

ACVATIX™

## Electromotive actuators for valves

SAV..



### Actuators with 40 mm stroke and 1600 N force

- SAV31.. Operating voltage AC 230 V, 3-position control signal
- SAV61.. Operating voltage AC/DC 24 V, positioning signal 0...10V, 4...20 mA  
With position feedback, forced control, characteristic changeover
- SAV61../MO operating voltage AC/DC 24 V,  
RS-485 for Modbus RTU communication
- SAV81.. Operating voltage AC/DC 24 V, 3-position control signal
- For direct mounting on valves; no adjustments required
- Manual adjuster, position and status indication (LED)
- Optional functions with auxiliary switches, potentiometer, function module, stem heating

## Use

Electromotive actuators to operate Siemens 2-port and 3-port valves, types V..F22.., V..F32.., V..F42.., V..F43.., and V..F53.. with 40 mm stroke as control and safety shut-off valves in heating, ventilation and air conditioning systems.

## Functions

Function	Description	Type
3-position control	A 3-position signal controls the actuator via connection terminals Y1 or Y2. The desired position is transmitted to the valve.	SAS31.. SAS81..
Modulating control	The positioning signal range (DC 0...10 V / DC 4...20 mA / 0...1000 Ω) corresponds to the positioning range (closed...open, or 0...100% stroke) in a linear manner.	SAS61..
Positioning signal and characteristic changeover	Setting with DIL switch. Factory setting SAS..: <ul style="list-style-type: none"> <li>• Characteristic curve: log = Equal percentage (switch set to Off)</li> <li>• Positioning signal: DC 0...10 V (switch set to Off)</li> </ul>	
Position feedback U	Signal returned to acquire the position via input.	
Forced control (Z-mode)	Forced control helps override automatic mode and is implemented via higher control.	
Calibration	Carry out during initial commissioning. The actuator drives to the top or bottom end position; the measured values are saved.	SAS61.. SAS61../MO
Valve seat detection	The actuators have power-dependent seat detection. After calibration, the exact valve stroke is stored in the actuator's memory.	
Foreign body detection	After clogging is detected, three attempts are made to get past clogging. If unsuccessful, the actuator continues to following the positioning signal only within a limited range, and the LED flashes red.	
Modbus RTU (RS-485), not galvanically isolated	Setpoint 0..100% valve position Actual value 0..100% for valve position Override control Open / Close / Min / Max / Stop Setpoint monitoring and backup mode	SAS61../MO

## Type summary

Type	Item NO.	Stroke	Positioning force	Operating voltage	Positioning signal	Spring return time	Positioning time	LED	Manual adjustment <sup>3)</sup>	Auxiliary functions		
SAV31.00 <sup>1)</sup>	S55150-A112	40 mm	1600 N	AC 230 V	3-position	-	120 s	-	Push and fix	-		
SAV61.00 <sup>2)</sup>	S55150-A110			AC 24 V DC 24 V	DC ...10 V DC 4...20 mA 0...1000 Ω			-		-	Yes	4)
SAV61.00U <sup>2)</sup>	S55150-A110-A100				Modbus RTU						5)	
SAV61.00/MO <sup>1)</sup>	S55150-A141											
SAV81.00 <sup>1)</sup>	S55150-A111							3-position			-	-
SAV81.00U <sup>2)</sup>	S55150-A111-A100											

1) Approbation: CE

2) Approbation: CE, UL

3) Not designed for continuous operation.

4) Position feedback, forced control, characteristic changeover

5) Position feedback, forced control

### Scope of delivery

Actuators, valves and accessories are supplied in individual packs.

### Accessories/spare parts

#### Electrical accessories

Type	Auxiliary switch ASC10.51	Potentiometer ASZ7.5	Function module AZX61.1	Stem heating element ASZ6.6
Item NO.	S55845-Z103	S55845-Z106	S55845-Z107	S55845-Z108
	Max. 2			Max. 1
SAV31..	Max. 2	Max. 1	-	
SAV61..		-	Max. 1	
SAV61../MO		-		
SAV81..		Max.1	-	

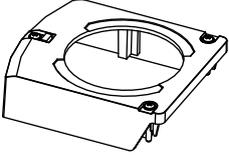
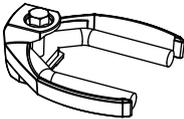
#### Mechanical accessory

Type	Weather shield ASK39.1
Item NO.	S55845-Z109

## Ordering (example)

Type	Stock number	Designation	Number of pieces
SAV81.00	S55150-A111	Actuator	1
ASZ7.5	S55845-Z106	Potentiometer	1

## Spare parts

Product number  Stock number		
8000060843	<b>Housing cover</b>	<b>Screw (valve stem coupling)</b>
		
		<b>U-bracket</b>
		

## Equipment combinations

### 2-port valves VV.. (control or safety shutoff valves)

Valve type		DN	PN class	$k_{vs}$ [m <sup>3</sup> /h]	Data sheet
VVF22..	Flange	40...100	6	16...160	N4401
VVF32..			10		N4402
VVF42..		100...150	16	160...360	N4403
VVF42..K					
VVF43..			65...150	50...400	N4404
VVF43..K <sup>1)</sup>		-			
VVF53..		40...150	25	16...400	N4405
VVF53..K <sup>1)</sup>		-			

<sup>1)</sup> Combination not permissible

### 3-port valves VX.. (Control valves for functions "mixing" and "distribution")

Valve type		DN	PN class	k <sub>vs</sub> [m <sup>3</sup> /h]	Data sheet
VXF22..	Flange	40...100	6	16...160	N4401
VXF32..		40...150	10	16...400	N4402
VXF42..			16		N4403
VXF43..		65...150	25	63...400	N4404
VXF53..		40...150		16...400	N4405

