VA-7700 Series Electric Non-Spring Return Actuators

Product Bulletin

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

Code No. LIT-12012122
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The VA-7700 Series Electric Non-Spring Return Actuators are synchronous motor-driven actuators for valves in HVAC applications. These compact actuators are available for floating or proportional control. The VA-7700 Series Electric Actuators provide a stroke capability of 3/8 in. (8 mm) to a maximum 3/4 in. (20 mm). They have a 90 lb (400 N) force minimum and respond to a variety of input signals.

The VA-7700 Series Electric Actuators can be combined with Johnson Controls® VG7000 and VB Series Valves in accordance with the maximum close-off pressure ratings specified.

Figure 1: VA-7700 Series Electric Non-Spring Return Actuator

Table 1: Features and Benefits

Features	Benefits
Self-Adjusting Proportional Electric Actuators	Allow for easy, quick, and precise commissioning and servicing.
Column of Five LEDs	Allows easy visualization of the electric actuator stroke position and status.
IP54 Protection Class	Allows for installation in a wide range of environments.
Unique C-Shaped Yoke Design	Allows for lateral mounting of the electric actuator, reducing the vertical space required over the valve for installation.
Positioner with Selectable Zero and Span Adjustment and Direct and Reverse Action Modes	Enables sequence control.
Magnetic Clutch	Provides constant output force for closeoff of valves, and protects the motor in stall conditions.
Signal Failure Position Preset	Indicates a control signal failure in the electric actuator.

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 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: 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 electric actuator to corrosive environments may damage the internal components of the device, 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.

Operation

The VA-7700 Series Electric Actuators are available for use with floating and proportional controllers.

Each electric actuator is installed directly on VG7000 Series threaded valves using a jam nut (included with the electric actuator).

Floating Control (VA-7700-AGA-2 Model)

See Table 2 for the stem actions and function of the wiring.

Table 2: Wiring Action

Connections	Actuator Stem
1-2	Extends
1-3	Retracts

Proportional Control (VA-7700-GGA-2 Model)

The proportional control model provides a proportional stroke corresponding to the control signal.

The following control signals are defined as standard:

- 0 to 10 VDC
- 0 to 5 VDC
- 5 to 10 VDC
- 0 to 20 mA
- 4 to 20 mA

The DA (direct acting) and RA (reverse acting) action modes are set through the DIP switches. See *DIP Switch Settings* and Table 3 for more information.

Table 3: Direct and Reverse Action Modes

Action (DIP Switch Set)[1]	Input Control Signal	Stem	Position at Control-Signal Failure[2]
Direct (DA)	Increases	Extends	Selectable
	Decreases	Retracts	
Reverse (RA)	Increases	Retracts	Selectable
	Decreases	Extends	

1. See Table 4 for more information.
2. The Signal Failure position preset does not operate when the 0 to 20 mA control signal is selected.

The electric actuator control signal has a buffer zone at each end of the span of 0.3 V or 0.3 mA. The buffer zone ensures that the valve is closed.

Control Signal Failure Preset Position

A control signal failure on the VA-7700-GGA-2 proportional model causes the electric actuator to automatically move the stem to a pre-selected position (100% extended or 100% retracted).

Note: This control signal failure preset position option is not available with the 0 to 20 mA control signal selection.

DIP Switch Settings

See Figure 2 for the location of the DIP switches and Figure 3 and Table 4 for DIP switch details. We recommend that you set the electric actuator to the desired control signal and action before you install the electric actuator on the valve.

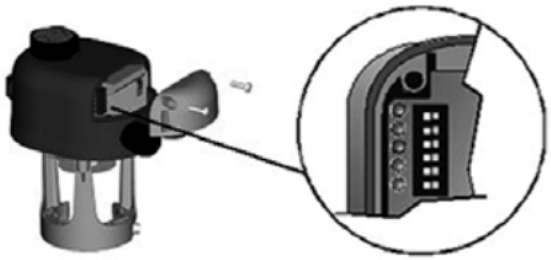

Figure 2: DIP Switch Location

Figure 3: DIP Switch Settings

Table 4: DIP Switch Description

DIP Switch Position	Function	DIP Switch Settings	
1	Control Signal Type	1 VDC	1 mA
2, 3, 4	Control Signal Ranges	2, 3, 4 0 to 10 VDC	2, 3, 4 0 to 20 mA
		2, 3, 4 0 to 5 VDC	2, 3, 4 4 to 20 mA
		2, 3, 4 5 to 10 VDC	N/A
		2, 3, 4 Free Range	N/A
5	Not Used	N/A	N/A
6	Action	6 DA	6 RA
7	Electrical Manual Override	7 OFF	7 ON
8	Control Signal Failure Position Preset[1]	8 Up	8 Down

1. This preset does not operate with mA control.

Operating Status Indicators

The VA-7700-AGA-2 floating model is equipped with a green LED that provides information about the operating status.

