

VA-4233 Series Electric Valve Actuators

VA-4233 Series Electric Valve Actuators use a stepper motor to accurately position control valves in HVAC applications. In the event of a power failure, a spring in the actuator automatically returns the valve to the full stem-up position. These direct-mount, spring return electric actuators provide a minimum 61 lb (271 N) force output for floating, on/off, or proportional control. They can be easily field mounted or ordered factory coupled to Johnson Controls 1/2 through 1-1/4 in. VG7000 Series Bronze Control Valves, with no additional linkage required.

The VA-4233 Series can also be field mounted to select Invensys valves, using mounting kits available from Johnson Controls. Proportional control models include an AUTO stroke calibration feature that eliminates the need for manual calibration or adjustment after installation. Integral auxiliary switches are available for indicating end stop position or to perform switching functions. On proportional models, position feedback is also available through a proportional DC voltage signal. All models feature a hand crank for manual positioning of the valve, independent of a power supply.



**Figure 1: VA-4233 Series Electric Valve Actuator
(Shown Mounted on a VG7000 Series
Bronze Control Valve)**

| Features and Benefits | |
|--|---|
| <input type="checkbox"/> Designed for Use in Hot Water, Chilled Water, and Steam Applications | Allows for universal application |
| <input type="checkbox"/> Automatic Spring Return | Returns the valve to the full stem-up position, in the event of a power failure |
| <input type="checkbox"/> Simple No-Linkage Mounting (All Models) with AUTO Stroke Calibration at Installation (VA-4233-GGx Models Only) | Reduces installation time and cost |
| <input type="checkbox"/> Reversible Stroke Direction (VA-4233-GGx Models Only) | Expands usability by allowing switch-selectable direct or reverse action |
| <input type="checkbox"/> Optional Auxiliary Switches Available | Provides adjustable switch points with line voltage capability |
| Continued on next page . . . | |

| Features and Benefits (Cont.) | |
|--|--|
| <input type="checkbox"/> 0 (2) to 10 VDC, 6 to 9 VDC, or 0 (4) to 20 mA Input (VA-4233-GGx Models Only) | Provides enhanced control solutions |
| <input type="checkbox"/> Optional Power Supply Output of 20 VDC at 25 mA (VA-4233-GGx-2MP Models Only) | Provides power for external devices, making the VA-4233-GGx-2MP an ideal replacement for Invensys retrofit installations |
| <input type="checkbox"/> Manual Hand Crank | Allows for manual positioning of the valve, independent of a power supply |
| <input type="checkbox"/> Integral Position Indicator | Provides visual indication of the valve stem position |
| <input type="checkbox"/> 1/2 in. Conduit Connector with 48 in. Wire Leads | Meets national and local code requirements for wiring, and allows for easy field wiring on retrofit jobs |

Table 1: Actuator Models

| Code Number | Description |
|------------------------|---|
| VA-4233-AGA-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, Floating Control |
| VA-4233-AGC-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, Floating Control, with Two Auxiliary Switches |
| VA-4233-BGA-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, On/Off Control |
| VA-4233-BGC-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, On/Off Control, with Two Auxiliary Switches |
| VA-4233-GGA-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, Proportional Control |
| VA-4233-GGA-2MP | Direct-Mount Electric Valve Actuator, Spring Return Up, Proportional Control, with 20 VDC Output at 25 mA |
| VA-4233-GGC-2 | Direct-Mount Electric Valve Actuator, Spring Return Up, Proportional Control, with Two Auxiliary Switches |
| VA-4233-GGC-2MP | Direct-Mount Electric Valve Actuator, Spring Return Up, Proportional Control, Two Auxiliary Switches, with 20 VDC Output at 25 mA |

Table 2: Accessories (Order Separately)

| Code Number | Description |
|--------------------|--|
| M9000-200 | Commissioning Tool |
| VG7000-1016 | Bonnet Adaptor (Used when Replacing Johnson Controls M100, V-400, V-500, and MP8000 Series Valve Actuators on VG7000 Series Bronze Control Valves) |
| V-9999-BC1 | Mounting Kit (Used when Mounting VA-4233 Series Electric Valve Actuators onto 1/2 through 1-1/4 in. Invensys VB-7xxx and VB-9xxx Series Valves) |

