

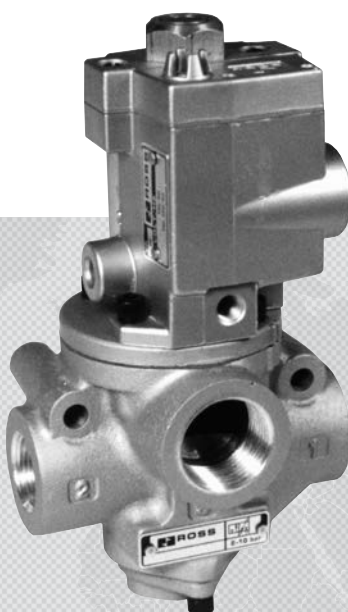


PRODUCT INFORMATION

DIRECTIONAL CONTROL VALVES

HIGH TEMPERATURE AND LOW TEMPERATURE APPLICATIONS

21 SERIES



ROSS CONTROLS

POPPET 21 SERIES VALVES – KEY FEATURES

- Low weight; compact size
- Available with choices of internal components for three different temperature ranges
- Can be mounted close to actuator, reducing length of pipe to be pressurized/exhausted on each cycle
- Long life expectancy
- Consistent response times over the life of the valve
- Construction makes them readily adaptable to vacuum service
- Easily field-convertible for use with an external pilot supply
- Models with external pilot supply available, consult ROSS

High Temperature Service:

Fluorocarbon seals are used to ensure high temperature stability.

Ambient Temperature: Up to 250°F (122°C) for solenoid models;

Up to 300°F (150°C) for pressure controlled models.

Media Temperature: 0° to 300°F (-17° to 150°C).

Low Temperature Service:

Buna-N seals are used to ensure good performance at low temperatures.

Ambient Temperature: Down to -40°F (-40°C).

Media Temperature: -40° to 175°F (-40° to 80°C).

Vacuum Service Valves

Vacuum service valves are ideal for lifting, holding, vacuum packaging and moving anything from large objects to tiny particles. They also provide an effective means for leak testing.

Explosion-Proof solenoid pilot valves available, see explosion proof valves section F.



For ATEX certified valves order placement, consult ROSS.



VALVE TYPE/SERIES	DESCRIPTION		AVAILABLE INLET PORT SIZES										FUNCTIONS										Page			
	Spool & Sleeve	Poppet	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	2½	2/2	3/2	3/4	4/2	5/2 Single	5/2 Double	5/3 Closed Center	5/3 Open Center	5/3 Pressure Center	Max Flow (Cv)		Solenoid Control	Direct Solenoid Control	Pressure Control
21																						40				D3.3 - D3.5
21																						40				D3.6 - D3.8
21 Vacuum																						71				D3.9 - D3.10 D3.12 - D3.13
21 Full Vacuum																						71				D3.11
Options & Accessories																									D3.14	

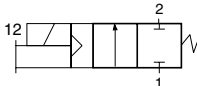
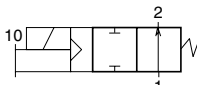
Directional Control Valves

Solenoid Pilot Controlled

High and Low Temperature

21 Series

2-Way 2-Position Valves, Spring Return

Port Size 1,2	Body Size	High Temperature		Low Temperature		Avg. C _v		Average Response Constants**			Weight lb (kg)	 Normally Closed
		Valve Model Number*#		Valve Model Number*#				M	F			
		Normally Closed	Normally Open	Normally Closed	Normally Open	NC	NO		NC	NO		
1/4	3/8	2171B2001W	2172B2001W	2171B2002W	2172B2002W	2.3	2.3	10	0.96	0.96	3.0 (1.4)	 Normally Open
3/8	3/8	2171B3001W	2172B3001W	2171B3002W	2172B3002W	3.8	3.3	10	0.90	0.93	3.0 (1.4)	
1/2	3/8	2171B4011W	2172B4011W	2171B4012W	2172B4012W	4.0	3.5	10	0.82	0.88	3.0 (1.4)	
1/2	3/4	2171B4001W	2172B4001W	2171B4002W	2172B4002W	7.7	6.5	14	0.39	0.50	3.3 (1.5)	
3/4	3/4	2171B5001W	2172B5001W	2171B5002W	2172B5002W	9.0	7.3	14	0.32	0.37	3.3 (1.5)	
1	3/4	2171B6011W	2172B6011W	2171B6012W	2172B6012W	9.0	7.9	14	0.31	0.36	3.3 (1.5)	
1	1¼	2171B6001W	2172B6001W	2171B6002W	2172B6002W	24	21	26	0.19	0.20	7.5 (3.4)	
1¼	1¼	2171B7001W	2172B7001W	2171B7002W	2172B7002W	29	20	26	0.14	.18	7.5 (3.4)	
1½	1¼	2171B8011W	2172B8011W	2171B8012W	2172B8012W	29	21	26	0.13	0.17	7.5 (3.4)	

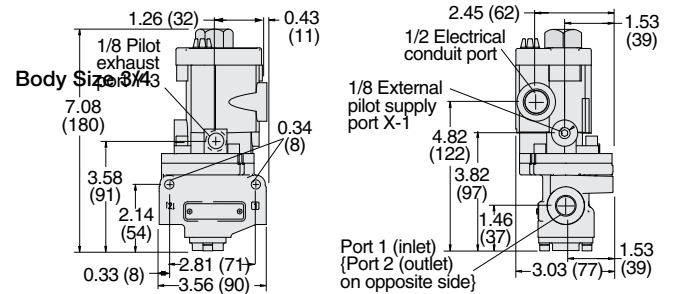
* NPT port threads. For G threads add a "D" prefix to the model number e.g., D2171B2001Z.

Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2171B2001Z. For other voltages, consult ROSS.

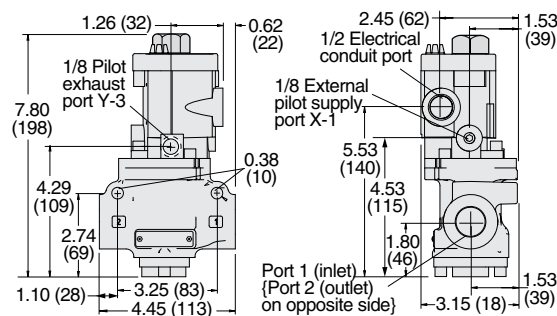
** Valve Response Time - Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions – inches (mm)

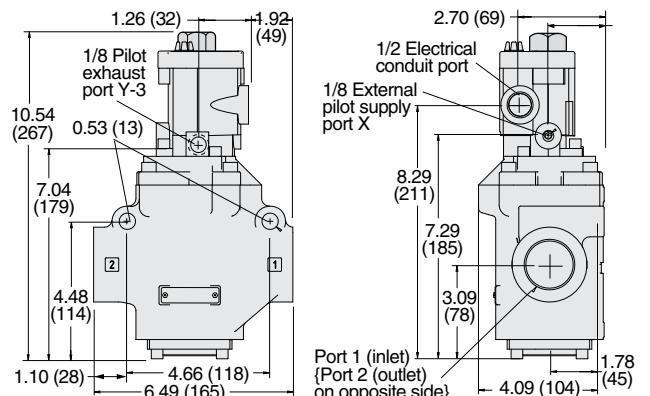
Body Size 3/8



Body Size 3/4



Body Size 1 1/4



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Pilot Supply	Internal or External
Mounting Type	In-line	Operating Pressure	30 to 150 psig (2 to 10 bar)
Solenoids	Rated for continuous duty	Construction Material	Pilot Supply - When external pilot supply, pressure must be equal to or greater than inlet pressure.
Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz		Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Manual Override	Non-locking metal button, standard
Temperature - Ambient	High Temp: 0° to 250°F (-17° to 122°C) Low Temp: -40° to 120°F (-40° to 50°C)	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Temperature - Media	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C)		
Temperature	For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.		
Flow Media	Filtered air		



