

M9104-AGx-2N Electric Non-spring Return Actuators

The M9104-AGA-2N synchronous motor-driven actuator provides floating (3-wire) control and is easily installed on a Variable Air Volume (VAV) box, or a small- or medium-sized damper with a round shaft up to 1/2 inch (13 mm) in diameter or a 3/8 inch (10 mm) square shaft.

This compact, non-spring return actuator has a 35 lb·in (4 N·m) running torque and 40 lb·in (4.5 N·m) minimum stall torque in a compact easy-to-install package. It has a nominal 90-second travel time at 60 Hz (108 seconds at 50 Hz) for 90° of rotation.

The M9104-AGS-2N Actuator/Transmitter combines an M9104-AGA-2N with a prewired DPT-2015 Differential Pressure Transmitter that has a 0 to 1.5 inch W.C. (0 to 374 Pa) differential pressure range.



Figure 1: M9104-AGS-2N Non-spring Return Actuator

Features and Benefits	
☐ 30 dBA Rating	Meets audible requirements for open ceilings
☐ Synchronous Drive	Provides constant rotation time independent of load
☐ 100,000 Cycle Rating	Extends actuator life due to improved technology
☐ Direct Shaft Mount with Single-Screw Coupler	Simplifies installation and provides three-point shaft gripping
☐ Magnetic Clutch	Provides torque protection for the actuator gear train and damper
☐ Adjustable Rotation Stops	Allow application versatility with 30 to 90° Clockwise (CW) or Counterclockwise (CCW) rotation
☐ Manual Gear Release	Simplifies setup and field adjustments
☐ Screw Terminal Connection	Makes wiring easy

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 M9104-AGx-2N actuator is used to position balancing, control, round, and zone dampers in typical Heating, Ventilating, and Air Conditioning (HVAC) applications. It is also used to position the blades in a VAV box.

The actuator mounts directly to the surface of a VAV box, round damper, or small rectangular damper with a single No. 10 self-drilling sheet metal screw (included). There are no additional linkages or couplers required. Clearly labeled electrical terminals simplify installation. Refer to the damper or VAV box manufacturer's information to select the proper timing for the actuator.

Operation

IMPORTANT: The M9104-AGx-2N Series actuators are intended to control equipment under normal operating conditions. Where failure or malfunction of an M9104-AGx-2N 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 the M9104-AGx-2N actuator must be incorporated into and maintained as part of the control system.

When combined with a VAV controller, the actuator provides reliable, integrated damper control. See the *M9104-AGx-2N Electric Non-spring Return Actuators Application Note (LIT-2681110)* for various configurations with and without the DPT-2015 differential pressure transmitter.

A 24 VAC signal from the controller to the CW or CCW terminal of the actuator causes the motor to rotate in the proper direction, and moves the damper blades open or closed. When the controller stops sending the signal, the actuator remains in place.

Note: To avoid excessive wear or drive time on the motor, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall).

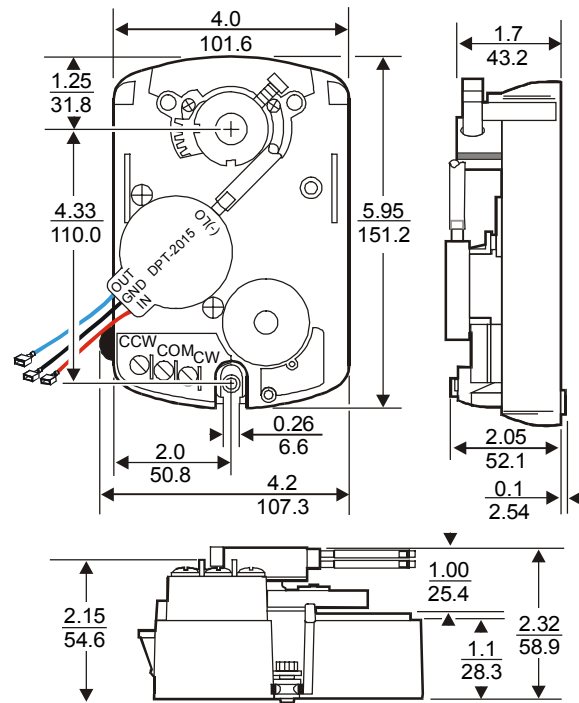
The actuator rotates at a nominal rate of 1° per second (90° in 1.5 minutes). The actuator rotation is field adjustable from 30 to 90°. Determine the actual rotation time for actuators using less than 90° rotation, and use that value with the controller software. For example, use 1 minute for 60° rotation.

