

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

## Installation Guide

VA9104-AGA-3S, VA9104-GGA-3S, VA9104-IGA-3S

Issued November 2020

### 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 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 equipment under normal operating conditions. Where failure or malfunction of the 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 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 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 electric actuator.

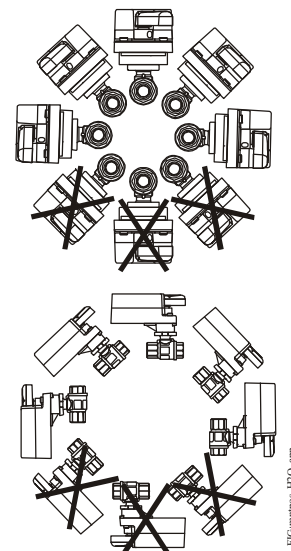
### Installation

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 tools

To install the actuator, use a digital voltmeter.



**Figure 1: Mounting positions for chilled water and condensing atmosphere applications**



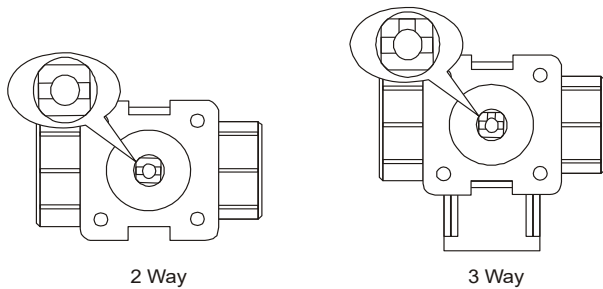
## Accessories

**Table 1: Accessories (order separately)**

Code number	Description
<b>M9000-561</b>	Thermal Barrier extends M(VA)9104, M(VA)9203, M(VA)9208, and M(VA)9310 Series Electric Actuator applications to Include low pressure steam (quantity 1)
<b>M9000-342</b>	Weathershield Kit for VG1000 Series Ball Valve application of VA9104, VA9203, VA9208, and VA9310 Series Electric Spring Return Actuators (quantity 1)
<b>M9000-700</b>	Universal Ball Valve Linkage Kit

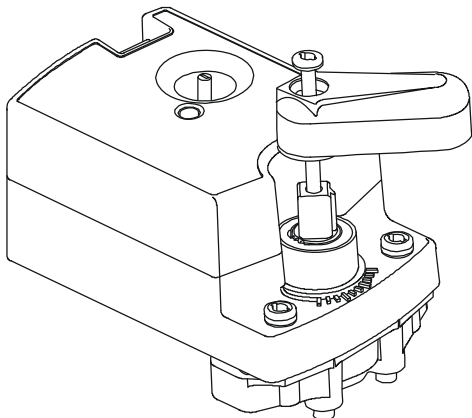
### Mounting the actuator

1. Turn valve stem to position below.



**Figure 2: Positioning the valve stem**

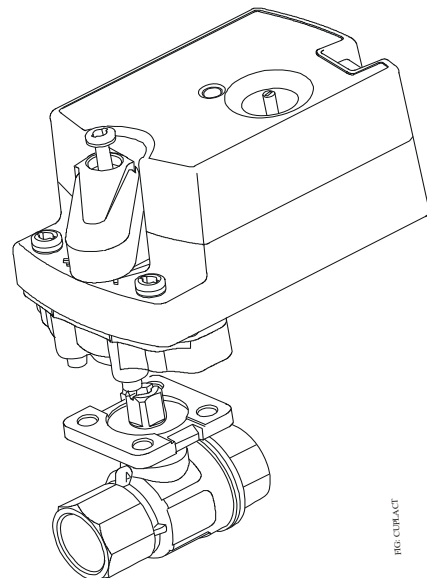
2. Mount optional M9000-561 Thermal Barrier to the valve if fluid temperature exceeds 212°F (100°C). See the [Mounting the thermal barrier](#) section for more information.
3. Place the handle the top of the drive shaft (Figure 3). The handle is keyed on and can only be mounted in one orientation.



**Figure 3: Installing the handle**

4. Check that the actuator coupler and handle are in the full 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



**Figure 4: Coupling the actuator to the valve**

6. To secure the actuator to the valve, use a 1/4 in. (6 mm) 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.

### Mounting the thermal barrier

Figure 5 shows the optional M9000-561 Thermal Barrier.

