34-636-2502, Rev. -
(barcode for factory use only)

M9320 and M9335 Series Electric Non-Spring Return Actuators

Installation Instructions

M9320-AUA-2, M9320-HGA-2,
M9335-AUA-2, M9335-HGA-2

Part No. 34-636-2502, Rev. —
Issued May 2017

Refer to the QuickLIT website for the most up-to-date version of this document.

Applications

IMPORTANT: Use this M9320 or M9335 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.

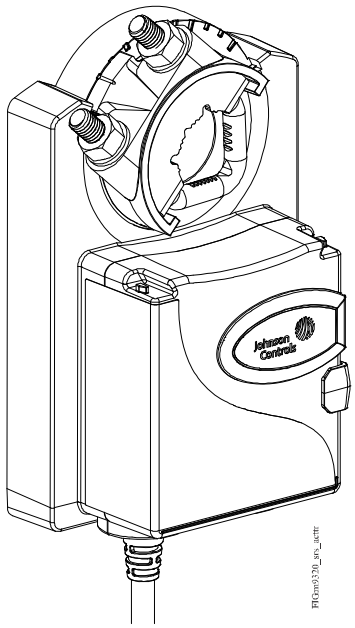
IMPORTANT : Utiliser ce M9320 or M9335 Series Electric Non-Spring Return Actuator uniquement pour commander des équipements dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du electric actuator risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du electric actuator.

Installation

Parts Included

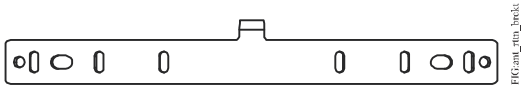
- M9320 or M9335 Series Electric Actuator

Figure 1: M9320 or M9335 Series Electric Actuator



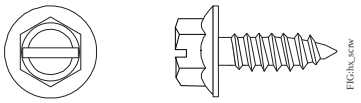
- anti-rotation bracket

Figure 2: Anti-Rotation Bracket



- No. 8 x 0.625 in. (16 mm) long self-tapping, hex washer-head screw

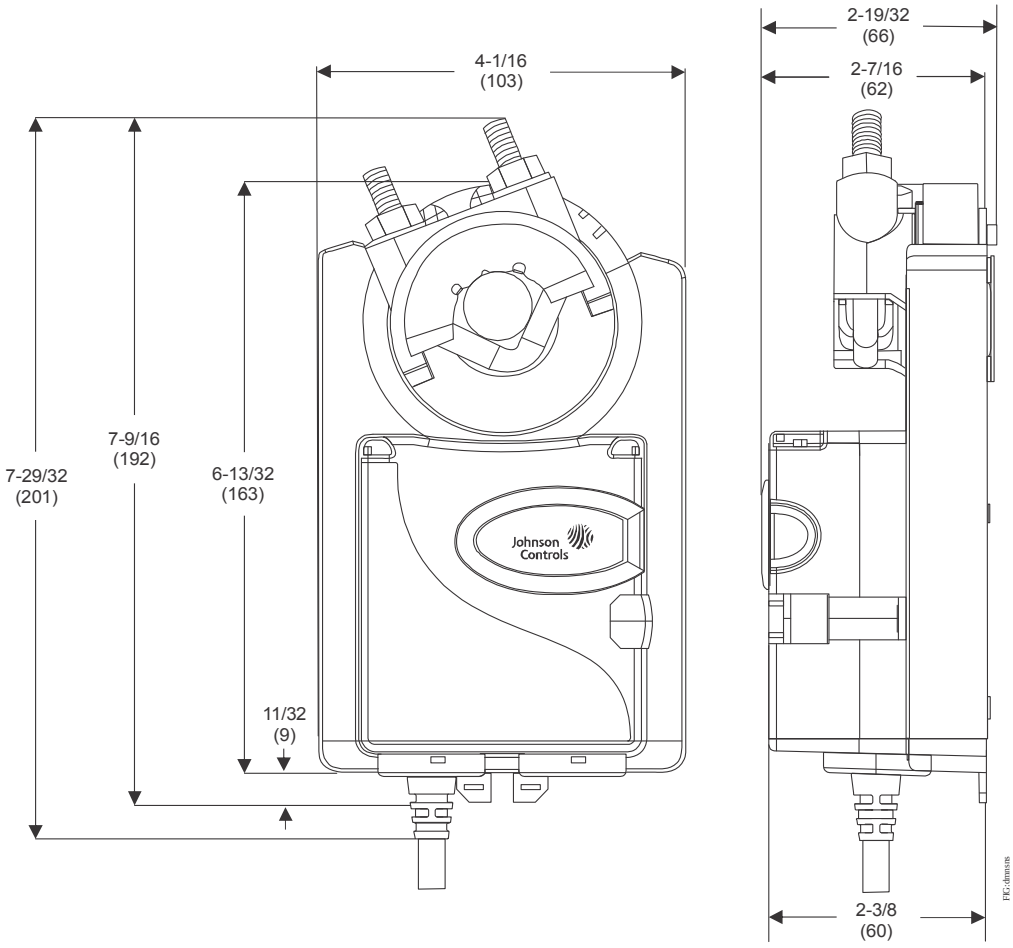
Figure 3: Self-Tapping Hex Washer-Head Screw



