



## M9106-GGx-4 Series Proportional Electric Non-Spring Return Actuators

### Installation

**IMPORTANT:** The M9106-GGx-4 Electric Actuator is intended to provide an input to 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 :** Le M9106-GGx-4 Electric Actuator est destiné à transmettre des données entrantes à un équipement 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.

### Parts Included

- M9106-GGx-4 actuator
- spade terminals

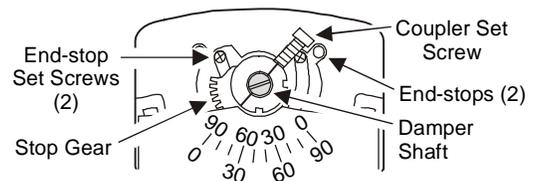
### Special Tools Needed

- wire/terminal crimper

### Mounting

The actuators are not position sensitive, and may be mounted in any convenient orientation onto a VG1000 Series Ball Valves by the means of the M9000-520 or M9000-512 Valve Linkage Kit.

For more details, refer to the *M9000-520 Ball Valve Linkage Kit Mounting Instructions (P/N 14-1297-5)* or *M9000-512 Valve Linkage Kit Instructions (P/N 14-1201-13)*.



**Figure 1: Setting the Rotation Range**

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.

**IMPORTANT:** Do not remove the end-stop set screws, as this could interfere with the actuator's operation.

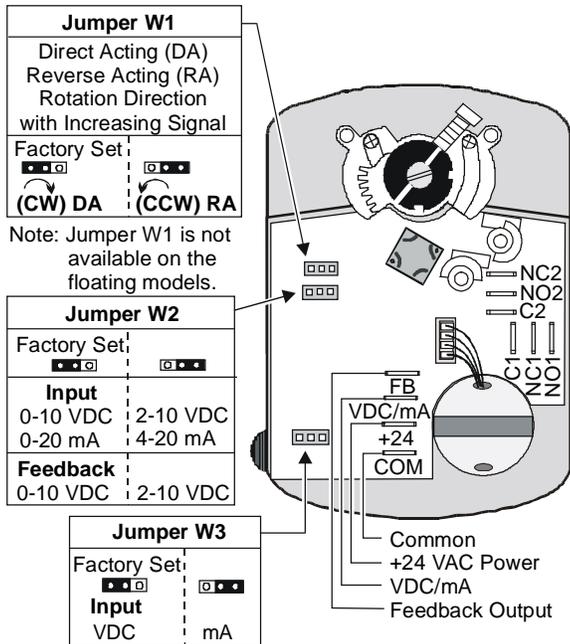
### Setup and Adjustments

#### Direction of Action

In the Direct Acting (DA) mode, a minimum control signal drives the actuator to the full CCW position, and a maximum control signal drives it fully 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.

#### GGx Models

The M9106-GGx-4 proportional actuators are factory set for Direct Acting (DA) mode with Jumper W1 in the DA position. Remove Jumper W1 and place it in the RA position. (See Figure 2.)



**Figure 2: Calibrating the GGx Models**

**Jumpers**

The M9106-GGx-4 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 terminal 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 Terminal is the feedback output. (See Figure 2.)

**Feedback Signal**

The feedback signal will vary 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.

		Rotation Range							
		Set Screw Adjustment				Set Screw Adjustment			
		90°	75°	60°	45°	30°	15°	0°	
		0°	15°	30°	45°	60°	75°	90°	
Direct Acting	0-10 V Feedback	10.0 V	8.3 V	6.7 V	5.0 V	3.3 V	1.7 V	0.0 V	
	2-10 V Feedback	10.0 V	8.7 V	7.3 V	6.0 V	4.7 V	3.3 V	2.0 V	
Reverse Acting	0-10 V Feedback	0.0 V	1.7 V	3.3 V	5.0 V	6.7 V	8.3 V	10.0 V	
	2-10 V Feedback	2.0 V	3.3 V	4.7 V	6.0 V	7.3 V	8.7 V	10.0 V	

Note: 0-10 V is available on GGA and GGC models.

**Figure 3: Nominal Feedback Signal Relative to the Rotation Range**

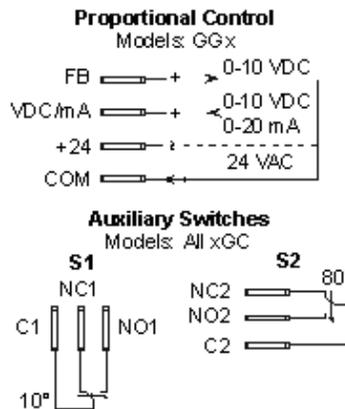
**Wiring**

**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 the National Electrical Code and all local regulations.

The actuator requires a 24 VAC control signal and is compatible with a variety of controllers. (See Figure 4.)



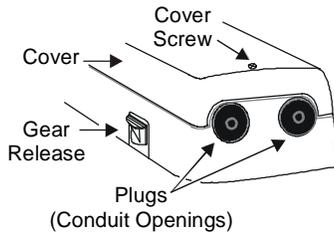
**Figure 4: Wiring for M9106-GGx Models**

Note: The GGx models have an auto shutoff to avoid excessive wear or drive time on the motor.

### Through the Conduit Openings

Depending on the M9106 model selected, one or both conduit openings are used.

1. Loosen the cover screw and remove the actuator cover.
2. Push the plastic conduit plug out of the conduit opening with fingertip. (See Figure 5.)



**Figure 5: Location of the Conduit Openings**

3. Use the Phillips No. 1 screwdriver to puncture a hole through the center of the plastic conduit plug. Reinsert the plug into the conduit opening.

