SIEMENS

ACVATIX

Electromotive actuators for valves

SAT..

Actuators with 5.5 mm stroke and 300 N force

- SAT31.. Operating voltage AC 230 V, 3-position control signal
- SAT61.. Operating voltage AC 24 V / DC 24 V, positioning signal DC 0...10 V / DC 4...20 mA / 0...1000 Ω
- SAT61./MO operating voltage AC24 V / DC 24 V, RS-485 for Modbus RTU communication
- For direct mounting on valves; no adjustments required
- Manual adjuster, position and status indication (LED)
- Optional function extension with auxiliary switch

Application

To operate Siemens 2-port and 3-port valves:

- Type series VVG549..
- 5.5 mm stroke

Used as control and shutoff valves in heating, ventilation plants and air conditioning plants.

Together with the ASK30 mounting kit, all former Landis & Gyr valves with 4 mm or 5.5 mm stroke can also be operated: X3i.., VVG45.., VXG45.., VXG46.., VVI51...

Features

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.	SAT31..
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.	SAT61..
Positioning signal and characteristic changeover	Setting with DIL switch. Factory setting SAT.. ● Characteristic: lin = linear (switch to "ON" ● Positioning signal: DC 0...10 V (switch set to Off)	
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.	SAT61.. SAT61../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 follow the positioning signal only within a limited range, and the LED flashes red.	
Modbus RTU (RS-485), not galvanically isolated	Setpoint 0...100 % valve setting Actual value 0..100% for valve position Override control Open / Close / Min / Max / Stop Setpoint monitoring and backup mode	SAT61../MO

Type summary

Type	Item NO.	Operating voltage	Positioning signal	Positioning time	Spring return		Manual adjustment [5]	Position feedback	Comment	
					funct.	time				
SAT31.008	S55158-A119	AC 230 V	3-pos.	8 s	No	–	Yes	-	[1]	[2]
SAT31.51	S55158-A120			15 s	Yes	<8 s [4]	No			
SAT61.008	S55158-A117	AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω	8 s	No	–	Yes	DC 0…10 V		[3]
SAT61.008/MO	S55158-A123		Modbus RTU					Modbus RTU	[1], [6]	
SAT61.51	S55158-A118		DC 0…10 V DC 4…20 mA 0…1000 Ω	15 s	Yes	<8 s [4]	No	DC 0…10 V	[1]	
SAT61.51/MO	S55158-A124		Modbus RTU					Modbus RTU	[1], [6]	

[1] Cable gland: M16, M20 (ISO50262)

[2] Approbation: CE

[3] Approvals: CE, UL

[4] Spring return time at low temperatures slightly longer

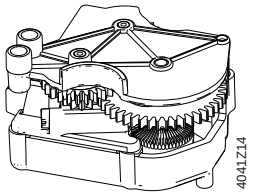
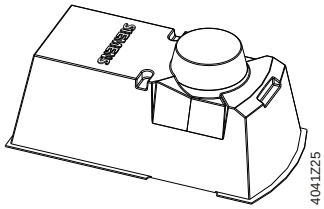
[5] Not designed for continuous operation.

[6] Fixed connection cable 5 x 0.75 mm ^{2}

Delivery

Actuators, valves, and accessories are supplied in individual packs.

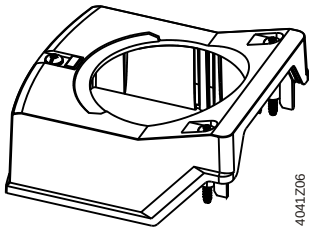
Accessories

Electrical accessories	Mechanical accessory
Auxiliary switch ASC10.51  	Weather shield ASK39.2 

Ordering (example)

Type	Order number	Designation	Number of pieces
SAT31.008	S55158-A119	Actuator	1
+ auxiliary components such as connections, aux switches, etc.			

