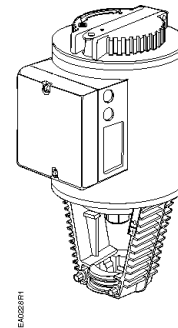
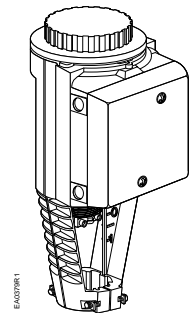


Flowrite™ EA 599 Series

SKB/C/D 62UA Series Electronic Valve Actuator 24 Vac Proportional Control Advanced Features



SKB/C



SKD

Description

The Flowrite EA 599 Series SKB/C/D62UA Electronic Valve Actuator requires a 24 Vac supply and receives a 0 to 10 Vdc or a 4 to 20 mA control signal to proportionally control a valve. This actuator is designed to work with Flowrite VF 599 Series valves and Siemens Industry, Inc. standard 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
- Automatic stroke calibration
- Direct or reverse acting
- Adjustable start and span
- Stroke limit control
- Selectable operation direction (direct-acting/reverse acting)
- Choice of linear or equal-percentage flow characteristic
- Maintenance-free

Application



These electronic actuators are designed to be used with Flowrite VF 599 Series valves with either 3/4-inch (20 mm) stroke (SKB/D) or a 1-1/2 inch (40 mm) stroke (SKC) in liquid service and steam service applications; or other manufacturer's valves with appropriate Universal Valve Linkage Kit.

Product Numbers

Table 1. Product Numbers.

Actuator Stroke	Order Number
3/4-inch (20 mm)	SKB62UA
	SKD62UA
1-1/2 inch (40 mm)	SKC62UA

Warning/Caution Notations

WARNING:		Personal injury/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 (SELV, PELV)	24 Vac \pm 20%
	Frequency	50 or 60 Hz
	Power consumption	
		SKB62UA 17 VA/12W SKC62UA 28 VA/20W SKD62UA 17 VA/12W
Operating	Type of control (proportional)	0 to 10 Vdc; 4 to 20 mA; or 0 to 1000 ohms
	Running time	<u>Opening:</u> <u>Closing:</u> SKB62UA 120 seconds 15 seconds SKC62UA 120 seconds 20 seconds SKD62UA 30 seconds 15 seconds
	Spring-return time	Closing: SKB62UA 15 seconds SKC62UA 20 seconds SKD62UA 15 seconds
	Nominal stroke	SKB62UA 3/4-inch (20 mm) SKC62UA 1-1/2-inch (40 mm) SKD62UA 3/4-inch (20 mm)
	Position force	SKB/C 62UA 2800N SKD62UA 1000N
	Signal Inputs	Terminal Y
Voltage		0 to 10 Vdc
Input impedance		100K ohm
Current		4 to 20 mA
Input impedance		240 ohm
Signal resolution		<1%
Hysteresis		<1%
Terminal Z		
Resistance		0 to 1000 ohm
Override control functions		
Z not connected	No function (priority at Terminal Y)	
Z connected directly to G	Maximum stroke 100%	
Z connected directly to G0	Minimum stroke 0%	
Z connected to M via 0 to 1000 ohm	Linear or equal percentage	

