VA-7700 Series Electric Non-Spring Return Actuators

Installation Instructions

VA-7700-AGA-2, VA-7700-GGA-2

Part No. 14-88328-187, Rev. C

Issued November 2017

Installation

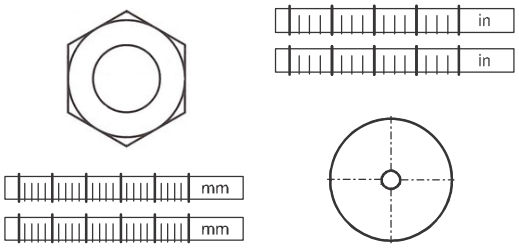
IMPORTANT: Use this VA-7700 Series Electric Non-Spring Return Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must 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 actuator.

IMPORTANT : Utiliser ce VA-7700 Series Electric Non-Spring Return Actuator uniquement pour commander des équipements dans des conditions normales de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du cooling 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 cooling actuator.

Parts Included

- One jam nut (top left drawing in Figure 1)
- Two-position scale (in.) (top right drawing in Figure 1)
- Two-position scale (mm) (bottom left drawing in Figure 1)
- Position indicator (bottom right drawing in Figure 1)

Figure 1: Parts Included

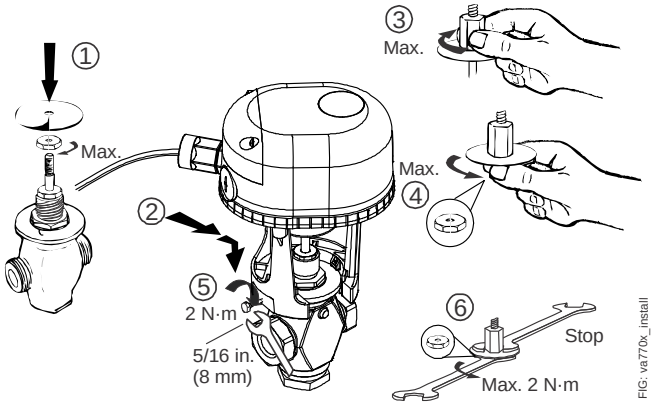


Special Tools Needed

- Wrenches, 3/4 in. (19 mm) and 9/16 in. (14 mm), open-end or adjustable
- Wrench, 5/16 in. (8 mm)
- Screwdrivers, Phillips cross-head with PH2 bit and blade, 3/32 in. (2 mm)
- Optional digital voltmeter

Installation on a Johnson Controls® VG7000 Series Valve

Figure 2: VA-7700 Series Installation



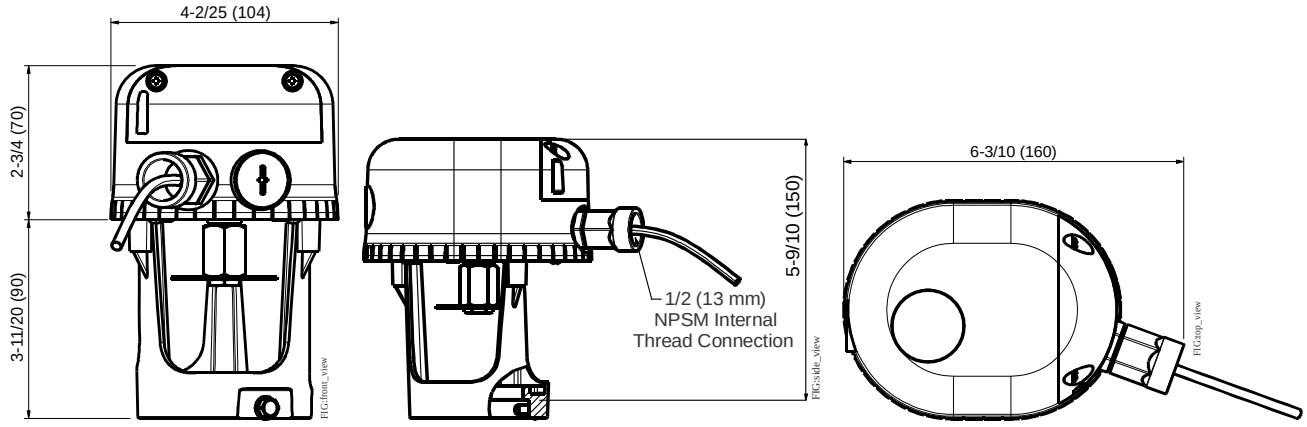
1. Thread the jam nut onto the valve stem down to the end of the thread. Place the position indicator on top of the jam nut.
2. Push the valve stem in so it is in the full-down position. Position the actuator on the valve bonnet.
3. Lift the stem to meet the coupler, and screw the coupler onto the stem until the valve reaches the end of stroke in the full-up position.