Special Tools Needed

- torque wrench with 1/2 in. (13 mm) socket, or 1/2 in. (13 mm) open-end wrench
- 1/4 in. (6 mm) nut driver
- digital voltmeter

Figure 4: M9320 and M9335 Series Actuator Dimensions, in. (mm)



Accessories

Table 1: Accessories (Order Separately)

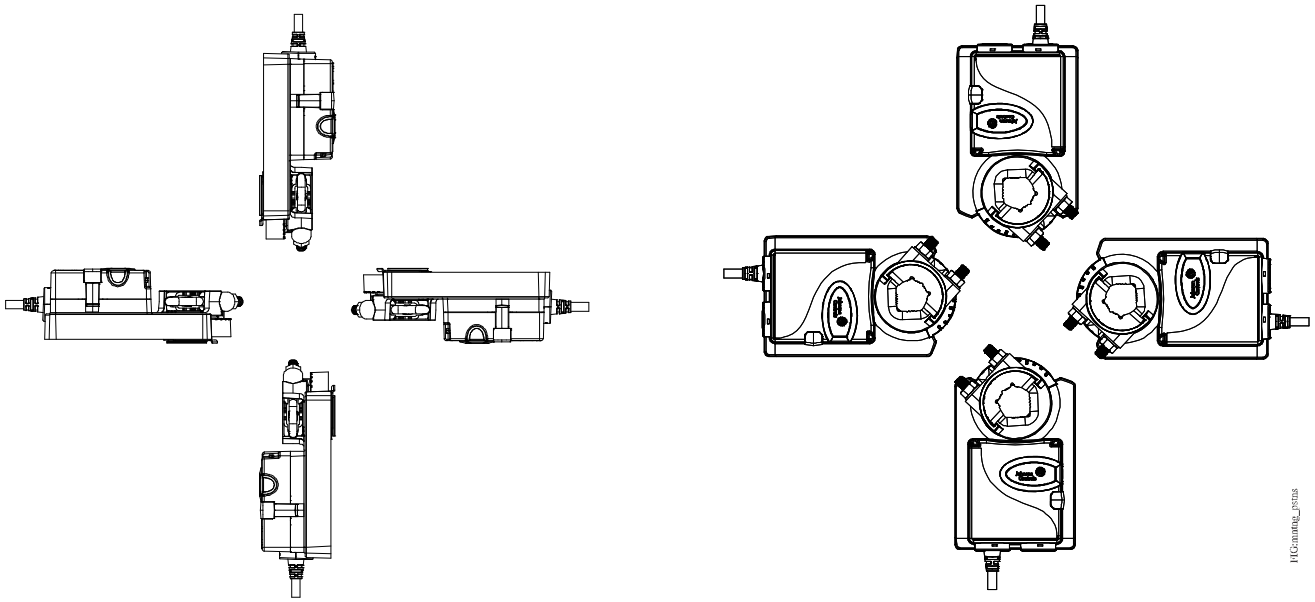
Code Number	Description
M9000-158	Tandem mounting bracket for mounting two M9335 Series Electric Actuators
M9000-323	NEMA 4X, IP66 weathershield kit for electric damper actuator applications
M9000-400	Jackshaft linkage kit
M9000-604	Replacement anti-rotation bracket kit
M9000-606	Position indicator (five per kit)
M9300-1	External auxiliary switch kit; one single-pole, double-throw (SPDT)
M9300-2	External auxiliary switch kit; two SPDT
M9300-100	Threaded conduit adapters for 1/2 in. (13 mm) electrician's fittings (five per kit)
M9300-140	External auxiliary feedback potentiometer, 140 ohm (optional for 140 ohm position feedback)
M9300-1K	External auxiliary feedback potentiometer, 1k ohm (optional for 1k ohm position feedback)
M9300-2K	External auxiliary feedback potentiometer, 2k ohm (optional for 2k ohm position feedback)
M9300-10K	External auxiliary feedback potentiometer, 10k ohm (optional for 10k ohm position feedback)

Repair Information

If the M9320 or M9335 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.