Signal Inputs, Continued	Terminal U Voltage	0 to 9.8 Vdc \pm 2%
	Load impedance	>500 ohm
	Current	4 to 19.6 mA \pm 2%
	Load impedance	<500 ohms
Ambient Conditions	Media temperature	
	SKD	20°F to 300°F (-7°C to 150°C)
	SKB/C	20°F to 337°F (-7°C to 170°C)
	Operation	To IEC 721-3-3
	Environmental conditions	Class 3K5
	Temperature	
	SKD	5°F to 122°F (-15°C to 50°C)
	SKB/C	5°F to 130°F (-15°C to 55°C)
	Humidity	5% to 95% rh
	Transport	To IEC 721-2-1
	Environmental conditions	Class 3K5
	Temperature	22°F to 149°F (-5°C to 65°C)
	Humidity	<95% rh
	Storage	To IEC 721-3-1
Environmental conditions	Class 1K3	
Temperature		
SKD	5°F to 122°F (-15°C to 50°C)	
SKB/C	5°F to 130°F (-15°C to 55°C)	
Humidity	5% to 95% rh	
Agency Certification	UL	Listed to UL873
	C-UL	Certified to Canadian standard C22.2 No. 24-93
	Meets CE requirements: EMC Directive	89/336/EEC
	C-tick	N474
	Protection standard Protection Class	IP54 to EN 60 529 III to EN 60 730
Miscellaneous	Materials	
	Actuator housing and bracket	Die-cast aluminum
	Housing box and manual adjustor	Plastic
	Conduit opening	1/2-inch NPSM
	Dimensions	See Figures 25 and 26
	Weight	
	SKB62UA	18.9 lbs (8,60 kg)
SKC62UA	22.5 lbs (10,00 kg)	
SKD62UA	8.5 lbs (3,85 kg)	
Housing	NEMA Rating	NEMA 1 (Interior only) See <i>Accessories</i>

Advanced Features

Direction of Operation Direct acting / reverse acting	0 to 10 Vdc; 10 to 0 Vdc 4 20 mA; 20 to 4 mA 0 to 1000 ohm/1000 to 0 ohm
Stroke Limit Control Range of lower limit Range of upper limit	0% to 45% adjustable 100% to 55% adjustable
Sequence Control Starting Point of Sequence (Start) Operating Range of Sequence (Span)	0 to 15V adjustable 3 to 15V adjustable

Accessories

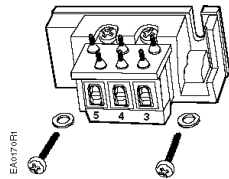


Figure 1. Auxiliary Switch.

ASC1.6 Auxiliary switch

- Sends a signal to indicate that the valve is in the 0% stroke position.
- The switching point is fixed at the 0% stroke position.

Switching capacity 24 Vac
 4A resistive,
 2A inductive

Lowest recommended current 10 mA

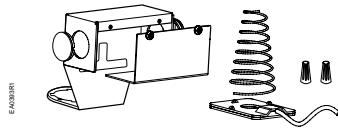


Figure 2. Packing Heating Element.

599-00417 Packing heating element for SKD
599-00418 Packing heating element for SKB/C

This heater allows the stem to move freely in valves that control fluids at temperatures below 32°F (0°C). It reduces ice crystal formation on the stem which may damage the packing.

Operating Voltage 24 Vac

Heating Output 20 W

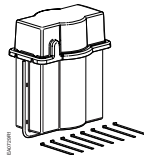


Figure 3. SKB/C Weather Shield.

599-10065 The SKB/C actuator is UL listed to meet NEMA Type 3R requirements (a degree of protection against rain, sleet, and damage from external ice formation) when installed with this weather shield and outdoor-rated conduit fittings in the vertical position. See *Service Kits* for replacement ultraviolet resistant cable ties.

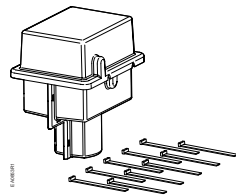


Figure 4. SKD Weather Shield.

599-10071 The SKD actuator is UL listed to meet NEMA TYPE 3R requirements (a degree of protection against rain, sleet, and damage from external ice formation) when installed with this weather shield and outdoor-rated conduit fittings in the vertical position. See *Service Kits* for replacement ultraviolet resistant cable ties.

**Accessories,
 Continued**

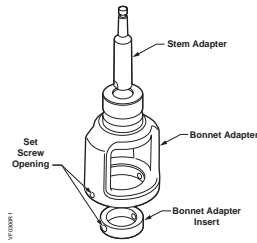


Figure 5. Valve Retrofit Kit.

Universal Retrofit Kit

Kit contains the parts needed to adapt a valve to the following Siemens 599 Series Flowrite actuators: SKB, SKC, SKD, SQX. Selected valves from the following manufacturers can also be accommodated: Honeywell, Johnson Controls, and Siebe. See your local Siemens representative for details.

