SIEMENS

ACVATIX™

Electromotoric actuators for valves

SAX..P..

Actuators with 20 mm stroke and 500 N force

- SAV31P03 Operating voltage AC 230 V, 3-position positioning signal
- SAV61P03 Operating voltage AC/DC 24 V, positioning signal 0...10V, 4...20 mA
  With position feedback, forced control, characteristic changeover
- SAV61P03/MO operating voltage AC/DC 24 V,
  RS-485 for Modbus RTU communication
- SAV81P03 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

Electromotoric actuators to operate Siemens combi valves for type series VPF43.. and VPF53.. 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 modulating positioning signal provides stepless motor 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: • Characteristic curve: log = Equal percentage (switch set to Off) • Positioning signal: DC 0...10 V (switch set to Off)	SAX61 P03, SAX61P03/MO
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.	
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 blinks 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	SAX61P03/MO

Type summary

Type	Item No.	Stroke	Positio-ning force	Operating voltage	Positioning signal	Spring return time	Positio-ing time	LED	Manual adjust-ment [3]	Auxiliary functions
SAX31P03 [1]	S55150-A118	20 mm	500 N	AC 230 V	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] [6]
SAX61P03/MO [2]	S55150-A143				Modbus RTU					
SAX81P03 [2]	S55150-A116				3-position			-		[4]

1) Approbation: CE
2) Approbation: CE, UL
3) Not designed for continuous operation.
4) Optional accessories: Auxiliary switch, potentiometer
5) Position feedback, forced control, characteristic changeover
6) Optional accessories: Auxiliary switch, sequence control, control action changeover

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
Item No.	S55845-Z103	S55845-Z106	S55845-Z107
	Max. 2		
SAX31P..	Max. 2	Max. 1	-
SAX61P..		-	Max. 1
SAX61P../MO		-	
SAX81P..		Max. 1	-

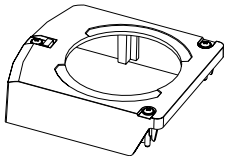
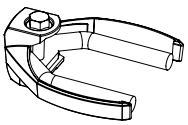
Mechanical accessory

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

Ordering (example)

Type	Stock number	Designation	Number of pieces
SAX81P03	S55150-A116	Actuator	1
ASZ7.5	S55845-Z106	Potentiometer	1

Spare parts

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

Equipment combinations

VPF43..

Valve type			DN	H_{100} [mm]	$\dot{V}_{Min.}$ [m³/h]	$\dot{V}_{m100}$ [m³/h]	Δp_{min} [kPa]	Data sheet
Standard flow	VPF43.50F16	S55266-V100	50	20	2.3	15	35	N4315
	VPF43.65F24	S55266-V102	65		4.4	25		
	VPF43.80F35	S55266-V104	80		5.3	34		
High flow rate	VPF43.50F25	S55266-V101	50		4.3	25	70	
	VPF43.65F35	S55266-V103	65		6	35		
	VPF43.80F45	S55266-V105	80		7	43		

VPF53..

Valve type			DN	H_{100} [mm]	$\dot{V}_{Min.}$ [m³/h]	$\dot{V}_{m100}$ [m³/h]	Δp_{min} [kPa]	Data sheet
Standard flow	VPF53.50F16	S55266-V112	50	20	2.3	15	35	N4316
	VPF53.65F24	S55266-V114	65		4.4	25		
	VPF53.80F53	S55266-V116	80		5.3	34		
High flow rate	VPF53.50F25	S55266-V113	50		4.3	25	70	
	VPF53.65F35	S55266-V115	65		6	35		
	VPF53.80F45	S55266-V117	80		7	43		

Product documentation

Title	Contents	Document ID
Electromotoric actuators for valves SAX..P..	Data sheet: Product description SAX..P..	CE1N4509
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
Electromotoric 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

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

Notes

Safety

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- 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:

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

Engineering

SAX31P03 / SAX81P03

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

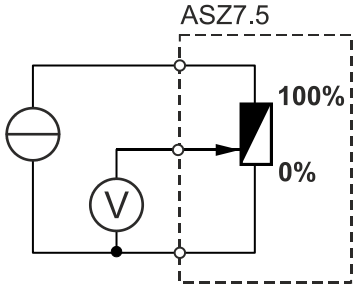
Keep the analog signal setting on the actuator as is (switch 1 to OFF); adjustment not permitted.