Valves with EN (DIN) connector available, consult ROSS.
For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



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D3.3

Directional Control Valves

Solenoid Pilot Controlled

High and Low Temperature

21 Series

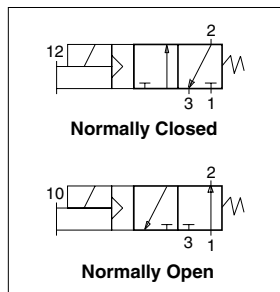
3-Way 2-Position Valves, Spring Return

Port Size			Body Size	High Temperature		Low Temperature		C _v				Average Response Constants**				Weight lb (kg)
				Valve Model Number*#		Valve Model Number*#		NC		NO		M	F			
1, 2	3	Normally Closed		Normally Open	Normally Closed	Normally Open	1-2	2-3	1-2	2-3	NC		NO			
											1-2		2-3	1-2	2-3	
1/4	1/2	3/8	2173B2001W	2174B2001W	2173B2002W	2174B2002W	2.4	3.4	2.0	2.1	10	1.76	2.08	1.60	2.30	3.0 (1.4)
3/8	1/2	3/8	2173B3001W	2174B3001W	2173B3002W	2174B3002W	3.0	5.8	2.3	2.4	10	0.95	1.07	1.03	1.60	3.0 (1.4)
1/2	1/2	3/8	2173B4011W	2174B4011W	2173B4012W	2174B4012W	3.0	5.2	2.9	2.8	10	0.94	0.98	11.00	2.00	3.0 (1.4)
1/2	1	3/4	2173B4001W	2174B4001W	2173B4002W	2174B4002W	6.6	12	6.5	7.0	11	0.58	0.64	0.50	0.70	3.3 (1.5)
3/4	1	3/4	2173B5001W	2174B5001W	2173B5002W	2174B5002W	7.8	13	7.5	7.5	11	0.38	0.41	0.43	0.67	3.3 (1.5)
1	1	3/4	2173B6011W	2174B6011W	2173B6012W	2174B6012W	7.5	12	7.7	7.6	11	0.24	0.36	0.42	0.60	3.3 (1.5)
1	1½	1¼	2173B6001W	2174B6001W	2173B6002W	2174B6002W	24	40	15	17	28	0.16	0.18	0.17	0.20	7.5 (3.4)
1¼	1½	1¼	2173B7001W	2174B7001W	2173B7002W	2174B7002W	29	39	21	23	28	0.12	0.17	0.15	0.19	7.5 (3.4)
1½	1½	1¼	2173B8011W	2174B8011W	2173B8012W	2174B8012W	30	38	22	23	28	0.12	0.16	0.13	0.18	7.5 (3.4)

* NPT port threads. For G threads add a "D" prefix to the model number e.g., D2173B2001W.

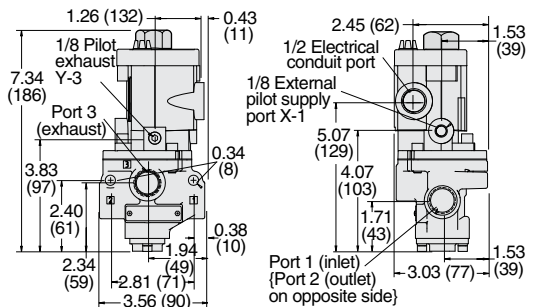
Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2173B2001Z. For other voltages, consult ROSS.

** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

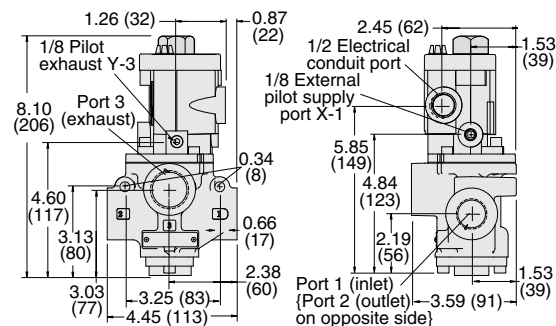


Valve Dimensions – inches (mm)

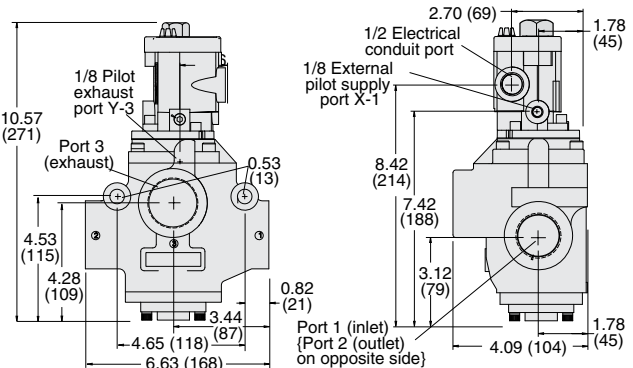
Body Size 3/8



Body Size 3/4



Body Size 1 1/4



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14. Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Flow Media	Filtered air
Mounting Type	In-line	Pilot Supply	Internal or External
Solenoids	Rated for continuous duty	Operating Pressure	30 to 150 psig (2 to 10 bar)
Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz		Pilot Supply - When external pilot supply, pressure must be equal to or greater than inlet pressure.
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Temperature - Ambient	High Temp: 0° to 250°F (-17° to 122°C) Low Temp: -40° to 120°F (-40° to 50°C)	Manual Override	Non-locking metal button, standard
Temperature - Media	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C)	Safety Integrity Level (SIL)	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.
Temperature	For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.		



Valves with EN (DIN) connector available, consult ROSS.
For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Directional Control Valves

Solenoid Pilot Controlled

High and Low Temperature

21 Series

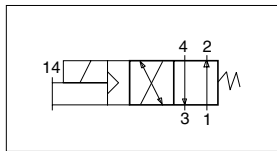
4-Way 2-Position Valves, Spring Return

Port Size		Body Size	High Temperature		Low Temperature		C _v		Average Response Constants**			Weight lb (kg)
1, 2, 4	3		Valve Model Number#		Valve Model Number#		1-2, 1-4	4-3, 2-3	M	F		
			NPT Threads	BSPG Threads	NPT Threads	BSPG Threads				1-2, 1-4	4-3, 2-3	
1/4	1/2	3/8	2176B2001W	D2176B2001W	2176B2002W	D2176B2002W	2.1	2.2	30	1.70	2.28	3.0 (1.4)
3/8	1/2	3/8	2176B3001W	D2176B3001W	2176B3002W	D2176B3002W	2.5	3.1	30	1.13	1.33	3.0 (1.4)
1/2	1/2	3/8	2176B4011W	D2176B4011W	2176B4012W	D2176B4012W	2.9	3.8	30	1.00	1.22	3.0 (1.4)
1/2	1	3/4	2176B4001W	D2176B4001W	2176B4002W	D2176B4002W	5.7	6.5	46	0.50	0.76	5.8 (2.6)
3/4	1	3/4	2176B5001W	D2176B5001W	2176B5002W	D2176B5002W	7.1	8.7	46	0.36	0.55	5.8 (2.6)
1	1	3/4	2176B6011W	D2176B6011W	2176B6012W	D2176B6012W	7.7	10	46	0.36	0.50	5.8 (2.6)
1	1½	1¼	2176B6001W	D2176B6001W	2176B6002W	D2176B6002W	18	23	99	0.19	0.22	12.0 (5.4)
1¼	1½	1¼	2176B7001W	D2176B7001W	2176B7002W	D2176B7002W	20	28	99	0.19	0.22	12.0 (5.4)
1½	1½	1¼	2176B8011W	D2176B8011W	2176B8012W	D2176B8012W	21	29	99	0.16	0.22	12.0 (5.4)

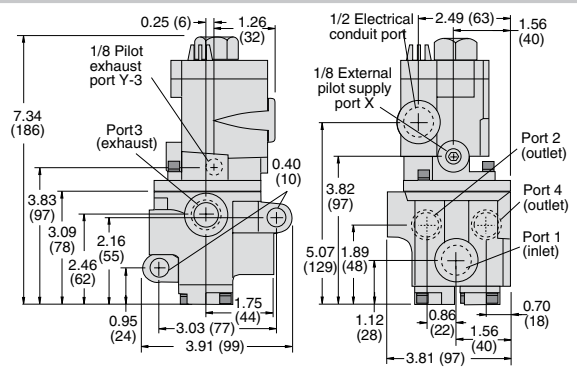
Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2176B2001Z. For other voltages, consult ROSS.

** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

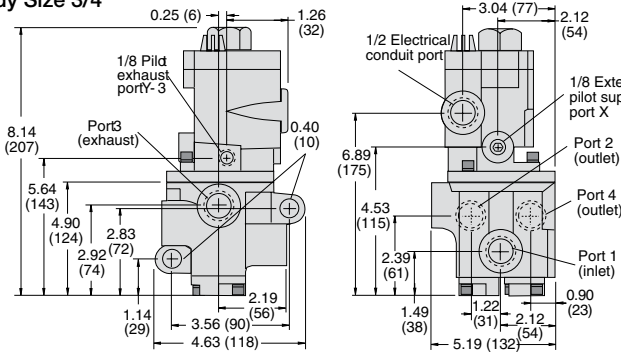
Valve Dimensions – inches (mm)



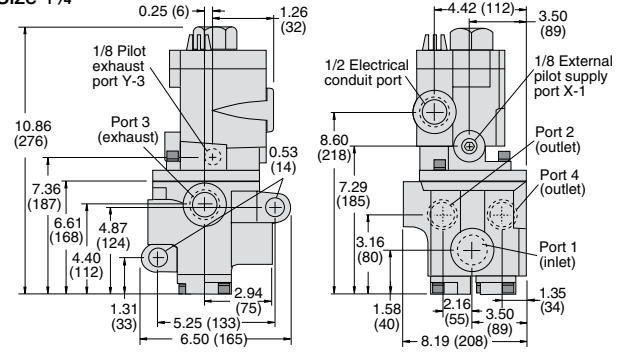
Body Size 3/8



Body Size 3/4



Body Size 1¼



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14. Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Flow Media	Filtered air
Mounting Type	In-line	Pilot Supply	Internal or External
Solenoids	Rated for continuous duty	Operating Pressure	30 to 150 psig (2 to 10 bar)
Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz		Pilot Supply - When external pilot supply, pressure must be equal to or greater than inlet pressure.
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Temperature - Ambient	High Temp: 0° to 250°F (-17° to 122°C) Low Temp: -40° to 120°F (-40° to 50°C)	Manual Override	Non-locking metal button, standard
Temperature - Media	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C)	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Temperature	For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.		



Valves with EN (DIN) connector available, consult ROSS.
For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



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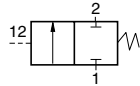
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D3.5

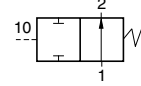
2-Way 2-Position Valves, Spring Return

Port Size	Body Size	High Temperature		Low Temperature		Avg. C _v		Average Response Constants**			Weight lb (kg)
		Valve Model Number*		Valve Model Number*							
		Normally Closed	Normally Open	Normally Closed	Normally Open	NC	NO	M	F		
									NC	NO	
1/4	3/8	2151B2001	2152B2001	2151B2002	2152B2002	2.3	2.3	10	0.91	0.91	1.8 (0.8)
3/8	3/8	2151B3001	2152B3001	2151B3002	2152B3002	3.8	3.3	10	0.70	0.76	1.8 (0.8)
1/2	3/8	2151B4011	2152B4011	2151B4012	2152B4012	4.0	3.5	10	0.64	0.72	1.8 (0.8)
1/2	3/4	2151B4001	2152B4001	2151B4002	2152B4002	7.7	6.5	16	0.37	0.43	4.2 (2.0)
3/4	3/4	2151B5001	2152B5001	2151B5002	2152B5002	9.0	7.3	16	0.34	0.39	4.2 (2.0)
1	3/4	2151B6011	2152B6011	2151B6012	2152B6012	9.0	7.9	16	0.34	0.37	4.2 (2.0)
1	1¼	2151B6001	2152B6001	2151B6002	2152B6002	24	21	27	0.17	0.17	11.0 (5.0)
1¼	1¼	2151B7001	2152B7001	2151B7002	2152B7002	29	20	27	0.19	0.19	11.0 (5.0)
1½	1¼	2151B8011	2152B8011	2151B8012	2152B8012	29	21	27	0.18	0.18	11.0 (5.0)

Normally Closed



Normally Open

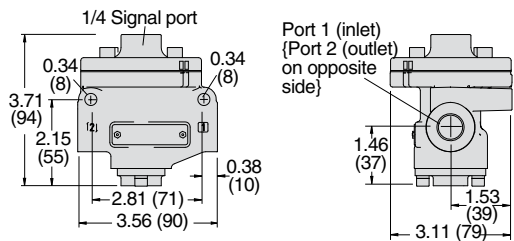


* NPT port threads. For G threads add a "D" prefix to the model number e.g., D2151B2001.

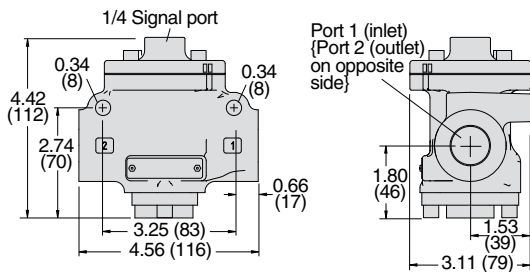
** Valve Response Time — Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions — inches (mm)

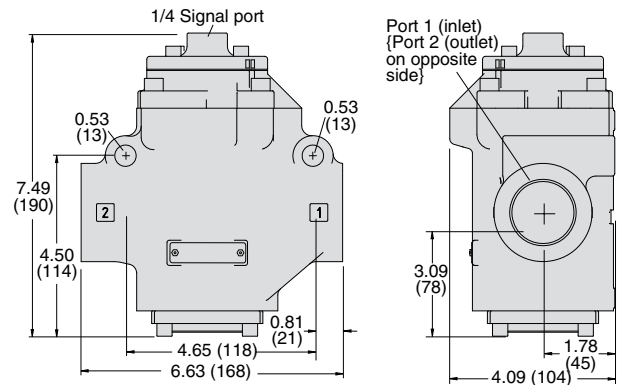
Body Size 3/8



Body Size 3/4



Body Size 1 1/4



Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

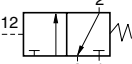
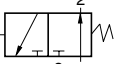
Construction Design	Poppet	Operating Pressure	30 to 150 psig (2 to 10 bar)
Mounting Type	In-line	Pilot Supply - Pilot supply pressure must be equal to or greater than inlet pressure.	
Temperature Ambient/Media:	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Flow Media	Filtered air	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance with IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Pilot Supply	External		



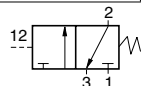
For ATEX certified valves, consult ROSS.

