

ACVATIX™

## Electromotive actuators for valves

SAT..



### Electromotive actuators with 5.5 mm stroke and 300 N positioning 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 AC 24 V / DC 24 V, RS-485 for Modbus RTU communication
- For direct mounting on valves; no adjustments required
- Manual adjuster, position indicator and status indication per LED
- Optional functions with auxiliary switch

## Application

For the operation of Siemens 2-port and 3-port valves:

- Type series VVG549..
- 5.5 mm stroke

As control or shutoff valves in heating and ventilation systems.

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

## Functions

| Function   | Description  | Type                  |
|--|--|-----------------------|
| 3-position control                               | A 3-position signal drives the actuator via connection terminals Y1 or Y2. The desired position is transmitted to the valve.   | SAT31..               |
| Modulating control                               | The modulating positioning signal drives the actuator steplessly. The positioning signal range (DC 0...10 V / DC 4...20 mA / 0...1000 Ω) corresponds in a linear manner to the positioning range (fully closed...fully open, or 0...100 % stroke). | SAT61..               |
| Positioning signal and characteristic changeover | Setting the DIL switches.<br>Factory setting SAT...: <ul style="list-style-type: none"> <li>• Characteristic curve: lin = linear (switch at "ON")</li> <li>• Positioning signal: DC 0...10 V (switch at "OFF")</li> </ul>                          |                       |
| Position feedback U                              | Signal, returned to acquire the position via an input.   |                       |
| Forced control Z (Z mode)                        | Forced control serves for overriding automatic mode and is implemented in the structure.   |                       |
| Calibration                                      | Conduct during initial commissioning. The actuator deploys to the top and bottom end position; measured values are saved.  | SAT61..<br>SAT61../MO |
| Detection of valve seat                          | Actuators have power-dependent seat detection. After calibration, the exact valve stroke is filed in the actuator's memory.  |                       |
| Foreign body protection                          | After detection of clogging, 3 attempts are made to overcome clogging. If the attempts made are unsuccessful, the actuator continues to follow the positioning signal within the restricted range only (LED continues to blink red).               |                       |
| Modbus RTU (RS-485), not galvanically isolated   | Setpoint 0...100 % valve position<br>Actual value 0...100 % for valve position<br>Override control Open / Close / Min / Max / Stop<br>Setpoint monitoring and backup mode  | SAT61../MO            |

## Types

| Type         | Stock no.   | Operating voltage | Positioning signal                        | Power consumption          | Posit. time | Spring return function/time | Manual adjustment <sup>6)</sup> | Position feedback | Remark   |
|--------------|-------------|-------------------|---|----------------------------|-------------|-----------------------------|---------------------------------|-------------------|----------|
| SAT31.008    | S55158-A119 | AC 230 V          | 3-position                                | 5.0 / 2.5 VA <sup>4)</sup> | 8 s         | No                          | Yes                             | -                 | 2)       |
| SAT31.51     | S55158-A120 |                   |   | 5.5 / 3.2 VA <sup>4)</sup> | 15 s        | Yes / <8 s <sup>5)</sup>    | No                              |                   |          |
| SAT61.008    | S55158-A117 | AC/DC 24 V        | DC 0...10 V<br>DC 4...20 mA<br>0...1000 Ω | 7.1 / 4.6 VA <sup>4)</sup> | 8 s         | No                          | Yes                             | DC 0...10 V       | 1)<br>3) |
| SAT61.008/MO | S55158-A123 |                   | Modbus RTU                                |                            |             |                             |                                 | Modbus RTU        |          |
| SAT61.51     | S55158-A118 |                   | DC 0...10 V<br>DC 4...20 mA<br>0...1000 Ω | 6.4 / 4.8 VA <sup>4)</sup> | 15 s        | Yes / <8 s <sup>5)</sup>    | No                              | DC 0...10 V       |          |
| SAT61.51/MO  | S55158-A124 |                   | Modbus RTU                                |                            |             |                             |                                 | Modbus RTU        |          |

1) Cable gland: M16, M20 (ISO50262)

2) Approbation: CE

3) Approbation: CE and UL

4) Second value: Power consumption at normal position

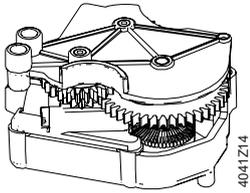
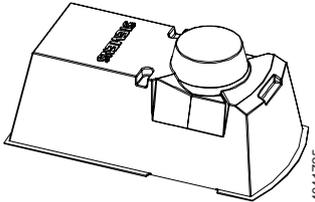
5) Spring return time at low temperature is slightly longer

6) Not designed for continuous operation.