ASZ7.5

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

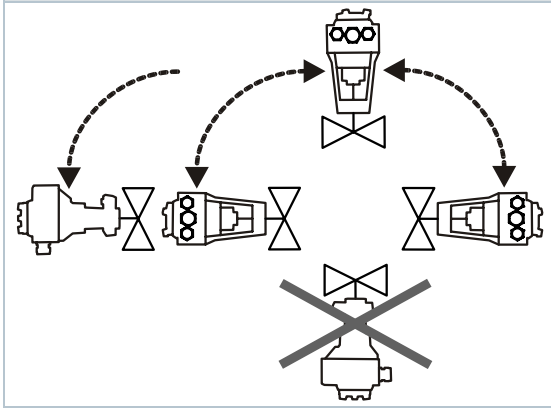
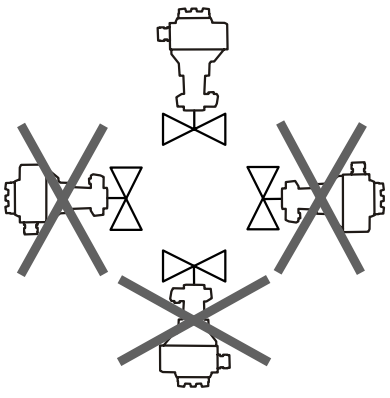
Signal peaks in potentiometer ASZ7.5 may result in error messages on Siemens SIMATIC. This is not the cause, however, when combined with Siemens HVAC controllers. The reason is the higher resolution and faster reaction time on SIMATIC.

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)]
	

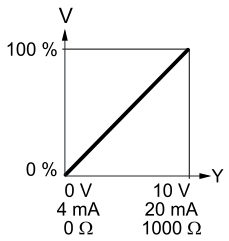
1) Only together with weather shield ASK39.2. IP54 housing protection remains unchanged.

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

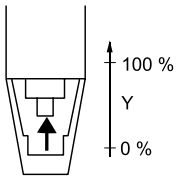
Operation

Direction of control action

On valves where the stem retracts to the close position, "direct acting" means that the value is fully closed at positioning signal Y = 0 V or Z = 0 Ω (i.e. 100 %).



Direct acting



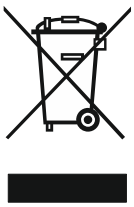
Positioning signal Y	DC 0...10 V, 4...20 mA
Positioning signal Z	0...1000 Ω

Y, Z	Positioning signal
V	Volume flow
_____	Control action: Direct acting

Maintenance

The actuators are maintenance-free.

Disposal



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

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

Warranty service

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

Power			
Operating voltage			
	SAX31P03		AC 230 V ±15%
	SAX61P03..		AC 24 V ± 20 % / DC 24 V +20 % / -15 % (SELV)
	SAX81P03		
Frequency			45...65 Hz
External supply line fusing (EU)			• Non-renewable fuse 6...10 A slow • Circuit break max. 13 A, tripping characteristic B, C, D to EN 60898 • Power source with current limitation of max. 10 A
Power consumption at 50 Hz			
	SAX31P03	Stem retracts/extends	6.5 VA / 4 W
	SAX61P03		9.5 VA / 4.5 W
	SAX61P03/MO		10.2 VA / 5 W
	SAX81P03		7 VA / 4.5 W
Typical switch-on current [1] (3-position actuators)			
	SAX31P03		2.3 A
	SAX81P03		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 [→ 3])
	SAX31P03, SAX61P03, SAX81P03	30 s
Positioning force		500 N
Nominal stroke		20 mm
Permissible media 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 kΩ

Communication SAX61P../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 Ω electronically switchable
		Factory setting	Off

Parallel connection	
SAX61P03	≤ 10 (depending on controller output)

Forced control			
Z positioning signal			
	SAX61P03		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	Max. stroke 0 % [2]
		Voltage	Max. AC 24 V ± 20 %
			Max. DC 24 V +20% / -15%
		Power consumption	≤ 0.1 mA

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

Connection cables			
Wire cross-sectional areas			0.75 mm², AWG 20...16 [3]
Cable entries			
	SAX..P..		• 2 entries ∅ 20.5 mm (for M20) • 1 entry ∅ 25.5 mm (for M25)
	SAXP61../MO		
		Fixed connection cable	0.9 m
		Number of cores	5 x 0.75 mm²

Degree of protection and class			
Housing from vertical 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		

