

Flowrite™ 599 Series SAX Electronic Valve Actuator

**Non-spring Return, 24 Vac,
3-Position Control**



Description	The Flowrite™ 599 Series SAX Non-spring Return (NSR), Electronic Valve Actuator requires a 24 Vac supply and receives a 3-position control signal to control a valve. This actuator is designed to work with Flowrite 599 Series 2-way and 3-way valves with 3/4-inch (20 mm) stroke.
Features	<ul style="list-style-type: none"> • 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 Flowrite 599 Series valves with 3/4-inch (20 mm) stroke in hot and chilled water and steam service applications in closed loop HVAC systems. They are particularly recommended for installations requiring quick response and good rangeability.
Product Number	SAX81.03U (Actuator Code 373)
Product Replacements	Replacement of SQX Series Actuators by SAX Series Actuators.
Stroke Actuators SQX... to SAX...	<p>NOTE:</p> <ul style="list-style-type: none"> • When replacing actuators consider positioning force, and positioning times. • Adjust the controller parameter "Running time" or "Positioning time", to ensure stable control.

SQX..		Pos. Time [s]	Pos. Force [N]	SAX..	Pos. Time [s]	Pos. force [N]
SQX82..	SQX82.00U	120	700	SAX81.03U	30	800
	SQX82.03U	30	700			

Specifications	Operating voltage	24 Vac \pm 20% / 24 Vdc + 20% / -15%, Class 2
	Power supply	Frequency Fusing of supply lines Power consumption Stem retracts/extends
		45 to 65 Hz Max. 10A slow 8 VA/3.75 W
Function data	Positioning times	30 s
	Positioning force	800 N
	Nominal stroke	20 mm
	Permissible medium temperature (valve fitted)	-13°F to 302°F (-25° to 150°C)
Signal inputs	Positioning signals "Y1", "Y2"	3-position
	Voltage	24 Vac \pm 20%/24 Vdc + 20%/-15%
Connecting cable	Wire gauge	16 to 24 AWG
	Cable entries	3 entries for 1/2" conduit connection
Degree of protection	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)
	Temperature general	23°F to 131°F (-5°C to 55°C)
	With heating element ASZ6.6	5°F to 131°F (-15°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	302°F (150°C)
Environmental compatibility		ISO 14001 (environment)
		ISO 9001 (quality)
		SN36350 (environment-compatible products)
		RL 2002/95/EG (RoHS)
Standards	CE conformity	
	As per EMC directive	2004/108/EC
	Immunity	EN 61000-6-2:[2005] Industrial
	Emissions	EN 61000-6-3:[2007] Residential
	Electrical safety	EN 60730-1
	C-tick	N 474
	UL conformity (24 Vac/Vdc)	UL 873
C-UL conformity (24 Vac/Vdc)	Certified to Canadian standard C22.2 No. 24-93	

Specifications (Continued)	Potentiometer ASZ7.5/135	0 to 135 Ω ± 5%
	Voltage	10 Vdc
	Current rating	<4 mA
Accessories	Potentiometer ASZ7.5/200	0 to 200 Ω ± 5%
	Voltage	10 Vdc
	Current rating	<4 mA
	Potentiometer ASZ7.5/1000	0 to 1,000 Ω ± 5%
	Voltage	10 Vdc
	Current rating	<4 mA
Auxiliary switch ASC10.51		
Switching capacity		24 to 230 Vac, 6A res., 3A Ind.
Stem heating element ASZ6.6		24 Vac, 30 W

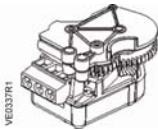
Accessories

NOTE: Installation instructions are included with each accessory.

Product Number	Auxiliary Switch ASC10.51	Potentiometer ASZ7.5/.. ¹⁾	Stem Heating Element ASZ6.6
SAX81.03U	Max. 2	Max. 1	Max. 1

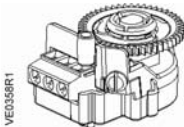
1) Available with 135 Ω, 200 Ω, or 1000 Ω.

Auxiliary switch
ASC10.51



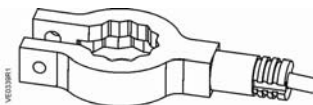
Auxiliary switch ASC10.51 switches on or off when a certain position is reached. The switching point can lie between 0 to 100%.

