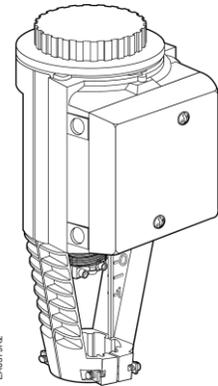


Flowrite™ 599 Series

SKD6xU Electronic Valve

Actuators

24 Vac Proportional Control



Description

The Flowrite 599 Series SKD6xU Electronic Valve Actuators require a 24 Vac supply and receive a 0 to 10 Vdc or a 4 to 20 mA control signal to proportionally control a valve. These actuators are designed to work with Flowrite 599 Series valves with a 3/4-inch (20 mm) stroke.

Features

- Direct-coupled installation requires no special tools or adjustments
- Visual and electronic stroke indication
- Die-cast aluminum housing
- Manual override
- Spring return to fail-safe position or non-spring return fail-in-place
- Automatic stroke calibration
- Maintenance-free

Application

These electronic actuators are designed to be used with Flowrite 599 Series valves with a 3/4-inch (20 mm) stroke in liquid and steam service applications.

Product Number

SKD62U, Spring Return	(Actuator Prefix Code 274)
SKD60U, Non-Spring Return	(Actuator Prefix Code 267)

Warning/Caution Notations

WARNING:		Personal injury or loss of life may occur if you do not perform a procedure as specified.
CAUTION:		Equipment damage or loss of data may occur if you do not perform a procedure as specified.

Specifications

Power supply	Operating voltage	24 Vac -20%/+30%	
	Frequency	50/60 Hz	
	Power consumption	17 VA/12W	
Control signals	Control input (Y)		
	Voltage	0 to 10 Vdc or 4 to 20 mA (DIP switch selectable)	
	Maximum Impedance	0 to 10 Vdc 100K ohms 4 to 20 mA; 240 ohm	
	Signal resolution	<1%	
	Hysteresis	1%	
	Control input (Z)		
	Resistance	0 to 1000 ohms	
	Voltage	0 to 1.6V	
	Control output (U) – position feedback		
	Voltage	0 to 9.8 Vdc \pm 2%	
	Load Impedance	>10K ohm	
	Current	4 to 19.6 mA \pm 2%	
	Load impedance	< 500 ohms	
Function	Nominal stroke	3/4-inch (20 mm)	
	Run time with control operation (full stroke)		
	Pushing stroke, 0 to 100%	30 seconds	
	Pulling and Spring return stroke, 100 to 0%	15 seconds	
	Nominal Force	Stroke	Force
	NC and 3-way upper	0%	225 lbs (1000 N)
	NO and 3-way by-pass	100%	258 lbs (1150 N)
Agency Certification	UL approval	UL873	
	cUL	Certified to Canadian standard C22.2 No. 24-93	
	 conformity per the EMC directive	89/336/EEC	
	Low voltage directive	73/23/EEC	
Ambient conditions	Ambient temperature (Operation)	5°F to 122°F (-15°C to 50°C)	
	Media temperature	-13°F to 300°F (-25°C to 150°C) <32°F (0°C) requires a Stem Heater	
Housing	NEMA Rating	NEMA 1 (interior only) See <i>Accessories</i> .	
Miscellaneous	Dimensions	See Figure 17	
	Conduit opening	1/2-inch NPSM	
	Weight		
	SKD60U	7.9 lbs (3.6 kg)	
SKD62U	8.5 lbs (3.85 kg)		

Accessories

NOTE: Installation instructions are included with each accessory.

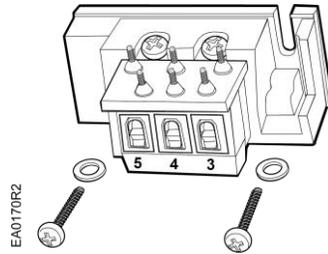


Figure 1. Auxiliary Switch.

ASC1.6 Auxiliary switch.

Sends a signal to indicate the valve is in the 0% stroke position. Switching point is fixed at the 0% stroke position.