The VA-7700-GGA-2 proportional model is equipped with a bi-color green/red LED that indicates the electric actuator stem position. The LED stops flashing when the stem reaches the position that corresponds to the control signal. See Table 5 for LED definitions.

Table 5: DIP Switch Connections

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

Auto-Calibration

When the VA-7700 Series Electric Actuator is installed on a valve, you must auto-calibrate the electric actuator. During the auto-calibration cycle, the electric actuator makes a full cycle to detect the stem extended and retracted limits.

Parallel Operation

Parallel Operation of VA-7700-AGA-2 Electric Actuators

Although synchronous motors have the same running speed (rate of travel), varying loads can cause a deviation in travel between motors during actuator starts and stops. This deviation depends on the number of on/off cycles. By periodically switching the electric actuators to the end-of-travel, electric actuators running in parallel can be reasonably synchronous.

See Figure 4 for the VA-7700-AGA-2 Electric Actuators in parallel operation wiring diagram.

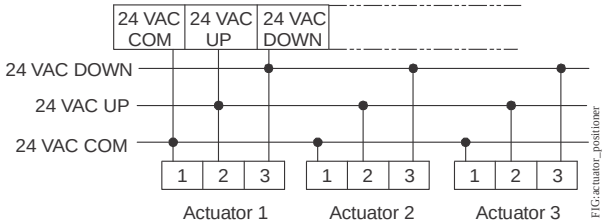

Figure 4: Parallel Operation of VA-7700-AGA-2 Electric Actuators

The number of electric actuators that can be linked to a single controller depends on the active power of the controller in relation to the power consumption of the electric actuators.

Parallel Operation of VA-7700-GGA-2 Proportional Electric Actuators

The 0 to 10 VDC output on the controller can operate several electric actuators with the built-in electronic positioner.

The number of electric actuators that can be linked to a single controller depends on the active power of the controller in relation to the power consumption of the electric actuators.

Each positioner has its own adjustment for the starting point between 0 to 10 VDC. Each electric actuator can have a different input (for example, 0 to 5 VDC or 5 to 10 VDC).

See Figure 5 for the VA-7700-AGA-2 Electric Actuators in parallel operation wiring diagram.

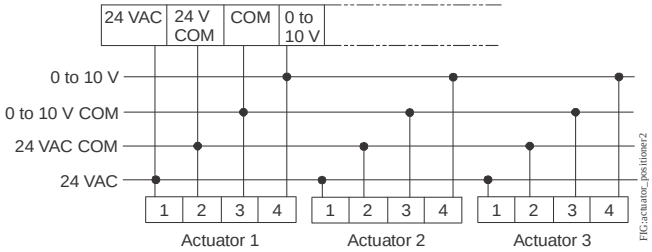

Figure 5: Parallel Operation of VA-7700-GGA-2 Electric Actuators

Each positioner can be switched for direct or reverse action as shown in Figure 6.

Figure 6: DIP Switch Settings

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Table 6: DIP Switch Settings

Zero	End Point (Zero + Span	Positioner Action	
0.3 V	9.7 V	DA	Factory Setting
5.3 V	9.7 V	RA	
6.0 V	8.0 V	DA	

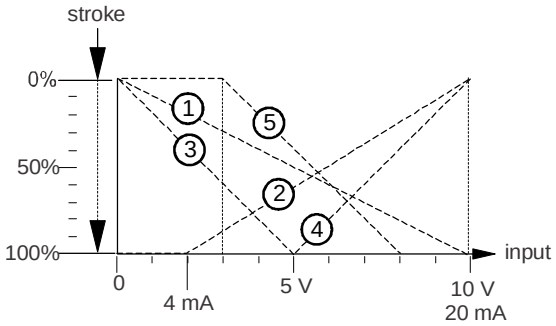

Figure 7: Setting the Built-In Positioner for Direct or Reverse Action

Wiring Diagrams

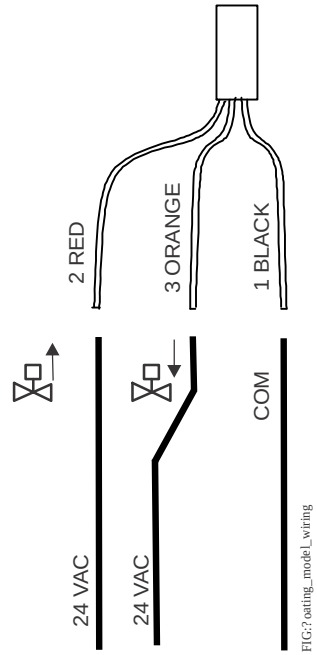

Figure 8: Wiring Diagram for VA-7700-AGA-2 Floating Model (24 VAC Applications)