Potentiometer
ASZ7.5/..



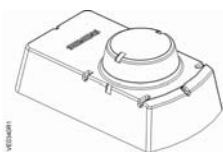
Potentiometer ASZ7.5/.. (1000 Ω, 200 Ω, 135 Ω) delivers an ohmic value to the controller giving the exact position of the actuator (continuous position feedback).

Stem Heating Element
ASZ6.6



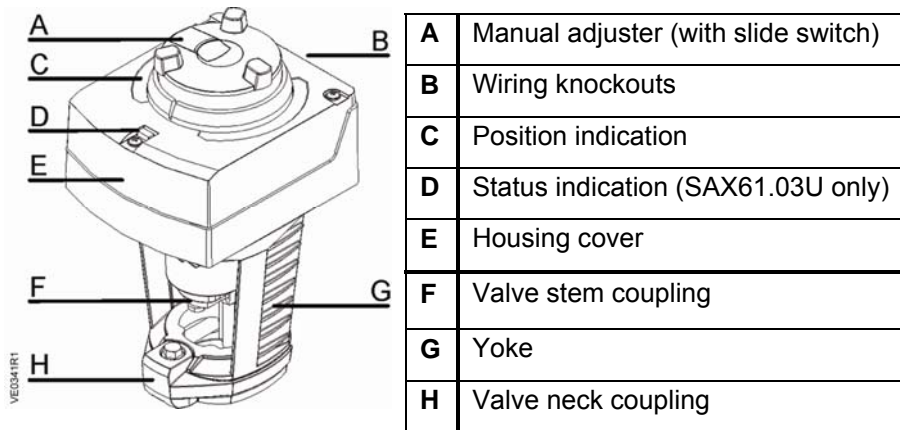
Stem heating element ASZ6.6 prevents the formation of ice on the stem when the medium temperature drops below 32°F (0°C). It is suited for universal use with valves having a stem or spindle diameter of 10 or 14 mm.

Weather shield
ASK39.1



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

Components



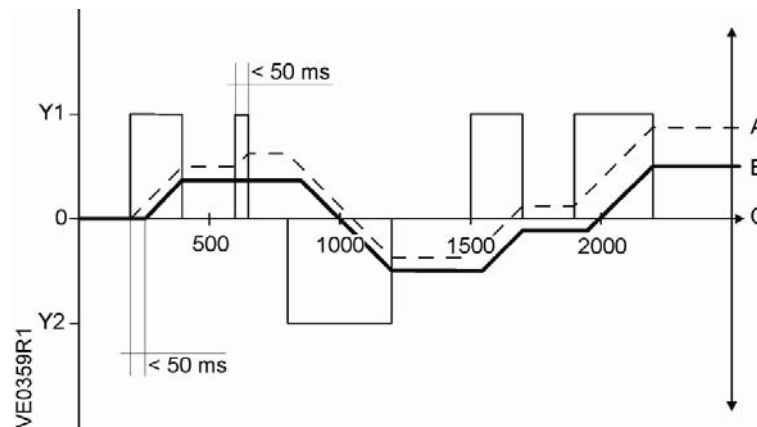
Operation

The actuator accepts a 24 Vac control signal to Y1, which causes the actuator's stem retainer to move toward the valve (extend). A 24 Vac 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 50 ms.
- when positioning signals Y1 and Y2 are active for less than 50 ms since the stroke movement cannot be made in that case.



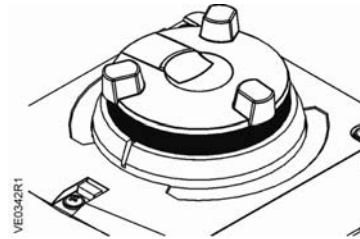
A	B	C	Y1	Y2	0
Calculated position	Actual position	Positioning time [ms]	Positioning signals (power applied)		No power applied

Accurate position feedback is made possible with the help of a potentiometer.

Figure 1. Three-position (Floating) Actuator Deviation.