Service Kits

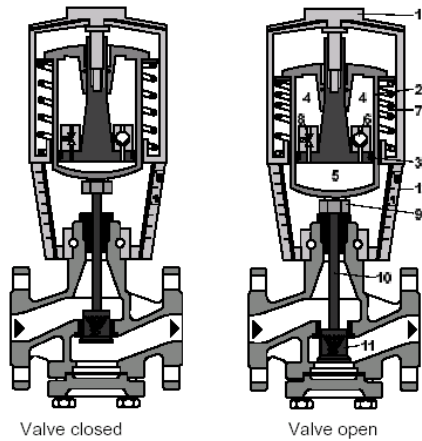
Circuit board replacement	4 668 5751 8
Manual override kit	4268 5510 8
Plastic wiring compartment cover	4 104 5582 8
Stem retainer kit	
Contains one stem nut (Figure 7, Item 6) and one stem retainer clip.	
2-1/2 and 3-inch valves	599-10048
4, 5, and 6-inch valves	599-10049
Retainer clamp kit	599-10200
Ultraviolet (UV) resistant cable ties (pkg. of 8)	538-994



WARNING:

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

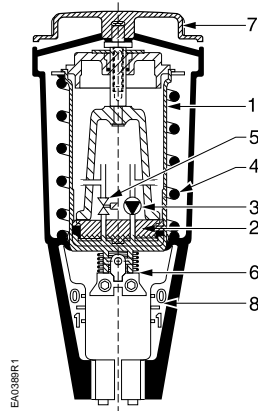
Valve Details



1. Manual Adjuster
2. Pressure Cylinder
3. Piston
4. Reservoir
5. Pressure Chamber
6. Pump
7. Return Spring
8. Bypass Valve
9. Coupling
10. Valve Stem
11. Inner Valve
12. Position Indicator (0 to 1)

Figure 6. SKB/C Valve Parts.

**Valve Details,
 Continued**



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 7. SKD Valve Parts.

Standard Operation

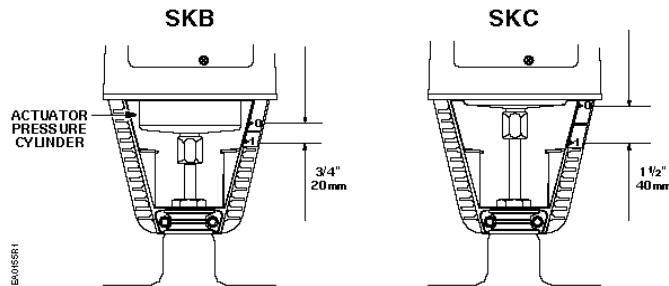


Figure 8. SKB/C Valve Stem Travel Indication.

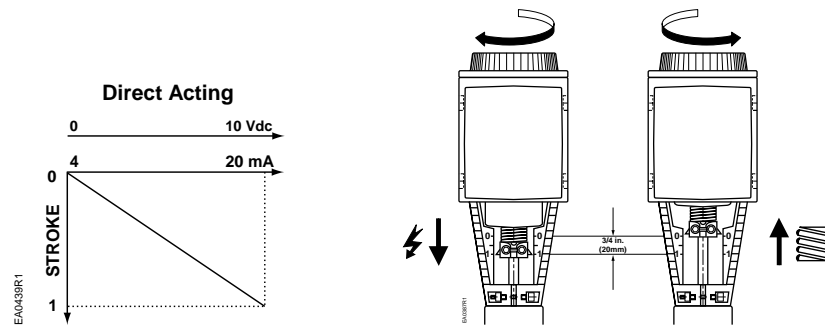


Figure 9. SKD Valve Stem Travel Indication.

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 actuator spring returns the valve to its normal position.

Mounting and Installation

The vertical position is the recommended position for mounting and the only position for NEMA Type 3R rating with the Weather Shield. Acceptable mounting positions are shown in Figure 10.

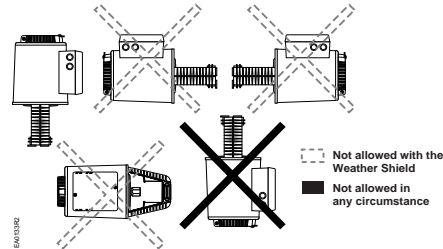


Figure 10. Acceptable Mounting Positions.

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 23 and Figure 24.

