M9116, M9124, and M9132 Series Electric Non-spring Return Actuators

The M91xx Series includes M9116, M9124, and M9132 models. All of these direct-mount electric actuators operate on 24 VAC or VDC power. The M91xx actuators 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). They 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 M91xx model delivers up to 280 lb·in (32 N·m) of torque. Two AGx, GGx, or HGx models in tandem deliver twice the torque or 560 lb·in (64 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. Position feedback is available through switches, a potentiometer, or a 0 (2) to 10 VDC signal.



Figure 1: M91xx Series Actuator

Features and Benefits	
❑ **Five Torques: 140 to 560 lb·in (16 to 64 N·m)**	Offer the most suitable choice for the application
❑ **Four Control Inputs**	Meet the needs of most applications
❑ **Output Position Feedback**	Provides simple, closed-loop control with accurate position sensing
❑ **Electronic Stall Detection**	Ensures higher reliability by deactivating the actuator motor when a stall condition is detected
❑ **Master/Subordinate Operation**	Allows synchronized control for two actuators stacked for tandem applications
❑ **Zero and Span Adjustment (HGx Models)**	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
❑ **Jumper-selectable Rotation Direction and Manual Gear Release**	Simplify installation, setup, and field adjustments
❑ **NPT Threaded Housing**	Provides easy connection for electrical fittings

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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.

M91xx actuators are designed to position air dampers and valves in HVAC systems. Applications include:

- positioning return air or exhaust dampers
- controlling face and bypass dampers
- positioning blades for variable volume fans
- positioning VF Series butterfly valves
- positioning VG1000 Series ball valves

Two of the following models provide twice the amount of running torque of a single unit when mounted in tandem: M9116-GGx or HGx; M9124-AGx, GGx, or HGx; and M9132-AGx or GGx.

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

Operation

IMPORTANT: The M91xx Series actuator is intended to control equipment under normal operating conditions. Where failure or malfunction of an M91xx 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 M91xx actuator must be incorporated into and maintained as part of the control system.

M91xx 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, HGx, and JGx 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. Pressing the spring-loaded gear release on the actuator cover disengages the gear train for manual repositioning of the coupler.

Dimensions

See Figure 2 for actuator dimensions.

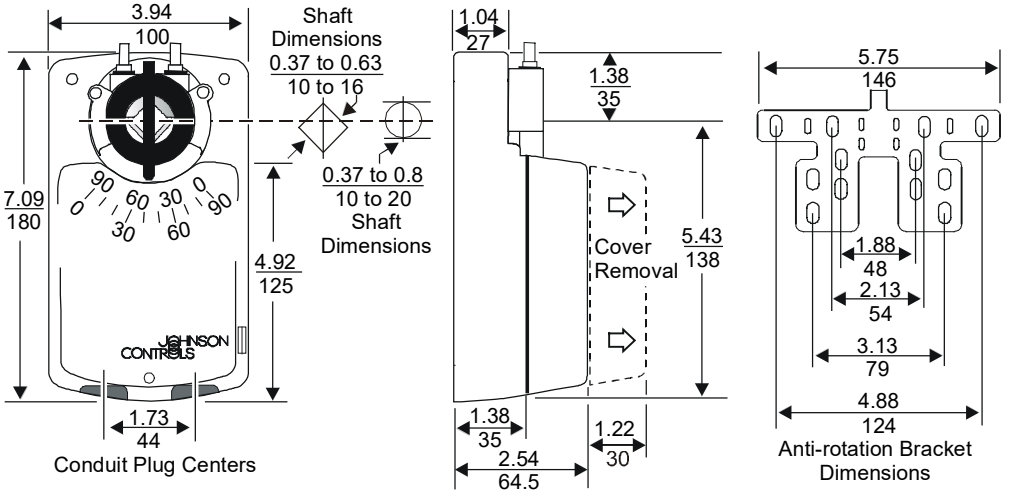

Figure 2: Actuator and Anti-rotation Bracket Dimensions, in. (mm)

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

M91xx Series Electric Non-spring Return Actuators	140 lb·in (16 N·m)									210 lb·in (24 N·m)										280 lb·in (32 N·m)				
	M9116-AGA-2	M9116-AGC-2	M9116-AGD-2	M9116-AGE-2	M9116-GGA-2	M9116-GGC-2	M9116-HGA-2	M9116-HGC-2	M9116-JGA-2	M9116-JGC-2	M9124-AGA-2	M9124-AGC-2	M9124-AGD-2	M9124-AGE-2	M9124-GGA-2	M9124-GGC-2	M9124-HGA-2	M9124-HGC-2	M9124-JGA-2	M9124-JGC-2	M9132-AGA-2	M9132-AGC-2	M9132-AGE-2	M9132-GGA-2	M9132-GGC-2
On/Off Control	■	■	■	■							■	■	■	■							■	■	■		
Floating Control	■	■	■	■							■	■	■	■							■	■	■		
Proportional Control					■	■	■	■							■	■	■	■						■	■
VDC and mA Input with Zero and Span							■	■									■	■							
Resistive Input Control									■	■									■	■					
Feedback																									
135 ohm Potentiometer			■										■												
1,000 ohm Potentiometer				■										■									■		
0 to 10 VDC					■	■	■	■	■	■					■	■	■	■	■	■				■	■
2 Auxiliary Switches		■				■		■		■		■				■		■		■		■			■
Tandem Operation					■	■	■	■			■	■	■	■	■	■	■	■			■	■	■	■	■