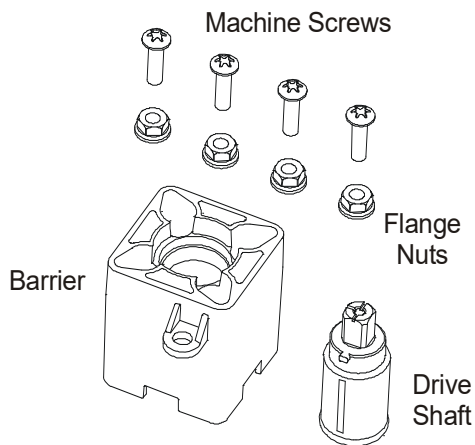


FIG: OPTNL

Figure 5: Optional M9000-561 Thermal Barrier

To mount the optional thermal barrier:

1. Install the thermal barrier drive shaft into the thermal barrier by aligning the tab on the drive shaft with the slot on the thermal barrier (Figure 6).

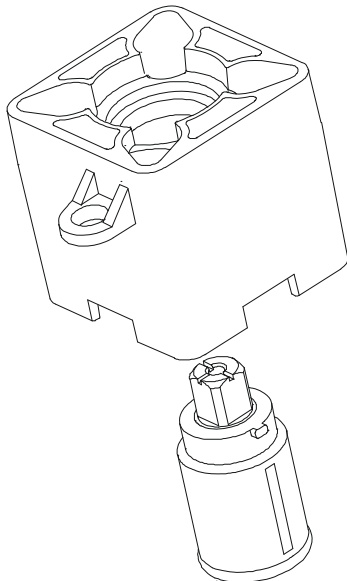


FIG: SHDR

Figure 6: Installing the drive shaft into the thermal barrier

2. Rotate the drive shaft to align marks on the top of the thermal drive shaft with matching marks on the valve stem.
3. Mount the thermal barrier onto the valve using the four included M5x16 mm machine screws and four M5 flange nuts. Tighten the screws to a recommended torque of 21 to 25 lb·in. (2.4 to 2.8 N·m) (Figure 7).

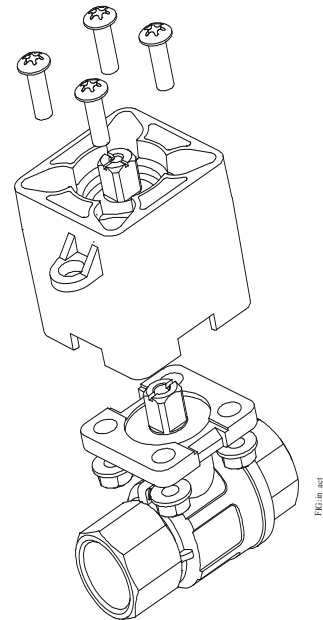


FIG: SHDR

Figure 7: Installing the barrier

4. Proceed to *Mounting the actuator*. Follow the same steps as mounting directly to the valve when mounting the actuator to the thermal barrier.

## Wiring

### **WARNING**

#### **Risk of Electric Shock.**

Disconnect or isolate all power supplies before making electrical connections. More than one disconnection or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

### **AVERTISSEMENT**

#### **Risque de décharge électrique.**

Débrancher ou isoler toute alimentation avant de réaliser un branchement électrique. Plusieurs isolations et débranchements sont peut-être nécessaires pour -couper entièrement l'alimentation de l'équipement. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

### **CAUTION**

#### **Risk of Electric Shock.**

Disconnect the power supply before making electrical connections to avoid electric shock.

### **ATTENTION**

#### **Risque de décharge électrique.**

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

### **NOTICE**

#### **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.

### **NOTICE**

#### **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.

### **NOTICE**

#### **Risk of Property Damage.**

Insulate and secure each unused wire lead before applying power to the [device]. Failure to insulate and secure each unused wire lead may result in property damage.

### **NOTICE**

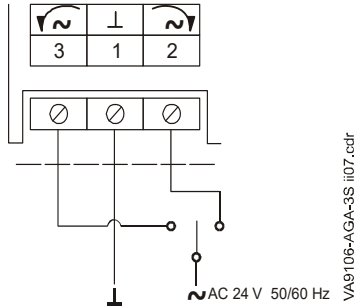
#### **Risque de dégâts matériels.**

Isoler et protéger chaque fil non utilisé avant de mettre l'[appareil] sous tension. Le non-respect de cette obligation d'isolation et de protection de chaque fil non utilisé risque d'entraîner des dégâts matériels.

