VA9104-xGA-1S Series Electric Non-Spring Return Valve Actuators

Installation Instructions

Part No. 14-1336-7, Rev. D
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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 HVAC applications.

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

IMPORTANT: Utiliser ce VA9104 Series Electric Non-Spring Return Valve Actuator uniquement pour commander des équipements dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du VA9104 Series electric actuator risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du VA9104 Series electric actuator.

Installation

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

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.

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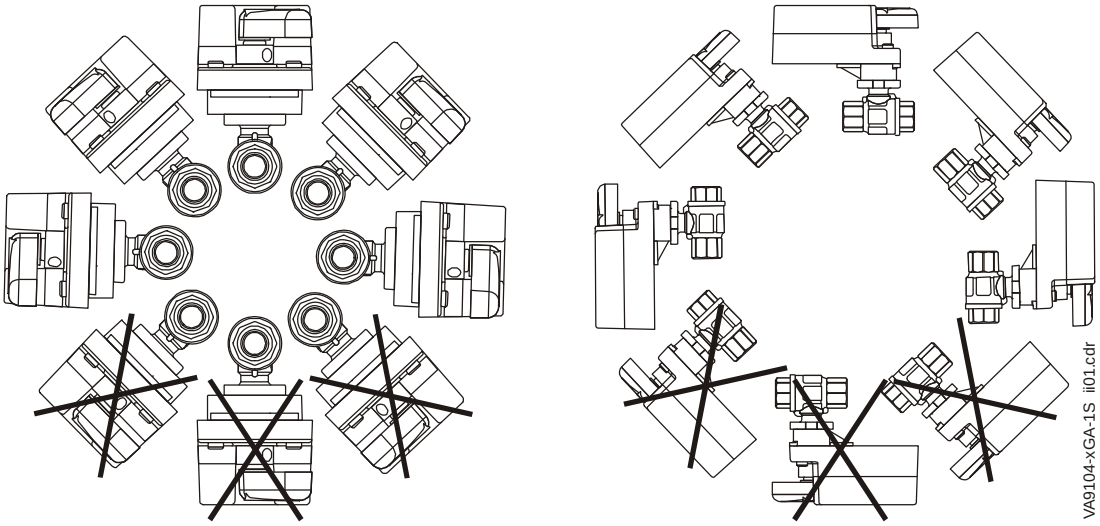


Figure 1: Mounting Positions for Chilled Water and Condensing Atmosphere Applications

Dimensions

See Figure 2 and Table 1 for valve actuator dimensions.

