

ACVATIX™

Electromotive actuators for valves

SAX..P..



Actuators with 20 mm stroke and 500 N force

- SAX31P03: Operating voltage AC 230 V, positioning signal 3-position
- SAX61P03: Operating voltage AC/DC 24 V, positioning signal 0...10 V, 4...20 mA, with position feedback, override control, characteristic changeover
- SAX61P03/MO: Operating voltage AC/DC 24 V, RS-485 for Modbus RTU communication
- SAX81P03: Operating voltage AC/DC 24 V, positioning signal 3-position
- For direct mounting on valves; no adjustments required
- Manual adjuster, position and status indication (LED)
- Optional functions with auxiliary switches, potentiometer

Use

Electromotive actuators to operate Siemens PICV (= pressure independent control valve) of the type series VPF44.. and VPF54.. with 20 mm stroke, as control valves on ventilation, air conditioning, district heating and refrigeration plants.

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.	SAX31P03 SAX81P03
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.	SAX61P03
Positioning signal and characteristic changeover	Setting with DIL switch. Factory setting: <ul style="list-style-type: none"> Characteristic curve: log = equal percentage (switch set to "OFF") Positioning signal: DC 0...10 V (switch set to "OFF") 	
Position feedback U	Signal returned to acquire the position via input.	
Calibration	Carry out during initial commissioning. The actuator drives to the top or bottom end position; the measured values are saved.	SAX61P03 SAX61P03/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 jamming is detected, three attempts are made to get past the jam. If unsuccessful, the actuator continues to follow the positioning signal only within a limited range, and the LED flashes red.	
Override control (Z-mode)	Override control bypasses automatic mode and is implemented via higher control.	
Modbus RTU (RS-485), not galvanically isolated	Setpoint 0...100 % valve position Actual value 0...100 % for valve position Override control Open / Closed / Min / Max / Stop Setpoint monitoring and backup mode	SAX61P03/MO

Type summary

Type	Stock no.	Stroke	Operating voltage	Positioning			Spring return function	LED	Manual adjustment ³⁾	
				force	signal	time				
SAX31P03 ¹⁾	S55150-A118	20 mm	AC 230 V	500 N	3-position	30 s	-	-	Push and fix	4)
SAX61P03 ²⁾	S55150-A114		AC 24 V / DC 24 V		DC ...10 V DC 4...20 mA 0...1000 Ω			yes		5), 7)
SAX61P03/MO ²⁾	S55150-A143				Modbus RTU					6), 7)
SAX81P03 ²⁾	S55150-A116				3-position			-		4)

¹⁾ Approval: CE

²⁾ Approvals: CE, UL

³⁾ Not designed for continuous operation.

⁴⁾ Optional accessories: Auxiliary switch, potentiometer

⁵⁾ Position feedback, override control, characteristic changeover

⁶⁾ Position feedback, override control

⁷⁾ Optional accessories: Auxiliary switch, sequence control, control action changeover

Scope of delivery

Actuators, valves and accessories are supplied in individual packs.

Ordering example

Type	Stock no.	Designation	Quantity
SAX81P03	S55150-A116	Actuator	1
ASZ7.5	S55845-Z106	Potentiometer	1

Accessories / spare parts

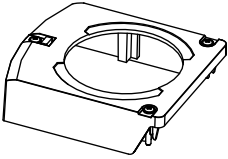

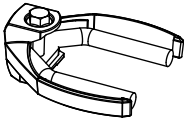
Electrical accessories

Type	Auxiliary switch ASC10.51	Potentiometer ASZ7.5/1000	Function module AZX61.1
Stock no.	S55845-Z103	S55845-Z106	S55845-Z107
	Max. 2 total		
SAX31P03	Max. 2	Max. 1	-
SAX61P03		-	Max. 1
SAX61P03/MO		-	
SAX81P03		Max. 1	-

Mechanical accessory

Type	Weather shield ASK39.1
Stock no.	S55845-Z109

Spare parts set

Type / Stock no.		
8000060843	Housing cover 	Screw (valve stem coupling) 
		U-bracket 

