### SAV Electronic Valve Actuator

#### Non-spring Return, 24 Vac/dc, 3-Position Control

**Description**
The SAV Non-spring Return (NSR), Electronic Valve Actuator requires a 24 Vac/dc supply to provide three-position (floating) control of a valve. This actuator is designed to work with Siemens flanged, Pressure Independent Control Valves with a 1-1/2-inch (40 mm) stroke.

**Features**
- 24 Vac/Vdc operating voltage
- Direct-coupled installation requires no special tools or adjustments
- Visual stroke indication
- Manual override
- Overload and stall protection
- Optional functions with auxiliary switches, potentiometer, and stem heater
- Maintenance-free

**Application**
These electronic actuators are designed to be used with Siemens flanged, Pressure Independent Control valves with 1-1/2-inch (40 mm) stroke in hot and chilled water applications in closed loop HVAC systems.

**NOTE:** Consult Technical Support if using with a TEC.

**Product Number**
SAV81.00U (Actuator Prefix Code 379)
### Specifications

| Power supply          | Operating voltage | 24 Vac ± 20%  
|                       | Frequency         | 45 to 65 Hz  
|                       | Fusing of supply lines | Max. 10A slow  
|                       | Power consumption | 7 VA/4.5 W  
|                       | Stem retracts/extends | 120 s  
|                       | Positioning times | 360 lb (1600 N)  
|                       | Positioning force | 1-1/2-inch (40 mm)  
|                       | Nominal stroke | 34°F to 248°F (1°C to 120°C)  
|                       | Permissible medium temperature (valve fitted) | 24 Vac ± 20%/24 Vdc + 20%/-15%  
|                       | Voltage | 24 Vac Vdc + 20%/24 Vdc + 20%/-15%  
| Function data         | 3-position | 3-position  
|                       | Signal inputs | 24 Vac ± 20%/24 Vdc + 20%/-15%  
|                       | Connecting cable | 16 to 24 AWG  
|                       | Wire gauge | 3 entries for 1/2” conduit connection  
|                       | Cable entries | 3 entries for 1/2” conduit connection  
| Environmental conditions | Housing from vertical to horizontal | IP54, as per EN 60529  
|                       | With Weathershield ASK39.1 | NEMA 3R  
|                       | Insulation class for 24 Vac/Vdc | Class III, as per EN 60730  
| Environmental conditions | Operation | IEC 60721-3-3  
|                       | Climatic conditions | Class 3K5  
|                       | Mounting location | Indoors (weather-protected)  
|                       | Ambient temperature | 23°F to 131°F (-5°C to 55°C)  
|                       | Humidity (non-condensing) | 5 to 95% rh  
|                       | Transportation | IEC 60721-3-2  
|                       | Climatic conditions | Class 2K3  
|                       | Temperature | -13°F to 158°F (-25°C to 70°C)  
|                       | Humidity | < 95% rh  
|                       | Storage | IEC 60721-3-1  
|                       | Temperature | 5°F to 131°F (-15°C to 55°C)  
|                       | Humidity | 5 to 95% rh  
|                       | Max. media temperature when mounted on a valve | 248°F (120°C)  
| Environmental compatibility | ISO 14001 (environment) | ISO 14001 (environment)  
|                       | ISO 9001 (quality) | ISO 9001 (quality)  
|                       | SN36350 (environment-compatible products) | SN36350 (environment-compatible products)  
|                       | RL 2002/95/EG (RoHS) | RL 2002/95/EG (RoHS)  
| Standards             | CE conformity | 2014/30/EU  
|                       | As per EMC directive | EN 61000-6-2:[2005] Industrial  
|                       | Immunity | EN 61000-6-3:[2007] Residential  
|                       | Emissions | Australia  
|                       |                   | RCM  
|                       |                   | UL  
|                       |                   | UL 873  
|                       |                   | C-UL  
|                       |                   | Canadian standard C22.2 No. 24
Specifications (Continued)

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<thead>
<tr>
<th>Accessories</th>
<th>Potentiometer ASZ7.5/135</th>
<th>Potentiometer ASZ7.5/200</th>
<th>Potentiometer ASZ7.5/1000</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0 to 135 Ω ± 5%</td>
<td>0 to 200 Ω ± 5%</td>
<td>0 to 1,000 Ω ± 5%</td>
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<tr>
<td></td>
<td>10 Vdc</td>
<td>10 Vdc</td>
<td>10 Vdc</td>
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<tr>
<td></td>
<td>&lt;4 mA</td>
<td>&lt;4 mA</td>
<td>&lt;4 mA</td>
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Accessories

**NOTE:** Installation instructions are included with each accessory.

<table>
<thead>
<tr>
<th>Product Number</th>
<th>Auxiliary Switch ASC10.51</th>
<th>Potentiometer ASZ7.5/.. 1)</th>
<th>Stem Heating Element ASZ6.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAV81.00U</td>
<td>Max. 2</td>
<td>Max. 1</td>
<td>Max. 1</td>
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</table>

1) Available with 135 Ω, 200 Ω, or 1000 Ω.

**Auxiliary Switch ASC10.51**

Auxiliary switch ASC10.51 switches on or off when a certain position is reached. The switching point can lie between 0 to 100%.

