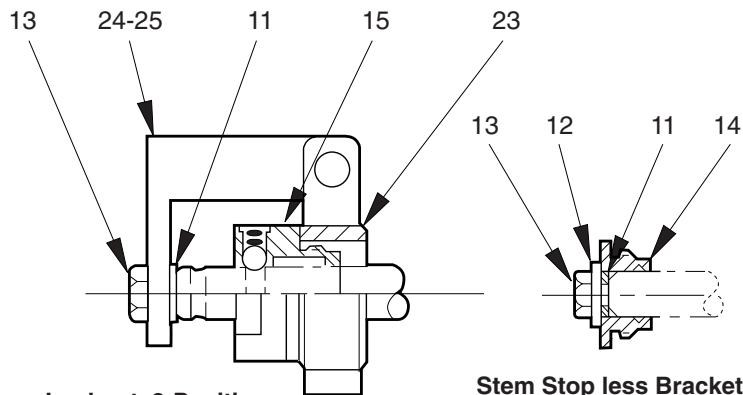
Direct Acting Spring Return less Bracket
M062 *62 Push Lever
M062 *64 Pull Knob



Reverse Acting Spring Return less Bracket
M062 *63 Pull Lever
M062 *65 Push Knob

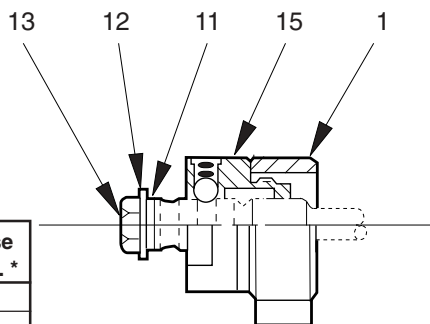


Spring Centered Neutral
M062 *74 Standard Spring
M062 *76 Light Spring
M062 *78 Heavy Spring

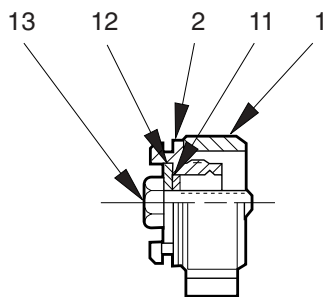


Lockout, 2-Position
M062 *60

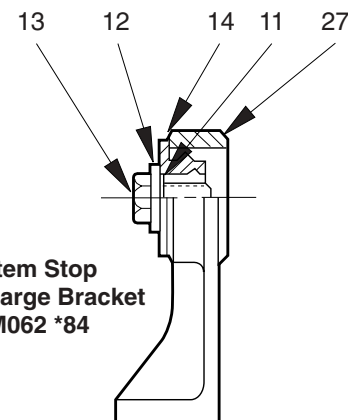
Stem Stop less Bracket
M062 *87



Ball Detent, 3-Position
M062 *54



Stem Stop with Small Bracket
M062 *85

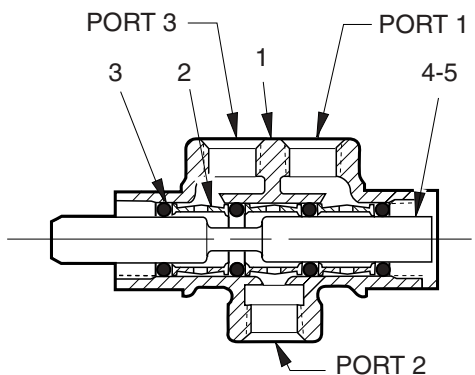


Stem Stop with Large Bracket
M062 *84

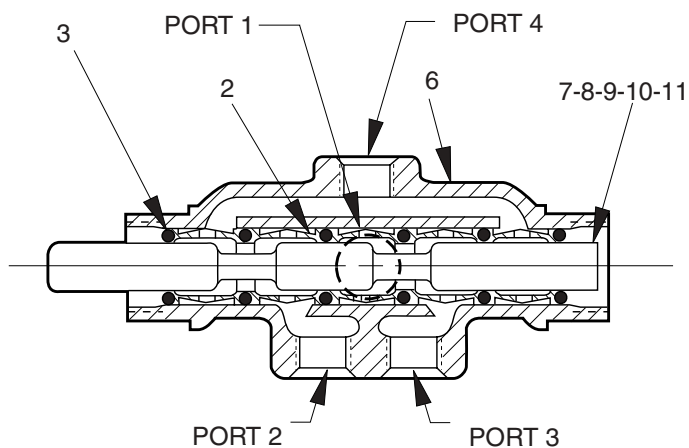
Port Size	Use No. *
1/4	2
3/8	3
1/2	4
3/4	6
1	8

