



ACVATIX™

## Electromotive actuators for valves **SAX..**

with a 20 mm stroke

- **SAX31..** Operating voltage AC 230 V, 3-position control signal
- **SAX61..** Operating voltage AC/DC 24 V, control signal DC 0...10 V, 4...20 mA
- **SAX81..** Operating voltage AC/DC 24 V, 3-position control signal
- **SAX61..** Position feedback, override control, changeover of flow characteristic
- **SAX61../MO** Operating voltage AC/DC 24 V, RS485 for Modbus RTU communication
- For direct mounting on valves, no adjustment required
- Manual adjuster, position indicator and status indication (LED)
- Optional functional extension using auxiliary switches, potentiometer, function module, stem heating element

### Use

To operate Siemens 2-port and 3-port valves, types V..F21..., V..F22..., V..F31..., V..F32..., V..F40..., V..F41..., V..G41..., V..F42..., VVF52.. and V..F53.. with 20 mm stroke as control and safety shutoff valves in heating, ventilation and air conditioning plants.

## Type summary

| Type                  | Stock no.                       | Stroke | Pos. force | Operating voltage | Pos. signal                               | Spr.. ret. time | Pos. time | LED | Manual adjuster | Extra functions                                                       |
|-----------------------|---------------------------------|--------|------------|-------------------|-------------------------------------------|-----------------|-----------|-----|-----------------|-----------------------------------------------------------------------|
| SAX31.00              | S55150-A105                     | 20 mm  | 800 N      | AC 230 V          | 3-Punkt                                   | -               | 120 s     | -   | Press and fix   | -                                                                     |
| SAX31.03              | S55150-A106                     |        |            | AC/DC 24 V        | DC 0...10 V<br>DC 4...20 mA<br>0...1000 Ω |                 | 30 s      | ✓   |                 | Position feedback, forced control, changeover of characteristic curve |
| SAX61.03<br>SAX61.03U | S55150-A100<br>S55150-A100-A100 |        |            |                   |                                           |                 |           |     |                 | Position feedback, forced control                                     |
| SAX61.03/MO           | S55150-A140                     |        |            |                   |                                           |                 |           |     |                 |                                                                       |
| SAX81.00              | S55150-A102                     |        |            |                   | 3-Punkt                                   |                 | 120 s     | -   |                 | -                                                                     |
| SAX81.03<br>SAX81.03U | S55150-A103<br>S55150-A103-A100 |        |            |                   |                                           |                 | 30 s      |     |                 |                                                                       |

## Electrical accessories

| Product no.       | Auxiliary switch<br><b>ASC10.51</b> | Potentiometer<br><b>ASZ7.5</b> | Function module<br><b>AZX61.1</b> | Stem heating element<br><b>ASZ6.6</b> |
|-------------------|-------------------------------------|--------------------------------|-----------------------------------|---------------------------------------|
| Stock number      | S55845-Z103                         | S55845-Z106                    | S55845-Z107                       | S55845-Z108                           |
|                   | Max. 2                              |                                |                                   | Max. 1                                |
| <b>SAX31..</b>    | Max. 2                              | Max. 1                         | -                                 | Max. 1                                |
| <b>SAX61..</b>    | Max. 2                              | -                              | Max. 1 AZX61.1                    |                                       |
| <b>SAX61../MO</b> |                                     | -                              |                                   |                                       |
| <b>SAX81..</b>    |                                     | Max. 1                         | -                                 |                                       |

Note: ASZ7.5

For the combination SIMATIC S5/S7 and position feedback message, we recommend actuators with DC 0...9.8 V feedback signals.

The signal peaks that occur in the potentiometer ASZ7.5 may result in error messages on Siemens SIMATIC.

This is not the case when combined with Siemens HVAC controllers.

The reason is that SIMATIC has a higher resolution and faster response time.

## Mechanical accessories

Weather shield ASK39.1<sup>1)</sup>

<sup>1)</sup> SAX61../MO is not suitable for exterior application

## Ordering

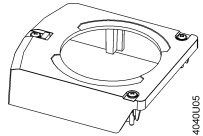
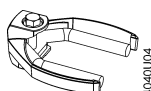
### Example

| Product no. | Stock no.   | Description   | Quantity |
|-------------|-------------|---------------|----------|
| SAX81.03    | S55150-A103 | Actuator      | 1        |
| ASZ7.5      | S55845-Z106 | Potentiometer | 1        |

### Delivery

Actuators, valves and accessories are supplied in individual packs.