#### Product documentation

Title	Contents	Document ID
Actuators SAX..., SAY..., SAV..., SAL.. for valves	Basic documentation: Detailed information on stroke actuators including Modbus types Stroke actuators for valves with 20/40 mm stroke and rotary actuators for butterfly valves	CE1P4040en
Electromotive actuators for valves SA..., Modbus RTU	Data sheet: Modbus communication profiles	A6V101037195
Mounting instructions G..161../MO and S..6/MO	Mounting instructions: Mounting and installation instructions for Modbus actuators	A5W00027551
Valve Actuator DIL Switch Characteristic Overview	Commissioning / Configuration: Describes the characteristics of valve and actuator combinations, it describes the DIL Switch function	A6V12050595

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

<http://siemens.com/bt/download>

#### Notes

#### Safety

 <b>CAUTION</b>	
	<p><b>National safety regulations</b></p> <p>Failure to comply with national safety regulations may result in personal injury and property damage.</p> <ul style="list-style-type: none"> <li>Observe national provisions and comply with the appropriate safety regulations.</li> </ul>

## ⚠ WARNING



### Risk of burns from hot actuator brackets

The actuator brackets on heating plants can also become hot from the contact with the hot valve during operation. The temperature of the actuator bracket can reach 100 °C.

When servicing the actuator:

- Switch off both pump and operating voltage.
- Close the main shutoff valve in the piping.
- Allow the piping to cool off.

## Engineering

### SAV31.. / SAV81..

3-position actuators must be controlled by a controller, see Connection diagrams.

### SAV61..

Up to 10 actuators can drive in parallel on a controller output with a rating of 1 mA. Modulating actuators have an input impedance of 100 kΩ.

### SAV61../MO

The Modbus converter is designed for analog control at 0...10 V.



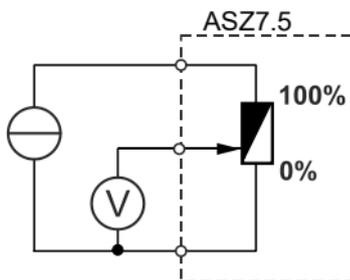
Keep the analog signal setting on the actuator as is (switch 1 to OFF); adjustment not permitted.

### ASZ7.5

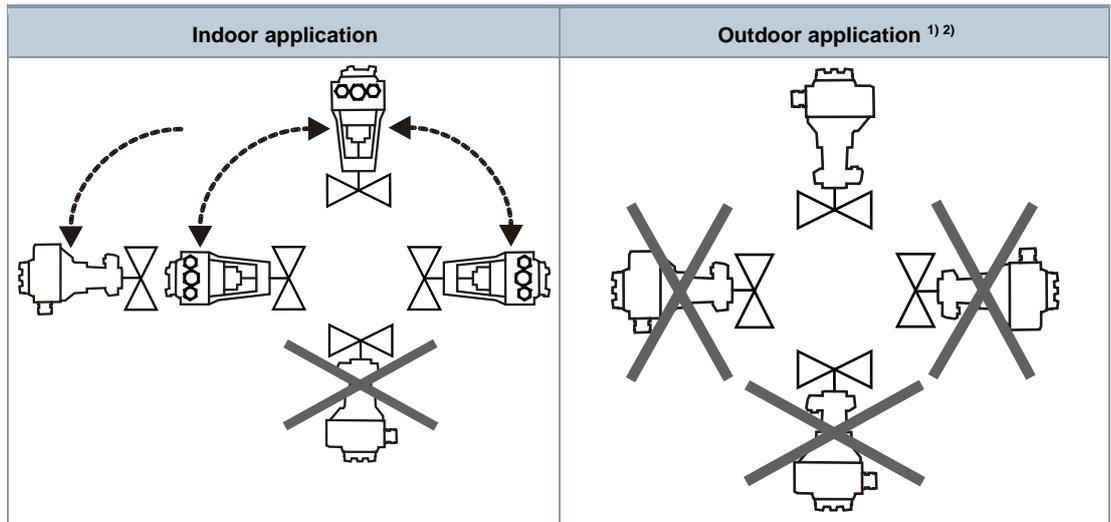
Actuators with a DC 0...9.8 V feedback signal are recommended for the combination SIMATIC S5/S7 and position feedback.

Signal peaks in potentiometer ASZ7.5 may result in error messages on Siemens SIMATIC. This is not the cause, however, when combined with Siemens HVAC controllers. The reason is the higher resolution and faster reaction time on SIMATIC.

Use the potentiometer as voltage divider on the 3-wire connection. Powering the potentiometer over the wiper may shorten the life cycle of the potentiometer. Signal peaks increase in frequency and scope over the lifespan in this operating mode.



Mounting positions



- 1) Only together with weather shield ASK39.1. IP54 housing protection remains unchanged.
- 2) SAS61../MO is not intended for outdoor use.

Operation

Direction of control action

On valves where the stem retracts to the close position, "direct acting" means that the valve is fully closed at positioning signal  $Y = 0\text{ V}$  or  $Z = 0\ \Omega$  (i.e. 0 %).

	<b>Direct acting</b>	
Positioning signal Y	DC 0...10 V, 4...20 mA	
Positioning signal Z	0...1000 Ω	
Y, Z	Positioning signal	
V	Volume flow	
<hr style="width: 10%; margin-left: 0;"/> Control action: Direct acting		

Maintenance

The actuators are maintenance-free.

## Disposal

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The device is considered an electronic device for disposal in accordance with European guidelines and may not be disposed of as domestic waste.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

## Warranty service

The application-specific technical data is guaranteed only in combination with the Siemens products listed in the 'Device combinations' section. If third-party products are used, any guarantee provided by Siemens will be invalidated.