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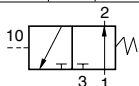
3-Way 2-Position Valves, Spring Return

Port Size		Body Size	High Temperature		Low Temperature		C _v				Average Response Constants**				Weight lb (kg)	
			Valve Model Number*		Valve Model Number*		NC		NO		M	F				
			Normally Closed	Normally Open	Normally Closed	Normally Open	1-2	2-3	1-2	2-3		NC		NO		
												1-2	2-3	1-2		2-3
1, 2	3															
1/4	1/2	3/8	2153B2001	2154B2001	2153B2002	2154B2002	2.4	3.4	2.0	2.1	10	1.76	2.08	1.60	2.30	1.8 (0.8)
3/8	1/2	3/8	2153B3001	2154B3001	2153B3002	2154B3002	3.0	5.8	2.3	2.4	10	0.95	1.07	1.03	1.60	1.8 (0.8)
1/2	1/2	3/8	2153B4011	2154B4011	2153B4012	2154B4012	3.0	5.2	2.9	2.8	10	0.94	0.98	11.00	2.00	1.8 (0.8)
1/2	1	3/4	2153B4001	2154B4001	2153B4002	2154B4002	6.6	12	6.5	7.0	11	0.58	0.64	0.50	0.70	4.5 (2.1)
3/4	1	3/4	2153B5001	2154B5001	2153B5002	2154B5002	7.8	13	7.5	7.5	11	0.38	0.41	0.43	0.67	4.5(2.1)
1	1	3/4	2153B6011	2154B6011	2153B6012	2154B6012	7.5	12	7.7	7.6	11	0.24	0.36	0.42	0.60	4.5 (2.1)
1	1½	1¼	2153B6001	2154B6001	2153B6002	2154B6002	24	40	15	17	28	0.16	0.18	0.17	0.20	11.0 (5.0)
1¼	1½	1¼	2153B7001	2154B7001	2153B7002	2154B7002	29	39	21	23	28	0.12	0.17	0.15	0.19	11.0 (5.0)
1½	1½	1¼	2153B8011	2154B8011	2153B8012	2154B8012	30	38	22	23	28	0.12	0.16	0.13	0.18	11.0 (5.0)
			Normally Closed				Normally Open									
																

Normally Closed



Normally Open

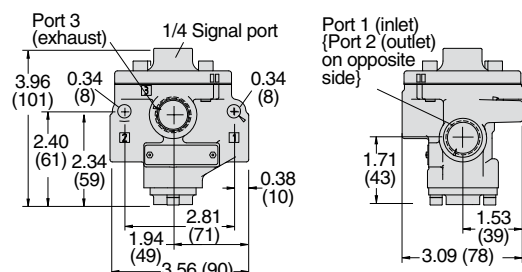


* NPT port threads. For G threads add a "D" prefix to the model number e.g., D2153B2001.

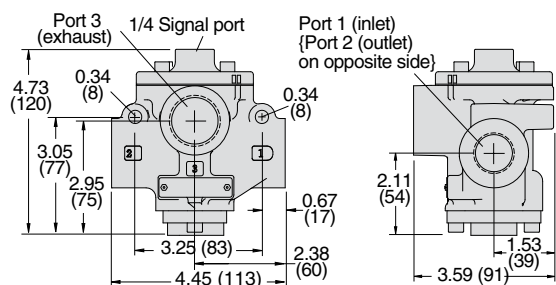
** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions – inches (mm)

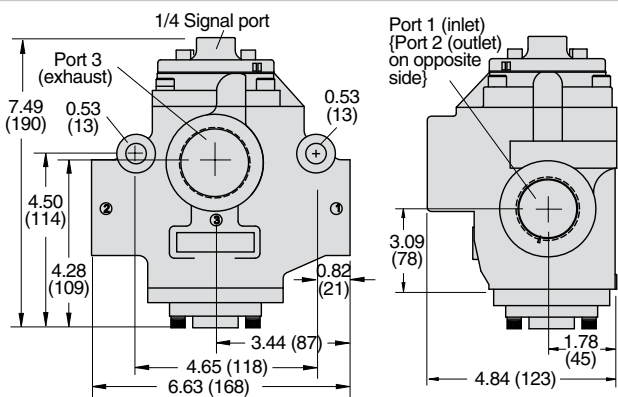
Body Size 3/8



Body Size 3/4



Body Size 1 1/4



Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Operating Pressure	30 to 150 psig (2 to 10 bar)
Mounting Type	In-line	Pilot Supply	Pilot supply pressure must be equal to or greater than inlet pressure.
Temperature Ambient/Media:	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Flow Media	Filtered air	Safety Integrity Level (SIL)	Certified by TÜV Rheinland in accordance with IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.
Pilot Supply	External		



For ATEX certified valves, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



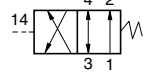
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4-Way 2-Position Valves, Spring Return

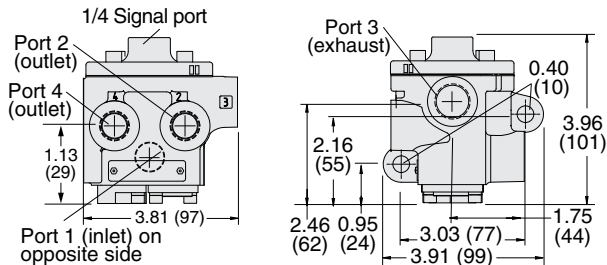
Port Size		Body Size	High Temperature		Low Temperature		C _v		Average Response Constants**			Weight lb (kg)
1, 2, 4	3		Valve Model Number		Valve Model Number		1-2, 1-4	4-3, 2-3	M	F		
			NPT Threads	G Threads	NPT Threads	G Threads				1-2, 1-4	4-3, 2-3	
1/4	1/2	3/8	2156B2001	D2156B2001	2156B2002	D2156B2002	2.1	2.9	30	1.70	2.28	3.0 (1.4)
3/8	1/2	3/8	2156B3001	D2156B3001	2156B3002	D2156B3002	2.9	4.2	30	1.13	1.33	3.0 (1.4)
1/2	1/2	3/8	2156B4011	D2156B4011	2156B4012	D2156B4012	3.1	4.3	30	1.00	1.22	3.0 (1.4)
1/2	1	3/4	2156B4001	D2156B4001	2156B4002	D2156B4002	5.6	8.1	46	0.50	0.76	5.8 (2.6)
3/4	1	3/4	2156B5001	D2156B5001	2156B5002	D2156B5002	7.0	9.3	46	0.36	0.55	5.8 (2.6)
1	1	3/4	2156B6011	D2156B6011	2156B6012	D2156B6012	7.8	10	46	0.36	0.50	5.8 (2.6)
1	1½	1¼	2156B6001	D2156B6001	2156B6002	D2156B6002	19	26	99	0.19	0.22	12.0 (5.4)
1¼	1½	1¼	2156B7001	D2156B7001	2156B7002	D2156B7002	21	27	99	0.19	0.18	12.0 (5.4)
1½	1½	1¼	2156B8011	D2156B8011	2156B8012	D2156B8012	22	27	99	0.16	0.15	12.0 (5.4)



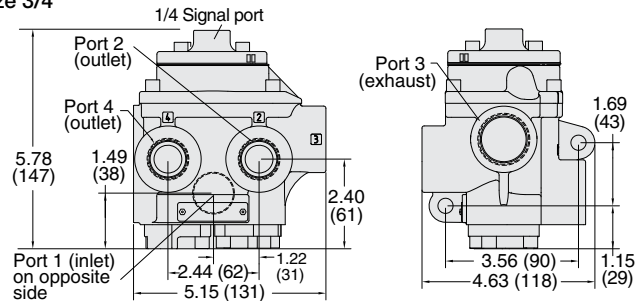
** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Valve Dimensions – inches (mm)