Note: For applications requiring metal conduit, thread the conduit fitting into the conduit opening and hand tighten.

4. Insert the cable wires through the plastic plug, compression fitting, or conduit fitting, and connect to the terminals using the appropriate wiring diagram in Figure 5.

**IMPORTANT:** Install all quick-connect terminals in the same direction to prevent shorting. (See Figure 6.)



**Figure 6: Orientation of Terminals**

Note: If using optional pluggable terminal blocks (M9000-105 or M9000-106), insert the cable wires through the conduit opening, and then connect the wires to the terminals.

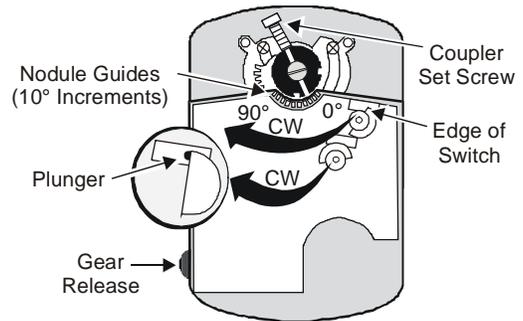
### Auxiliary Switches (GGC Models)

The M9106-GGC-4 models have two built-in auxiliary switches that may be set for any angle between 0 and 90° (factory set for 10 and 80°, nominal). Refer to the *Technical Data* section for auxiliary switch ratings.

The following procedures serve as examples to change the position of the auxiliary switch angles when starting at full CCW position.

### Switch S1

To change the angle of Switch S1 to 20°, refer to Figure 7 and proceed as follows:



**Figure 7: Switch Angle Settings**

1. Press and hold the gear release. Using the 0 to 90° nodule guides, rotate the coupler until the center of the coupler set screw is at 20°.
2. Rotate Switch S1 CW, and align the edge of the switch with the plunger until the plunger rises. (See Figure 7.)

Note: At this point, the normally closed contact closes, and the normally open contact opens. (See Auxiliary Switches in Figure 5.)

### Switch S2

To change the angle of Switch S2 to 70°, refer to Figure 7 and proceed as follows:

1. Press and hold the gear release. Using the 0 to 90° nodule guides, rotate the coupler until the center of the coupler set screw is at 70°.
2. Rotate Switch S2 CW, and align the edge of the switch with the plunger until the plunger rises. (See Figure 7.)

Note: At this point, the normally closed contact opens, and the normally open contact closes. (See Auxiliary Switches in Figure 4.)

3. Press and hold the gear release. Rotate the coupler until the center of the coupler set screw is back to 0°.
4. Check all the wiring and system settings, and apply power to the controller. Provide signals to the actuator to drive it at least one complete cycle open and closed to verify proper operation.

## Repairs and Replacement

Field repairs must not be made. For a replacement or an accessory, refer to the *Ordering Information* section in the *M9106-xGx-4 Series Electric Non-Spring Return Actuators Product Bulletin (LIT-2681123)*.

## Technical Data

<b>Product</b>	M9106-GGx-4 Series Electric Non-Spring Return Actuators
<b>Power Requirements</b>	20 to 30 VAC at 50/60 Hz; 3.2 VA supply, Class 2
<b>Input Signal</b>	0 (2) to 10 VDC or 0 (4) to 20 mA
<b>Input Signal Adjustments</b>	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>	Voltage Input, 150,000 ohms; Current Input, 500 ohms
<b>Feedback Signal</b>	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>	GGC: 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</b>	Running Torque: 53 lb·in (6 N·m)
<b>Cycles</b>	100,000 full cycles; 2,500,000 repositions rated at 53 lb·in (6 N·m)
<b>Audible Noise Rating</b>	35 dBA maximum at 1 m
<b>Rotation Range</b>	Adjustable from 30 to 90°, CW or CCW; mechanically limited to 93°
<b>Rotation Time</b>	Nominal 60 seconds at 60 Hz and 72 seconds at 50 Hz for 90°
<b>Electrical Connection</b>	1/4 in. spade terminals (Optional pluggable terminal blocks are available.)
<b>Conduit Connection</b>	PG11 Threaded
<b>Mechanical Connection</b>	3/8 to 1/2 in. (10 to 12.7 mm) round steel shaft or 3/8 in. (10 mm) square steel shaft
<b>Enclosure</b>	NEMA 2, IP32
<b>Ambient Operating Conditions</b>	-4 to 125°F (-20 to 52°C); 90% RH maximum, non-condensing
<b>Ambient Storage Conditions</b>	-40 to 176°F (-40 to 80°C); 90% RH maximum, non-condensing
<b>Dimensions (H x W x D)</b>	5.9 x 4.2 x 2.64 in. (150.1 x 106.5 x 67.0 mm)
<b>Shipping Weight</b>	2.4 lb (1.08 kg)
<b>Agency Compliance</b>	UL Listed, File E27734, CCN XAPX CE CSA Certified, File LR85083, Class 3221 02 CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive

*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.*

### European Single Point of Contact:

JOHNSON CONTROLS  
WESTENDHOF 3  
45143 ESSEN  
GERMANY

### NA/SA Single Point of Contact:

JOHNSON CONTROLS  
507 E MICHIGAN ST  
MILWAUKEE WI 53202  
USA

### APAC Single Point of Contact:

JOHNSON CONTROLS  
C/O CONTROLS PRODUCT  
MANAGEMENT  
NO. 22 BLOCK D NEW DISTRICT  
WUXI JIANGSU PROVINCE 214142  
CHINA



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507 E. Michigan Street, Milwaukee, WI 53202

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