## Technical data

Power			
Operating voltage			
	SAV31..	AC 230 V $\pm$ 15%	
	SAV61..	AC 24 V $\pm$ 20 % / DC 24 V +20 % / -15 % (SELV / PELV)	
	SAV81..		
Frequency		45...65 Hz	
External supply line fusing (EU)		<ul style="list-style-type: none"> <li>• Non-renewable fuse 6...10 A slow</li> <li>• Circuit break max. 13 A, tripping characteristic B, C, D to EN 60898</li> <li>• Power source with current limitation of max. 10 A</li> </ul>	
Power consumption at 50 Hz			
	SAV31.00	Stem retracts/extends	6.5 VA / 4 W
	SAV61.00		9.5 VA / 4.5 W
	SAV61.00/MO		10.2 VA / 5 W
	SAV81.00		7 VA / 4.5 W
Typical switch-on current <sup>1)</sup> (3-position actuators)			
	SAV31..	2.3 A	
	SAV81..	4.5 A	

Operating data		
Positioning times (with the specified nominal stroke)		The positioning time may vary depending on the type of valve (Type summary [ <a href="#">▶ 3</a> ])
	SAV31..., SAV61..., SAV81..	120 s
Positioning force		1600 N
Nominal stroke		40 mm
	Working stroke range at which the actuator is calibrated	15...43 mm
Permissible media temperature (valve fitted)		-25...130 °C At 150 °C, installed horizontally

Signal inputs			
Positioning signal "Y"			
	SAV31.., SAV81..		3-position
	SAV31..	Voltage	AC 230 V $\pm$ 15%
	SAV81..		AC 24 V $\pm$ 20% / DC 24 V + 20% / - 15%
	SAV61..		
	DC 0...10 V	Power consumption	$\leq$ 0.1 mA
		Input impedance	$\geq$ 100 k $\Omega$
	DC 4...20 mA	Power consumption	DC 4...20 mA $\pm$ 1%
		Input impedance	$\leq$ 500 k $\Omega$

Communication SAV../MO			
Communication protocol			
	Modbus RTU		RS-485, not galvanically isolated
	Number of nodes		Max. 32
	Address range		1...248 / 255
		Factory setting	255
	Transmission formats		1-8-E-1 / 1-8-O-1 / 1-8-N-1 / 1-8-N-2
		Factory setting	1-8-E-1
	Baud rates (kbaud)		Auto / 9.6 / 19.2 / 38.4 / 57.6 / 76.8 / 115.2
		Factory setting	Auto
	Bus termination		120 $\Omega$ electronically switchable
		Factory setting	Off

Parallel connection	
SAV61..	$\leq$ 10 (depending on controller output)

Forced control			
Z positioning signal			
	SAV61..		R = 0...1000 $\Omega$ , G, G0
		R = 0...1000 $\Omega$	Stroke proportional to R
		Z connected to G	Max. stroke 100 % <sup>2)</sup>
		Z connected to G0	Max. stroke 0 % <sup>2)</sup>
		Voltage	Max. AC 24 V $\pm$ 20 %
			Max. DC 24 V +20% / -15%
		Power consumption	$\leq$ 0.1 mA

Position feedback			
Position feedback U			
	SAV61..		DC 0...10 V
		Load impedance	> 10 kΩ resistive
		Load	Max. 1 mA

Connection cables			
Wire cross-sectional areas		0.13...1.5 mm <sup>2</sup> , AWG 24...16 <sup>3)</sup>	
Cable entries			
	SAV..	EU: <ul style="list-style-type: none"> <li>• 2 entries Ø 20.5 mm (for M20)</li> <li>• 1 entry Ø 25.5 mm (for M25)</li> </ul>	
	SAV..U	US: <ul style="list-style-type: none"> <li>• 3 entries Ø 21.5 mm for ½" tube connection</li> </ul>	
	SAV61../MO		
		Fixed connection cable	0.9 m
		Number of cores	5 x 0.75 mm <sup>2</sup>

Degree of protection and class			
Housing from vertical to horizontal		IP 54 as per EN 60529 <sup>4)</sup>	
Protection class		To EN 60730-1	
	SAV31..	AC 230 V	II
	SAV61..	AC / DC 24 V	III
	SAV81..		

Environmental conditions			
Operation		IEC 60721-3-3	
	Climatic conditions		
		Mounting location	Indoors (weather-protected) <sup>4)</sup>
		Temperature, general	-5...<55 °C
		Humidity (non-condensing)	5...95 % r.h.
Transportation		IEC 60721-3-2	
	Climatic conditions		
		Temperature	-25...70 °C
		Humidity	5...95 % r.h.
Storage		IEC 60721-3-1	
	Climatic conditions		
		Temperature	-15...55 °C
		Humidity	5...95 % r.h.
Max. media temperature when mounted on valve		130 °C At 150 °C, installed horizontally	

Directives and standards		
Product standard		EN 60730-x
Electromagnetic compatibility (field of use)		For residential, commercial, and industrial environments
EU conformity (CE)		CE1T4503xx <sup>5)</sup>
RCM conformity	AC 230 V	8000078495 <sup>5)</sup>
EAC compliance		Eurasian compliance for all SAV..
UL, cUL		
	AC 230 V	-
	AC / DC 24 V	UL 873 <a href="http://ul.com/database">http://ul.com/database</a> ; file number E35198

Environmental compatibility
Product environmental declarations 71 7331 0522 <sup>5)</sup> and A6V101083254 <sup>5)</sup> include data on environmentally friendly product design and testing (RoHS compliance, material composition, packaging, environmental benefits, disposal).