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



CAUTION:

When removing the knockout do not damage the circuit board. Use the top knockout position, if possible.

Start-up

Check the wiring for proper connections.

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

Spring Return Function

All SKB/C/D62UA actuators are factory-fitted with a spring-return function. If the control signal or power supply fails, the actuator will return to the 0% stroke position (stem fully retracted).

Start-up, Continued

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

Override Control

No Function	Override with 0 ... 1000 Ω
<p>Stroke</p> <p>100 % ↑</p> <p>H_{max}</p> <p>H_{min}</p> <p>→ Y</p> <p>Z-Contact not Wired Valve Stroke Follows Control Signal Y</p>	<p>Stroke</p> <p>100 % ↑</p> <p>0 % ↓</p> <p>50 900</p> <p>→ R [Ω]</p> <p>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</p>
Actuator Fully Extended	Actuator Fully Retracted
<p>Stroke</p> <p>100 % ↑</p> <p>V_{max}</p> <p>0 % ↓</p> <p>→ Y</p> <p>Z-Contact Connected Directly to G Y-Input has No Effect</p>	<p>Stroke</p> <p>100 % ↑</p> <p>V_{max}</p> <p>0 % ↓</p> <p>→ Y</p> <p>Z-Contact Connected Directly to G0 Y-Input has No Effect</p>

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

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 supply voltage of 24 Vac. The calibration procedure can be repeated as often as necessary



CAUTION:

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

There is a slot on the printed circuit boards for the actuators. To initiate the calibration procedure, the contacts inside this slot must be short-circuited (possibly with a screwdriver). See Figure 11.

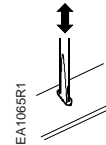


Figure 11.

Automatic calibration proceeds as follows (see Figure 12):

- Actuator runs to the 0% stroke position (1), the green LED flashes.
- Actuator then runs to the 100% stroke position (2), the 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 steady (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.

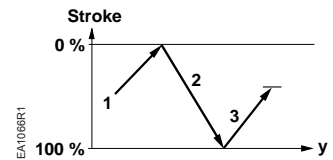


Figure 12.
Automatic Calibration.

Table 2. 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) - Replace electronics
	Flashing	Internal Error	- Replace electronics
	OFF	Valve plug jammed	Check the valve
		<ul style="list-style-type: none"> • No power supply • Faulty electronics 	<ul style="list-style-type: none"> - Check mains - Replace electronics

Start-up, Continued

Advanced Features

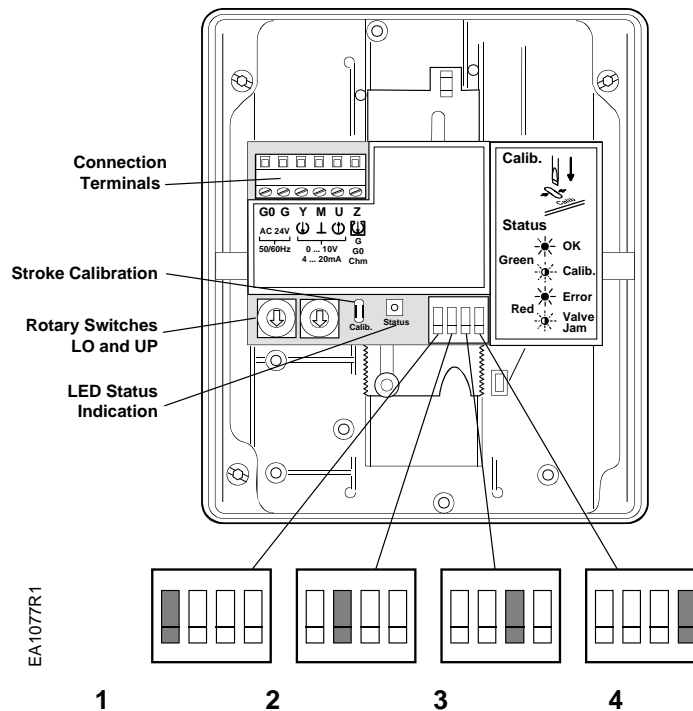


Figure 13. DIP Switches.