Mounting

Figure 5: Actuator Mounting Positions



Adjusting the Angular Rotation Stops

Figure 6: Removing the Clip

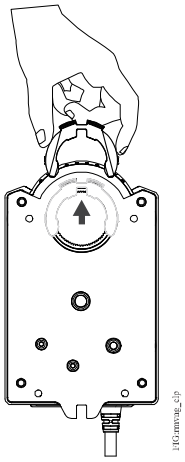


Figure 7: Removing the Coupler

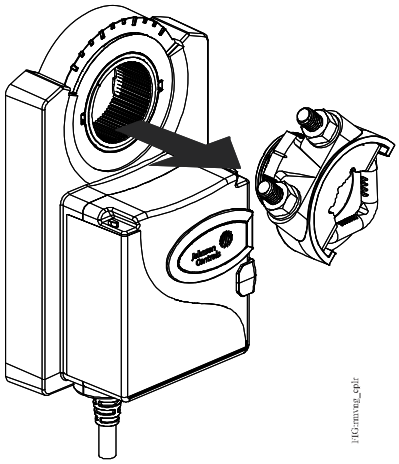


Figure 8: Rotating the Coupler

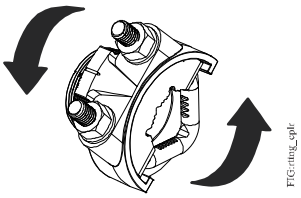


Figure 9: Reinstalling the Coupler

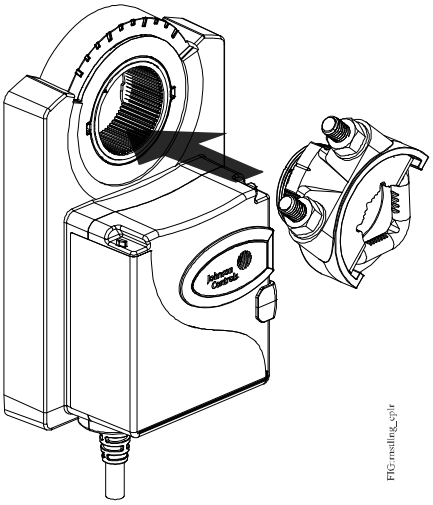
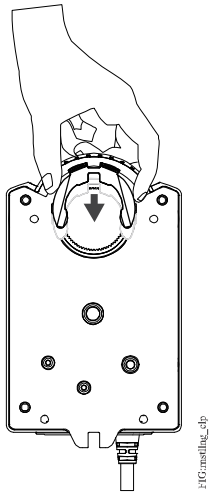


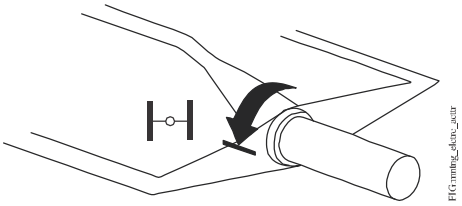
Figure 10: Reinstalling the Clip



Mounting the Electric Actuator

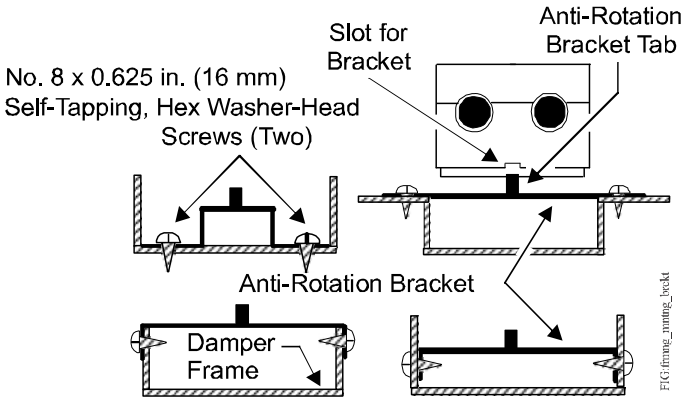
1. Position the damper until it is fully closed. See Table 2 for shaft diameters and required torques.

Figure 11: Mounting the Electric Actuator



2. Bend or cut the anti-rotation bracket to fit the damper frame or duct.

Figure 12: Forming the Mounting Bracket



3. Load the actuator seal by rotating the shaft approximately 5 degrees using the electric actuator.

4. Slip the electric actuator onto the shaft and fully tighten the U-bolt on the coupler according to the required wrench torque in Table 2.

Figure 13: Slipping the Electric Actuator onto the Shaft

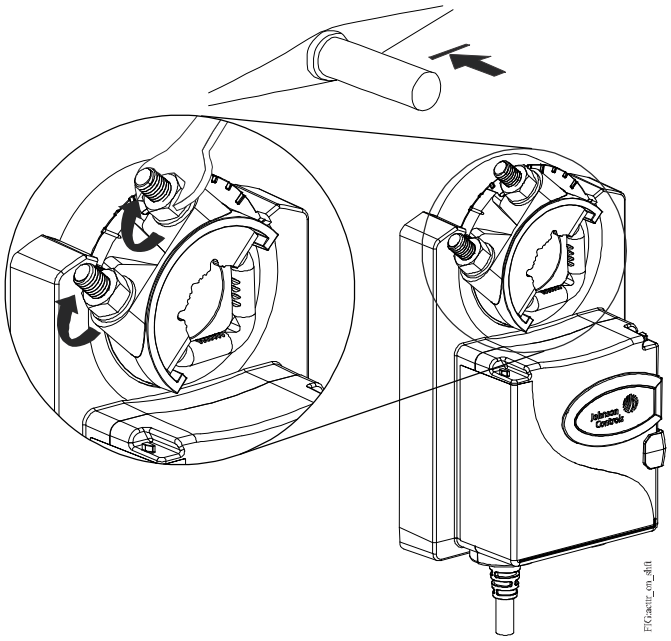
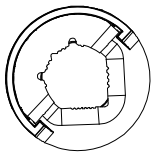
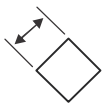
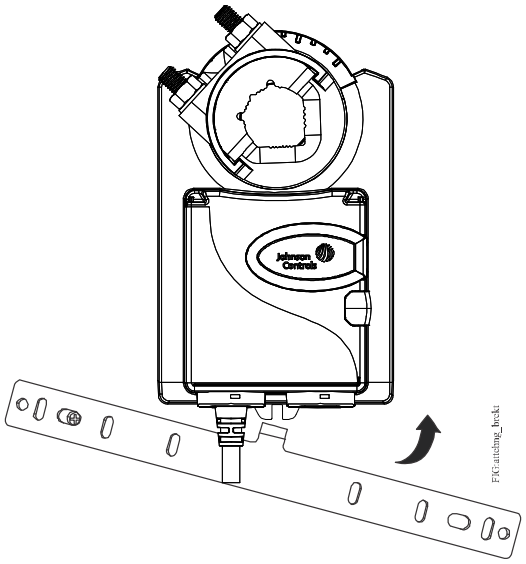