### Spare parts

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

## Product documentation

| Title                                                        | Contents                                                                            | Document ID   |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------|
| Position actuators SAX..., SAY..., SAV..., SAL... for valves | Basic documentation:<br>Comprehensive information on new generation actuators SAX.. | CE1P4040_01en |
| Electromotive actuators for valves SAX..                     | Data sheet:<br>Product description SAX..                                            | CE1N4501      |
| Electromotive actuators for valves SA..., Modbus RTU         | Data sheet:<br>Communication profile Modbus                                         | A6V101037195  |
| Mounting instructions S..6../MO and G..161../MO              | Mounting instructions:<br>Mounting and installation instructions                    | A5W00027551   |

The documents, to include related documents such as environmental declarations, CE declaration, etc. are available for download from the following Internet address:  
<http://siemens.com/bt/download>

## Equipment combinations

| Type reference                                                                                                                                                        |        | DN      | PN class | $k_{vs}$<br>[m <sup>3</sup> /h] | Data sheet |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|----------|---------------------------------|------------|
|  <b>2-port valves VV.. (control or safety shutoff valves)</b>                      |        |         |          |                                 |            |
| VVF21..                                                                                                                                                               | Flange | 25...80 | 6        | 1.9...100                       | N4310      |
| VVF22..                                                                                                                                                               | Flange | 25...80 | 6        | 2.5...100                       | N4401      |
| VVF31..                                                                                                                                                               | Flange | 15...80 | 10       | 2.5...100                       | N4320      |
| VVF32..                                                                                                                                                               | Flange | 15...80 | 10       | 1,6...100                       | N4402      |
| VVF40..                                                                                                                                                               | Flange | 15...80 | 16       | 1.9...100                       | N4330      |
| VVF41..                                                                                                                                                               | Flange | 50      |          | 19 / 31                         | N4340      |
| VVF42..                                                                                                                                                               | Flange | 15...80 |          | 1,6...100                       | N4403      |
| VVF42..K                                                                                                                                                              | Flange | 50...80 |          | 40...100                        |            |
| VVG41..                                                                                                                                                               | Thread | 15...50 | 25       | 0.63...40                       | N4363      |
| VVF52..                                                                                                                                                               | Flange | 15...40 |          | 0.16...25                       | N4373      |
| VVF53..                                                                                                                                                               | Flange | 15...50 |          | 0.16...40                       | N4405      |
|  <b>3-port valves VX.. (control valves for "mixing" and "diverting" functions)</b> |        |         |          |                                 |            |
| VXF21..                                                                                                                                                               | Flange | 25...80 | 6        | 1.9...100                       | N4410      |
| VXF22..                                                                                                                                                               | Flange | 25...80 | 6        | 2.5...100                       | N4401      |
| VXF31..                                                                                                                                                               | Flange | 15...80 | 10       | 2.5...100                       | N4420      |
| VXF32..                                                                                                                                                               | Flange | 15...80 | 10       | 1,6...100                       | N4402      |
| VXF40..                                                                                                                                                               | Flange | 15...80 | 16       | 1.9...100                       | N4430      |
| VXF41..                                                                                                                                                               | Flange | 15...50 |          | 1.9...31                        | N4440      |
| VXF42..                                                                                                                                                               | Flange | 15...80 |          | 1,6...100                       | N4403      |
| VXG41..                                                                                                                                                               | Thread | 15...50 |          | 1,6...40                        | N4463      |
| VXF53..                                                                                                                                                               | Flange | 15...50 | 25       | 1,6...40                        | N4405      |

## Notes

### Engineering

SAX31.. and SAX81..

3-position actuators must have their own specific controller, refer to "Connection diagrams" (page 9).

SAX61..

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.

SAX61../MO

The Modbus converter is designed for analog control on 0..10 V on the actuator side.

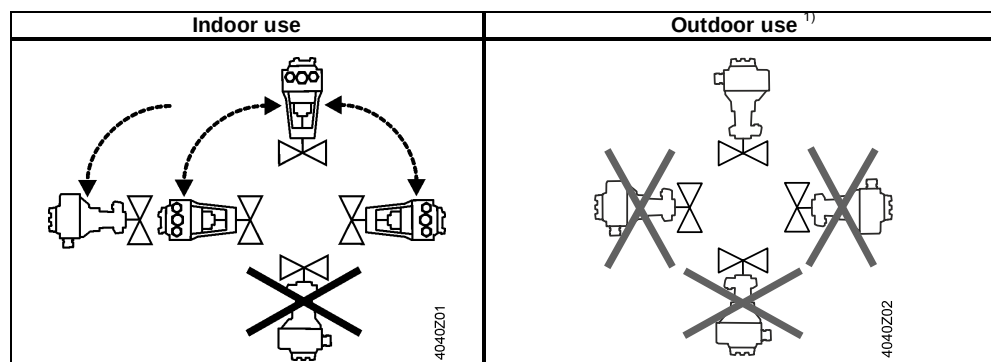
**Note:** Keep the setting of the analog signal on the actuator as is (switch 1 to "OFF"), adjustment is not allowed.