Spare parts

Order number	Description
S55845-Z180	Type ASQ1: Housing cover with associated screws and light guide as component, without laser labeling 

Device combinations

Valves PN25				Actuators SAT.. [3]	
VVG549.. (2-port)	**DN**	**G**	**k_{vs}**	**Δp_s**	**Δp_{max}**
Medium: 1…130 °C [1]		[inch]	[m^3/h]	**[kPa]**	**[kPa]**
VVG549.15-0.25	15	G ¾ B	0.25	2500	1200
VVG549.15-0.4			0.4		
VVG549.15-0.63			0.63		
VVG549.15-1			1	1500	
VVG549.15-1.6			1.6		
VVG549.15-2.5			2.5		
VVG549.20-4K [2]	20	G 1 B	4	1600	
VVG549.25-6.3K [2]	25	G 1 ¼ B	6.3		

[1] Briefly to +150 °C (max. 6 of 24 hours to +150 °C)

[2] Pressure compensated

[3] SAT.. combined with VVG549: Change DIL switch setting to linear (factory setting = log).
SAT../MO: Change additional Modbus register 263 to "0 = linear"

Product documentation

Title	Contents	Document ID
Actuators SAS.., SAT.. for valves Basic documentation	Comprehensive information on actuators SAS..	CE1P4041
Electromotive actuators for valves SAT..	Datasheet: Product description SAT..	CE1N4584
Electromotive actuators for valves SA.., Modbus RTU	Datasheet: Modbus communication profiles	A6V101037195
Mounting instructions actuators S..6./MO and G..161../MO	Mounting instructions: Mounting and installation instructions for Modbus actuators	A5W00027551
Valve actuator DIL switch characteristic overview	Commissioning / configuration: Depictions, description of actuator and valve characteristics by DIL switch setting	A6V12050595

Related documents such as the environmental declarations, declarations of conformity, etc., can be downloaded from the following Internet address:

www.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. ● Observe national provisions and comply with the appropriate safety regulations.

Engineering

SAT31..

3-position actuators must have their own specific controller, see "Connection Diagrams".

SAT61..

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.

SAT61../MO

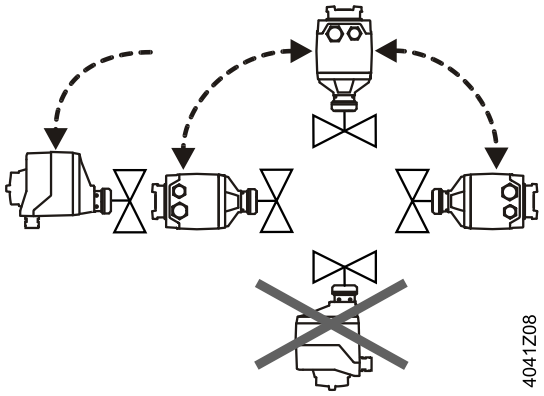
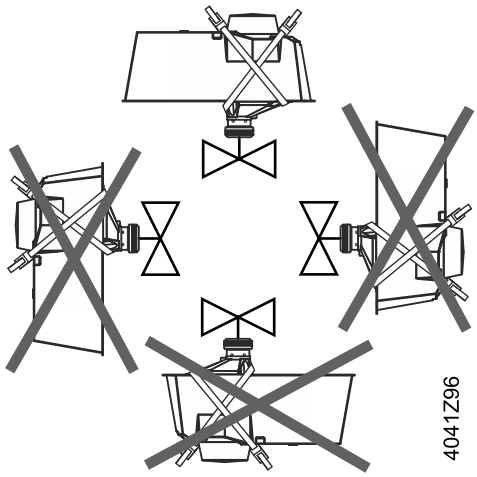
The Modbus converter is designed for analog control on the valve at 0...10 V.

NOTES:

- Keep the analog signal setting on the actuator as is (switch 1 to OFF); adjustment not permitted.
- DIL switch (internal actuator characteristic changeover) to linear (switch 2 to On).
- Modbus register 263: Set "Y_U_Characteristic" to "0 = linear".

Mounting

Mounting positions

Indoor application	Outdoor application [1) 2)]
	

1) Requires weather shield ASK39.2 Housing protection class remains IP54.

2) SAT61../MO is not intended for outdoor use.

Maintenance

The SAT.. actuators are maintenance-free.