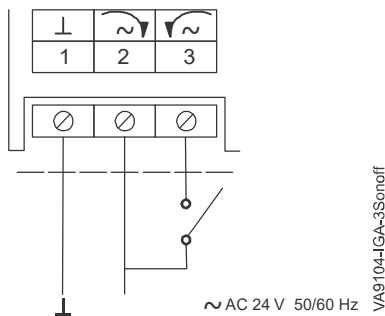
**IMPORTANT:** Make all wiring connections in accordance with the National Electrical Code and local regulations. Use proper Electrostatic Discharge (ESD) precautions during installation and servicing to avoid damaging the electronic circuits of the actuator.

### 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 8 and Figure 9 to wire the applicable VA9104 Series model.



**Figure 8: VA9104-AGA-3S and VA9104-IGA-3S floating control wiring diagram**



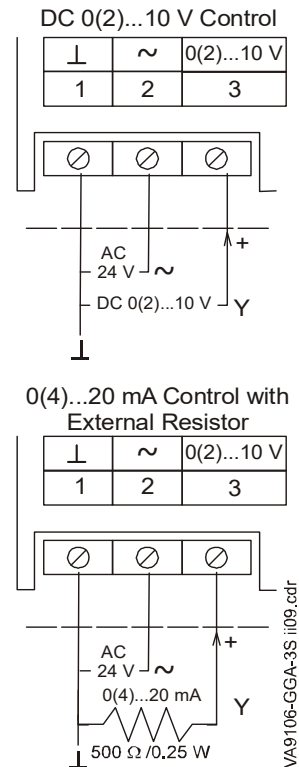
**Figure 9: VA104-IGA-3S control wiring diagram, on/off**

**Note:** When using the VA9104-AGA-1S or VA9104-IGA-1S Series actuator with a controller featuring triac output, add a 4.7k ohm resistor one half watt between the Common (COM) and Counterclockwise (CCW) terminals.

**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-3S

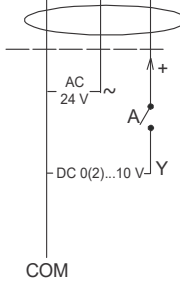
The VA9104-GGA Series Electric Non-Spring Return valve actuators require AC 24 V power and a DC 0(2) to 10 V or 0(4) to 20 mA controller input signal. These electric actuators include M3 screw terminals; see Figure 10 for proper wiring.



**Figure 10: VA9104-GGA-3S control wiring diagram**

Override to MIN position

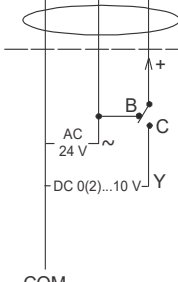
BLK	RED	GRY
1	2	3



A Open = MIN Position  
A Closed = Normal Operation

Override to MAX position

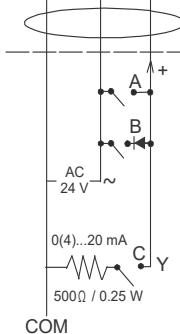
BLK	RED	GRY
1	2	3



B Closed = MAX Position  
C Closed = Normal Operation

Override to MIN, MID, MAX positions  
0(4)...20 mA Control with External Resistor

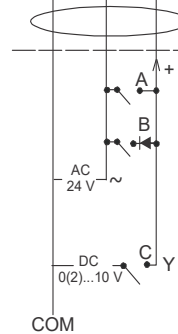
BLK	RED	GRY
1	2	3



FUNCTION	A	B	C
0% ( MIN )	—/—	—/—	—/—
50% ( MID )	—/—	—/—	—/—
100% ( MAX )	—/—	—/—	—/—
NORMAL	—/—	—/—	—/—

Override to MIN, MID, MAX positions  
0(2)...10 V Control

BLK	RED	GRY
1	2	3



FUNCTION	A	B	C
0% ( MIN )	—/—	—/—	—/—
50% ( MID )	—/—	—/—	—/—
100% ( MAX )	—/—	—/—	—/—
NORMAL	—/—	—/—	—/—

Figure 11: VA9104-GGA control wiring diagram (overrides)

