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# M9109-xGx-5 Series Electric Non-Spring Return Actuators

## Product Bulletin

Code No. 10.866 E  
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The M9109-xGx-5 Series direct-mount electric actuators operate on 24 VAC power and are available for use with floating, or proportional controllers. These non-spring return actuators may be field mounted to a VG1000 Series ball valve using the M9000-520-5 Valve Linkage Kit.

The M9109 models have 9 N·m running torque. They have a nominal 72 second travel time for 90° of rotation at 50 Hz with a load-independent rotation time.

The M9109-xGC-5 models are available with integral auxiliary switches to perform switching functions at any angle within the selected rotation range. GGx models feature 0 to 10 VDC position feedback.

All models feature a 1.2 m halogenefree appliance cable.



Figure 1: M9109 Non-Spring Return Actuator

Table 1: Features and Benefits

Features	Benefits
35 dBA Rating	Meets audible requirements for open ceilings
Synchronous Drive	Provides constant rotation time independent of load
Direct Shaft Mount with Single-screw Coupler	Simplifies installation and provides 3-point shaft gripping
Magnetic Clutch	Provides torque protection for the damper and actuator
Jumper-selectable Rotation Direction (GGx Models Only)	Simplifies installation
Adjustable Rotation Stops	Allow application versatility with 30 to 90° Clockwise (CW) or Counterclockwise (CCW) rotation
Factory mounted 1.2 m halogene free appliance cable	Simplifies installation
M16 Threaded Conduit Opening	Meets electrical code requirements and allows the use of cables up to 12 mm diameter
Manual Gear Release	Simplifies setup and field adjustments
Output Position Feedback	Provides simple, closed-loop control with accurate position sensing

## Application

The M9109 actuators are used for operating VG1000 Series ball valves and are mounted using the M9000-520-5 Valve Linkage Kit.

## Operation

A controller provides a control signal to the actuator depending upon the desired movement of the valve ball. This signal causes the motor to rotate in the proper direction and the valve ball to open or close.

**Note:** To avoid excessive wear or drive time on the motor for the AGx models, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall). The GGx model has an auto shutoff to avoid excessive wear or drive time on the motor.

The actuator rotates at a nominal rate of 1.3° per second (90° in 72 seconds) at 50 Hz input. The actuator rotation is field adjustable from 30 to 90°.

## Repairs and Replacements

Field repairs must not be made. For a replacement or an accessory, refer to the Ordering Information section.

## Ordering Information

Contact the nearest Johnson Controls representative, and specify the desired product code number from Table 1 or Table 2.

**Table 2: Actuators**

M9109 Series Non - Spring Electric Actuator 6 N·m	M9109-AGA-5	M9109-AGC-5	M9109-GGA-5	M9109-GGC-5
Floating Control	■	■		
Proportional Control			■	■
Feedback				
0 to 10 VDC Feedback			■	■
2 Auxiliary Switches		■		■

**Table 3: Accessories**

Product Code Number	Description
M9000-105	Pluggable 3-Terminal Block
M9000-106	Pluggable 4-Terminal Block
M9000-160	Replacement anti-rotation bracket for M9109 Series actuators
M9000-520-5	Valve Linkage kit for field mounting an M9109 actuator DN 15 to DN 40 VG1000 Series ball valves

## Mounting

The actuators are not position sensitive. Mount the actuator within 90° of the vertical position above the valve body. Failure to do so may permit condensation to travel into the actuator which would damage the actuator and void the warranty. Protect the actuator from dripping water. In steam or high temperature applications where fluid temperatures exceed 100°C, install the valve with the stem horizontal to the piping so the actuator is not directly above the valve to minimize heat transfer to the actuator. Do not insulate the actuator.

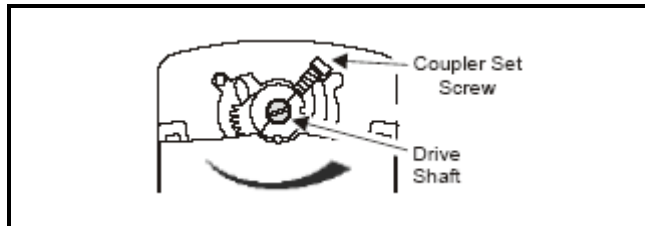


Figure 2: Valve Position Scale

Use the center of the coupler set screw as a pointer to observe the position on the scale when rotating the coupler from one side to the other.

