SIEMENS

SAS31.03

SAS61.53

SAS61.33

Acvatix™
Actuators SAS.., SAT.. for valves
Basic Documentation

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Building Technologies

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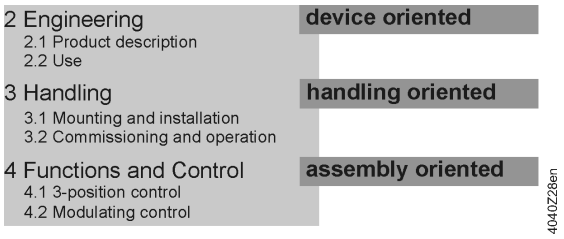
Contents

1 About this documentation

1.1 Navigation

Information about a specific actuator is provided throughout the document. The structure of chapters 2 to 4 is as follows:



Note

Glossary and Index are arranged at the end of the document.

1.2 Revision history

Revision	Date	Changes	Chapter
First edition	2015-05-19	-	-

1.3 Reference documents

Type of document		SAS..	SAT..
Data Sheet		N4581	N4584
Mounting Instructions		lasered on cover	
CE Declaration of Conformity	AC 230 V	T4581X1	T4584X1
	AC/DC 24 V	T4581X2	T4584X2
Environmental Declaration		E4581	E4584

1.4 Before you start

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Acvatix™	Siemens Switzerland Ltd

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1.4.2 Copyright

1.4.3 Quality assurance

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- The contents of all documents are checked at regular intervals
- All necessary corrections are included in subsequent versions
- Anpassungen bzw. Documents are automatically amended as a consequence of modifications and corrections to the products described

Please make sure that you are aware of the latest document revision date.
If you find lack of clarity while using this document, or if you have any criticisms or suggestions, please contact the product manager in your nearest branch office.
The addresses of the Siemens regional companies are available at www.siemens.com/acvatix.

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1.5 Scope of this documentation

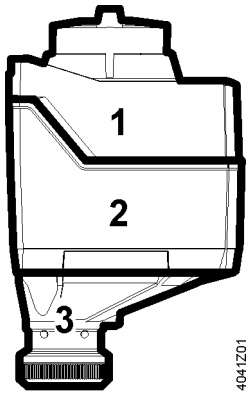
This document shall serve as a source of knowledge. In addition to basic information, it provides general technical information about the actuators used in HVAC plants. It is also targeted at engineering staff, HVAC electrical planners, system integrators and service engineers and provides all information required for planning work, correct installation, commissioning and service.

2 Engineering

2.1 Product description

The line of small actuators is comprised of stroke actuators SAS.. and SAT..

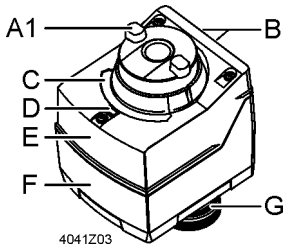
Mechanical design



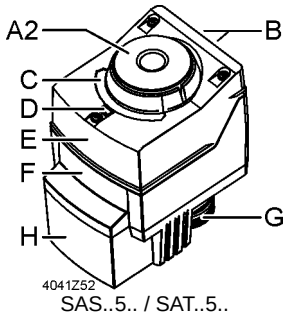
SAS.., SAT..

1	User interface Electrical connections
2	Power transmission and preparation Print Motor
3	Yoke (for assembly of actuator and seat, slipper valve)

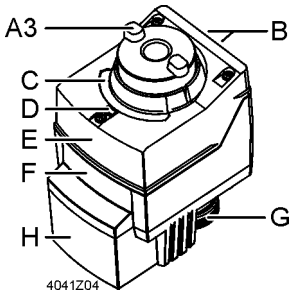
Components



SAS.. / SAT..



SAS..5.. / SAT..5..



SAS..33..

A1 Manual adjuster (with slide switch)
A2 Dummy cover (without manual adjuster)
A3 Manual adjuster (without slide switch)
B Cable glands (M16 / M20)
C Position indication
D Status indication (SA..61.., 0…10 V)
E Housing cover
F Housing
G Valve stem coupling
H Housing of spring return

2.2 Use

SAS.. / SAT..

For use in connection with Siemens 2-port or 3-port valves, as control or shutoff valves for HVAC plants.

2.3 Type summary

2.3.1 Stroke actuators

All types:
- **Stroke** 5.5 mm
- **Positioning force** SAS.. 400 N
  SAT.. 300 N

Product no.	Stock no.	Operating voltage	Positioning signal	Power consumption	Positioning time	Fail safe function / Spring return time	Manual adjuster	Position feedback	Remark	
SAS31.00	S55158-A106	AC 230 V	3-position	2.8 / 2.4 VA [5]	120 s	no / –	yes	-	[1]	[3]
SAS31.03	S55158-A107			3.5 / 2.9 VA [5]	30 s					
SAS31.50	S55158-A108			3.5 / 2.9 VA [5]	120 s	yes / <28 s [6]	no			
SAS31.53	S55158-A109			5.5 / 3.8 VA [5]	30 s	yes / <14 s [6]				
SAS61.03	S55158-A100	AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω	5.3 / 4.5 VA [5]	30 s	no / –	yes	DC 0…10 V	[1]	[4]
SAS61.03U	S55158-A100-A100			5.3 / 4.5 VA [5]					[2]	
SAS61.33	S55158-A101			5.9 / 4.8 VA [5]		yes / <14 s [6]			[1]	
SAS61.33U	S55158-A101-A100			5.9 / 4.8 VA [5]					[2]	
SAS61.53	S55158-A102			5.8 / 5.0 VA [5]			no		[1]	
SAS81.00	S55158-A103	AC/DC 24 V	3-position	2.2 / 2.0 VA [5]	120 s	no / –	yes	-	[1]	[4]
SAS81.00U	S55158-A103-A100			2.2 / 2.0 VA [5]					[2]	
SAS81.03	S55158-A104			2.5 / 2.1 VA [5]	30 s				[1]	
SAS81.03U	S55158-A104-A100			2.5 / 2.1 VA [5]					[2]	
SAS81.33	S55158-A105			3.4 / 2.4 VA [5]		yes / <14 s [6]			[1]	
SAS81.33U	S55158-A105-A100			3.4 / 2.4 VA [5]					[2]	
SAT31.008	S55158-A119	AC 230 V	3-position	5.0 / 2.5 VA [5]	8 s	no / –	yes	-	[1]	[3]
SAT31.51	S55158-A120			5.5 / 3.2 VA [5]	15 s	yes / <8 s [6]	no			
SAT61.008	S55158-A117	AC/DC 24 V	DC 0…10 V DC 4…20 mA 0…1000 Ω	7.1 / 4.6 VA [5]	8 s	no / –	yes	DC 0…10 V		[4]
SAT61.51	S55158-A118			6.4 / 4.8 VA [5]	15 s	yes / <8 s [6]	no			

[1] Cable gland: M16 and M20 (ISO50262)
[2] Cable gland: ½“ (UL514C)
[3] Approbation: CE
[4] Approbation: CE and UL (only 24 V)
[5] Second value: Power consumption in neutral position
[6] Spring return time increased slightly at low temperatures

2.4 Ordering

Example

Product no.	Stock no.	Description	Quantity
SAS31.00	S55158-A106	Actuator	1
+ auxiliary components (connections, auxiliary switches…)			

Delivery

Actuators, valves and accessories are supplied in individual packs.