Operation

| | |
|-------------------|--|
| IMPORTANT: | VA-4233 Series Electric Valve Actuators are intended to control valves under normal operating conditions. Where failure or malfunction of VA-4233 Series Actuators could lead to an abnormal operating condition that could result in personal injury or damage to the equipment or other property, additional devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of VA-4233 Series Actuators must be incorporated into and maintained as part of the control system. |
|-------------------|--|

VA-4233-AGx Series Floating Electric Valve Actuators

VA-4233-AGx Series Floating Electric Valve Actuators operate on 24 VAC at 50/60 Hz or 24 VDC, and use a stepper motor with stall detection circuitry that operates throughout the entire actuator stroke. Application of a 24 VAC or VDC control signal between the Stem Up (white/brown) or Stem Down (brown) input and the Common terminal will drive the actuator in the indicated direction. Removal of the signal will hold the actuator in position. In the event of power failure, a spring in the actuator automatically returns the valve to the full stem-up position. Restoration of power will return the actuator and valve assembly to normal operation.

VA-4233-BGx Series On/Off Electric Valve Actuators

VA-4233-BGx Series On/Off Electric Valve Actuators operate on 24 VAC at 50/60 Hz or 24 VDC, and use a stepper motor with stall detection circuitry that operates throughout the entire actuator stroke. Application of a power signal will extend the actuator, driving the valve stem down to the end of travel and holding it in position. Removal of the power signal will cause a spring in the actuator to automatically return the valve to the full stem-up position.

VA-4233-GGx Series Proportional Electric Valve Actuators

VA-4233-GGx Series Proportional Electric Valve Actuators operate on 24 VAC at 50/60 Hz or 24 VDC, and use a stepper motor with stall detection circuitry that operates throughout the entire actuator stroke. All models employ noise-filtering techniques on the control signal, in order to eliminate repositioning due to line noise.

VA-4233-GGx Series Actuators position the valve in response to a control signal, in a manner defined by the mode switch that is field selected: 0 to 10, 2 to 10, or 6 to 9 VDC, or 0 to 20 or 4 to 20 mA input signal. A built-in direct or reverse (DA/RA) switch allows selection of the required control action. These actuators feature an AUTO stroke calibration function that enables the actuator to scale the selected input signal and feedback proportionally across the actual valve stroke. Initial application of a power signal will drive the actuator and valve assembly to the full stem-up position and then the full stem-down position, and will store these positions in nonvolatile memory (retains data when power is lost or removed). The actuator will then drive to the position determined by the applied control signal.

If, during normal operation, the valve stroke increases due to disk or seat wear, the actuator will automatically calibrate to the increased stroke range. While AUTO stroke calibrating, the valve control function could be lost for up to three minutes. If this temporary loss of control function will result in system control problems during start-up, the actuator should be mounted to the valve and have electric power supplied to it prior to start-up. Doing so will allow the actuator to AUTO stroke calibrate itself. The Johnson Controls M9000-200 Commissioning Tool (ordered separately) is a convenient method for applying power to the actuator prior to start-up.

The actuator will AUTO stroke calibrate only once upon initial power application. Certain conditions, such as removal of the actuator from the valve, will require cancellation of the stored memory in order for the actuator to adjust to its new position once it is remounted on the valve. Refer to the literature included with the actuator for step-by-step instructions on how to cancel the stored memory.