Equipment combinations

Valve type			DN	H ₁₀₀	\dot{V}_{\min}	\dot{V}_{100}	Δp_{\min}	Data sheet
				[mm]	[m³/h]		[kPa]	
Standard flow	VPF44.50F15	S55266-V174	50	20	3.7	16	25	A6V14362310
	VPF54.50F15	S55266-V152						
	VPF44.65F25	S55266-V176	65		4.5	24.4	32	
	VPF54.65F25	S55266-V154						
	VPF44.80F35	S55266-V178	80		6.8	35.7	22	
	VPF54.80F35	S55266-V156						
High flow rate	VPF44.50F25	S55266-V175	50		5.7	24.6	55	
	VPF54.50F25	S55266-V153						
	VPF44.65F35	S55266-V177	65		6.4	37.7	50	
	VPF54.65F35	S55266-V155						
	VPF44.80F45	S55266-V179	80		8.5	49	40	
	VPF54.80F45	S55266-V157						



Title	Content	Document ID
Actuators SAX..., SAY..., SAV..., SAL... for valves	Basic documentation: Detailed information on valve actuators, including Modbus types Stroke actuators for valves with 15/20/40 mm stroke and rotary actuators for butterfly valves	CE1P4040en
Electromotive actuators for valves SA..., Modbus RTU	Datasheet: 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: Illustration/description of the characteristics of the valve and actuator combination, depending on the DIL switch setting	A6V12050595
PICV PN16/PN25 with flanged connections	Data sheet: Product description of the PICVs VPF43../VPF44.. (PN16) and VPF53../VPF54.. (PN25)	A6V14362310



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

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

Notes

Safety

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

 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: <ul style="list-style-type: none"> Switch off both pump and operating voltage. Close the main shutoff valve in the piping. Allow the piping to cool off.

SAX31P03 / SAX81P03

3-position actuators must be controlled by a controller, see "Internal diagrams [► 14]".

SAX61P03

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.

SAX61P03/MO

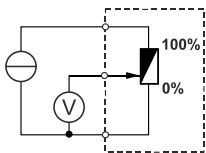
The Modbus converter is designed for analog control at 0...10 V.



Keep the analog signal setting on the Modbus actuator as is (switch 1 to "OFF"). Adjustment is 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

Mounting positions	
Indoor application	Outdoor application ^{1) 2)}

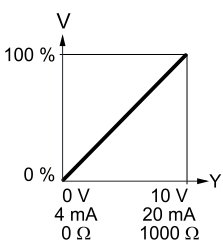
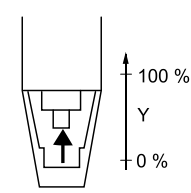

¹⁾ Requires weather shield ASK39.1. Housing protection class remains IP 54.

²⁾ SAX61P03/MO is not intended for outdoor use.

Operation

Direction of control action


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

		Direct acting	
			
		Pos. signal Y	DC 0...10 V, 4...20 mA
		Pos. signal Z	0...1000 Ω
Y, Z	Positioning signal		
V	Volume flow		
	Control action: Direct acting		

Maintenance

The actuators are maintenance-free.

Disposal

	<p>This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national legislation.</p> <p>For additional details, refer to Siemens information on disposal.</p>
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Warranty

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.

Power supply			
Operating voltage		SAX31P03	AC 230 V (±15 %)
		SAX61P03..	AC 24 V (±20 %) / DC 24 V (+20 % / -15 %) (SELV / PELV)
		SAX81P03	
Frequency			45...65 Hz
External supply line fusing (EU)			<ul style="list-style-type: none">• Slow-blow fuse 6...10 A• Circuit breaker max. 13 A, tripping characteristic B, C, D as per EN 60898• Power source with current limitation of max. 10 A
Power consumption at 50 Hz	SAX31P03	Running	7.0 VA / 3.9 W
		Holding	2.2 VA / 1.3 W
	SAX61P03	Running	9.0 VA / 3.8 W
		Holding	4.5 VA / 1.7 W
	SAX61P03/MO	Running	9.7 VA / 4.3 W
		Holding	5.9 VA / 2.2 W
	SAX81P03	Running	6.2 VA / 3.5 W
		Holding	2.7 VA / 1.5 W
Typical in-rush current ¹⁾ (3-position actuators)		SAX31P03	2,3 A
		SAX81P03	4,5 A