## Delivery

Actuator, valve and accessories are packed and supplied as separate items.

## Accessories

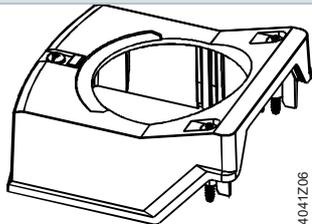
| Electric accessories  | Mechanical accessories   |
|---|--|
| Auxiliary switch<br>ASC10.51<br> | Weather shield<br>ASK39.2<br> |

## Ordering (Example)

| Type  | Stock no.   | Designation | Quantity |
|---|-------------|-------------|----------|
| SAT31.008   | S55158-A119 | Actuator    | 1        |
| + auxiliary components (connections, auxiliary switches · |             |             |          |

## Spare parts

| Stock no.   | Description   |
|-------------|---|
| S55845-Z180 | Type ASQ1: Housing cover with screws and light guides as component, without laser labelling |

| Stock no. | Description  |
|-----------|--|
|           |  |

## Compatibility

| Valves PN25                      |  |    |         |                     | Actuators SAT.. |                  |
|----------------------------------|--|----|---------|---------------------|-----------------|------------------|
| VVG549... (2-port)               |  | DN | G       | $k_{vs}$            | $\Delta p_s$    | $\Delta p_{max}$ |
| Medium: 1...130 °C <sup>1)</sup> |  |    | [Inch]  | [m <sup>3</sup> /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 <sup>2)</sup>       |  | 20 | G 1 B   | 4                   | 1600            |                  |
| VVG549.25-6.3K <sup>2)</sup>     |  | 25 | G 1 ¼ B | 6,3                 |                 |                  |

<sup>1)</sup> For a short time even up to +150 °C (up to 150 °C max. 6 of 24 hours)

<sup>2)</sup> Pressure compensated

## Product documentation

| Name   | Topic  | Document ID  |
|--|--|--------------|
| SAS.., SAT.. actuators for valves<br>Basic documentation | Detailed information about the SAS.. actuators   | CE1P4041en   |
| Electromotive actuators for valves<br>SAT..              | Data sheet:<br>Product description SAT..   | CE1N4584     |
| Electromotive actuators for valves SA...<br>Modbus RTU   | Data sheet:<br>Modbus communication profiles   | A6V101037195 |
| Mounting instructions G..161../MO and<br>S..6/MO         | Mounting instructions:<br>Mounting and installation instructions for Modbus<br>actuators   | A5W00027551  |
| Valve Actuator DIL Switch<br>Characteristic Overview     | Commissioning / Configuration:<br>Describes the characteristics of valve and actuator<br>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



## ⚠ 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 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

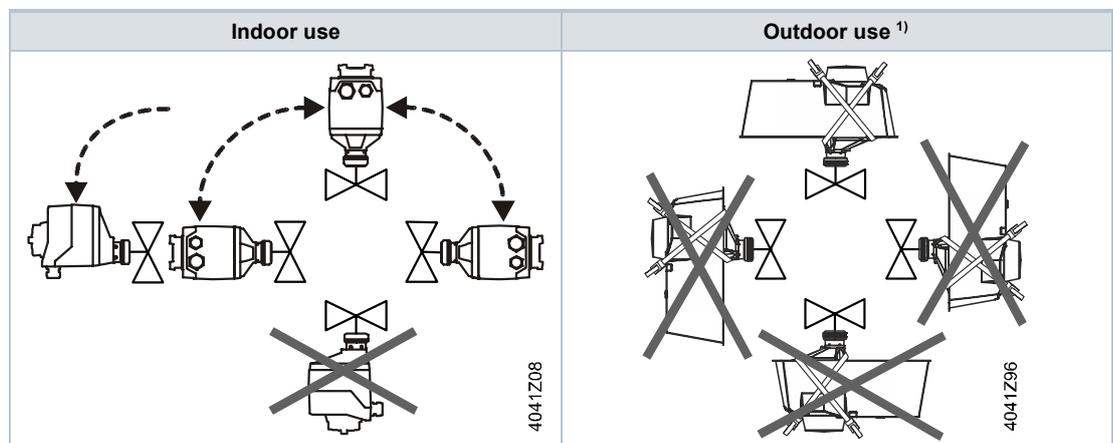
The Modbus converter is dimensioned for analog control at 0...10 V.