Mounting

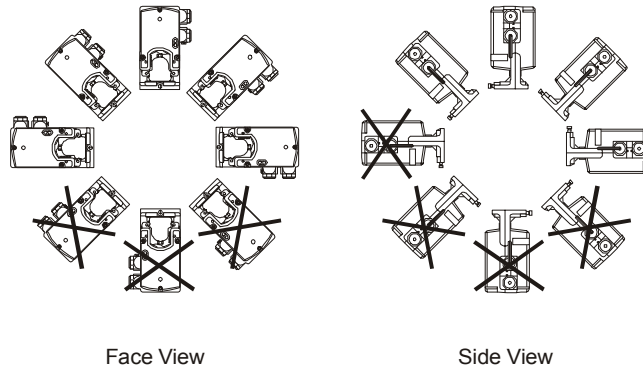


Figure 2: Mounting Positions for Chilled Water Applications and Condensing Atmospheres

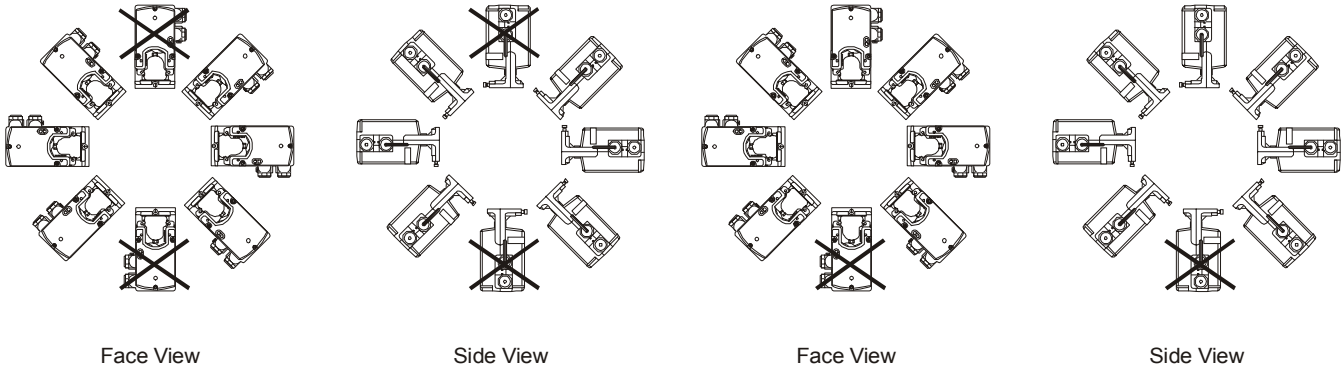


Figure 3: Mounting Positions for Steam Applications

Figure 4: Mounting Positions for Hot Water Applications

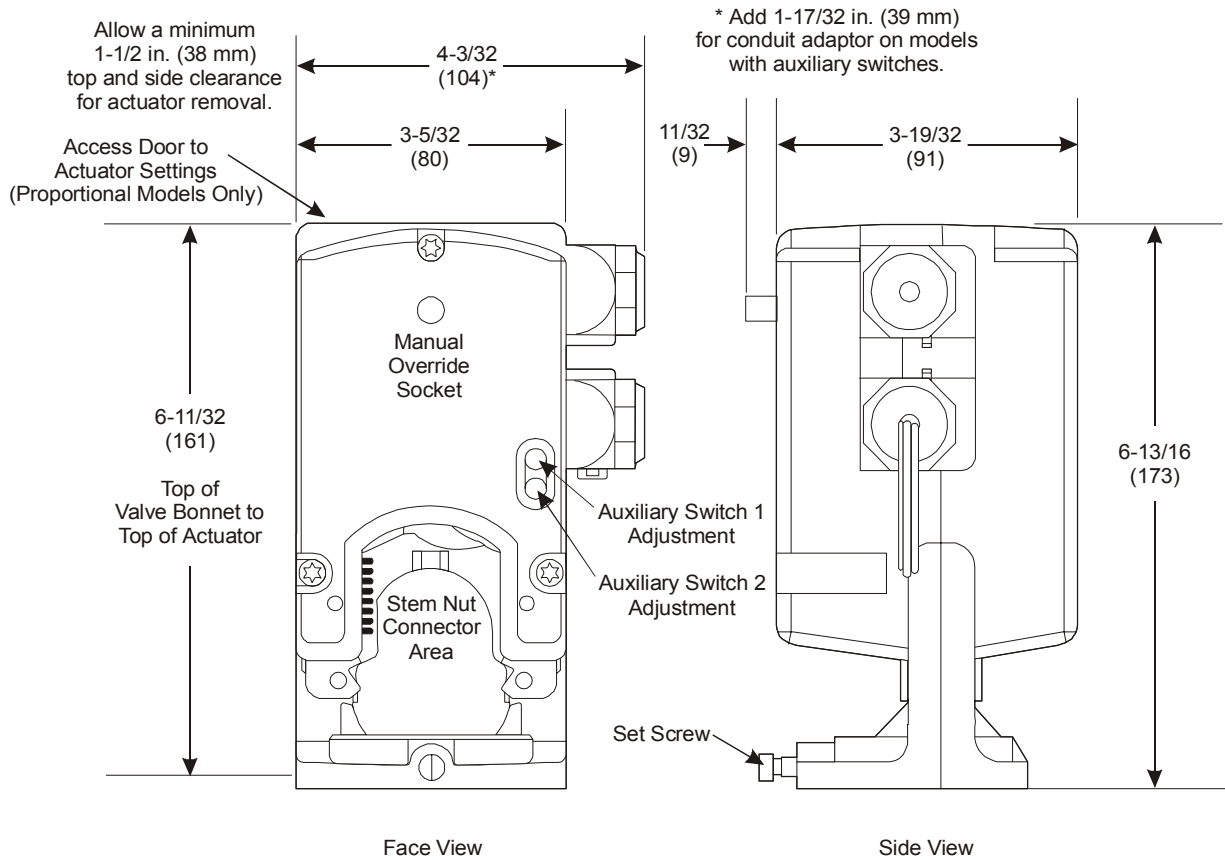


Figure 5: Actuator Dimensions, in. (mm)

Table 3: Repair Parts

| Code Number | Description |
|--------------|--|
| VA-4233-600 | Manual Hand Crank (Includes Five Manual Hand Cranks) |
| VA-4233-601* | Hardware Kit (Includes One Manual Hand Crank, One Special Stem Nut, One Jam Nut, and One Yoke Screw) |

