P1000 Series Pressure Independent Valves

Product Bulletin

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P1000 Series Pressure Independent Valves are designed to regulate the flow of hot or chilled water and 60% glycol solutions in response to the demand of a controller in Heating, Ventilating, and Air Conditioning (HVAC) systems. The pressure independent valves eliminate the need for separate balancing valves. These valves are available in sizes 1/2 through 2 in. (DN15 through DN50) with factory-mounted Johnson Controls® VA2104 and VA2120 Non-Spring Return and VA2202, M2204, and M2215 Series Spring Return Electric Actuators for floating or proportional control.

Figure 1: P1000 Series Pressure Independent Valve Assembly

Table 1: Features and Benefits

Features	Benefits
No Cv Calculation	Simplifies valve selection.
Automatic System Balancing	Prevents overflow or underflow to maximize system performance.
Combined Control and Balancing Valve	Reduces installation time and cost.
600 psi (4137 kPa) Static Pressure Rating for 1/2 through 1 in. Valves and 400 psi Static Pressure Rating for 1-1/4 through 2 in. Valves	Allows use of valve in a wide range of systems.
200 psi (1380 kPa) Closeoff Pressure Rating	Provides tight shutoff in high pressure systems.
5 to 50 psi (345 kPa) Operating Differential Pressure Rating	Allows use of valve in a wide range of systems.
Availability of Factory-Mounted VA2104, VA2120, VA2202, M2204, or M2215 Series Electric Actuators	Reduces installation time, thus, reducing overall installation cost.
Maintenance-free Design	Eliminates need for periodic rebuilding and rebalancing of the system, with no packings to adjust.
American National Standards Institute (ANSI) Class IV Leakage and ±5% Flow Accuracy	Reduces energy costs and provides superior room comfort.

Johnson Controls

Ordering Information

Table 2: Ordering Information

Code	Position	Field	Description
P 1	1 2	**Family**	Pressure Independent Characterized Control Valve
2	3	**Body Type and Flow Characteristic**	2 = Two-Way, with Equal Percentage Flow Characteristics
4	4	**End Connections**	0 = BSPP (British Straight Pipe–Parallel) 4 = Threaded - National Pipe Thread (NPT) - Taper
1	5	**Trim**	1 = Chrome-Plated Brass Ball and Stem without Pressure Taps
A	6	**Size**	A = 1/2 in. B = 3/4 in. C = 1 in. D = 1-1/4 in. E = 1-1/2 in. F = 2 in.
0 4	7 8	**Flow Rate (GPM)**	Available Factory Flow Rates in Gallons Per Minute (GPM) by Valve Size (see below)
+	9	**Actuator Mounting**	+ = Factory-Mounted Actuator (Not present in all code numbers.) (Leave fields 9 through 15 blank for valves without factory-mounted actuator.) **Note:** + is not used for 1.5 gallon models.

Available Factory Flow Rates in Gallons Per Minute (GPM) by Valve Size

1/2 in.	3/4 in.	1 in.	1-1/4 in.	1-1/2 in.	2 in.
00 = .5	06 = 6	11 = 11	18 = 18	26 = 26	33 = 33
01 = 1	065 = 6.5	12 = 12	19 = 19	27 = 27	34 = 34
015 = 1.5	07 = 7	13 = 13	20 = 20	28 = 28	35 = 35
02 = 2	075 = 7.5	14 = 14	21 = 21	29 = 29	36 = 36
025 = 2.5	08 = 8	15 = 15	22 = 22	30 = 30	37 = 37
03 = 3	085 = 8.5	16 = 16	23 = 23	31 = 31	38 = 38
035 = 3.5	09 = 9	17 = 17	24 = 24	32 = 32	39 = 39
04 = 4	095 = 9.5	18 = 18	25 = 25	33 = 33	40 = 40
045 = 4.5	10 = 10	19 = 19	26 = 26		44 = 44
05 = 5					48 = 48
055 = 5.5					52 = 52
					56 = 56
					60 = 60
					65 = 65
					70 = 70
					75 = 75
					80 = 80
					90 = 90
					100 = 100

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	= Field
P	1	2	4	1	A	0	4								Example: Two-way pressure independent Valve, 1/2 in. factory set for a maximum flow of 4 gallons per minute
Valve								+	Actuator						

Table 3: Ordering Information - Adding a Factory-Mounted Electric Actuator

P	**1**	**2**	**4**	**2**	**A**	**0**	**4**	**+**								**Actuator Mounting**	+ = Factory-Mounted Actuator **Note:** + is not used for 1.5 gallon models.
								9									
									2							**Actuator Family**	2 = VA2000 or M2000 Series Electric Actuator
									10								
										2						**Actuator Action**	1 = Non-Spring Return 2 = Spring Return Valve Open 4 = Spring Return Valve Closed
										11							
											L					**Actuator Size**	T = VA2202 Series Spring Return (For all 1/2 in. P1000 Series Valves) L = VA2104 Series Non-Spring Return or M2204 Spring Return (For all 1/2, 3/4, and 1 in. P1000 Series Valves) A = VA2120 Series Non-Spring Return or M2215 Spring Return (For all 1-1/4, 1-1/2, and 2 in. P1000 Series Valves)
											12						
												H				**Control Type**	A = Floating, 24 VAC/VDC Input (VA2104 Only) H = Proportional, 0-10 VDC (Factory set for valve closed with 0 volt input signal)
												13					
													G			**Supply Voltage**	G = 24 VAC
													14				
														A		**Feedback**	A = 0-10 VDC (Proportional Only), No Switches
														15			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**		**= Field**	
P	**1**	**2**	**4**	**1**	**A**	**0**	**4**	**+**	**2**	**2**	**L**	**H**	**G**	**A**		Example: Two-way pressure Independent Valve, 1/2 in. factory set for a maximum flow of 4 gallons per minute, factory-mounted M2204-HGA-2 Actuator, Spring Return, Proportional Control, 24 VAC Supply, with 0 to 10 VDC feedback.	
Valve								**+**	**Actuator**								

Note: All valves with proportional control actuators are shipped from the factory programmed with the valve fully closed with a 0 VDC input signal.

Figure 2: P1000 Valve with VA2104 Actuator

Figure 3: P1000 Valve with VA2120 Actuator

Table 4: Two-Way Non-Spring Return (Part 1 of 3)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	24 VAC	
			No Pressure Taps	
			Floating	DC 0 to 10 V Proportional
			VA2104-AGA-2	VA2104-HGA-2
1/2	0.5	200	P1241A00+21LAGA	P1241A00+21LHGA
	1		P1241A01+21LAGA	P1241A01+21LHGA
	1.5		P1241A01521LAGA	P1241A01521LHGA
	2		P1241A02+21LAGA	P1241A02+21LHGA
	2.5		P1241A02521LAGA	P1241A02521LHGA
	3		P1241A03+21LAGA	P1241A03+21LHGA
	3.5		P1241A03521LAGA	P1241A03521LHGA
	4		P1241A04+21LAGA	P1241A04+21LHGA
	4.5		P1241A04521LAGA	P1241A04521LHGA
	5		P1241A05+21LAGA	P1241A05+21LHGA
	5.5		P1241A05521LAGA	P1241A05521LHGA
3/4	6	200	P1241B06+21LAGA	P1241B06+21LHGA
	6.5		P1241B06521LAGA	P1241B06521LHGA
	7		P1241B07+21LAGA	P1241B07+21LHGA
	7.5		P1241B07521LAGA	P1241B07521LHGA
	8		P1241B08+21LAGA	P1241B08+21LHGA
	8.5		P1241B08521LAGA	P1241B08521LHGA
	9		P1241B09+21LAGA	P1241B09+21LHGA
	9.5		P1241B09521LAGA	P1241B09521LHGA
	10		P1241B10+21LAGA	P1241B10+21LHGA

