M9102-AGA-2S, -3S and M9104-xGA-2S, -3S Series Electric Non-Spring Return Actuators

Product Bulletin

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The M9102 and M9104 Series Actuators are direct-mount, non-spring return electric actuators that operate on AC 24 V power. These synchronous motor-driven actuators provide floating control (AGA), floating control with automatic shutoff (IGA), and proportional control with selectable 0-10 or 2-10 VDC (GGA). The -2S models are equipped with plenum cables, and the -3S models are equipped with terminal blocks.

All models are compact in size and are easily installed on Variable Air Volume (VAV) boxes, Variable Air Volume and Temperature (VVT) two-position zone applications, or small- to medium-sized dampers with a round shaft up to 1/2 in. (13 mm) in diameter or a 3/8 in. (10 mm) square shaft.

The M9102 Series Electric Non-Spring Return Actuators provide a running torque of 18 lb·in (2 N·m), and the nominal travel time is 30 seconds at 60 Hz (36 seconds at 50 Hz) for 90° of rotation.

The M9104 Series Electric Non-Spring Return Actuators provide a running torque of 35 lb·in (4 N·m), and the nominal travel time is 60 seconds at 60 Hz (72 seconds at 50 Hz) for 90° of rotation.

Figure 1: M9102/M9104 Series Electric Non-Spring Return Actuator

Table 1: Features and Benefits

Features	Benefits
Two Torques Available: 18 and 35 lb·in (2 and 4 N·m)	Offer the most suitable choice for the specific application
Short 30-Second Travel Time Available	Provides a quick response for two-position zone applications
35 dBA Nominal Audible Noise Rating	Meets the audible noise requirements for open ceiling environments
Synchronous Drive	Provides a constant rotation time that is independent of the load
100,000 Cycle Rating	Provides years of trouble-free service
Direct Shaft Mounting with Single-Screw Coupler	Reduces installation time and provides three-point shaft gripping
Magnetic Clutch	Protects the actuator gear train and the damper from damage due to excessive torque during a stall condition
Manual Gear Release	Simplifies actuator setup and adjustments in the field
Plenum Cable or Screw Terminal Electric Connections	Make wiring quick and easy
Floating, Floating with Timeout, and Proportional 0(2)...10 VDC Control Inputs Available	Offer a full range of control input options
Small, Compact Design	Allows installation in tight-fitting locations

Product Details

The M9102 and M9104 Series Electric Non-Spring Return Actuators are designed to position balancing, control, round, and zone dampers in Heating, Ventilating, and Air Conditioning (HVAC) systems. These electric actuators are also designed to position blades in a VAV box, or they can be used in VVT two-position zone applications.

Each actuator mounts directly to the surface in any convenient orientation using a single No. 10 self-drilling sheet metal screw (included with the actuator). No additional linkages or couplers are required. Electrical connections on the actuator are clearly labeled to simplify installation.

IMPORTANT: Use this M9102 or M9104 Series Electric Non-Spring Return Actuator only to control 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: Do not install or use this M9102 or M9104 Series Electric Non-Spring Return Actuator in or near environments where corrosive substances or vapors could be present. Exposure of the electric actuator to corrosive environments may damage the internal components of the device and will void the warranty.

IMPORTANT: Before specifying M9102 or M9104 Series Electric Non-Spring Return Actuators for plenum applications, verify acceptance of exposed plastic materials in plenum areas with the local building authority. Building codes for plenum requirements vary by location. Some local building authorities accept compliance to UL 1995, Heating and Cooling Equipment, while others use different acceptance criteria.

Operation

When combined with a VAV or VVT controller, the M9102 or M9104 Series Electric Non-Spring Return Actuator provides reliable, integrated damper control.

AGA Models

An AC 24 V input signal from the controller to the Clockwise (CW) or Counterclockwise (CCW) terminal on the electric actuator causes the motor to rotate in the proper direction, and moves the damper blades open or closed. When the controller stops sending the input signal, the electric actuator remains in place.

Note: Use a VAV or VVT controller and/or software that provides a timeout function at the end of rotation (stall) to avoid excessive wear or drive time on the actuator motor.

IGA Models

The IGA models operate in the same fashion as the AGA models, except the motor automatically shuts off after a time delay. IGA models can be used with controllers that apply a constant CW or CCW signal.