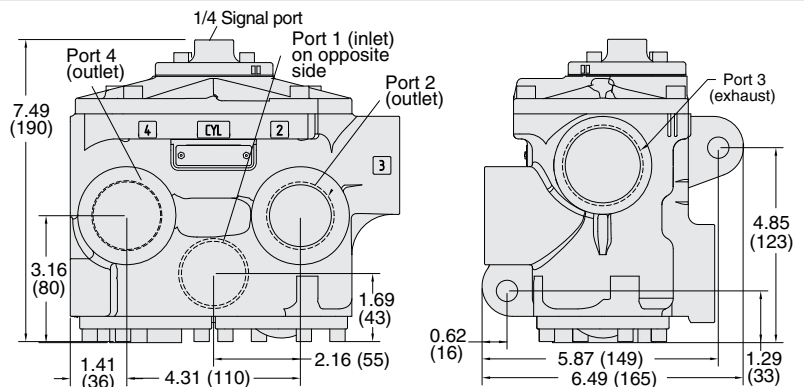
Body Size 3/8



Body Size 3/4



Body Size 1¼



Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Operating Pressure	30 to 150 psig (2 to 10 bar)
Mounting Type	In-line	Pilot Supply - Pilot supply pressure must be equal to or greater than inlet pressure.	
Temperature Ambient/Media:	High Temp: 0° to 300°F (-17° to 150°C) Low Temp: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Flow Media	Filtered air	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Pilot Supply	External		



For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



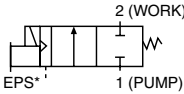
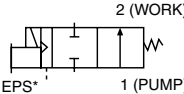
IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Directional Control Valves

Solenoid Pilot Controlled

Vacuum
21 Series

2-Way 2-Position Valves, Spring Return

Port Size	Body Size	Valve Model Number#		Function	C _v	Average Response Constants**		Weight lb (kg)	
		NPT Threads	G Threads			M	F		
1/4	3/8	2171B2901W	D2171B2901W	NC	2.1	10	0.96	3.0 (1.4)	 Normally Closed
3/8	3/8	2171B3906W	D2171B3906W	NC	2.6	10	0.90	3.0 (1.4)	
1/2	3/8	2171A4917W	D2171A4917W	NC	2.6	10	0.82	3.0 (1.4)	
3/4	3/4	2171B5905W	D2171B5905W	NC	7.8	14	0.39	3.3 (1.5)	
1	3/4	2171B6904W	D2171B6904W	NC	8.3	14	0.32	3.3 (1.5)	
1	1 1/4	2171B6916W	D2171B6916W	NC	20	14	0.31	3.3 (1.5)	 Normally Open
1 1/4	1 1/4	2171B7901W	D2171B7901W	NC	30	26	0.19	7.5 (3.4)	
1 1/4	1 1/4	2171B8906W	D2171B8906W	NC	31	26	0.14	7.5 (3.4)	
1 1/2	1 1/4	2172B8900W	D2172B8900W	NO	21	26	0.17	7.5 (3.4)	
1 1/2	2	2171B8900W	D2171B8900W	NC	57	##	##	15.5 (6.9)	
2 1/2	2	2171B9901W	D2171B9901W	NC	64	##	##	15.5 (6.9)	

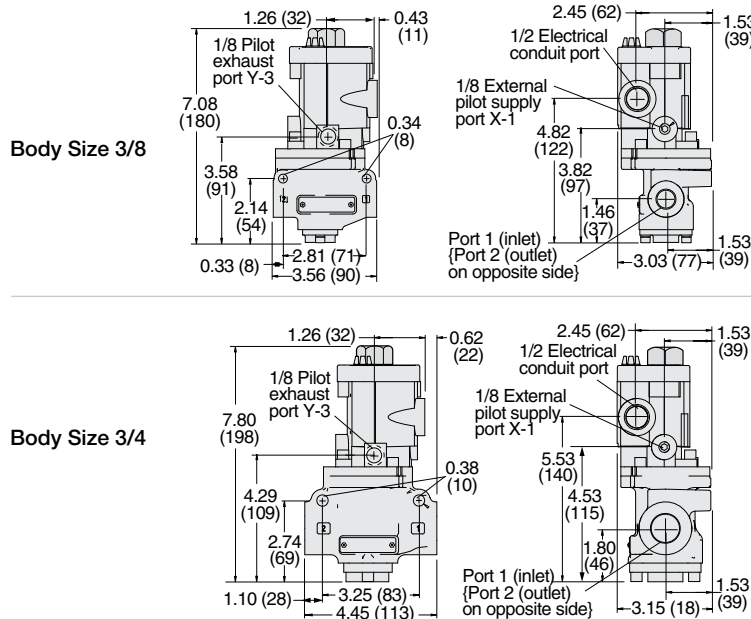
Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2171B2901Z. For other voltages, consult ROSS.
 ** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.
 ## Consult ROSS.

Piping 2/2 Normally Closed (NC) or Normally Open (NO) Valves

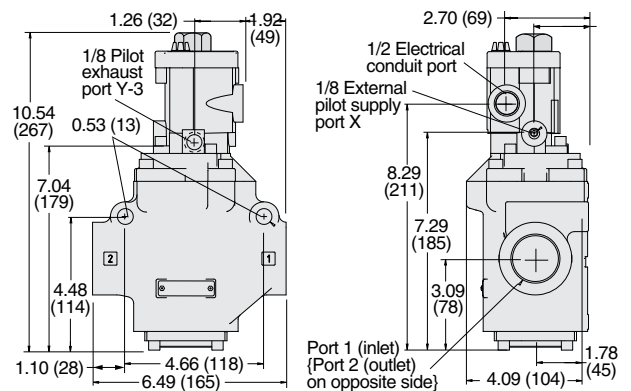
Pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2).

Note: 2/2 vacuum valves provide only on/off control and do not have an exhaust function.

Valve Dimensions – inches (mm)



Body Size 1 1/4



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Pilot Supply	Internal or External
Mounting Type	In-line	Operating Pressure	Vacuum to 150 psig (vacuum to 10 bar)
Solenoids	Rated for continuous duty		Pilot Supply - External Pilot: Minimum 30 psig (2 bar)
Standard Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz		When external pilot supply, pressure must be equal to or greater than inlet pressure.
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Temperature	Ambient: -40° to 120°F (-40° to 50°C), for low temperature valves. High temperature valves also available. Media: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Manual Override	Non-locking metal button, standard
Flow Media	Vacuum and/or filtered-compressed air	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	



For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



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D3.9

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Directional Control Valves

Solenoid Pilot Controlled

Vacuum

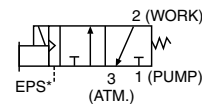
21 Series

3-Way 2-Position Valves, Spring Return

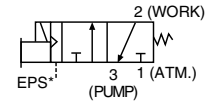
3-Way 2-Position Valves, Spring Return												
Port Size		Body Size	Valve Model Number#		C _v		Function	Average Response Constants**			Weight lb (kg)	
			NPT Threads	G Threads	1-2	2-3		M	F			
1, 2	3								In-Out	Out-Exh.		
1/4	1/2	3/8	2173B2900W	D2173B2900W	2.4	3.4	NC	10	1.76	2.08	3.0 (1.4)	
3/8	1/2	3/8	2173A3908W	D2173A3908W	3.0	5.8	NC	10	0.95	1.07	3.0 (1.4)	
1/2	1/2	3/8	2173B4901W	D2173B4901W	3.0	5.2	NC	10	0.94	0.98	3.0 (1.4)	
1/2	1	3/4	2173B4902W	D2173B4902W	6.6	12	NC	11	0.58	0.64	3.3 (1.5)	
1/2	1	3/4	2174A4912W	D2174A4912W	6.5	7.0	NO	11	0.58	0.64	3.3 (1.5)	
3/4	1	3/4	2173B5900W	D2173B5900W	7.8	13	NC	11	0.38	0.41	3.3 (1.5)	
1	1	3/4	2173B6901W	D2173B6901W	7.5	12	NC	11	0.24	0.36	3.3 (1.5)	
1	1½	1¼	2173B6902W	D2173B6902W	24	40	NC	28	0.16	0.18	7.5 (3.4)	
1	1½	1¼	2174A6914W	D2174A6914W	15	17	NO	28	0.16	0.18	7.5 (3.4)	
1¼	1½	1¼	2173B7901W	D2173B7901W	29	39	NC	28	0.12	0.17	7.5 (3.4)	
1¼	1½	1¼	2173B7917W	D2173B7917W	29	39	NO	28	0.12	0.17	7.5 (3.4)	
1½	1½	1¼	2173B8900W	D2173B8900W	30	38	NC	28	0.12	0.16	7.5 (3.4)	
2	2½	2	2173A9905W	D2173A9905W	70	70	NC	##	##	##	16.5 (7.4)	
2½	2½	2	2173A9906W	D2173A9906W	70	71	NC	##	##	##	16.5 (7.4)	

Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2173B2900Z. For other voltages, consult ROSS.

** Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above. ## Consult ROSS.



Normally Closed



Normally Open

Piping 3/2 Normally Closed (NC) Valves

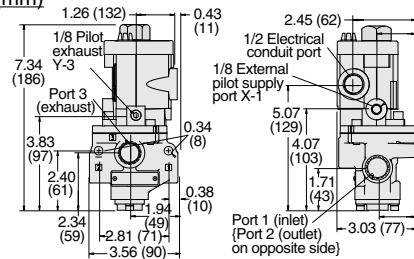
In this valve configuration, pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2), and the normal air pressure exhaust port becomes the atmosphere port (port 3).

Piping 3/2 Normally Open (NO) Valves

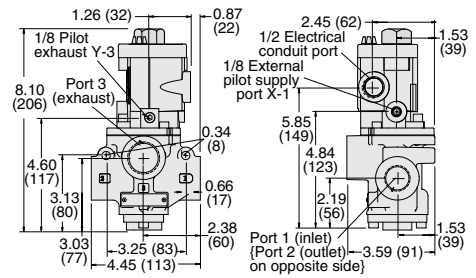
To obtain a 3/2 normally open ROSS vacuum valve, simply pipe the 3/2 normally closed body slightly differently. Connect the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

Valve Dimensions – inches (mm)

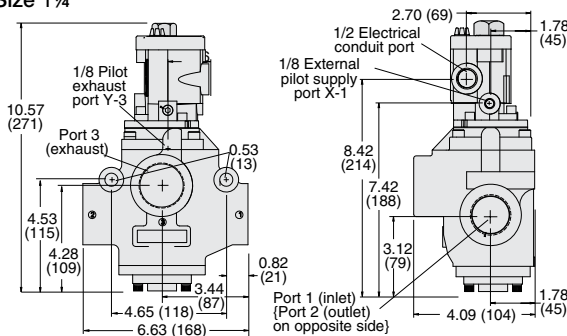
Body Size 3/8



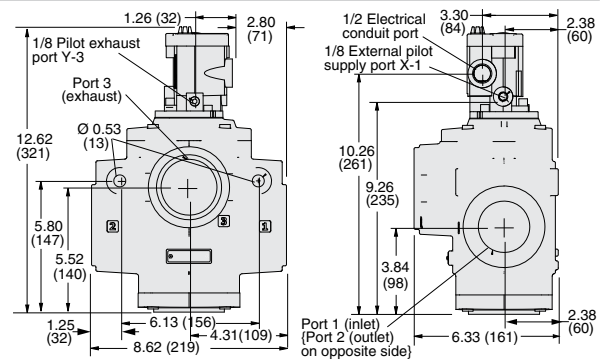
Body Size 3/4



Body Size 1¼



Body Size 2



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14. Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Pilot Supply	Internal or External
Mounting Type	In-line	Operating Pressure	Vacuum to 150 psig (vacuum to 10 bar)
Solenoids	Rated for continuous duty	Construction Material	Pilot Supply - External Pilot: Minimum 30 psig (2 bar) When external pilot supply, pressure must be equal to or greater than inlet pressure.
Standard Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz	Manual Override	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance with IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Temperature	Ambient: -40° to 120°F (-40° to 50°C), for low temperature valves. High temperature valves also available. Media: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.		
Flow Media	Vacuum and/or filtered-compressed air		



For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.

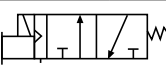
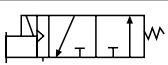


IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

Directional Control Valves

Solenoid Pilot Controlled

Full Vacuum 21 Series

3-Way 2-Position Valves, Spring Return											
Port Size		Body Size	Valve Model Number#		C _v		Function	Average Response Constants**			Weight lb (kg)
1, 2	3		NPT Threads	G Threads	1-2	2-3		M	F		
									In-Out	Out-Exh.	
1/2	1/2	3/8	2173B4914W	D2173B4914W	3.0	5.2	NC	11	0.50	0.70	3.0 (1.4)
1/2	1/2	3/8	2174B4900W	D2174B4900W	2.8	2.8	NO	11	0.58	0.64	3.0 (1.4)
1¼	1½	1¼	2173B7904W	D2173B7904W	39	39	NC	28	0.15	0.19	7.5 (3.4)
1¼	1½	1¼	2174B7903W	D2174B7903W	23	23	NO	28	0.12	0.17	7.5 (3.4)
Normally Closed Normally Open											



Voltage: W=24 VDC; Z=110-120 VAC, 50/60 Hz, e.g., 2173B4914Z. For other voltages, consult ROSS.

** **Valve Response Time** – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

Full Vacuum – 3-Way Normally Closed (NC) Valves

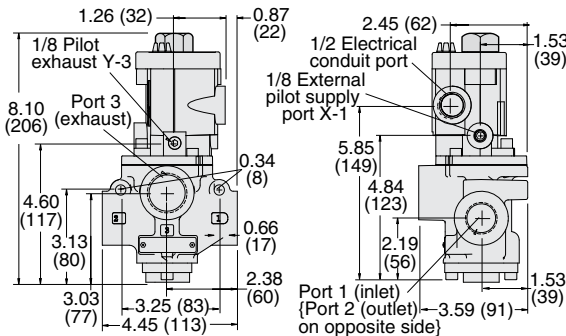
This valve functions as a **normally open** valve. Pipe the unit into the system by connecting the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

Full Vacuum – 3-Way Normally Open (NO) Valves

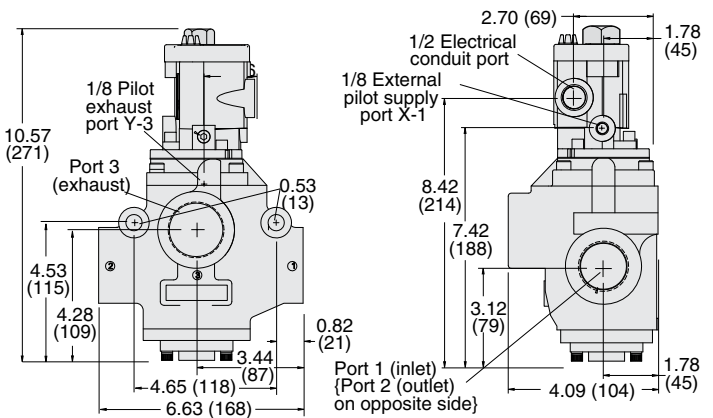
This valve functions as a normally closed valve. Pipe the unit into the system by connecting the vacuum source or pump to port 3, the normal exhaust. Leave port 1 open to atmosphere, and the normal outlet remains as the work port (port 2).