**Potentiometer ASZ7.5/..**

Potentiometer ASZ7.5/.. (1000 Ω, 200 Ω, 135 Ω) delivers an ohmic value to the controller giving the exact position of the actuator (continuous position feedback).

**Stem Heating Element ASZ6.6**

Stem heating element ASZ6.6 prevents the formation of ice on the stem when the medium temperature drops below 32°F (0°C). It is suited for universal use with valves having a stem or spindle diameter of 10 or 14 mm.

**Weather Shield ASK39.1**

Weather Shield ASK39.1 protects the actuator when installed outdoors. Provides NEMA 3R protection.
Components

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<tr>
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<tbody>
<tr>
<td>A</td>
<td>Manual adjuster (with slide switch)</td>
</tr>
<tr>
<td>B</td>
<td>Wiring knockouts</td>
</tr>
<tr>
<td>C</td>
<td>Position indication</td>
</tr>
<tr>
<td>D</td>
<td>Status indication (SAV61.00U only)</td>
</tr>
<tr>
<td>E</td>
<td>Housing cover</td>
</tr>
<tr>
<td>F</td>
<td>Valve stem coupling</td>
</tr>
<tr>
<td>G</td>
<td>Yoke</td>
</tr>
<tr>
<td>H</td>
<td>Valve neck coupling</td>
</tr>
</tbody>
</table>

Operation

The actuator accepts a 24 Vac/dc control signal to Y1, which causes the actuator’s stem retainer to move toward the valve (extend). A 24 Vac/dc control signal to Y2 causes the actuator’s stem retainer to move toward the actuator (retract). The stroke travel is proportional to the length of time the signal is applied.

When power is turned off or in the event of a power failure, the actuator maintains its position.

In the 3-position (floating) actuators, deviation occurs (See Figure 1):

- after several positioning signals Y1 and Y2 in the same direction since the stroke movement starts with a delay of 300 ms.
- when positioning signals Y1 and Y2 are active for less than 300 ms, there is no stroke movement.
- Accurate position feedback is made possible with the help of a potentiometer.

**NOTE**: Consult Technical Support if using with a TEC.

![Figure 1. Three-position (Floating) Actuator Deviation.](image-url)
Manual Override

Automatic mode

When the motor drives the manual adjuster turns. In Automatic Mode, the manual adjuster is used for indication of travel. If the manual adjuster is held firm in this mode, there is no transmission of power to the gear train.

Manual operation

When pushing the manual adjuster down (1), it engages and the actuator can be manually operated.

When turning the manual adjuster in a clockwise/counterclockwise direction (2), the actuator’s stem extends/retracts.

An overload protection prevents damage to the manual adjuster.

Setting the position

When the black slide switch is pushed out, the manual adjuster remains engaged.

When in this mode, do not turn the manual adjuster.

Disengaging the setting

When the black slide switch is pushed back in, and the manual adjuster is not pressed down, the manual adjuster returns to Automatic Mode.
Mounting and Installation

Indoor Use

Outdoor Use\(^1\)

1) Only in connection with Weather Shield ASK39.1 for NEMA 3R protection.

**Figure 2. Acceptable Mounting Positions.**

The vertical position is the recommended position for mounting. Figure 2 shows the acceptable mounting positions.

Allow 8 inches (200 mm) above and on the wiring side of the actuator, and four inches (100 mm) on all other sides of the actuator. This service envelope is the minimum space required to access and service the actuator. See *Dimensions* for actuator dimensions and the recommended service envelope.

**CAUTION:**

Do not rotate the actuator on the valve once the actuator and valve stem are connected. Doing so will inadvertently adjust the flow setting of the valve.

### Start-Up

Check the wiring for proper connections.

### PIC Valve

Y1 control signal extends the actuator (0 to 1): Valve closes.

Y2 control signal retracts the actuator (1 to 0): Valve opens.

### Wiring

**NOTE:** All wiring must conform to national and local codes and regulations (NEC, CE, and so on).

Do not use auto transformers. Use earth ground isolating step-down Class 2 power supplies.

3-position actuators must have one specific controller each. It is not possible to have multiple 3-position actuators in parallel from one controller.
Wiring Diagrams

Figure 3.

Figure 4. Wiring Designations.

The diagram shows all possible connections. The application determines which connections are used.

Wiring Terminals

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
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<tbody>
<tr>
<td>G</td>
<td>System potential (SP)</td>
</tr>
<tr>
<td>Y1</td>
<td>Positioning signal (actuator's stem extends)</td>
</tr>
<tr>
<td>Y2</td>
<td>Positioning signal (actuator's stem retracts)</td>
</tr>
</tbody>
</table>

24 Vac/Vdc, 3-Position

Troubleshooting

Check that the wires are connected correctly and attached securely.

Check for adequate power supply.
Figure 5. Dimensions in Inches (Millimeters).

Service envelope

Minimum access space recommended

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>SAV81.03U</td>
<td>10.43</td>
<td>4.88</td>
<td>5.91</td>
<td>2.68</td>
<td>3.23</td>
<td>3.15</td>
<td>3.94</td>
<td>3.94</td>
<td>7.87</td>
<td>4.23</td>
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<tr>
<td>With ASK39.1</td>
<td>11.42</td>
<td>6.06</td>
<td>11.81</td>
<td>7.87</td>
<td>3.94</td>
<td>3.94</td>
<td>7.87</td>
<td>4.74</td>
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