Table 4: Two-Way Non-Spring Return (Part 2 of 3)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	24 VAC	
			No Pressure Taps	
			Floating	DC 0 to 10 V Proportional
			VA2104-AGA-2	VA2104-HGA-2
1	11	200	P1241C11+21LAGA	P1241C11+21LHGA
	12		P1241C12+21LAGA	P1241C12+21LHGA
	13		P1241C13+21LAGA	P1241C13+21LHGA
	14		P1241C14+21LAGA	P1241C14+21LHGA
	15		P1241C15+21LAGA	P1241C15+21LHGA
	16		P1241C16+21LAGA	P1241C16+21LHGA
	17		P1241C17+21LAGA	P1241C17+21LHGA
	18		P1241C18+21LAGA	P1241C18+21LHGA
	19		P1241C19+21LAGA	P1241C19+21LHGA
1-1/4	18	200	—	P1241D18+21AHGA
	19		—	P1241D19+21AHGA
	20		—	P1241D20+21AHGA
	21		—	P1241D21+21AHGA
	22		—	P1241D22+21AHGA
	23		—	P1241D23+21AHGA
	24		—	P1241D24+21AHGA
	25		—	P1241D25+21AHGA
	26		—	P1241D26+21AHGA
1-1/2	26	200	—	P1241E26+21AHGA
	27		—	P1241E27+21AHGA
	28		—	P1241E28+21AHGA
	29		—	P1241E29+21AHGA
	30		—	P1241E30+21AHGA
	31		—	P1241E31+21AHGA
	32		—	P1241E32+21AHGA
	33		—	P1241E33+21AHGA

Table 4: Two-Way Non-Spring Return (Part 3 of 3)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	24 VAC	
			No Pressure Taps	
			Floating	DC 0 to 10 V Proportional
			VA2104-AGA-2	VA2104-HGA-2
2	33	200	—	P1241F33+21AHGA
	34		—	P1241F34+21AHGA
	35		—	P1241F35+21AHGA
	36		—	P1241F36+21AHGA
	37		—	P1241F37+21AHGA
	38		—	P1241F38+21AHGA
	39		—	P1241F39+21AHGA
	40		—	P1241F40+21AHGA
	44		—	P1241F44+21AHGA
	48		—	P1241F48+21AHGA
	52		—	P1241F52+21AHGA
	56		—	P1241F56+21AHGA
	60		—	P1241F60+21AHGA
	65		—	P1241F65+21AHGA
	70		—	P1241F70+21AHGA
	75		—	P1241F75+21AHGA
	80		—	P1241F80+21AHGA
	90		—	P1241F90+21AHGA
	100		—	P1241F10021AHGA

1. All valves with proportional control actuators are shipped from the factory programmed with the valve fully closed at 0 VDC input signal.

Figure 4: P1000 Valve with M2204 Actuator, P1000 Valve with VA2202 Actuator

Table 5: Two-Way Spring Return (Part 1 of 4)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	DC 0 to 10 V Proportional Control, 24 VAC Supply	
			Spring Return Open	Spring Return Closed
			Without Pressure Taps	Without Pressure Taps
Assemblies with VA2202-HGA-2P Spring Return Actuator				
1/2	0.5	200	P1241A00+22THGA	P1241A00+24THGA
	1		P1241A01+22THGA	P1241A01+24THGA
	1.5		P1241A01522THGA	P1241A01524THGA
	2		P1241A02+22THGA	P1241A02+24THGA
	2.5		P1241A02522THGA	P1241A02524THGA
	3		P1241A03+22THGA	P1241A03+24THGA
	3.5		P1241A03522THGA	P1241A03524THGA
	4		P1241A04+22THGA	P1241A04+24THGA
	4.5		P1241A04522THGA	P1241A04524THGA
	5		P1241A05+22THGA	P1241A05+24THGA
	5.5		P1241A05522THGA	P1241A05524THGA

Table 5: Two-Way Spring Return (Part 2 of 4)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	DC 0 to 10 V Proportional Control, 24 VAC Supply	
			Spring Return Open	Spring Return Closed
			Without Pressure Taps	Without Pressure Taps
Assemblies with M2204-HGA-2 Spring Return Actuator				
1/2	0.5	200	P1241A00+22LHGA	P1241A00+24LHGA
	1		P1241A01+22LHGA	P1241A01+24LHGA
	1.5		P1241A01522LHGA	P1241A01524LHGA
	2		P1241A02+22LHGA	P1241A02+24LHGA
	2.5		P1241A02522LHGA	P1241A02524LHGA
	3		P1241A03+22LHGA	P1241A03+24LHGA
	3.5		P1241A03522LHGA	P1241A03524LHGA
	4		P1241A04+22LHGA	P1241A04+24LHGA
	4.5		P1241A04522LHGA	P1241A04524LHGA
	5		P1241A05+22LHGA	P1241A05+24LHGA
	5.5		P1241A05522LHGA	P1241A05524LHGA
3/4	6	200	P1241B06+22LHGA	P1241B06+24LHGA
	6.5		P1241B06522LHGA	P1241B06524LHGA
	7		P1241B07+22LHGA	P1241B07+24LHGA
	7.5		P1241B07522LHGA	P1241B07524LHGA
	8		P1241B08+22LHGA	P1241B08+24LHGA
	8.5		P1241B08522LHGA	P1241B08524LHGA
	9		P1241B09+22LHGA	P1241B09+24LHGA
	9.5		P1241B09522LHGA	P1241B09524LHGA
	10		P1241B10+22LHGA	P1241B10+24LHGA
1	11	200	P1241C11+22LHGA	P1241C11+24LHGA
	12		P1241C12+22LHGA	P1241C12+24LHGA
	13		P1241C13+22LHGA	P1241C13+24LHGA
	14		P1241C14+22LHGA	P1241C14+24LHGA
	15		P1241C15+22LHGA	P1241C15+24LHGA
	16		P1241C16+22LHGA	P1241C16+24LHGA
	17		P1241C17+22LHGA	P1241C17+24LHGA
	18		P1241C18+22LHGA	P1241C18+24LHGA
	19		P1241C19+22LHGA	P1241C19+24LHGA

Table 5: Two-Way Spring Return (Part 3 of 4)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	DC 0 to 10 V Proportional Control, 24 VAC Supply	
			Spring Return Open	Spring Return Closed
			Without Pressure Taps	Without Pressure Taps
Assemblies with M2215-HGA-2 Spring Return Actuator				
1-1/4	18	200	P1241D18+22AHGA	P1241D18+24AHGA
	19		P1241D19+22AHGA	P1241D19+24AHGA
	20		P1241D20+22AHGA	P1241D20+24AHGA
	21		P1241D21+22AHGA	P1241D21+24AHGA
	22		P1241D22+22AHGA	P1241D22+24AHGA
	23		P1241D23+22AHGA	P1241D23+24AHGA
	24		P1241D24+22AHGA	P1241D24+24AHGA
	25		P1241D25+22AHGA	P1241D25+24AHGA
	26		P1241D26+22AHGA	P1241D26+24AHGA
1-1/2	26	200	P1241E26+22AHGA	P1241E26+24AHGA
	27		P1241E27+22AHGA	P1241E27+24AHGA
	28		P1241E28+22AHGA	P1241E28+24AHGA
	29		P1241E29+22AHGA	P1241E29+24AHGA
	30		P1241E30+22AHGA	P1241E30+24AHGA
	31		P1241E31+22AHGA	P1241E31+24AHGA
	32		P1241E32+22AHGA	P1241E32+24AHGA
	33		P1241E33+22AHGA	P1241E33+24AHGA

Table 5: Two-Way Spring Return (Part 4 of 4)[1]

Size, in.	Flow Rate (GPM)	Closeoff psig	DC 0 to 10 V Proportional Control, 24 VAC Supply	
			Spring Return Open	Spring Return Closed
			Without Pressure Taps	Without Pressure Taps
M2215-HGA-2				
2	33	200	P1241F33+22AHGA	P1241F33+24AHGA
	34		P1241F34+22AHGA	P1241F34+24AHGA
	35		P1241F35+22AHGA	P1241F35+24AHGA
	36		P1241F36+22AHGA	P1241F36+24AHGA
	37		P1241F37+22AHGA	P1241F37+24AHGA
	38		P1241F38+22AHGA	P1241F38+24AHGA
	39		P1241F39+22AHGA	P1241F39+24AHGA
	40		P1241F40+22AHGA	P1241F40+24AHGA
	44		P1241F44+22AHGA	P1241F44+24AHGA
	48		P1241F48+22AHGA	P1241F48+24AHGA
	52		P1241F52+22AHGA	P1241F52+24AHGA
	56		P1241F56+22AHGA	P1241F56+24AHGA
	60		P1241F60+22AHGA	P1241F60+24AHGA
	65		P1241F65+22AHGA	P1241F65+24AHGA
	70		P1241F70+22AHGA	P1241F70+24AHGA
	75		P1241F75+22AHGA	P1241F75+24AHGA
	80		P1241F80+22AHGA	P1241F80+24AHGA
	90		P1241F90+22AHGA	P1241F90+24AHGA
	100		P1241F10022AHGA	P1241F10024AHGA

1. All valves with proportional control actuators are shipped from the factory programmed with the valve fully closed at a 0 VDC input signal.