## Setup and Adjustments

### Models for floating control (M9109-AGA-5 and M9109-AGC-5)

#### Direction of Action

For Clockwise (CW) rotation, apply 24 VAC to the Common conductor (COM, BLK, 1) and CW (CW, RED, 2) Conductors. For Counterclockwise (CCW) rotation, apply 24 VAC to the COM (COM, BLK, 1) conductor and CCW (CCW, ORN, 3) conductors. (See Figure 5.)

### Models for proportional control (M9109-GGA-5 and M9109-GGC-5)

#### Direction of Action

In the Direct Acting (DA) mode, a minimum control signal drives the actuator to the full Counterclockwise (CCW) position, and a maximum control signal drives it fully Clockwise (CW). For Reverse Acting (RA) operation, a minimum control signal drives the actuator to the full CW position, and a maximum control signal drives it fully CCW. To set an actuator for RA, proceed to the appropriate section for the actuator model.

The actuators are factory set for DA mode with Jumper W1 in the DA position. Remove Jumper W1 and place it in the RA position.

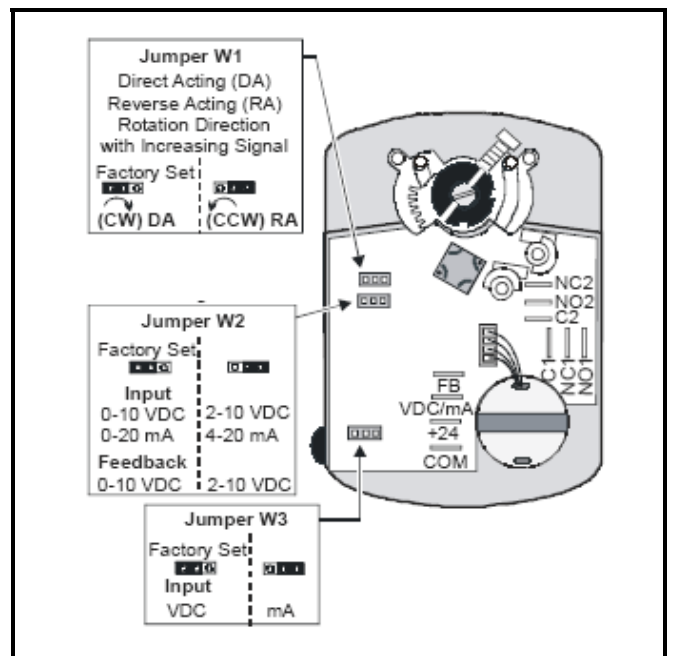


Figure 3: Calibrating the GGx models

#### Jumpers

The M9109-GGx-5 proportional actuators are factory set with Jumper W2 in the 0 to 10 VDC position and Jumper W3 in the VDC position. The VDC/mA conductor (GRY, 3) is the control input signal. Jumper W3 must be in the VDC position for voltage input and in the mA position for current input. The FB conductor (ORN, 4) is the feedback output.

## Feedback Signal

The feedback signal varies with a change to the rotation range. For the GGA and GGC models, a change to the rotation range changes the feedback signal and the operating range proportionally. (See Figure 4.)