Table 2: Shaft Diameters and Required Wrench Torques

Shaft Diameter, in. (mm)		
	3/4 (19)	1-1/16 (27)
	5/8 (16)	3/4 (19)
Required Wrench Torque, lb·in (N·m)	125 (14.1)	

5. Lightly tighten one side of the anti-rotation bracket to the mounting surface.

Figure 14: Attaching the Anti-Rotation Bracket



6. Swing the anti-rotation bracket under the electric actuator, until it reaches the middle of the slot on the bottom of the actuator and is aligned with the scribe mark near the slot.

Note: Do not position the anti-rotation bracket all the way up into the slot.

Figure 15: Positioning the Anti-Rotation Bracket into the Middle of the Slot

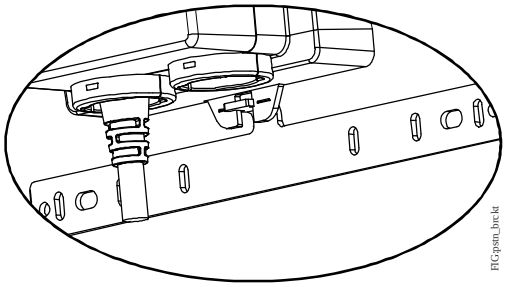
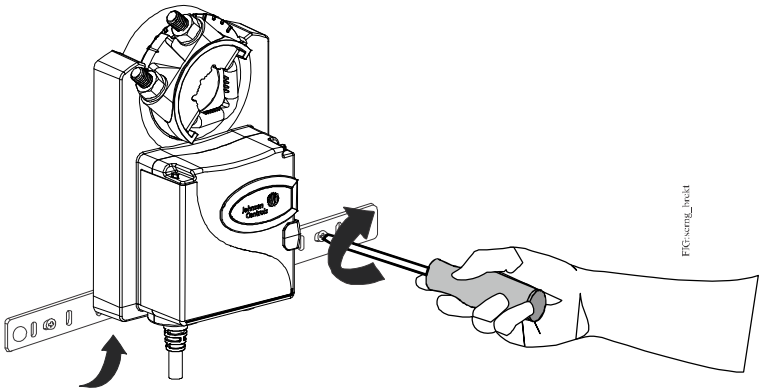
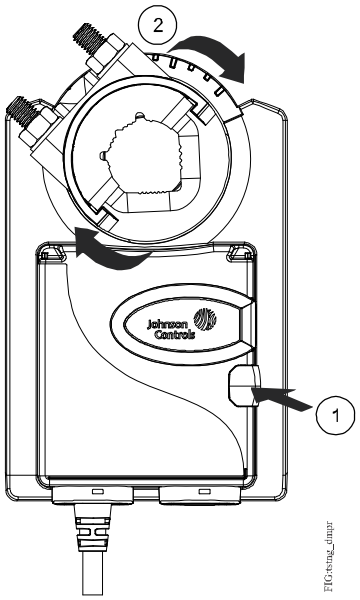


Figure 16: Securing the Anti-Rotation Bracket to the Damper Frame



7. Test the damper.
   a. Press and hold the gear release.
   b. Rotate the coupler from the fully closed position to the fully open position and verify that the damper and electric actuator rotate freely throughout the range.

Figure 17: Testing the Damper



Wiring

⚠ WARNING

Risk of Electric Shock.
Disconnect the power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

⚠ ADVERTISSEMENT

Risque de décharge électrique.
Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

IMPORTANT: When using the M9320 or M9335 Series Electric Actuator in the floating mode, verify that the DIP switch is positioned on the DC 2 to 10 V option. This setting ensures compatibility with the controller's triac output exhibiting voltage leakage. See Figure 28 for the proper DIP switch placement.