Table 6 lists the shipping weights for the P1000 Series Pressure Independent Valves.

Table 6: Shipping Weights[1]

Valve Code Number	Description	Shipping Weight, lb (kg)
P124xAxx	1/2 in. Two-Way Pressure Independent Valves	2.64 (1.20)
P124xBxx	3/4 in. Two-Way Pressure Independent Valves	3.17 (1.44)
P124xCxx	1 in. Two-Way Pressure Independent Valves	6.09 (2.76)
P124xDxx	1-1/4 in. Two-Way Pressure Independent Valves	8.31 (3.77)
P124xExx	1-1/2 in. Two-Way Pressure Independent Valves	7.70 (3.49)
P124xFxx	2 in. Two-Way Pressure Independent Valves (33 to 40 GPM)	9.38 (4.25)
	2 in. Two-Way Pressure Independent Valves (44 to 100 GPM)	29.10 (13.20)

1. For VA2104 Actuated Non-Spring Return Valve Assemblies, add 2.0 lb (0.9 kg). For VA2120 Actuated Non-Spring Return Valve Assemblies, add 3.4 lb (1.5 kg). For VA2202 Actuated Spring Return Valve Assemblies, add 1.5 lb (0.7 kg). For M2204 Actuated Spring Return Valve Assemblies, add 4.0 lb (1.8 kg). For M2215 Actuated Spring Return Valve Assemblies, add 7.0 lb (3.2 kg).

Application Overview

Available in sizes 1/2 through 2 in. (DN15 through DN50), P1000 Series Pressure Independent Valves are designed specifically for automated commercial HVAC service. These valves feature a forged brass body with a chrome-plated brass ball for water or glycol solutions to 212°F (100°C). Pressure independent valves combine the function of the traditional control valve and balancing valve by use of a differential pressure regulator.

P1000 Series Pressure Independent Valves are designed for factory-mounting to Johnson Controls VA2104 and VA2120 Non-Spring Return and VA2202, M2204, and M2215 Spring Return Series Electric Actuators and are ideally suited for floating or proportional HVAC service. Because of their cost-effective, reliable design, P1000 Series Pressure Independent Valves are maintenance free.

IMPORTANT: The P1000 Series Pressure Independent Valves are intended to control the flow of hot water, chilled water, and 60% glycol solutions under normal equipment operating conditions. Where failure or malfunction of the P1000 Series Pressure Independent Valve could lead to personal injury or damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the P1000 Series Pressure Independent Valve.

Electric Actuator Control Signal Action

The P1000 Pressure Independent Valves are at 100% of flow when the actuator is fully Counterclockwise (CCW) and the valves are closed when the actuator is fully Clockwise (CW). The actuators are factory set to be fully clockwise (closed valve) with an input signal of 0 VDC.

For proper operation under all conditions, the P1000 valves should be set up with the valves fully closed with a DC 0 V input signal.

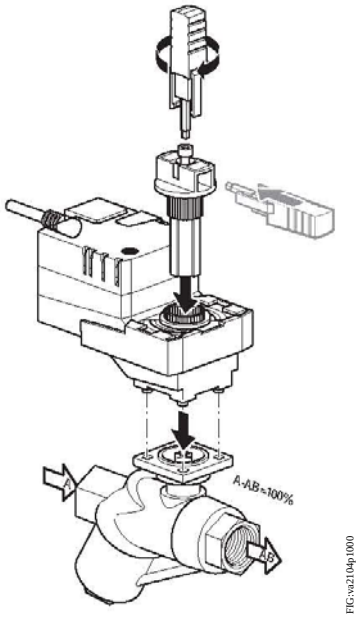


Figure 5: Installation of VA2104 Actuator on P1000 Valve

VA2104-AGA-2

The VA2104-AGA-2 Electric Non-Spring Return Valve Actuator requires an AC or DC 24 V input signal and is compatible with a variety of controllers.

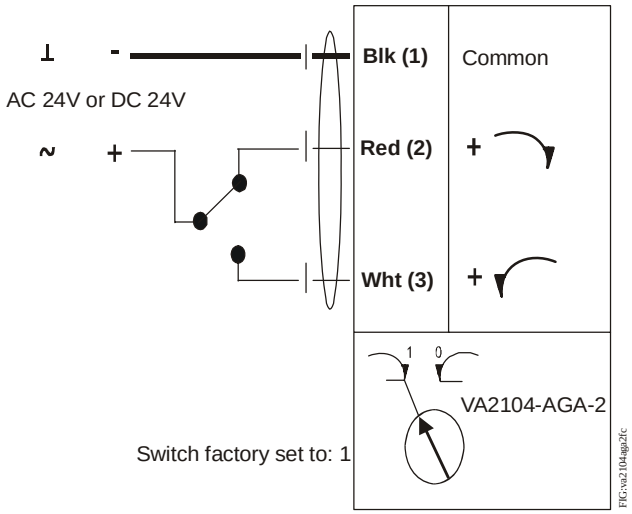


Figure 6: VA2104-AGA-2 Floating Control

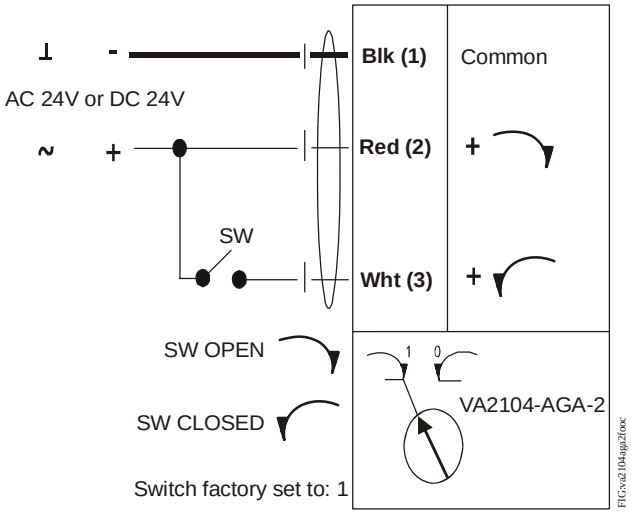
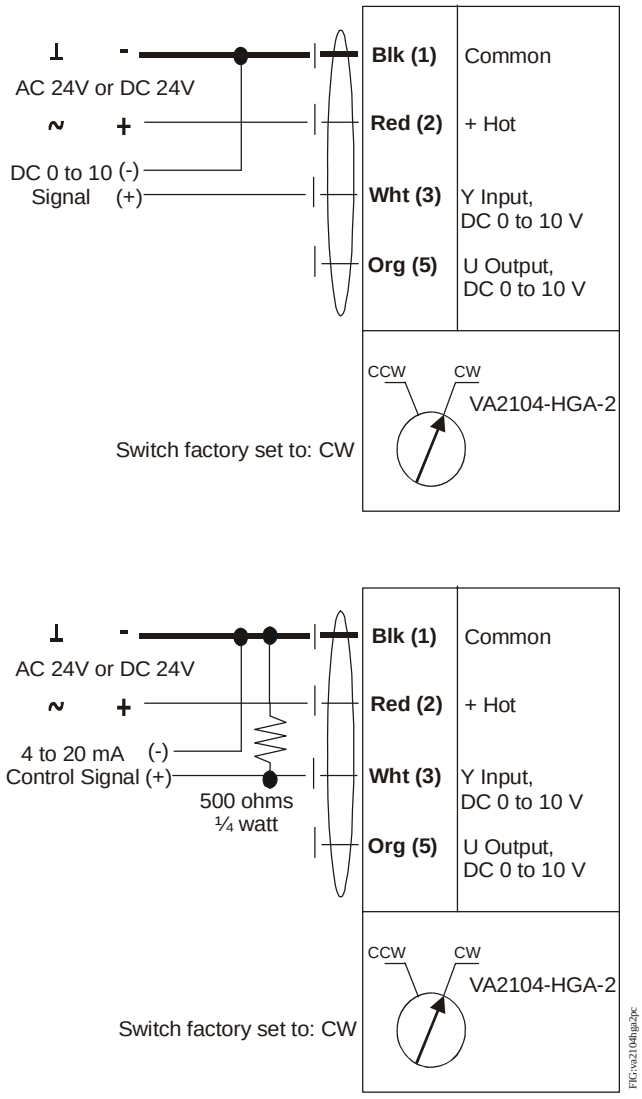