Note: The coupler should be turned a minimum of four revolutions.

4. While holding the coupler in place, hand-tighten the jam nut against the coupler.
5. Use a 5/16 in. (8 mm) wrench to tighten the set screw.
6. Use the 3/4 in. (19 mm) and 9/16 in. (14 mm) open-end or adjustable wrenches to tighten the coupler and jam nut an additional 1/8 to 1/4 turn.

Dimensions

Figure 3: VA-7700 Actuator Dimensions

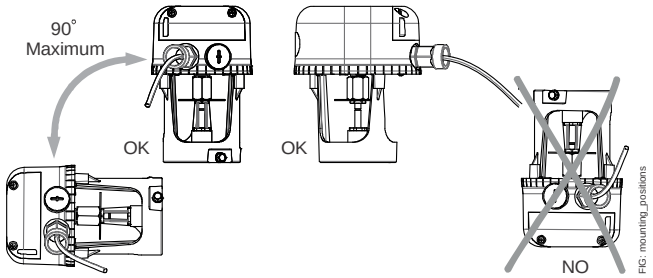


Mounting

IMPORTANT: Do not install or use this VA-7700 Series Electric Non-Spring Return Actuator in or near environments where corrosive substances or vapors could be present. Exposure of the actuator to corrosive environments may damage the device's internal components and will void the warranty.

IMPORTANT: The actuator is intended for indoor mounting only, with no direct exposure to water beyond NEMA 2 conditions. Use an appropriate shield or enclosure where the environment exceeds NEMA 2 specifications.

Figure 4: Mounting Positions



Note: For steam applications, the actuator should not be mounted above the pipe.

Wiring

WARNING: Risk of Electric Shock.
Disconnect or isolate all power supplies before making electrical connections. More than one disconnection or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

AVERTISSEMENT : Risque de décharge électrique.
Débrancher ou isoler toute alimentation avant de réaliser un branchement électrique. Plusieurs isolations et débranchements sont peut-être nécessaires pour couper entièrement l'alimentation de l'équipement. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

Figure 5: Wiring Diagram for VA-7700-GGA-2 Proportional Model 24 VAC Applications

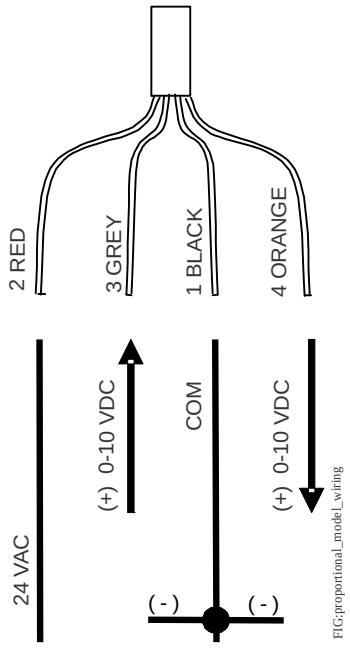
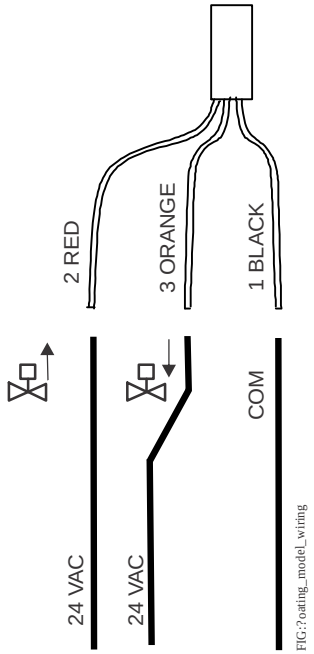


Figure 5: Wiring Diagram for VA-7700-AGA-2 Floating Model 24 VAC Applications



Setup and Adjustments

Auto-Calibration with Standard Input Signal Ranges (Only for VA-7700-GGA-2)

Select the standard control signals by setting DIP switches 3 and 4. See Figure 6 for the location of the DIP switches and Figure 7, Figure 8, Table 1, and Table 2 for DIP switch information. We recommend that you set the actuator to the desired control signal and action before you fit the actuator to the valve. The power must be connected before the auto-calibration cycle can start.