DIP Switches (From Left to Right)	1 Select Direction of Operation	2 Sequence Control or Stroke Limit Control	3 Selection of Control Signal	4 Selection of Flow Characteristic
ON	Reverse-acting	Sequence control	4 to 20 mA	Modified*
OFF (Factory Settings)	Direct-acting	Stroke limit control	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.

**Start-Up,
continued**

**Selecting the
Direction of
Operation**

- With normally-closed valves, "direct-acting" means that with a 0 Vdc signal input, the valve is closed.
- With Normally-open valves, "direct-acting" means that with a 0 Vdc signal input, the valve is open.

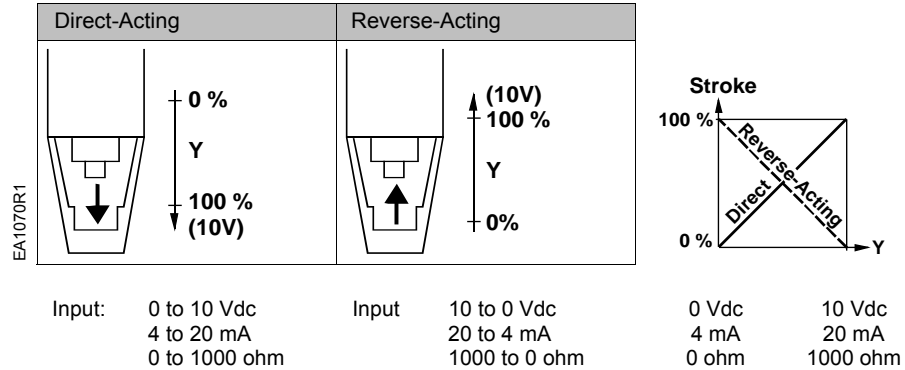


Figure 14. Direction of Operation.

**Sequence Control
or Stroke Limit
Control**

Check the wiring for proper connections.

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

Table 3.

Setting the Stroke Limit Control			
The rotary switches LO and UP can be used to apply an upper and lower limit to the stroke in increments of 3% up to a maximum of 45%.			
Position of LO	Lower Stroke Limit	Position of UP	Upper Stroke Limit
0	0%	0	100%
1	3%	1	97%
2	6%	2	94%
3	9%	3	91%
4	12%	4	88%
5	15%	5	85%
6	18%	6	82%
7	21%	7	79%
8	24%	8	76%
9	27%	9	73%
A	30%	A	70%
B	33%	B	67%
C	36%	C	64%
D	39%	D	61%
E	42%	E	58%
F	45%	F	55%

Table 4.

Setting the Sequence Control			
The rotary switches LO and UP can be used to determine the starting point (Start) or the operating range of a sequence (Span).			
Position of LO	Starting Point for Sequence Control	Position of UP	Operating Range of Sequence Control
0	0V	0	10V
1	1V	1	10V*
2	2V	2	10V*
3	3V	3	3V*
4	4V	4	4V
5	5V	5	5V
6	6V	6	6V
7	7V	7	7V
8	8V	8	8V
9	9V	9	9V
A	10V	A	10V
B	11V	B	11V
C	12V	C	12V
D	13V	D	13V
E	14V	E	14V
F	15V	F	15V

*The smallest adjustment is 3 Vdc; Control with 0 to 3 Vdc is possible only via Y.

Start-up, continued	When actuator pressure cylinder: Moves outward (0 to 1): Valve opens.
Normally Closed Valve	Moves inward (1 to 0): Valve closes.
Normally Open Valve	When actuator pressure cylinder: Moves outward (0 to 1): Valve closes. Moves inward (1 to 0): Valve opens.
Three Way Valve	When actuator pressure cylinder: Moves outward (0 to 1): Valve opens between port NC and C. Moves 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

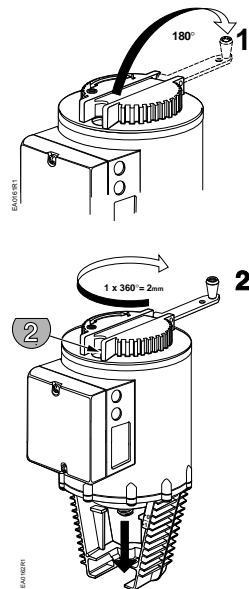


Figure 15. SKB/C Manual Operation.