Figure 7: VA2104-AGA-2 On/Off Control

VA2104-HGA-2 and VA2120-HGA-2

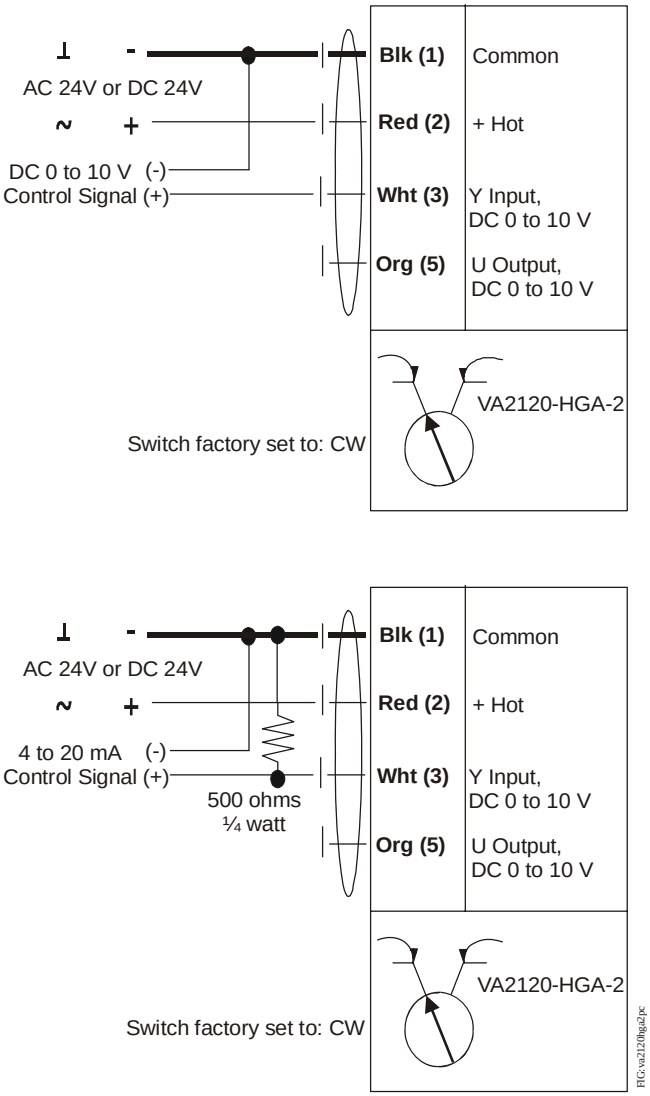
The VA2104-HGA-2 and VA2120-HGA-2 Electric Non-Spring Return Valve Actuators require AC or DC 24 V power supply and a DC 0 to 10 V or 0(4) to 20 mA input signal from the controller. Factory settings are as follows:

- 0 V: Valve closed (clockwise)
- 10 V: Valve open to rated flow setting (counterclockwise)



Note: Resistor is for 4 to 20 mA applications only.

Figure 8: VA2104-HGA-2 Proportional Control



Note: Resistor is for 4 to 20 mA applications only.

Figure 9: VA2120-HGA-2 Proportional Control

VA2202-HGA-2P, M2204-HGA-2, and M2215-HGA-2

The VA2202-HGA-2P, M2204-HGA-2, and M2215-HGA-2 Electric Spring Return Valve Actuators require an AC or DC 24 V power supply and a DC 0 to 10 V or 0(4) to 20 mA input signal from the controller. The factory setting is fully closed, 0 V (clockwise). If switches are moved to counterclockwise (CCW, or 0 for some models), the settings are as follows:

- 10 V: Valve closed (clockwise)
- 0 V: Valve open (counterclockwise)

IMPORTANT: P1000 valves must always be applied as an electrically normally closed valve. Zero volt control signal must always indicate that the valve is closed. The P1000 valve loses its ability to properly control the maximum flow if it is applied as an electrically normally open valve or if zero volts indicates valve open.

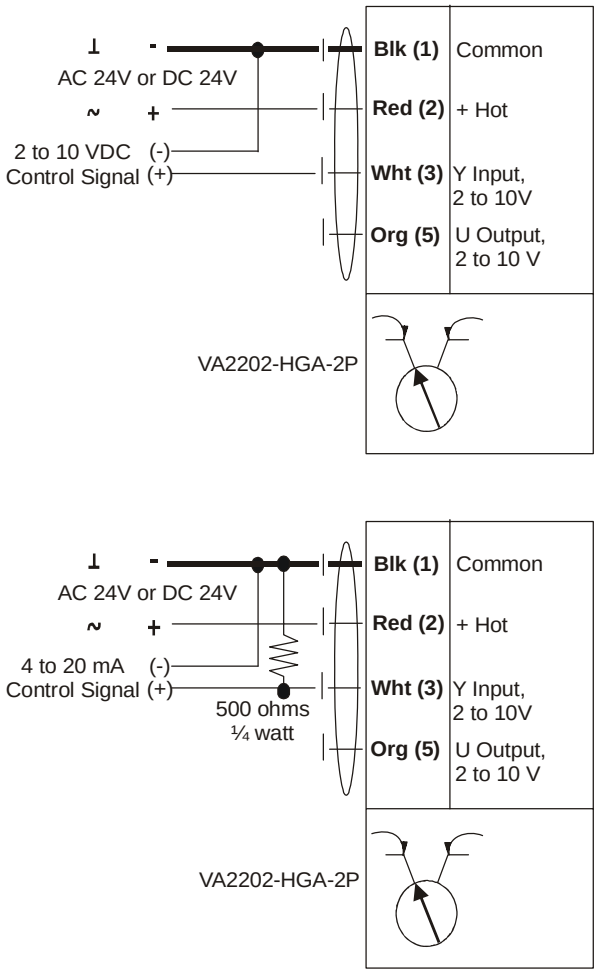


Figure 10: VA2202-HGA-2P Proportional Control

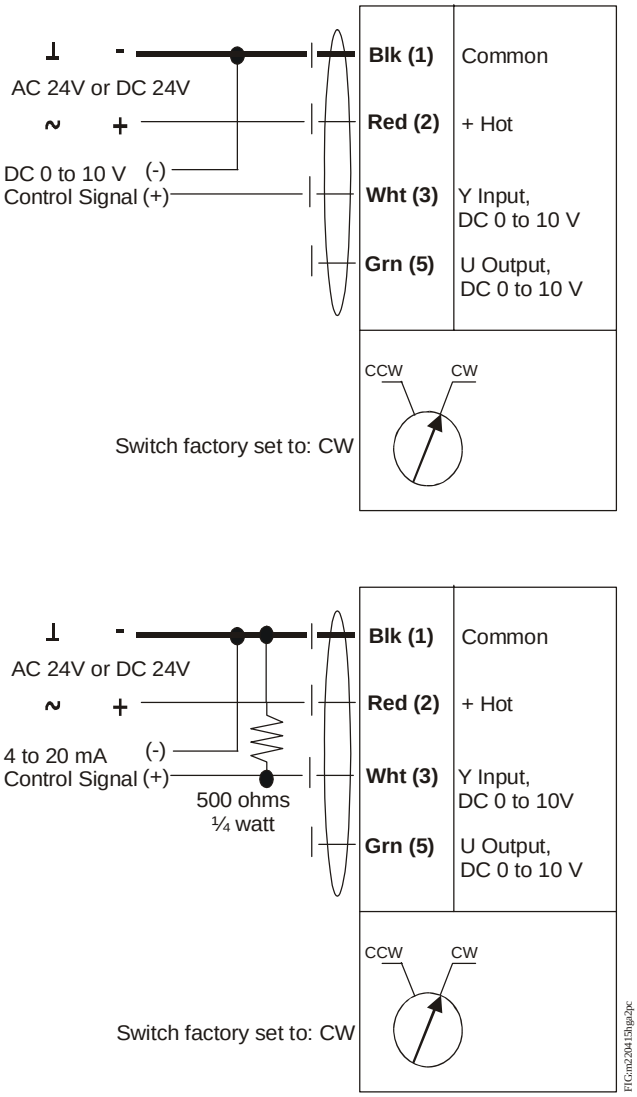


Figure 11: M2204-HGA-2 or M2215-HGA-2 Proportional Control

Feedback

Feedback is only available on proportional models. For the VA2104-HGA-2 and VA2120-HGA-2 actuator, the feedback signal equals the setpoint. For the VA2202-HGA-2P, M2104-HGA-2, and M2215-HGA-2 actuators, the setpoint does not equal feedback. To determine the rate of flow based on the feedback signal for VA2202-HGA-2P, M2104-HGA-2, and M2215-HGA-2 actuators, refer to the *P1000 Series Pressure Independent Valves Technical Bulletin (LIT-12011301).*

Electric Actuator Selection

P1000 Series Pressure Independent Valves are designed for factory or field mounting to Johnson Controls VA2104 and VA2120 Series Non-Spring Return and M2204 and M2215 Series Spring Return Electric Actuators.

