

VA9104-xGA-3S Series Electric Non-Spring Return Valve Actuators

Installation Instructions

Part No. 14-1336-23, Rev. —
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Applications

The VA9104 Series Actuators are direct-mount, non-spring return electric valve actuators that operate on AC 24 V power. These synchronous, motor-driven actuators are used to provide accurate positioning on Johnson Controls® VG1000 Series DN15, DN20, and DN25 (1/2, 3/4, and 1 in.) ball valves in Heating, Ventilating, and Air Conditioning (HVAC) applications.

The VA9104 Series Electric Non-Spring Return Actuators provide a running torque of 35 lb-in (4 N-m). The nominal travel time is 60 seconds at 60 Hz (72 seconds at 50 Hz) for 90° of rotation.

IMPORTANT: Use this VA9104 Series Electric Non-Spring Return Valve Actuator only to control valves under normal operating conditions. Where failure or malfunction of the VA9104 Series electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control 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 VA9104 Series electric actuator.

Installation

Install the ball valve with the actuator at or above the centerline of the horizontal piping (see Figure 1).

IMPORTANT: Before specifying VA9104 Series Electric Non-Spring Return Valve Actuators for plenum applications, verify acceptance of exposed plastic materials in plenum areas with the local building authority. Building codes for plenum requirements vary by location. Some local building authorities accept compliance to UL 1995, Heating and Cooling Equipment, while others use different acceptance criteria.

IMPORTANT: Do not install or use this VA9104 Series Electric Non-Spring Return Valve Actuator in or near environments where corrosive substances or vapors could be present. Exposure of the electric actuator to corrosive environments may damage the internal components of the device, and will void the warranty.

Special Tool Needed

To install the actuator, use a digital voltmeter or M9000-200 Commissioning Tool.

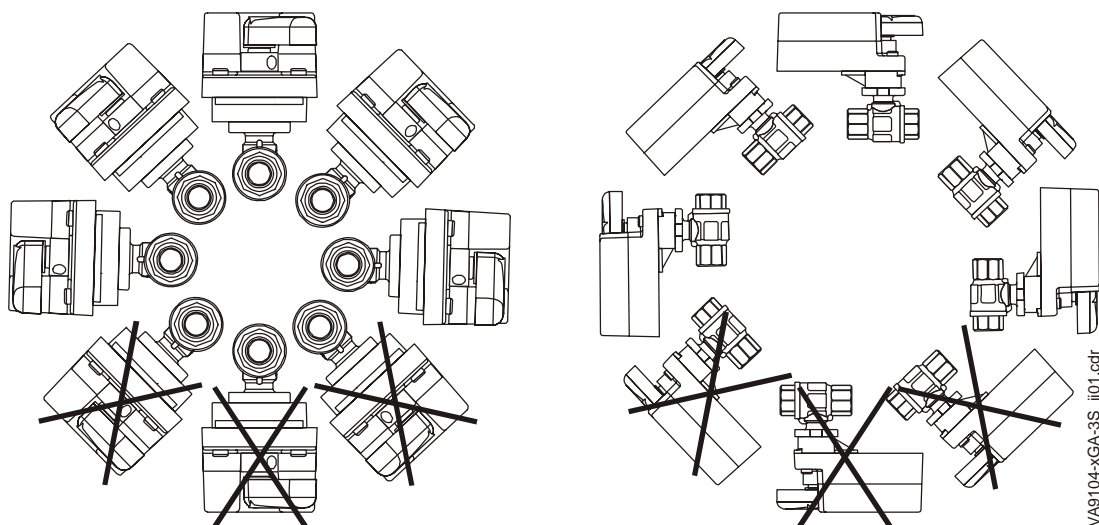


Figure 1: Mounting Positions for Chilled Water and Condensing Atmosphere Applications

Dimensions

See Figure 2 and Table 1 for valve actuator dimensions.