The actuators are factory-set to equal-percentage characteristic curve.

**Note:** The DIL switch (actuator-internal changeover of characteristic curve) must be set to "log" (switch 2 to "OFF").

### Mounting

Mounting positions



<sup>1)</sup> Only together with weather shield ASK39.1  
SAX61../MO is not suitable for outdoor use.

## Maintenance

The actuators are maintenance-free.

## Disposal



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

The engineering data specified in "Equipment combinations" (page 3) are only guaranteed in combination with the Siemens valves listed.

### Note

**When using the actuators together with valves by other manufacturers, users are required to ensure correct functioning, and Siemens will assume no responsibility.**

## Technical data

|                                         |                                                                                                                                                                                                                                                                                                                                                                                          | SAX..                                                                                                                                                                                                                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply                            | Operating voltage<br>SAX31..<br>SAX61..<br>SAX81..                                                                                                                                                                                                                                                                                                                                       | AC 230 V ±15%<br>AC 24 V ± 20% / DC 24 V + 20% / -15% (SELV)<br>AC 24 V ±20% / DC 24 V + 20 % / -15% (SELV)                                                                                                                           |
|                                         | External supply line protection (EU)                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Fuse slow 6...10 A</li> <li>Circuit breaker max. 13 A, Characteristic B, C, D according to EN 60898</li> <li>Power source with current limitation of max. 10 A</li> </ul>                      |
|                                         | Power consumption at 50 Hz<br>SAX31.00                      Stem retracts / extends<br>SAX31.03                      Stem retracts / extends<br>SAX61.03..                   Stem retracts / extends<br>SAX61.03/MO                Stem retracts / extends<br>SAX81.00..                   Stem retracts / extends<br>SAX81.03..                   Stem retracts / extends               | 3.5 VA / 2 W<br>6 VA / 3.5 W<br>8 VA / 3.75 W<br>8.7 VA / 4.25 W<br>3.5 VA / 2.25 W<br>5 VA / 3.75 W                                                                                                                                  |
| Function data                           | Positioning times (with the specified nominal stroke)<br>The positioning time can vary, depending on the type of valve -> refer chapter "Type summary" (page 2)<br>SAX31.00, SAX81.00..<br>SAX31.03, SAX61.03.., SAX81.03..<br>Positioning force<br>Nominal stroke<br>Working stroke area the actuator is able to calibrate<br>Permissible medium temperature (valve fitted)             | 120 s<br>30 s<br>800 N<br>20 mm<br>6 .. 24 mm<br>-25°...130 °C                                                                                                                                                                        |
| Signal inputs                           | Y1 / Y2<br>SAX31.., SAX81..<br>SAX31..                      Voltage<br>SAX81..                      Voltage<br>Y-positioning signal<br>SAX61.. (DC 0...10 V)                      Current draw<br>SAX61.. (DC 4...20 mA)                      Input impedance<br>SAX61.. (DC 4...20 mA)                      Current draw<br>SAX61.. (DC 4...20 mA)                      Input impedance | 3-position<br>AC 230 V ± 15 %<br>AC 24 V ± 20 % / DC 24 V + 20 % / - 15%<br>≤ 0,1 mA<br>≥ 100 kΩ<br>DC 4...20 mA ± 1 %<br>≤ 500 Ω                                                                                                     |
| Communication<br>Communication protocol | Modbus RTU<br>Number of nodes<br>Address range<br>Transmission formats<br>Baud rates (kbaud)                                                                                                                                                                                                                                                                                             | RS-485, not galvanically isolated<br>Max. 32<br>1...247 / 255<br>Factory setting: 255<br>1-8-E-1 / 1-8-O-1 / 1-8-N-1 / 1-8-N-2<br>Factory setting: 1-8-E-1<br>Auto / 9.6 / 19.2 / 38.4 / 57.6 / 76.8 / 115.2<br>Factory setting: Auto |
| Parallel operation                      | SAX61..                                                                                                                                                                                                                                                                                                                                                                                  | ≤ 10 (depending on controller output)                                                                                                                                                                                                 |
| Forced control                          | Positioning signal "Z"<br>SAX61..<br>R = 0...1000 Ω<br>Z connected to G<br>Z connected to G0<br>Voltage<br>Current draw                                                                                                                                                                                                                                                                  | R = 0...1000 Ω, G, G0<br>Stroke proportional to R<br>Max. stroke 100% <sup>1)</sup><br>Min. stroke 0% <sup>1)</sup><br>Max. AC 24 V ± 20%<br>Max. DC 24 V + 20% / -15%<br>≤ 0.1 mA                                                    |
| Position feedback                       | Position feedback U<br>SAX61..<br>Load impedance<br>Load                                                                                                                                                                                                                                                                                                                                 | DC 0...10 V<br>>10 kΩ res.<br>Max. 1 mA                                                                                                                                                                                               |
| Connecting cable                        | Wire cross-sectional areas                                                                                                                                                                                                                                                                                                                                                               | 0.13...1.5 mm <sup>2</sup> , AWG 24...16 <sup>2)</sup>                                                                                                                                                                                |
|                                         | Cable entries<br>SAX..<br>SAX..U<br>SAX61../MO                                                                                                                                                                                                                                                                                                                                           | EU: 2 entries Ø 20.5 mm (for M20)<br>1 entry Ø 25.5 mm (for M25)<br>US: 3 entries Ø 21.5 mm for ½" tube connection<br>Fixed connecting cable 0.9 m<br>Number of cores 5 x 0.75 mm <sup>2</sup>                                        |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                       |
| Degree of protection                    | Housing from vertical to horizontal (see "Mounting")                                                                                                                                                                                                                                                                                                                                     | IP54 as per EN 60529 <sup>3)</sup>                                                                                                                                                                                                    |
|                                         | Insulation class<br>Actuators SAX31..                      AC 230 V<br>Actuators SAX61..                      AC / DC 24 V<br>Actuators SAX81..                      AC / DC 24 V                                                                                                                                                                                                        | As per EN 60730<br>II<br>III<br>III                                                                                                                                                                                                   |
| Environmental conditions                | Operation<br>Climatic conditions<br>Mounting location<br>Temperature General<br>Humidity (noncondensing)                                                                                                                                                                                                                                                                                 | IEC 60721-3-3<br>Class 3K5<br>Indoors (weather-protected) <sup>3)</sup><br>-5...<55 °C<br>5...95% r.h.                                                                                                                                |