#### Notes

- Keep the analog signal setting on the actuator as is (switch 1 to Off); adjustment not possible.
- Set DIL switch (internal actuator characteristic changeover) to linear (switch 2 to On).
- Set Modbus register 263 "Y\_U\_Characteristic" to "0 = linear".

## Installation

### Mounting positions



<sup>1)</sup> Requires the weather shield ASK39.2. Degree of protection of housing IP54 remains unchanged.

## Maintenance

The SAT.. actuators are maintenance-free.

Mounting:

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

The actuator must be correctly fitted to the valve before recommissioning.

## Disposal



### **WARNING**

#### **Tensioned return spring**

Opening the actuator housing can release the tensioned return spring resulting in flying parts that may cause injury.

- Do not open the actuator body.



The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive 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

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 supply                         |          |  |
|--------------------------------------|----------|--|
| Operating voltage                    | SAT31..  | AC 230 V (±15 %)   |
|                                      | SAT61..  | AC 24 V ± 20 % / DC 24 V +20 % / -15 % <sup>1) 2)</sup> or<br>AC 24 V class 2 (US)   |
| Frequency                            |          | 45...65 Hz   |
| External supply line protection (EU) |          | Fuse slow 6 A...10 A or fuse switch max. 13 A, release characteristic B,C,D per EN 60898 power source with current limitation of max. 10 A |
| Power consumption                    | at 50 Hz | See "Type summary"; stem retracts/extends  |

| Function data                       |              |  |
|-------------------------------------|--------------|--|
| Positioning time for nominal stroke | SAT..008     | 8 s  |
|                                     | SAT..51      | 15 s   |
| Positioning force                   |              | 300 N  |
| Nominal stroke                      |              | 5.5 mm   |
| Permissible medium temperature      | valve fitted | 1...130 °C<br>for a short time even up to +150 °C<br>(up to 150 °C max. 6 of 24 hours) |

| Communication SAT61../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  |

| Signal inputs        |                        |   |                    |
|----------------------|------------------------|---|--------------------|
| Y positioning signal | SAT31..                | 3-position                              |                    |
|                      | 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                                 |                    |

| Parallel operation |         |                                     |
|--------------------|---------|-------------------------------------|
|                    | SAT61.. | ≤ 10 (depends on controller output) |

| Forced control Z     |                   |  |
|----------------------|-------------------|--|
| Positioning signal Z | 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 % /<br>Max. DC 24 V +20 % / -15 % |
|                      | Current draw      | ≤ 0.1 mA   |

| Position feedback |                       |              |
|-------------------|-----------------------|--------------|
| U                 | Voltage range SAT61.. | DC 0...10 V  |
|                   | Load impedance        | > 10 kΩ res. |
|                   | Load                  | max. 1 mA    |

| Connecting cable           |                        |  |
|----------------------------|------------------------|--|
| Wire cross-sectional areas |                        | 0.75...1.5 mm <sup>2</sup> , AWG 20...16 <sup>1)</sup>                               |
| Cable inputs               | SAT.. (EU)             | 1 entry Ø 16.4 mm (for M16)<br>1 entry Ø 20.5 mm (for M20)<br>Thread length max. 9mm |
|                            | SAT61../MO             |  |
|                            | Fixed connecting cable | 0.9 m  |
|                            | Number of cores        | 5 x 0.75 mm <sup>2</sup>   |