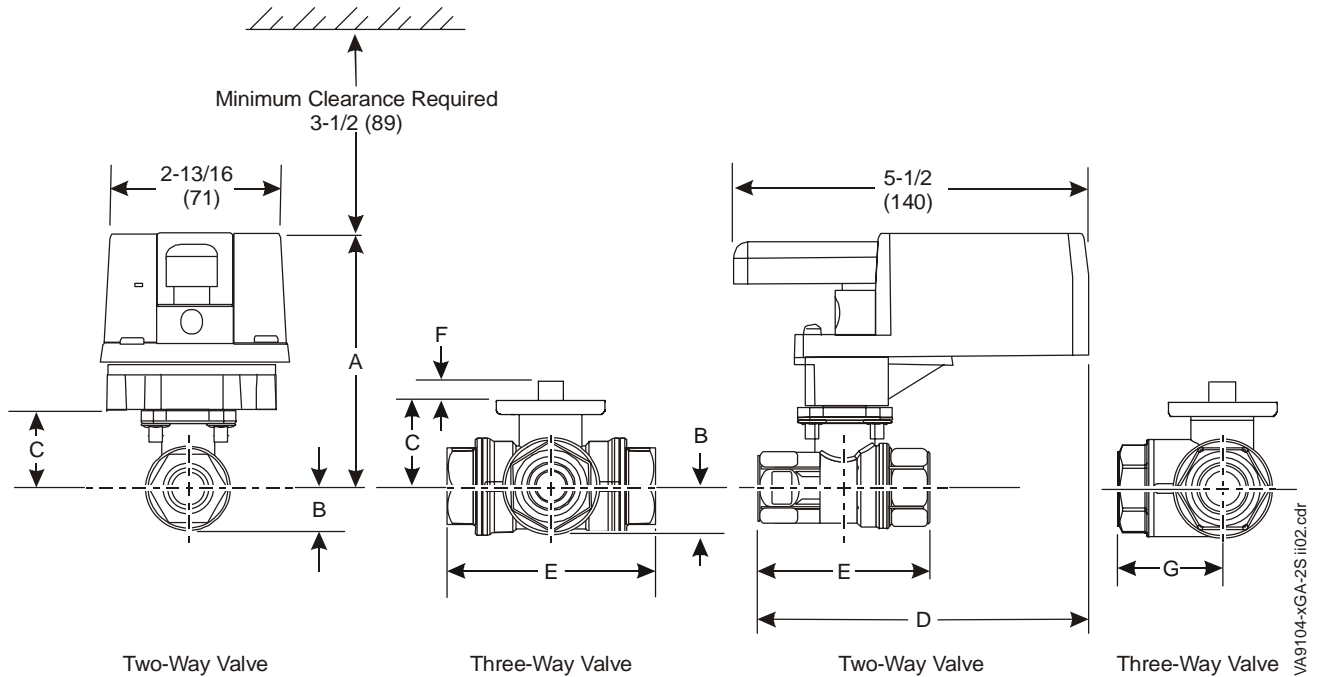


Figure 2: VA9104 Series Electric Non-Spring Return Valve Actuator Dimensions, in. (mm)

Table 1: VA9104-xGx-3S Actuated VG1241, VG1245, VG1841, and VG1845 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN) ¹	A	B	C	D	E	F	G
1/2 (DN15)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-7/64 (129)	2-33/64 (64)	11/32 (9)	1-1/4 (32)
3/4 (DN20)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-7/32 (133)	2-51/64 (71)	11/32 (9)	1-13/32 (36)
1 (DN25)	3-15/16 (100)	3/4 (19)	1-19/64 (33)	5-9/16 (141)	3-13/32 (87)	11/32 (9)	1-11/16 (43)

1. On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the valve inlet.

Accessories

Table 2: Accessories (Order Separately)

Code Number	Description
M9000-550	Mounting Hardware Replacement Kit
M9000-200	Commissioning Tool that Provides a Control Signal to Drive 24 V On/Off, Floating, Proportional, and/or Resistive Electric Actuators

Mounting

Mounting the Actuator

To mount the actuator to a ball valve:

1. Rotate the valve stem manually several times using an adjustable wrench to break the torque that may have built up during long-term storage. Then, rotate the valve stem so that Port A on the valve is open.

Note: Two-way valves in the fully open position have the index marking on the top of the valve stem, parallel to the direction of flow. Two-way valves in the fully closed position have the index marking perpendicular to the direction of flow. Three-way valves feature two index markings on the top of the valve stem, with one of the index markings parallel to the common port. See Figure 3 and Figure 4.

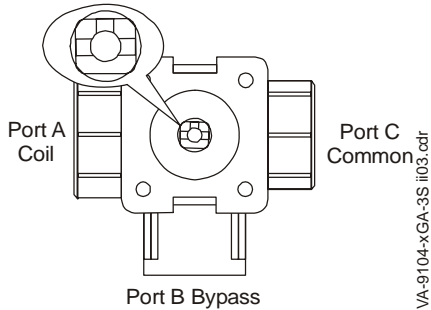


Figure 3: VG1000 Series Three-Way Ball Valve (Port A Connected to Port C)

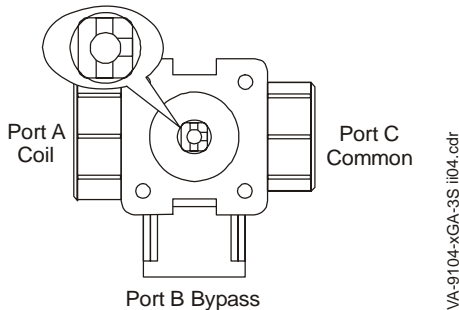


Figure 4: VG1000 Series Three-Way Ball Valve (Port B Connected to Port C)

- Place the handle on top of the drive shaft as shown in Figure 5. The handle is keyed and can only be mounted in one orientation.