2.5 Equipment combinations

2.5.1 2-port / 3-port threaded valves with stroke actuator SAS..

Typical applications:
- Heating plants
- District heating plants
- Ventilation and air conditioning plants

Actuators	**SAS..**
Stroke	5.5 mm
Positioning force	400 N
Data sheet	N4581

PN 16	**VVG44..**	**PN 16**	**VXG44..**				**SAS..**	
Medium	1…120 °C	Medium	1…120 °C	**DN**	**G**	**k_{vs}**	**Δp_s**	**Δp_{max}**
Data sheet	N4364	Data sheet	N4464		[Inch]	[m^3/h]	[kPa]	[kPa]
	VVG44.15-..[1]		VXG44.15-..[1]	15	G 1 B	0.25 / 0.4 / 0.63	1600	400
	VVG44.15-..[1]		VXG44.15-..[1]	15	G 1 B	1 / 1.6	725	400
	VVG44.15-..[1]		VXG44.15-..[1]	15	G 1 B	2.5 / 4	400	400
	VVG44.20-6.3		VXG44.20-6.3	20	G 1 1/4 B	6.3	750	400
	VVG44.25-10		VXG44.25-10	25	G 1 1/2 B	10	400	400
	VVG44.32-16		VXG44.32-16	32	G 2 B	16	250	250
	VVG44.40-25		VXG44.40-25	40	G 2 1/4 B	25	125	125

PN 25	**VVG55..**				**SAS..**	
Medium	1…130 °C	**DN**	**G**	**k_{vs}**	**Δp_s**	**Δp_{max}**
Data sheet	N4379		[Inch]	[m^3/h]	[kPa]	[kPa]
	VVG55.15-..[1]	15	G 3/4 B	0.25 / 0.4 / 0.63	2500	1200
	VVG55.15-..[1]	15	G 3/4 B	1 / 1.6 / 2.5	2000	1200
	VVG55.20-4	20	G 1 B	4	1000	1000
	VVG55.25-6.3	25	G 1 1/4 B	6.3	800	800

[1] .. = insert k_{vs} value

2.5.2 2-port / 3-port threaded valves with stroke actuator SAT..

Typical applications:
- Heating plants
- Ventilation plants

Actuators	**SAT..**
Stroke	5.5 mm
Positioning force	300 N
Data sheet	N4584

PN 25	**VVG549..**				**SAT..**	
Medium	2...130 °C [1]	**DN**	**G**	**k_{vs}**	**Δp_s**	**Δp_{max}**
Data sheet	Q4380		[Inch]	[m^3/h]	[kPa]	[kPa]
	VVG549.15-0.25	15	G 3/4 B	0.25	1200	2500
	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 1/4 B	6.3		

[1] Briefly 150 °C, with ALG..B fittings up to 100 °C
[2] Pressure compensated

2.6 Accessories

2.6.1 Electrical accessories

Product no.	Accessory	Description
SAS.. / SAT..	ASC10.51	Auxiliary switch

2.6.2 Mechanical accessories

Product no.	Accessory	Description
SAS.. / SAT..	ASK39.2	Weather shield

2.7 Product replacements

Replacement of SQS../SSC.. actuators by SAS.. and SAT.. actuators.

Note

- When replacing actuators consider positioning force and torque.
- Adjust in the controller the parameter "Running time" (corresponds to positioning time + idle stroke) and "Positioning time" if changed, to ensure stable control.
- The replacement of accessory items needs to be taken into consideration also. In that case, compatibility is not necessarily ensured.

2.7.1 Stroke actuators SAS../SAT.. to SQS..

SQS..				**SAS.. / SAT..**					
Product no.	OEM	**Pos. time** [s]	**Pos. force** [N]	Product no.	**Pos. time** [s]	**Pos. force** [N]	**VVG44.. VXG44..** DN15…40	**VVG55..** DN15…25	**VVG549..** DN15…25
SQS35.00	SQS359.00/189	150	400	SAS31.00	120	400	✓	✓	-
	SQS35.000C						✓	✓	-
	SQS35.00SL						✓	✓	-
SQS35.03	SQS359.03	35		SAS31.03	30		✓	✓	-
	SQS359.03/189						✓	✓	-
SQS35.50	-	150		SAS31.50	120		✓	✓	-
SQS35.53	-	35		SAS31.53	30		✓	✓	
-	SQS359.05	15	250	SAT31.008	8	300	-	-	✓
-	SQS359.54	20	400	SAT31.51	15		-	-	✓
SQS65	-	150	400	SAS61.03	30	400	✓	✓	-
SQS65.2	-	35		-			✓	✓	-
SQS65.5	-			SAS61.53			✓	✓	-
SQS65.5U	-			SAS61.33U			✓	✓	-
SQS65U	-			SAS61.03U			✓	✓	-
SQS85.00	-	150	400	SAS81.00	120	400	✓	✓	-
SQS85.03	-	35		SAS81.03	30		✓	✓	-
SQS85.53U	-			SAS81.33U			✓	✓	-

2.7.2 Electrical accessories

Notes

- If auxiliary switches are used, their switching points should be indicated on the plant schematic.
- Do not insulate the yoke and housing of the actuator and the valve stem, as air circulation must be ensured.

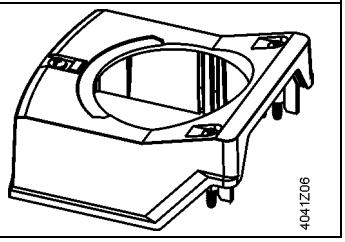
⚠ ⚠
- **Non-observance of the above may result in accidents and fires!**
- **Do not touch the hot parts without prior protective measures to avoid burns!**

Stroke actuators		SQS..	SAS..
ASC9.6	Auxiliary switch	ASC9.6	**ASC10.51**

2.8 Spare parts

The following spare parts are available:

SAS..
SAT..

Stock number	Description	
8000069479	Housing cover with screws and light conductor as an assembly, without laser marking	

2.9 Sizing

2.9.1 Parallel operation of actuators

SAS31.. and SAS81..

3-position actuators must have one specific controller each; refer to chapter 6.3 Connection diagrams (page 41).

SAS61..

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.

2.9.2 Permissible cable length and wire cross-sectional area

Cable lengths and wire cross-sectional areas depend on the following criteria of the actuators:

- Current draw
- Permissible voltage drop across the power supply lines

The control accuracy of the modulating actuators can be improved by using 4-wire connections, thus ensuring that voltage drops on G0 will not distort the positioning signal.

Note

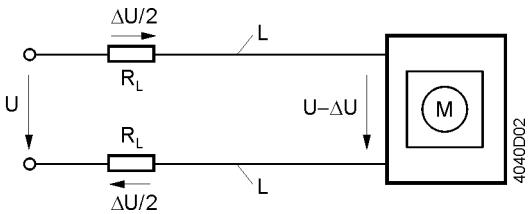
When determining the cable length and the wire cross-sectional area, adherence to the permissible operating voltage tolerance at the actuator is of importance, in addition to the permissible voltage drop across the operating voltage and signal lines (see table below).

