

# M9220 Series Electric Spring-Return Actuators

## Description

The M9220-xxx-3 actuators are direct-mount, spring-return electric actuators that operate with these available power options:

- AC 24 V at 50/60 Hz or DC 24 V (AGx, BGx, GGx, HGx)
- AC 120 V at 60 Hz (BAX)
- AC 230 V at 50/60 Hz (BDx)

These bidirectional actuators do not require a damper linkage, and are easily installed on dampers with 1/2 to 3/4 in. or 12 to 19 mm round shafts, or 3/8 and 1/2 in. or 10, 12, and 14 mm square shafts using the standard shaft clamp included with the actuator. An optional M9220-600 Jackshaft Coupler Kit is available for 3/4 to 1-1/16 in. or 19 to 27 mm round shafts, or 5/8 and 3/4 in. or 16, 18, and 19 mm square shafts.

A single M9220-xxx-3 Electric Spring-Return Actuator provides a running and spring-return torque of 177 lb-in (20 N·m). Two or three models mounted in tandem deliver twice or triple the torque. Integral line voltage auxiliary switches are available on the -xxC models to indicate end-stop position or to perform switching functions within the selected rotation range.

Refer to the *M9220-xxx-3 Electric Spring-Return Actuators Product Bulletin (LIT-12011057)* for important product application information and single point of contact information.

## Features

- Available torques of 177 lb-in (20 N·m) for single actuators, 354 lb-in (40 N·m) for two models, and 531 lb-in (60 N·m) for three models mounted in tandem—offer a selection that is most suitable for the application.
- Reversible mounting design—simplifies installation and enables the actuator to spring return in either direction.
- Electronic stall detection throughout entire rotation range—extends the life of the actuator by deactivating the actuator motor when an overload condition is detected.
- Removable coupler—adapts to a shorter damper shaft.
- Integral 48 in. (1.2 m) halogen-free cables with colored and numbered conductors—simplify field wiring.
- Integral auxiliary switches (xxC Models)—provide one fixed and one adjustable switch point with line voltage capability.
- NEMA 2 (IP54) rated aluminum enclosure—protects the internal components of the actuator from dirt and moisture.
- Easy-to-use locking manual override with auto release and crank storage—allows for manual positioning of the actuator hub.
- Integral connectors for 3/8 in. flexible metal conduit—simplify installation and field wiring.
- Microprocessor-controlled brushless DC motor (-AGx, -GGx, and -HGx types)—provides constant run-time independent of torque.

## M9220 Series Electric Spring-Return Actuator



## Applications

The M9220-xxx-3 Electric Spring-Return Actuators provide reliable control of dampers and valves in HVAC systems. The M9220-xxx-3 Actuators are available for use with on/off, floating, and proportional controllers.

## Repair Information

If the M9220 Series Electric Actuator fails to operate within its specifications, replace the unit. For a replacement actuator, contact the nearest Johnson Controls® representative.

## Selection Chart

Code Number	Control Type	Auxiliary Switches	Power Requirements
M9220-AGA-3	Floating	None	AC 24 V at 50/60 Hz or DC 24 V
M9220-AGC-3	Floating	Two	AC 24 V at 50/60 Hz or DC 24 V
M9220-BAA-3	On/Off	None	AC 120 V at 60 Hz
M9220-BAC-3	On/Off	Two	AC 120 V at 60 Hz
M9220-BDA-3	On/Off	None	AC 230 V at 50/60 Hz
M9220-BDC-3	On/Off	Two	AC 230 V at 50/60 Hz
M9220-BGA-3	On/Off	None	AC 24 V at 50/60 Hz or DC 24 V
M9220-BGC-3	On/Off	Two	AC 24 V at 50/60 Hz or DC 24 V
M9220-GGA-3	Proportional	None	AC 24 V at 50/60 Hz or DC 24 V
M9220-GGC-3	Proportional	Two	AC 24 V at 50/60 Hz or DC 24 V
M9220-HGA-3	Proportional with Adjustable Zero and Span	None	AC 24 V at 50/60 Hz or DC 24 V
M9220-HGC-3	Proportional with Adjustable Zero and Span	Two	AC 24 V at 50/60 Hz or DC 24 V