Figure 6: DIP Switch Location

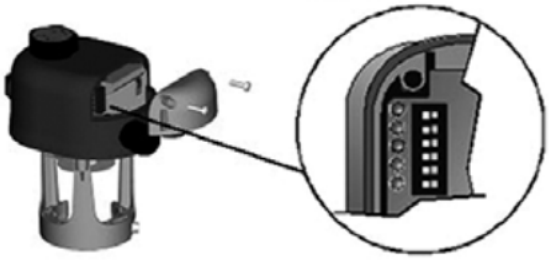


Figure 7: DIP Switch Settings

Table 1: DIP Switch Description

DIP Switch Position	Function	DIP Switch Settings	
1	Control signal type	 VDC	 mA
2, 3, 4	Control signal ranges	 0 to 10 VDC	 0 to 20 mA
		 0 to 5 VDC	 4 to 20 mA
		 5 to 10 VDC	N/A
		 Free range	N/A
5	Not used	N/A	N/A
6	Action	 DA	 RA
7	Electrical manual override	 OFF	 ON
8	Control signal failure position preset[1]	  Up	  Down

1. This preset does not operate with mA control.

Figure 8: DIP Switch Examples

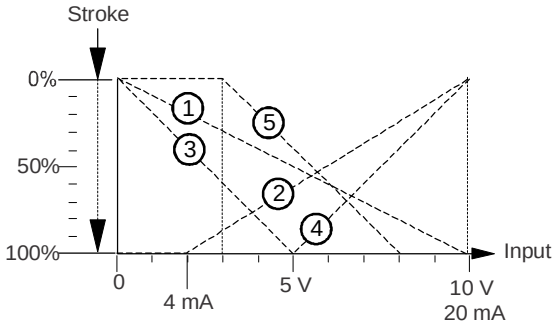
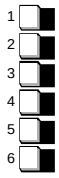
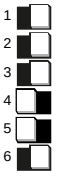
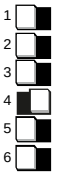
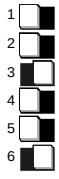
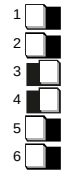


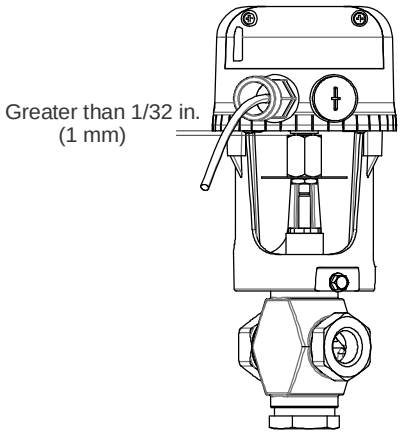
Table 2: DIP Switch Setting Examples

Example	1	2	3	4	5
Input	0 to 10 VDC	4 to 20 mA	0 to 5 VDC	5 to 10 VDC	Free range
Action	DA	RA	DA	RA	DA
DIP Switch Settings					

To auto-calibrate the actuator mounted to a valve:

1. Verify that a minimum distance of 1/32 in. (1 mm) exists between the top of the actuator stem nut and the stem guide bush in the actuator motor housing base plate with the stem fully retracted (Figure 9). If necessary, correct the distance by adjusting the actuator or the valve stem connection.

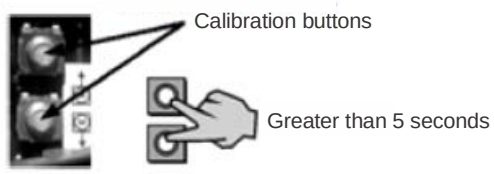
Figure 9: Actuator Minimum Distance



2. To begin the auto-calibration cycle, push both calibration buttons on the printed circuit board for at least 5 seconds. The actuator travels a full cycle to detect the stem extended and retracted limits (Figure 10).