|                             |                                                                                                                                                                                                                                                                   | SAX..                                                                                                                      |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
|                             | Transport<br>Climatic conditions<br>Temperature<br>Humidity                                                                                                                                                                                                       | IEC 60721-3-2<br>Class 2K3<br>-25...70 °C<br><95% r.h.                                                                     |
|                             | Storage<br>Climatic conditions<br>Temperature<br>Humidity                                                                                                                                                                                                         | IEC 60721-3-1<br>Class 1K3<br>-15...55 °C<br>5...95% r.h.                                                                  |
|                             | Max. media temperatur when mounted on valve                                                                                                                                                                                                                       | 130 °C                                                                                                                     |
| Standards and directives    | Product standard                                                                                                                                                                                                                                                  | EN 60730-x                                                                                                                 |
|                             | Electromagnetic compatibility (application)                                                                                                                                                                                                                       | For residential, commercial and industrial environments                                                                    |
|                             | EU conformity (CE)                                                                                                                                                                                                                                                | CE1T4501X1 <sup>4)</sup>                                                                                                   |
|                             | RCM conformity                                                                                                                                                                                                                                                    | CE1T4515X4 <sup>4)</sup>                                                                                                   |
|                             | EAC conformity                                                                                                                                                                                                                                                    | Eurasian conformity for all SAX..                                                                                          |
|                             | UL, cUL<br>AC 230 V<br>AC/DC 24 V                                                                                                                                                                                                                                 | -<br>UL 873 <a href="http://ul.com/database">http://ul.com/database</a>                                                    |
| Environmental compatibility | The product environmental declarations 7173310559Ben <sup>4)</sup> and A6V101083254 <sup>4)</sup> contain data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal). |                                                                                                                            |
| Dimensions                  |                                                                                                                                                                                                                                                                   | See "Dimensions" (page 10)                                                                                                 |
| Accessories <sup>5)</sup>   | Potentiometer ASZ7.5<br>Voltage<br>Current rating                                                                                                                                                                                                                 | 0...1000 Ω ± 5%<br>DC 10 V<br><4 mA                                                                                        |
|                             | Auxiliary switch ASC10.51<br>External supply line protection<br>US Installation, UL & cUL                                                                                                                                                                         | Switching capacity<br>AC 24...230 V, 6 (2) A, potential-free<br>See "Power supply"<br>AC 24 V class 2, 5 A general purpose |
|                             | Stem heating element ASZ6.6<br>Power supply<br>Power consumption<br>Inrush current (cold)                                                                                                                                                                         | AC/DC 24 V, ± 20%<br>40 VA / 30 W<br>Max. 8,5 A (max. temperature 85 °C / 185 F)                                           |
|                             |                                                                                                                                                                                                                                                                   |                                                                                                                            |