Environmental conditions			
Operation			IEC 60721-3-3
	Climatic conditions		Class 3K5
		Mounting location	Indoors (weather-protected) [4]
		Temperature, general	5...< 55 °C
		Humidity (non-condensing)	5...95 % r.h.
Transportation			IEC 60721-3-2
	Climatic conditions		Class 2K3
		Temperature	-25...70 °C
		Humidity	< 95% r.h.
Storage			IEC 60721-3-1
	Climatic conditions		Class 1K3
		Temperature	-15...55 °C
		Humidity	5...95 % r.h.
Max. media temperature when mounted on valve			120 °C

Directives and standards		
Product standard		EN 60730-x
Electromagnetic compatibility (field of use)		For residential, commercial, and industrial environments
EU conformity (CE)		CE1T4501X1 [5]
RCM conformity		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 number E35198

Environmental compatibility
Product environmental declarations 71 7331 0559 [5] und A6V101083254 [5] include data on environmentally friendly product design and testing (RoHS compliance, material composition, packaging, environmental benefits, disposal).

Dimensions
See Dimensions [➞ 16]

Accessories [6]		
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		• Non-renewable fuse 6...10 A slow • Circuit break max. 13 A, tripping characteristic B, C, D to 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 operation, always use weather shield ASK39.1, housing protection class IP 54 remains as is. SAX61../MO is not intended for outdoor use.

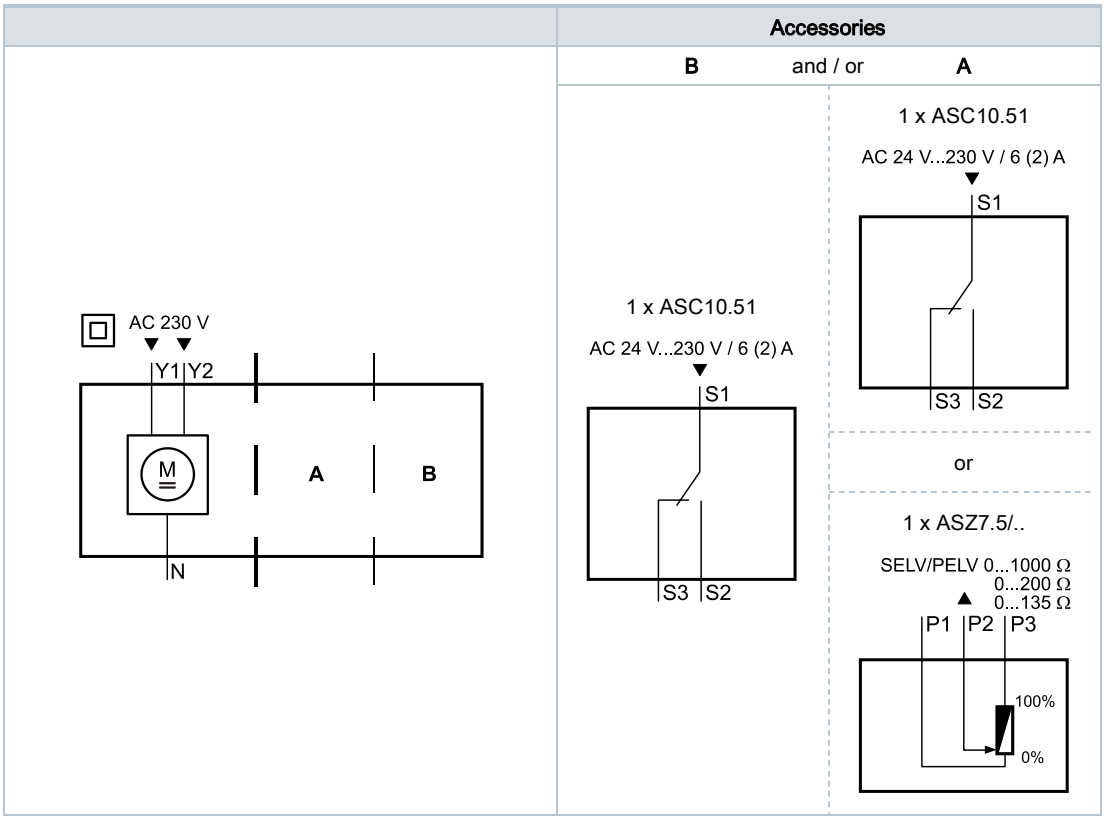
5) Documents can be downloaded at http://www.siemens.com/bt/download