M9320-HGA-2 and M9335-HGA-2 Electric Actuator Wiring Diagrams

Figure 18: On/Off AC 24 V Applications

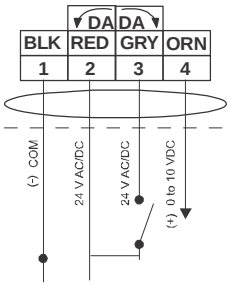


Figure 19: Floating AC 24 V Applications

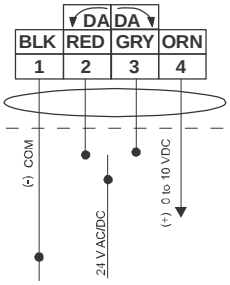


Figure 20: Proportional DC 0 (2) to 10 V Applications

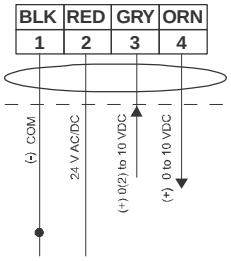
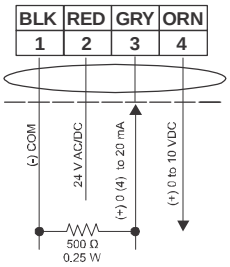


Figure 21: Proportional 0 (4) to 20 mA Applications with External Resistor



M9320-AUA-2 and M9335-AUA-2 Electric Actuator Wiring Diagrams

Figure 22: On/Off AC 120 V Applications

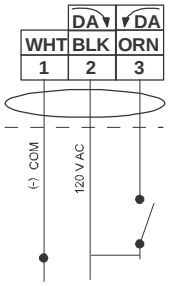
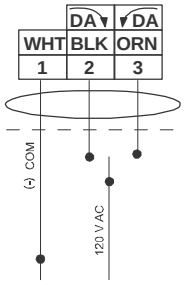


Figure 23: Floating AC 120 V Applications



Two M9335-HGA-2 Electric Actuators Wired in Tandem

Figure 24: Proportional DC 0 (2) to 10 V Applications

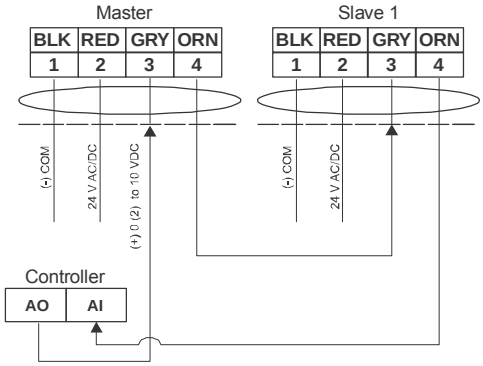
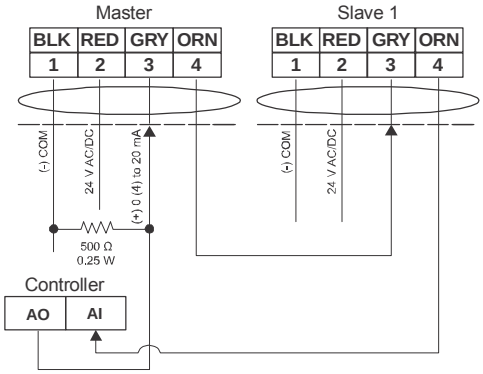
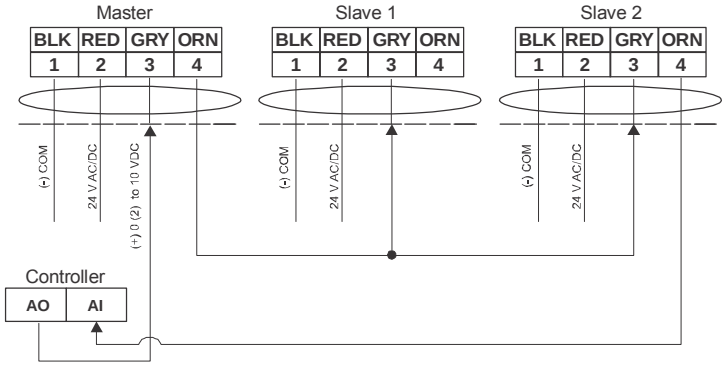


Figure 25: Proportional 0 (4) to 20 mA Applications with External Resistor



Three M9335-HGA-2 Electric Actuators Wired Collectively

Figure 26: Proportional DC 0 (2) to 10 V Applications



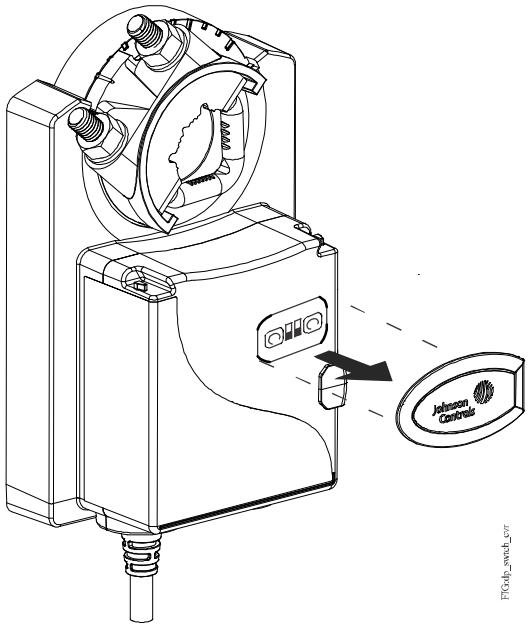
Auto Calibration Mode (M9320-HGA-2 and M9335-HGA-2 Models)

The electric actuator enters auto calibration mode and positions the coupler to the maximum and minimum end stops to identify the range of travel.