Product no.	Operating voltage	Terminal	Max. permissible voltage drop
SA..31..	AC 230 V	N, Y1, Y2	2% each (total of 4%)
SA..61..	AC/DC 24 V	G0, Y, U	1% each (at DC 0…10 V)
SA..81..		G, Y1, Y2	4% each (total of 8%)

The following criteria must be considered:

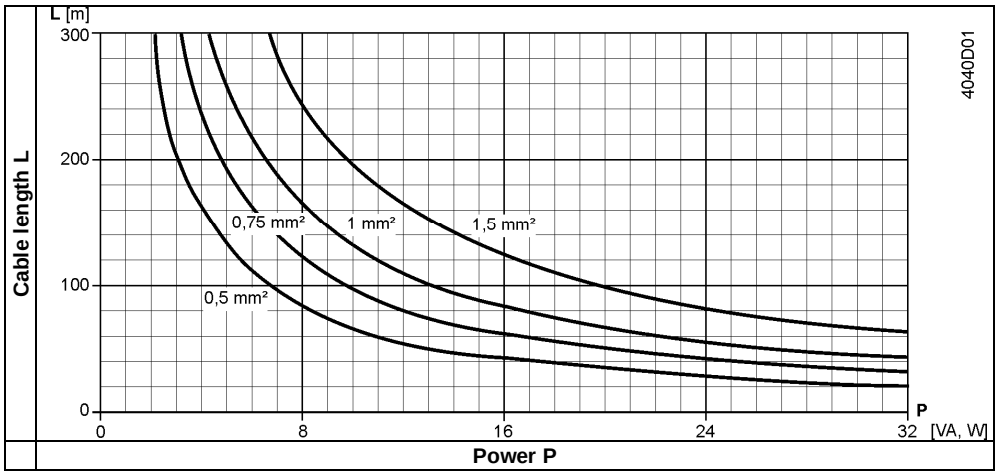
- With modulating control, the permissible positioning signal error must not exceed 1%, the reason being the voltage drop on the G0 wire.
- The voltage drop, caused by charging current peaks in the actuator's DC circuit, must not exceed 2 Vpp.
- If the G0 line is not correctly sized, load changes of the actuator due to changes of the DC voltage drop might lead to self-oscillations.
- The operating voltage drop at AC/DC 24 V may be a maximum of 8% (4% across the G0 wire).

Basic diagram − voltage drop across the power supply cables



The following diagram can be used to determine the cable lengths and wire cross-sectional areas.

L/P-diagram for AC/DC 24 V



Permissible cable length **L** as a function of power **P** and cross-sectional area of wire as a parameter

Note

P is the decisive power consumption of all actuators connected in parallel. When operating on AC 24 V, power consumption is in VA; when operating on DC 24 V, in W.

Formulas for wire lengths

Operating voltage	Permissible voltage drop / wire	Formula for wire length
AC 230 V	2 % of AC 230 V	$L = 46 \bullet \frac{1313 \bullet A}{P}$ [m]
AC 24 V	4 % of AC 24 V	$L = \frac{1313 \bullet A}{P}$ [m]
	1 % of DC 10 V	$L = \frac{5.47 \bullet A}{I(DC)}$ [m]

A Cross-sectional area of wire in mm^2
L Permissible wire length in m
P Power consumption in VA (AC) or W (DC) (see actuator's rating plate)
I(DC) DC current part (in A) on G0 wire

2.10 Warranty

The engineering data specified in chapter 2.5 Equipment combinations (page 9) are only guaranteed in connection with the Siemens valves listed.

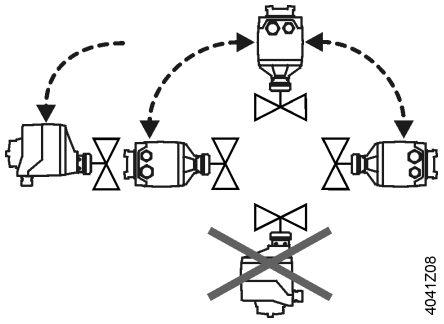
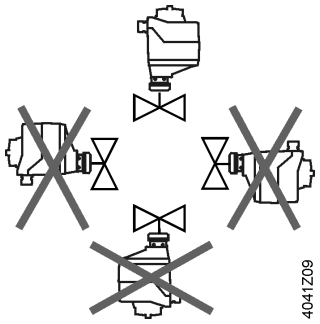
Note

When using the actuators in connection with valves of other manufacture, correct functioning must be ensured by the user, and Siemens will assume no responsibility.

3 Handling

3.1 Mounting and installation

3.1.1 Mounting positions

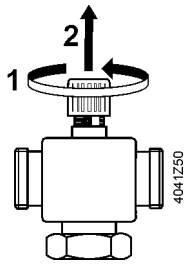
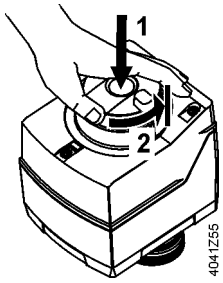
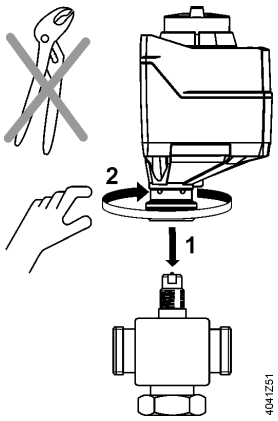
Indoor use	Outdoor use [1]
	

[1] Only in connection with weather shield ASK39.2, housing protection IP54 remains unchanged

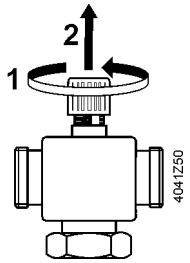
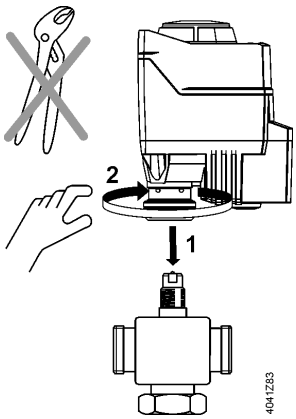
3.1.2 Fitting stroke actuators SAS.. to threaded valves

First, observe chapter 3.1.1 Mounting positions.

SAS..0..
SAT..0..

1	2	3
		
		tighten firmly by hand

SAS..5..