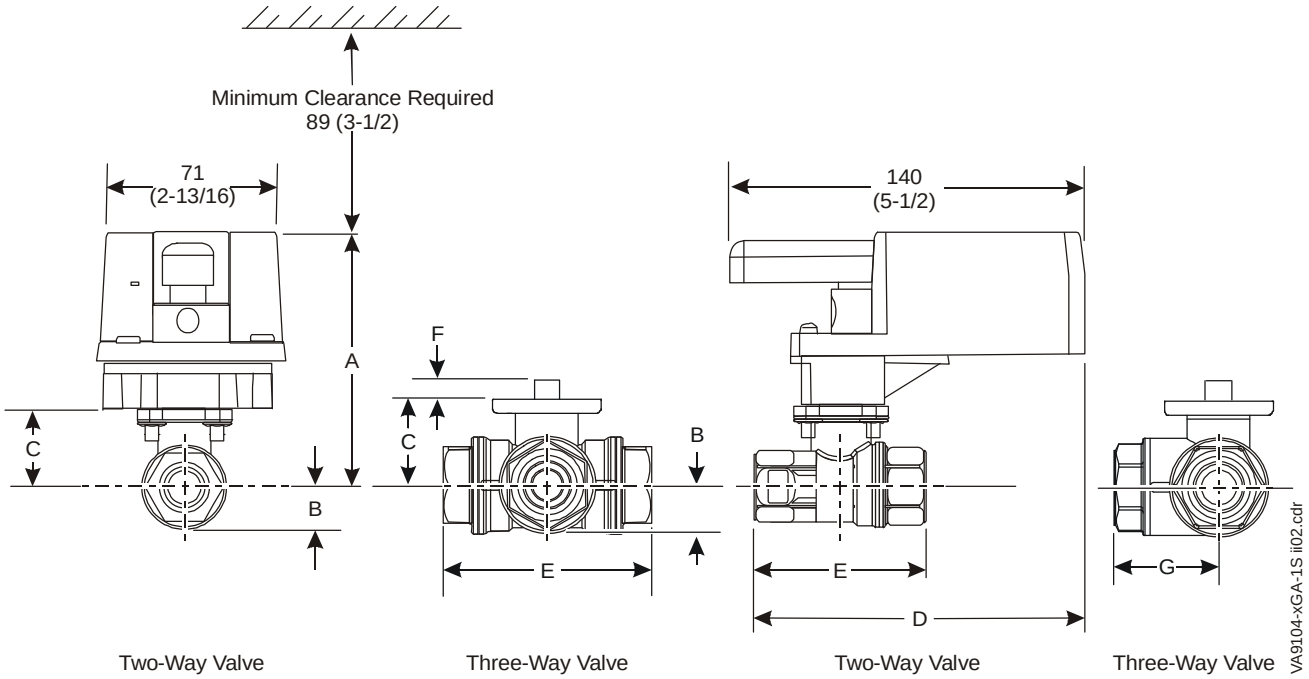


Figure 2: VA9104 Series Electric Non-Spring Return Valve Actuator Dimensions, mm (in.)

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

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

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

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.

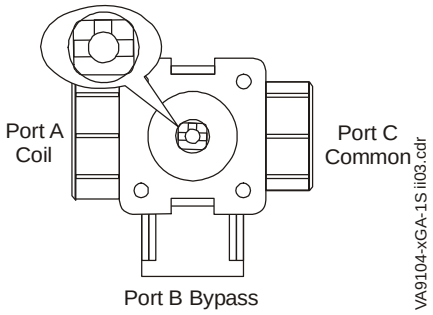


Figure 3: VG1000 Series Three-Way Ball Valve (Port A Connected to Port C)

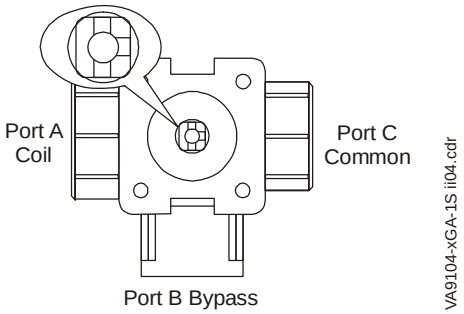


Figure 4: VG1000 Series Three-Way Ball Valve (Port B Connected to Port C)

2. 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.

3. 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.

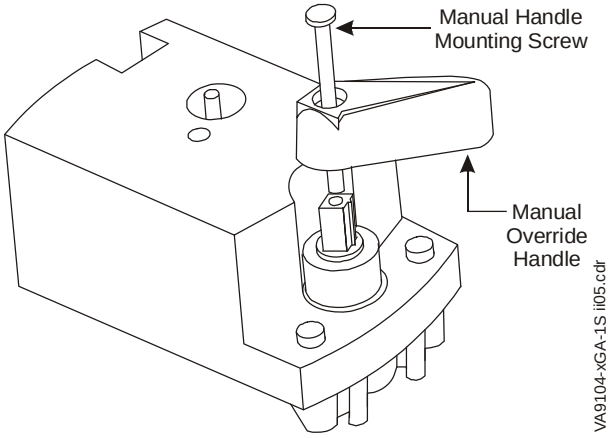


Figure 5: Installing the Handle

4. 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.
5. 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.
6. To secure the actuator to the valve, use a No. 2 flat blade screwdriver. Recommended torque is 0.9 to 1.4 N·m (8 to 12 lb·in).

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

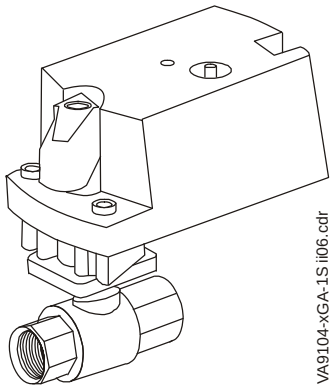


Figure 6: Two-Way Ball Valve with VA9104 Actuator (Valve Open Position)

Wiring

VA9104-AGA-1S and VA9104-IGA-1S

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 an integrated 1.2 m (48 in.) long cable. See Figure 7 for proper wiring.

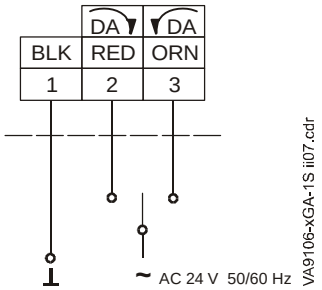


Figure 7: VA9104-AGA-1S and VA9104-IGA Control Wiring Diagram

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 **-GGA** and **-IGA** models have an auto shutoff feature to prevent excessive wear or drive time on the motor.

VA9104-GGA-1S

The **VA9104-GGA** Series Electric Non-Spring Return valve actuators require an 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 an integrated 1.2 m (48 in.) long cable. See Figure 7 for proper wiring.