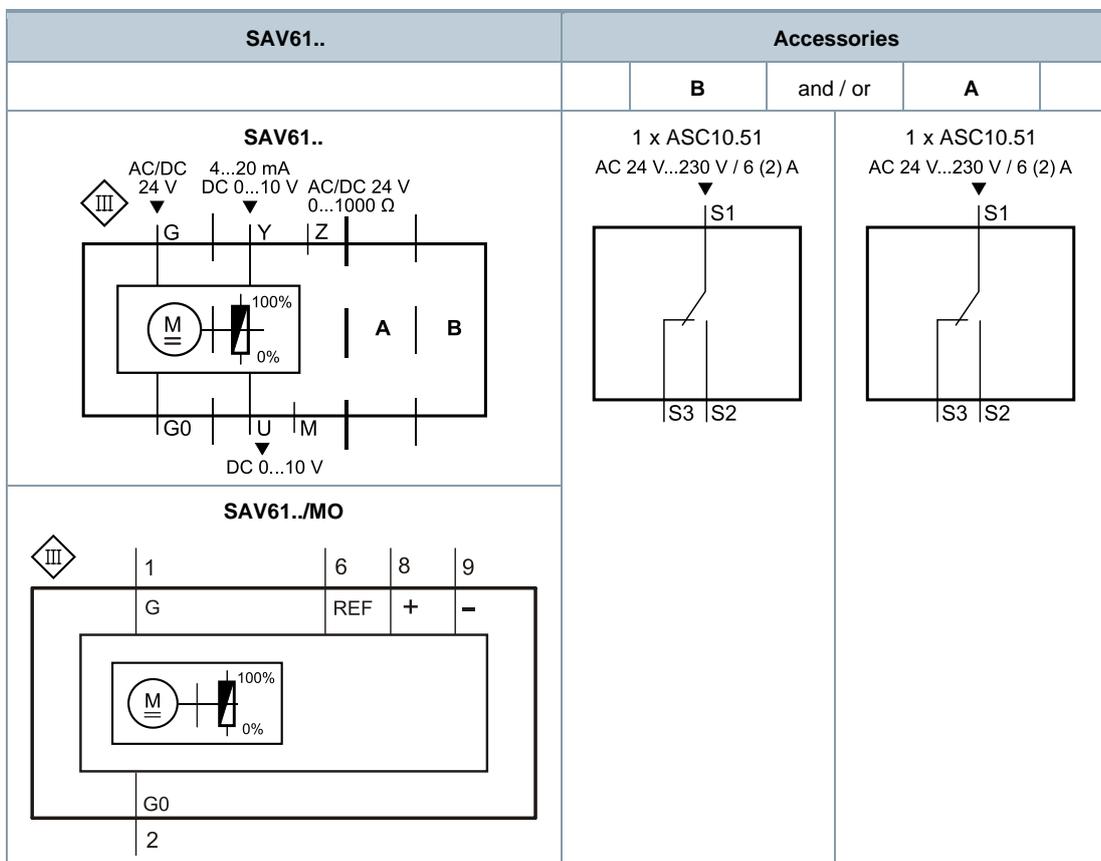
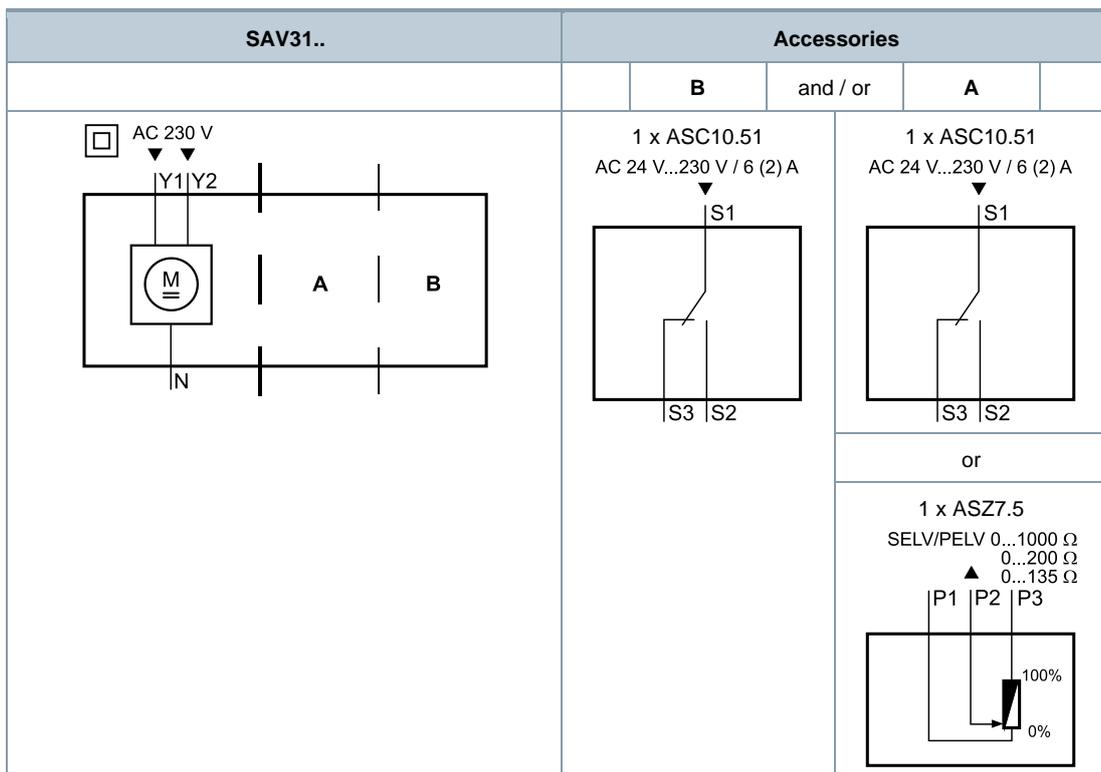
Dimensions
See Dimensions [▶ 19]