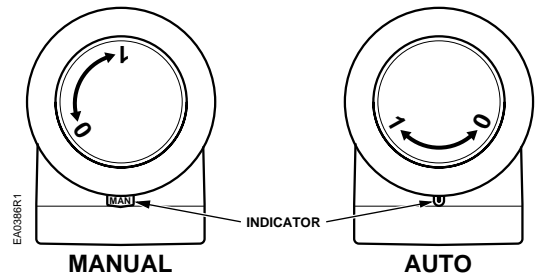


Figure 16. SKD Manual Operation.

Turn the manual setting knob clockwise for manual operation. As you begin to turn, a red indicator becomes visible. Each complete revolution (360°) is equal to 3/32-inch (2.5 mm) stroke.

NOTE: 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.

Start-up, Continued

Automatic Operation

SKB/C

When returning to automatic control, you must turn the crank arm of the manual setting knob counterclockwise until the red numbers disappear. It is essential that the window is clear and the crank arm is snapped into position. See Figure 17.

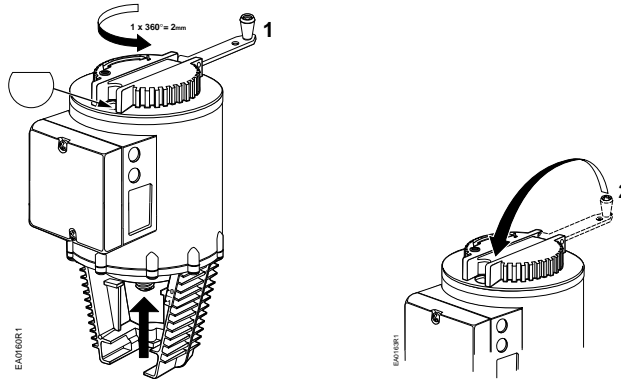


Figure 17. SKB/C Automatic Operation.

SKD

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.

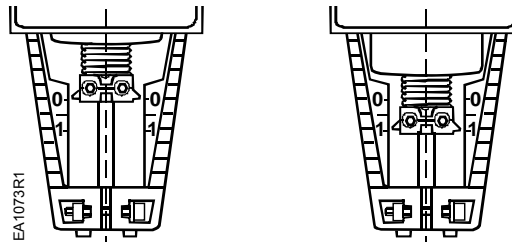


Figure 18.

Fully Retracted Coupling
▶ Stroke = 0%

Fully Extended Coupling
▶ Stroke = 100%



CAUTION:

The manual adjuster must be rotated counterclockwise to the end stop until the red indicator marked MAN is no longer visible.

Wiring

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

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

Determine the rating for Class 2 step-down transformer is 100 VA and consider the following requirements:

SKB62UA = 17 VA SKC62UA = 28 VA SKD62UA = 17 VA;

A maximum of four actuators can be powered by one transformer (80% of transformer VA). Operating more than four SK series 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

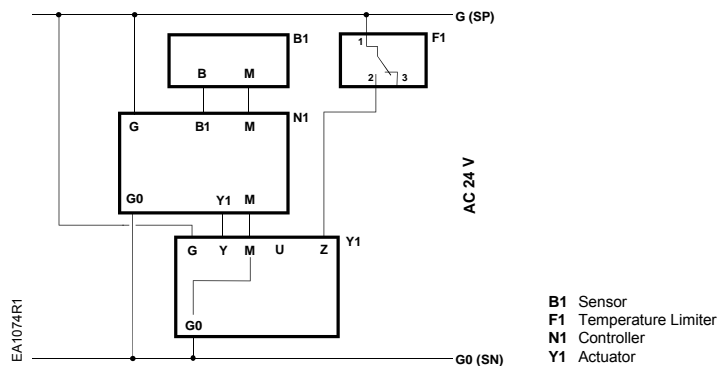


Figure 19. Terminal Connections.

24 Vac	
G	System potential (SP)
G0	System neutral (SN)
Y	Control input signal 0 to 10 (30) Vdc or 4 to 20 mA
M	Measuring neutral
U	Position indication 0 to 10 Vdc or 4 to 20 mA (see Table 1)
Z	Override input.