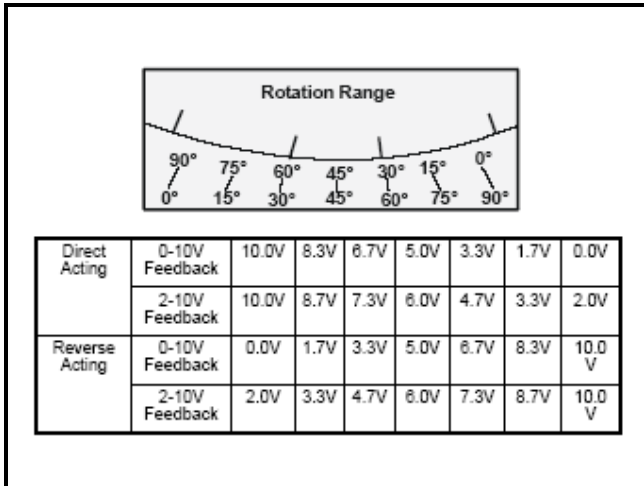


Figure 4: Nominal Feedback Signal Relative to the Rotation Range

## Models with auxiliary switches (M9109-AGC-5 and M9109-GGC-5)

The M9109-xGC-5 model has two built-in auxiliary switches that may be set for any angle between 0 and 90° (factory set for 10 and 80°, nominal). See the Technical Specifications section for auxiliary switch ratings.

## Wiring

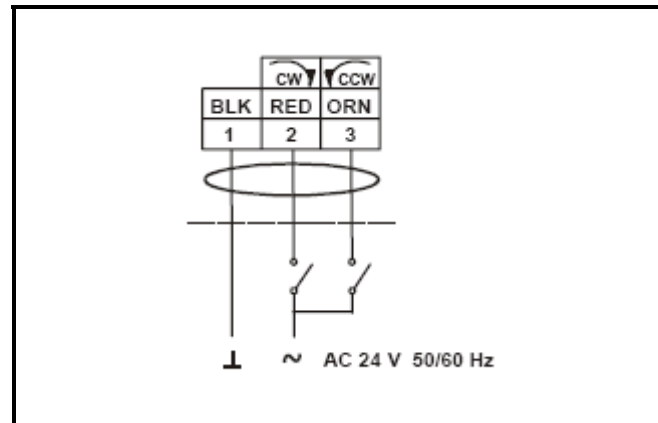


Figure 5: Wiring diagram Floating Control (M9109-AGA-5 and M9109-AGC-5)

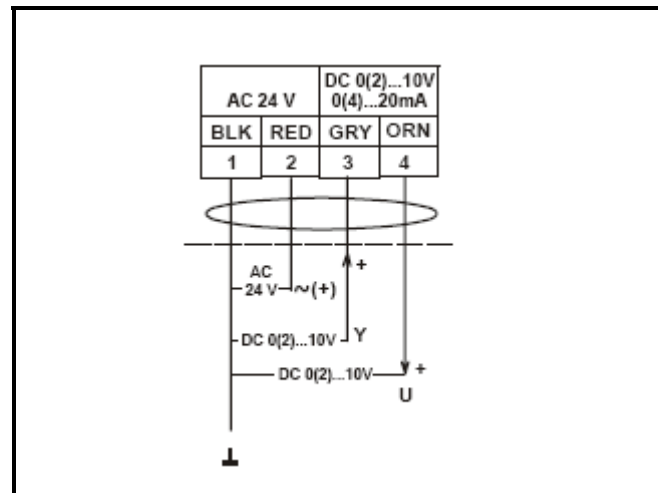
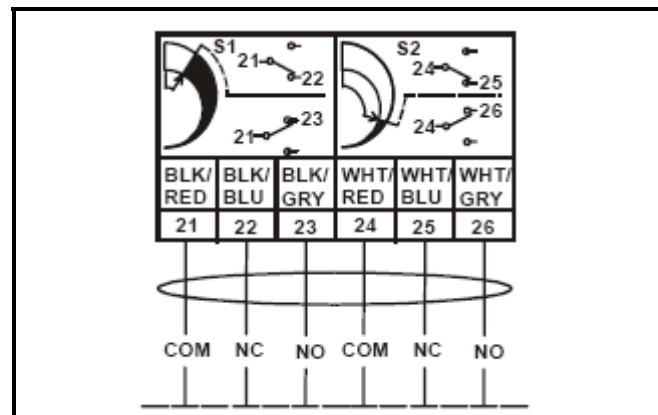


Figure 6: Wiring Diagram Proportional Control (M9109-GGA-5 and M9109-GGC-5)