Sizing Pressure Independent Valves

P1000 Series Pressure Independent Valves are selected based on the required Gallons Per Minute (GPM) of the coil. Select the valve that has a GPM rating equal to or slightly larger than the required flow.

Selection Examples

For a requirement of a 1/2 in. valve with a flow requirement of 2.5 GPM and no pressure taps, select a P1241A025 valve with the desired actuator.

For a requirement of a 1 in. valve with a flow requirement of 14 GPM and with pressure taps, select a P1241C14 valve with the desired actuator.

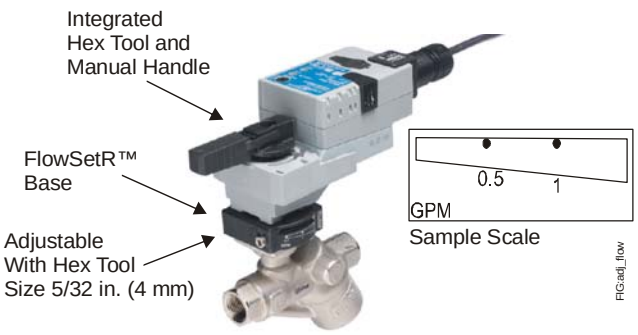


Figure 12: P1000 Valve with FlowSetR™ Base

Note: Each floating control non-spring return valve has a flow adjustment that can be used to limit the flow when a closer setting than the standard factory setting is required. The setting from the factory corresponds to the specified value ordered. The range of adjustment for each valve is shown in Table 7. For valves with pressure taps, confirm the factory flow rate using the pressure flow data shown in Table 7. More detailed instructions are available in the *P1000 Series Pressure Independent Valves Installation Instructions (Part No. 14-1345-6)*.

Table 7: Field Adjustable Flow Ranges and Runtime Data (Part 1 of 3)

Size, in.	Valve Code Number	Factory Flow Rate (GPM)	Field Adjustable Flow Range Using FlowSetR Base (GPM)	Running Time (Seconds)	
	Without Pressure Taps			VA2104-AGA-2	VA2104-HGA-2 VA2120-HGA-2 VA2202-HGA-2P M2204-HGA-2 M2215-HGA-2
1/2	P1241A00	0.5	0.5 to 1.0	36	100
	P1241A01	1	0.5 to 1.0	60	
	P1241A015	1.5	0.5 to 5.5	47	
	P1241A02	2	0.5 to 5.5	51	
	P1241A025	2.5	0.5 to 5.5	53	
	P1241A03	3	0.5 to 5.5	56	
	P1241A035	3.5	0.5 to 5.5	58	
	P1241A04	4	0.5 to 5.5	63	
	P1241A045	4.5	0.5 to 5.5	66	
	P1241A05	5	0.5 to 5.5	68	
	P1241A055	5.5	0.5 to 5.5	73	

Table 7: Field Adjustable Flow Ranges and Runtime Data (Part 2 of 3)

Size, in.	Valve Code Number	Factory Flow Rate (GPM)	Field Adjustable Flow Range Using FlowSetR Base (GPM)	Running Time (Seconds)	
	Without Pressure Taps			VA2104-AGA-2	VA2104-HGA-2 VA2120-HGA-2 VA2202-HGA-2P M2204-HGA-2 M2215-HGA-2
3/4	P1241B06	6	2 to 10	61	100
	P1241B065	6.5	2 to 10	62	
	P1241B07	7	2 to 10	64	
	P1241B075	7.5	2 to 10	66	
	P1241B08	8	2 to 10	67	
	P1241B085	8.5	2 to 10	68	
	P1241B09	9	2 to 10	69	
	P1241B095	9.5	2 to 10	71	
	P1241B10	10	2 to 10	76	
1	P1241C11	11	2 to 16	60	100
	P1241C12	12	2 to 16	62	
	P1241C13	13	2 to 16	64	
	P1241C14	14	2 to 16	67	
	P1241C15	15	2 to 16	69	
	P1241C16	16	2 to 16	86	
	P1241C17	17	6 to 19	65	
	P1241C18	18	6 to 19	67	
	P1241C19	19	6 to 19	78	
1-1/4	P1241D18	18			100
	P1241D19	19			
	P1241D20	20			
	P1241D21	21			
	P1241D22	22			
	P1241D23	23			
	P1241D24	24			
	P1241D25	25			
	P1241D26	26			
1-1/2	P1241E26	26			100
	P1241E27	27			
	P1241E28	28			
	P1241E29	29			
	P1241E30	30			
	P1241E31	31			
	P1241E32	32			
	P1241E33	33			

Table 7: Field Adjustable Flow Ranges and Runtime Data (Part 3 of 3)

Size, in.	Valve Code Number	Factory Flow Rate (GPM)	Field Adjustable Flow Range Using FlowSetR Base (GPM)	Running Time (Seconds)	
	Without Pressure Taps			VA2104-AGA-2	VA2104-HGA-2 VA2120-HGA-2 VA2202-HGA-2P M2204-HGA-2 M2215-HGA-2
2	P1241F33	33			100
	P1241F34	34			
	P1241F35	35			
	P1241F36	36			
	P1241F37	37			
	P1241F38	38			
	P1241F39	39			
	P1241F40	40			
	P1241F44	44			
	P1241F48	48			
	P1241F52	52			
	P1241F56	56			
	P1241F60	60			
	P1241F65	65			
	P1241F70	70			
	P1241F75	75			
	P1241F80	80			
	P1241F90	90			
	P1241F100	100			

Repair Information

If the P1000 Series Pressure Independent Valve fails to operate within its specifications, see Table 8, Table 9, and Table 10 for a list of replacement parts available.

Table 8: Replacement Valves (Part 1 of 2)

Valve Size, in.	GPM	Valve Assembly	Replacement Valve
Valves without Pressure Taps			
1/2 (DN15)	0.5	P1241A00+2xxxxx	P1241A01
	1	P1241A01+2xxxxx	
	1.5	P1241A0152xxxxx	P1241A05
	2	P1241A02+2xxxxx	
	2.5	P1241A0252xxxxx	
	3	P1241A03+2xxxxx	
	3.5	P1241A0352xxxxx	
	4	P1241A04+2xxxxx	
	4.5	P1241A0452xxxxx	
	5	P1241A05+2xxxxx	
	5.5	P1241A0552xxxxx	
3/4 (DN20)	6	P1241B06+2xxxxx	P1241B10
	6.5	P1241B0652xxxxx	
	7	P1241B07+2xxxxx	
	7.5	P1241B0752xxxxx	
	8	P1241B08+2xxxxx	
	8.5	P1241B0852xxxxx	
	9	P1241B09+2xxxxx	
	9.5	P1241B0952xxxxx	
	10	P1241B10+2xxxxx	
1 (DN25)	11	P1241C11+2xxxxx	P1241C16
	12	P1241C12+2xxxxx	
	13	P1241C13+2xxxxx	
	14	P1241C14+2xxxxx	
	15	P1241C15+2xxxxx	
	16	P1241C16+2xxxxx	
	17	P1241C17+2xxxxx	P1241C18
	18	P1241C18+2xxxxx	
	19	P1241C19+2xxxxx	

Table 8: Replacement Valves (Part 2 of 2)