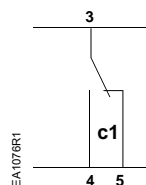


Figure 20. Auxiliary Switches.

Table 1. Actuator Output Signal U.

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

Wiring Diagrams, Continued

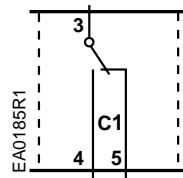


Figure 21.
Auxiliary Switch
ASC1.6.

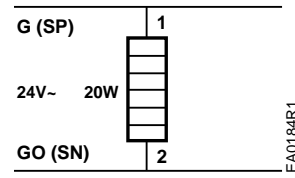


Figure 22.
Packing Heating Element
599-00418.

Dimensions

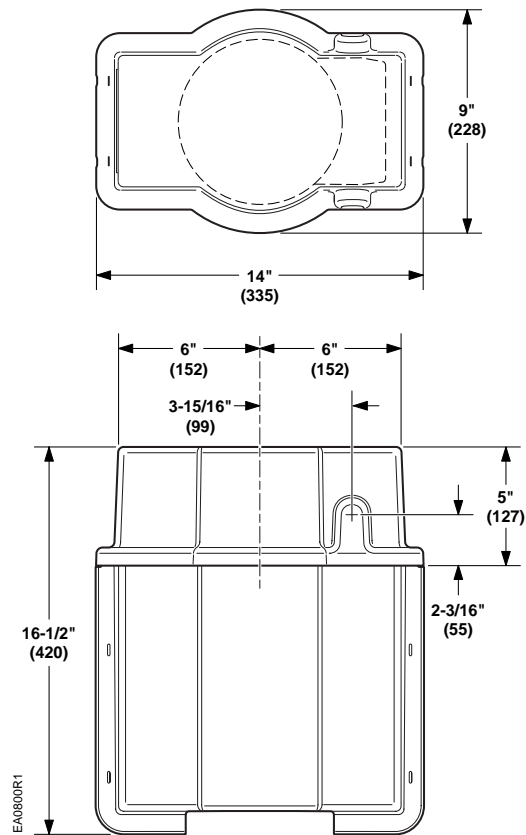


Figure 23. Dimensions of 599-10065 SKB/C Weather Shield in Inches (Millimeters).

**Dimensions,
 Continued**

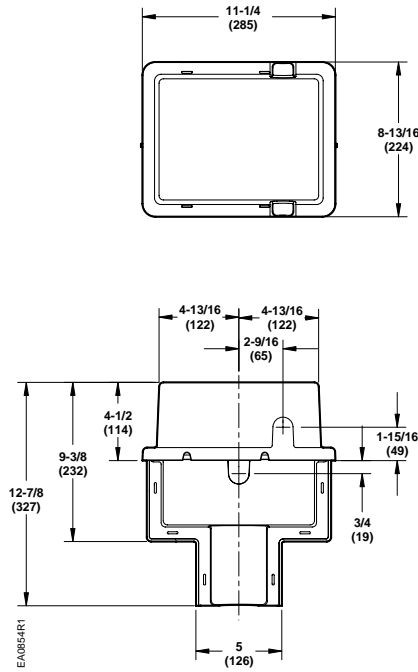


Figure 24. Dimensions of 599-10071 SKD Weather Shield in Inches (Millimeters).