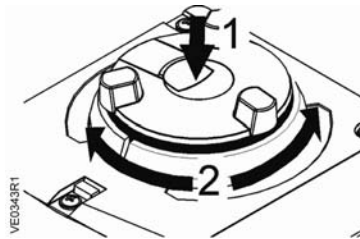
Manual Override

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

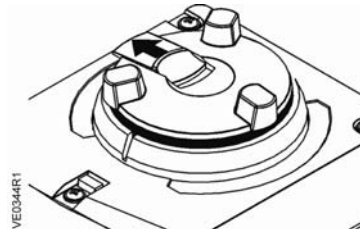


When pushing the manual adjuster down (1), it engages and the actuator can be manually operated.

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.

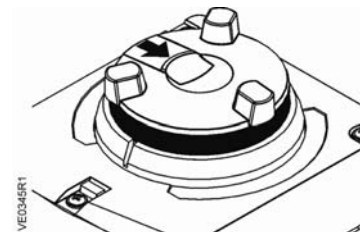
Setting the position



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

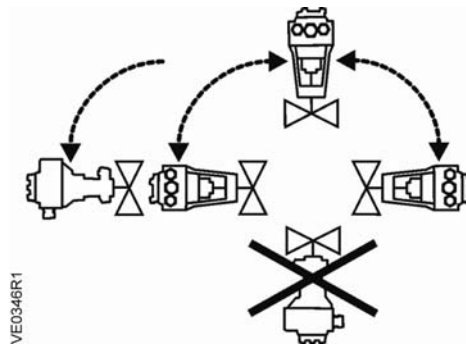
When in this mode, do not turn the manual adjuster.

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 or Outdoor Use¹

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.

Start-Up

Check the wiring for proper connections.

NOTE: The valve body assembly determines the complete assembly action.

Normally Closed Valve

Y1 control signal extends the actuator (0 to 1): Valve opens.
 Y2 control signal retracts the actuator (1 to 0): Valve closes.

Normally Open Valve

Y1 control signal extends the actuator (0 to 1): Valve closes.
 Y2 control signal retracts the actuator (1 to 0): Valve opens.

Three-Way Valve

Y1 control signal extends the actuator (0 to 1): Valve opens between Ports A and AB (through port).

Y2 control signal retracts the actuator (1 to 0): Valve opens between Ports B and AB (bypass port)

Wiring

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

Determine supply transformer rating by summing total VA of all actuators used.

The maximum rating for Class 2 step-down transformer is 100 VA. It is recommended that no more than 10 actuators are powered by one transformer.

Wiring Diagrams

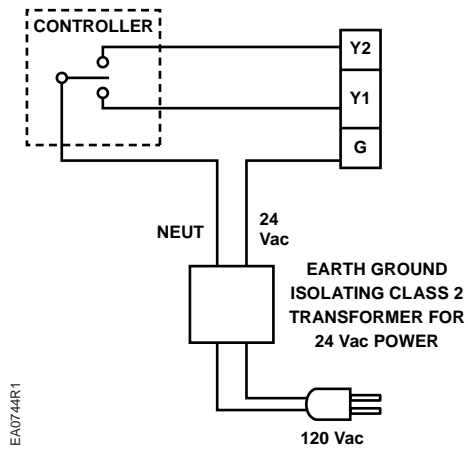


Figure 3.

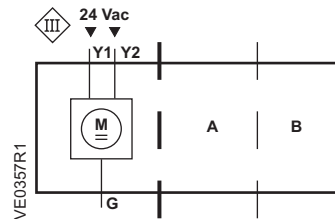
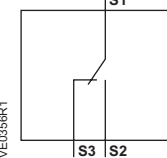


Figure 4. Wiring Designations.

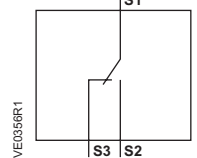
Accessories

A and/or B

1x ASC10.51
 Auxiliary Switch
 24 Vac to 230V / 6 (3) A

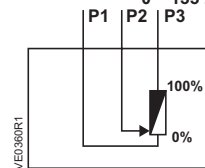


1x ASC10.51
 Auxiliary Switch
 24 Vac to 230V / 6 (3) A



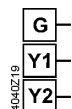
or 1 x ASZ7.5/..
 Potentiometer

SELV/PELV 1000 Ω
 0 200 Ω
 0 135 Ω



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

Wiring Terminals



24 Vac/Vdc, 3-Position

G System potential (SP)
 Y1 Positioning signal (actuator's stem extends)
 Y2 Positioning signal (actuator's stem retracts)

Troubleshooting

Check that the wires are connected correctly and attached securely.