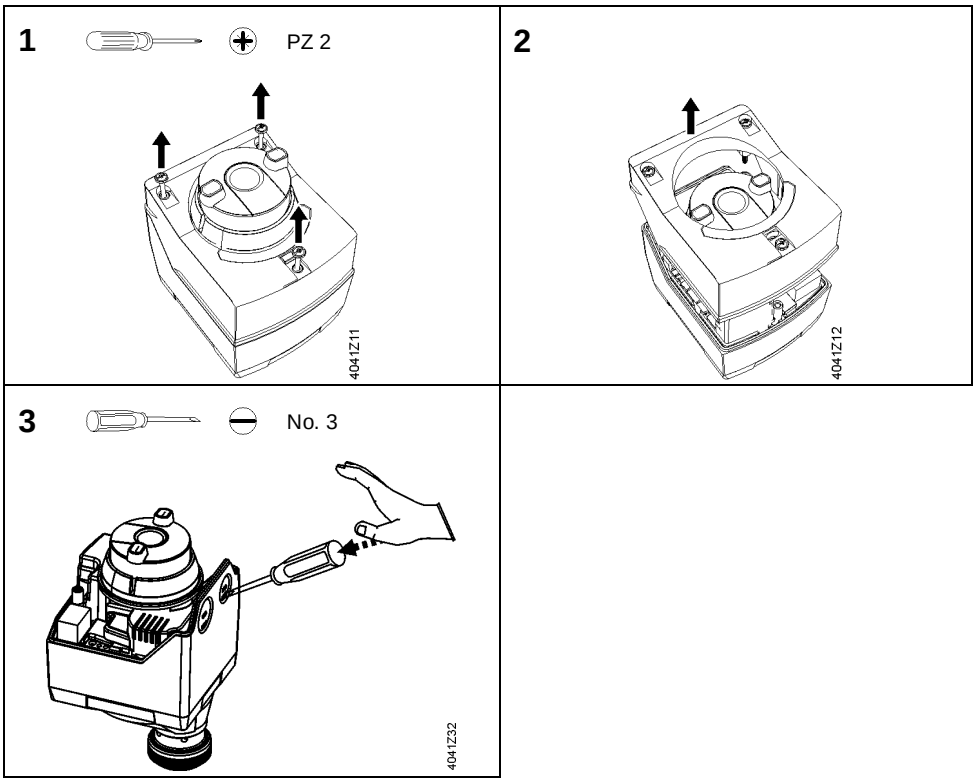
1	2	3
	-	
		tighten firmly by hand

3.1.3 Accessories

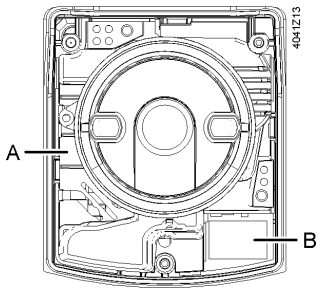
Special notes on mounting

Before fitting the accessory items shown below, the following steps must be performed:

1. Actuator is mechanically connected to a Siemens valve.
2. Observe compatibility and choice of combinations. Refer to 2.6 (page 10).
3. Disconnect actuator, auxiliary switch from power.
   Attention if AC 230 V connected danger of life!
4. ⚠ Only required with actuators without fail safe function: Using the manual adjuster, drive the actuator's stem to the fully retracted position and fix the coupling. See "Manual operation" and "Fixing the position" (page 33).
5. To fit an auxiliary switch the housing cover must be removed and the M16 knock-out broken out.



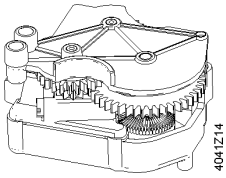
Interior view



A Plug-in space for accessory
B Connection terminal

Auxiliary switch ASC10.51

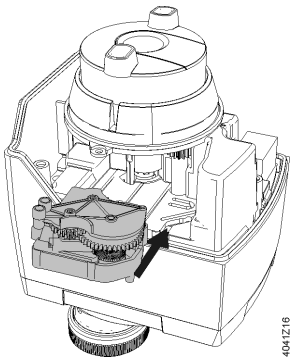
Scope of delivery
- 1 auxiliary switch
- 1 screw



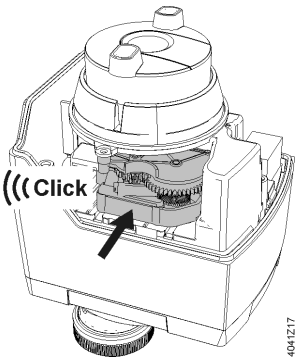
Plug-in space for accessory

First, observe "Special notes on mounting" (page 15).

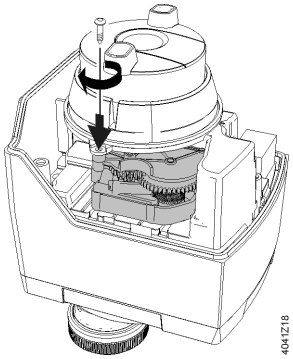
1



2

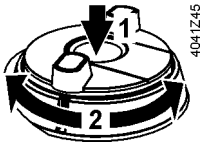


3 No.: 1

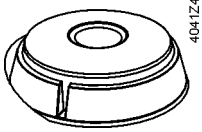


4 **Adjust switch position** (refer also to "Manual adjuster" page 33)

Without fail safe function (SA..1.0..)

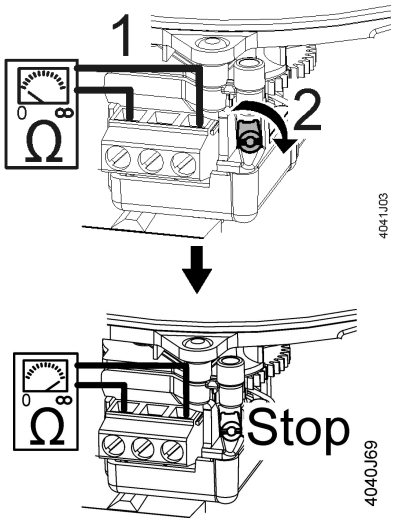


With fail safe function (SA..1.3.. / SA..1.5..)

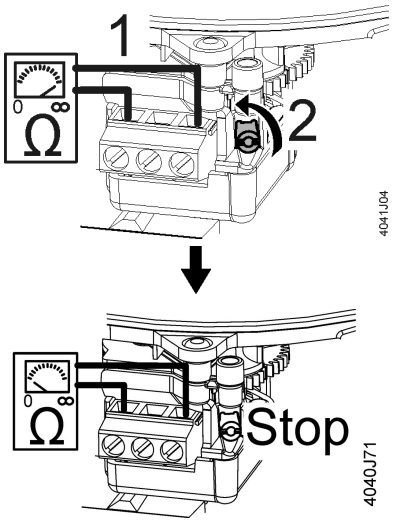


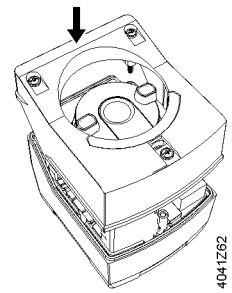
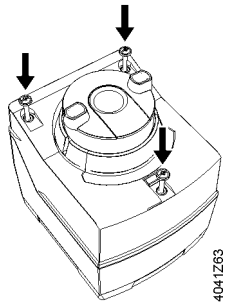
5 No.: 1

When initial situation**: 0 Ω**



When initial situation: **∞ Ω**



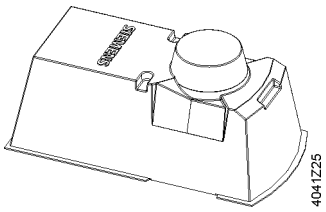
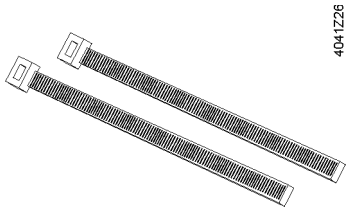
6 Observe "Wiring (installation)" (page 18)	**7** Observe "Connection terminals" (page 39)
8 	**9** max. 1.2 Nm 

Note

Before commissioning with the control, check the exact position again; see "Auxiliary switch", page 21.