Functional Data	
Positioning time for nominal stroke	30 s
Positioning force	500 N
Nominal stroke	20 mm
Permissible medium temperature (valve fitted)	1...120 °C

Signal inputs			
Positioning signal Y			
	SAX31P03, SAX81P03		3-position
	SAX31P03	Voltage	AC 230 V (±15 %)
	SAX81P03		AC 24 V (±20 %) / DC 24 V (+20 % / -15 %)
	SAX61P03		
	DC 0...10 V	Power consumption	≤ 0.1 mA
		Input impedance	≥ 100 kΩ
	DC 4...20 mA	Power consumption	DC 4...20 mA (±1 %)
		Input impedance	≤ 500 Ω

Parallel connection	
SAX61P03	≤ 10 (depending on controller output)

Override control SAX61P03		
Positioning signal Z		R = 0...1000 Ω, G, G0
	R = 0...1000 Ω	Stroke proportional to R
	Z connected to G	Max. stroke 100 % ²⁾
	Z connected to G0	Min. stroke 0 % ²⁾
	Voltage	Max. AC 24 V (±20 %)
		Max. DC 24 V (+20 % / -15 %)
	Power consumption	≤ 0.1 mA

Position feedback SAX61P03		
Position feedback U	Voltage range	DC 0...10 V
	Load impedance	> 10 kΩ resistive
	Load	Max. 1 mA

Communication SAX61P03/MO		
Communication protocol	Modbus RTU	RS-485, not galvanically isolated
	Number of nodes	Max. 32
	Address range	1...245 / 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 Ω electronically switchable
	Factory setting	Off

Connection cables		
Wire cross-sectional area		0.75...1.5 mm ² , AWG 20...16 ³⁾
Cable entries	SAX..P..	<ul style="list-style-type: none"> 2 entries Ø 20.5 mm (for M20) 1 entry Ø 25.5 mm (for M25)
	SAX61P03/MO	Fixed connection cable 0.9 m
		Number of wires 5 x 0.75 mm ²

Degree and class of protection		
Housing protection, upright to horizontal		IP 54 as per EN 60529 ⁴⁾
Protection class		As per EN 60730
	SAX31P03, AC 230 V	II
	SAX61P03..., AC/DC 24 V	III
	SAX81P03, AC/DC 24 V	

Environmental conditions		
Operation		As per IEC 60721-3-3 (1994)
	Climatic conditions	Class 3K5
	Mounting location	Indoors, weather-protected ⁴⁾
	Temperature general	-5...55 °C
	Humidity (non-condensing)	5...95 % r.h.
Transport		As per IEC 60721-3-2 (1994)
	Climatic conditions	Class 2K3
	Temperature	-25...70 °C
	Humidity	< 95 % r.h.
Storage		IEC 60721-3-1 (1994)
	Climatic conditions	Class 1K3
	Temperature	-15...55 °C
	Humidity	5...95 % r.h.
Max. medium temperature at fitted valve		120 °C

Directives and Standards		
Product standard		EN 60730-x
Electromagnetic compatibility (field of use)		Residential, commercial and industrial environments
EU conformity (CE)		8000061818 (CE1T4501X1) ⁵⁾
UK conformity (UKCA)		A5W00185581A ⁵⁾
RCM conformity	AC 230 V	8000074421 (CE1T4515X4) ⁵⁾
EAC compliance		Eurasian compliance for all SAX..P..
UL, cUL	AC 230 V	-
	AC/DC 24 V	UL 873 http://ul.com/database ; File no. E35198

Environmental compatibility
The product environmental declarations 7173310559 (actuators) ⁵⁾ and A5W00030126 (Modbus adapter) ⁵⁾ contain data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

Dimensions

See "Dimensions [► 16]"

Accessories ⁶⁾

Potentiometer ASZ7.5/1000		0...1000 $\Omega \pm 5\%$
	Voltage	DC 10 V
	Current rating	<4 mA
Auxiliary switch ASC10.51	Switching capacity	AC 24...230 V, 6 (2) A, potential free
External supply line fusing		<ul style="list-style-type: none"> • Slow-blow fuse 6...10 A • Circuit breaker max. 13 A, tripping characteristic B, C, D as per EN 60898 • Power source with current limitation of max. 10 A
US installation, UL & cUL		AC 24 V class 2, 5 A general purpose

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 use, always use weather shield ASK39.1, housing protection IP 54 remains as is. SAX61P03/MO is not intended for outdoor use.
See also "Mounting [► 6]".