Item No.	Part Number					Description
	1/4"	3/8"	1/2"	3/4"	1"	
1	M073 016	M073 026	M073 037	M073 046	M073 065	Bracket
2	M103 111	M103 112	M103 113	M103 114	M103 115	End Bearing
3	M413 015	M413 015	M413 016	M413 017	M413 018	Spring Retainer Washer
4	M523 009	M523 009	M523 010	M523 011	M523 012	Stem Stop – Guide
5	M243 043	M243 043	M243 044	M243 045	M243 046	Spring Housing
6	M493 037	M493 037	M493 027	M493 026	—	Spring – Knob Oper.
7	M493 038	M493 038	M493 011	M493 012	M493 013	Spring – Other Oper.
8	M383 032	M383 032	M383 033	M383 034	M383 035	Spring Retainer
9	H072 54	H072 54	H072 70	H072 71	H072 72	Roll Pin
10	H113 04	H113 04	H113 06	H113 52	H113 11	Screw
11	H177 05	H177 05	H177 06	H174 08	H174 08	Lockwasher
12	M563 002	M563 002	M563 006	M563 014	M563 014	Stem Stop
13	H096 26	H096 26	H096 45	H097 06	H097 06	Stem Stop Screw
14	M103 012	M103 047	M103 066	M103 108	M103 104	End Bearing – Plain
15	M012 001	M012 002	M012 003	M012 005	M012 006	Ball Detent Assembly
16	M563 007	M563 009	M563 008	M563 016	M563 016	Washer
17	M243 008	M243 019	M243 027	M243 032	M243 038	Spring Housing
18	M083 003	M083 004	M083 005	M083 008	M083 007	Spacer
19	M493 008	M493 008	M493 008	M493 014	M493 014	Spring
20	M493 019	M493 019	M493 019	M493 033	—	Spring – Knob Oper.
21	M493 006	M493 006	M493 006	M493 007	M493 007	Spring – Dbl. Act. Cyl.
22	H090 25	H090 25	H090 25	H090 12	H090 12	Retainer Ring
23	M073 075	M073 076	M073 077	M073 074	M073 078	Bracket
24	M353 042	M353 043	M353 044	M353 036	M353 045	Lock Plate
25	H072 09	H072 11	H072 14	H072 14	H072 55	Roll Pin
26	M353 037	M353 038	M353 039	M353 040	M353 041	Lock Plate
27	M073 006	M073 017	M073 028	M073 039	M073 051	Large Bracket

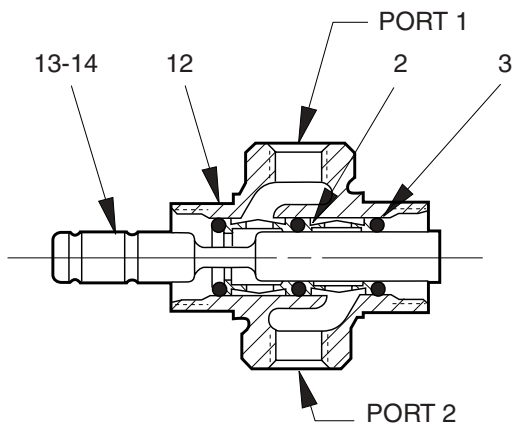
NOTE: () denotes quantity required when more than one.



Standard 3-Way
M032 *18
2-Position Detent
M032 *24



M032 *46 **Standard 4-Way**
M032 *54 **2-Position Detent**
M032 *51 **3-Position Detent**
M032 *49 **Spring Centered Neutral**
M032 *47 **Spring Centered Double Acting Cylinder**