Switching capacity 24 Vac
 4A resistive
 2A inductive

Lowest recommended
 current 10 mA

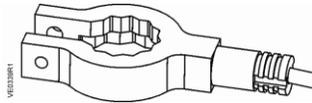


Figure 2. Stem Heating Element.

ASZ6.6 The stem heating element 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.

Operating voltage 24 Vac/dc ± 20%
 Power consumption ≤ 40 VA/30W

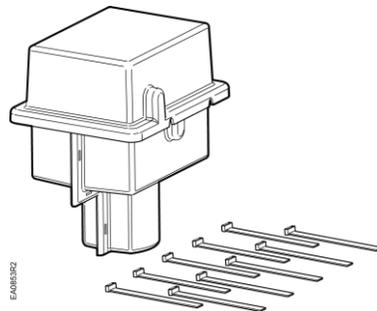


Figure 3. Weather Shield.

599-10071 Weather Shield.

See *Service Kits* for replacement ultraviolet resistant cable ties.

Service Kits

The only field serviceable part is the circuit board.

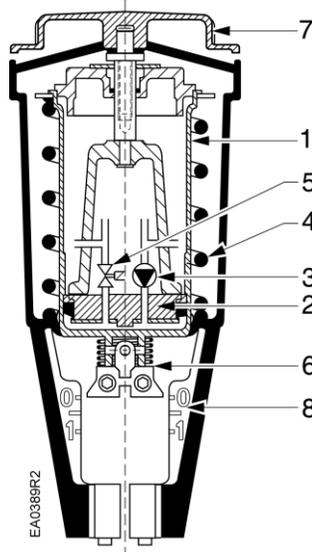
Circuit board replacement	4-668-5748-8
Plastic wiring compartment cover	4-104 5634-8
Manual Override Kit for SKD	4-268 5504-8
Ultraviolet (UV) resistant cable ties (pkg. of 10)	538-996



WARNING:

This product contains a spring under high compression. Do not attempt to disassemble the actuator.

SKD Details



Legend

- 1 Pressure cylinder
- 2 Piston
- 3 Oscillating pump
- 4 Return spring
- 5 Bypass valve
- 6 Valve stem retainer
- 7 Manual override knob
- 8 Position indicator

Figure 4. SKD6xU Details.

Operation

The actuator accepts a 0 to 10 Vdc or a 4 to 20 mA control signal. The actuator mounted on a valve, produces a stroke proportional to the input signal. When power is turned off or in the event of a power failure, the SKD62U Actuator spring returns the valve to its normal position, and the SKD60U Actuator fails in place.

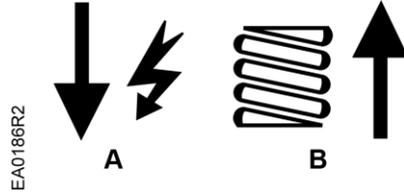


Figure 5.



Figure 6.

Spring return: When power is turned off or in the event of a power failure, the actuator spring returns the valve to its normal position.

Non-spring return: When power is turned off or in the event of a power failure, the actuator maintains its position.

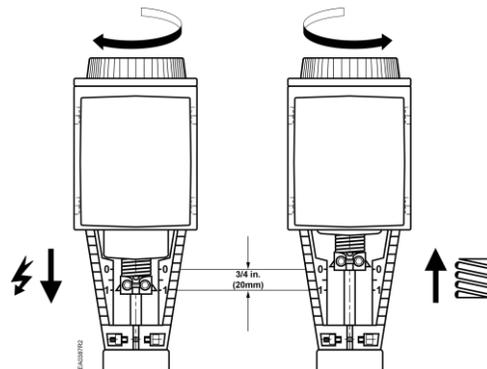


Figure 7. Valve Stem Travel Indication.

Mounting and Installation

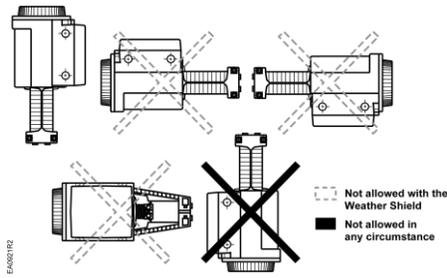


Figure 8. Acceptable Mounting Positions.