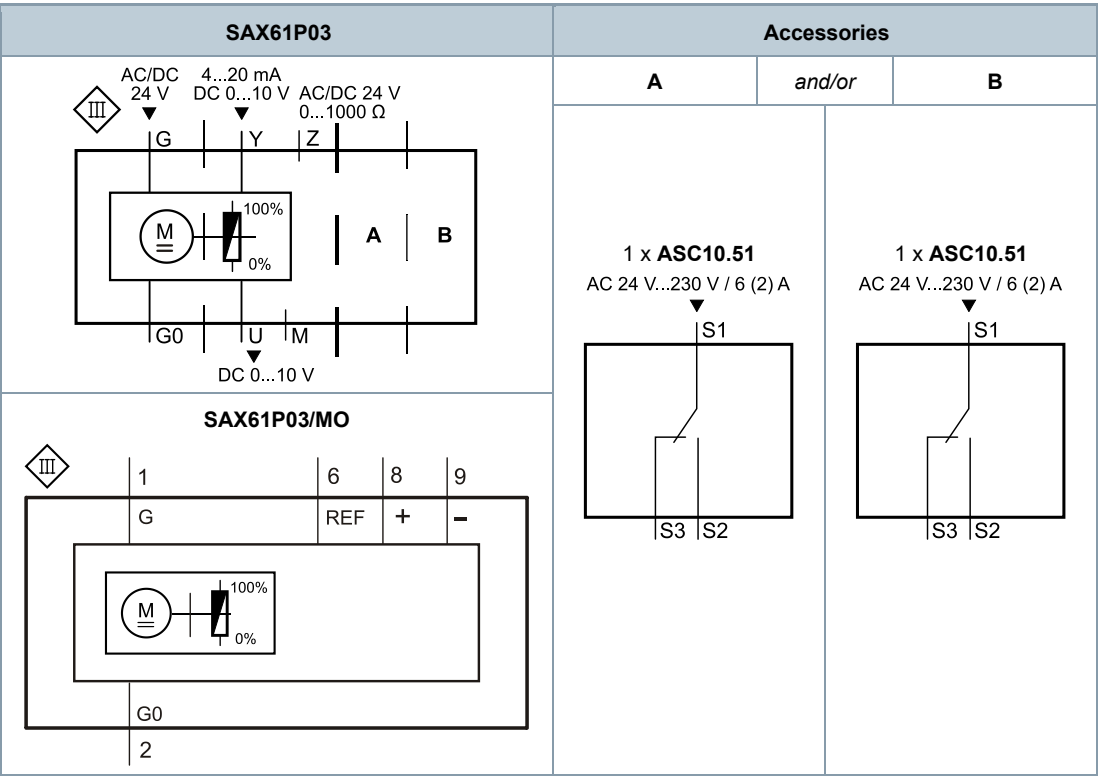
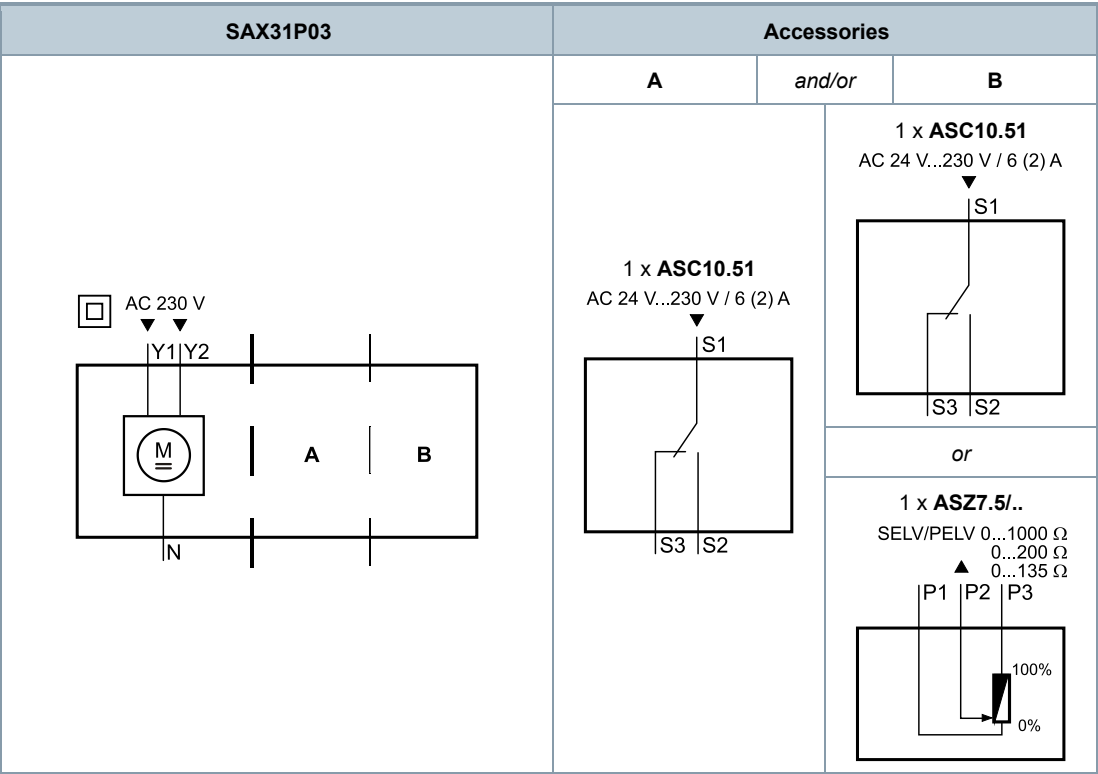
⁵⁾ Documents can be downloaded at <http://www.siemens.com/bt/download>.

