M9106-xGx-2 Series Electric Non-spring Return Actuators

The M9106-xGx-2 Series direct-mount electric actuators operate on 24 VAC power and are available for use with on/off, floating, or proportional controllers. These non-spring return actuators are easily installed on a Variable Air Volume (VAV) box, a damper with a round shaft up to 1/2 inch (13 mm) in diameter, or a square shaft up to 3/8 inch (10 mm).

The M9106 models have 53 lb·in (6 N·m) running torque. They have a nominal 60-second travel time for 90° of rotation at 60 Hz (72 seconds at 50 Hz) with a load-independent rotation time.

The M9106-xGC-2 models are available with integral auxiliary switches to perform switching functions at any angle within the selected rotation range. GGx models feature 0 to 10 VDC position feedback, and the AGF models provide 10,000 ohm position feedback.

Figure 1: M9106-xGx-2 Non-spring Return Actuator

Features and Benefits	
❑ **35 dBA Rating**	Meets audible requirements for open ceilings
❑ **Synchronous Drive**	Provides constant rotation time independent of load
❑ **Direct Shaft Mount with Single-screw Coupler**	Simplifies installation and provides 3-point shaft gripping
❑ **Magnetic Clutch**	Provides torque protection for the damper and actuator
❑ **Field-selectable Rotation Time (IGx Models Only)**	Replaces M9104, EDA-2040, and ATP-2040 actuators and provides optimum rotation time for the specific application
❑ **Jumper-selectable Rotation Direction (GGx Models Only)**	Simplifies installation
❑ **Adjustable Rotation Stops**	Allow application versatility with 30 to 90° Clockwise (CW) or Counterclockwise (CCW) rotation
❑ **1/2 in. NPT Threaded Conduit Opening**	Meets electrical code requirements and allows the use of armored cable
❑ **Manual Gear Release**	Simplifies setup and field adjustments
❑ **Output Position Feedback**	Provides simple, closed-loop control with accurate position sensing

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.

The M9106 actuators are used to position balancing, control, round, and zone dampers in typical Heating, Ventilating, and Air Conditioning (HVAC) applications. They are also used to position the blades in a VAV box.

The M9106 mounts directly on the duct surface, round damper, or small rectangular damper with an anti-rotation bracket and two sheet metal screws (included). Additional linkages or couplers are not required.

Refer to the damper or VAV box manufacturer's information to select the proper timing for the actuator. Refer to the appropriate application note for specific wiring diagrams and information.

Operation

IMPORTANT: The M9106-xGx-2 Series actuator is intended to control equipment under normal operating conditions. Where failure or malfunction of an M9106-xGx-2 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 M9106-xGx-2 actuator must be incorporated into and maintained as part of the control system.

A controller provides a control signal to the actuator depending upon the desired movement of the damper blade. This signal causes the motor to rotate in the proper direction and the damper blade to open or close.

Note: To avoid excessive wear or drive time on the motor for the AGx models, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall). The GGx and IGx models have an auto shutoff to avoid excessive wear or drive time on the motor.

The actuator rotates at a nominal rate of 1.5° per second (90° in 60 seconds) at 60 Hz input. The actuator rotation is field adjustable from 30 to 90°. Determine the actual rotation time for actuators using less than 90° rotation, and use that value with the controller software. For example, 40 seconds is used for 60° rotation.

The IGA and IGC models offer adjustable rotation times of 1, 1.5, 2, 5.5 and 11 minutes (factory set for 1 minute). The 1-, 1.5-, and 2-minute settings are ideal for on/off and floating applications, and replace the M9104-xGx-2 1.5-minute models. The 5.5- and 11-minute settings are replacements for the 35 lb·in (4 N·m) EDA-2040 and the ATP-2040 models.

Dimensions

See Figure 2 for the actuator dimensions.