Accessing the DIP Switches and LEDs

Locate the oval cover on the front of the electric actuator and pull the cover outward to remove it.

Figure 27: DIP Switch and LED Cover



To complete the auto calibration cycle, press **Enter/Autocal** until all three LEDs are illuminated. See Figure 28 for viewing the DIP switches and LEDs.

Operation

NOTICE

Risk of Property Damage.
Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

NOTICE

Risque de dégâts matériels.
Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

Figure 28: DIP Switches and LEDs

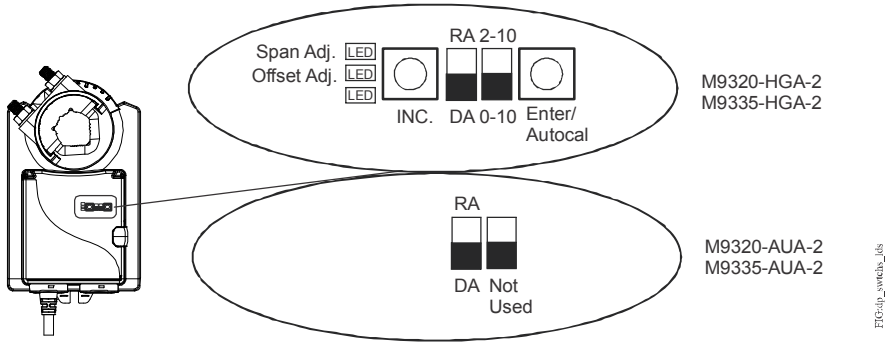
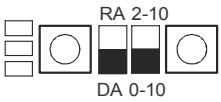
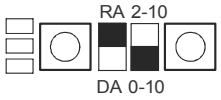
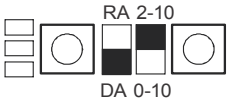
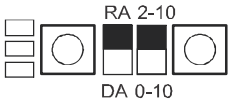


Table 3: DIP Switch Settings for M9320-HGA-2 and M9335-HGA-2

Example	Command Signal	Feedback Signal	Settings for User Interface
1	DC 0 to 10 V	Direct DC 0 to 10 V	
2	DC 0 to 10 V	Reverse DC 0 to 10 V	
3	DC 2 to 10 V	Direct DC 2 to 10 V	
	AC 24 V (Floating)	—	
4	DC 2 to 10 V	Reverse DC 2 to 10 V	
5[1]	Offset = 5	Active DC 2 to 10 V	
	Span = 7		

1. See *Setting the Span and Offset Proportional Command Signal to Other Values* for more details.

Figure 29: Graphed Examples of Table 3 Command Signals

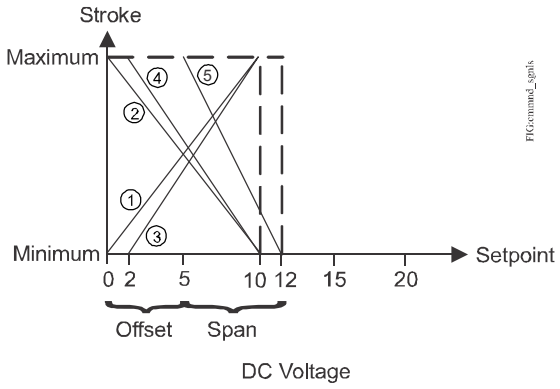


Table 4: DIP Switch Settings for M9320-AUA-2 and M9335-AUA-2

Example	Command Signal	Settings for User Interface
1	Reverse	
2	Direct	

WARNING

Risk of Electric Shock.
Do not touch any exposed metal parts with anything other than properly insulated tools or insulated probes of the digital voltage meter. Failure to use properly insulated tools and probes may result in severe personal injury or death.

ADVERTISSEMENT

Risque de décharge électrique.
Ne jamais toucher une partie métallique exposée avec tout élément autre que des outils correctement isolés ou les sondes isolées du voltmètre numérique. L'utilisation d'outils et de sondes incorrectement isolés risque de provoquer des blessures graves, voire mortelles.

The valid offset values are DC 0 to 10 V, and the valid span values are DC 2 to 10 V. The maximum feedback voltage of the electric actuator is DC 10 V.

Setting the Span and Offset Proportional Command Signal to Other Values

1. Set DIP switch one and two before proceeding. Refer to Figure 28 for DIP switch placement.
2. Connect a digital multimeter between the orange (feedback) and black (common) wires. See *Wiring* for more wiring information.
3. Press **Enter/Autocal**.

   To adjust the span and offset, press but do not hold **Enter/Autocal**. Holding **Enter/Autocal** for longer than 3 seconds triggers an autocal.

   The **Offset Adj.** LED turns on and the multimeter displays the current offset value.
4. Press **INC.**

   The **Offset Adj.** LED flashes. The voltage reading on the multimeter increases DC 0.5 V each time you press the button. Press **INC.** until you reach the desired voltage.

   If no further action is required, the **Offset Adj.** LED stops flashing after 10 seconds. The electric actuator exits the program mode and the original offset value remains unchanged.
5. Press **Enter/Autocal**.