Note: During the auto-calibration cycle, all five status indication LEDs flash simultaneously.

Figure 10: Auto-Calibration



3. When the auto-calibration cycle is complete, the LEDs stop flashing, the actuator stem moves to the position that corresponds to the control signal, and the five LEDs indicate the stem position. See Figure 11 for an example LED display.

When the control signal changes, the actuator stem moves to the new position and one LED flashes. The LED stops flashing when the actuator stem reaches the position that corresponds to the control signal.

Auto-Calibration for Freely Defined Control Signal Ranges

Non-standard control signals (such as 2 to 8 VDC) are applied by setting DIP switches 3 and 4 (Figure 8 and Table 2). We recommend that you set the actuator to the desired control signal type and action before you fit it to the valve. Power must be connected before you start the auto-calibration cycle.

To auto-calibrate the actuator mounted to a valve:

1. Verify that a minimum distance of 1/32 in. (1 mm) exists between the top of the actuator stem nut and the stem guide bush in the actuator motor housing base plate with the stem fully retracted (Figure 9). If necessary, correct the distance by adjusting the actuator or the valve stem connection.
2. To begin the auto-calibration cycle, push both calibration buttons on the printed circuit board for at least 5 seconds. The actuator travels a full cycle to detect the stem extended and retracted limits.
3. During the auto-calibration cycle, apply one of the control signal values (Table 1) and confirm the setting by pressing one of the two calibration buttons for 2 seconds. All five LEDs illuminate for 5 seconds to confirm the setting.
4. During the auto-calibration cycle, apply the second control signal value and confirm the setting by pressing one of the two calibration buttons for 2 seconds. All five LEDs illuminate for 5 seconds to confirm the setting.

Note: Both the minimum and the maximum control signal values are stored in the memory of the actuator.

5. When the auto-calibration cycle is complete, the LEDs stop flashing, the actuator stem moves to the position that corresponds to the control signal, and the five LEDs indicate the stem position. See Figure 11 for an example LED display.
6. When the control signal changes, the actuator stem moves to the new position and one LED flashes. The LED stops flashing when the actuator stem reaches the position that corresponds to the control signal.

Operation

Normal Operating Mode

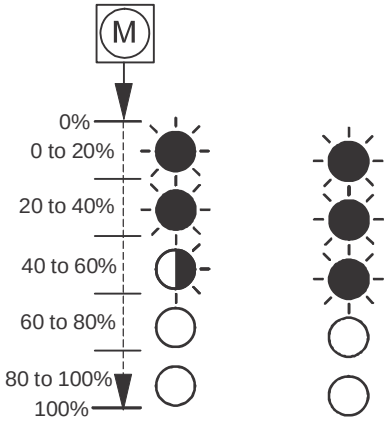
The LED display indicates the actuator stem position. The LED stops flashing when the actuator stem reaches the position that corresponds to the control signal. See Table 3 for the LED definitions.

Table 3: LED Definitions

LED	Definition
☀	LED is permanently on
◐	LED is flashing
○	LED is permanently off

Figure 11 illustrates the LEDs when the actuator stem is moving between 40 and 60% of the stroke (left) and the LEDs when the actuator stem is stopped between 40 and 60% of the stroke (right).

Figure 11: Actuator Stem Between 40 to 60% of Stroke



Actuator Status Indication

The actuator microprocessor displays a failure diagnosis when a failure is detected. The actuator status is indicated by the LED display.

When the microprocessor detects that the stem has come to an unexpected stop, it initiates a retry cycle. The cycle is repeated three times. If it is unsuccessful, the actuator status is switched to fault mode, and the LEDs indicate an alarm code. If the problem is cleared, the actuator continues normal operation.

Fault Mode

If the actuator enters fault mode, the LEDs flash as indicated in Figure 12. The actuator can enter fault mode under the following circumstances:

- the stem comes to an unexpected stop, and the retry cycle fails to correct the issue
- the freely defined control signal settings are incomplete or not stored
- the factory-set parameters are invalid

Figure 12: LEDs in Fault Mode

To indicate the specific fault, press one of the calibration buttons for 5 seconds. One of four LED fault alarm codes is displayed. See Figure 13 for the four LED fault alarm codes and Table 4 for the diagnoses.