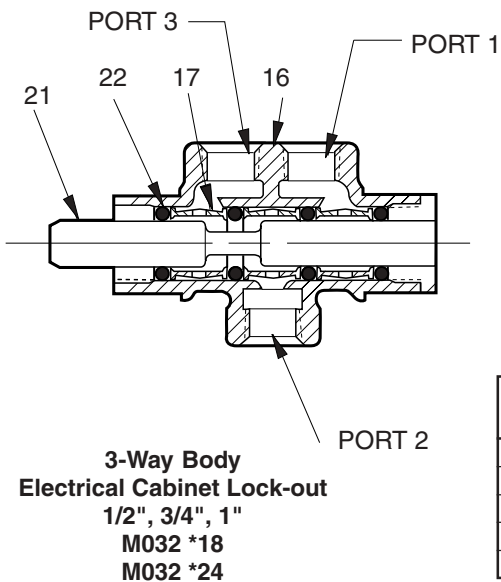
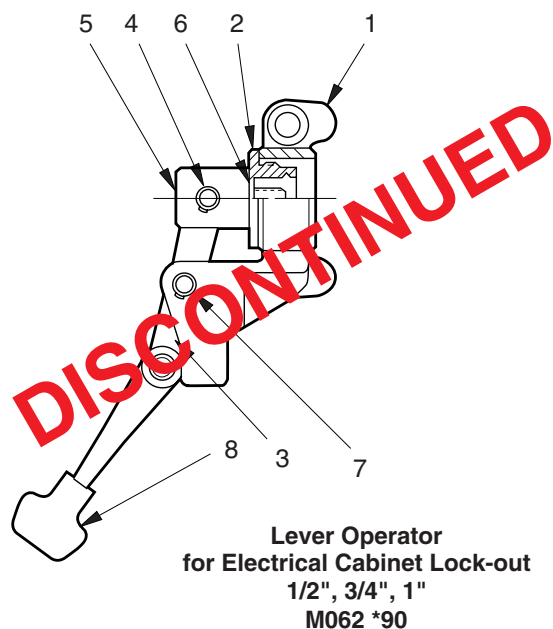


2-Position Detent
M032 *14

Port Size	Use No. *
1/4	2
3/8	3
1/2	4
3/4	6
1	8

Item No.	Part Number					Description
	1/4"	3/8"	1/2"	3/4"	1"	
1	M053 007	M053 019	M053 030	M053 038	M053 042	Body – 3-Way
2	M313 004	M313 011	M313 013	M313 017	M313 023	Spacer (2-3-5)
3	H134 66	H135 88	H135 80	H135 84	H136 89	O-Ring (3-4-6)
4	M373 014	M373 060	M373 102	M373 142	M373 176	Stem – 3-Way
5	M373 020	M373 064	M373 103	M373 146	M373 195	Stem – 3-Way 2-Position Detent
6	M053 003	M053 020	M053 033	M053 039	M053 043	Body – 4-Way
7	M373 033	M373 074	M373 116	M373 156	M373 185	Stem – 4-Way
8	M373 039	M373 076	M373 118	M373 158	M373 186	Stem – 4-Way 2-Pos. Detent
9	M373 040	M373 077	M373 119	M373 160	M373 187	Stem – 4-Way 3-Pos. Detent
10	M373 044	M373 083	M373 123	M373 162	M373 189	Stem – 4-Way 3-Pos. Spring Center
11	M373 050	M373 088	M373 128	M373 166	M373 191	Stem – 4-Way 3-Pos. Spring Center Dbl. Act. Cyl.
12	M053 005	M053 015	M053 028	M053 037	M053 040	Body – 3-Way Lockout
13	M373 003	M373 053	M373 093	M373 136	M373 171	Stem – 3-Way Open End Exhaust
14	M373 008	M373 055	M373 096	M373 139	M373 194	Stem – 3-Way Lockout

NOTE: () denotes quantity required when more than one.



Port Size	Use No. *
1/4	2
3/8	3
1/2	4
3/4	6
1	8

Item No.	Part Number			Description
	1/2"	3/4"	1"	
1	M073 071	M073 069	M073 070	Bracket
2	M103 066	M103 108	M103 104	End Bearing – Plain
3	M273 020	M273 019	M273 019	Lever
4	M333 013	M333 013	M333 013	Trunnion (2)
5	M133 027	M133 026	M133 026	Clevis
6	H177 06	H174 08	H174 08	Lockwasher
7	H089 03	H089 03	H089 03	Retaining Ring
8	H050 28	H050 28	H050 28	Knob
9	M053 030	M053 038	M053 042	Body
10	M313 013	M313 017	M313 023	Spacer (3)
11	M373 102	M373 142	M373 176	Plunger
12	H135 80	H135 84	H136 89	O-Ring (4)

NOTE: () denotes quantity required when more than one.