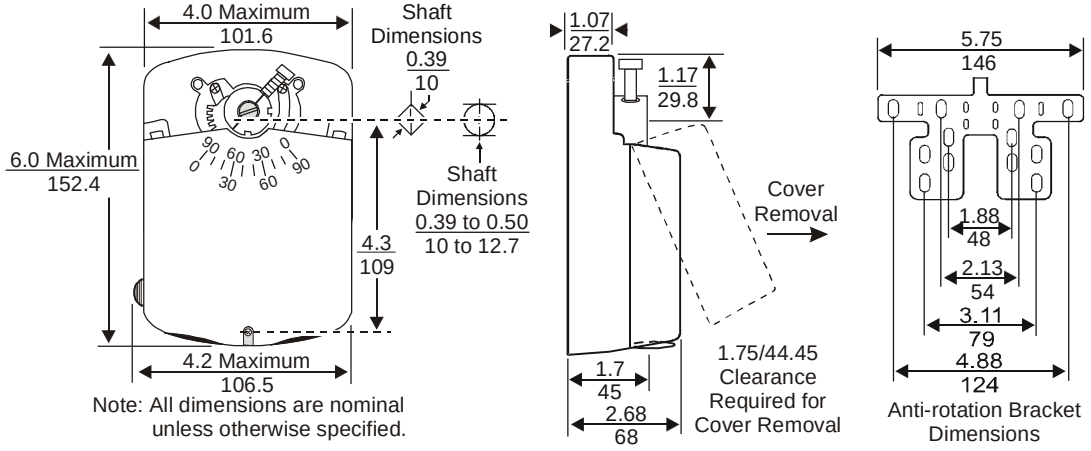

Figure 2: Actuator and Anti-rotation Bracket Dimensions, in. (mm)

Repairs and Replacement

Field repairs must not be made. For 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 Table 2.

Table 1: Actuators

M9106-xGx-2 Series Electric Actuator 53 lb·in (6 N·m)	M9106-AGA-2	M9106-AGC-2	M9106-AGF-2	M9106-GGA-2	M9106-GGC-2	M9106-IGA-2	M9106-IGC-2
On/Off Control						■	■
Floating Control	■	■	■			■	■
Proportional Control				■	■		
Feedback							
10,000 ohm Potentiometer			■				
0 to 10 VDC Feedback				■	■		
2 Auxiliary Switches		■			■		■
Adjustable Rotation Time						■	■

Table 2: Accessories

Product Code Number	Description
CBL-2000-1	20 in. (0.5 m) Wiring Harness, Underwriter's Laboratories, Inc® (UL) accepted for plenum use, connects the M9106 and DPT-2015 to the VAV controller **Note**: Use with an M9106-AGC-2 actuator to replace an ATP-2040 actuator and an EDA-2040-102 switch kit. An external relay (not provided) is needed for line voltage auxiliary switching.
CBL-2000-2	20 in. (0.5 m) plenum-rated Wiring Harness
CBL-2000-3	72 in. (1.8 m) plenum-rated Wiring Harness
DPT-2015-0	0 to 1.5 in. W.C. (0 to 375 Pa) differential pressure transmitter **Note**: Use with an M9106-AGC-2 actuator to replace an ATP-2040 actuator and an EDA-2040-102 switch kit. An external relay (not provided) is needed for line voltage auxiliary switching.
DMPR-KC003	Blade Pin Extension without Bracket supplied with Johnson Controls® CD-1300 dampers and may be ordered separately for all direct mount applications
DMPR-KC010	Adjustable Blade Position Indicator Switch Kit with total switching load limited to 2000 VA for the following applications: Pilot Duty: 24 VAC, 50 VA; 125/250/277 VAC, 125 VA; Motor Load: 125/250/277 VAC, 1/3 hp; Resistive Load: 125 VAC, 11 A; 250 VAC, 8 A; 277 VAC, 7 A (all maximum values) **Note:** Use with an M9106 actuator to replace an EDA-2040 or ATP-2040 actuator and an EDA-2040-102 switch kit when line voltage switches are required and an external relay is not desired.
DMPR-KC011	Hex Head Blade Pin Extension without Bracket
DMPR-KC012	Hex Head Blade Pin Extension with Bracket
DMPR-KC013	Damper Jackshift 1/2 in. Diameter, 1 Panel
DMPR-KC014	Damper Jackshift 1/2 in. Diameter, 2 Panel
M9000-105	Pluggable 3-Terminal Block
M9000-106	Pluggable 4-Terminal Block
M9000-160	Replacement anti-rotation bracket for M9106 Series actuators
M9000-520	Valve Linkage Kit for field mounting an M9106 Series actuator to a 1/2 in. (DN15) to 1-1/2in. (DN40) VG1000 Series ball valve