- Insert the M4x60 long machine screw into the hole in the handle. Use a No. 2 flat blade screwdriver to drive the screw into the drive shaft until the screw is below the top of the handle.

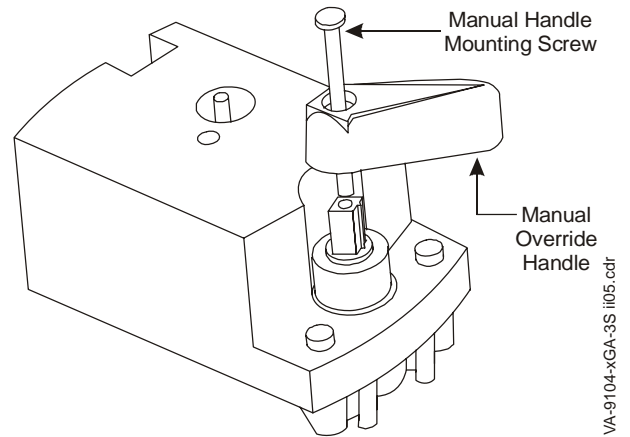


Figure 5: Installing the Handle

- Check that the actuator coupler and handle are in the fully counterclockwise position as viewed from the top of the actuator. If not, press the actuator gear release and rotate the handle until the actuator coupler is fully counterclockwise.
- Install the valve actuator over the ball valve mounting flange. Depending on the installation, position the assembly in any one of four 90° increments on the valve.

Note: For proper operation, the actuator must drive the valve counterclockwise to open Port A when viewed from above the valve.
- To secure the actuator to the valve, use a No. 2 flat blade screwdriver. Recommended torque is 8 to 12 lb-in (0.9 to 1.4 N·m).

IMPORTANT: Do not overtighten the manual handle mounting screw. Overtightening may strip the threads resulting in damage to the valve stem threads.

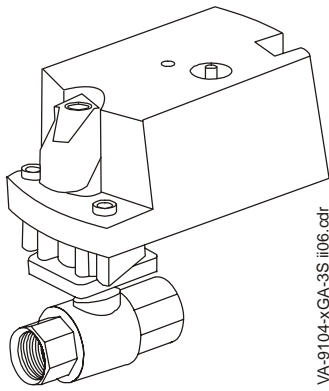


Figure 6: Two-Way Ball Valve with VA9104 Actuator (Valve Open Position)

Wiring

VA9104-AGA-3S and VA9104-IGA-3S

The VA9104-AGA and VA9104-IGA Series Electric Non-Spring Return valve actuators require an AC 24 V input signal and work with a variety of controllers. These electric actuators include M3 screw terminals; see Figure 7 and Figure 8 for proper wiring.

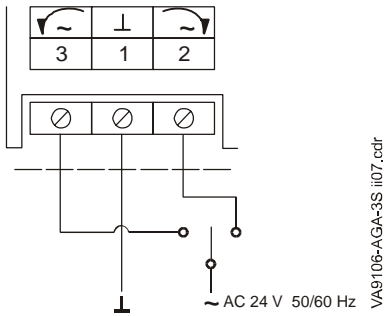


Figure 7: VA9104-AGA-3S Control Wiring Diagram

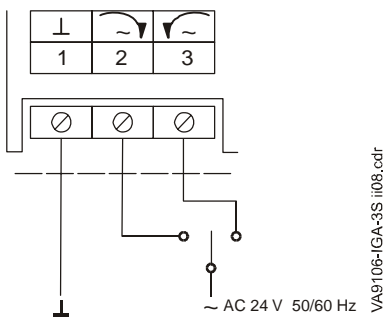


Figure 8: VA9104-IGA-3 Control Wiring Diagram

Note: For all VA9104-AGA Series actuators, use a controller and/or software that provides a timeout function at the end of rotation (stall) to avoid excessive wear or drive time on the actuator motor. The -AGA and -IGA models have an auto shutoff feature to prevent excessive wear or drive time on the motor.

VA9104-GGA-3S

The VA9104-GGA Series Electric Non-Spring Return valve actuators require AC 24 V power and a DC 0(2) to 10 V or 0(4) to 20 mA controller input signal. These electric actuators include M3 screw terminals; see Figure 9 for proper wiring.