| Degree of protection |                              |                    |
|----------------------|------------------------------|--------------------|
| Housing              |                              | IP 54 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                |                          | IEC 60721-3-3                   |
|                          | Climatic conditions      | class 3K5                       |
|                          | Mounting location        | Indoors, outdoors <sup>2)</sup> |
|                          | Temperature general      | -5...55 °C                      |
|                          | Humidity (noncondensing) | 5...95 % r. h.                  |
| Transport                |                          | IEC 60721-3-2                   |
|                          | Climatic conditions      | class 2K3                       |
|                          | Temperature              | -25...70 °C                     |
|                          | Humidity                 | <95 % r. F.                     |
| Storage                  |                          | 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 environments                                  |
| EU conformity (CE)                           |              | CE1T4584xx <sup>3)</sup><br>(8000073403)   |
| RCM conformity                               |              | CE1T4584en_C1 <sup>3)</sup><br>(8000069922)  |
| UL, cUL                                      | AC / DC 24 V | UL 873 <a href="http://ul.com/database">http://ul.com/database</a><br>File number E35198 |
| EAC conformity                               |              | Eurasia conformity for all SAT variants  |

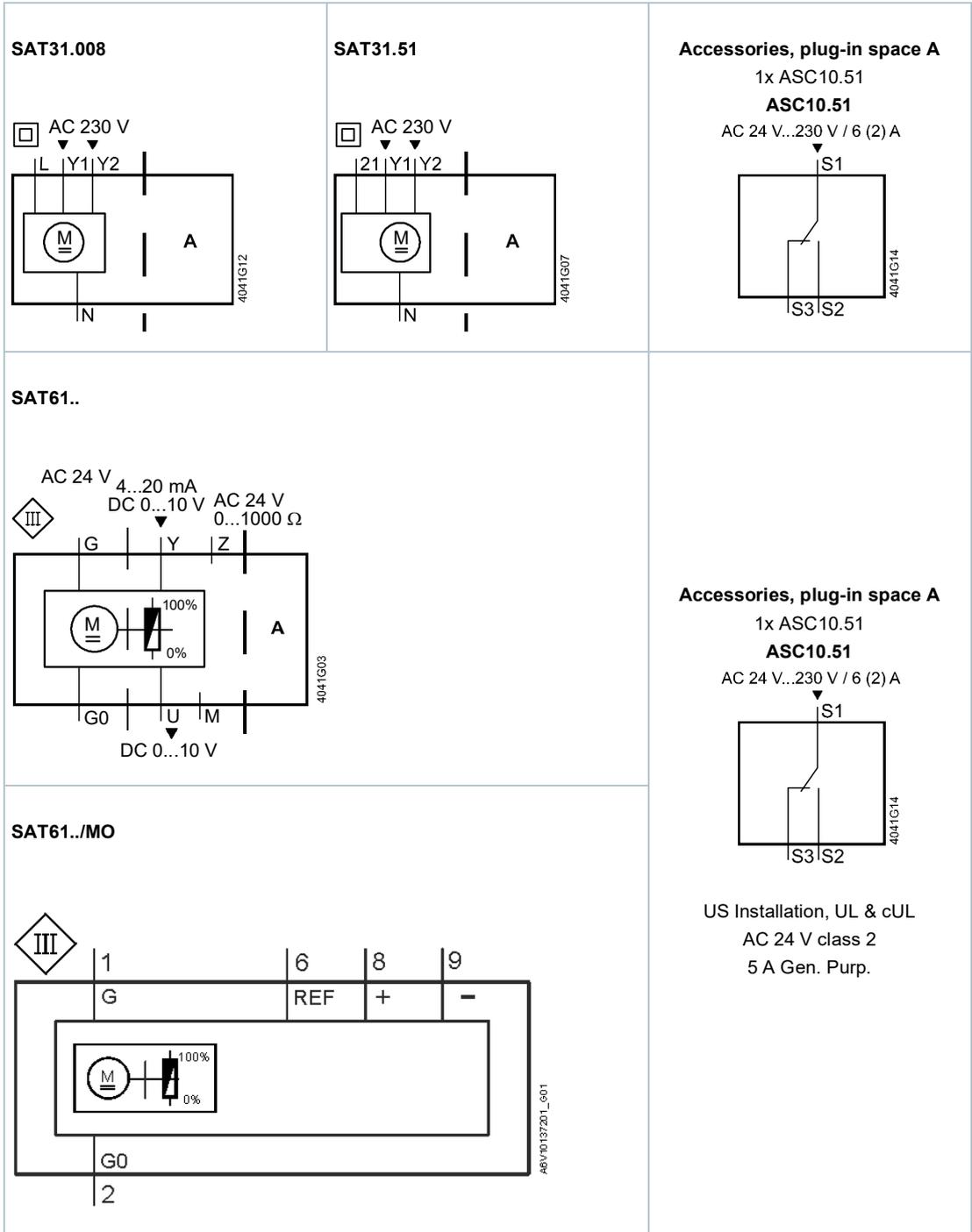
| Environmental compatibility  |
|--|
| Environmental declaration CE1E4584en <sup>3)</sup> and A6V101083254 <sup>3)</sup> contain data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal) |