Valve Size, in.	GPM	Valve Assembly	Replacement Valve
Valves without Pressure Taps			
1-1/4 (DN32)	18	P1241D18+2xxxxx	P1241D26
	19	P1241D19+2xxxxx	
	20	P1241D20+2xxxxx	
	21	P1241D21+2xxxxx	
	22	P1241D22+2xxxxx	
	23	P1241D23+2xxxxx	
	24	P1241D24+2xxxxx	
	25	P1241D25+2xxxxx	
	26	P1241D26+2xxxxx	
1-1/2 (DN40)	26	P1241E26+2xxxxx	P1241E33
	27	P1241E27+2xxxxx	
	28	P1241E28+2xxxxx	
	29	P1241E29+2xxxxx	
	30	P1241E30+2xxxxx	
	31	P1241E31+2xxxxx	
	32	P1241E32+2xxxxx	
	33	P1241E33+2xxxxx	
2 (DN50)	33	P1241F33+2xxxxx	P1241F40
	34	P1241F34+2xxxxx	
	35	P1241F35+2xxxxx	
	36	P1241F36+2xxxxx	
	37	P1241F37+2xxxxx	
	38	P1241F38+2xxxxx	
	39	P1241F39+2xxxxx	
	40	P1241F40+2xxxxx	
	44	P1241F44+2xxxxx	P1241F80
	48	P1241F48+2xxxxx	
	52	P1241F52+2xxxxx	
	56	P1241F56+2xxxxx	
	60	P1241F60+2xxxxx	
	65	P1241F65+2xxxxx	
	70	P1241F70+2xxxxx	
	75	P1241F75+2xxxxx	
	80	P1241F80+2xxxxx	
	90	P1241F90+2xxxxx	P1241F100
	100	P1241F1002xxxxx	

Table 9: Actuators and Accessories

Code Number	Description
VA2104-AGA-2	Electric Actuator, Non-Spring Return, 24 V Floating Control, for all 1/2, 3/4, and 1 in. Pressure Independent Valves
VA2104-HGA-2	Electric Actuator, Non-Spring Return, DC 0 to 10 V Proportional Control, DC 0 to 10 V Feedback, for all 1/2, 3/4, and 1 in. Pressure Independent Valves
VA2120-HGA-2	Electric Actuator, Non-Spring Return, DC 0 to 10 V Proportional Control, DC 0 to 10 V Feedback, for all 1-1/4, 1-1/2, and 2 in. Pressure Independent Valves
VA2202-HGA-2P	Electric Actuator, Spring Return, DC 0 to 10 V Proportional Control, DC 0 to 10 V Feedback, for all 1/2 in. Pressure Independent Valves
M2204-HGA-2	Electric Actuator, Spring Return, DC 0 to 10 V Proportional Control, DC 0 to 10 V Feedback, for all 1/2, 3/4, and 1 in. Pressure Independent Valves
M2215-HGA-2	Electric Actuator, Spring Return, DC 0 to 10 V Proportional Control, DC 0 to 10 V Feedback, for all 1-1/4, 1-1/2, and 2 in. Pressure Independent Valves
VA2202-500P	Linkage Kit for VA2202-HGA-2P Actuator and all 1/2 in. Pressure Independent Valves
M2204-500	Linkage Kit for M2204-HGA-2 Actuator and all 1/2, 3/4, and 1 in. Pressure Independent Valves
M2215-500	Linkage Kit for M2215-HGA-2 Actuator and all 1-1/4, 1-1/2, and 2 in. Pressure Independent Valves
M2104-501	FlowSetR Base, for use with 0.5 and 1 GPM P1241A01 Replacement Valve
M2104-502	FlowSetR Base, for use with 1.5 through 5.5 GPM P1241A05 Replacement Valve
M2104-503	FlowSetR Base, for use with 6 through 10 GPM P1241B10 Replacement Valve
M2104-504	FlowSetR Base, for use with 12 through 16 GPM P1241C16 Replacement Valve
M2104-505	FlowSetR Base, for use with 18 GPM P1241C18 Replacement Valve

Table 10: Actuator, Linkage, and FlowSetR Base Replacement Parts

Actuator	Actuator Description	Linkage	FlowSetR Base
VA2104-AGA-2	45 lb·in (5 N·m) Non-Spring Return Electric Actuator, 24 VAC/VDC On/Off (Floating) Control for use with 1/2, 3/4, and 1 in. P1000 Series Pressure Independent Valves	None Needed	M2104-50x (See Table 9.)
VA2104-HGA-2	45 lb·in (5 N·m) Non-Spring Return Electric Actuator, DC 0 to 10 V Proportional Control for use with 1/2, 3/4, and 1 in. P1000 Series Pressure Independent Valves		None
VA2120-HGA-2	180 lb·in (20 N·m) Non-Spring Return Electric Actuator, DC 0 to 10 V Proportional Control for use with 1 through 2 in. P1000 Series Pressure Independent Valves		
VA2202-HGA-2P	18 lb·in (2 N·m) Spring Return Electric Actuator, DC 0 to 10 V Proportional Control for use with 1/2 in. P1000 Series Pressure Independent Valves	VA2202-500P	
M2204-HGA-2	35 lb·in (4 N·m) Spring Return Electric Actuator, DC 0 to 10 V Proportional Control for use with 1/2, 3/4, and 1 in. P1000 Series Pressure Independent Valves	M2204-500	
M2215-HGA-2	133 lb·in (15 N·m) Spring Return Electric Actuator, DC 0 to 10 V Proportional Control for use with 1 through 2 in. P1000 Series Pressure Independent Valves	M2215-500	

Dimensions

Figure 13 and Figure 14 show the dimensions of the VA2104-AGA-2 and VA2104-HGA-2 Actuated P1000 Valves without pressure taps.

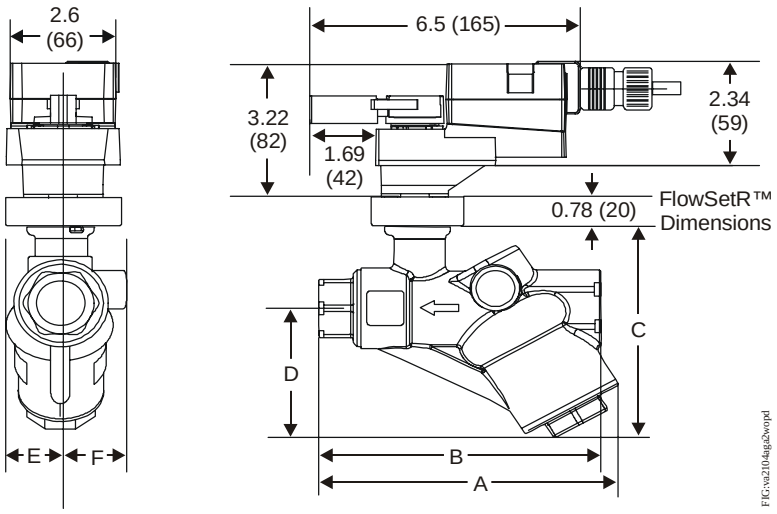


Figure 13: VA2104-AGA-2 Actuated P1000 Valve without Pressure Taps Dimensions, in. (mm)

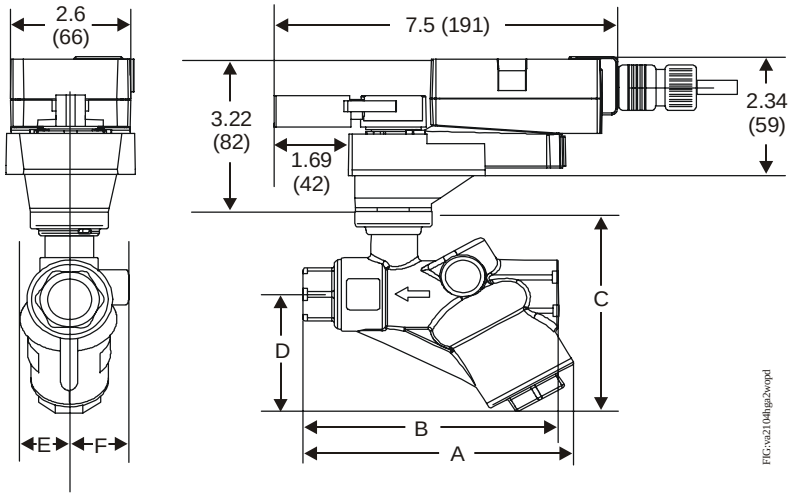


Figure 14: VA2104-HGA-2 Actuated P1000 Valve without Pressure Taps Dimensions, in. (mm)

Table 11: VA2104 Actuated P1000 Valve without Pressure Taps Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D	E	F
1/2 (DN15)	4.80 (122)	4.60 (117)	4.02 (102)	2.28 (58)	1.04 (26.4)	1.30 (33.0)
3/4 (DN20)	5.25 (133)	5.03 (128)	4.22 (107)	2.38 (61)	1.04 (26.4)	1.30 (33.0)
1 (DN25)	7.05 (179)	6.85 (174)	4.80 (122)	3.23 (82)	1.60 (40.6)	1.60 (40.6)

Figure 15 shows the dimensions of the M2204 Actuated P1000 Valve without pressure taps.