   The **Offset Adj.** LED turns off indicating that the desired **Offset Adj.** value was recorded. The **Span Adj.** LED turns on and the multimeter displays the present span value.
6. Press **INC.**

   The **Span Adj.** LED flashes. The voltage reading on the multimeter increases by DC 0.5 V each time you press the button. Press **INC.** until you reach the desired voltage.

   If no further action is required, the **Offset Adj.** LED stops flashing after 10 seconds. The electric actuator exits the program mode and the original offset value remains unchanged.
7. Press **Enter/Autocal**.

   The **Span Adj.** LED turns off indicating that the desired **Span Adj.** setting is saved, and the electric actuator exits the program mode.

Reading the Span and Offset Proportional Command Signal Voltage Settings

1. Connect a digital multimeter between the orange (feedback) and black (common) wires. See *Wiring* for more wiring information.
2. Press **Enter/Autocal**.

   The **Offset Adj.** LED turns on and the multimeter displays the current offset value.

IMPORTANT: Do not press **INC.** Otherwise your observed offset voltage setting will change.

3. Press **Enter/Autocal**.

   The **Offset Adj.** LED turns off, the **Span Adj.** LED turns on, and the multimeter displays the present span value.

IMPORTANT: Do not press **INC.** Otherwise your observed span voltage setting will change.

4. Press **Enter/Autocal**.

   The **Span Adj.** LED turns off.

Clearing the Span and Offset Proportional Command Signal Voltage Settings

Cycle DIP switch two between 2 to 10 and 0 to 10. The active setting is the final state of DIP switch two.

Installing the Cover Over the DIP Switches and LEDs

IMPORTANT: Once you have verified the DIP switch placement and LED activity, place the oval cover back onto the electric actuator before repositioning the actuator hub.

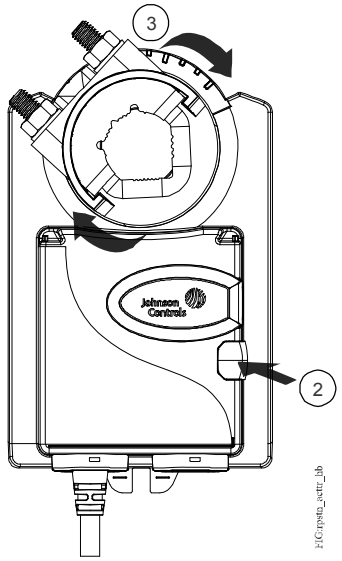
Repositioning the Actuator Hub

1. De-energize the electric actuator.
2. Press the black manual override button on the side of the housing.

IMPORTANT: The manual override is automatically released when the button is released.

3. Rotate the shaft to the desired position.

Figure 30: Repositioning the Actuator Hub

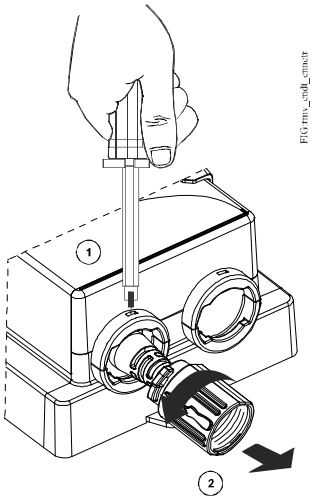


Removing the Conduit Connector

You can remove the conduit connector at the bottom of the electric actuator if the connector is damaged. To remove the connector:

1. Insert a screwdriver into the slot on the actuator housing.
2. Rotate the conduit connector counterclockwise and remove it from the electric actuator.

Figure 31: Removing the Conduit Connector



Tandem Operation

The tandem configuration of two M9335-HGA-2 Electric Actuators provides 664 lb·in (75 N·m) of torque, resulting in twice the torque of a single unit. The two M9335-HGA-2 Electric Actuators operate in exact synchronization, ensuring that the load is split evenly between each actuator. Likewise, when three M9335-HGA-2 Electric Actuators are mounted collectively, the configuration provides triple the torque.

Note: Only the M9335-HGA-2 model may be mounted two in tandem or three collectively; all other M9300 Series Actuators do not feature a master/slave auto configuration capability.

Two M9335-HGA-2 Electric Actuators may be mounted in tandem using the M9000-158 Tandem Mounting Kit (order separately). For configurations of three M9335-HGA-2 Electric Actuators mounted collectively, only two of the actuators may be mounted at one location. The third actuator can drive the same shaft; however, it must be mounted at a different location.

The M9335-HGA-2 Electric Actuator provides a plug-and-play tandem solution, where the orange feedback wire of the master actuator is connected to the gray proportional DC 0 to 10 V input wire of the slave actuator. When the slave actuator detects the presence of the master actuator, it sends an acknowledge signal back to the master actuator, which causes the master actuator to automatically configure itself into the master/slave mode of operation. If no acknowledgment signal is received by the master actuator, it configures itself into the normal mode of operation.

Refer to Figure 24 through Figure 26 and wire the master actuator to the slave actuator(s) as follows:

1. Designate one actuator as the master actuator and the other actuator(s) as the slave actuator(s).
2. Connect the black and red wires of the master and slave actuator(s) to an AC/DC 24 V power source.
3. Connect the orange feedback wire of the master actuator to the gray proportional DC 0 to 10 V input wire of the slave actuator(s).