Valve Dimensions – inches (mm)

Body Size 3/8



Body Size 1 1/4



Options: Indicator Light Kits, Manual Override Kits; refer to page D3.14. Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Operating Pressure	Vacuum to 150 psig (vacuum to 10 bar)
Mounting Type	In-line	Pilot Supply - External Pilot: Minimum 30 psig (2 bar)	
Solenoids	Rated for continuous duty	When external pilot supply, pressure must be equal to or greater than inlet pressure.	
Standard Voltage	24 volts DC; 110-120 volts AC, 50/60 Hz	Valve Body: Cast Aluminum	
Power Consumption	14 watts on DC; 87 VA inrush, 30 VA holding on 50 or 60 Hz	Poppet: Aluminum and Stainless Steel	
Temperature	Ambient: -40° to 120°F (-40° to 50°C), for low temperature valves. High temperature valves also available.	Seals: Fluorocarbon	
	Media: -40° to 175°F (-40° to 80°C)	Manual Override	Non-locking metal button, standard
Pilot Supply	Internal or External	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	



For ATEX certified valves, consult ROSS. For FM, CSA approved Explosion-Proof valves, see section F.



IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



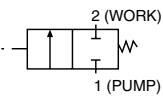
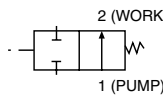
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D3.11

2-Way 2-Position Valves, Spring Return

Port Size	Body Size	Valve Model Number		Function	C _v	Average Response Constants**		Weight lb (kg)	
		NPT Threads	G Threads			M	F		
1/4	3/8	2151A2901	D2151A2901	NC	2.1	10	0.96	1.8 (0.8)	 Normally Closed
1/2	3/8	2151A4910	D2151A4910	NC	3.0	10	0.90	1.8 (0.8)	
1/2	3/4	2151B4904	D2151B4904	NC	6.9	10	0.82	4.5 (2.0)	 Normally Open
3/4	3/4	2151A5913	D2151A5913	NC	7.8	14	0.39	4.5 (2.0)	
3/4	3/4	2152A5901	D2152A5901	NO	7.0	14	0.37	4.5 (2.0)	
1	3/4	2151B6900	D2151B6900	NC	8.3	14	0.19	4.5 (2.0)	
1 1/4	1 1/4	2151A7909	D2151A7909	NC	30	26	0.14	11.0 (5.0)	
1 1/2	1 1/4	2151B8900	D2151B8900	NC	31	26	0.13	11.0 (5.0)	
1 1/2	1 1/4	2152B7900	D2152B7900	NO	23	26	0.17	11.0 (5.0)	

** **Valve Response Time** – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above.

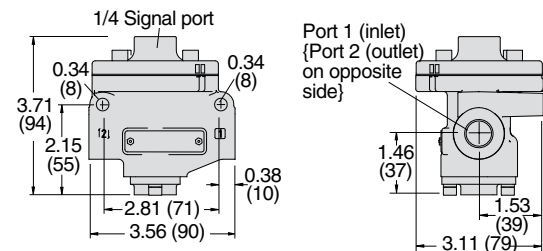
Piping 2/2 Normally Closed (NC) or Normally Open (NO) Valves

Pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2).

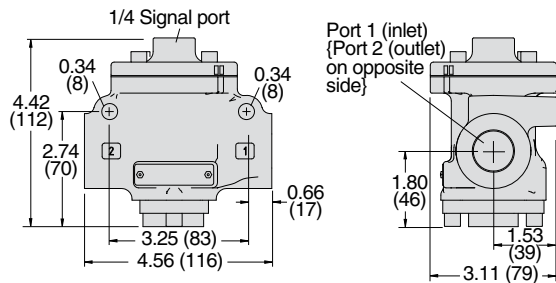
Note: 2/2 vacuum valves provide only on/off control and do not have an exhaust function.

Valve Dimensions – inches (mm)

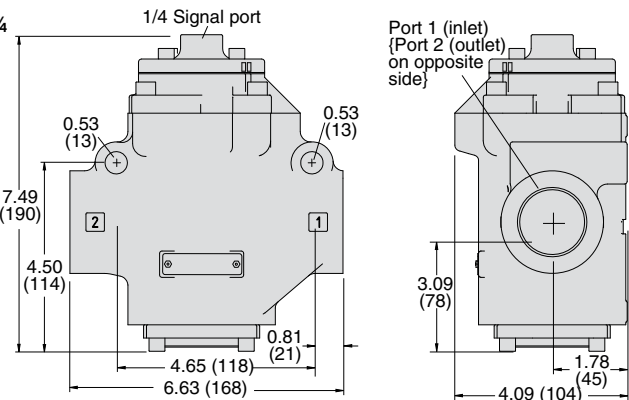
Body Size 3/8



Body Size 3/4



Body Size 1 1/4



STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Operating Pressure	Vacuum to 150 psig (vacuum to 10 bar)
Mounting Type	In-line	Pilot Supply	Minimum 30 psig (2 bar)
Temperature	Ambient/Media: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Pilot supply pressure must be equal to or greater than inlet pressure.	
Flow Media	Vacuum and/or filtered-compressed air	Valve Body:	Cast Aluminum
Pilot Supply	External	Poppet:	Aluminum and Stainless Steel
		Seals:	Fluorocarbon
		Safety Integrity Level (SIL)	- Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.



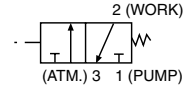
For ATEX certified valves, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

3-Way 2-Position Valves, Spring Return

Port Size		Body Size	Valve Model Number		Function	C _v		Average Response Constants**			Weight lb (kg)
						1-2	2-3	M	F		
1, 2	3		NPT Threads	G Threads					In-Out	Out-Exh.	
1/4	1/2	3/8	2153B2900	D2153B2900	NC	2.4	3.4	10	1.60	2.30	1.8 (0.8)
3/8	1/2	3/8	2153A3913	D2153A3913	NC	2.4	3.4	10	0.95	1.07	1.8 (0.8)
1/2	1/2	3/8	2153B4903	D2153B4903	NC	3.0	5.2	10	0.94	0.98	1.8 (0.8)
3/4	1	3/4	2153B5903	D2153B5903	NC	7.8	13	11	0.38	0.41	4.5 (2.0)
1	1	3/4	2153A6906	D2153A6906	NC	7.4	12	11	0.24	0.36	4.5 (2.0)
1	1½	1½	2153C6905	D2153C6905	NC	24	40	28	0.17	0.20	11.0 (5.0)
1¼	1½	1½	2153A7906	D2153A7906	NC	29	39	28	0.15	0.19	11.0 (5.0)
1½	1½	1½	2153B8900	D2153B8900	NC	30	38	28	0.12	0.16	11.0 (5.0)
2	2½	2	2153A9903	D2153A9903	NC	70	71	***	***	***	15.3 (6.9)
2½	2½	2	2153A9902	D2153A9902	NC	70	71	***	***	***	15.3 (6.9)

2 (WORK)
1 (PUMP)
3 (ATM.)



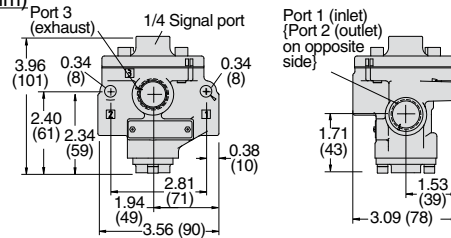
Valve Response Time – Response Time (msec) = M + (F • V). This is the average time required to fill a volume V (cubic inches) to 90% of supply pressure or to exhaust it to 10% of supply pressure. M and F values are shown above. * Consult ROSS.

Piping 3/2 Normally Closed (NC) Valves

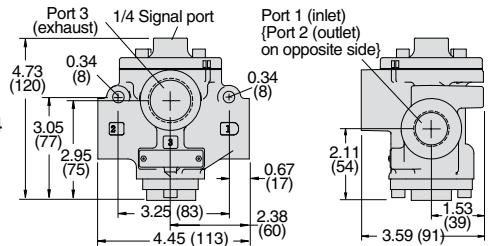
In this valve configuration, pipe the unit into the system by connecting the vacuum source or pump to the normal air pressure inlet port (port 1). The normal outlet port is the work port (port 2), and the normal air pressure exhaust port becomes the atmosphere port (port 3).