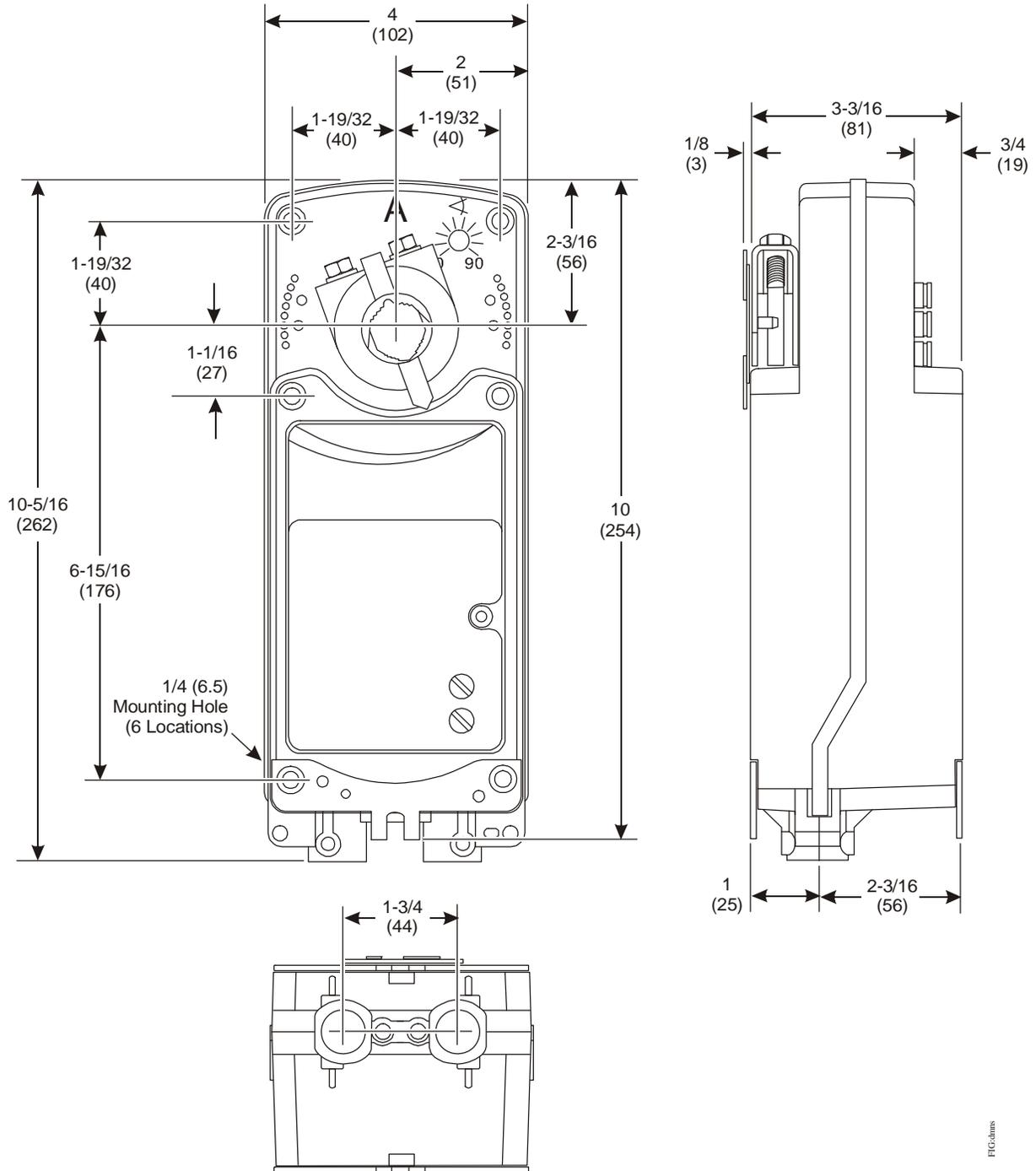
## M9220 Series Electric Spring-Return Actuators (Continued)