Check for adequate power supply.

Dimensions

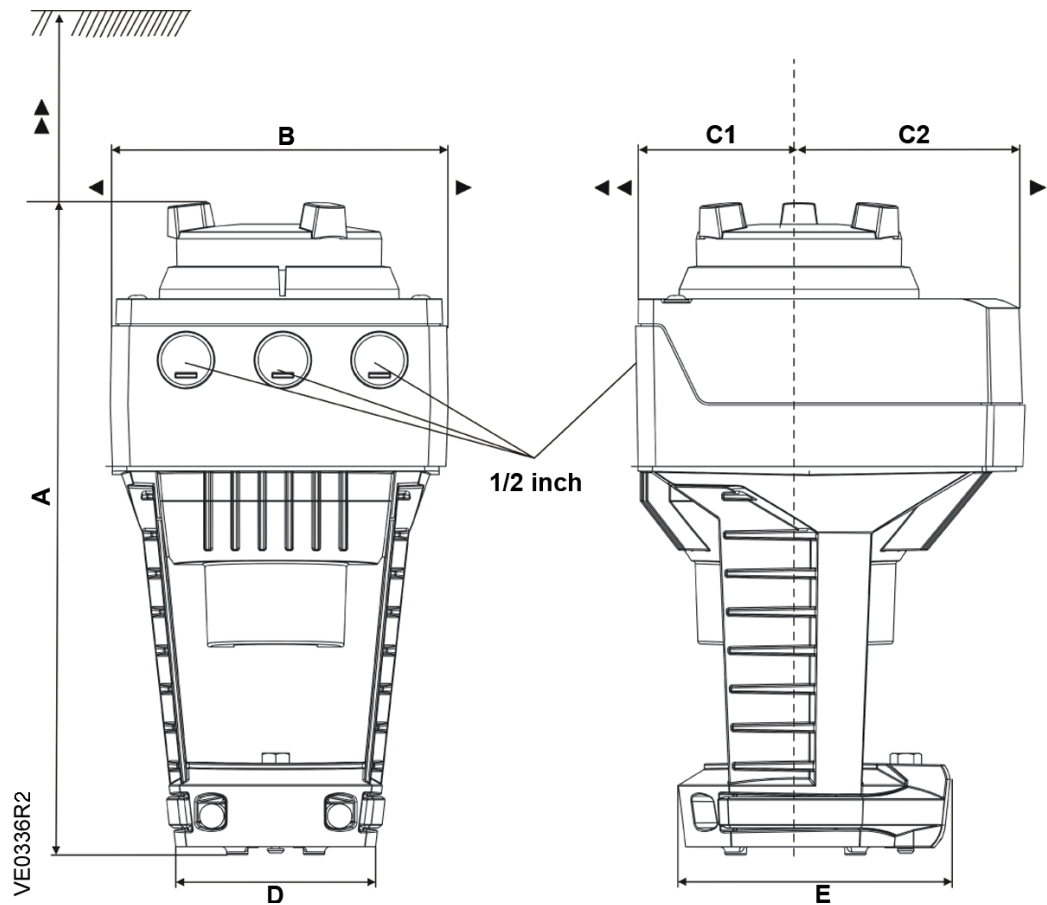


Figure 5. Dimensions in Inches (Millimeters).

Service envelope

Minimum access space recommended

▶
4 inch (100 mm)

▲
8 inch (200 mm)

Product Numbers	A	B	C	C1	C2	D	E	▶	▶▶
SAX81.03U	9.53 (242)	4.88 (124)	5.91 (150)	2.68 (68)	3.23 (82)	3.15 (80)	3.94 (100)	3.94 (100)	7.87 (200)
With ASK39.1	10.51 (267)	6.06 (154)	11.81 (300)	7.87 (200)	3.94 (100)	–	–	–	–

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