Actuator installation:

- Do not touch valve coupling if components (valve/piping) are hot
- If necessary, disconnect electrical connections from the terminals

Correctly fit the actuator to the valve before recommissioning.

Disposal

⚠ WARNING	
	**Tensioned spring return** Opening the actuator housing can trigger the fully tensioned spring return resulting in flying parts and possible injury. ● Do not open the actuator housing.

	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. For additional details, refer to Siemens information on disposal.

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.

Technical data

Power supply		
Operating voltage	SAT31..	AC 230 V ± 15 %
	SAT61..	AC 24 V ± 20 % / DC 24 V +20 % / -15 or AC 24 V class 2 (US)
Frequency		45…65 Hz
External supply line fusing (EU)		Fuse slow 6 A…10 A or fuse switch max. 13 A, release characteristic B,C,D as per EN 60898 power source with current limitation of max. 10 A

Functional data		
Positioning time for nominal stroke	SAT..008	8 s
	SAT..51	15 s
Positioning force		300 N
Nominal stroke		5.5 mm
Permissible media temperature with valve		1…130 °C kurzzeitig auf +150 °C (max. 6 von 24 Stunden auf +150 °C)

Signal Inputs		
Positioning signal "Y"	SAT31..	3-pos.
	SAT61..	DC 0…10 V / DC 4…20 mA / 0…1000 Ω
	SAT61.. (DC 0...10 V) current draw	≤ 0.1 mA
	Input impedance	≥100 kΩ
	SAT61.. (DC 4…20 mA) current draw	DC 4...20 mA ± 1%
	Input impedance	≤ 500 Ω

Power consumption at 50 Hz

Type	Item NO.	Operating [W]	Operating [VA]	Standby [W]	Standby [VA]
SAT31.008	S55158-A119	2.1	4.4	0.8	2.0
SAT31.51	S55158-A120	2.7	5.4	1.4	3.0
SAT61.008	S55158-A117	2.8	7.1	1.9	4.9
SAT61.008/MO	S55158-A123	3.3	7.8	2.4	6.3
SAT61.51	S55158-A118	3.3	8.1	2.1	5.4
SAT61.51/MO	S55158-A124	3.8	8.8	2.6	6.8

Communication SAT61../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

Parallel connection	
SAT61..	≤ 10 (depending on controller output)

Forced control		
Z positioning signal	SAT61..	R = 0…1000 Ω, G, G0
	R = 0…1000 Ω	Stroke proportional to R
	Z connected to G	Max. stroke 100%
	Z connected to G0	Min. stroke 0%
	Voltage	Max. AC 24 V ±20% / Max. DC 24 V +20 % / -15%
	Power consumption	≤ 0.1 mA

Position feedback		
U	Voltage range SAT61..	DC 0…10 V ± 1 %
	Load impedance	> 10 kΩ resistive
	Load	Max. 1 mA

Connection cable		
Wire cross-sectional areas		0.75…1.5 mm ^{2}, AWG 20…16 [1)]
Cable entries	SAT.. (EU)	1 entry Ø 16.4 mm (for M16) 1 entry Ø 20.5 mm (for M20) Thread length max. 9 mm
	SAT61../MO	Fixed connection cable: 0.9m
		Number of cores: 5 x 0.75 mm ^{2}

Protection class		
Protection degree of housing	See Mounting [▶ 6]	IP 54 as per EN 60529
Insulation class as per EN 60730	Actuators SAT31.. AC 230 V	II
	Actuators SAT61.. AC / DC 24 V	III

Environmental conditions		
Operation per IEC 60721-3-3	Climatic conditions	Class 3K5
	Mounting location	Indoors, outdoors [2)]
	Temperature, general	-5…55 °C
	Humidity (non-condensing)	5…95 % r. h.
Transport per IEC 60721-3-2	Climatic conditions	Class 2K3
	Temperature	-25…70 °C
	Humidity	< 95 % r. h.
Storage per IEC 60721-3-1	Temperature	-15…55 °C
	Humidity	5…95 % r. h.