* Items included in the hardware kit are also included with each actuator.

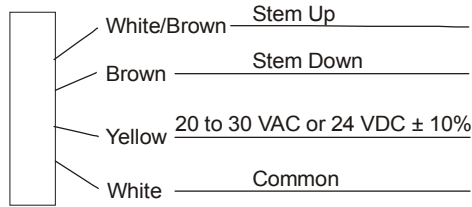


Figure 6: VA-4233-AGx Wiring Diagram for Floating Control

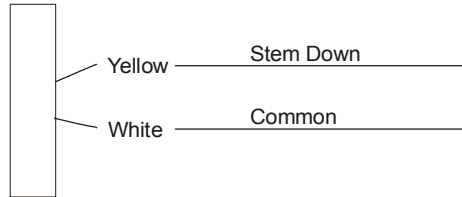
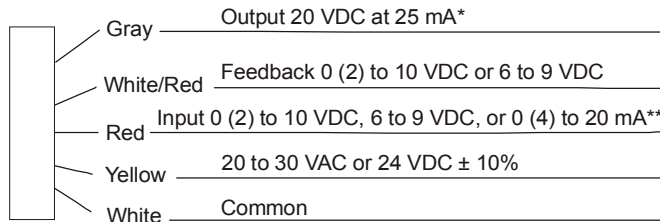


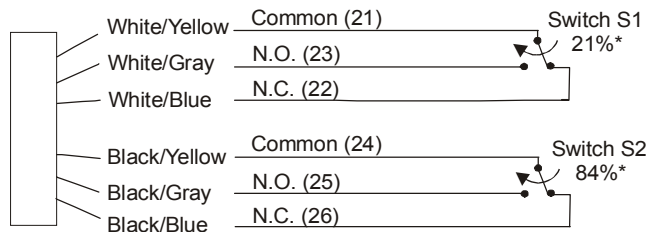
Figure 7: VA-4233-BGx Wiring Diagram for On/Off Control



* Available on VA-4233-GGx-2MP models only.

** The control inputs shown will move the valve stem down as the control input increases, with the DA/RA switch in the DA mode.