<sup>1)</sup> Note the direction of control action of the DIL switch

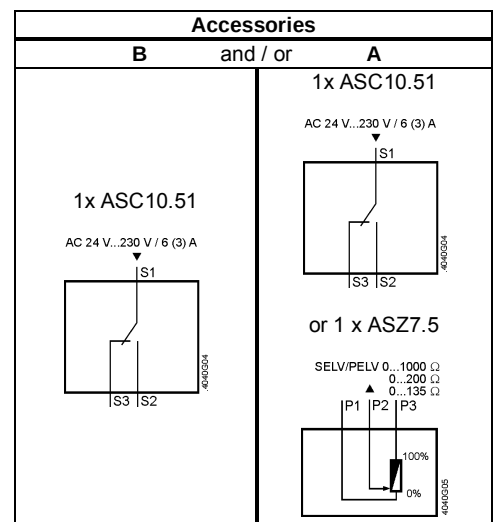
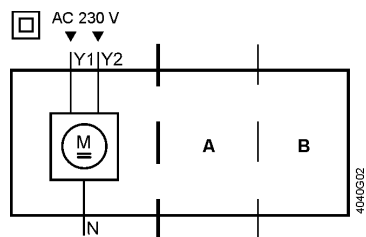
<sup>2)</sup> AWG = American wire gauge

<sup>3)</sup> Always together with weather shield ASK39.1 for outdoor use, housing IP protection IP 54 as is SAX61../MO is not suitable for outdoor use.

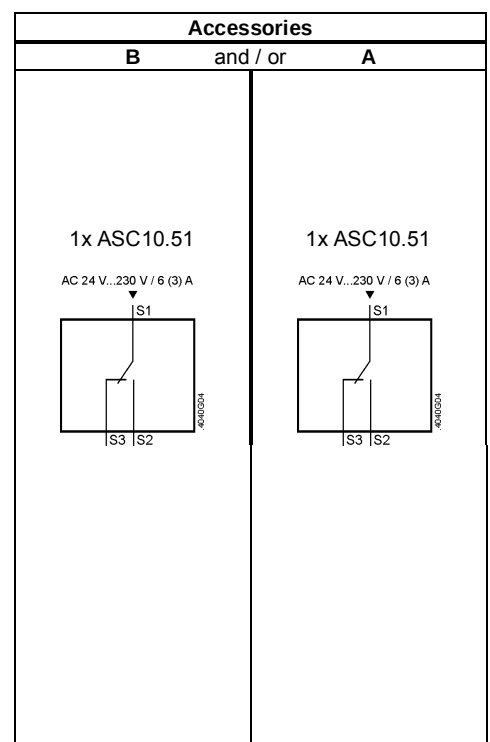
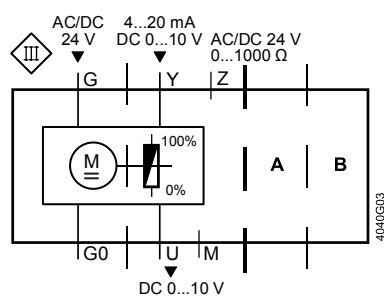
<sup>4)</sup> Documents available at <http://www.siemens.com/bt/download>

<sup>5)</sup> UL recognized component 

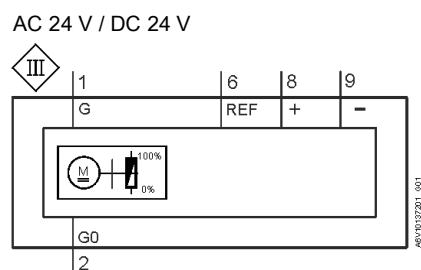
## SAX31..