Standards		
Product standard		EN60730-x
Electromagnetic compatibility (field of use)		For residential, commercial and industrial environment
EU conformity (CE)		See EU declaration of conformity CE1T4584xx [3)] (8000073403)
UK conformity (UKCA)		See UK declaration of conformity A5W00197117A-001 [3)]
RCM conformity		See RCM declaration of conformity CE1T4584en_C1 [3)] (8000069922)
EAC compliance		Eurasien compliance for all SAT variants
UL, cUL	AC / DC24 V	UL 873 http://ul.com/database File no. E35198

Environmental compatibility
The product environmental declaration A5W02128675A [3)] contains data on environmentally compatible product design and assessments (RoHS compliance, material composition, packaging, environmental benefit, and disposal).

Dimensions / weight
See Dimensions [▶ 14]

Accessories [4]		
Auxiliary switch ASC10.51	Switching capacity	AC 24…230 V, 6 (2) A, potential free
	External fusing of supply line	See "Power supply"
	US installation, UL & cUL	AC 24 V class 2, 5 A general purpose

1) AWG = American wire gauge.
The planner/installer is responsible for matching wire cross sections and fuses. Standard regarding protective measures – Note protection for overcurrent:
IEC 60364-4-43:2008 or German adoption HD 60364-4-43:2010.

2) For outdoor operation, always use weather shield ASK39.2, housing protection class IP 54 remains as is.
SAT61../MO is not intended for outdoor use.

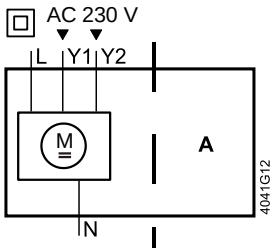
3) Documents can be downloaded at http://siemens.com/bt/download.

4) By UL-approved component

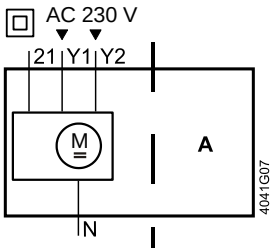
Connection diagrams

Internal diagrams

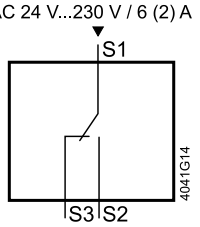
SAT31.008



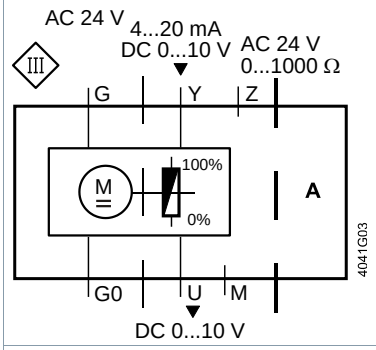
SAT31.51



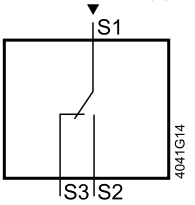
Accessories, plug A
1x ASC10.51
ASC10.51
AC 24 V...230 V / 6 (2) A



SAT61..

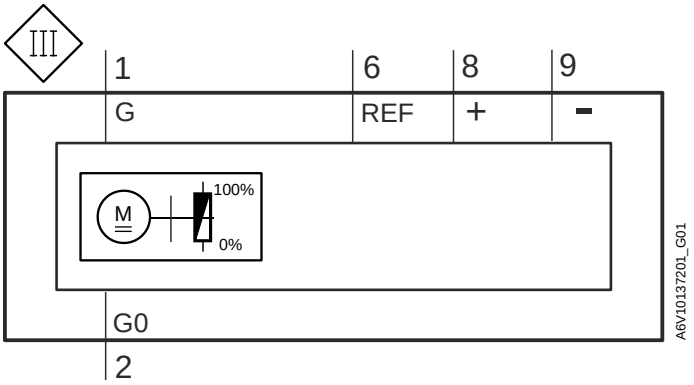


Accessories, plug A
1x ASC10.51
ASC10.51
AC 24 V...230 V / 6 (2) A

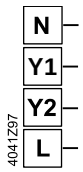


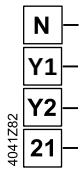
US installation, UL & cUL
AC 24 V class 2
5 A gen. Purp.