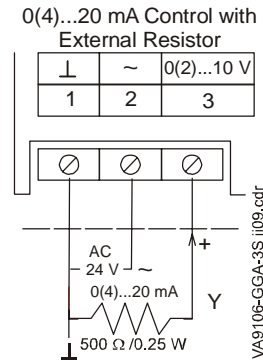
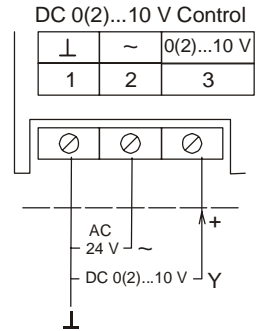


Figure 9: VA9104-GGA-3S Control Wiring Diagram

VA9104-GGA actuators are factory set for Direct Acting (DA) mode and for a DC 0 to 10 V input control signal. In DA mode, a minimum control signal drives the actuator to the full counterclockwise (CCW) position, and a maximum control signal drives the actuator to the full clockwise (CW) position.

For Reverse Acting (RA) operation, a minimum control signal drives the actuator to the full CW position and a maximum signal drives the actuator to the full CCW position. To change the factory settings, remove the actuator cover and adjust the switches on the circuit board as shown in Figure 10.

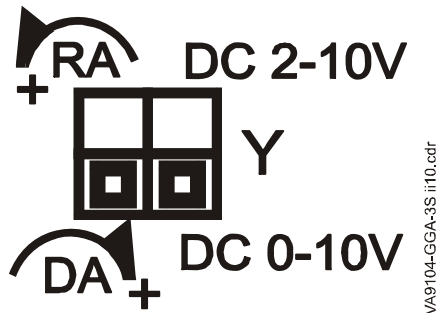


Figure 10: VA9104-GGA Factory Switch Setting



CAUTION: Risk of Electric Shock.
Disconnect the power supply before making electrical connections to avoid electric shock.



CAUTION: Risk of Property Damage.
Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

IMPORTANT: Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the electrical ratings of the VA9104 Series Electric Non-Spring Return Valve Actuator.

Setup and Adjustments

Commissioning

After wiring is complete, apply power to the Variable Air Volume (VAV) or Variable Air Volume and Temperature (VVT) controller and provide input signals to the actuator to drive it at least one complete cycle open and closed.

Troubleshooting

If the VA9104 Series Electric Non-Spring Return Valve Actuator is not responding or working properly:

- verify that the actuator assembly is properly secured to the valve
- check that all electrical connections are complete and that power is applied
- verify that the valve fully opens and closes, using the gear release button on the actuator and the manual override handle, shown in Figure 5

Repairs and Replacement

If the VA9104 Series Electric Non-Spring Return Actuator fails to operate within its specifications, replace the unit. For a replacement electric actuator, contact the nearest Johnson Controls representative.

Technical Specifications

VA9104-xGA-3S Series Electric Non-Spring Return Valve Actuators

Power Requirements		AC 24 V +25%/-20% at 50/60 Hz, 2.3 VA (AGA), 3.6 VA (GGA), and 3.0 VA (IGA) Supply, Class 2 or Safety Extra-Low Voltage (SELV)
Control Type	VA9104-AGA-3S	Floating or On/Off Control without Time Out
	VA9104-GGA-3S	Proportional Control
	VA9104-IGA-3S	Floating or On/Off Control with Time Out
Input Signal	VA9104-AGA-3S	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV without Time Out
	VA9104-GGA-3S	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm resistor
	VA9104-IGA-3S	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV with Time Out
Motor Input Impedance	VA9104-AGA-3S	200 ohms Nominal
Control Input Impedance	VA9104-GGA-3S	Voltage Input: 200,000 ohms Current Input: 500 ohms with field furnished 500 ohm resistor
Running Torque		35 lb-in. (4 N-m)
Travel Time		60 Seconds at 60 Hz (72 Seconds at 50 Hz) for 90° of Rotation
Rotation Range		93° ±3°, CW or CCW
Cycles		100,000 Full Stroke Cycles at 20% Duty Cycle; 2,500,000 Repositions at Rated Running Torque
Audible Noise Rating		35 dBA Nominal at 39-13/32 in. (1 m)
Electrical Connections	VA9104-xGA-3S	M3 Screw Terminals
Enclosure	VA9104-xGA-3S	NEMA 2, IP40
Ambient Conditions	Operating	-4 to 140°F (-20 to 60°C); 90% RH Maximum, Noncondensing
	Storage	-20 to 150°F (-29 to 66°C); 90% RH Maximum, Noncondensing
Fluid Temperature Limits (Actuator and Valve Assembly)	Water	VG1241 and VG1841 Series Valves: 23 to 203°F (-5 to 95°C) VG1245 and VG1845 Series Valves: -22 to 212°F (-30 to 100°C)
	Steam	Not Rated for Steam Service
Compliance	North America	UL Listed, File E27734, CCN XAPX (United States) and XAPX7 (Canada) Actuator Housing is Plenum Rated per CSA C22.2 No. 236/UL 1995, Heating and Cooling Equipment.
	European Union	CE Mark, EMC Directive 89/336/EEC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		1.25 lb (0.55 kg)

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.



Controls Group
507 E. Michigan Street
Milwaukee, WI 53202

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