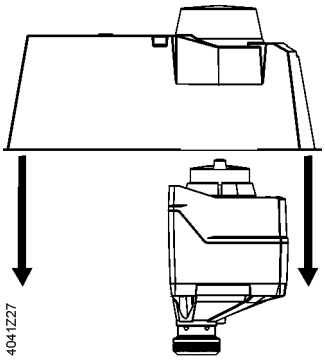
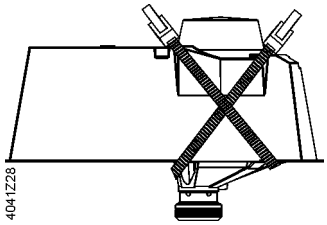
Weather shield ASK39.2

First, observe "Special notes on mounting" (page 15).

Scope of delivery	
Weather shield ASK39.2	2 UV-proof cable ties
	

Notes

- To protect the actuator from weather effects when used outdoors, the weather shield must always be fitted. The housing protection IP54 remains unchanged.
- If fitted several times, 2 UV-proof cable ties (700 x 7 mm) must be used when fitted again.
- The manual adjuster cannot be used when the weather shield is mounted.

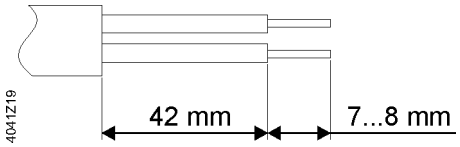
1 	**2** 

3.1.4 Wiring (installation)

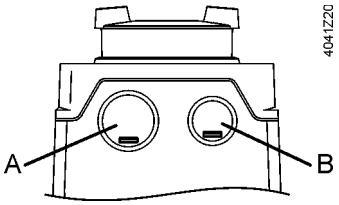
Conduct the electrical connections in accordance with local regulations on electrical installations as well as chapter 6.2 "Connection terminals" on page 39.

Preparation of wire endings

The cable endings must be prepared before as follows:

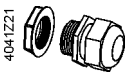
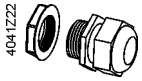
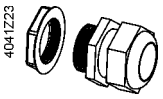


Cable entries



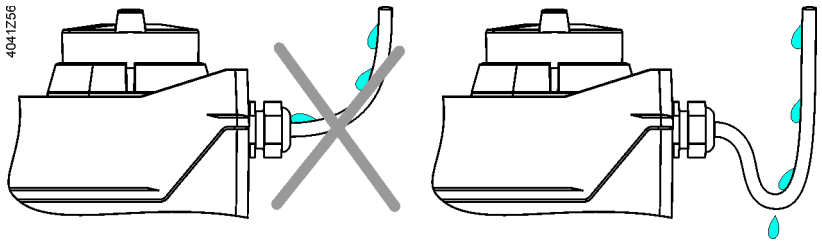
A	EU: M20 US: ½“	Connection actuator
B	EU: M16 US: ½“	Connection accessories

Cable glands

Cable glands (not contained in scope of delivery)		
Metric	Metric	Inch thread
M16	M20	½“
		

Notes

- Without cable gland IP protection is **not** guaranteed!
- Guide the cable in a loop to the cable gland, so water can drop off.

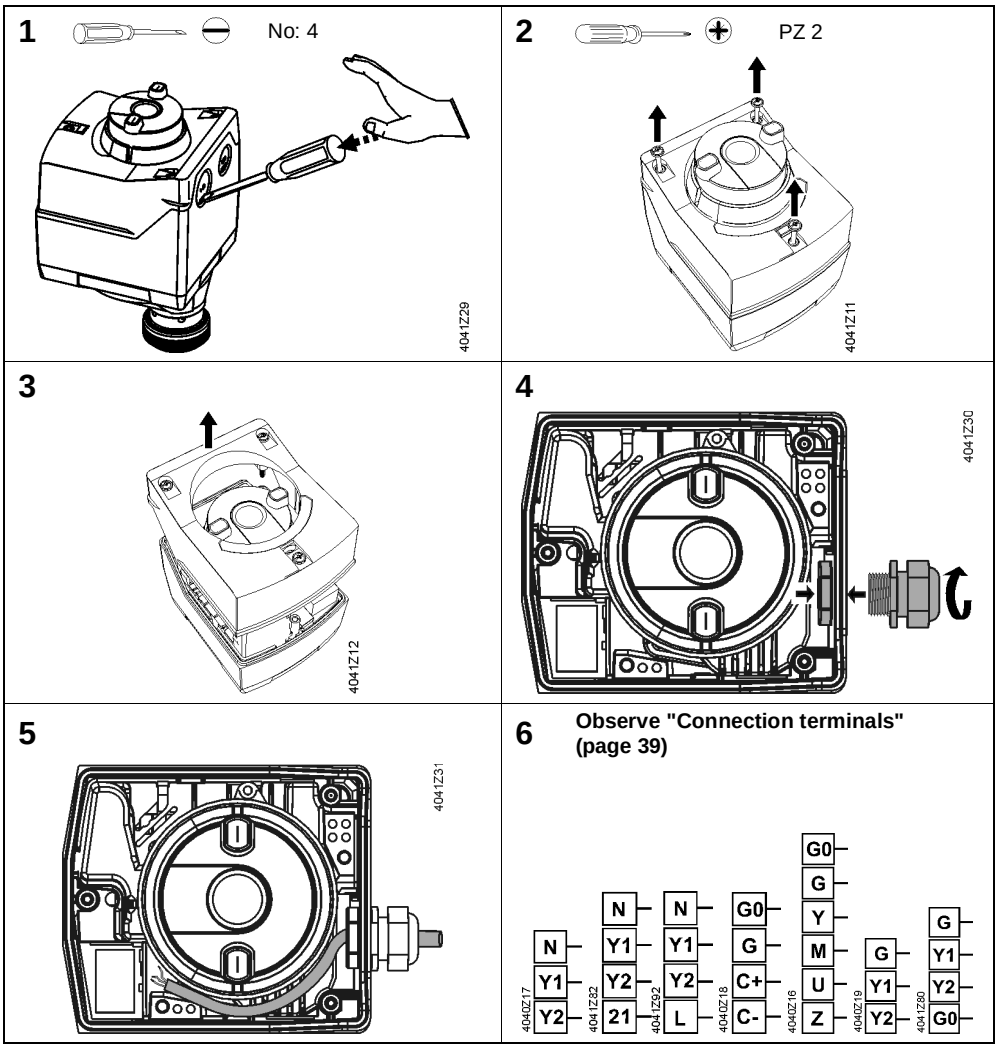


Preconditions

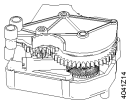
Prior to installation, the following preconditions must be satisfied:

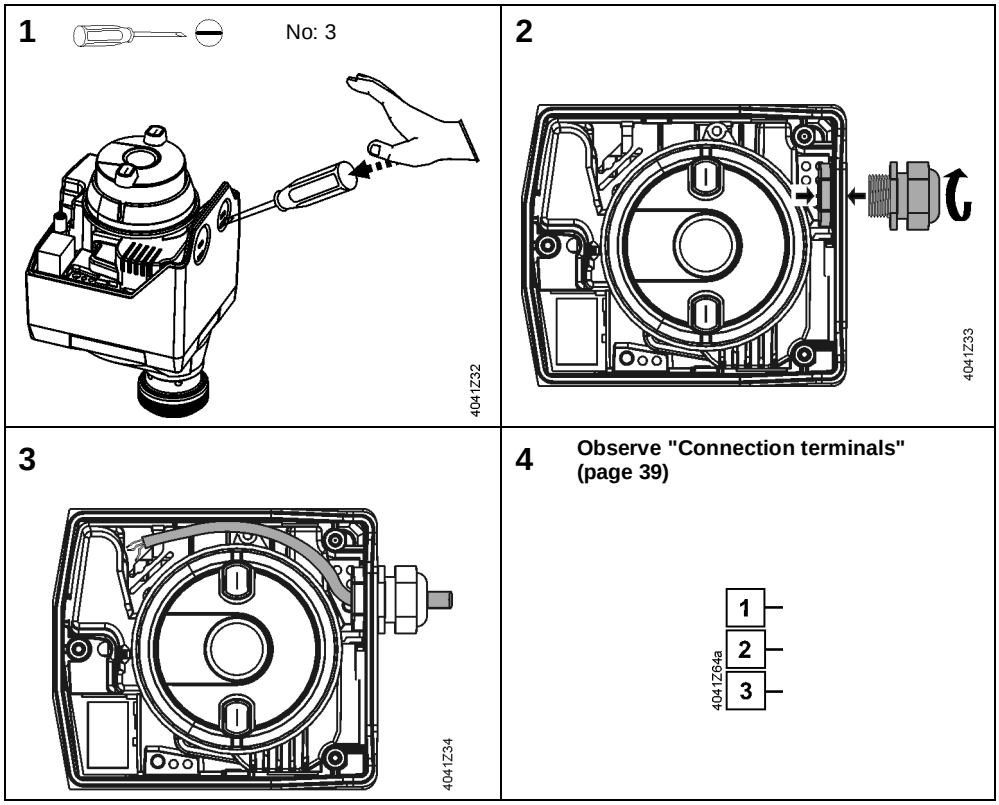
- Actuator is mechanically connected to a Siemens valve.
- Housing cover is removed.

Actuator



Auxiliary switch ASC10.51





3.2 Commissioning and operation

3.2.1 Function check and Calibration

Manually

Before making the function check, the following preconditions must be satisfied:

- "Environmental conditions" specified in chapter "Technical data" (page 36)
- Actuator is mechanically connected to a Siemens valve.
- ⚠ • **Actuator is in "Manual operation" mode** (page 33).

If available, the actuator can be operated with the help of the “Manual adjuster” (see page 33).

Manual adjuster	Stroke actuator	Rotary actuator	Control path valve A→AB	Bypass valve B → AB
Turning in clockwise direction	Actuator’s stem extends	Actuator’s spindle turns in clockwise direction	Opening	Closing
Turning in counter-clockwise direction	Actuator’s stem retracts	Actuator’s spindle turns in counterclockwise direction	Closing	Opening

Notes

- If the actuator is forced to travel beyond its end positions, overload protection responds.
- Observe information given in chapter 4.2.1 Positioning signal and flow characteristic selection, page 26.

Electrically

Before making the function check, the following preconditions must be satisfied:

- "Environmental conditions" specified in chapter "Technical data" (page 36).
- Actuator is mechanically connected to a Siemens valve.
- ⚠ • **Actuator is in “Automatic” mode** (page 33).
- Actuator and, if required, accessories are correctly fitted and connected. Also refer to chapter 6.2 Connection terminals (page 39).
- Power is applied.

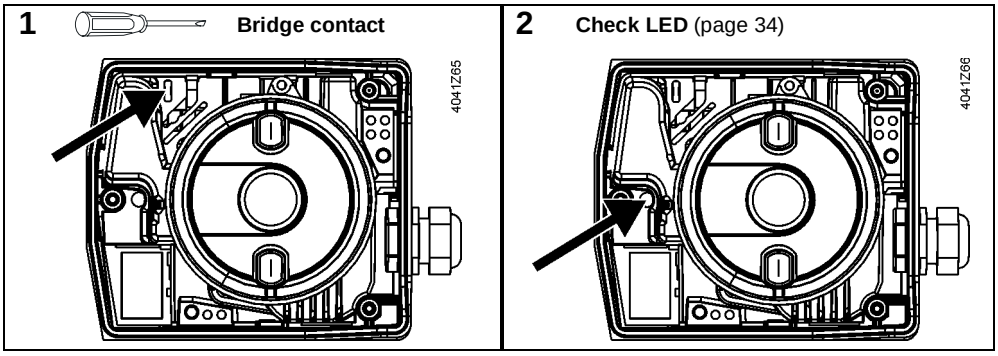
SA..61..

Calibration is required with modulating actuators and SA..61.. before the function check.

General notes on calibration

Before making the calibration, the following preconditions must be satisfied:

- A description of the calibration function is given in chapter 4.2.3 Calibration (page 27).
- Housing cover is removed (see “Special notes on mounting”, page 15).



If required, calibration can be repeated any number of times.

Make the function check for modulating actuators after the calibration with a point test according to the following table:

Connection terminals	Stroke actuator	Rotary actuator	Control path valve A→AB	Bypass valve B → AB	Position feedback U
Y 6 V 13.6 mA	Actuator's stem extends (60%)	Actuator's spindle turns in clockwise direction (60 %)	Opening	Closing	6 V
Y 5 V 12 mA	Actuator's stem retracts (50%)	Actuator's spindle turns in counterclockwise direction (50 %)	Closing	Opening	5 V
Z connected to G	Actuator's stem extends	Actuator's spindle turns in clockwise direction	Opening	Closing	10 V
Z connected to G0	Actuator's stem retracts	Actuator's spindle turns in counterclockwise direction	Closing	Opening	0 V
Only SAS61.33, SAS61.33U, SAS61.53, SAT61.51 No voltage at G and G0 (fail safe function) [1)]	Actuator's stem retracts (until end position is reached)	-	Closing	Opening	-

[1)] Closing action is always completed first, also when power returns.

SA..31.. and SA..81.. Make the function check for 3-position actuators according to the following table:

Connection terminals	Stroke actuator	Rotary actuator	Control path valve A→AB	Bypass valve B → AB
Voltage at Y1	Actuator's stem extends	Actuator's spindle turns in clockwise direction	Opening	Closing
Voltage at Y2	Actuator's stem retracts	Actuator's spindle turns in counterclockwise direction	Closing	Opening
No voltage at Y1 and Y2	Actuator's stem maintains the position	Actuator's spindle maintains the position	Maintains the position	
Only SAS31.50, SAS31.53, SAS81.33, SAS81.33U, SAT31.51 No voltage at G and G0 (fail safe function) [1)]	Actuator's stem retracts (until end position is reached)	-	Closing	Opening

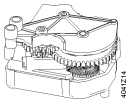
[1)] Closing action is always completed first, also when power returns.

Note

- Observe information given in chapter 4.2.1 Positioning signal and flow characteristic selection, page 26.