The vertical position is the recommended position for mounting. Other positions are allowed. When using the Weather Shield for NEMA 3R rating, the vertical position is required. See Weather Shield installation instructions and Figure 8.

Allow four inches (100 mm) around the sides and back of the actuator and eight inches (200 mm) above and to the front of the actuator.

See dimensions in Figure 16 and Figure 17.

Detailed installation instructions for field mounting are shipped with the actuator.

Start-up

Check the wiring for proper connections.

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

Stroke Calibration

To determine the stroke positions 0% and 100% in the valve, calibration is required when the valve/actuator are commissioned for the first time.

The actuator must be mechanically connected to a valve and must have a 24 Vac power supply. The calibration procedure can be repeated as often as necessary.



CAUTION:

Before starting calibration, be sure the manual adjuster is set to **Automatic** to register the actual values.

There is a slot on the printed circuit boards of the actuators. To initiate the calibration procedure, the contacts inside this slot must be short-circuited, for example, with a screwdriver (see Figure 9).

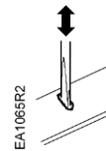


Figure 9.

Automatic calibration proceeds as follows (see Figure 10):

- Actuator runs to the 0 stroke position (1), green LED flashes.
- Actuator then runs to the 100 stroke position (2), green LED flashes.
- Measured values are stored in the EPROM.
- The actuator now moves to the position defined by control signal **Y** or **Z** (3), and the green LED now glows steadily (normal operation).
- Throughout this procedure, output **U** is inactive; meaning, the values only represent actual positions when the green LED stops flashing and remains on continuously.

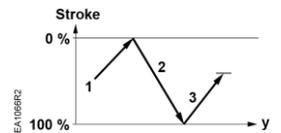


Figure 10.

**Stroke Calibration,
 Continued**

Table 1. LED Status.

LED	Display	Function	Action
Green	ON	Normal Operation	Automatic operation
	Flashing	Stroke calibration In Progress	Wait for calibration to be completed (LED stops flashing)
Red	ON	Faulty stroke calibration	- Check mounting - Restart stroke calibration (by short-circuiting calibration slot)
	ON	Internal Error	- Replace electronics
	Flashing	Inner valve jammed	Check the valve
	OFF	<ul style="list-style-type: none"> No power supply Faulty electronics 	-Check mains -Replace electronics

Override Control

The override control input (Z) has three modes of operation:

No Function	Override with 0 ... 1000 Ω
<p>Stroke</p> <p>100 %</p> <p>H_{max}</p> <p>H_{min}</p> <p>Y</p> <ul style="list-style-type: none"> - Z-Contact not Wired - Valve Stroke Follows Control Signal Y 	<p>Stroke</p> <p>100 %</p> <p>0 %</p> <p>50</p> <p>900</p> <p>R [Ω]</p> <ul style="list-style-type: none"> - Z-Contact Connected to M Via Resistor R - Linear or Equal-Percentage Characteristic - Starting Position at 50 / End Position at 900 - Y-Input has No Effect
Actuator Fully Extended	Actuator Fully Retracted
<p>Stroke</p> <p>100 %</p> <p>V_{max}</p> <p>0 %</p> <p>Y</p> <ul style="list-style-type: none"> - Z-Contact Connected Directly to G - Y-Input has No Effect 	<p>Stroke</p> <p>100 %</p> <p>V_{max}</p> <p>0 %</p> <p>Y</p> <ul style="list-style-type: none"> - Z-Contact Connected Directly to G0 - Y-Input has No Effect

The Z-modes have a "direct acting" factory setting.