Replacement Knobs & Palm Buttons

Description	1/4 & 3/8	1/2	3/4
Knob & Adapter Kit	M122 001	M122 002	M122 003
Palm Button & Adapter Kit	M122 004	M122 005	M122 006



Hex Drive Pipe Plugs

Port Size	1/4"	3/8"	1/2"	3/4"	1"
Part Number	H074 07	H074 11	H074 14	H074 81	H074 71

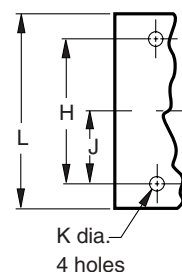
Pedal Guard

(Fits all pedal operated valves)

Description	Model Number
Guard with door	M232 001
Guard without door	M232 002
• Guard with door for 1/4 and 3/8 valve	M232 003
• Guard without door for 1/4 and 3/8 valve	M232 004
• Guard with door for 1/2, 3/4 and 1" valve	M232 005
• Guard without door for 1/2, 3/4 and 1" valve	M232 006

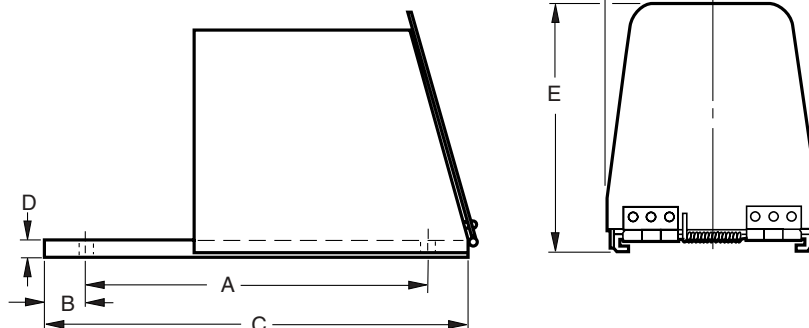
- Includes mounting hardware.

CAUTION:
 Foot valves utilizing this guard shall not be used to actuate a punch presse. Do not use this valve on punch presses or press brakes. See OSHA 1910.217.



Dimensions

Key	Inch	mm
A	10.50	266.7
B	1.25	31.8
C	13.00	330.2
D	.50	12.7
E	7.38	187.4
F	6.36	161.5
G	3.18	80.8
H	4.50	114.3
J	2.25	57.2
K	.44	11.2
L	6.00	152.4



Service Kits

(Field Service Instructions)

Description (For all 3 & 4-Way Valves)	1/4	3/8	1/2	3/4	1
Manual & Mechanical Operators	M242 001	M242 002	M242 003	M242 004	M242 005
Cylinder (Single, Double & Double-Acting)	M242 006	M242 007	M242 008	M242 009	M242 010
Diaphragm (Single & Double)	M242 011	M242 012	M242 013	M242 014	M242 015

Materials & Construction

Body: Cast from high pressure valve bronze for durability and corrosion resistance.

Stem: Machined from stainless steel* and hard chrome plated to resist abrasion (*1-1/2" basic stem is hard-anodized aluminum).

Spacers & End Bearings: Machined from quality brass bar stock (1-1/2" basic – aluminum).

Operators: Machined from quality iron castings; steel rod, bar and tube, and plated for corrosion resistance. Knobs and palm buttons are anodized aluminum.

Springs: Wound from high quality steel and plated for corrosion resistance.

O-rings: Specially compounded of Buna-N and impregnated with Molybdenum Disulfide to assure long life where no air line lubrication is desirable.

Viton Seals:

- 1/4" = H23277
- 3/8" = H24908
- 1/2" = H24983
- 3/4" = H24984
- 1" = H24985

Lubrication

Air should be lubricated to assure maximum valve life and trouble-free operation. We recommend F442 oil for lubrication or a similar quality lubricant with a medium aniline point range between 180° and 220°F. Lubrication oil must not contain additives or contaminants, such as diesters, that will adversely affect Buna-N compounds. High aniline oil will shrink o-rings, while low aniline oils will swell o-rings, reducing operating life and efficiency.

Media

Standard valves are compatible with inert gases, medium aniline oils and partial vacuums.



CAUTION: Manual valves are not warranted for oxygen, natural gas, acetylene or other explosive media, or life-support systems. Use of these valves for applications not recommended by Parker is done solely at the purchaser's risk.

Flow Capacities

The capacity curves shown in the chart are for a theoretical valve having a $C_v = 1.0$ for air at standard conditions.

To estimate the capacity of a manual valve if the supply or initial pressure is known, proceed as follows:

Assuming initial pressure is 100 psig, select the 100 psi initial pressure curve and follow it upward and to the left edge of the chart. Read the flow in SCFM (in this example the flow is approximately 56 SCFM). This value reflects a full pressure drop. Multiply the SCFM flow obtained in the chart by the C_v for the valve type and flow path desired shown on the accompanying table. This example is for U.S. units; capacity in SI units is estimated in the same manner.