### Accessories

Code Number	Description
<b>DMPR-KC003</b>	7 in. (178 mm) blade pin extension (without bracket) for Johnson Controls direct-mount damper applications (quantity 5) <b>Note:</b> Available with damper and may be ordered separately
<b>M9000-153</b>	Crankarm (quantity 1)
<b>M9000-158</b>	Tandem Mounting Kit used to mount two models of M9220-xxx-3 Series Proportional Electric Spring-Return Actuators (quantity 1)
<b>M9000-170</b>	Remote Mounting Kit, horizontal. Kit includes mounting bracket, M9000-153 crankarm, ball joint, and mounting bolts (quantity 1)
<b>M9000-171</b>	Remote Mounting Kit, Vertical. Kit Includes mounting bracket, M9000-153 crankarm, ball joint, and mounting bolts (quantity 1)
<b>M9000-320</b>	Weather Shield Enclosure - NEMA 3R enclosure for protecting a single M9210/20 Actuator from rain, sleet, or snow (quantity 1)
<b>M9000-400</b>	Jackshaft Linkage Kit. Open-ended design enables clamping onto a jackshaft without requiring access to the ends of the jackshaft (quantity 1)
<b>M9000-519</b>	Valve linkage for mounting M9220 actuator to 2-1/2 to 6 in. flanged ball valves
<b>M9000-604</b>	Replacement Anti-Rotation Bracket Kit (with Screws) for M9220-xxx-3 Series Proportional Electric Spring-Return Actuators (quantity 1)
<b>M9200-100</b>	Threaded Conduit Adapter, 1/2 NPSM, for M9210(20) and M(VA)9208 Series Actuators (quantity 5)
<b>M9220-600</b>	1 in. (25 mm) Jackshaft Coupler Kit (with locking clip) for mounting M9220-xxx-3 Proportional Electric Spring-Return Actuators on dampers with 3/4 to 1-1/16 in. or 19 to 27 mm round shafts, or 5/8 and 3/4 in. or 16, 18, and 19 mm square shafts (quantity 1)
<b>M9220-601</b>	Replacement Coupler Kit (with locking clip) for mounting M9220-xxx-3 Proportional Electric Spring-Return Actuators on dampers with 1/2 to 3/4 in. or 12 to 19 mm round shafts, or 3/8 and 1/2 in. or 10, 12, and 14 mm square shafts (quantity 1)
<b>M9220-602</b>	Replacement Locking Clips for M9220-xxx-3 Proportional Electric Spring-Return Actuators (five per bag)
<b>M9220-603</b>	Adjustable Stop Kit for M9220-xxx-3 Proportional Electric Spring-Return Actuators (quantity 1)
<b>M9220-604</b>	Replacement Manual Override Cranks for M9220-xxx-3 Proportional Electric Spring-Return Actuators (five per bag)
<b>M9220-610</b>	Replacement Shaft Gripper, 10 mm square shaft with locking clip (quantity 1)
<b>M9220-612</b>	Replacement Shaft Gripper, 12 mm square shaft with locking clip (quantity 1)
<b>M9220-614</b>	Replacement Shaft Gripper, 14 mm square shaft with locking clip (quantity 1)

## M9220 Series Electric Spring-Return Actuators (Continued)

### Dimensions



M9220-xxx-3 Electric Spring-Return Actuator Dimensions, in. (mm)

FIG. 04000

## M9220 Series Electric Spring-Return Actuators (Continued)

### Technical Specifications

M9220 Series Electric Spring-Return Actuators (Part 1 of 2)		
<b>Product Codes</b>		M9220-AGx-3 Models: Floating M9220-Bxx-3 Models: On/Off M9220-GGx-3 Models: Proportional M9220-HGx-3 Models: Proportional Adjustable
<b>Power Requirements</b>	<b>AGx, HGx, GGx Models</b>	AC 24 V (19.2 to 30 V) at 50/60 Hz: Class 2, 15.5 VA running, 7.7 VA holding position; DC 24 V (21.6 to 26.4 V): Class 2, 6.7 W running, 2.9 W holding position
	<b>BAx Models</b>	AC 120 V (AC 102 to 132 V) at 60 Hz: 0.25 A running, 0.13 A holding position
	<b>BDx Models</b>	AC 230 V (AC 198 to 264 V) at 50/60 Hz: 0.15 A running, 0.09 A holding position
	<b>BGx Models</b>	AC 24 V (19.2 to 30 V) at 50/60 Hz: Class 2, 24.6 VA running, 7.7 VA holding position; DC 24 V (21.6 to 26.4 V): Class 2, 17.6 W running, 2.8 W holding position
<b>Transformer Sizing Requirements</b>	<b>AGx, HGx, GGx Models</b>	20 VA minimum per actuator
	<b>Bxx Models</b>	25 VA minimum per actuator
<b>Input Signal/Adjustments</b>	<b>AGx Models</b>	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 Ohm resistor; Switch selectable direct or reverse action with signal increase, 500 ms minimum pulse width
	<b>GGx Models</b>	Factory set DC 0 to 10 V, CW Rotation with signal increase; Selectable DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 Ohm, 0.25 W minimum resistor; switch selectable direct or reverse action with signal increase
	<b>HGx Models</b>	Factory set DC 0 to 10 V, CW rotation with signal increase; Selectable DC 0 to 10 V or 0 to 20 mA with field furnished 500 Ohm, 0.25 W minimum resistor; Start point programmable DC 0 to 10 V; Span programmable DC 2 to 10 V; Switch selectable direct or reverse action with signal increase
<b>Control Input Impedance</b>	<b>GGx, HGx Models</b>	Voltage Input: 200,000 Ohms; Current Input: 500 Ohms with field furnished 500 Ohm resistor
<b>Feedback Signal</b>	<b>GGx Models</b>	0 (2) to 10 VDC for desired rotation range up to 90°; Corresponds to rotation limits, 1 mA maximum
	<b>HGx Models</b>	0 to 10 VDC for desired rotation range up to 90°; Corresponds to rotation limits, 1 mA maximum
<b>Auxiliary Switch Rating</b>	<b>xxC Models</b>	Two Single-Pole, Double-Throw (SPDT), double-insulated switches with gold flash contacts: AC 24 V, 50 VA Pilot Duty; AC 120 V, 5.8 A resistive, 1/4 hp, 275 VA Pilot Duty; AC 240 V, 5.0 A resistive, 1/4 hp, 275 VA Pilot Duty
<b>Spring Return</b>		Direction is selectable with mounting position of actuator: Side A, actuator face away from Damper for CCW spring return; Side B, actuator face away from Damper for CW spring return
<b>Running and Spring Return Torque</b>		177 lb-in (20 N-m) for a single actuator; 354 lb-in (40 N-m) for two models mounted in tandem 531 lb-in (60 N-m) for three models mounted in tandem
<b>Valid Tandem Combinations</b>		Two M9220-Bxx-3 Three M9220-AGx-3 One M9220-HGx-3 master with one or two M9220-GGX-3 slaves One M9220-GGx-3 master with one or two M9220-GGX-3 slaves
<b>Rotation Range</b>		Adjustable from 30 to 90° CW or CCW with optional M9220-603 Adjustable Stop Kit; mechanically limited to 90°
<b>Rotation Time Power On (Running)</b>	<b>AGx, HGx, GGx Models</b>	150 seconds for 0 to 177 lb-in (0 to 20 N-m) at all operating conditions; independent of load
	<b>BGx Models</b>	24 to 57 seconds for 0 to 177 lb-in (0 to 20 N-m) at all operating conditions; 35 seconds nominal at full rated load
<b>Rotation Time Power Off (Spring Returning)</b>	<b>AGx, HGx, GGx Models</b>	20 seconds for 0 to 177 lb-in (0 to 20 N-m) at room temperature
	<b>BGx Models</b>	11 to 15 seconds for 0 to 177 lb-in (0 to 20 N-m) at room temperature; 35 seconds maximum for 0 to 177 lb-in (0 to 20 N-m) at -22°F (-30°C) 130 seconds maximum for 0 to 177 lb-in (0 to 20 N-m) at -40°F (-40°C)
<b>Cycles</b>		60,000 full stroke cycles; 1,500,000 repositions
<b>Audible Noise Rating (AGx, HGx, GGx Models)</b>	<b>Power On (Running)</b>	< 40 dBA at 39-13/32 in. (1 m)
	<b>Power On (Holding)</b>	< 20 dBA at 39-13/32 in. (1 m)
	<b>Power Off (Spring Returning)</b>	< 55 dBA at 39-13/32 in. (1 m)