Start-up, Continued

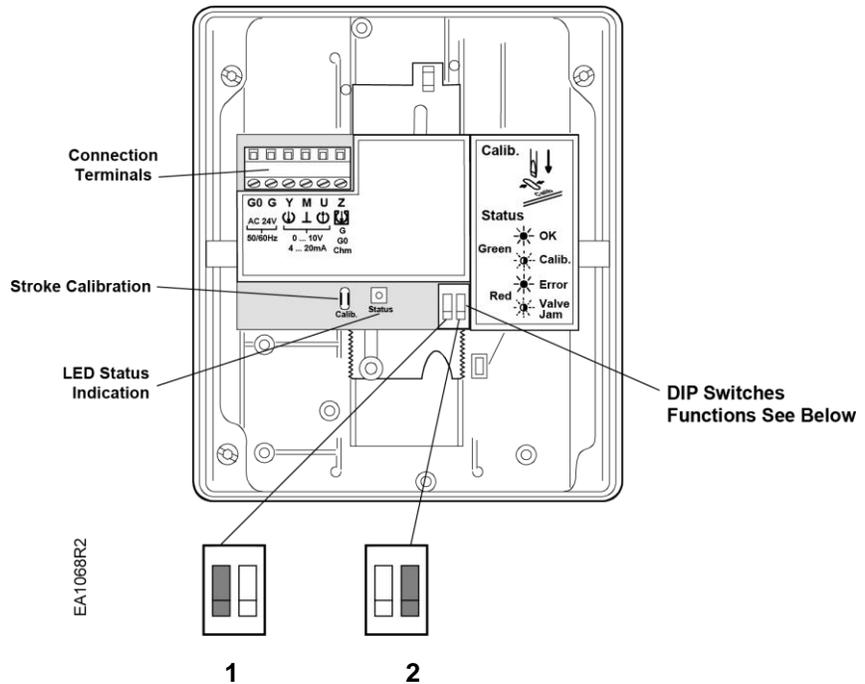


Figure 11. SKD Electronic Features.

DIP Switches (Left to right)	1 Selection of Control Signal	2 Selection of Flow Characteristic
ON	4 to 20 mA	Modified*
OFF Factory Setting	0 to 10 Vdc	Default

*Changing the default setting will modify an equal percentage valve to a linear flow characteristic. When set to default, the flow characteristic is determined by the valve body.

Normally Closed Valve

- Actuator pressure cylinder moves:
- Outward (**0** to **1**): Valve opens.
 - Inward (**1** to **0**): Valve closes.

Normally Open Valve

- Actuator pressure cylinder moves:
- Outward (**0** to **1**): Valve closes.
 - Inward (**1** to **0**): Valve opens.

Three-Way Valve

- Actuator pressure cylinder moves
- Outward (**0** to **1**): Valve opens between port NC and C.
 - Inward (**1** to **0**): Valve opens between ports NO and C.

The measuring voltage at terminal **U** provides valve stem position feedback to an indicating instrument or building automation system.

Manual Operation

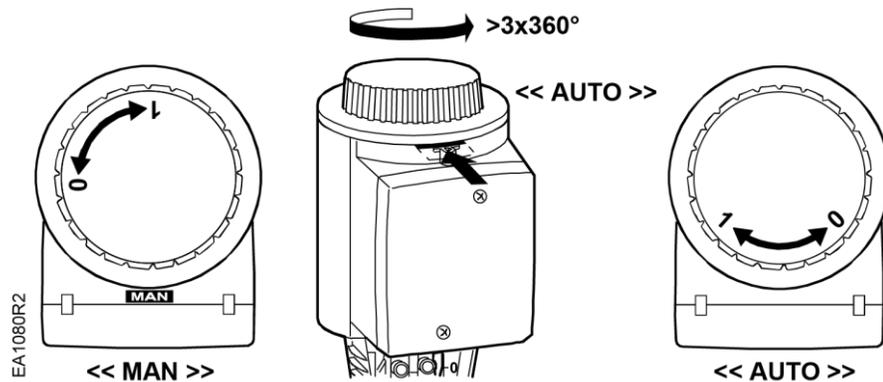


Figure 12. The Manual Setting Knob in Manual and Automatic Position.

- Turn the manual setting knob clockwise for manual operation.
- A red indicator becomes visible as you begin to crank. Each complete revolution (360°) is equal to 3/32-inch (2.5 mm) stroke.
- If a signal is sent to the actuator while it is in manual operation, the actuator will move but the control will not be accurate.
- The valve cannot be commanded to its 0% position while in manual operation.

Automatic operation

For automatic operation the manual override knob must be in the fully closed position.

Turn the manual override knob counterclockwise until the red indicator disappears.