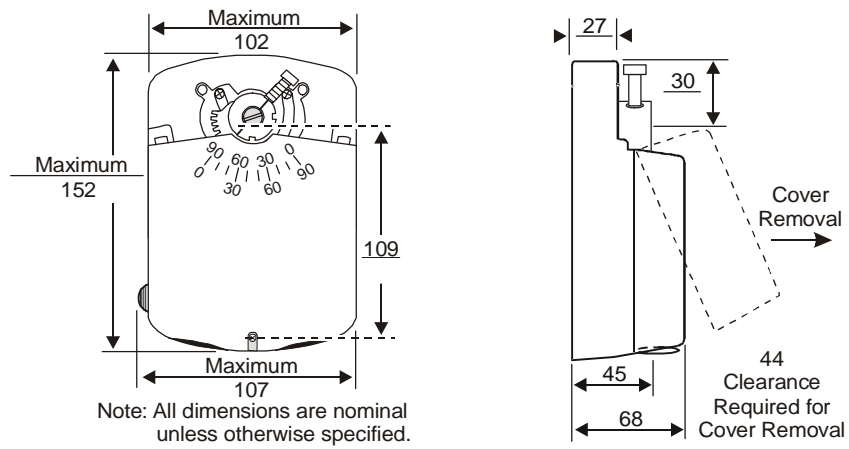


Wiring Diagram Auxiliary Switches (M9109-AGC-5 and M9109-GGC-5)

## Dimensions

See Figure 2 for the actuator dimensions.

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**Figure 7: Actuator and Anti-rotation Bracket Dimensions, mm**

## Technical Data

<b>Product</b>	M9109 Series Electric Non-spring Return Actuators
<b>Power Requirements</b>	20 to 30 VAC at 50/60 Hz; 3.2 VA supply
<b>Input Signal</b>	AGx: 20 to 30 VAC at 50/60 Hz GGx: 0 to 10 VDC or 0 to 20 mA
<b>Input Signal Adjustments</b>	AGx: CW and COM Terminals, CW rotation; CCW and COM Terminals, CCW rotation  GGx (Voltage Input or Current Input): Jumper Selectable: 0 (2) to 10 VDC or 0 (4) to 20 mA Factory Setting: 0 to 10 VDC, CW rotation with signal increase  Action is jumper selectable Direct (CW) or Reverse (CCW) with signal increase.
<b>Input Impedance</b>	AGx: 200 $\Omega$ , nominal GGx: Voltage Input, 150,000 $\Omega$ ; Current Input, 500 $\Omega$
<b>Feedback Signal</b>	GGx: 0 to 10 VDC or 2 to 10 VDC for 90° (10 VDC at 1 mA); Corresponds to input signal span selection
<b>Auxiliary Switch Rating</b>	xGx: Two Single-Pole, Double-Throw (SPDT) switches rated at 24 VAC, 1.5 A inductive, 3.0 A resistive; 35 VA maximum per switch, Class 2
<b>Mechanical Output (Running Torque)</b>	9 Nm
<b>Cycles</b>	100,000 full cycles; 2,500,000 repositions rated at 9 Nm
<b>Audible Noise Rating</b>	35 dBA maximum at 1 m
<b>Rotation Range</b>	0 to 93°, non adjustable
<b>Rotation Time</b>	Nominal 72 seconds at 50 Hz and 60 seconds at 60 Hz for 90°
<b>Electrical Connection</b>	Actuator: 1.2 m halogen free cable, with 0.75 mm <sup>2</sup> wire leads, with M16 cable gland Auxiliary Switch: 1.2 m halogen free cable, with 0.75 mm <sup>2</sup> wire leads, with M16 cable gland
<b>Enclosure</b>	IP42, NEMA 2
<b>Ambient Operating Conditions</b>	-20 to 55°C; 90% RH maximum, non-condensing
<b>Ambient Storage Conditions</b>	-40 to 80°C; 90% RH maximum, non-condensing
<b>Dimensions (H x W x D)</b>	150 x 136 x 67mm (not including the cable)
<b>Shipping Weight</b>	1.1 kg
<b>Agency Compliance</b>	CE Mark, EMC Directive 89/336/EEC UL Listed, File E27734, CCN XAPX CSA Certified, File LR85083, Class 3221 02

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.

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