

## Description

**Figure 1: M9220 Series Electric Spring-Return Actuator**



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 in. to 3/4 in. or 12 mm to 19 mm round shafts, or 3/8 in. and 1/2 in. or 10 mm, 12 mm, 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 in. to 1-1/16 in. or 19 mm to 27 mm round shafts, or 5/8 in. and 3/4 in. or 16 mm, 18 mm, 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.

## 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 |

## Accessories

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


**Figure 2: M9220-xxx-3 Electric Spring-Return Actuator Dimensions, in. (mm)**



## Technical specifications

| M9220 Series Electric Spring-Return Actuators |                      |   |
|---|----------------------|---|
| Product codes                                 |                      | M9220-AGx-3 models: Floating<br>M9220-Bxx-3 models: On/off<br>M9220-GGx-3 models: Proportional<br>M9220-HGx-3 models: Proportional adjustable   |
| Power requirements                            | AGx, HGx, GGx models | AC 24 V (19.2 V to 30 V) at 50/60 Hz: Class 2, 15.5 VA running, 7.7 VA holding position;<br>DC 24 V (21.6 V to 26.4 V): Class 2, 6.7 W running, 2.9 W holding position  |
|   | BAx models           | AC 120 V (AC 102 to 132 V) at 60 Hz: 0.25 A running, 0.13 A holding position  |
|   | BDx models           | AC 230 V (AC 198 to 264 V) at 50/60 Hz: 0.15 A running, 0.09 A holding position   |
|   | BGx models           | AC 24 V (19.2 to 30 V) at 50/60 Hz: Class 2, 24.6 VA running, 7.7 VA holding position;<br>DC 24 V (21.6 to 26.4 V): Class 2, 17.6 W running, 2.8 W holding position   |
| Transformer sizing requirements               | AGx, HGx, GGx models | 20 VA minimum per actuator  |
|   | Bxx models           | 25 VA minimum per actuator  |
| Input signal/adjustments                      | AGx models           | DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm resistor;<br>Switch selectable direct or reverse action with signal increase, 500 ms minimum pulse width  |
|   | GGx models           | Factory set DC 0 to 10 V, CW Rotation with signal increase;<br>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   |
|   | HGx models           | Factory set DC 0 to 10 V, CW rotation with signal increase;<br>selectable DC 0 to 10 V or 0 to 20 mA with field furnished 500 Ohm, 0.25 W minimum resistor;<br>start point programmable DC 0 to 10 V;<br>span programmable DC 2 to 10 V;<br>switch selectable direct or reverse action with signal increase |
| Control input impedance                       | GGx, HGx models      | Voltage input: 200,000 ohms;<br>Current input: 500 ohms with field furnished 500 ohm resistor   |
| Feedback signal                               | GGx models           | 0 (2) to 10 VDC for desired rotation range up to 90°;<br>corresponds to rotation limits, 1 mA maximum   |
|   | HGx models           | 0 to 10 VDC for desired rotation range up to 90°;<br>corresponds to rotation limits, 1 mA maximum   |
| Auxiliary switch rating                       | xxC Models           | Two Single-Pole, Double-Throw (SPDT), double-insulated switches with gold flash contacts:<br>AC 24 V, 50 VA pilot duty;<br>AC 120 V, 5.8 A resistive, 1/4 hp, 275 VA pilot duty;<br>AC 240 V, 5.0 A resistive, 1/4 hp, 275 VA pilot duty  |
| Spring return                                 |                      | Direction is selectable with mounting position of actuator:<br>Side A, actuator face away from damper for CCW spring return;<br>Side B, actuator face away from damper for CW spring return   |
| Running and spring return torque              |                      | 177 lb·in (20 N·m) for a single actuator;<br>354 lb·in (40 N·m) for two models mounted in tandem<br>531 lb·in (60 N·m) for three models mounted in tandem   |

## M9220 Series Electric Spring-Return Actuators

|   |   |  |
|---|---|--|
| Valid tandem combinations   |   | Two M9220-Bxx-3<br>Three M9220-AGx-3<br>One M9220-HGx-3 master with one or two M9220-GGx-3 subordinates<br>One M9220-GGx-3 master with one or two M9220-GGx-3 subordinates   |
| Rotation range  |   | Adjustable from 30° to 90° CW or CCW with optional M9220-603 Adjustable Stop Kit; mechanically limited to 90°  |
| Rotation time<br>Power on (running)   | AGx, HGx, GGx models                        | 150 seconds for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at all operating conditions; independent of load  |
|   | BGx models                                  | 24 to 57 seconds for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at all operating conditions; 35 seconds nominal at full rated load   |
| Rotation time<br>Power off (spring returning)                                       | AGx, HGx, GGx models                        | 20 seconds for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at room temperature  |
|   | BGx models                                  | 11 to 15 seconds for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at room temperature; 35 seconds maximum for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at -22°F (-30°C)<br>130 seconds maximum for 0 lb-in to 177 lb-in (0 N·m to 20 N·m) at -40°F (-40°C) |
| Cycles  |   | 60,000 full stroke cycles; 1,500,000 repositions   |
| Audible Noise Rating (AGx, HGx, GGx models)   | Power on (running)                          | < 40 dBA at 39-13/32 in. (1 m)   |
|   | Power on (holding)                          | < 20 dBA at 39-13/32 in. (1 m)   |
|   | Power off (spring returning)                | < 55 dBA at 39-13/32 in. (1 m)   |
| 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 in. to 3/4 in. or 12 mm to 19 mm diameter round shafts, or 3/8 in. and 1/2 in. or 10 mm, 12 mm, and 14 mm square shafts  |
|   | Optional M9220-600 Jackshaft Coupler Kit    | 3/4 in. to 1-1/16 in. or 19 mm to 27 mm diameter round shafts, or 5/8 in. and 3/4 in. or 16 mm, 18 mm, and 19 mm square shafts   |
| Aluminum enclosure  |   | NEMA 2 (IP54) for all mounting orientations  |
| Ambient conditions  | Operating                                   | -40°F to 131°F (-40°C to 55°C); 90% RH maximum, noncondensing  |
|   | Storage                                     | -85°F to 185°F (-65°C to 85°C); 95% RH maximum, noncondensing  |
| Dimensions  |   | See <a href="#">Dimensions</a> .   |
| 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)  |

## Patents

Patents: <https://jciapat.com>

## Product warranty

This product is covered by a limited warranty, details of which can be found at [www.johnsoncontrols.com/buildingswarranty](http://www.johnsoncontrols.com/buildingswarranty).

## Single point of contact

| APAC  | Europe   | NA/SA  |
|---|--|--|
| JOHNSON CONTROLS<br>C/O CONTROLS PRODUCT MANAGEMENT<br>NO. 32 CHANGJIANG RD NEW DISTRICT<br>WUXI JIANGSU PROVINCE 214028<br>CHINA | JOHNSON CONTROLS<br>VOLTAWEG 20<br>6101 XK ECHT<br>THE NETHERLANDS | JOHNSON CONTROLS<br>507 E MICHIGAN ST<br>MILWAUKEE WI 53202<br>USA |