| Dimensions / Weight   |
|-----------------------|
| Refer to "Dimensions" |

| Accessories <sup>4)</sup> |                                 |  |
|---------------------------|---------------------------------|--|
| Auxiliary switch ASC10.51 | Switching capacity              | AC 24...230 V, 6 (2) A, potential free |
|                           | External supply line protection | See section power supply               |
|                           | US Installation, UL & cUL       | AC 24 V class 2, 5 A general purpose   |

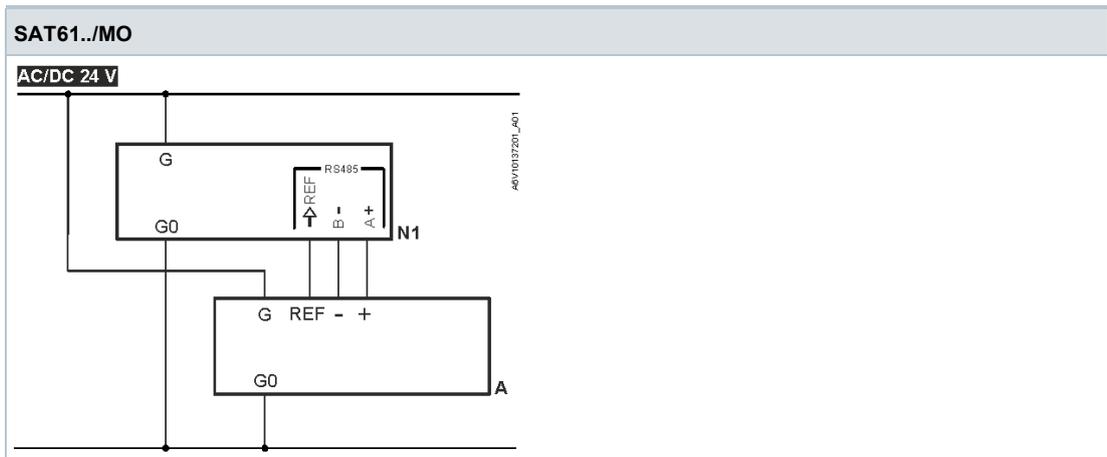
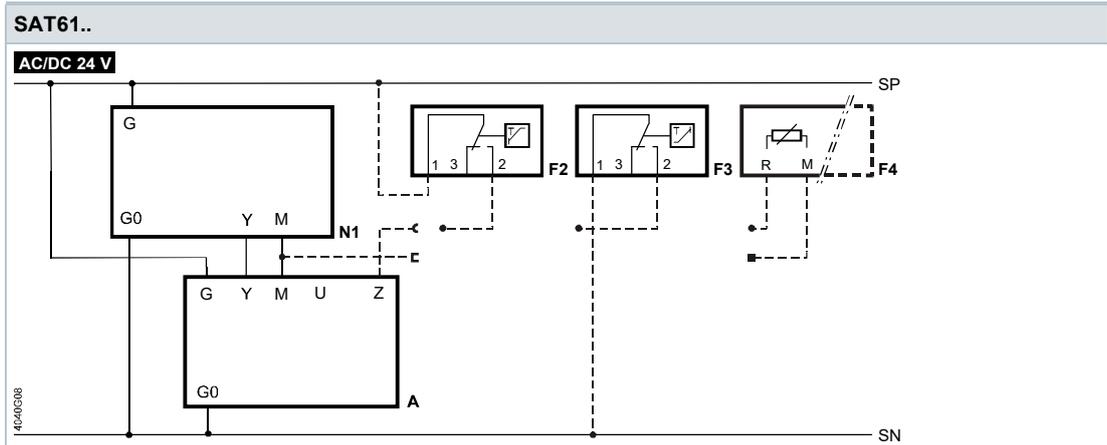
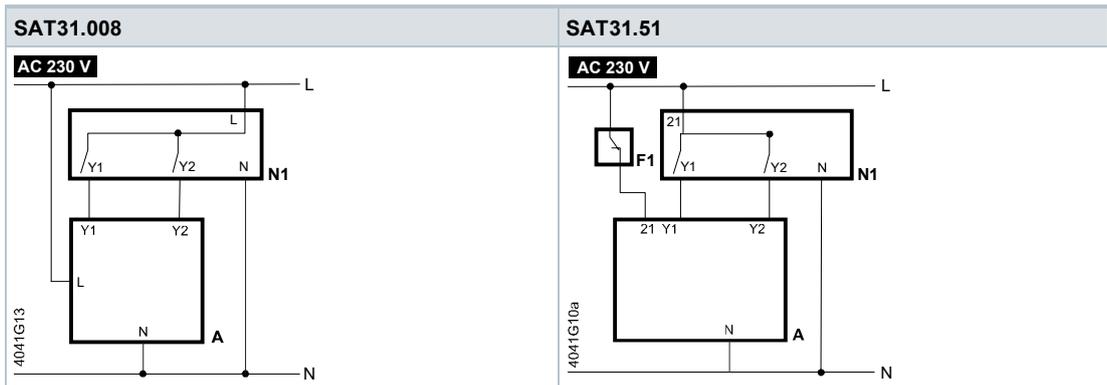
- 1) AWG = American wire gauge.  
Wire cross-sectional areas and fuses have to be matched, which is the responsibility of the planner/installer. Observe standard on protection measures – Protection against overcurrent: IEC 60364-4-43:2008 or German adoption HD 60364-4-43:2010.
- 2) Outdoors use only with weather shield ASK39.2, degree of protection of housing IP 54 remains unchanged
- 3) The documents can be downloaded at the Internet address, see Section 'Product documentation'.
- 4)  UL recognized component

