

## M9116 Series Proportional Control Electric Non-spring Return Actuators

The M9116-GGx-2 and M9116-HGx-2 Series direct-mount electric actuators operate on 24 VAC or VDC power. These actuators are available for use with proportional controllers. These bidirectional actuators do not require a damper linkage, and are easily installed on a damper with a round shaft up to 3/4 in. (19 mm) in diameter or a square shaft up to 5/8 in. (16 mm). They may be direct- or remote-mounted to a damper.

A single M9116-GGx-2 or M9116-HGx-2 model delivers 140 lb·in (16 N·m) of torque. Two HGx models in tandem deliver twice the torque, 280 lb·in (32 N·m). The angle of rotation is mechanically adjustable from 0 to 90° in 5-degree increments. Integral auxiliary switches are available to indicate end-stop position or to perform switching functions at any angle within the selected rotation range. Jumpers on the actuator allow users to select the direction of action, range of control input, and calibration (fixed or adjustable). Position feedback is available through a 0 to 10 VDC signal.



Figure 1: M9116 Series Actuator

Features and Benefits	
<input type="checkbox"/> <b>Output Position Feedback</b>	Provides simple, closed-loop control with accurate position sensing
<input type="checkbox"/> <b>Electronic Stall Detection</b>	Ensures higher reliability by deactivating the actuator motor when a stall condition is detected
<input type="checkbox"/> <b>Zero and Span Adjustment (HGx Models)</b>	Allows sequential operation of dampers from a single input signal of 0 (2) to 10 VDC, 0 (4) to 20 VDC, or 0 (4) to 20 mA
<input type="checkbox"/> <b>Removable Coupler</b>	Allows adjustment of the rotation range from 0 to 90°
<input type="checkbox"/> <b>Steel U-bolt Clamp</b>	Provides four-point damper shaft gripping
<input type="checkbox"/> <b>Combination of Actuator, Linkage and Ball-style Valve</b>	Regulates the flow of hot or chilled water, 50% glycol solution, and low pressure steam
<input type="checkbox"/> <b>Jumper-selectable Rotation Direction and Manual Gear Release</b>	Simplifies installation, setup, and field adjustments
<input type="checkbox"/> <b>Noise Filter</b>	Eliminates repositioning due to line noise
<input type="checkbox"/> <b>National Pipe Thread (NPT) Threaded Housing</b>	Provides easy connection for electrical fittings

## Application

**IMPORTANT:** This device is not designed or intended to be used in or near environments where explosive vapors or gases could be present, or environments where substances corrosive to the device's internal components could be present.

M9116-GGx-2 and M9116-HGx-2 actuators are designed to position air dampers and valves in Heating, Ventilating, and Air Conditioning (HVAC) systems. Applications include:

- positioning return air or exhaust dampers
- controlling face and bypass dampers
- positioning blades for variable volume fans

Two of the M9116-HGx-2 models provide twice the amount of running torque of a single unit when mounted in tandem.

Refer to the manufacturer's information to properly size the damper, valve, and/or actuator. Spring return actuators, such as Johnson Controls® M9208 and M9220 Series, are recommended for use with outdoor air dampers in cold climates.

## Operation

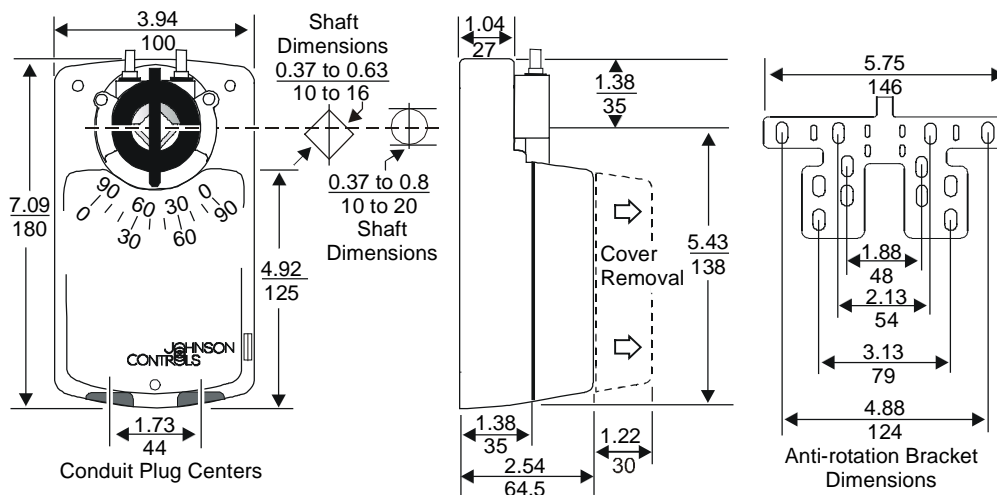
**IMPORTANT:** The M9116 Series proportional actuators are intended to control equipment under normal operating conditions. Where failure or malfunction of an M9116 proportional actuator could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls), or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of the M9116 proportional actuator must be incorporated into and maintained as part of the control system.

M9116-GGx-2 and M9116-HGx-2 actuators operate on 24 VAC at 50/60 Hz or 24 VDC. These compact actuators use a DC motor with stall detection circuitry that operates throughout the entire stroke. The GGx and HGx models employ noise-filtering techniques on the control signal to eliminate repositioning due to line noise.

Rotation is mechanically limited to 93° by integral end-stops. The position of the actuator is marked from 0 to 90° on the cover. An anti-rotation bracket prevents lateral movement of the actuator. Press the spring-loaded gear release on the actuator cover to disengage the gear train for manual repositioning of the coupler.