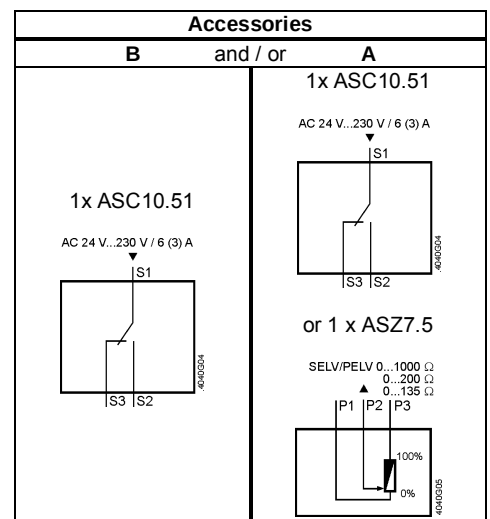
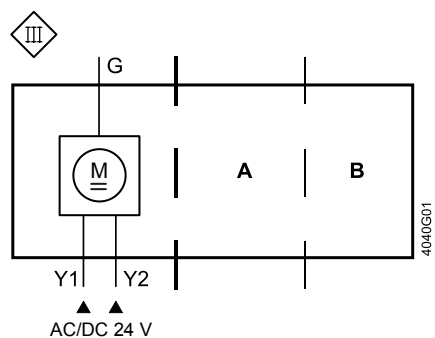
SAX61..



SAX61../MO



SAX81..



## Connection terminals

SAX31..

AC 230 V, 3-position

|           |                                               |
|-----------|-----------------------------------------------|
| <b>N</b>  | System neutral (SN)                           |
| <b>Y1</b> | Positioning signal (actuator's stem extends)  |
| <b>Y2</b> | Positioning signal (actuator's stem retracts) |

SAX61..

AC/DC 24 V, DC 0...10 V / 4...20 mA / 0...1000 Ω

|           |                                                                              |
|-----------|------------------------------------------------------------------------------|
| <b>G0</b> | System neutral (SN)                                                          |
| <b>G</b>  | System potential (SP)                                                        |
| <b>Y</b>  | Positioning signal for DC 0...10 V / 4...20 mA                               |
| <b>M</b>  | Measuring neutral                                                            |
| <b>U</b>  | Position feedback DC 0...10 V - (reference potential is M measuring neutral) |
| <b>Z</b>  | Positioning signal forced control                                            |

SAX61../MO,  
Fixed connecting cable  
5 x 0.75 mm<sup>2</sup>

AC/DC 24 V, Modbus RTU

|            |                                             |        |
|------------|---------------------------------------------|--------|
| <b>G0</b>  | System neutral (SN)                         | black  |
| <b>G</b>   | System potential (SP) AC 24 V ~ / DC 24 V = | red    |
| <b>REF</b> | Reference (Modbus RTU)                      | purple |
| <b>+</b>   | Bus + (Modbus RTU)                          | gray   |
| <b>-</b>   | Bus - (Modbus RTU)                          | rose   |

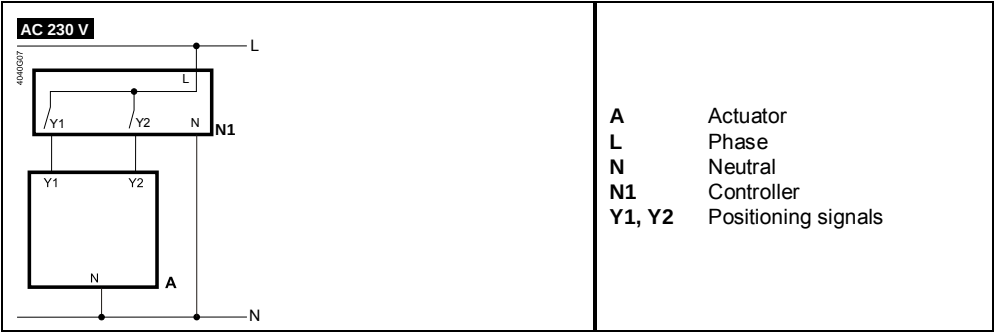
SAX81..