Internal diagrams



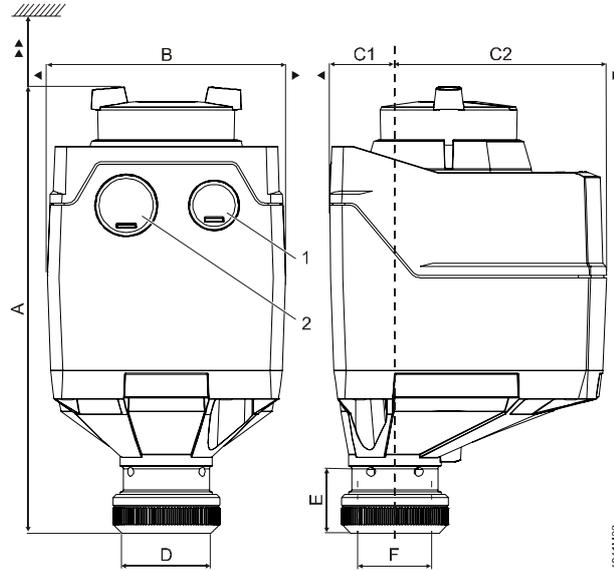


## Connection diagrams



|    |  |        |                                   |
|----|--|--------|-----------------------------------|
| A  | Actuator   | REF    | Referenz (Modbus RTU)             |
| F1 | Temperature limiter  | SN     | System neutral                    |
| F2 | Frost protection thermostat; terminals:<br>1 – 2 Frost hazard/sensor is off (thermostat closes for frost)<br>1 – 3 normal mode | 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 <b>NOT</b> 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     | Fail safe function                |
| M  | Measuring neutral  | +      | Bus + (Modbus RTU)                |
| N  | Neutral  | -      | Bus - (Modbus RTU)                |
| N1 | Controller   |        |                                   |