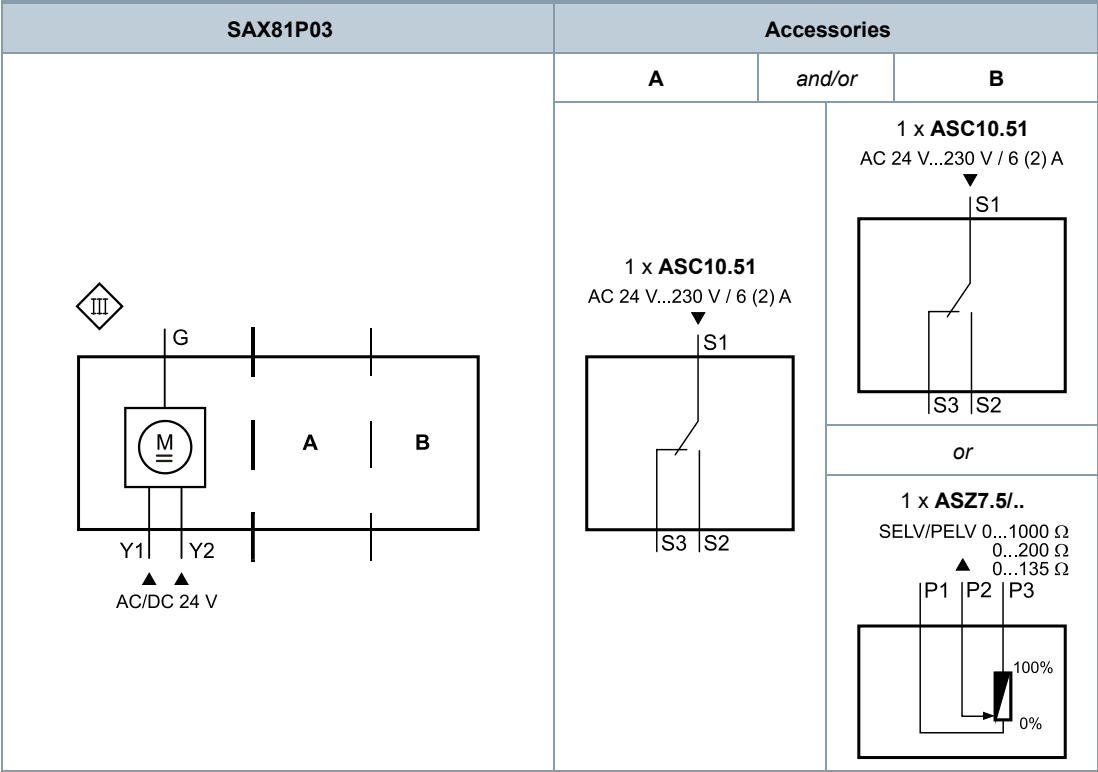
⁶⁾

UL-approved component



Internal diagrams





Connection terminals

SAX31P03	AC 230 V	3-position
<div>N</div>	System neutral (SN)	
<div>Y1</div>	Positioning signal (actuator stem retracts)	
<div>Y2</div>	Positioning signal (actuator stem extends)	

SAX61P03	AC / DC 24 V	DC 0...10 V / 4...20 mA / 0...1000 Ω
<div>G0</div>	System neutral (SN)	
<div>G</div>	System potential (SP)	
<div>Y</div>	Positioning signal for DC 0...10 V / 4...20 mA	
<div>M</div>	Measuring neutral	
<div>U</div>	Position feedback DC 0...10 V - (reference potential is measuring neutral M)	
<div>Z</div>	Control signal override control	

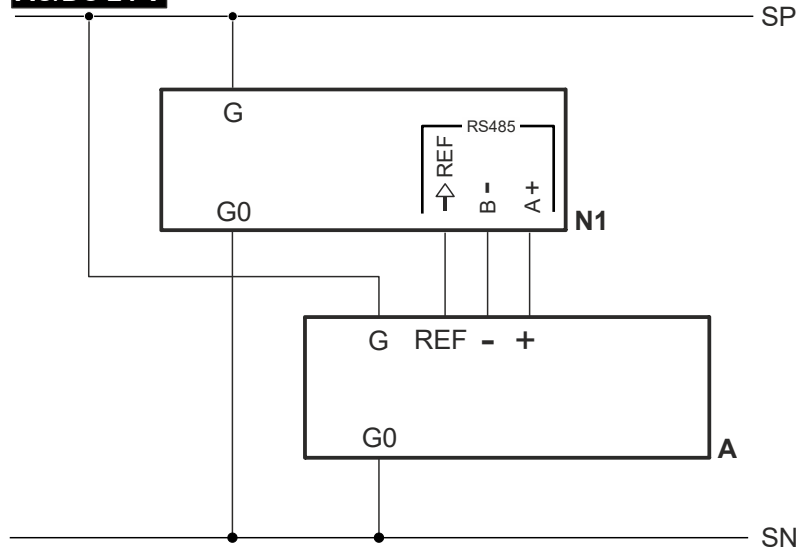
SAX61P03/MO	AC / DC 24 V	Modbus RTU connection cable
<div>G0</div>	System neutral (SN)	black
<div>G</div>	System potential (SP) AC 24 V / DC 24 V	red
<div>REF</div>	Reference line (Modbus RTU)	purple
<div>+</div>	Bus + (Modbus RTU)	gray
<div>-</div>	Bus - (Modbus RTU)	pink

SAX81P03	AC / DC 24 V	3-position
G	System potential (SP)	
Y1	Positioning signal (actuator stem retracts)	
Y2	Stellsignal (actuator stem extends)	