Auxiliary switch ASC10.51

Make the function check of the mounted auxiliary switch with a point test according to the following table – example switching point at 25% position:



Connection terminals		Stroke actuator	Rotary actuator	Terminal S1 – S3	Terminal S1 – S2
Voltage at Y2	Y = 0 V	Actuator's stem retracts (until end position is reached)	Actuator's spindle turns in counter-clockwise direction (until end position is reached)	-	-
No voltage at Y1 und Y2	Y = 0 V	Actuator's stem maintains the position	Actuator's spindle maintains the position		
Voltage at Y1 for desired valve position % + 2% x positioning time **Example:** SAS31.00 = 27 % x 120 sec = 32.5 sec	Valve position % + 2% Y = 2.7 V	Actuator's stem extends to desired position (27%)	Actuator's spindle turns in clockwise direction to desired position (27%)		
Check switching point with voltmeter		Actuator's stem maintains the position	Actuator's spindle maintains the position	-	-

3.2.2 Maintenance

The 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

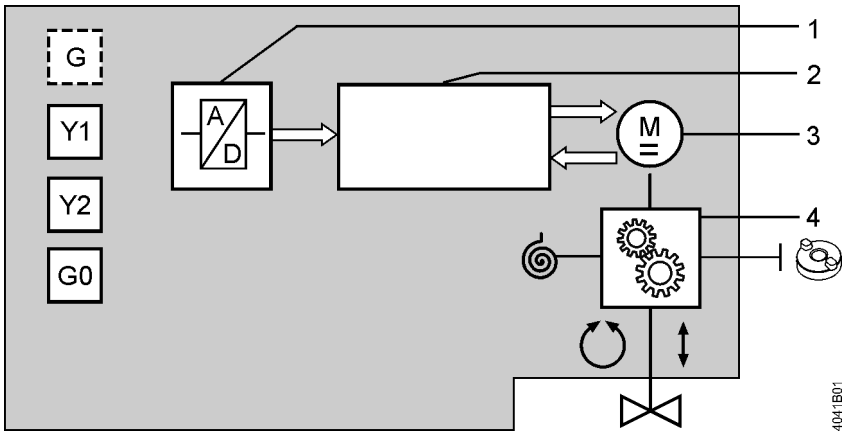
The actuator must be correctly fitted to the valve before recommissioning.

3.2.3 Disposal

The products contain electrical and electronic components and must not be disposed of together with domestic waste. This applies in particular to the printed circuit board.
Legislation may demand special handling of certain components, respectively it may be sensible from an ecological point of view.
Observe all local and currently valid legislation.

4 Functions and control

4.1 3-position control



Example: brushless DC motor with fail safe function

A 3-position signal drives the actuator via connection terminals Y1 or Y2. The required position is transferred to the valve.

1	A/D conversion	
2	Control functions	Identification of seat
		Control of direction
		Motor control
		Manual adjustment
3	Brushless DC motor	
4	Gear train	
	Fail safe function	
	Manual adjuster	

Positioning signal	**Stroke actuator**	**Rotary actuator**	**Control path valve A→AB**	**Bypass valve B → AB**
Voltage at Y1	Actuator's stem extends	Actuator's spindle turns in clockwise direction	Opening	Closing
Voltage at Y2	Actuator's stem retracts	Actuator's spindle turns in counter-clockwise direction	Closing	Opening
No voltage at Y1 and Y2	Actuator's stem maintains the position	Actuator's spindle maintains the position	Maintains the position	
No voltage at Y1 and Y2; with fail safe function	Actuator's stem retracts	Actuator's spindle turns in counter-clockwise direction	Closing	Opening

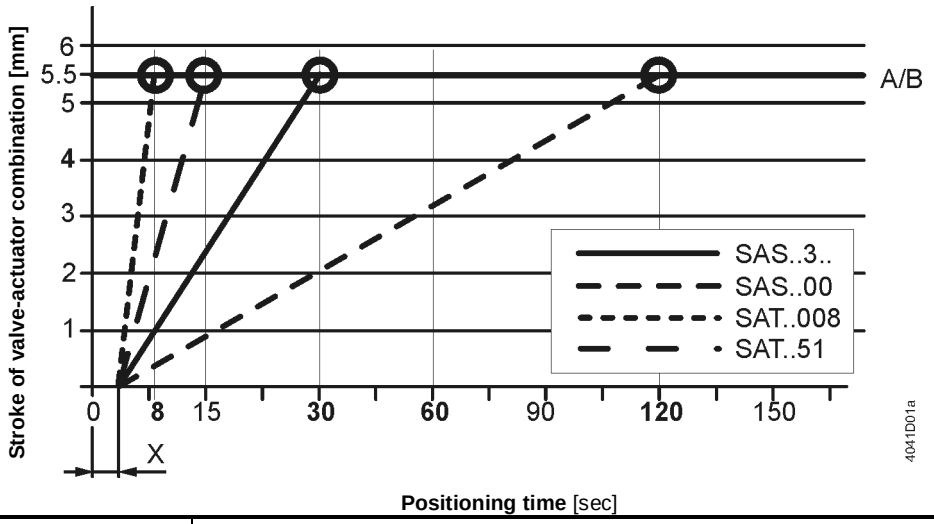
Note

Observe information given in chapter 4.2.1 Positioning signal and flow characteristic selection on page 26.

Internal control ensures very constant positioning times and determination of the actuator's position.

Positioning times stroke model

The specified positioning times refer to the respective nominal stroke / nominal angular rotation. Since the end positions of rotary actuators are inside the actuator, the following remarks refer to stroke actuators.
The resulting effective strokes vary, depending on the type of valve, resulting in shorter or longer actuator positioning times.

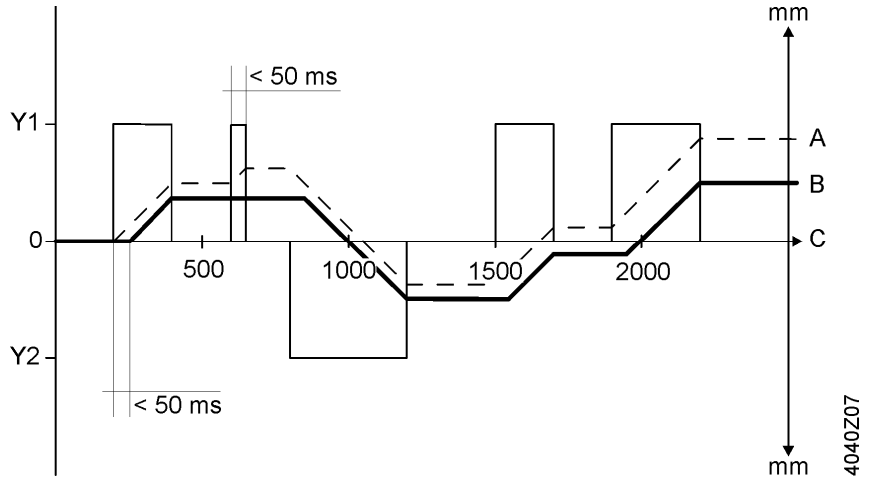


Legend diagram	
A	Mechanical end position in actuator
B	Valves with 5.5 mm nominal stroke
X	Time to override idle stroke (delay time), see glossary