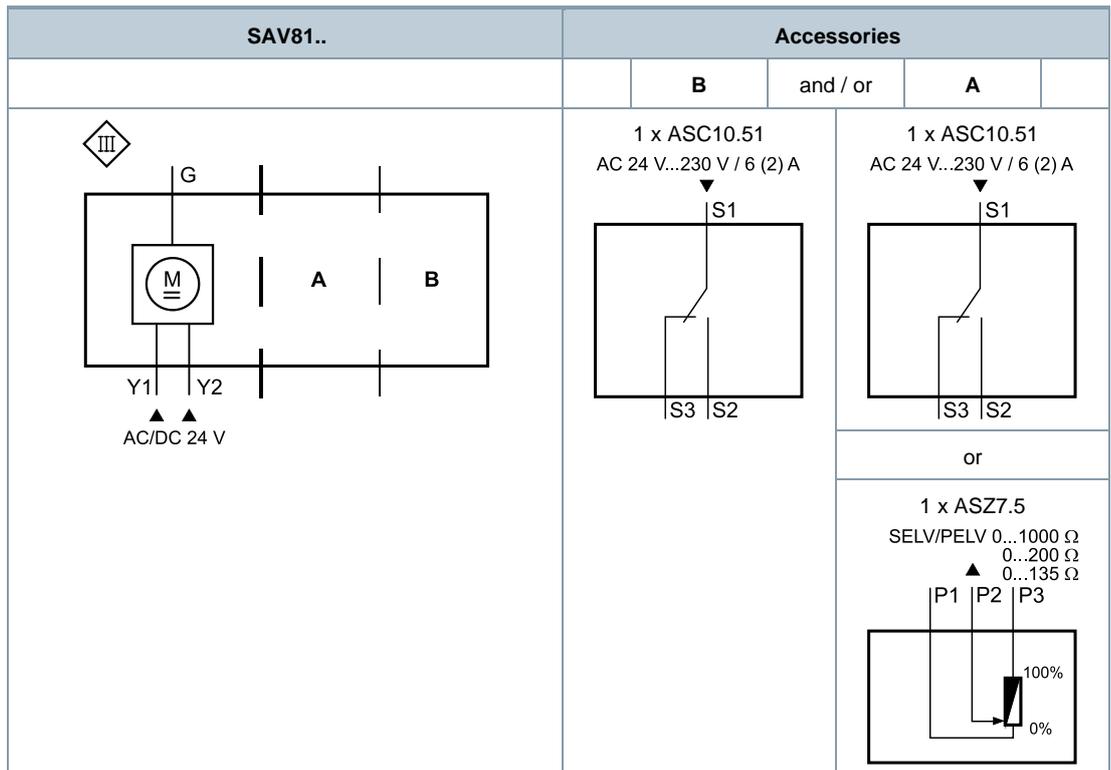
Accessories <sup>6)</sup>		
Potentiometer ASZ7.5		0...1000 Ω ± 5 %
	Voltage	DC 10 V
	Current rating	<4 mA
Auxiliary switch ASC10.51	Switching capacity	AC 24...230 V, 6 (2) A, potential free
External fusing of supply line		<ul style="list-style-type: none"> <li>• Non-renewable fuse 6...10 A slow</li> <li>• Circuit break max. 13 A, tripping characteristic B, C, D to EN 60898</li> <li>• Power source with current limitation of max. 10 A</li> </ul>
US installation, UL & cUL		AC 24 V class 2, 5 A general purpose
Stem heating element ASZ6.6	Operating voltage	AC/DC 24 V ± 20 %.
	Power consumption	50 VA, 30 W
	Switch-on current (cold)	Max. 8.5 A (max. temperature 85 °C/185 F)

- 1) Switching time for RMS value of the sine wave at nominal voltage
- 2) Observe acting direction of DIL switches
- 3) AWG = American wire gauge
- 4) For outdoor operation, always use weather shield ASK39.1, housing protection class IP 54 remains as is. SAS61../MO is not intended for outdoor use.
- 5) Documents can be downloaded at <http://www.siemens.com/bt/download>

6) UL-approved component 

Internal Diagrams





### Connection terminals

SAV31..	AC 230 V	3-position
<div style="border: 1px solid black; padding: 2px; display: inline-block;">N</div> —	System neutral (SN)	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Y1</div> —	Positioning signal (actuator's stem extends)	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Y2</div> —	Positioning signal (actuator's stem retracts)	

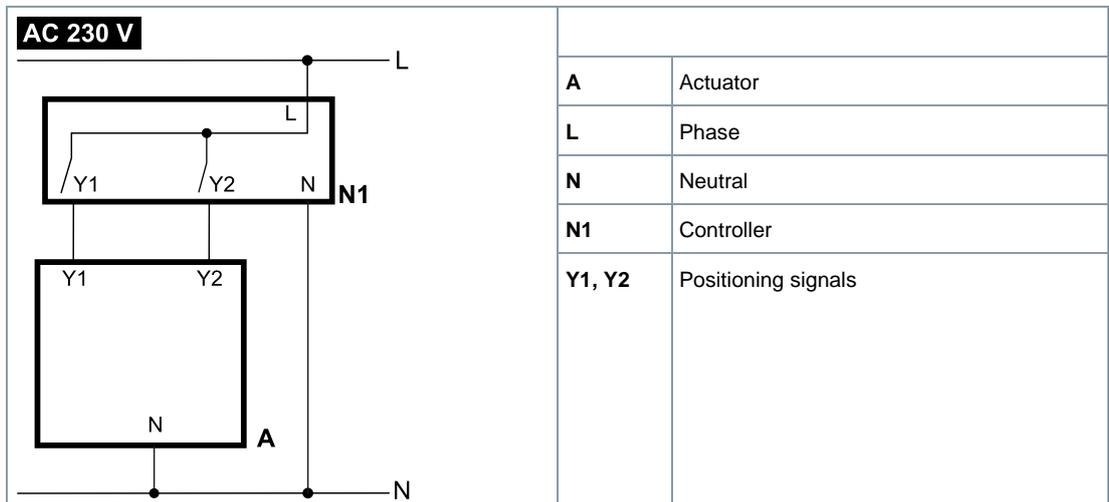
SAV61..	AC / DC 24 V	D 0...10 V 4...20 mA 0...1000
<div style="border: 1px solid black; padding: 2px; display: inline-block;">G0</div> —	System neutral (SN)	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">G</div> —	System potential (SP)	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Y</div> —	Positioning signal for DC 0...10 V / 4...20 mA	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">M</div> —	Measuring neutral	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">U</div> —	Position feedback DC 0...10 V - (System neutral is measuring ground M)	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Z</div> —	Control signal forced control	