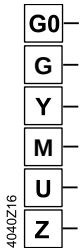
SAT61../MO

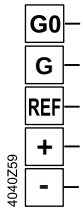


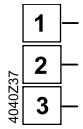
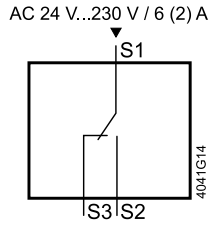
Connection terminals

SAT31.008	AC 230 V, 3-position
	System neutral (SN) Positioning signal (actuator's stem extends) Positioning signal (actuator's stem retracts) System potential (SP)

SAT31.51	AC 230 V, 3-position
	System neutral (SN) Positioning signal (actuator's stem extends) Positioning signal (actuator's stem retracts) Spring return

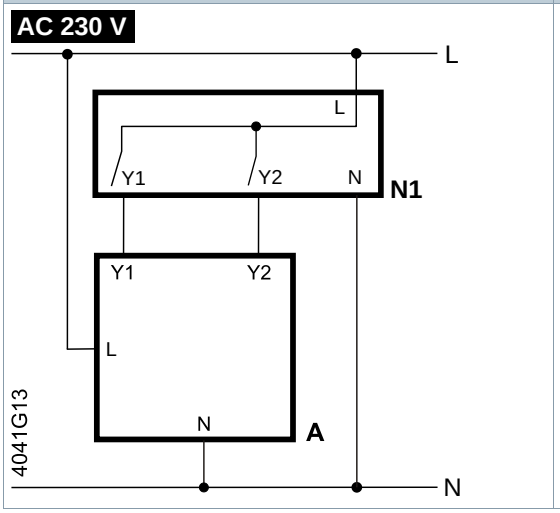
SAT61..	AC/DC 24 V, DC 0…10 V / 4…20 mA / 0…1000 Ω
	System neutral (SN) System potential (SP) Positioning signal for DC 0…10 V / 4…20 mA Measuring neutral Position feedback DC 0…10 V Positioning signal forced control AC/DC ≤ 24 V, 0...1000 Ω

SAT61../MO	AC/DC 24 V, Modbus RTU connection cable	
	System neutral (SN) System potential (SP) AC 24 V ~ / DC 24 V = Reference line (Modbus RTU) Bus + (Modbus RTU) Bus - (Modbus RTU)	black red violet gray pink

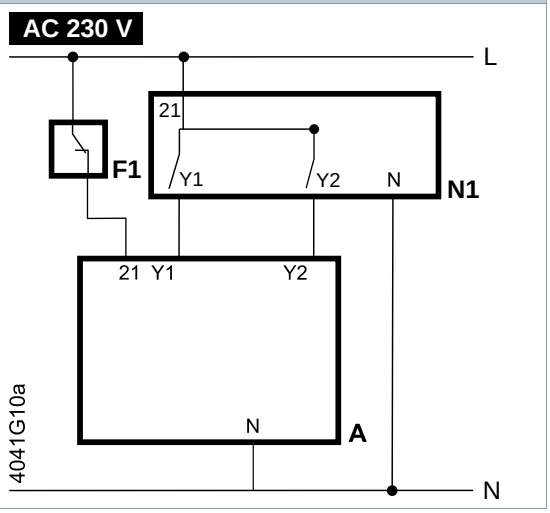
Electrical accessories		
ASC10.51	Auxiliary switch, adjustable switching positions, AC 24…230 V	
	System potential (SP) Closes (actuator stem extends) Opens (actuator stem extends)	