To estimate flow capacity at a specific "final pressure":

Locate the desired final pressure on the bottom scale of the chart. Follow a vertical upward until it intersects the initial pressure curve. Then follow a horizontal line from that point to the left edge of the chart. Read the flow.

Multiply the flow obtained in the chart by C_v of selected valve type and desired flow path for flow.

Flow rating determined in accordance with NFPA recommended standard NFPA/T3.21.3 - 1974.

Flow C_v Ratings

Valve Type	Port Size	Port 1 to 2	Port 1 to 3	Port 2 to 3	Port 2 to 4	Port 3 to 4
3-Way 2-Position	1/4	2.4	—	2.4	—	—
	3/8	3.2	—	3.4	—	—
	1/2	5.0	—	5.1	—	—
	3/4	9.5	—	9.8	—	—
	1	12.1	—	13.1	—	—
4-Way 2-Position	1/4	2.4	2.4	—	2.0	2.2
	3/8	3.4	3.2	—	3.0	3.1
	1/2	5.2	5.3	—	4.7	4.7
	3/4	8.7	9.2	—	7.9	8.0
	1	12.8	13.2	—	11.6	11.6
4-Way 3-Position	1/4	2.1	2.4	—	1.9	2.1
	3/8	3.5	3.1	—	2.9	3.2
	1/2	5.2	5.2	—	4.5	4.7
	3/4	8.7	8.4	—	7.8	7.5
	1	12.4	12.9	—	11.6	12.1

C_v Method (U.S. units)

Data at standard conditions:

68°F temperature
14.7 psi Abs. pressure
36% relative humidity

$$Q = 22.48 C_v \sqrt{\frac{P_c \times (P_2 + P_a)}{T_1 \times G}}$$

C_v Method (SI units)

Data at standard conditions:

20°C temperature
760 mm Hg Abs. pressure
36% relative humidity

$$Q = 114.55 C_v \sqrt{\frac{P_c \times (P_2 + P_a)}{T_1 \times G}}$$

C_v = Flow Coefficient

G = ratio of molecular weight of gas being used to that of air. Mw for air = 28.96

$$\frac{\text{Mw of gas used}}{\text{Mw of air}}$$

P_2 = downstream pressure (psig or bar)

P_a = ambient pressure (psia or bar, Abs.)

P_c = component pressure drop (psi or bar)

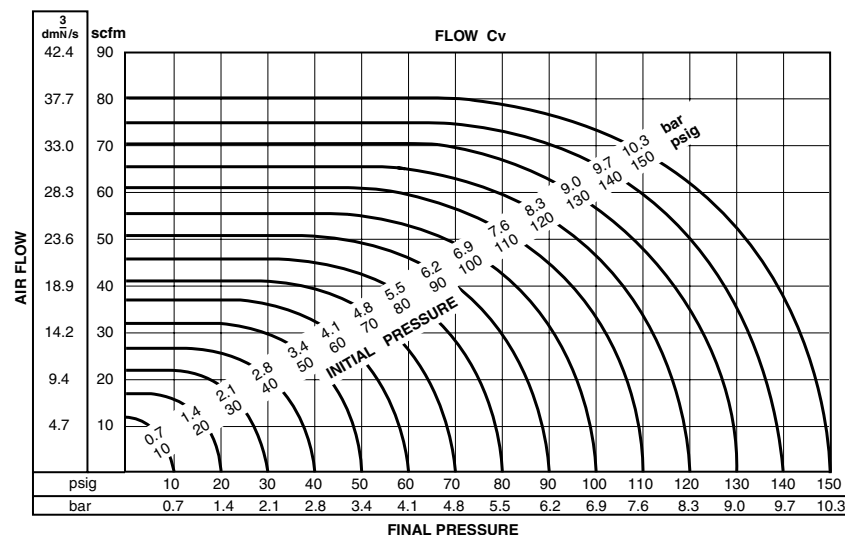
Q = flow rate (SCFM or dm^3/s) at 14.7 psia at 68°F or 760mm Hg at 20°C at 36% relative humidity

T_1 = upstream temperature

(°R = °F + 460°)