## M9220 Series Electric Spring-Return Actuators (Continued)

M9220 Series Electric Spring-Return Actuators (Part 2 of 2)		
Audible Noise Rating (BGx Models)	Power On (Running)	< 66 dBA at 39-13/32 in. (1 m)
	Power On (Holding)	< 18 dBA at 39-13/32 in. (1 m)
	Power Off (Spring Returning)	< 66 dBA at 39-13/32 in. (1 m)
Electrical Connections	Actuator (All Models)	48 in. (1.2 m) halogen-free cable with 18 AWG (0.75 mm <sup>2</sup> ) wire leads
	Auxiliary Switches (xxC Models)	48 in. (1.2 m) halogen-free cable with 18 AWG (0.75 mm <sup>2</sup> ) wire leads
Conduit Connections		Integral connectors for 3/8 in. (10 mm) flexible metal conduit
Mechanical Connections	Standard Shaft Clamp Included with Actuator	1/2 to 3/4 in. or 12 to 19 mm diameter round shafts, or 3/8 and 1/2 in. or 10, 12, and 14 mm square shafts
	Optional M9220-600 Jackshaft Coupler Kit	3/4 to 1-1/16 in. or 19 to 27 mm diameter round shafts, or 5/8 and 3/4 in. or 16, 18, and 19 mm square shafts
Aluminum Enclosure		NEMA 2 (IP54) for all mounting orientations
Ambient Conditions	Operating	-40 to 131°F (-40 to 55°C); 90% RH maximum, noncondensing
	Storage	-85 to 185°F (-65 to 85°C); 95% RH maximum, noncondensing
Dimensions		See <i>Dimensions</i> .
Compliance  	United States	UL Listed, CCN XAPX, File E27734; to UL 60730-1, Automatic Controls for Household and Similar Use and UL 60730-2-14 Part 2, Particular Requirements for Electric Actuators (Models: All)
	Canada	UL Listed, CCN XAPX7, File E27734; to CAN/CSA E60730-1, Automatic Controls for Household and Similar Use; and CAN/CSA E60730-2-14 Part 2, Particular Requirements for Electric Actuators (Models: All)
	Europe	CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emission Compliant (Models: All M9220-xGx and M9220-xDx)
Shipping Weight	xGx Models	6.4 lb (2.9 kg)
	BAx and BDx Models	7.6 lb (3.5 kg)