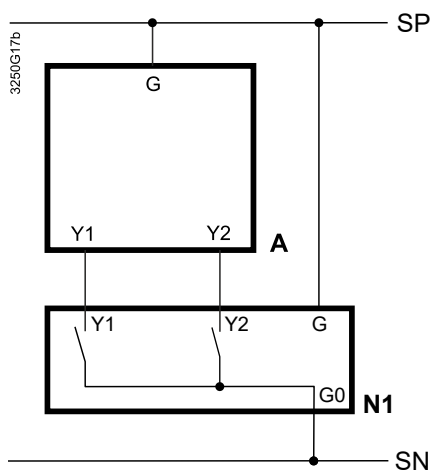
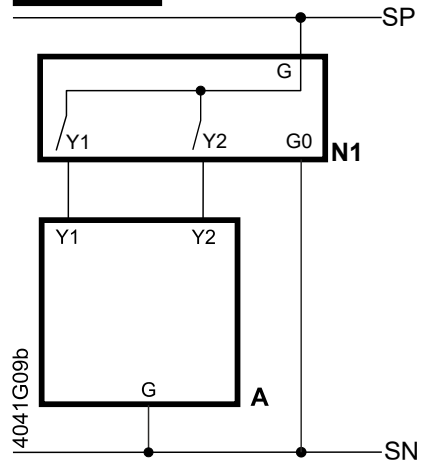
Internal diagrams

SAX31P03		
AC 230 V		
A	Actuator	
L	Phase	
N	Neutral	
N1	Controller	
Y1, Y2	Positioning signals	

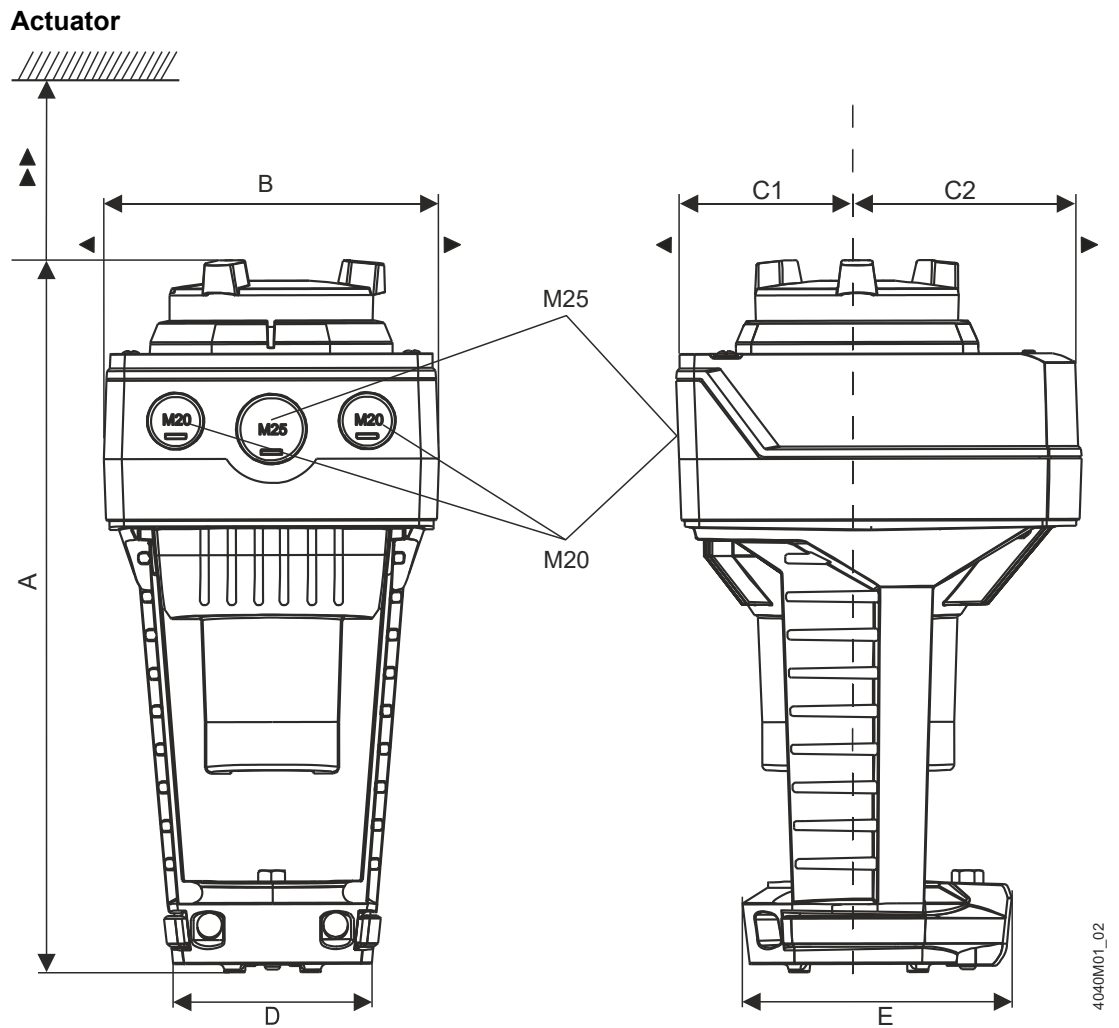
SAX61P03			
AC/DC 24 V			
A	Actuator		N1 Controller
M	Measuring neutral		U Position feedback - (reference potential is measuring neutral M)
SN	System neutral		Y Positioning signal
SP	System potential AC / DC 24 V		Z Positioning signal override control
F2	Frost protection monitor	<i>Terminals 1 – 2: Frost hazard / Sensor is off (monitor closes with frost)</i>	<i>Terminals 1 – 3: Normal operation</i>
F3	Temperature detector		F4 Frost protection monitor with 0...1000 Ω signal output, does NOT QAF21.. or GAQ61..