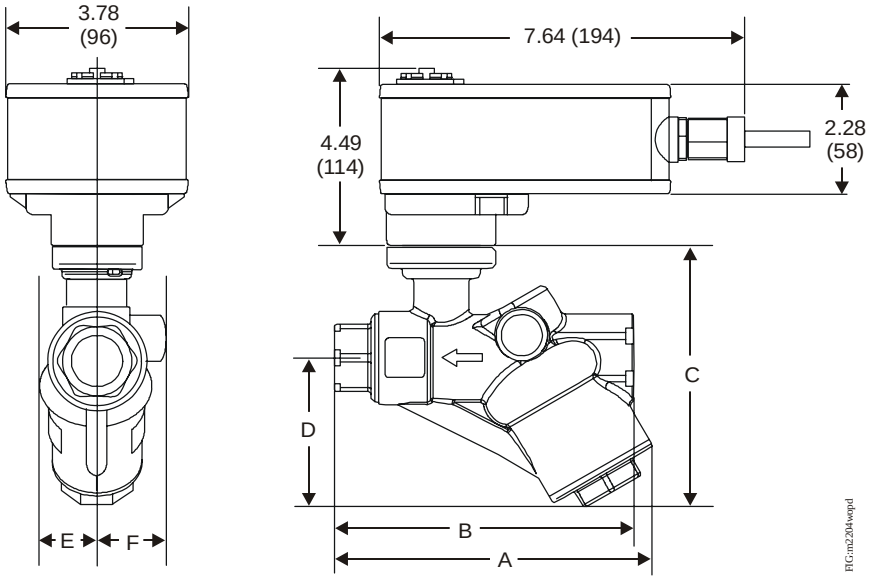


Figure 15: M2204 Actuated P1000 Valve without Pressure Taps Dimensions, in. (mm)

Table 12: M2204 Actuated P1000 Valve without Pressure Taps Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D	E	F
1/2 (DN15)	4.80 (122)	4.60 (117)	4.02 (102)	2.28 (58)	1.04 (26.4)	1.30 (33.0)
3/4 (DN20)	5.25 (133)	5.03 (128)	4.22 (107)	2.38 (61)	1.04 (26.4)	1.30 (33.0)
1 (DN25)	7.05 (179)	6.85 (174)	4.80 (122)	3.23 (82)	1.60 (40.6)	1.60 (40.6)

Figure 16 show the dimensions of the VA2120 Actuated P1000 Valve without pressure taps for flows up to 40 GPM.

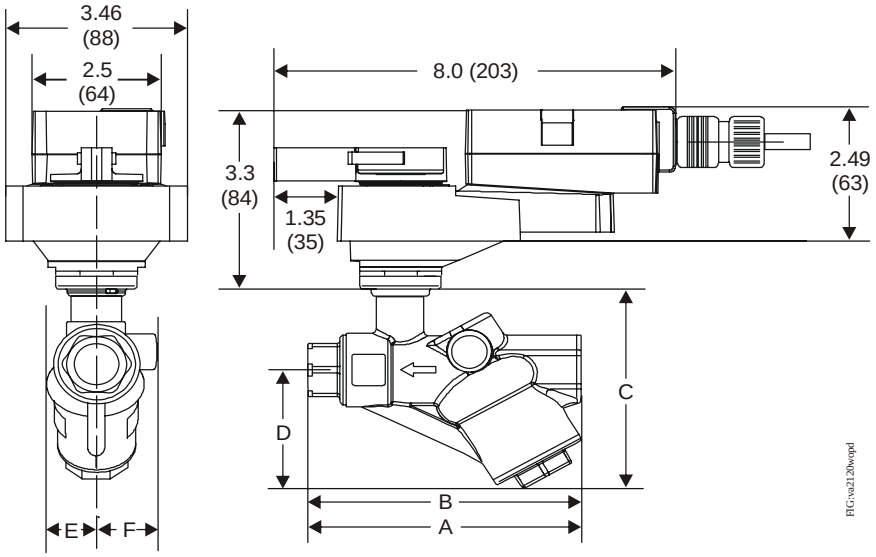


Figure 16: VA2120 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)

Table 13: VA2120 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)[1]

Valve Size, in. (DN)	A	B	C	D	E	F
1-1/4 (DN32)	8.19 (208)	8.19 (208)	5.67 (144)	3.66 (93)	1.77 (45)	1.61 (41)
1-1/2 (DN40)	8.03 (204)	8.03 (204)	5.67 (144)	3.66 (93)	1.77 (45)	1.61 (41)
2 (DN50)	8.50 (216)	8.50 (216)	5.91 (150)	3.66 (93)	1.77 (45)	1.61 (41)

1. Dimensions shown are for 2 in. valves with flows up to 40 GPM.

Figure 17 shows the dimensions of the VA2120 Actuated P1000 Valve without pressure taps for 2 in. valves with flows from 44 to 100 GPM.

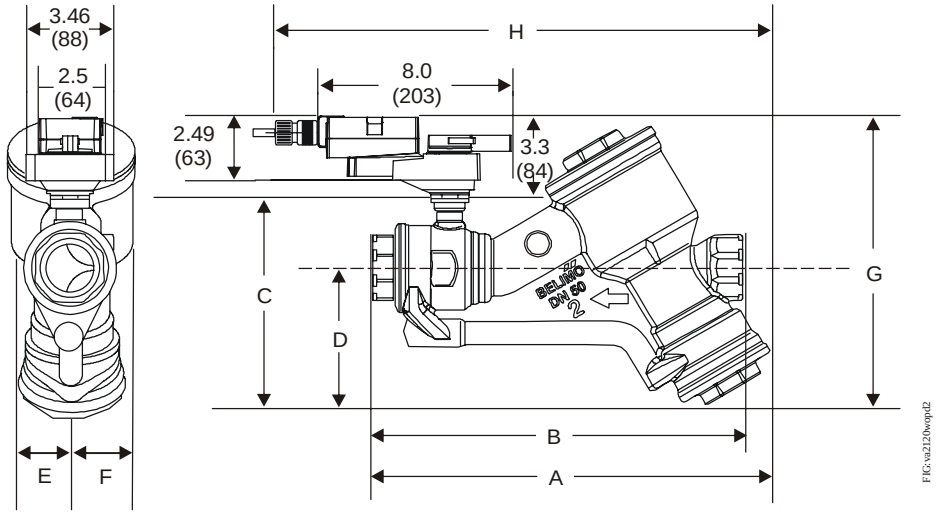


Figure 17: VA2120 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)

Table 14: VA2120 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)[1]

Valve Size, in. (DN)	A	B	C	D	E	F	G	H
2 (DN50)	16.39 (416)	15.60 (396)	8.94 (227)	5.87 (149)	2.64 (67)	2.64 (67)	12.83 (326)	21.90 (556)

1. Dimensions shown are for 2 in. valves with flows from 44 to 100 GPM.

Figure 18 shows the dimensions of the M2215 Actuated P1000 Valves without pressure taps for flows up to 40 GPM.