## Dimensions

See Figure 2 for actuator dimensions.



**Figure 2: Actuator and Anti-Rotation Bracket Dimensions, in. (mm)**

## Ordering Information

**Table 1: Actuator Models and Accessories**

<b>Product Code Number</b>	<b>Description</b>
<b>M9116-GGA-2</b>	140 lb-in (16 N·m) electric non-spring return actuator with proportional control and 0 to 10 VDC feedback
<b>M9116-GGC-2</b>	140 lb-in (16 N·m) electric non-spring return actuator with proportional control, 0 to 10 VDC feedback input, and two SPDT 24 VAC auxiliary switches
<b>M9116-HGA-2</b>	140 lb-in (16 N·m) or 280 lb-in (32 N m) in tandem, electric non-spring return actuator with proportional control, 0 to 10 VDC feedback input, adjustable zero and span
<b>M9116-HGC-2</b>	140 lb-in (16 N·m) or 280 lb-in (32 N m) in tandem, electric non-spring return actuator with proportional control, 0 to 10 VDC feedback input, adjustable zero and span, and two SPDT 24 VAC auxiliary switches
<b>DMPR-KR003*</b>	Sleeve Pin Kit for Johnson Controls round dampers with a 5/16 in. (8 mm) diameter shaft
<b>DMPR-KC003*</b>	Blade Pin Extension without Bracket for Johnson Controls D-1300 direct-mount applications
<b>DMPR-KC254</b>	Inside Frame Mounting Kit for damper applications requiring the actuator within the airstream
<b>M9000-103</b>	14 VA Transformer, 120/24 VAC, 60 Hz, Class 2
<b>M9000-104</b>	14 VA Transformer, 230/24 VAC, 60 Hz, Class 2
<b>M9000-105</b>	Pluggable 3-terminal block
<b>M9000-150</b>	Damper Mount Linkage Kit for remote inside duct mounting an M9116 actuator to a 3-blade to larger damper (not intended for a Johnson Controls damper)
<b>M9000-151</b>	Base Mount Linkage Kit for remote inside duct mounting (not intended for tandem application)
<b>M9000-153</b>	Crank Arm Kit for remote mounting (not intended for tandem application)
<b>M9000-154</b>	1 in. Jackshaft Coupler Kit for mounting on a 1 in. diameter damper shaft
<b>M9000-155</b>	Manual Handle for positioning a damper or valve when power is removed from an M91xx actuator
<b>M9000-158</b>	Mounting Kit to tandem mount two M9116 GGx or HGx models on a damper.
<b>M9000-160</b>	Replacement anti-rotation bracket for M91xx Series actuators

\* Furnished with the damper and may be ordered separately.

## Technical Specifications

<b>Product</b>	M9116 Series Proportional Control Electric Non-spring Return Actuators	
<b>Power Requirements</b>	20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$ ; 7.5 VA supply, Class 2	
<b>Input Signal</b>	0 (2) to 10 VDC, 0 (4) to 20 VDC, or 0 (4) to 20 mA	
<b>Input Signal Adjustments</b>	(Voltage Input or Current Input): Jumper selectable: 0 (2) to 10 VDC, 0 (4) to 20 VDC, or 0 (4) to 20 mA Adjustable: Zero, 0 to 6 VDC, 0 to 12 VDC, or 0 to 12 mA Span, 2 to 10 VDC, 4 to 20 VDC, or 4 to 20 mA Factory Setting: 0 to 10 VDC, 0 to 20 mA, CW rotation with signal increase Action is jumper selectable Direct (CW) or Reverse (CCW) with signal increase.	
<b>Input Impedance</b>	Voltage Input, 205,000 ohms for 0 (2) to 10 V and 410,000 ohms for 0 (4) to 20 V 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>	xGC:	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>	140 lb·in (16 N·m) for one unit, 280 lb·in (32 N·m) for two in tandem (HGx)	
<b>Audible Noise Rating</b>	45 dBA at 1 m	
<b>Rotation Range</b>	0 to 90° in 5-degree increments, mechanically limited to 93°	
<b>Rotation Time</b>	80 seconds at 50% rated load, 70 to 115 seconds for 0 to 140 lb·in (0 to 16 N·m)	
<b>Electrical Connection</b>	Screw terminals for 22 to 14 AWG; maximum of two 18, 20, or 22 AWG per terminal	
<b>Mechanical Connection</b>	3/8 to 3/4 in. (10 to 20 mm) diameter round shaft or 3/8 to 5/8 in. (10 to 16 mm) square shaft	
<b>Enclosure</b>	NEMA 2, IP42	
<b>Ambient Conditions</b>	Operating:	-4 to 122°F (-20 to 50°C); 0 to 95% RH, noncondensing
	Storage:	-40 to 186°F (-40 to 86°C); 0 to 95% RH, noncondensing
<b>Dimensions (H x W x D)</b>	7.09 x 3.94 x 2.54 in. (180 x 100 x 64.5 mm)	
<b>Shipping Weight</b>	2.9 lb (1.3 kg)	
<b>Agency Compliance</b>	<p><b>United States:</b>            UL Listed, CCN XAPX, File E27734; to UL 873, the Standard for Temperature Indicating and Regulating Equipment, Eleventh Edition</p> <hr/> <p><b>Canada:</b>            UL Listed, CCN XAPX7, File E27734; Canadian Standard C22.2 NO. 24-93, Standard for Temperature Indicating and Regulating Equipment, Eighth Edition</p> <hr/> <p><b>Europe:</b>            CE Mark – 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 Low Voltage Directive 2006/95/EC.</p>	



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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