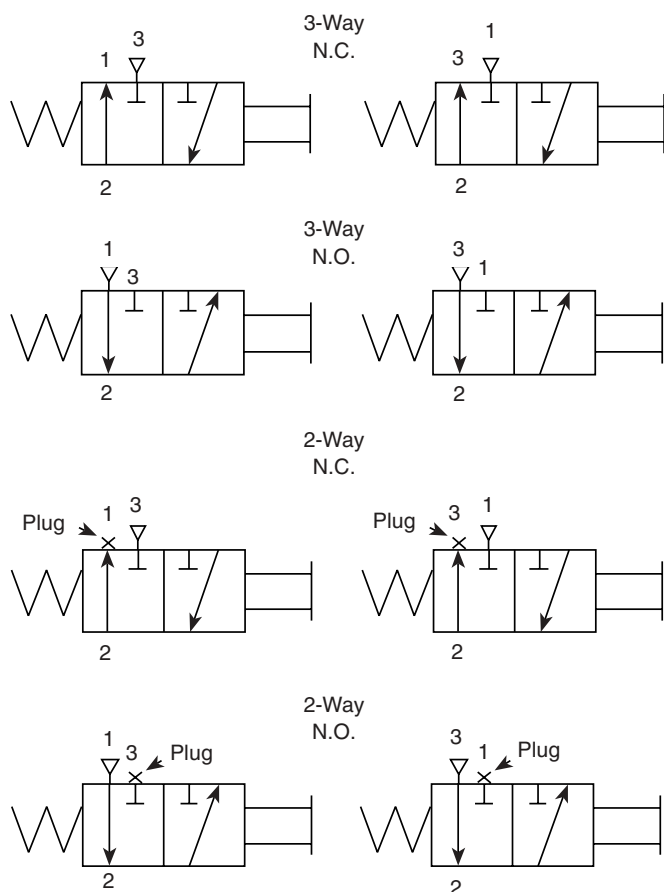
(°K = °C + 273°)

Flow C_v



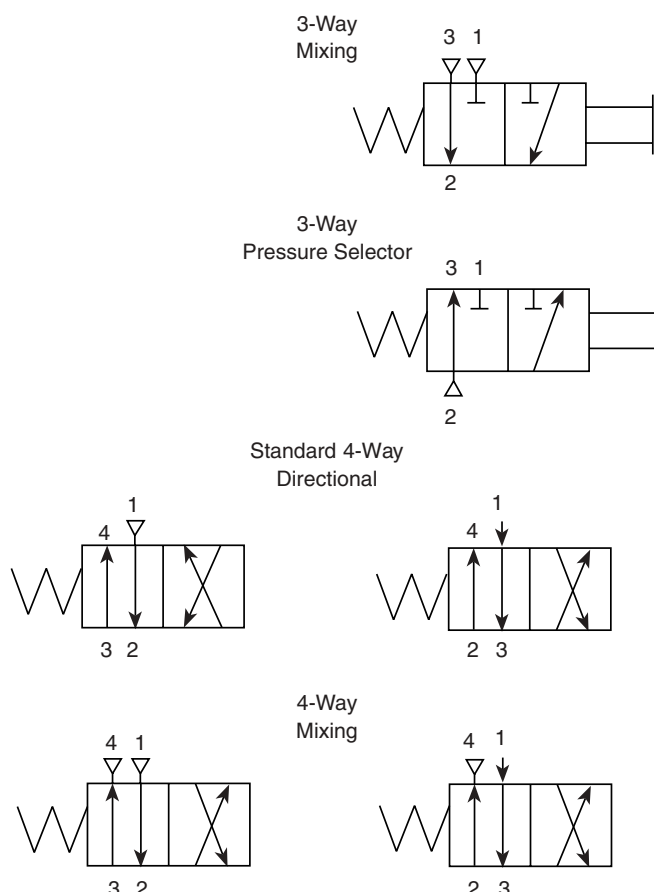
Knob Type Push to Operate
(Section A of Chart Below)

Knob Type Pull to Operate
(Section B of Chart Below)



Knob Type Push to Operate
(Section A of Chart Below)

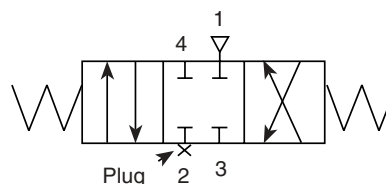
Knob Type Pull to Operate
(Section B of Chart Below)



Hex Drive Pipe Plugs

Part	Model No.
1/4" Plug	H074 07
3/8" Plug	H074 11
1/2" Plug	H074 14
3/4" Plug	H074 81
1" Plug	H074 71