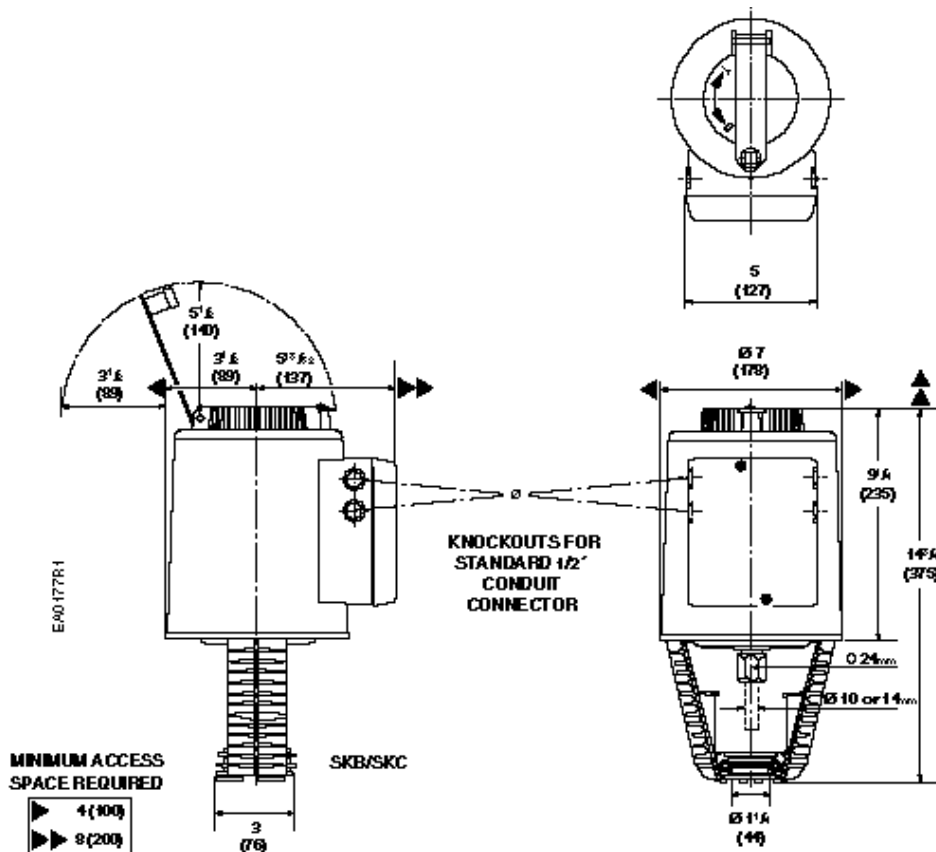


Figure 25. SKB/C Weather Shield, 599-10071 in Inches (Millimeters).

Dimensions, Continued

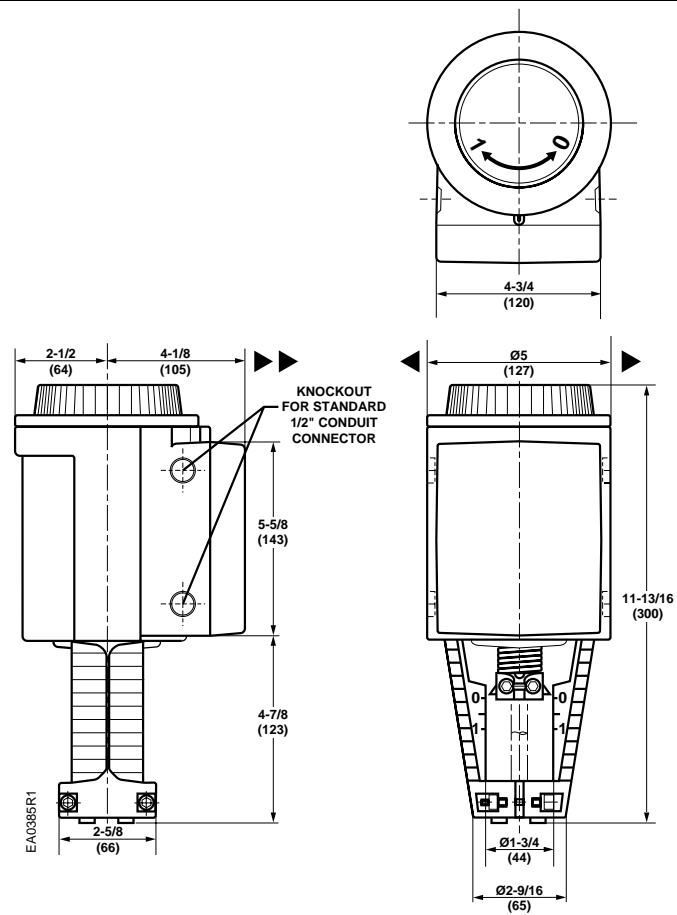


Figure 26. Dimensions of SKD Actuator in Inches (Millimeters).

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