Internal diagrams

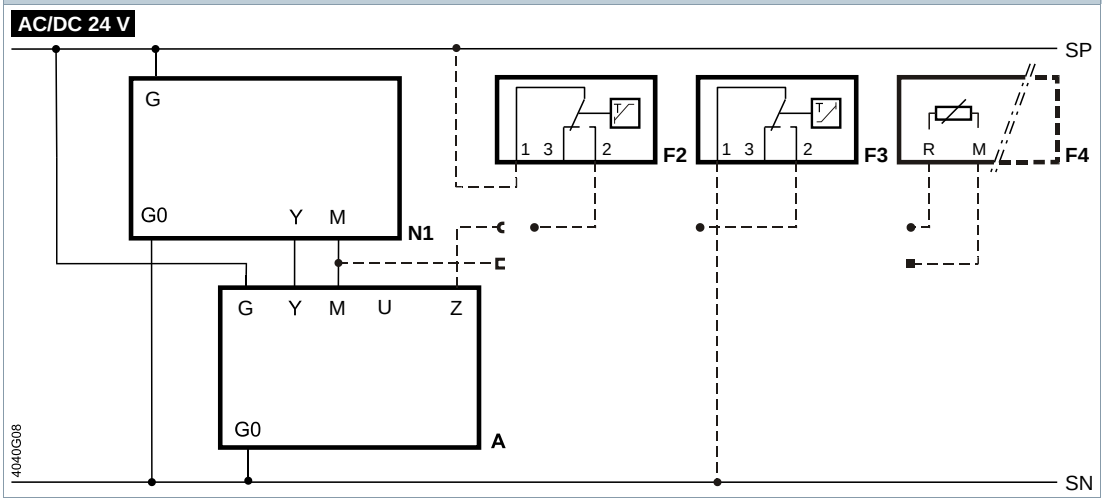
SAT31.008

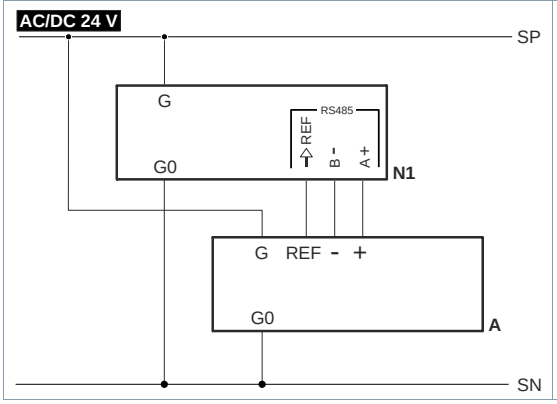
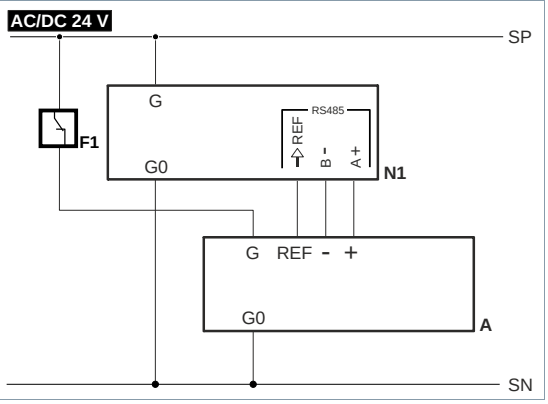


SAT31.51



SAT61..