SAX61P03/MO
AC/DC 24 V


A	Actuator	REF	Reference line (Modbus RTU)
N1	Controller	+	Bus + (Modbus RTU)
SP / G	System potential AC / DC 24 V	-	Bus - (Modbus RTU)
SN / G0	System neutral		

SAX81P03
AC 24 V

AC/DC 24 V


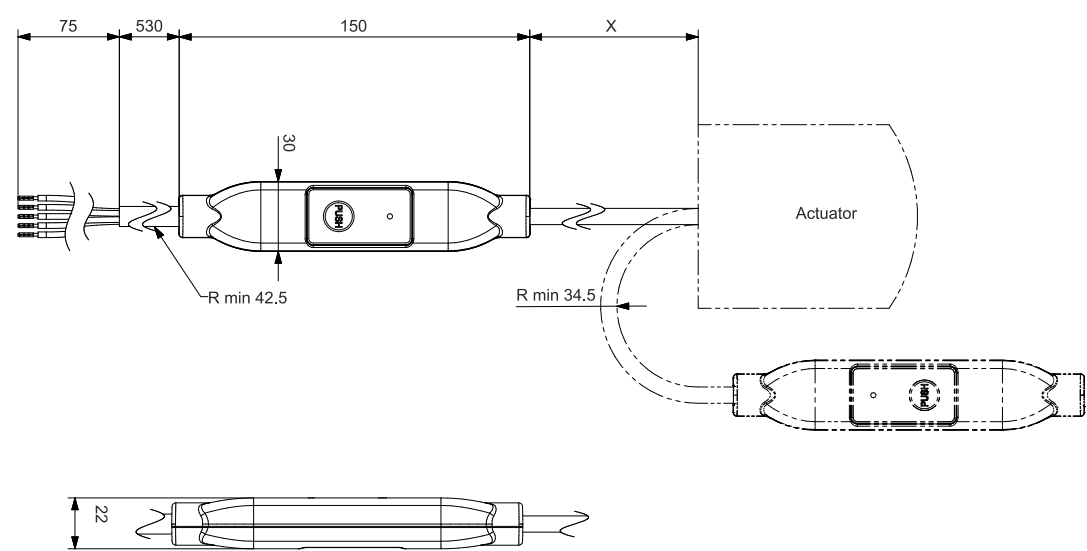
A	Actuator	SN	System neutral
N1	Controller	SP	System potential
Y1, Y2	Positioning signals		



Type	A	B	C	C1	C2	D	E	▶	▶▶	
	[mm]									[kg]
SAX..P..	242	124	150	68	82	80	100	100	200	1.78
SAX61P03/MO ¹⁾										1.93
With ASK39.1	267	154	300	200	100	-				+ 0.23

1) Device has fixed connection cable – left cable entry occupied

External Modbus converter



Dimensions in mm

Type	X	kg
	[mm]	[kg]
SAX61P03/MO	250	0.15 ¹⁾

¹⁾ Included in total weight.

Revision numbers

Type	Valid from rev. no.
SAX31P03	..K
SAX61P03	..H
SAX61P03/MO	..B
SAX81P03	..H

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