6) UL-approved component

Connection diagrams

Internal Diagrams

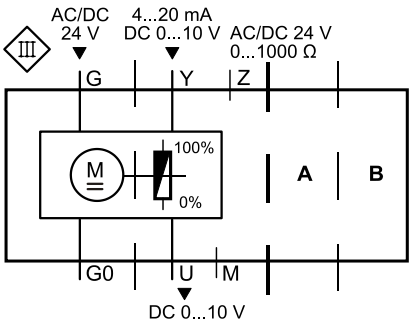
SAX31P03



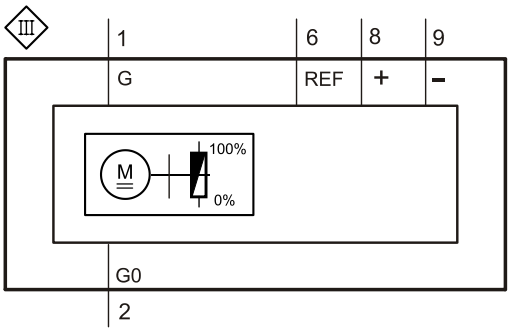
SAX61P..

	Accessories
	B and / or A

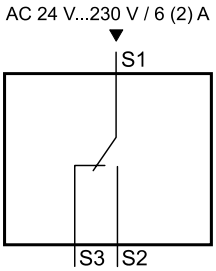
SAX61P03



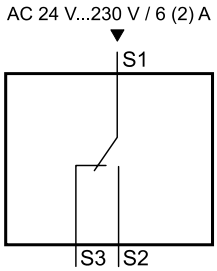
SAX61P03/MO



B: 1 x ASC10.51

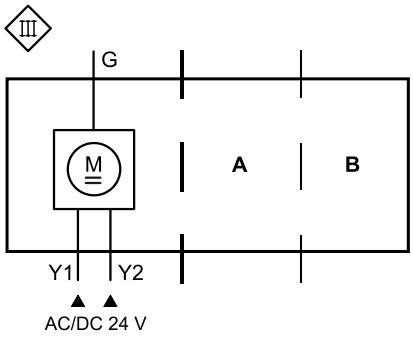


A: 1 x ASC10.51

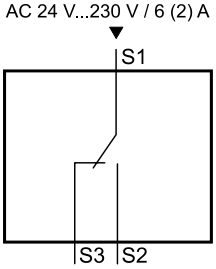


SAX81P03

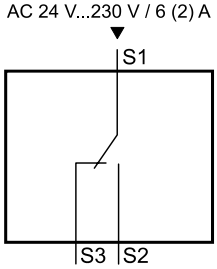
	Accessories
	B and / or A



B: 1 x ASC10.51

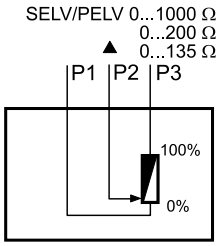


A: 1 x ASC10.51



or

1 x ASZ7.5/..



SAX31P03

	AC 230 V	3-position
N	System neutral (SN)	
Y1	Positioning signal (actuator's stem extends)	
Y2	Positioning signal (actuator's stem retracts)	

SAX61P03

	AC / DC 24 V	D 0...10 V 4...20 mA 0...1000
G0	System neutral (SN)	
G	System potential (SP)	
Y	Positioning signal for DC 0...10 V / 4...20 mA	
M	Measuring neutral	
U	Position feedback DC 0…10 V - (System neutral is measuring ground M)	
Z	Control signal forced control	

SAX61P03/MO

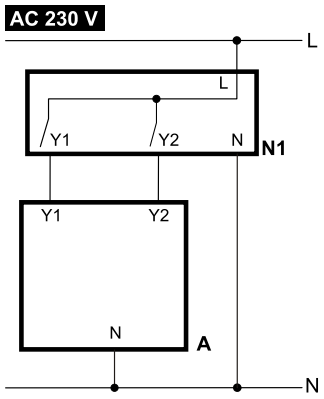
	AC / DC 24 V	Modbus RTU connecting cable
G0	System neutral (SN)	black
G	System potential (SP) AC 24 V / DC 24 V	red
REF	Reference line (Modbus RTU)	violet
+	Bus + (Modbus RTU)	gray
-	Bus - (Modbus RTU)	pink