**Actuators SAT.. with manual adjuster**

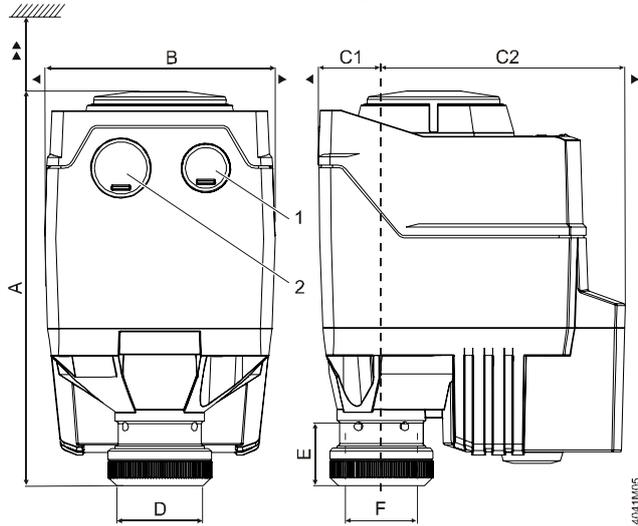


| Type                   | A [mm] | B [mm] | C [mm] | C1 [mm] | C2 [mm] | D [mm] | E [mm] | F [Inch] | ▶ [mm] | ▶▶ [mm] | kg   | 1                 | 2                 |
|------------------------|--------|--------|--------|---------|---------|--------|--------|----------|--------|---------|------|-------------------|-------------------|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

1) Device contains fixed connecting cable – left cable duct used

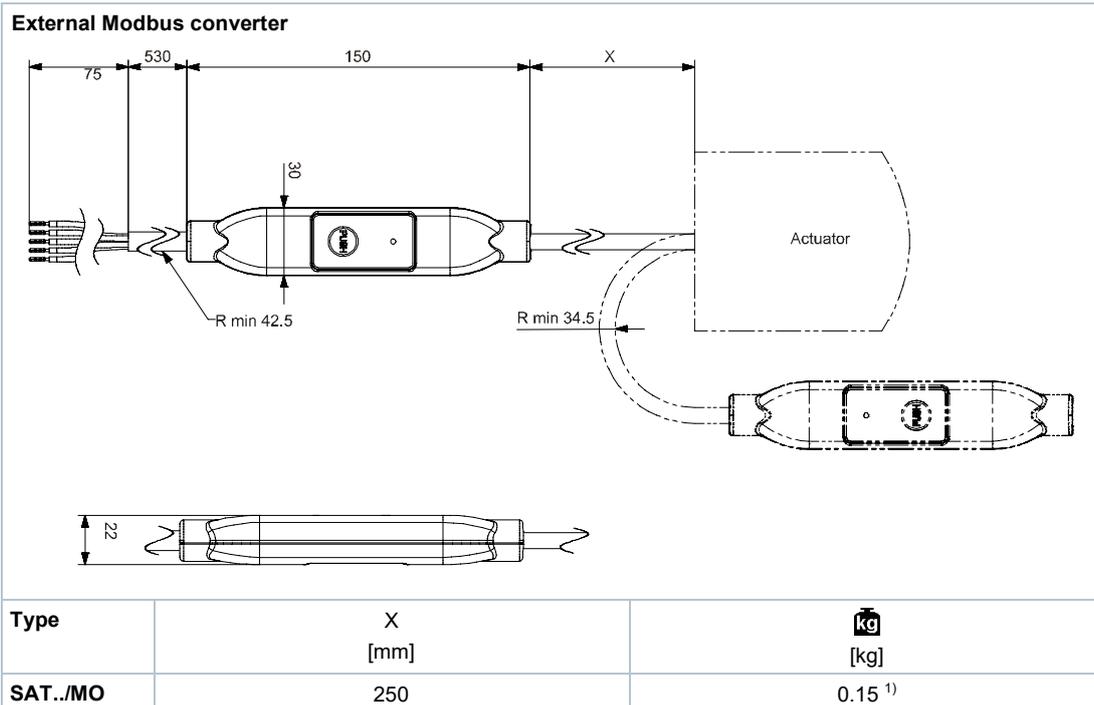
2) Thread length max. 9 mm

**Actuators SAT.. without manual adjuster**



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

- 1) Device contains fixed connecting cable – left cable duct used
- 2) Black cover
- 3) Blue manual adjuster
- 4) Thread length max. 9 mm



- 1) Included in total weight.

## 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                 |