The M9104-AGS-2N includes the 20 in. (0.5 m) CBL-2000-1 Wiring Harness and the DPT-2015, which is connected to the airflow pickup device of the VAV box. The DPT-2015 measures differential pressure and generates a proportional 0.5 to 4.5 VDC signal. The voltage signal from the DPT-2015 is read by the VAV controller and converted to airflow in cubic feet per minute (cfm). The wiring harness is used to connect the transmitter and actuator to the VAV Series controller for simplified installation.

Only zero calibration is required, which is performed within the controller. The VAV controller must be provided with the correct "K" factor and VAV box size to perform the calculations. Refer to the *HVAC PRO User's Guide, Appendix B: VAV Controller Flow Calculation Constants (LIT-6375185)*.

Dimensions

See Figure 2 for the actuator and differential pressure transmitter.



Note: All dimensions are nominal unless otherwise specified.

Figure 2: M9104-AGS-2N, in. (mm)

Ordering Information

Table 1: Products Available

Product Code Number	Description
M9104-AGA-2N	35 lb in (4 N m) Electric non-spring return actuator with floating control
M9104-AGS-2N	35 lb in (4 N m) Electric non-spring return actuator with floating control (includes the DPT-2015 and CBL-2000-1)
CBL-2000-1	20 in. (0.5 m) wiring harness, Underwriters Laboratories®, Inc. (UL) accepted for plenum use, supplied with the M9104-AGS-2N and may be ordered separately; connects the M9104 and DPT-2015 to the VAV controller
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 374 Pa) differential pressure transmitter supplied with the M9104-AGS-2N and may be ordered separately
DMPR-KC003	Blade Pin Extension without Bracket supplied with D-1300 dampers and may be ordered separately
DMPR-KR003	Sleeve Pin Kit supplied with round dampers that have a 5/16 in. (8 mm) shaft and may be ordered separately
M9000-200	Commissioning Tool provides a control signal to drive on/off, floating, proportional, or resistive actuators.

Technical Specifications

Product	M9104-AGx-2N Electric Non-spring Return Actuators	
Power Requirements	M9104-AGx-2N:	20 to 30 VAC at 50/60 Hz, 2.1 VA supply, Class 2
	DPT-2015:	15 VDC (14.5 to 17 VDC) unregulated; 15 mA maximum
Input Signal	M9104-AGx-2N:	24 VAC (20 to 30 VAC) at 50/60 Hz
Motor Input Impedance	M9104-AGx-2N:	250 ohms, nominal
DPT-2015-0	Pressure Range:	0 to 1.5 in. W.C. (0 to 374 Pa)
	Over Pressure Limit:	15 in. W.C. (3.74 kPa)
	Output Voltage:	0.5 to 4.5 VDC with 25,000 ohm minimum load impedance
Mechanical Output	Running Torque:	35 lb-in (4 N·m)
Cycles	100,000 full cycles; 2,500,000 repositions rated at 35 lb-in (4 N·m)	
Audible Noise Rating	30 dBA maximum at 1 m	
Rotation Range	Adjustable from 30 to 90°, CW or CCW	
Rotation Time	Nominal 90 seconds at 60 Hz for 90° Nominal 108 seconds at 50 Hz for 90°	
Electrical Connection	No. 6-32 screw terminals on the M9104 actuator; 1/4 in. spade terminals on the DPT-2015	
Pressure Connection	6 in. (152 mm) length of silicone tubing with barbed fittings for 1/4 in. (6.35 mm) O.D. tubing	
Enclosure	NEMA 1, IP30	
Ambient Operating Conditions	M9104-AGA-2N:	32 to 125°F (0 to 52°C); 90% RH maximum, noncondensing
	M9104-AGS-2N:	32 to 125°F (0 to 52°C); 90% RH maximum, noncondensing 60 to 100°F (16 to 38°C); 90% RH maximum, noncondensing for DPT rated accuracy, see <i>DPT-2015 Differential Pressure Transmitter for VAV Box Applications Installation Instructions</i> (Part No. 24-7547-18).
Ambient Storage Conditions	-20 to 150°F (-29 to 66°C); 90% RH maximum, noncondensing	
Dimensions (H x W x D)	M9104-AGA-2N:	5.95 x 4.2 x 2.15 in. (151.2 x 107.3 x 54.6 mm)
	M9104-AGS-2N:	5.95 x 4.2 x 2.32 in. (151.2 x 107.3 x 58.9 mm) with the DPT-2015
Shipping Weight	M9104-AGA-2N:	2.0 lb (0.91 kg)
	M9104-AGS-2N:	2.2 lb (0.99 kg) with the DPT-2015
Agency Compliance (M9104)	UL 873 Listed, File E27734, CCN XAPX CSA Certified C22.2 No. 139, File LR85083, Class 3221 02 CE Mark, EMC Directive 89/336/EEC	

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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