Valve Dimensions – inches (mm)

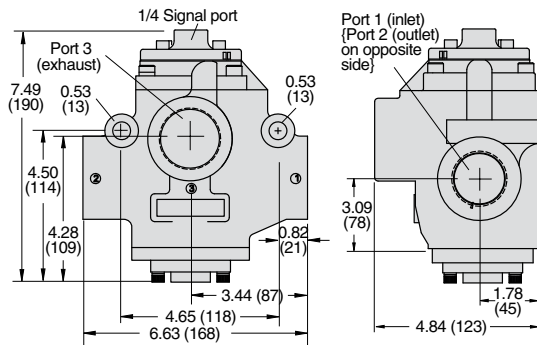
Body Size 3/8



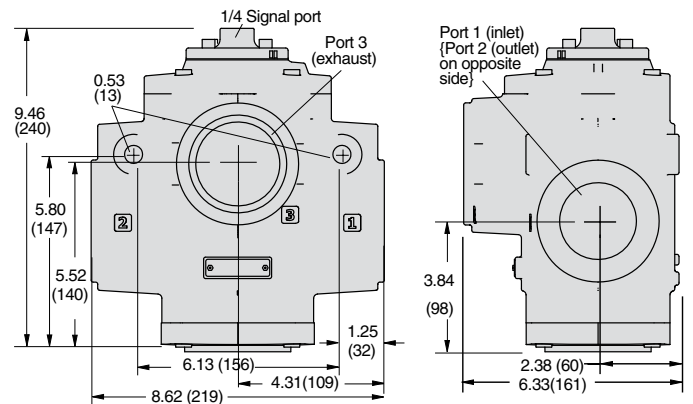
Body Size 3/4



Body Size 1¼



Body Size 2



Silencers ordered separately, refer to page D3.14.

STANDARD SPECIFICATIONS (for valves on this page):

Construction Design	Poppet	Operating Pressure	Vacuum to 150 psig (vacuum to 10 bar)
Mounting Type	In-line	Pilot Supply - Minimum 30 psig (2 bar)	Pilot supply pressure must be equal to or greater than inlet pressure.
Temperature	Ambient/Media: -40° to 175°F (-40° to 80°C) For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.	Construction Material	Valve Body: Cast Aluminum Poppet: Aluminum and Stainless Steel Seals: Fluorocarbon
Flow Media	Vacuum and/or filtered-compressed air	Safety Integrity Level (SIL) - Certified by TÜV Rheinland in accordance with IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT ≥ 1, for details see certificate.	
Pilot Supply	External		



For ATEX certified valves, consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.



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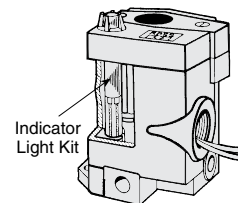
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Indicator Light Kits

To visually verify valve operation indicator lights are available in kit form. The indicator light extends through the solenoid or pilot cover and is illuminated when the solenoid is energized. Such lights are standard on double solenoid valves. Indicator light kits are available for single solenoid models (low temperature valves only).

Kit Number		
24 volts DC	110-120 volts AC 50-60 Hz	220 volts 50-60 Hz
862K87-W	862K87-Z	862K87-Y

Indicator Light



Manual Override Kits

Flush flexible manual overrides are standard on single solenoid models. Double solenoid models have flush metal-button overrides. Both types are non-locking. Each of the buttons in the override kits below is made of metal and is spring-returned. The locking type button, however, can be kept in the actuated position by turning the slot in the top of the button with a screwdriver.

Flush Button	
Locking Type	Kit Number
Non-Locking	790K87
Locking	792K87



Extended Button	
Locking Type	Kit Number
Non-Locking	791K87



Extended Button with Palm	
Locking Type	Kit Number
Non-Locking	984H87



Electrical Connector

Valves available with installed prewired connectors, please consult ROSS.

System 8 Pilot

Models available with preinstalled System 8 solenoid pilot, consult ROSS.

Silencers

Port Size	Thread Type	Model Number		Avg. C _v	Dimensions inches (mm)		Weight lb (kg)
		NPT Threads	R/Rp Threads		Width	Length	
3/8	Male	5500A3003	D5500A3003	4.3	1.3 (32)	3.5 (88)	0.2 (0.1)
1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)
1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)
1½	Female	5500A8001	D5500A8001	29.9	2.5 (64)	5.7 (144)	1.0 (0.5)
2½	Female	5500A9002	D5500A9002	103.7	4.0 (102)	5.7 (145)	2.9 (1.4)

Pressure Range: 0 to 290 psig (0 to 20 bar) maximum.

Flow Media: Filtered air.



Port size 1/4 thru 2



Port size 2½



IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

CAUTIONS, WARNINGS And STANDARD WARRANTY

ROSS OPERATING VALVE, ROSS CONTROLS®, ROSS DECCO®, and AUTOMATIC VALVE INDUSTRIAL, collectively the "ROSS Group".

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure all sources of energy are turned off, the entire pneumatic system is shut down and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).
2. All ROSS Group Products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any product can be tampered with and/or need servicing after installation, persons responsible for the safety of others or the care of equipment must check ROSS Group Products on a regular basis and perform all necessary maintenance to ensure safe operating conditions.
3. All applicable instructions should be read and complied with before using any fluid power system to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use. If you have any questions, call your nearest ROSS Group location.
4. Each ROSS Group Product should be used within its specification limits. In addition, use only ROSS Group components to repair ROSS Group Products.

WARNINGS: *Failure to follow these instructions can result in personal injury and/or property damage.*

FILTRATION and LUBRICATION

1. Dirt, scale, moisture, etc., are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. The ROSS Group recommends a filter with a 5-micron rating for normal applications.
2. All standard ROSS Group filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition and hazardous leakage. Immediately replace crazed, cracked, or deteriorated bowls.
3. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline

point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure which risks personal injury, and/or damage to property.

WARNINGS: *Failure to follow these instructions can result in personal injury and/or property damage.*

AVOID INTAKE/EXHAUST RESTRICTION

1. Do not restrict air flow in the supply line. To do so could reduce the pressure of the supply air below minimum requirements for the valve and thereby causing erratic action.
2. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and must have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

WARNINGS: *Failure to follow these instructions can result in personal injury and/or property damage.*

SAFETY APPLICATIONS

1. Mechanical Power Presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.
2. Safety exhaust (dump) valves without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All safety exhaust valve installations should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.
3. Per specifications and regulations, the ROSS L-O-X® and L-O-X® with EEZ-ON®, N06 and N16 Series operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARNINGS: *Failure to follow these instructions can result in personal injury and/or property damage.*

STANDARD WARRANTY

All products sold by the ROSS Group are warranted for a one-year period [with the exception of Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven (7) years] from the date of purchase. All products are, during their respective warranty periods, warranted to be free of defects in material and workmanship. The ROSS Group's obligation under this warranty is limited to repair, replacement or refund of the purchase price paid for products which the ROSS Group has determined, in its sole discretion, are defective. All warranties become void if a product has been subject to misuse, misapplication, improper maintenance, modification or tampering. Products for which warranty protection is sought must be returned to the ROSS Group freight prepaid.

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Other literature is available for engineering, maintenance, and service requirements.

If you need products or specifications not shown in this catalog, please visit ROSS' website, contact ROSS or your ROSS distributor. The ROSS Support Team will be happy to assist you in selecting the best product for your application.

For a current list of countries and local distributors, visit ROSS' at rosscontrols.com.