3-Position, 3-Way
All Ports Blocked In Neutral



Optional Functions

Section A – Knob Type Push to Operate
Section B – Knob Type Pull to Operate

Valve Function			Pressure Service				Vacuum Service			
			Port 1	Port 2	Port 3	Port 4	Port 1	Port 2	Port 3	Port 4
A	2-Way	N.O.	Inlet	Outlet	Plugged	—	Pump	Device	Plugged	—
		N.C.	Plugged	Outlet	Inlet	—	Plugged	Device	Pump	—
	3-Way	N.O.	Inlet	Cylinder	Exhaust	—	Pump	Device	Open	—
		N.C.	Exhaust	Cylinder	Inlet	—	Open	Device	Pump	—
B	2-Way	N.O.	Plugged	Outlet	Inlet	—	Plugged	Device	Pump	—
		N.C.	Inlet	Outlet	Plugged	—	Pump	Device	Plugged	—
	3-Way	N.O.	Exhaust	Cylinder	Inlet	—	Open	Device	Pump	—
		N.C.	Inlet	Cylinder	Exhaust	—	Pump	Device	Open	—
C	4-Way		Inlet	Cylinder	Cylinder	Exhaust	Pump	Device	Device	Open

Chart A

This chart shows size in relationship to the Body / Function. Refer to page 3 for full descriptions.

Example:

Body / Function 53 is available as 4 (1/2" NPT) and 8 (1" NPT) sizes.

("X" indicates available sizes.)

Body / Function	Body / Size					
	2	3	4	6	8	9
01	X	X	X	X	X	-
03	-	-	X	X	-	-
11	X	X	-	-	-	-
12	X	-	-	-	-	-
14	X	X	X	X	X	-
18	X	X	X	X	X	X
24	X	X	X	X	X	-
35	X	X	-	-	-	-
46	X	X	X	X	X	-
47	X	-	X	X	X	-
48	X	-	-	-	-	-
49	X	X	X	X	X	-
50	X	X	X	-	-	-
51	X	X	X	X	X	-
52	X	-	-	-	-	-
53	-	-	X	-	X	-
54	X	X	X	X	X	-

Chart B

This chart shows those End Sections which are compatible with specific bodies. After determining the Valve Model Number from the description on page 3, see if the End Sections will function with the Body selected.

Example:

End Section number 98 will function with Bodies 01, 11, 18, or 46.

("X" indicates combinations that will work with either Left or Right End of the Model Number. "R" indicates an End Section that will only function on the Right End of the Model Number.)

End Sections		Body Functions																	
		01	03	11	12	14	18	24	35	46	47	48	49	50	51	52	53	54	
O P E R A T I N G	01	X	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	
	03	X	-	X	X	-	X	-	X	X	-	X	-	X	-	X	X	-	
	04	X	-	R	X	-	X	-	X	X	-	X	-	X	-	X	X	-	
	05	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	
	07	-	-	X	X	-	-	-	X	-	-	X	-	X	-	X	X	-	
	08	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	
	12	-	-	X	-	-	-	-	X	-	-	X	-	X	-	X	X	-	
	13	-	-	-	-	-	-	X	-	-	X	X	-	X	-	X	X	X	
	16	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	19	X	-	-	-	-	X	-	-	X	-	-	-	-	X	-	-	X	
	21	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	23	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	26	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	28	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	30	X	-	X	-	-	X	-	X	X	-	-	X	-	-	-	-	-	
	31	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	32	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	33	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	35	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	36	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	37	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	39	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	40	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	42	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	
	43	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	
	45	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	
	46	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	
	47	X	-	R	R	-	X	-	-	X	-	X	-	X	-	X	X	-	
	48	X	X	R	R	X	X	X	-	X	-	X	X	X	X	X	X	X	
	49	-	-	R	R	-	-	-	-	-	-	X	-	X	-	X	X	-	
	50	X	X	R	R	X	X	X	-	X	-	X	X	X	X	X	X	X	
	51	X	X	R	R	X	X	X	-	X	-	X	X	X	X	X	X	X	
	52	-	-	X	X	-	-	-	X	-	-	X	-	X	-	X	X	-	
	59	X	X	R	R	X	X	X	-	X	-	X	X	X	X	X	X	X	
	88	X	-	X	X	-	X	-	X	X	-	X	X	X	X	X	X	X	
	90	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
	99	X	X	R	R	X	X	X	X	X	X	-	X	X	X	X	X	X	
N O N - O P E R A T I N G	54	-	X	-	-	X	-	X	-	-	-	-	-	-	X	X	-	X	
	58	-	X	-	-	X	-	X	-	-	-	-	-	-	X	X	-	X	
	60	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	X	
	62	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	63	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	64	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	65	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
	74	-	-	-	X	-	-	-	-	-	X	X	X	X	X	X	-	-	
	76	-	-	-	X	-	-	-	-	-	-	X	X	X	X	X	-	-	
	78	-	-	-	X	-	-	-	-	-	X	X	X	-	X	X	-	-	
	82	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	
	83	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	
	84	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	-	
	85	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	X	
	86	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	
	87	X	-	X	-	-	X	-	X	X	-	-	-	-	-	-	-	X	
	94	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	
	95	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-	
96	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-		
97	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-		
98	X	-	R	-	-	X	-	-	X	-	-	-	-	-	-	-	-		
		01	03	11	12	14	18	24	35	46	47	48	49	50	51	52	53	54	