SAX81P03

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

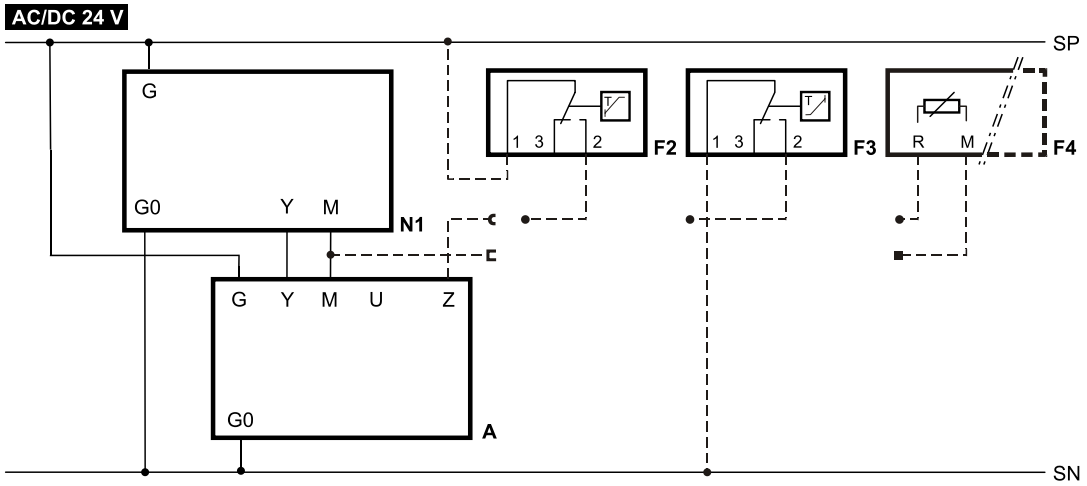
Connection diagrams

SAX31P03



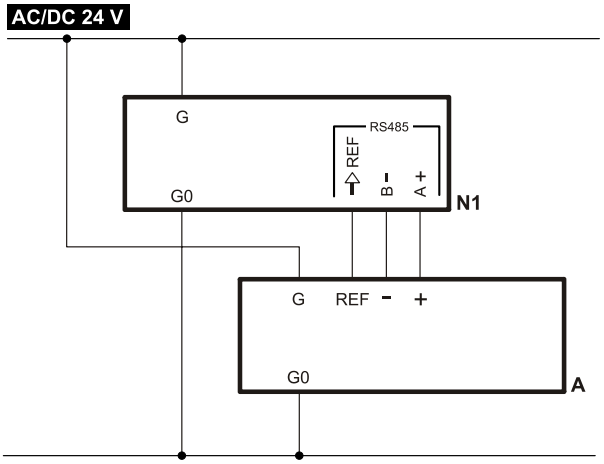
A	Actuator
L	Phase
N	Neutral
N1	Controller
Y1, Y2	Positioning signals

SAX61P03



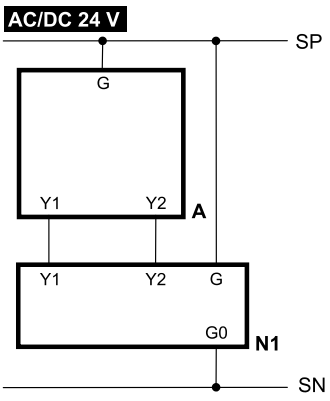
A	Actuator
F2	Frost protection thermostat: terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation
F3	Thermal reset limit thermostat
F4	Frost protection monitor with 0…1000 Ω signal output, does **NOT** support QAF21.. or QAQ61..
M	Measuring neutral
N1	Controller
SN	System zero
SP	System potential AC/DC 24 V
U	Position feedback - (System neutral is measuring ground M)
Y	Positioning signal
Z	Control signal forced control