Figure 13: Four LED Fault Alarm Codes

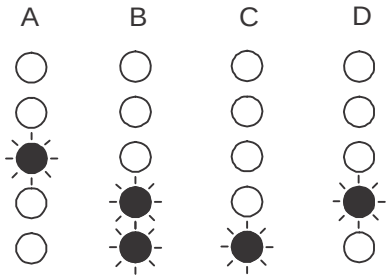


Table 4: LED Fault Alarm Code Diagnoses

LED Fault Alarm Code	Diagnosis
A	The calibration is interrupted before completion or values are missing
B	Calibration parameters read into memory are invalid
C	The actuator is stalled due to valve blockage
D	Incorrect calibration parameters writing into memory

When the problem is corrected, press one of the calibration buttons for at least five seconds to exit the fault mode and display the current actuator status.

Repair Information

If the VA-7700 Series Electric Non-Spring Return Actuator fails to operate within its specifications, replace the unit. For a replacement actuator, contact the nearest Johnson Controls representative.

Technical Specifications

VA-7700 Series Electric Non-Spring Return Actuators (Part 1 of 2)

Product	VA-7700-AGA-2 Floating Model	VA-7700-GGA-2 Proportional Model
Power Requirement	24 VAC (20.4 to 27.6 VAC) at 50/60 Hz: Class 2 (North America) or SELV (Europe), 3.2 VA running	24 VAC (20.4 to 27.6 VAC) at 50/60 Hz: Class 2 (North America) or SELV (Europe), 4.3 VA running
Input Signal/ Adjustments	N/A	0 to 10 VDC 0(4) to 20 mA Adjustable zero and span
Control Input Impedance	N/A	0 to 10 VDC: 100k Ohms
Feedback Signal	N/A	0 to 10 VDC
Motor	Impedance protected motor	
Force Minimum	90 lb (400 N)	
Stroke Range	4/5 in. (20 mm) maximum	
Movement Type	Linear	
Stroke Time Normal	3/8 in. (8 mm) at 50 Hz: 84 seconds at 60 Hz: 70 seconds 1/2 in. (13 mm) at 50 Hz: 137 seconds at 60 Hz: 114 seconds 3/4 in. (19 mm) at 50 Hz: 200 seconds at 60 Hz: 167 seconds	
Cycles	250,000 full-stroke cycles	

VA-7700 Series Electric Non-Spring Return Actuators (Part 2 of 2)

Audible Noise Rating	Less than 30 dBA at 39-13/32 in. (1 m)	
Electrical Connections	120 in. (3.05 m) UL 444 Type CMP plenum-rated cable with 19 AWG (0.75 mm²) conductors and 1/4 in. (6 mm) ferrule ends	
Conduit Connections	1/2 in. (13 mm) NPSM threaded conduit connectors	
Valve Compatibility	Johnson Controls VG7000 Series Bronze Control Valves	
Enclosure	IP54/NEMA 2	
Operating Ambient Conditions	23 to 131°F (-5 to 55°C); 90% RH maximum, noncondensing	
Storage Ambient Conditions	-4 to 149°F (-20 to 65°C); 90% RH maximum, noncondensing	
Dimensions	5-9/10 in. x 5-1/5 in. x 6-2/5 in. (150 mm x 131 mm x 162 mm)	
Compliance	**United States**	UL Listed, CCN XAPX, File E194024; to UL60730-1 Automatic Electric Controls for Household and Similar Use, Part 1: General Requirements. Fourth Edition, dated November 13, 2013; and UL 60730-2-14 Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Electric Actuators, Second Edition, Dated February 27, 2013. Plenum-Rated (UL 2043). Suitable for use in other environmental air space (plenums) in accordance with Section 300.22 (C) of the National Electric Code.
	Canada	UL Listed, CCN XAPX7, File E194024; to CAN/CSA-E60730-1:02, Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, Third Edition, dated July 2002; and Amendment, February 1, 2007.
	Europe	CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.
Shipping Weight	2.85 lb (1.25 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 shall not be liable for damages resulting from misapplication or misuse of its products.

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