GGA Models

The GGA models accept a 0(2)...10 VDC command signal to position the Output hub. The actuator returns a 0-10 volt position indication on the Feedback signal. A selectable switch allows 0-10 VDC or 2-10 VDC commands and Reverse Acting/Direct Acting (RA/DA) operation.

Repair Information

If the M9102 or M9104 Series Electric Non-Spring Return Actuator fails to operate within its specifications, replace the unit. For a replacement electric actuator, contact the nearest Johnson Controls® representative.

Ordering Information

Table 2: Electric Non-Spring Return Actuator Models

Code Number	Control Type	Running Torque	Travel Time	Electrical Connections
M9102-AGA-2S	Floating	18 lb·in (2 N·m)	30 Seconds at 60 Hz	48 in. (1.2 m) UL 444 Type CMP Plenum Rated cable with 19 AWG (0.75 mm^2) conductors and .25 in. (6 mm) ferrule ends
M9102-AGA-3S	Floating	18 lb·in (2 N·m)	30 Seconds at 60 Hz	M3 Screw Terminals
M9104-AGA-2S	Floating	35 lb·in (4 N·m)	60 Seconds at 60 Hz	48 in. (1.2 m) UL 444 Type CMP Plenum Rated cable with 19 AWG (0.75 mm^2) conductors and .25 in. (6 mm) ferrule ends
M9104-AGA-3S	Floating	35 lb·in (4 N·m)	60 Seconds at 60 Hz	M3 Screw Terminals
M9104-IGA-2S	Floating or On/Off	35 lb·in (4 N·m)	60 Seconds at 60 Hz	48 in. (1.2 m) UL 444 Type CMP Plenum Rated cable with 19 AWG (0.75 mm^2) conductors and .25 in. (6 mm) ferrule ends
M9104-IGA-3S	Floating or On/Off	35 lb·in (4 N·m)	60 Seconds at 60 Hz	M3 Screw Terminals
M9104-GGA-2S	Proportional	35 lb·in (4 N·m)	60 Seconds at 60 Hz	48 in. (1.2 m) UL 444 Type CMP Plenum Rated cable with 19 AWG (0.75 mm^2) conductors and .25 in. (6 mm) ferrule ends
M9104-GGA-3S	Proportional	35 lb·in (4 N·m)	60 Seconds at 60 Hz	M3 Screw Terminals

Table 3: Accessories (Order Separately)

Code Number	Description
DMPR-KC003[1]	7 in. (178 mm) Blade Pin Extension without Bracket for Johnson Controls Direct-Mount Damper Applications
DMPR-KR003[1]	Sleeve Pin Kit for Johnson Controls Round Dampers with a 5/16 in. (8 mm) Diameter Shaft
M9000-200	Commissioning Tool that Provides a Control Signal to Drive 24 V On/Off, Floating, Proportional, and/or Resistive Electric Actuators
M9104-100	Connector for 3/8 in. (10 mm) flexible metal conduit