SAX61P03/MO



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

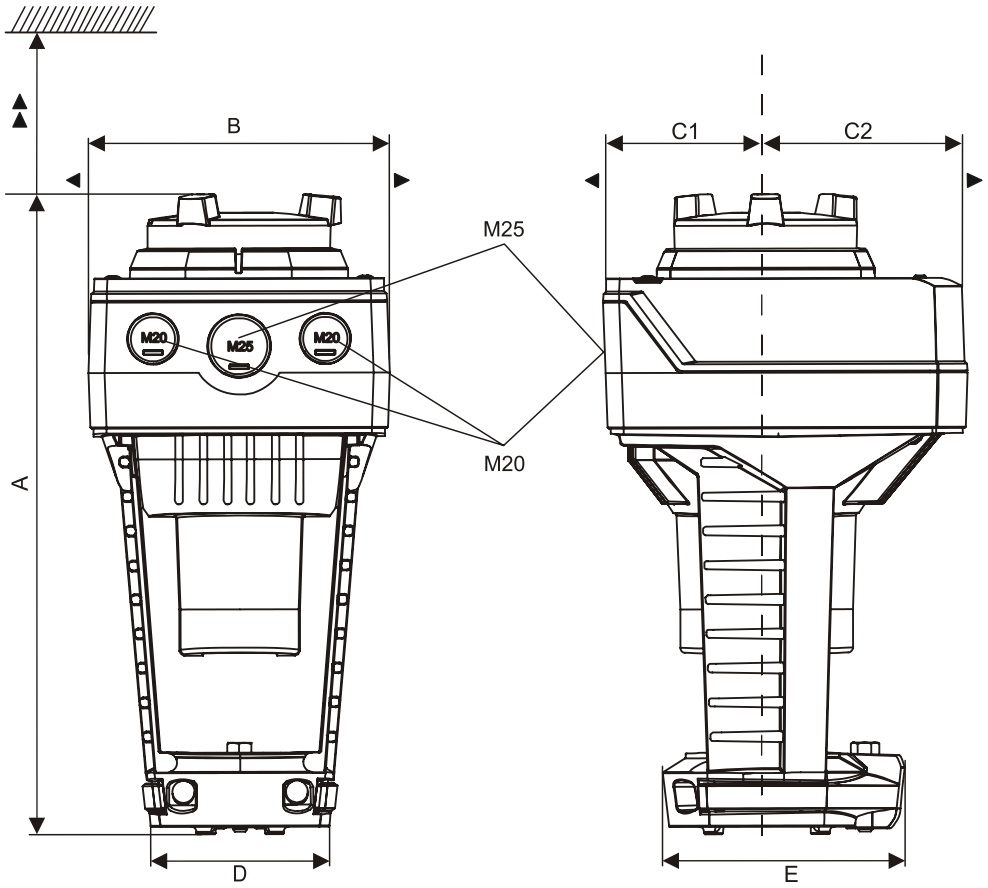
SAX81P03



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

Dimensions

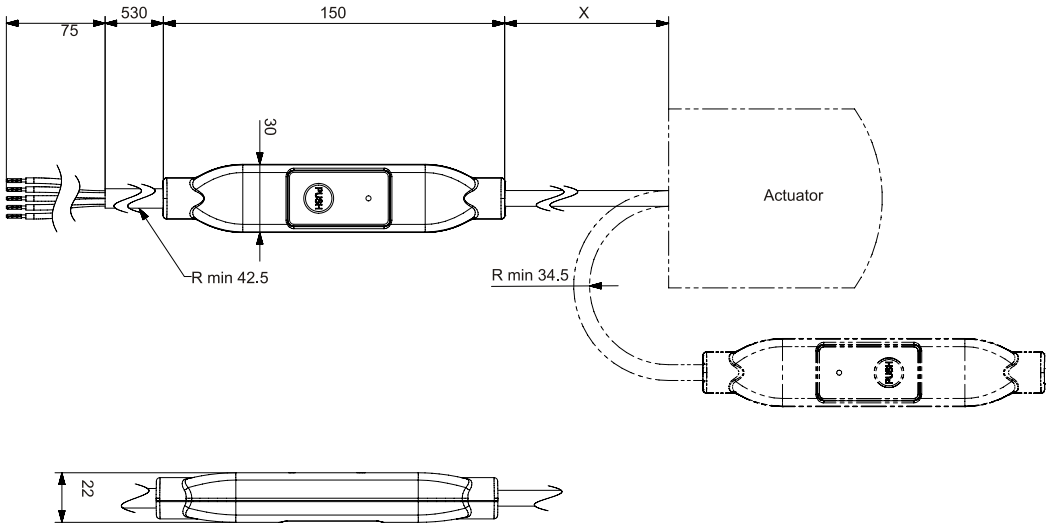
Actuator



Type	A	B	C	C1	C2	D	E	►	►►	kg
	[mm]									[kg]
SAX..P..	242	124	150	68	82	80	100	100	200	1.780
SAX61P03/MO [1]										2.930
With ASK39.1	267	154	300	200	100	-				2.010

[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	..H
SAX61P03	..H
SAX61P03/MO	..A
SAX81P03	..H