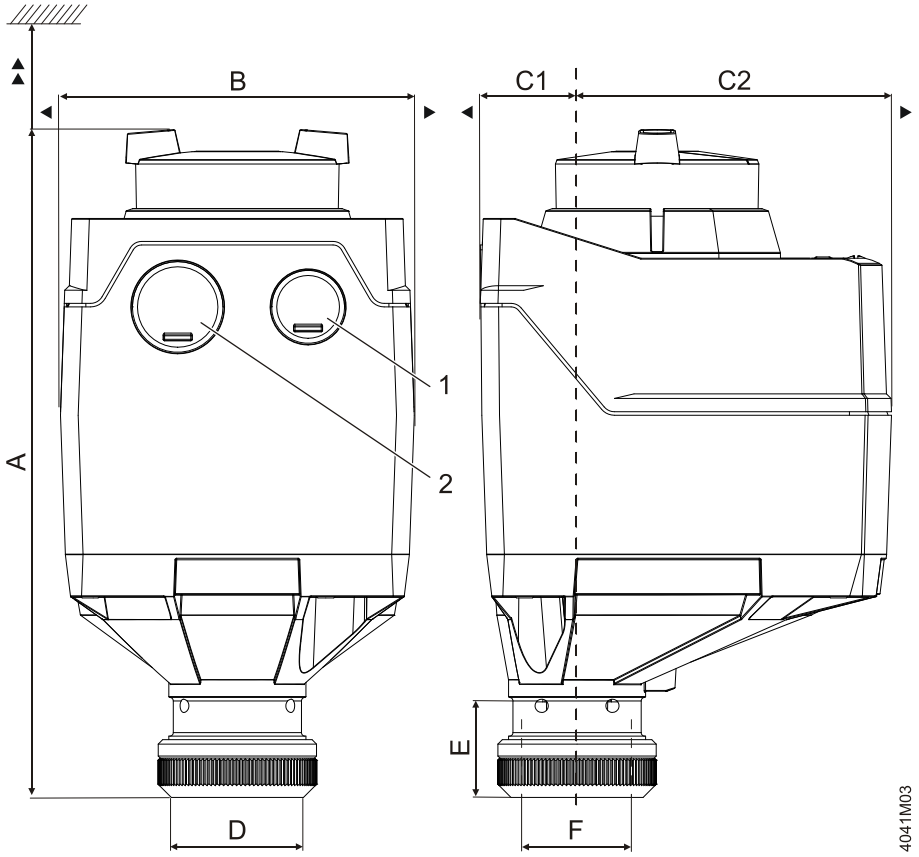
SAT61.008/MO	SAT61.51/MO [1)]
	

[1)] The actuator can no longer be addressed via the bus once the limit thermostat is triggered.

A	Actuator	REF	Reference line (Modbus RTU)
F1	Temperature limiter	SN	System neutral
F2	Frost protection thermostat; terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation	SP	System potential AC/DC 24 V
F3	Thermal reset limit thermostat	U	Position feedback
F4	Frost protection monitor with 0…1000 Ω signal output, does **NOT** support QAF21.. or QAF61..	Y	Positioning signal
G	System potential (SP)	Y1, Y2	Positioning signals
G0	System neutral (SN)	Z	Positioning signal forced control
L	Phase	21	Spring return
M	Measuring neutral	+	Bus + (Modbus RTU)
N	Neutral	-	Bus - (Modbus RTU)
N1	Controller		