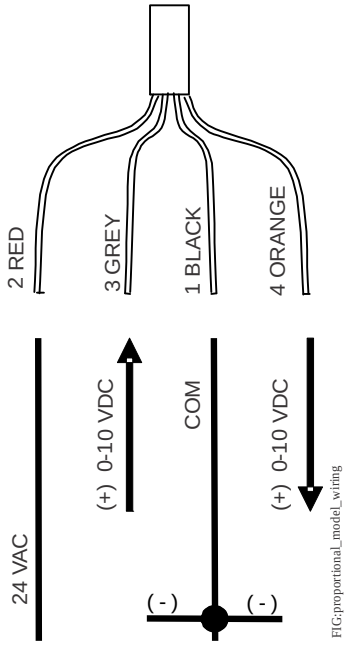

Figure 9: Wiring Diagram for VA-7700-GGA-2 Proportional Model (24 VAC Applications)

Dimensions

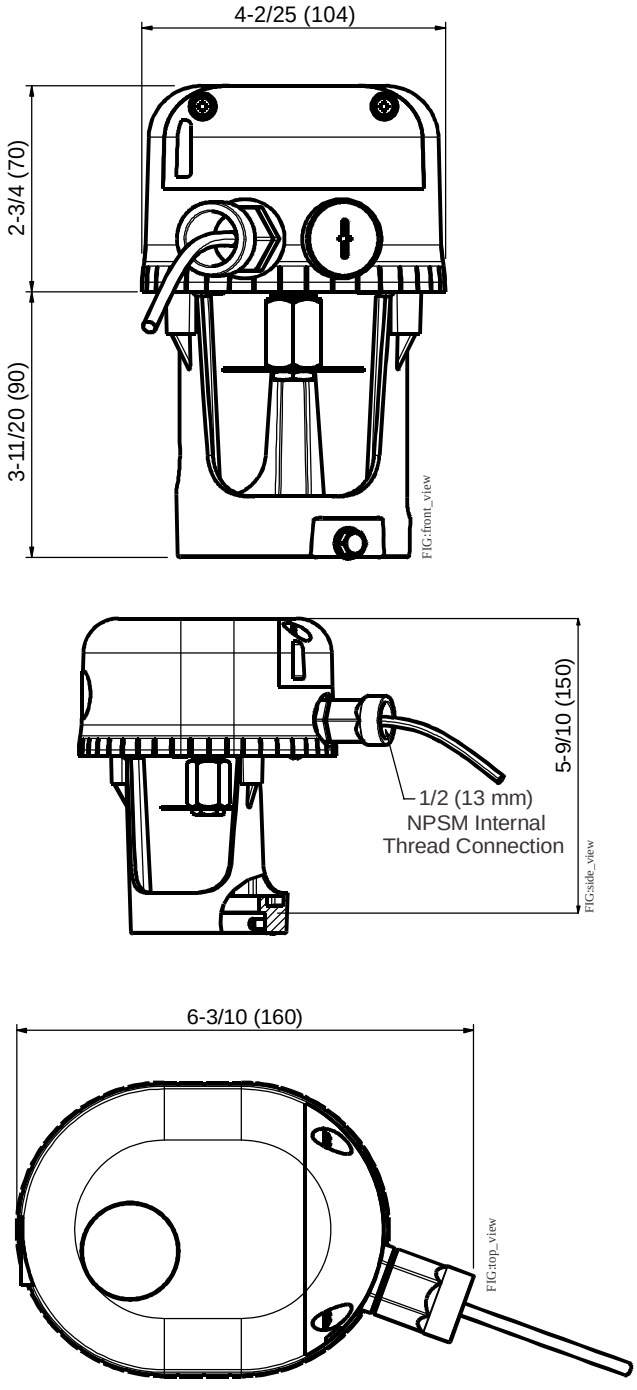

Figure 10: VA-7700 Dimensions, in. (mm)

Ordering Information

Table 7: VA-7700 Series Electric Non-Spring Return Actuators

Code Number	Power Supply	Control Type	Manual Override	Valve Combination
VA-7700-AGA-2	24 VAC	Floating	No	VG7000 and VB Series
VA-7700-GGA-2	24 VAC	Proportional (0 to 10 VDC / 0(4) to 20 mA)	Electrical	VG7000 and VB Series

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	
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 VB Series Brass Flare Valves and VG7000 Series Cast Bronze 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)	

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

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, Inc. 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, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202