**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 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 12.

### Setup and adjustments

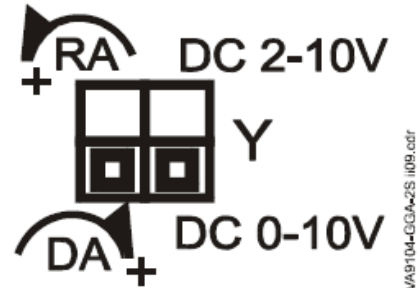


Figure 12: VA9104-GGA factory switch setting

### CAUTION

#### Risk of Electric Shock.

Disconnect the power supply before making electrical connections to avoid electric shock.

### ATTENTION

#### Risque de décharge électrique.

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

### Commissioning

After wiring is complete, apply power 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.

## 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

<b>Power requirements</b>		AC 24 V +25%/-20% at 50/60 Hz, 2.3 VA (AGA), 2.9 VA (GGA), and 3.0 VA (IGA) Supply, Class 2 or Safety Extra-Low Voltage (SELV)
<b>Control type</b>	<b>VA9104-AGA-3S</b>	Floating or on/off control without timeout
	<b>VA9104-GGA-3S</b>	Proportional control
	<b>VA9104-IGA-3S</b>	Floating or on/off control with timeout
<b>Input signal</b>	<b>VA9104-AGA-3S</b>	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV without timeout
	<b>VA9104-GGA-3S</b>	DC 0 (2) to 10 V or 0 (4) to 20 mA with field-furnished 500 ohm resistor
	<b>VA9104-IGA-3S</b>	AC 24 V +25%/-20% at 50/60 Hz, Class 2 or SELV with timeout
<b>Motor input impedance</b>	<b>VA9104-AGA-3S</b>	200 ohms nominal
<b>Control input impedance</b>	<b>VA9104-GGA-3S</b>	Voltage input: 200,000 ohm Current input: 500 ohms with field-furnished 500 ohm resistor
<b>Running torque</b>		35 lb-in. (4 N·m)
<b>Travel time</b>		60 seconds at 60 Hz (72 seconds at 50 Hz) for 90° of rotation
<b>Rotation range</b>		93° ±3°, CW or CCW
<b>Cycles</b>		100,000 full stroke cycles; 2,500,000 repositions at rated running torque
<b>Audible noise rating</b>		35 dBA nominal at 39-13/32 in. (1 m)
<b>Electrical connections</b>	<b>VA9104-xGA-3S</b>	M3 screw terminals
<b>Enclosure</b>	<b>VA9104-xGA-3S</b>	NEMA 1, IP40
<b>Ambient conditions</b>	<b>Operating</b>	-4 to 140°F (-20 to 60°C); 90% RH maximum, noncondensing
	<b>Storage</b>	-20 to 150°F (-29 to 66°C); 90% RH maximum, noncondensing
<b>Fluid temperature limits (Actuator and valve assembly)</b>	<b>VG12x1 and VG18x1 Series</b>	23 to 203°F (-5 to 95°C)
	<b>VG1245 and VG1845 Series</b>	-22 to 212°F (-30 to 100°C)
	<b>VG12x5 and VG18x5 Series with M9000-561 Thermal Barrier</b>	-22 to 284°F (-30 to 140°C) water; 15 psig (103 kPa) at 250°F (121°C) saturated steam
<b>Compliance</b>  	<b>United States</b>	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
	<b>Canada</b>	cUL Listed, CCN XAPX7, File 27734 Plenum Rated Per CSA 22.2 No. 236/UL 1995, Heating and Cooling Equipment
	<b>Europe</b>	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.
	<b>Australia and New Zealand</b>	RCM Mark, Australia/NZ Emissions Compliant
<b>Shipping weight</b>		1.25 lb (0.55 kg)
<b>Software license</b>	Any software (including firmware) included in or with this product is licensed, not sold. Any Johnson Controls software included in or with this product is subject to the terms of the Johnson Controls End User License Agreement available at <a href="https://www.johnsoncontrols.com/buildings/legal/digital/generaleula">https://www.johnsoncontrols.com/buildings/legal/digital/generaleula</a> Any third party software (including open source software, if any) included in or with this product is subject to the terms of its respective license. By using any of the foregoing software, you are also agreeing to be bound to the terms of such licenses.	

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