NOTE: Reference only. Check Model Index for available options.

1/4" End Sections ("X" indicates available combinations.)

End Sections		OPERATING																																NON-OPERATING																															
		01	03	04	05	07	08	12	13	16	19	21	23	26	28	30	32	33	35	36	37	39	40	42	43	45	46	47	48	49	50	51	52	59	88	99																													
		-	X	X	X	X	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																												
01		-	X	X	X	X	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																													
03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																													
04		X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																													
05		X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																													
07		X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																													
08		X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																													
12		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
13		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
16		-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
19		-	X	X	X	X	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
21		X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																														
23		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
26		-	X	X	X	X	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
28		X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
30		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
32		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
33		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
35		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
36		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
37		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
39		-	X	X	X	X	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
40		-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
42		-	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																														
43		-	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																														
45		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
46		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
47		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
48		X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																														
49		X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																														
50		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
51		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
52		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
59		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
88		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
99		-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
54		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
58		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
60		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
62		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
63		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
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97		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
98		-	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																														
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1 1/2" End Sections

[illegible]

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1" End Sections ("X" indicates available combinations.)

End Sections		OPERATING																		NON-OPERATING																	
		03	04	05	07	08	13	16	19	23	26	30	31	32	33	40	42	43	45	46	88	90	54	58	60	62	63	74	78	84	85	87	94	95	96		
OPERATING	03	X	X	X	X	X	-	-	-	-	X	X	X	X	X	X	X	X	X	-	-	X	X	X	X	X	X	X	X	-	X	X	X	X			
	04	X	X	X	X	X	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-	-	X	X	X	X	X	X	X	X	-	X	X	X			
	05	X	X	X	X	X	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	-	X	X	X		
	07	X	X	X	X	X	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	-	X	X	X		
	08	X	X	X	X	X	X	-	-	X	X	X	X	X	X	-	X	X	X	X	-	-	X	X	X	X	X	X	X	X	X	-	X	X	X		
	13	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-		
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	19	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	23	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-		
	26	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-		
	30	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-		
	31	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-		
	32	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-		
	33	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
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	42	X	X	X	X	X	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	-	-	X	-	-	
	43	X	X	X	X	X	X	X	-	-	X	X	X	X	X	-	-	-	X	X	-	-	-	X	X	X	X	X	X	X	X	-	-	X	-	-	
	45	X	X	X	X	X	X	-	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	X	X	-	-	X	-	-
	46	X	X	X	X	X	X	-	-	-	X	X	X	-	X	-	-	X	X	X	-	-	-	X	X	X	X	X	X	-	X	X	-	-	X	-	-
	88	-	X	X	X	X	X	X	-	-	X	X	X	X	X	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	X	X	-	-	X	-	-
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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		58	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
		60	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
62		X	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	
63		X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	
74		X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	
78		X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	
84		-	X	X	X	X	X	-	-	X	X	X	X	X	-	-	X	X	-	X	-	-	-	X	X	X	X	X	X	X	X	-	-	X	X	-	-
85		X	X	X	X	X	X	-	-	X	X	X	X	X	-	-	X	X	X	X	-	-	-	X	X	X	X	X	X	X	X	-	-	X	X	-	-
87		X	X	X	X	X	X	-	-	X	X	X	X	X	-	-	X	X	X	X	-	-	-	X	X	X	X	X	X	X	X	-	-	X	X	-	-
94		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95		X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-
96		X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-
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Offer of Sale

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

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

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

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

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

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

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

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

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by

Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

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

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

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

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

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



Parker Hannifin Corporation

Pneumatic Division
8676 E. M89
P.O. Box 901
Richland, MI 49083 USA
Tel: (269) 629-5000
Fax: (269) 629-5385

Customer/Technical Service

Tel: (269) 629-5575
Fax: (269) 629-5385
Web site: www.parker.com/pneumatic
E-mail: PDNMKTG@parker.com