

# M9216 Series Electric Spring Return Actuators

The M9216 Series direct-mount, spring return electric actuators operate on 24 VAC or VDC power and are available for use with on/off, floating, proportional, or resistive 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). M9216 actuators may be direct or remote mounted to a damper, or mounted to a valve using one of the M9000-5xx Valve Linkage Kits.

A single M9216 model delivers up to 140 lb·in (16 N·m) of torque. Two BGx, GGx, or HGx models in tandem deliver twice the torque or 280 lb·in (32 N·m). The angle of rotation is mechanically adjustable from 30 to 90°. Integral auxiliary switches are available to indicate end-stop position or to perform switching functions at any angle within the selected rotation range. Position feedback is available through switches, a potentiometer, or a 0 (2) to 10 VDC signal.



**Figure 1: M9216 Series Actuator**

<b>Features and Benefits</b>	
<input type="checkbox"/> <b>Available Torques: 140 and 280 lb-in (16 and 32 N·m)</b>	Offer selection most suitable for the application
<input type="checkbox"/> <b>Bidirectional, Return-to-Normal Spring Return</b>	Allows selectable rotation/spring return direction simplifying installation
<input type="checkbox"/> <b>Extended Temperature Range</b>	Meets the needs of most outdoor air applications
<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>Auto Stroke Calibration (GGx Models)</b>	Reduces field installation time and cost due to self adjustment
<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 or 0 (4) to 20 mA
<input type="checkbox"/> <b>Manual Override</b>	Allows manual positioning when the actuator is not powered; simplifies setup and field adjustments
<input type="checkbox"/> <b>NPT Conduit Adaptor (Included)</b>	Provides easy connection for electrical fittings and armored cable

## 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.

M9216 actuators are designed to position air dampers and valves in Heating, Ventilating, and Air Conditioning (HVAC) systems. Applications include:

- positioning return air, exhaust, or outdoor air dampers
- controlling face and bypass dampers
- positioning blades for variable volume fans
- positioning VG1000 Series ball valves and VG7000 Series globe valves when used with an M9000-5xx Valve Linkage

Refer to the manufacturer's information to properly size the damper, valve, and/or actuator.

## Operation

**IMPORTANT:** The M9216 Series actuator is intended to control equipment under normal operating conditions. Where failure or malfunction of an M9216 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 an M9216 actuator must be incorporated into and maintained as part of the control system.

M9216 actuators operate on 24 VAC at 50/60 Hz or 24 VDC. They use a DC motor with stall detection circuitry that operates throughout the entire stroke. The proportional and resistive actuators employ noise-filtering techniques on the control signal to eliminate repositioning due to line noise. Mounting two each M9216 (BGx, GGx or HGx) models in tandem provides twice the amount of running torque as a single unit.

Rotation is mechanically limited to 93° by integral end-stops. The position of the actuator is visually indicated from 0 to 90° on the cover. An anti-rotation bracket prevents lateral movement of the actuator. The damper position may be set manually with the manual override feature in the event of a power failure.

## Dimensions

See Figure 2 for actuator dimensions.

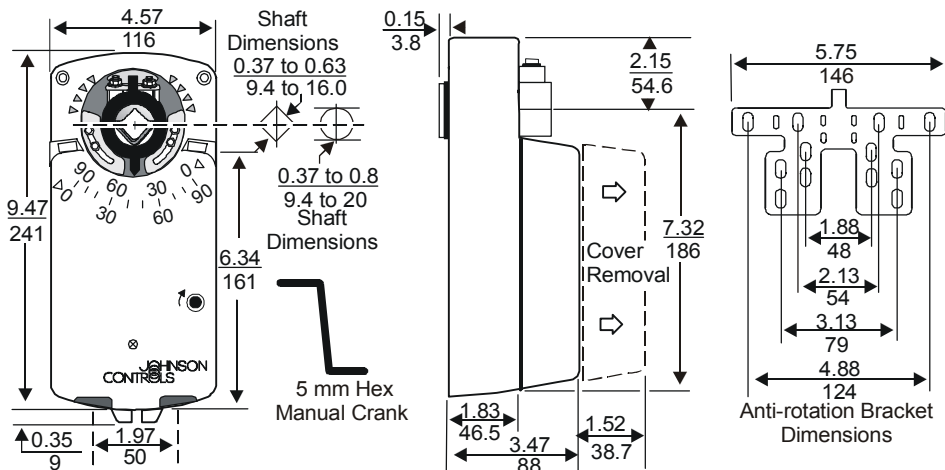


Figure 2: Actuator, Anti-rotation Bracket, and Manual Crank Dimensions, in. (mm)