Wiring

Do not use autotransformers. 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.

- Since SKD6xU actuators require ≈ 20 VA, a maximum of four actuators can be powered by one transformer (80% of transformer VA).
 - Operating more than four SKD6xU actuators requires additional transformers or separate 100 VA power supplies.
 - The position output signal **U** will switch from 0 to 10 Vdc to 4 to 20 mA when a 4 to 20 mA input signal is selected and used on the Y terminal.
-

Wiring Diagrams

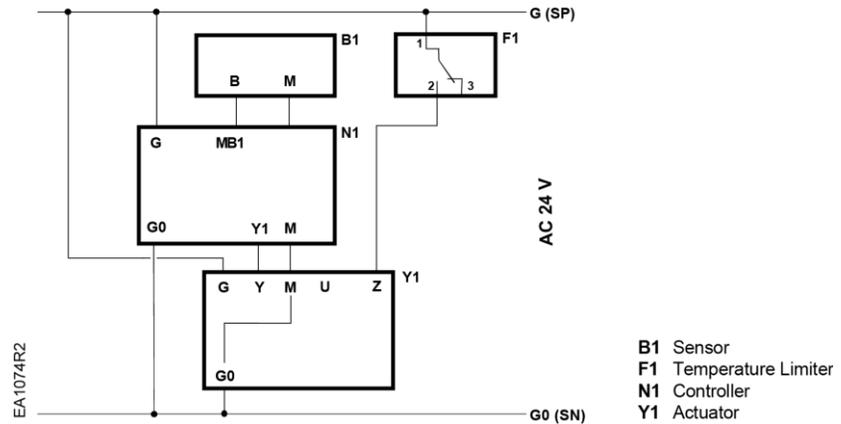


Figure 13. Connecting Terminals.

24 Vac	
G	System Potential (SP)
G0	System Neutral (SN)
Y	Control input 0 to 10 Vdc or 4 to 20 mA (DIP switch selectable)
M	Measuring neutral
U	Position indication 0 to 10 Vdc or 4 to 20 mA, (see Table 2.
Z	Override control

Table 2.

Actuator input signal	Receiving Impedance	
	Low (<500 Ohm)	High (>10K Ohm)
0 to 10 Vdc	0 to 20 mA	0 to 10 Vdc
4 to 20 mA	4 to 20 mA	2 to 10 Vdc

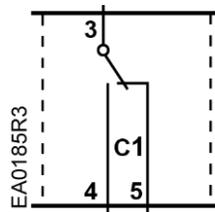


Figure 14. Auxiliary Switch ASC1.6.

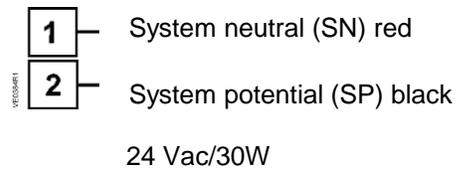


Figure 15. Heating Element ASZ6.6.

Troubleshooting

- Check that the wires are connected correctly and attached securely.
- Check for adequate power supply.
- Check that the actuator is set for automatic operation. See the *Start-Up* section.