AC/DC 24 V, 3-position

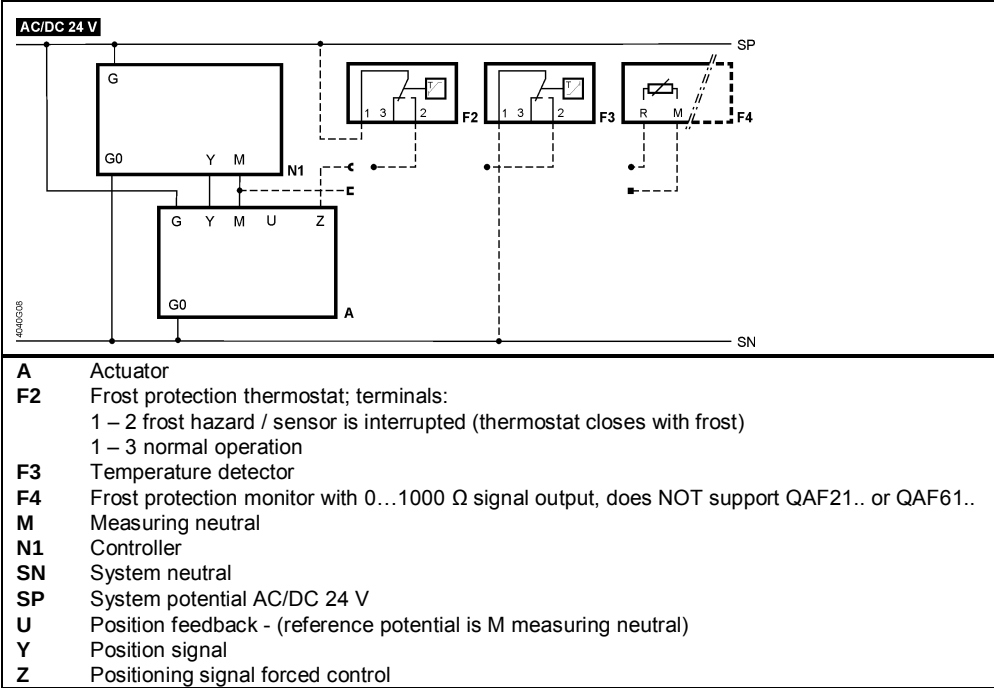
|           |                                               |
|-----------|-----------------------------------------------|
| <b>G</b>  | System potential (SP)                         |
| <b>Y1</b> | Positioning signal (actuator's stem extends)  |
| <b>Y2</b> | Positioning signal (actuator's stem retracts) |



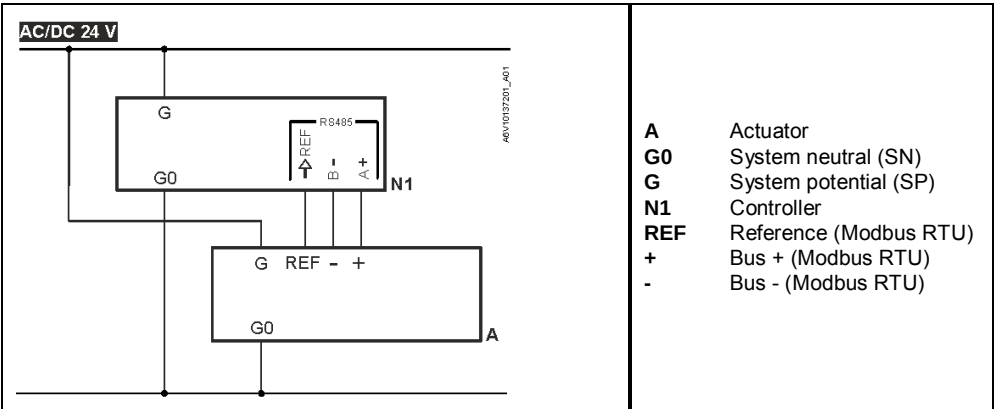
Connection diagrams  
SAX31..



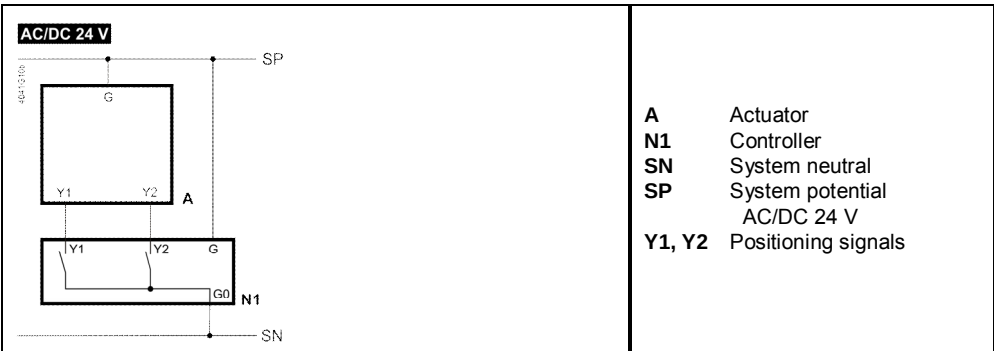
SAX61..