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

Table 2: Accessories

Product Code Number	Description
DMPR-KR003	Square Head Blade Pin Extension without bracket for Johnson Controls CD-1300 direct mount applications **Note:** Available with damper and may be ordered separately
DMPR-KC011	Hex Head Blade Pin Extension without bracket
DMPR-KC012	Hex Head Blade Pin Extension with bracket
DMPR-KC210	Damper Jackshaft 1 in. diameter, 1 panel
DMPR-KC211	Damper Jackshaft 1 in. diameter, 2 panel
DMPR-KC212	Damper Jackshaft 1 in. diameter, 3 panel
DMPR-KC213	Damper Jackshaft 1/ 2 in. diameter, 1 panel
DMPR-KC214	Damper Jackshaft 1/ 2 in. diameter, 1 panel
M9000-103	14 VA Transformer, 120/24 VAC, 60 Hz, Class 2
M9000-104	14 VA Transformer, 230/24 VAC, 60 Hz, Class 2
M9000-105	Pluggable 3-terminal block
M9000-151	Base Mount Linkage Kit for remote inside duct mounting (not intended for M9132 actuators or any tandem application)
M9000-153	Crank Arm Kit for remote mounting (not intended for M9132 actuators or any tandem application)
M9000-154	1 in. Jackshaft Coupler Kit for mounting on a 1 in. diameter damper shaft
M9000-155	Manual handle for positioning a damper or valve when power is removed from an M91xx actuator
M9000-158	Mounting Kit to tandem mount two M9116 GGx or HGx; two M9124 AGx, GGx or HGx models; or two M9132 AGx or GGx models on a damper
M9000-160	Replacement anti-rotation bracket for M91xx Series actuators
M9000-518	Valve Linkage Kit for mounting M9124 actuators to 2-1/2 to 6 in. VG1xA5 Series flange body ball valves

Technical Specifications

Product	M91xx Series Electric Non-spring Return Actuators
Power Requirements	M9116-AGx: AC 20 to 30 V at 50/60 Hz or DC 24 V ±10%; 6.5 VA supply minimum All Other Models: AC 20 to 30 V at 50/60 Hz or DC 24 V ± 10%; 7.5 VA supply minimum
Input Signal	AGx: V 24 AC at 50/60 Hz or DC 24 V GGx, HGx: DC 0 (2) to 10 V, DC 0 (4) to 20 V, or DC 0 (4) to 20 mA JGx: Potentiometer value is 100 ohms minimum to 10,000 ohms maximum
Input Signal Adjustments	AGx: Factory Setting, Terminals 1 and 2, CW rotation; Terminals 1 and 3, CCW rotation GGx, HGx (Voltage Input or Current Input): Jumper selectable: DC 0 (2) to 10 V, DC 0 (4) to 20 V, or DC 0 (4) to 20 mA Adjustable: Zero, DC 0 to 6 V, DC 0 to 12 V, or DC 0 to 12 mA Span, DC 2 to 10 V, DC 4 to 20 V, or 4 to 20 mA Factory Setting: DC 0 to 10 V, DC 0 to 20 mA, CW rotation with signal increase GGx, HGx, and JGx: Action is jumper selectable Direct (CW) or Reverse (CCW) with signal increase.
Input Impedance	GGx, HGx: 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 JGx: 1.8 Megohms
Feedback Signal	AGD: 135 ohm feedback potentiometer AGE: 1,000 ohm feedback potentiometer GGx, HGx: DC 0 to 10 V or DC 2 to 10 V for 90° (10 VDC at 1 mA) corresponds to input signal span selection JGx: 0 to 10 VDC for 90° (10 VDC at 1 mA)
Auxiliary Switch Rating	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
Mechanical Output (Running Torque)	M9116: 140 lb·in (16 N·m) for one unit, 280 lb·in (32 N·m) for two in tandem (GGx, HGx) M9124: 210 lb·in (24 N·m) for one unit, 420 lb·in (48 N·m) for two in tandem (AGx, GGx, HGx) M9132: 280 lb·in (32 N·m) for one, 560 lb·in (64 N·m) for two in tandem (AGx, GGx)
Audible Noise Rating	45 dBA at 1 m
Rotation Range	0 to 90° in 5-degree increments, mechanically limited to 93° - rotation range is adjusted by repositioning the output hub
Rotation Time	M9116: 80 seconds at 50% rated load, 70 to 115 seconds for 0 to 140 lb·in (0 to 16 N·m) M9124: 130 seconds at 50% rated load, 115 to 175 seconds for 0 to 210 lb·in (0 to 24 N·m) M9132: 140 seconds at 50% rated load, 115 to 205 seconds for 0 to 280 lb·in (0 to 32 N·m)
Electrical Connection	M9124-, M9132-AGx: 1/4 in. spade terminals with pluggable 3-terminal blocks All Other Models: Screw terminals for 22 to 14 AWG; maximum of two 18, 20, or 22 AWG per terminal
Mechanical Connection	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 1 in. (25.4 mm) diameter jackshift with M9000-154 coupler
Enclosure	NEMA 2, IP42
Ambient Conditions	Operating: -4 to 122°F (-20 to 50°C); 0 to 95% RH, non-condensing Storage: -40 to 186°F (-40 to 86°C); 0 to 95% RH, non-condensing
Dimensions (H x W x D)	7.09 x 3.94 x 2.54 in. (180 x 100 x 64.5 mm)
Shipping Weight	2.9 lb (1.3 kg)
Agency Compliance	**United States:** UL Listed, CCN XAPX, File E27734; to UL 873, the Standard for Temperature Indicating and Regulating Equipment, Eleventh Edition
	Canada: UL Listed, CCN XAPX7, File E27734; Canadian Standard C22.2 NO. 24-93, Standard for Temperature Indicating and Regulating Equipment, Eighth Edition
CE	**Europe:** CE Mark - Johnson Controls, Inc. 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 Emissions Compliant (Models: All M9220-xGx and M9220-xDx)

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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