Technical Data

Product	M9106-xGx-2 Series Electric Non-spring Return Actuators
Power Requirements	AGx: 20 to 30 VAC at 50/60 Hz; 2.5 VA supply, Class 2 IGx: 20 to 30 VAC at 50/60 Hz; 2.8 VA supply, Class 2 GGx: 20 to 30 VAC at 50/60 Hz; 3.2 VA supply, Class 2
Input Signal	AGx and IGx: 20 to 30 VAC at 50/60 Hz GGx: DC 0 to 10 V or DC 0(4) to 20 mA proportional
Input Signal Adjustments	AGx and IGx: CW and COM Terminals, CW rotation; CCW and COM Terminals, CCW rotation GGx (Voltage Input or Current Input): Jumper Selectable: 0 (2) to 10 VDC or 0 (4) to 20 mA Factory Setting: 0 to 10 VDC, CW rotation with signal increase Action is jumper selectable Direct (CW) or Reverse (CCW) with signal increase.
Input Impedance	AGx: 200 ohms, nominal IGx: 160 ohms, nominal GGx: Voltage Input, 150,000 ohms; Current Input, 500 ohms
Feedback Signal	AGF: 10,000 ohm potentiometer, 1 W GGx: DC 0 to 10 V or DC 2 to 10 V for 90° (1 mA); Corresponds to input signal span selection
Auxiliary Switch Rating	xGC: Two Single-Pole, Double-Throw (SPDT) switches rated at 24 V, 1.5 A inductive, 3.0 A resistive; 35 VA maximum per switch, Class 2
Mechanical Output (Running Torque)	1-, 1.5-, and 2-minute settings: 53 lb·in (6 N·m) 5.5- and 11-minute settings: 35 lb·in (4 N·m)
Cycles	100,000 full cycles; 2,500,000 repositions rated at 53 lb·in (6 N·m)
Audible Noise Rating	35 dBA maximum at 39.4 (1 m)
Rotation Range	Adjustable from 30 to 90°, CW or CCW
Rotation Time	IGx: Adjustable with switch settings (Factory set for 1 minute.) 60, 90, 120, 330, or 660 seconds (1, 1.5, 2, 5.5, or 11 minutes) at 60 Hz; and 72, 108, 144, 396, or 792 seconds (1.2, 1.8, 2.4, 6.6, or 13.2 minutes) at 50 Hz All Other Models: Nominal 60 seconds at 60 Hz and 72 seconds at 50 Hz for 90°
Electrical Connection	1/4 in. spade terminals (To order optional pluggable terminal blocks, see Table 2.)
Mechanical Connection	3/8 to 1/2 in. (10 to 12.7 mm) round shaft or 3/8 in. (10 mm) square shaft
Enclosure	NEMA 2, IP32
Ambient Operating Conditions	-4 to 125°F (-20 to 52°C); 90% RH maximum, non-condensing
Ambient Storage Conditions	IGx: -40 to 186°F (-40 to 86°C); 90% RH maximum, non-condensing All Other Models: -40 to 176°F (-40 to 80°C); 90% RH maximum, non-condensing
Dimensions (H x W x D)	5.9 x 4.2 x 2.64 in. (150.1 x 106.5 x 67.0 mm)
Shipping Weight	2.4 lb (1.08 kg)
Agency Compliance	UL 873 Listed, File E27734, CCN XAPX CSA C22.2 No. 139 Certified, File LR85083, Class 3221 02 CE Mark, EMC Directive 2004/108/EC

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.