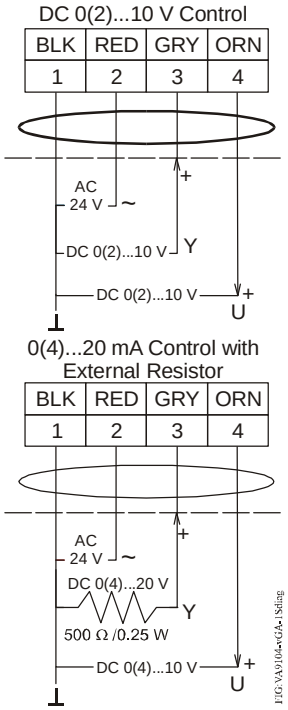
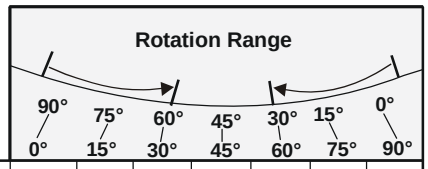


Figure 8: VA9104-GGA-1S Control Wiring Diagram

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.



Direct Acting	0-10V Feedback	10.0V	8.3V	6.7V	5.0V	3.3V	1.7V	0.0V
	2-10V Feedback	10.0V	8.7V	7.3V	6.0V	4.7V	3.3V	2.0V
Reverse Acting	0-10V Feedback	0.0V	1.7V	3.3V	5.0V	6.7V	8.3V	10.0V
	2-10V Feedback	2.0V	3.3V	4.7V	6.0V	7.3V	8.7V	10.0V

Figure 9: Feedback Signal Relative to the Rotation Range

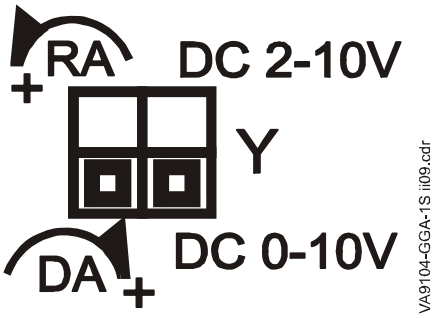


Figure 10: VA9104-GGA Factory Switch Setting

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

MISE EN GARDE : Risque de décharge électrique.
Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

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.

MISE EN GARDE : Risque de dégâts matériels.
Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

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 valve 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-1S Series Electric Non-Spring Return Valve Actuators

Power Requirements		AC 24 V +25%/-20% at 50/60 Hz, 2.3 VA (AGA) 3.0 VA (IGA) requires Class II Power Supply 2.9 VA (GGA) requires SELV Class III Power Supply
Control Type	VA9104-AGA-1S	Floating or On/Off Control without Time Out
	VA9104-GGA-1S	Proportional Control
	VA9104-IGA-1S	Floating or On/Off Control with Time Out
Input Signal	VA9104-AGA-1S	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV, without Time Out
	VA9104-GGA-1S	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm resistor
	VA9104-IGA-1S	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV, with Time Out
Feedback Signal	VA9104-GGA-1S	0 to 10 VDC or 2 to 10 VDC for 90° (10 VDC at 1 mA) Corresponds to input signal span selection
Motor Input Impedance	VA9104-AGA-1S	200 ohms Nominal
Control Input Impedance	VA9104-GGA-1S	Voltage Input: 200,000 ohms Current Input: 500 ohms with field furnished 500 ohm resistor
Running Torque		4 N·m (35 lb·in)
Travel Time		72 Seconds at 50 Hz (60 Seconds at 60 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 1 m (39-13/32 in.)
Electrical Connections	VA9104-xGA-1S	1.2 m (48 in.) Polyvinyl Chloride (PVC) cable with 0.75 mm^2 conductors (19 AWG) and 6 mm (.25 in.) ferrule ends
Enclosure	VA9104-xGA-1S	NEMA 2, IP42
Ambient Conditions	Operating	-20 to 60°C (-4 to 140°F); 90% RH Maximum, Noncondensing
	Storage	-29 to 66°C (-20 to 150°F); 90% RH Maximum, Noncondensing
Fluid Temperature Limits (Actuator and Valve Assembly)	Water	**VG1241 and VG1841 Series Valves:** -5 to 95°C (23 to 203°F) **VG1245 and VG1845 Series Valves:** -30 to 100°C (-22 to 212°F)
	Steam	Not Rated for Steam Service
Compliance	United States	UL Listed, CCN XAPX, File 27734 Plenum Rated, UL2043, suitable for use in other environmental spaces (plenums) in accordance with section 300.22.(c) of the National Electrical Code
	Canada	cUL Listed, CCN XAPX7, File 27734 Plenum Rated Per CSA 22.2 No. 236/UL 1995, Heating and Cooling Equipment
	Europe	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		1.0 lb (0.45 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 shall not be liable for damages resulting from misapplication or misuse of its products.

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