1. Furnished with the damper and may be ordered separately.

Dimensions

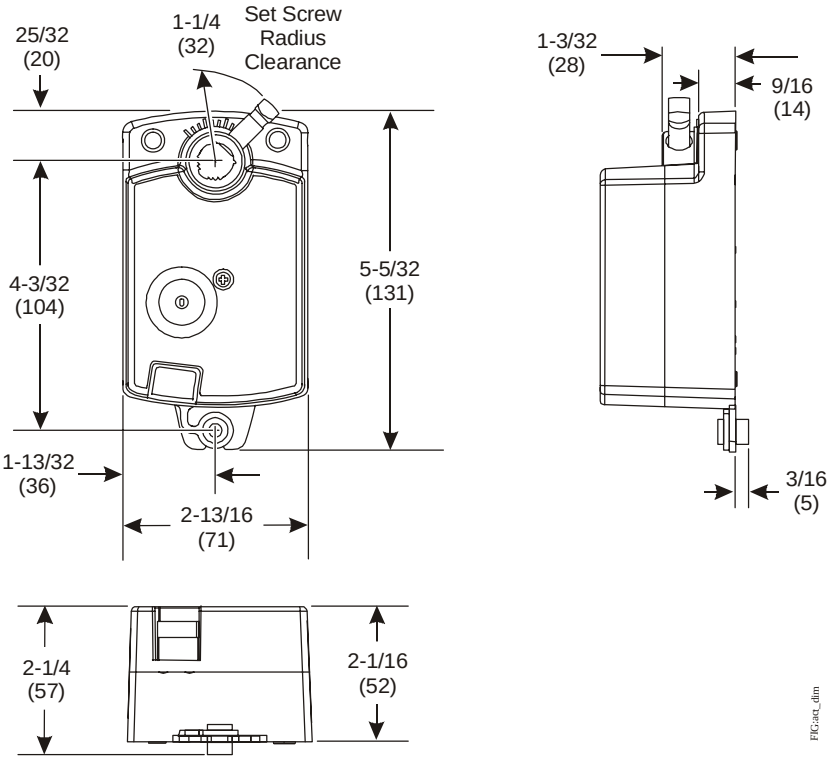

Figure 2: M9102/M9104 Series Electric Non-Spring Return Actuator Dimensions, in. (mm)

Technical Specifications

M9102-AGA-2S, -3S and M9104-xGA-2S, -3S Series Electric Non-Spring Return Actuators (Part 1 of 2)

Power Requirements	M910x-AGA-xS	AC 24 V +25%/-20% at 50/60 Hz, 2.1 VA, Class 2, Safety Extra-Low Voltage (SELV)
	M9104-IGA-xS	AC 24 V +25%/-20% at 50/60 Hz, 3.0 VA, Class 2, SELV
	M9104-GGA-xS	AC 24 V +25%/-20% at 50/60 Hz, 3.6 VA, Class 2, SELV
Control Type	M910x-AGA-xS	Floating Control without Timeout
	M9104-IGA-xS	Floating or On/Off Control with Timeout
	M9104-GGA-xS	Proportional Control
Input Signal	M910x-AGA-xS	AC 24 V +25%/-20% at 50/60 Hz, Class 2, SELV without Timeout
	M9104-IGA-xS	AC 24 V +25%/-20% at 50/60 Hz, Class 2, SELV with Timeout
	M9104-GGA-xS	0(2) to 10 VDC or 0(4) to 20 mA with field-furnished 500 ohm resistor
Feedback Signal	M9104-GGA-2S	0 to 10 VDC or 2 to 10 VDC for 90° (10 VDC at 1 mA) Corresponds to input signal span selection
Motor Input Impedance		200 ohms Nominal
Running Torque	M9102 Series	18 lb·in (2 N·m)
	M9104 Series	35 lb·in (4 N·m)
Travel Time	M9102 Series	30 Seconds at 60 Hz (36 Seconds at 50 Hz) for 90° of Rotation
	M9104 Series	60 Seconds at 60 Hz (72 Seconds at 50 Hz) for 90° of Rotation

M9102-AGA-2S, -3S and M9104-xGA-2S, -3S Series Electric Non-Spring Return Actuators (Part 2 of 2)

Rotation Range		93° ±3°, CW or CCW
Cycles		100,000 Full Stroke Cycles; 2,500,00 Repositions at Rated Running Torque
Audible Noise Rating		35 dBA Nominal at 39-13/32 in. (1 m)
Electrical Connections	M9102-AGA-2S M9104-xGA-2S	48 in. (1.2 m) UL 444 Type CMP Plenum Rated cable with 19 AWG (0.75 mm^2) conductors and .25 in. (6 mm) ferrule ends
	M9102-AGA-3S M9104-xGA-3S	M3 Screw Terminals
Mechanical Connections		Up to 1/2 in. (13 mm) Diameter Round Damper Shaft or 3/8 in. (10 mm) Square Damper Shaft
Enclosure	M9102-AGA-2S M9104-xGA-2S	NEMA 2, IP42
	M9102-AGA-3S M9104-xGA-3S	NEMA 1, IP40
Ambient Conditions	Operating	-4 to 140°F (-20 to 60°C); 90% RH Maximum, Noncondensing
	Storage	-20 to 150°F (-29 to 66°C); 90% RH Maximum, Noncondensing
Compliance	North America	UL Listed, File E27734, CCN XAPX (United States) and XAPX7 (Canada)
		Actuator Housing is Plenum Rated per CSA C22.2 No. 236/UL 1995, Heating and Cooling Equipment
	European Union	CE Mark, EMC Directive 89/336/EEC
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight		1.0 lb (0.5 kg)

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.

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