SAV61../MO	AC / DC 24 V	Modbus RTU connecting cable
<b>G0</b>	System neutral (SN)	black
<b>G</b>	System potential (SP) AC 24 V / DC 24 V	red
<b>REF</b>	Reference line (Modbus RTU)	violet
<b>+</b>	Bus + (Modbus RTU)	Gray
<b>-</b>	Bus - (Modbus RTU)	pink

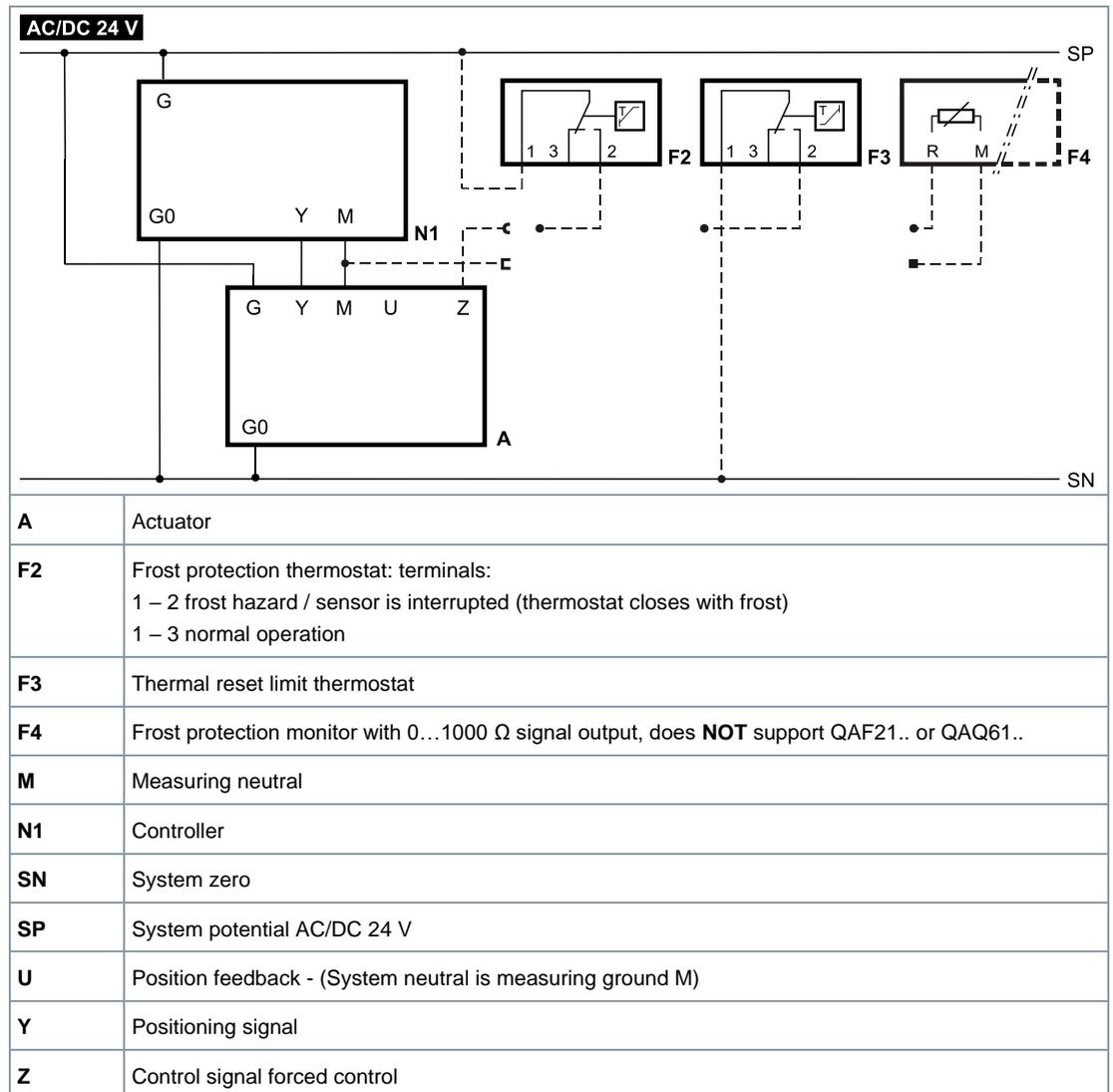
SAV81..	AC / DC 24 V	3-position
<b>G</b>	System potential (SP)	
<b>Y1</b>	Positioning signal (actuator's stem extends)	
<b>Y2</b>	Positioning signal (actuator's stem retracts)	