## Repairs and Replacement

Field repairs must not be made. To order 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 2.

**Table 1: Actuators**

<b>M9216 Series Electric Spring Return Actuator 140 lb-in (16 N·m)</b>	M9216-AGA-2	M9216-AGC-2	M9216-AGD-2	M9216-AGE-2	M9216-BGA-2	M9216-BGC-2	M9216-GGA-2	M9216-GGC-2	M9216-HGA-2	M9216-HGC-2	M9216-JGA-2	M9216-JGC-2
<b>On/Off Control</b>	*	*	*	*	■	■						
<b>Floating Control</b>	■	■	■	■								
<b>Proportional Control</b>							■	■	■	■		
VDC and mA Input with Zero and Span									■	■		
<b>Resistive Input Control</b>											■	■
<b>Feedback</b>												
135 ohm Potentiometer			■									
1000 ohm Potentiometer				■								
0 to 10 VDC					■	■	■	■	■	■	■	■
2 Auxiliary Switches		■				■	■	■	■	■	■	■
<b>Tandem Operation</b>					■	■	■	■	■	■	■	■

\* May be used with 2-wire on/off control.

Notes: AGx, HGx, and JGx models have a 25-second delay upon startup.

Use two actuators with the same torque and control input for tandem operation.

**Table 2: Accessories**

<b>Product Code Number</b>	<b>Description</b>
<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 CD-1300 direct-mount applications
<b>DMPR-KC254</b>	Inside Frame Mounting Kit for Johnson Controls dampers that require the actuator within the airstream
<b>M9000-100**</b>	Conduit Adaptor Kit
<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>M9000-106</b>	Pluggable 4-terminal block
<b>M9000-150</b>	Damper Mount Linkage Kit for remote inside duct mounting an M9108, M9116, M9124, or M9216 actuator to a 3-blade or 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 M9216 tandem applications)
<b>M9000-153</b>	Crank Arm Kit for remote mounting (not intended for M9216 tandem applications)
<b>M9000-154</b>	1 in. Jackshaft Coupler for mounting on a 1 in. diameter damper shaft
<b>M9000-158</b>	Mounting Kit for tandem mounting two each M9216 BGx, GGx, or HGx models on a damper
<b>M9000-160</b>	Replacement anti-rotation bracket for M9216 Series actuators
<b>M9000-200</b>	Commissioning Tool provides a control signal to drive on/off, floating, proportional, or resistive actuators.
<b>M9000-500</b>	Valve Linkage Kit for mounting M9216 actuators to 1/2 to 2 in. VG7000 Series globe valves
<b>M9000-510</b>	Valve Linkage Kit for mounting M9216 actuators to 1/2 and 3/4 in. 2-way or 3-way VG1000 Series ball valves, and 1 and 1-1/4 in. 2-way VG1000 Series ball valves
<b>M9000-511</b>	Valve Linkage Kit for field mounting M9216 actuators to 1 and 1-1/4 in. 3-way VG1000 Series ball valves