Dimensions

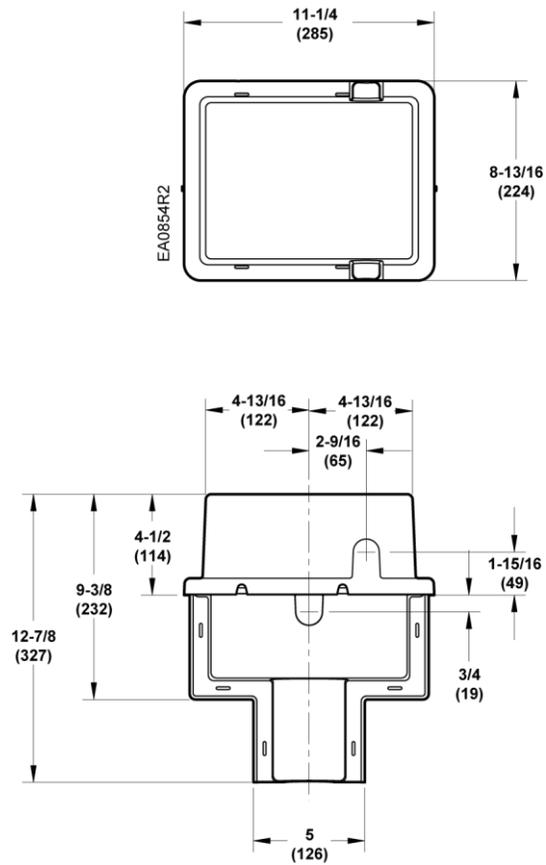


Figure 16. Dimensions of 599-10071 Weather Shield in Inches (Millimeters).

**Dimensions,
 Continued**

NOTE: The top knockout position should be used when installing the Weather Shield.

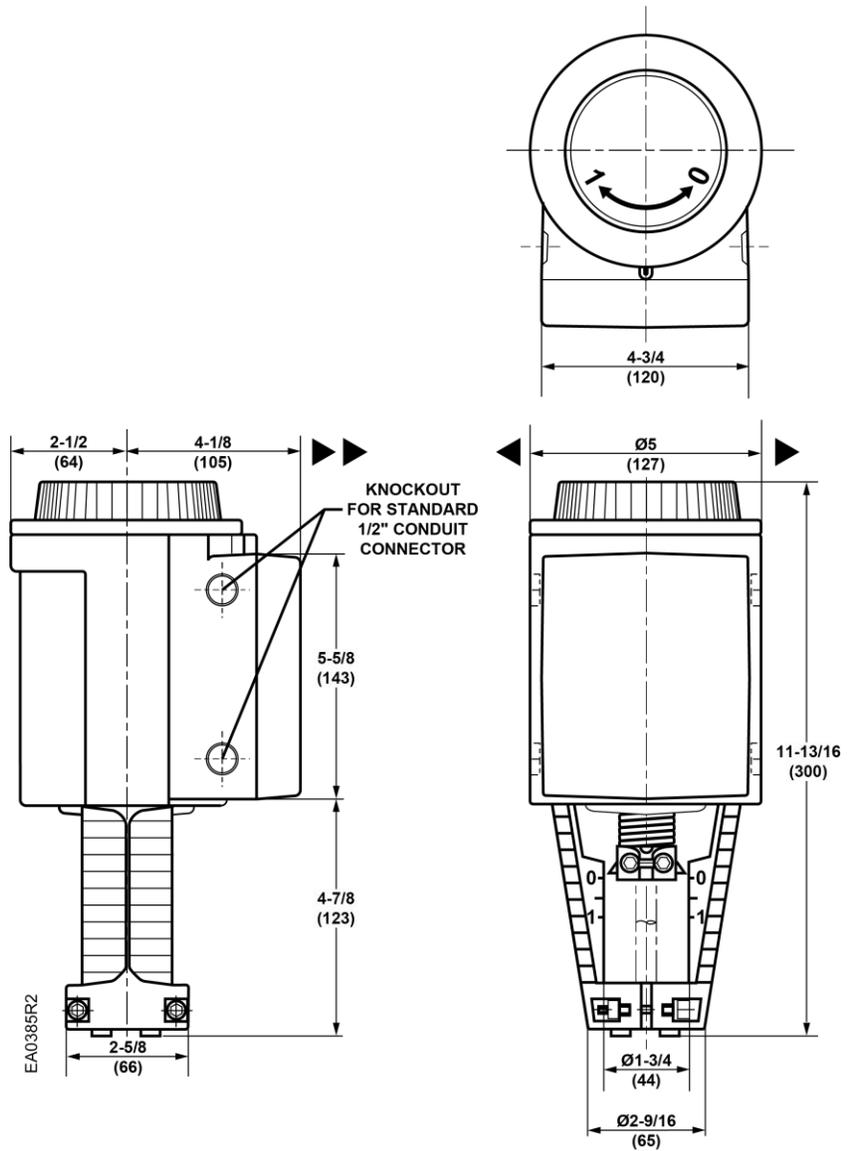


Figure 17. Dimensions of SKD6xU Actuators in Inches (Millimeters).

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