## Connection diagrams

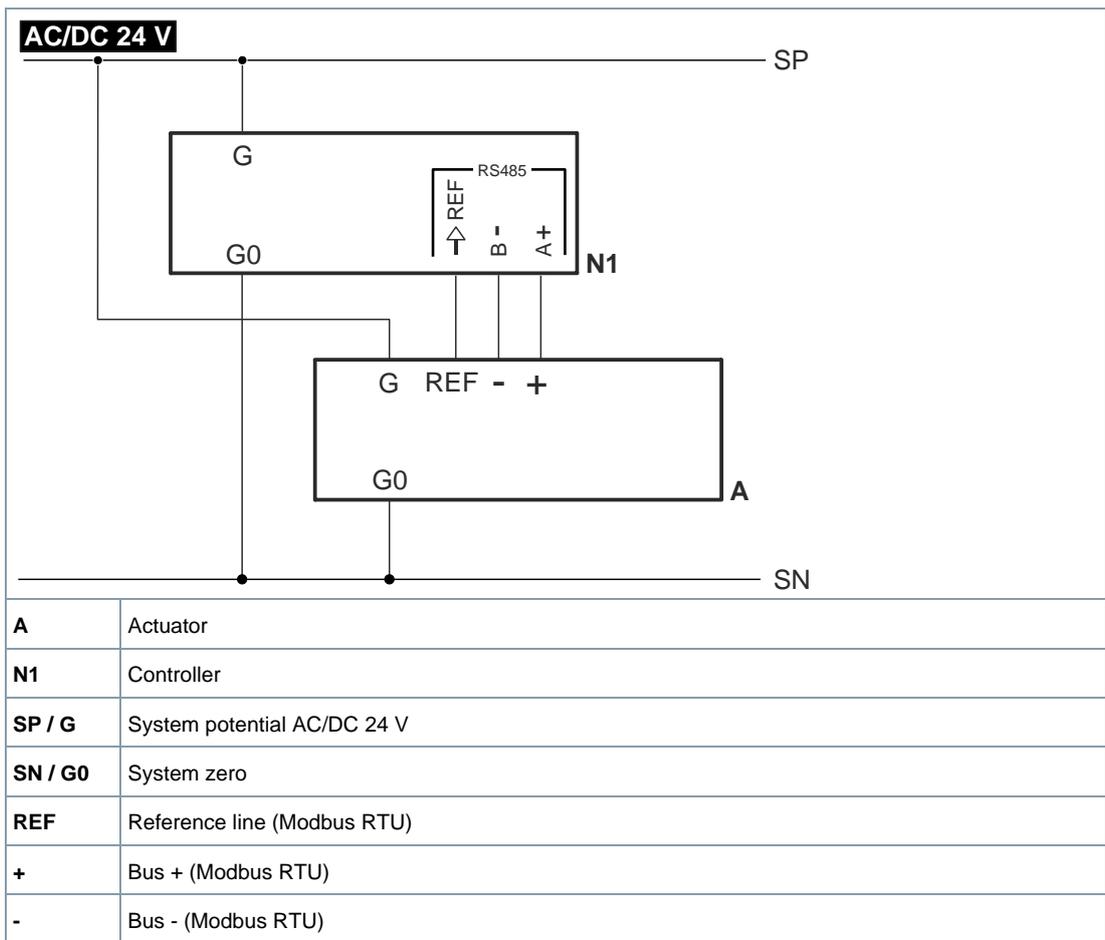
### SAV31..



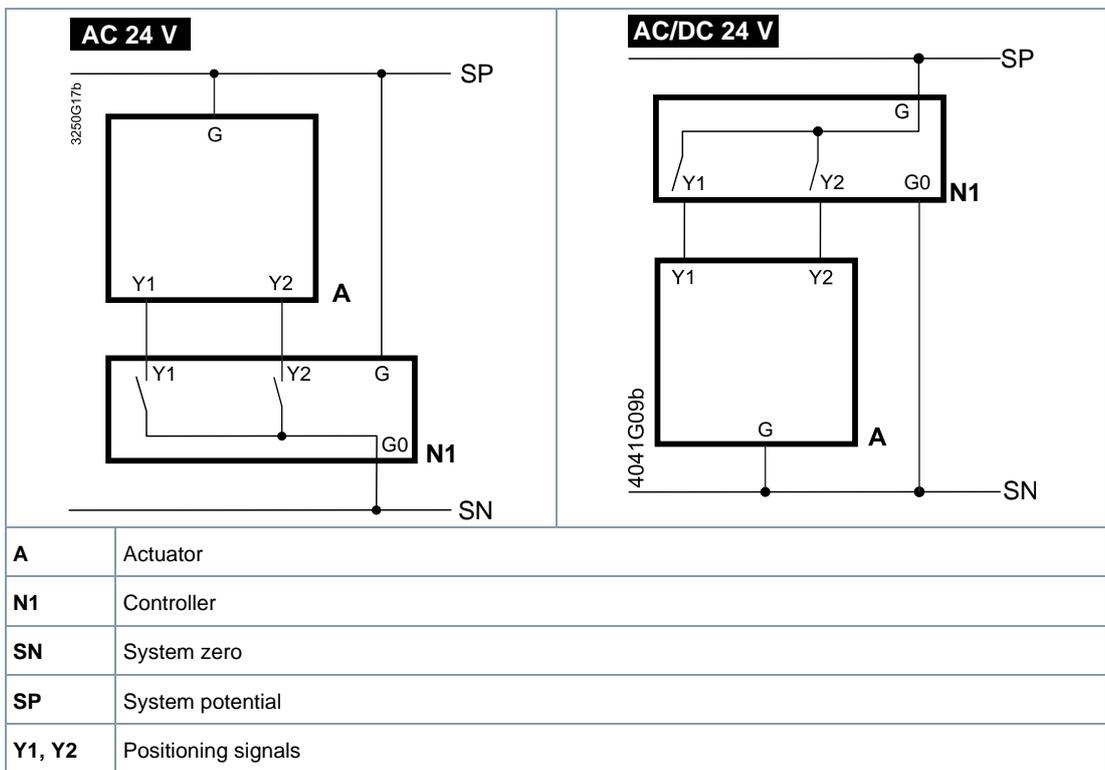
## SAV61..