Figure 8: VA-4233-GGx Wiring Diagram for Proportional Control



* Refers to a full actuator stroke of 29/32 in. (23 mm).
Switches are readjustable to all applicable Johnson Controls stroke ranges.

Figure 9: Auxiliary Switch Wiring

Technical Data

| | | |
|---|---|---|
| Product | VA-4233 Series Electric Valve Actuators | |
| Models | Refer to Table 1. | |
| Control Type | VA-4233-AGx Models | Floating Control |
| | VA-4233-BGx Models | On/Off Control |
| | VA-4233-GGx Models | Proportional Control |
| Force Output | Minimum 61 lb (271 N) | |
| Power Requirements | 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$; Class 2, 12 VA | |
| Input Signal | VA-4233-AGx Models | 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$, 2 mA |
| | VA-4233-BGx Models | 20 to 30 VAC at 50/60 Hz or 24 VDC $\pm 10\%$, 12 VA |
| | VA-4233-GGx Models | 0 (2) to 10 VDC, 6 to 9 VDC, or 0 (4) to 20 mA |
| Input Signal Adjustments (VA-4233-GGx Models Only) | Factory Set at 0 to 10 VDC; Switch Selectable 0 (2) to 10 VDC, 6 to 9 VDC, or 0 (4) to 20 mA | |
| Direction of Action (VA-4233-GGx Models Only) | Factory Set to Move in Stem-Down Direction with Increasing Input Signal (Direct Acting); Switch Selectable Stem-Up or Stem-Down | |
| Input Impedance (VA-4233-GGx Models Only) | Voltage Input | 200,000 Ohms |
| | Current Input | 500 Ohms |
| Feedback Signal (VA-4233-GGx Models Only) | 0 to 10 VDC, 2 to 10 VDC, or 6 to 9 VDC at 2 mA (Corresponding to Input Signal Selection) | |
| Switch Contact Rating (VA-4233-xGC-2 and -2MP Models Only) | Two Single-Pole, Double-Throw (SPDT), Double Insulated Switches: 24 VAC, 50 VA Pilot Duty; 120 VAC, 5.8 A Resistive, 1/4 hp, 275 VA Pilot Duty; 240 VAC, 2.9 A Resistive, 1/4 hp, 275 VA Pilot Duty | |
| Maximum Stroke | 29/32 in. (23 mm) | |
| Nominal Timing for 29/32 in. Stroke | 76 Seconds (Proportionally Less for Shorter Strokes) | |
| Nominal Spring Return Timing for 29/32 in. Stroke | 3 to 15 Seconds at Room Temperature and No Load (Proportionally Less for Shorter Strokes) | |
| Spring Return Direction | Stem Up | |
| Electrical Connections | Actuator | 48 in. (122 cm) Cable with 20 AWG Wire Leads |
| | Auxiliary Switches (VA-4233-xGC-2 and -xGC-2MP Models Only) | 48 in. (122 cm) Cable with 18 AWG Wire Leads |

Continued on next page . . .

Technical Data (Cont.)

| | | |
|---|--------------------------------|---|
| Ambient Temperature Limits | Operating | 32 to 122°F (0 to 50°C) |
| | Storage | -85 to 185°F (-65 to 85°C) |
| Maximum Ambient Humidity Limits | | 90% RH Non-Condensing at 70°F (21°C) Ambient Temperature and 40°F (4°C) Fluid Temperature |
| Fluid Temperature Limits (Actuator and Valve Assembly) | | 35 to 250°F (2 to 121°C); 15 psig (103 kPa) Saturated Steam |
| Acoustic Noise | | 35 dB(A) Maximum at 39 in. (100 cm) per DIN 1946 and ISO 3745 |
| Agency Compliance | All Models | UL 873 Listed, File E27734, CCN XAPX; CSA C22.2 No. 139 Certified, File LR85083, Class 3221 02; CE Mark, EMC Directive 89/336/EEC |
| | VA-4233-xGC Models Only | Low Voltage Directive 73/23/EEC |
| Enclosure Rating | | NEMA 2, IP 42 |
| Shipping Weight | | 3.1 lb (1.4 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.



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