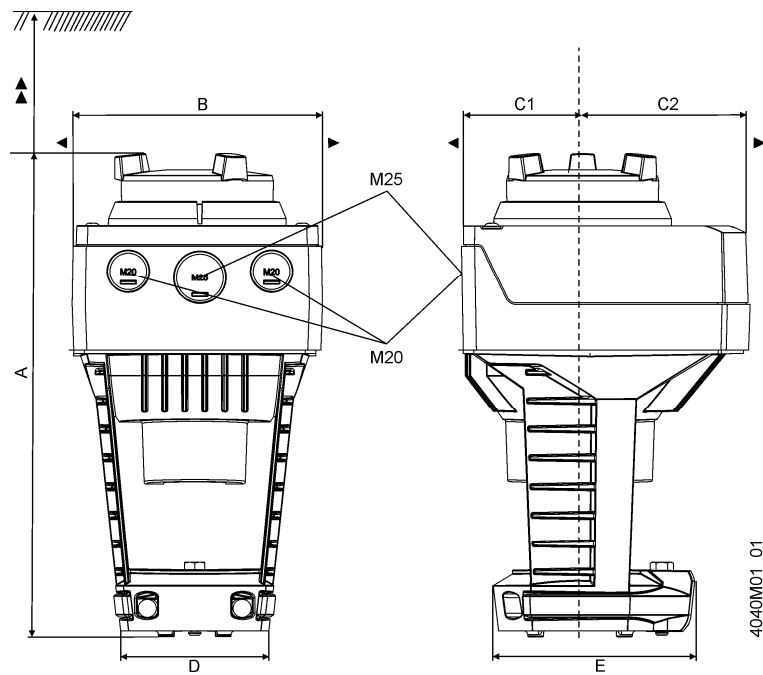
SAX61../MO



SAX81..



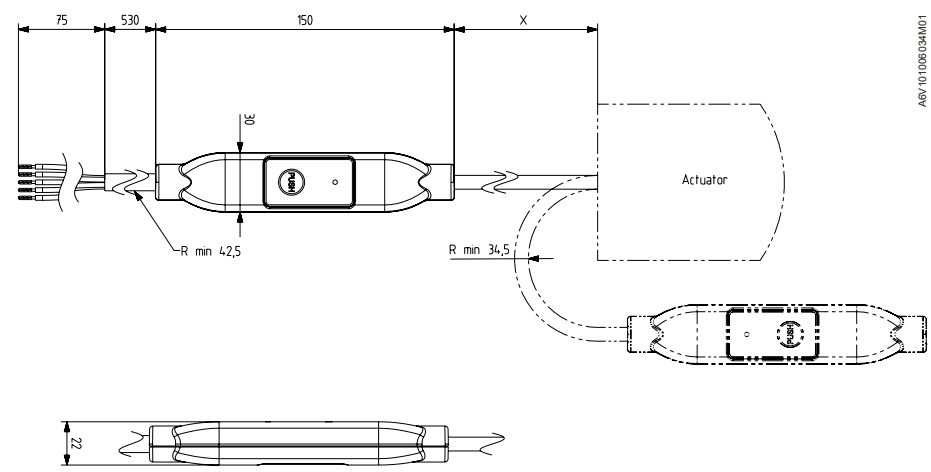
Dimensions



| Type                                     | A   | B   | C   | C1  | C2  | D  | E   | ▶   | ▶▶  | kg    |
|------------------------------------------|-----|-----|-----|-----|-----|----|-----|-----|-----|-------|
| SAX..(U <sup>1)</sup> )                  | 242 | 124 | 150 | 68  | 82  | 80 | 100 | 100 | 200 | 1,780 |
| SAX../MO <sup>2)</sup>                   |     |     |     |     |     |    |     |     |     | 1,930 |
| With ASK39.1:<br>SAX..(U <sup>1)</sup> ) | 267 | 154 | 300 | 200 | 100 | -  | -   | -   | -   | 2,010 |

<sup>1)</sup> SAX..U: For 1/2" tube connections (21.5 mm dia.); 1,850 kg; 2,080 kg with ASK39.1  
<sup>1)</sup> Device contains fixed connecting cable – left cable duct used

External Modbus converter



| Type     | X   | kg                 |
|----------|-----|--------------------|
| SAX../MO | 250 | 0.15 <sup>1)</sup> |

<sup>1)</sup> Already included in the total weight

Dimensions in mm

Revision numbers

| Type        | Valid from rev. no. |
|-------------|---------------------|
| SAX31.00    | ..H                 |
| SAX31.03    | ..H                 |
| SAX61.03..  | ..H                 |
| SAX61.03/MO | ..H                 |
| SAX81.00..  | ..H                 |
| SAX81.03..  | ..H                 |

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