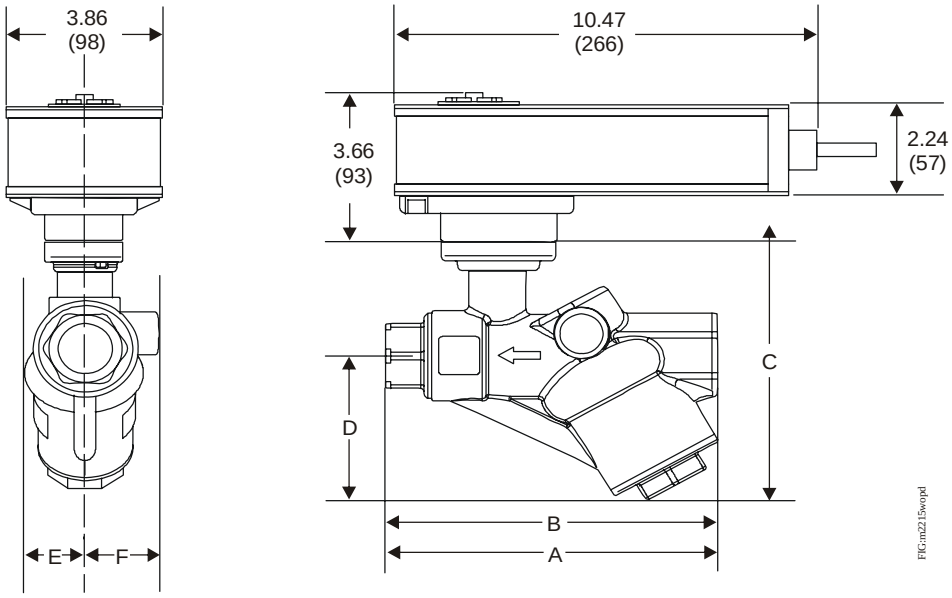


Figure 18: M2215 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)

Table 15: M2215 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)[1]

Valve Size, in. (DN)	A	B	C	D	E	F
1-1/4 (DN32)	8.19 (208)	8.19 (208)	5.67 (144)	3.66 (93)	1.77 (45)	1.61 (41)
1-1/2 (DN40)	8.03 (204)	8.03 (204)	5.67 (144)	3.66 (93)	1.77 (45)	1.61 (41)
2 (DN50)	8.50 (216)	8.50 (216)	5.91 (150)	3.66 (93)	1.77 (45)	1.61 (41)

1. Dimensions shown are for 2 in. valves with flows up to 40 GPM.

Figure 19 shows the dimensions of the M2215 Actuated P1000 Valves without pressure taps for flows from 44 to 100 GPM.

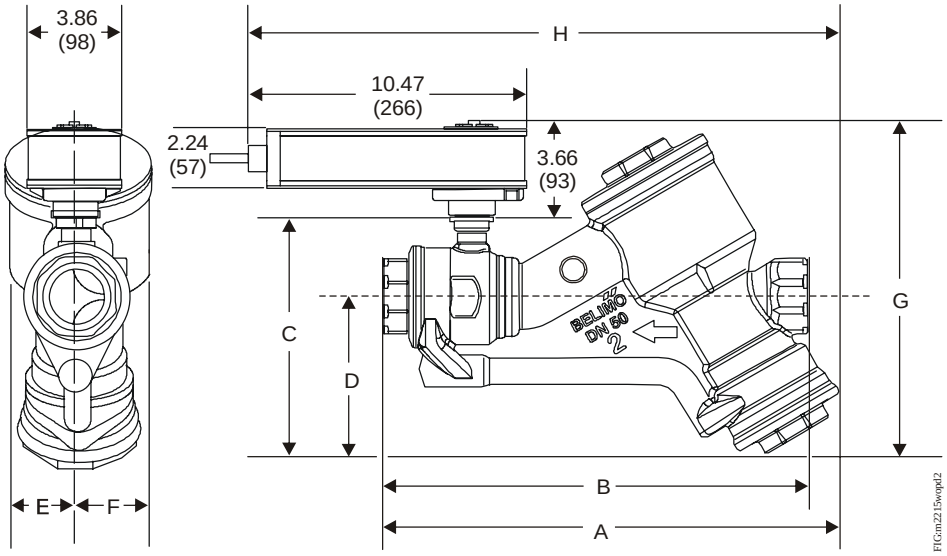


Figure 19: M2215 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)

Table 16: M2215 Actuated P1000 Pressure Independent Valve without Pressure Taps Dimensions, in. (mm)[1]

Valve Size, in. (DN)	A	B	C	D	E	F	G	H
2 (DN50)	16.39 (416)	15.60 (396)	8.94 (227)	5.87 (149)	2.64 (67)	2.64 (67)	12.83 (326)	21.9 (556)

1. Dimensions shown are for 2 in. valves with flows from 44 to 100 GPM.

Technical Specifications

P1000 Series Pressure Independent Valves (Part 1 of 2)

Service[1]		Hot Water, Chilled Water, and 60% Glycol Solutions for HVAC Systems
Valve Fluid Temperature Limits		0 to 212°F (-18 to 100°C)
Valve Body Pressure/Temperature Rating		600 psig (4,134 kPa) - Sizes 1/2, 3/4, and 1 in. 400 psig (2,756 kPa) - Sizes 1-1/4, 1-1/2, and 2 in.
Maximum Closeoff Pressure		200 psi (1,378 kPa)
Recommended Minimum Differential Operating Pressure		5 psi (34 kPa)
Maximum Recommended Operating Pressure Drop		50 psi Maximum Differential Pressure
Flow Characteristics		Equal Percentage
Flow Accuracy		±10% Combination of manufacturing tolerances and pressure variations
Valve Body Size/Flow Rate		See Table 7.
Leakage		0.01% of Maximum Flow per ANSI/FCI 70-2, Class 4
End Connections		National Pipe Thread (NPT)
Material	**Body**	Forged Brass, Nickel Plated
	Ball	Chrome-Plated Brass
	Stem	Chrome-Plated Brass
	Seats	Fiberglass Reinforced Teflon® Polytetrafluoroethylene (PTFE)
	Characterizing Disk	Tefzel®
	Packing	Two Ethylene Propylene Diene Monomer (EPDM) O-rings
	Diaphragm	Polyester Reinforced Silicone
	Regulator	Stainless Steel/Brass/Delrin
	Spring	Stainless Steel
Power Requirements	**VA2104-AGA-2**	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 3 VA Supply Class 2
	VA2104-HGA-2	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 4 VA Supply Class 2
	VA2120-HGA-2	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 5 VA Supply Class 2
	VA2202-HGA-2P	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 4 VA Supply Class 2
	M2204-HGA-2	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 5 VA Supply Class 2
	M2215-HGA-2	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%, 10 VA Supply Class 2
Input Signal	**Floating**	AC 24 V ±20%, 50/60 Hz, DC 24 V ±10%
	Proportional	DC 0 to 10 V, 4 to 20 mA with Field Furnished 500 ohm Resistor
Input Impedance	**Floating**	600 ohm
	Proportional	100,000 ohm for DC 0 to 10 V
Feedback	**Proportional Only**	DC 0 to 10 V, 0.5 mA Maximum Refer to the *P1000 Series Pressure Independent Valves Technical Bulletin (LIT-12011301)* for the exact range of voltage.
Electric Connection	**VA2104 VA2120**	36 in. (.91 m) 18 AWG Plenum Rated Cable, 1/2 in. Conduit
	VA2202 M2204	36 in. (.91 m) 18 AWG Plenum Rated Cable, 1/2 in. Conduit
	M2215	36 in. (.91 m) 18 AWG Appliance Cable, 1/2 in. Conduit
Runtime		See Table 7.

P1000 Series Pressure Independent Valves (Part 2 of 2)

Audible Noise Rating	**VA2104**	<35 dB (A)
	M2204	<30 dB (A) Operating, <62 dB (A) Spring Return
	VA2202	<35 dB (A) Operating, <65 dB (A) Spring Return
	VA2120 **M2215**	<45 dB (A)
Manual Override	**VA2104**	External Push Button and Handle
	VA2120	
	VA2202	None
	M2204	
	M2215	Hex Crank
Actuator Ambient Conditions	**Operating**	-22 to 122°F (-30 to 50°C), 5 to 95% RH Noncondensing (EN 60730-1)
	Storage	-40 to 176°F (-40 to 80°C), 5 to 95% RH Noncondensing (EN 60730-1)
Housing	**VA2104** **VA2120** **M2204** **M2215**	NEMA 2 (IP54)
	VA2202	NEMA 2 (IP42)
Housing Material	**VA2104** **VA2120** **VA2202**	Thermoplastic Material, UL 94-5V
	M2204 **M2215**	Zinc-coated Metal
Compliance (North America)	**VA2104** **VA2120** **M2204** **M2215**	UL Listed, File E22734, CCN XAPX (United States) and XAPX7 (Canada)
	VA2202	UL Listed According to UL 60730-1, UL 60730-2-14 (XAPX) cUL Listed According to CAN/CSA C22.2 No. 24 (XAPX7)

1. Proper water treatment is recommended; refer to VDI 2035 Standard.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202