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

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## Technical Data

<b>Product</b>	M9216 Series Electric Spring Return Actuators
<b>Power Requirements</b>	AGx, HGx, JGx: 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$ , 12 VA supply, Class 2 BGx: 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$ , 10 VA supply, Class 2 GGx: 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$ , 14 VA supply from 32 to 122°F (0 to 50°C) or 18 VA supply from -22 to 32°F (-30 to 0°C), Class 2
<b>Input Signal</b>	AGx: 24 VAC at 50/60 Hz or 24 VDC, 4.8 mA (on/off mode, 500 mA maximum) BGx: 24 VAC at 50/60 Hz or 24 VDC, 420 mA maximum GGx, HGx: 0 to 10 VDC or 0 to 20 mA JGx: Potentiometer value is 100 ohms minimum to 10,000 ohms maximum
<b>Input Signal Adjustments</b>	AGx Factory Setting: Terminals 1 and 3, Clockwise (CW) rotation; Terminals 1 and 4, Counterclockwise (CCW) rotation BGx Factory Setting: Terminals 1 and 2, CW rotation GGx (Voltage or Current Input): Switch Selectable: 0 (2) to 10 VDC or 0 (4) to 20 mA Factory Setting: 0 to 10 VDC, CW rotation with signal increase HGx (Voltage Input or Current Input): Jumper Selectable, Fixed: 0 (2) to 10 VDC or 0 (4) to 20 mA Adjustable: Zero, 0 to 6 V (0 to 12 mA); Span, 2 to 10 V (4 to 20 mA) Factory Setting: 0 to 10 VDC, 0 to 20 mA, CW rotation with signal increase GGx, HGx, JGx: Direction of action is user selectable Direct (CW) or Reverse (CCW) with signal increase.
<b>Input Impedance</b>	GGx, HGx: Voltage Input, 200,000 ohms; Current Input, 500 ohms JGx: 1.8 Megohms
<b>Feedback Signal</b>	AGD: 135 ohm feedback potentiometer AGE: 1,000 ohm feedback potentiometer GGx, HGx: 0 to 10 VDC or 2 to 10 VDC for 90° (10 VDC at 1 mA) Corresponds to input signal span selection and rotation limits. JGx: 0 to 10 VDC for 90° (10 VDC at 1 mA)
<b>Auxiliary Switch Rating</b>	xGC: Two SPDT (Single-Pole, Double-Throw) switches rated at 24 VAC, 1.5 A inductive, 3.0 A resistive, 35 VA maximum per switch, Class 2
<b>Spring Return</b>	Factory Setting: CCW; Direction is selectable with the coupler.
<b>Mechanical Output (Running Torque)</b>	All Models: 140 lb-in (16 N-m) for one unit BGx, GGx, HGx: 280 lb-in (32 N-m) for two units in tandem
<b>Rotation Range</b>	Adjustable from 30 to 90°, CW or CCW, mechanically limited to 93°
<b>Rotation Time</b>	70 to 130 seconds for 0 to 140 lb-in (0 to 16 N-m); 90 seconds nominal at 50% rated load (Powered rotation is faster in the spring return direction than in the spring winding direction; power failed spring return is less than 15 seconds.)
<b>Cycles</b>	65,000 full stroke cycles
<b>Electrical Connection</b>	GGx: 1/4 in. spade terminals with pluggable terminal blocks (See Table 2.) All Other Models: Screw terminals for 22-14 AWG; maximum of two 18, 20, or 22 AWG each M9000-100: One included with all models; two included with AGD, AGE, and xGC
<b>Mechanical Connection</b>	3/8 to 3/4 in. (10 to 20 mm) diameter round shaft; 3/8 to 5/8 in. (10 to 16 mm) square shaft
<b>Enclosure</b>	NEMA 2, IP42
<b>Ambient Conditions</b>	Operating, GGx: -22 to 122°F (-30 to 50°C); 0 to 95% RH, non-condensing All Other Models: -4 to 122°F (-20 to 50°C); 0 to 95% RH, non-condensing Storage, All Models: -40 to 186°F (-40 to 86°C); 0 to 95% RH, non-condensing
<b>Dimensions (H x W x D)</b>	9.82 x 4.57 x 3.62 in. (249.4 x 116.0 x 91.9 mm)
<b>Shipping Weight</b>	6.4 lb (2.9 kg)
<b>Agency Compliance</b>	UL 873 Listed, File E27734, CCN XAPX CSA C22.2 No. 139 Certified, File LR85083, Class 3221 02 CE Mark, EMC Directive 89/336/EEC

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.