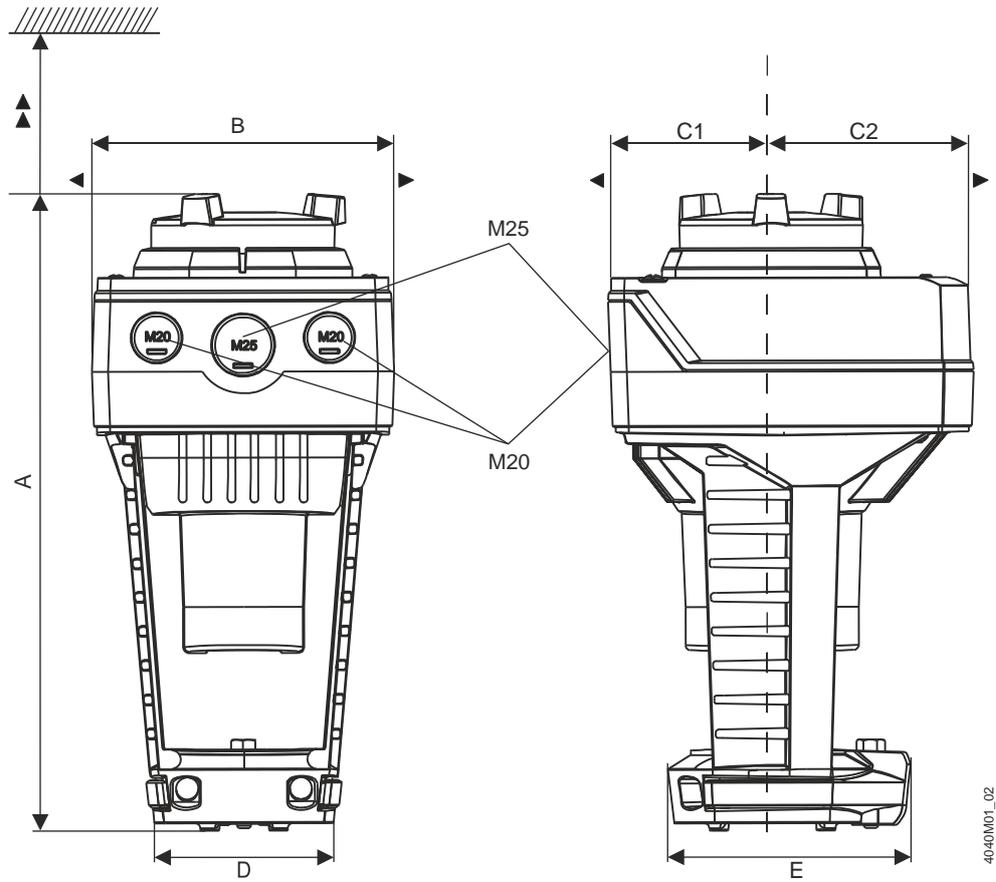
SAV61../MO



SAV81..



Actuator

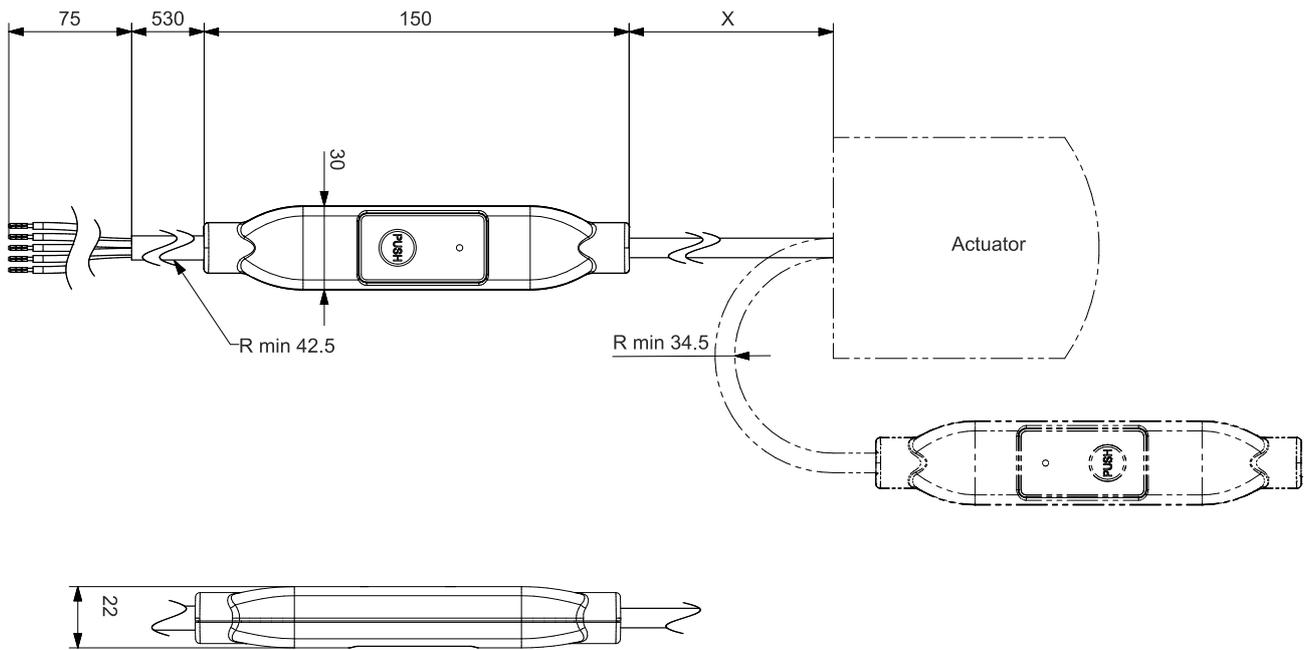


Type	A	B	C	C1	C2	D	E	▶	▶▶	kg
	[mm]									[kg]
SAV..(U <sup>1)</sup> )	265	124	150	68	82	80	100	100	200	1,920
SAV../MO <sup>2)</sup>										2,070
With ASK39.1	290	154	300	200	100		-			2,150

<sup>1)</sup> SAV..U: For ½" tube connections (Ø 21.5 mm)

<sup>2)</sup> Device has fixed connection cable – left cable entry occupied

### External Modbus converter



Dimensions in mm

Type	X	kg
	[mm]	[kg]
SAV61../MO	250	0.15 <sup>1)</sup>

<sup>1)</sup> Included in total weight.

## Revision numbers

Type	Valid from rev. no.
SAV31.00	..B
SAV61.00	..C
SAV61.00U	..C
SAV61.00/MO	..B
SAV81.00	..C
SAV81.00U	..C

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