Dimensions

Actuators SAT.. with manual adjustment

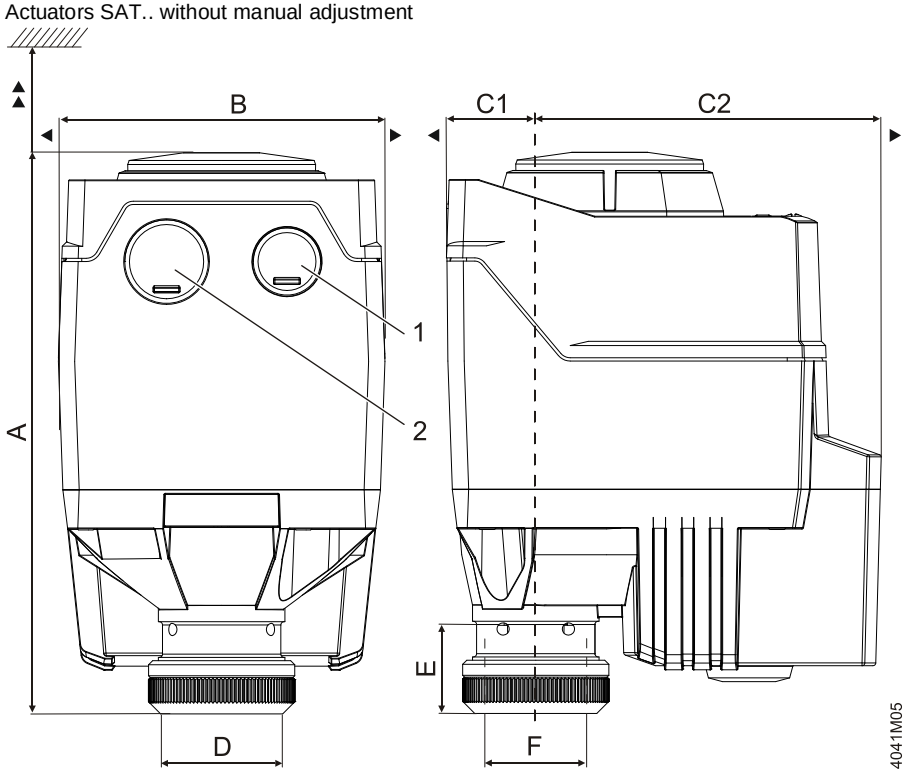


Type	A [mm]	B [mm]	C [mm]	C1 [mm]	C2 [mm]	D [mm]	E [mm]	F [inch]	► [mm]	►► [mm]	kg [kg]	1	2
SAT..	151	80	93	21.9	71.1	29.9	21.8	G ¾	100	200	0.4	M16 [2]	M20 [2]
SAT../MO [1]											0.55		
With ASK39.2	155	126	248	99	149						0.55		

[1] Device has fixed connection cable – left cable entry 2 occupied

[2] Thread length max. 9 mm

Actuators SAT.. without manual adjustment



Type	A [mm]	B [mm]	C [mm]	C1 [mm]	C2 [mm]	D [mm]	E [mm]	F [inch]	► [mm]	►► [mm]	kg [kg]	1	2
SAT..	137.6 [2]	80	106.5	21.9	84.6	29.9	21.8	G ¾	100	200	0.68	M16 [4]	M20 [4]
SAT../MO [1]	151 [3]										0.83		
With ASK39.2	155	126	248	99	149						0.83		

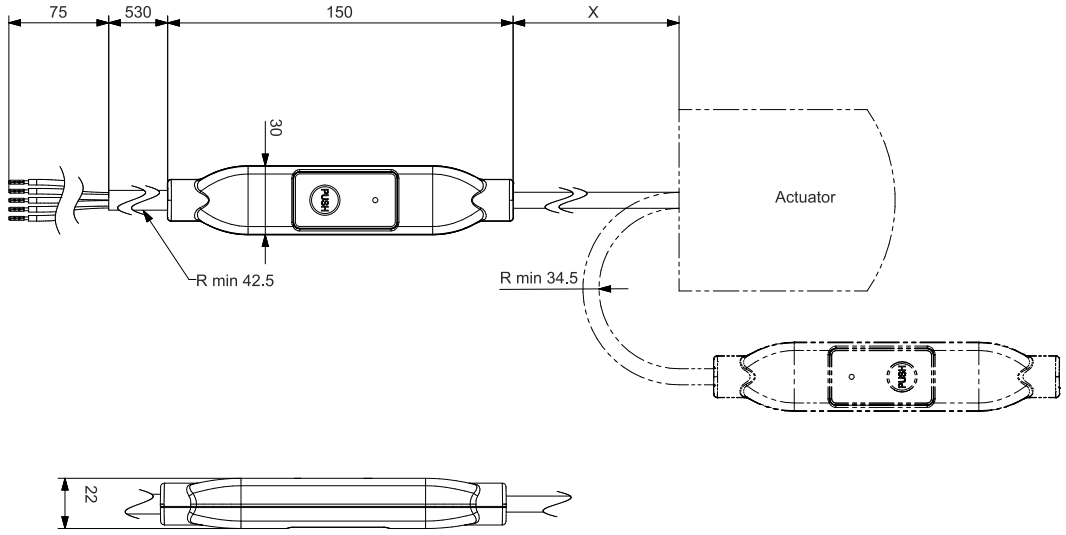
[1] Device has fixed connection cable – left cable entry occupied

[2] Black cover

[3] Blue handwheel

[4] Thread length max. 9 mm

External Modbus converter



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

1) Included in total weight

Dimensions in mm

Revision numbers

Type	Valid from rev. no.
SAT31.008	..B
SAT31.51	..B
SAT61.008	..B
SAT61.008/MO	..A
SAT61.51	..B
SAT61.51/MO	..A

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Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies

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