4. Connect the gray proportional DC 0 to 10 V input wire of the master actuator to the control signal.
5. Connect the orange feedback wire of the last slave actuator to the feedback input of the controller.

Note: Up to three M9335-HGA-2 Electric Actuators can be wired collectively, consisting of one master actuator and up to two slave actuators. The total wire length for all connections must not exceed 30 ft (9 m).

Calibrate the master actuator as follows:

1. Locate the oval cover on the front of the master actuator (Figure 27).
2. Pull the oval cover outward to remove it.
3. Apply power to the master actuator and the slave actuator(s).
4. On the master actuator, press **Enter/Autocal** until all three LEDs are illuminated (Figure 28). The configuration performs an auto calibration cycle, where all of the actuators fully cycle from one end stop to the other. After the auto calibration cycle is complete, the three LEDs turn off and all of the actuators drive to the command position.
5. Re-install the oval cover on the front of the master actuator.

Technical Specifications

M9320 and M9335 Series Electric Non-Spring Return Actuators (Part 1 of 2)

Product Description	**M9320-HGA-2 and M9335-HGA-2**		**M9320-AUA-2 and M9335-AUA-2**
	On/off and floating mode	Proportional mode	On/off and floating mode
Power Requirements	AC 24 V (AC 19.2 to 28.8 V) at 50/60 Hz, Class 2 (North America) or SELV (Europe) **M9320-HGA-2:** 5.7 VA running **M9335-HGA-2:** 6.1 VA running DC 24 V (DC 21.6 to 26.4 V) Class 2 (North America) or SELV (Europe) **M9320-HGA-2:** 2.1 W running **M9335-HGA-2:** 2.1 W running		Nominal AC 120 V at 60 Hz **M9320-AUA-2:** 0.05 A running **M9335-AUA-2:** 0.05 A running
Transformer Sizing Requirements	≥7 VA		—
Input Signal/Adjustments	AC 19.2 to 28.8 V at 50/60 Hz or DC 24 V ±10% Class 2 (North America) or SELV (Europe)	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm 1/4 W resistor Offset: DC 0 to 10 V Span: DC 2 to 10 V	AC 100 to 240 V (AC 85 to 264 V) at 50/60 Hz
Control Impedance	4.7k ohm	100k ohm	—
Feedback Signal	—	DC 0 (2) to 10 V	—
Running Torque	**M9320-HGA-2 and M9320-AUA-2:** 180 lb·in (20 N·m) **M9335-HGA-2 and M9335-AUA-2:** 310 lb·in (35 N·m)		
Rotation Range	Mechanically limited 35 to 95° (±3°) in 5° increments		
Rotation Time for 90° of Travel	**M9320-HGA-2 and M9320-AUA-2:** 90 seconds; constant for all operating conditions **M9335-HGA-2 and M9335-AUA-2:** 150 seconds; constant for all operating conditions		
Rotation Time Auto-Calibration	**M9320-HGA-2 and M9320-AUA-2:** 35 seconds **M9335-HGA-2 and M9335-AUA-2:** 75 seconds		
Cycles	**M9320-HGA-2 ans M9320-AUA-2:** 100,000 full stroke cycles; 2,500,000 repositions **M9335-HGA-2 and M9335-AUA-2:** 30,000 full stroke cycles; 750,000 repositions		
Audible Noise	<45 dBA at maximum load, at a distance of 39-13/32 in. (1 m)		

M9320 and M9335 Series Electric Non-Spring Return Actuators (Part 2 of 2)

Electrical Connections	48 in. (1.2 m) halogen-free cable with 18 AWG (0.82 mm^2) conductors and 1/4 in. (6 mm) ferrule ends	
Conduit Connections	Optional 1/2 in. NPSM (13 mm) threaded conduit connectors with M9300-100 Conduit Connector	1/2 in. NPSM (13 mm) threaded conduit connectors with M9300-100 Conduit Connector
Mechanical Connections	**Round:** 3/4 to 1-1/16 in. (19 to 27 mm) **Square:** 5/8 to 3/4 in. (16 to 19 mm)	
Ambient Conditions	**Operating:** -22 to 140°F (-30 to 60°C), 95% RH, noncondensing **Storage:** -40 to 185°F (-40 to 85°C), 95% RH, noncondensing	
Enclosure	IP54/NEMA 5	
Compliance	**United States:** UL Listed, CCN XAPX, File E27734; to UL 60730-1: Automatic Electrical Controls for Household and Similar Use, Part 1; and UL 60730-2-14: Part 2, Particular Requirements for Electric Actuators. **Canada:** UL Listed, CCN XAPX7, File E27734; to CAN/CSA E60730-1:02: Automatic Electrical Controls for Household and Similar Use, Part 1; and CAN/CSA-E60730-2-14, Particular Requirements for Electric Actuators.	
CE	**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 the Low Voltage Directive. IEC 60730-1: Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements and IEC 60730-2-14, Automatic Electrical Controls for Household and Similar Use; Part 2—Particular Requirements for Electric Actuators	
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant	
Shipping Weight	3 lb (1.36 kg)	

The performance specifications are nominal and conform to acceptable industry standard. 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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