Notes

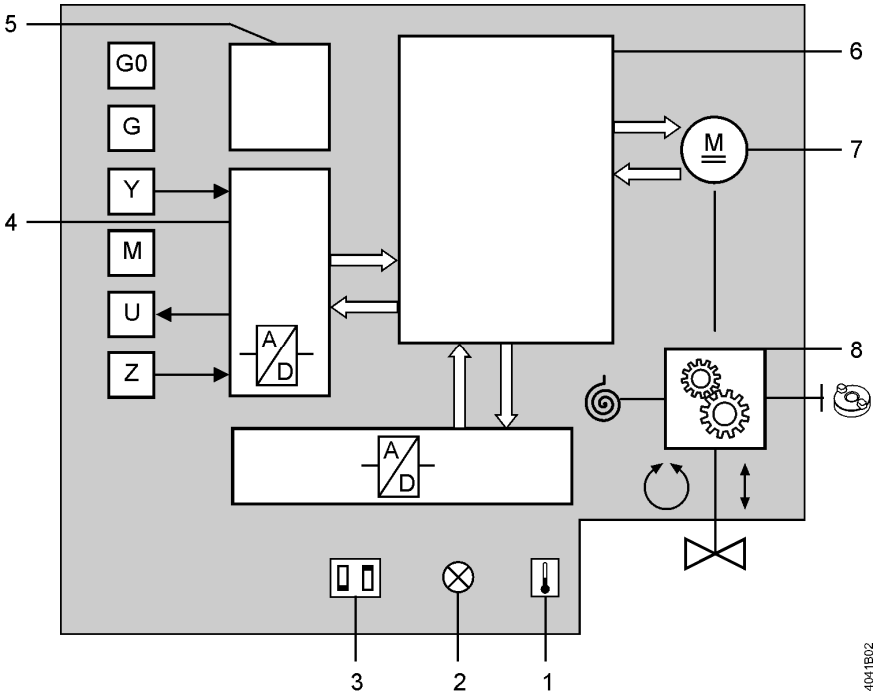
Deviations occur

- after several positioning signals Y1 and Y2 in the same direction since the stroke movement starts with a delay of 50 ms.
- when positioning signals Y1 and Y2 are active for less than 50 ms since the stroke movement cannot be made in that case.



A	B	C	Y1	Y2	0
Calculated position	Actual position	Positioning time [ms]	Positioning signals (power applied)		No power applied

4.2 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).

The actuator is controlled via terminal Y or forced control Z (page 30). The desired stroke / the desired rotation is transferred to the valve stem / the valve spindle.

1	Calibration slot	
2	LED (2 colors)	
3	DIL switches	Changeover of characteristic
		Positioning signal
4	A/D conversion	
5	Power supply	
6	Control functions	Identification of seat
		Position control
		Motor control
		Detection of foreign bodies
		Calibration
		Forced control
		Characteristics function
		Manual adjustment
7	Brushless DC motor	
8	Gear train	
	Fail safe function	
	Manual adjuster	

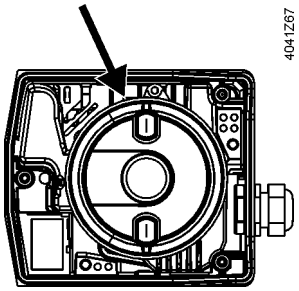
Positioning signal	Stroke actuator	Rotary actuator	Control path valve A→AB	Bypass valve B → AB
Signal Y, Z increasing	Actuator's stem extends	Actuator's spindle turns in clockwise direction	Opening	Closing
Signal Y, Z decreasing	Actuator's stem retracts	Actuator's spindle turns in counterclockwise direction	Closing	Opening
Signal Y, Z constant	Actuator's stem maintains the position	Actuator's spindle maintains the position	Maintains the position	
No voltage at Y1 and Y2; with fail safe function	Actuator's stem retracts	Actuator's spindle turns in counterclockwise direction	Closing	Opening

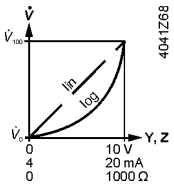
Note

Observe the information given in chapter 4.2.1 Positioning signal and flow characteristic selection on page 26.

4.2.1 Positioning signal and flow characteristic selection

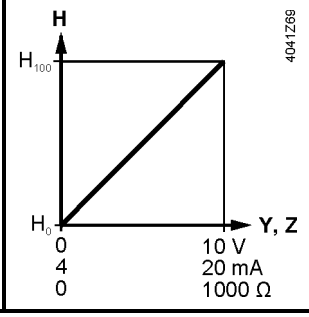
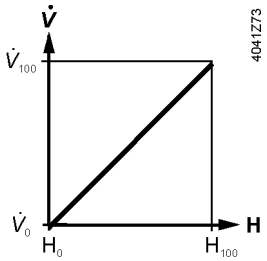
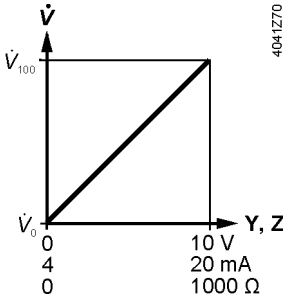
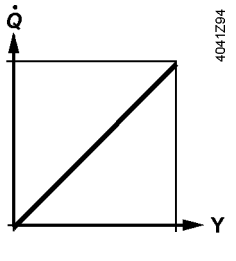
DIL switches

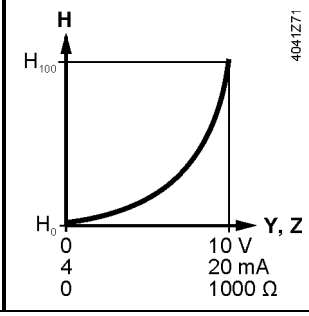
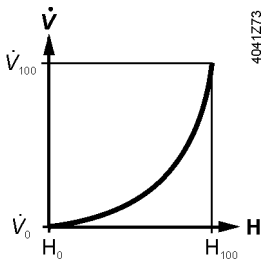
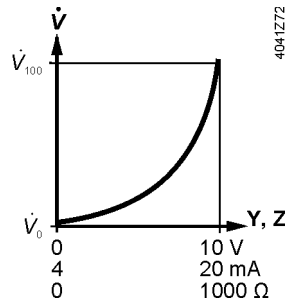
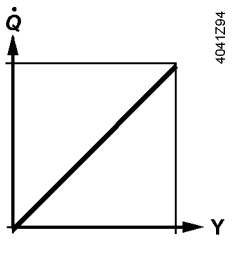


	Positioning signal "Y"	Position feedback "U"	Flow characteristic	
OFF [1]	 DC 0…10 V	DC 0…10 V	 log = equal-percentage	
ON	 DC 4…20 mA	DC 0…10 V	 lin = linear	

[1] Factory setting: All DIL switches set to OFF

Flow characteristic

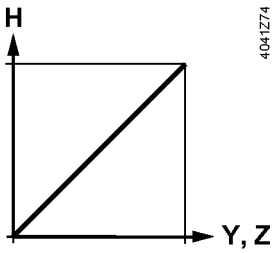
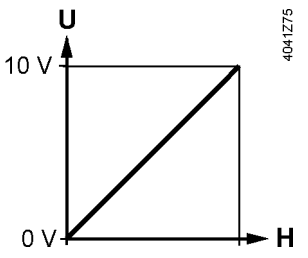
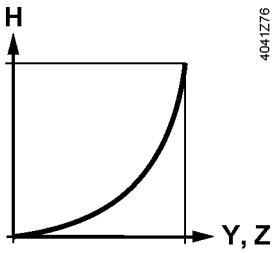
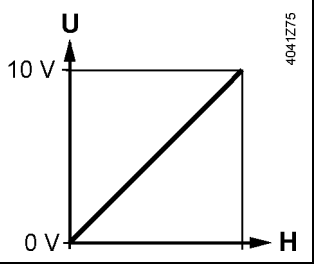
	Actuator	Valve VVG44.. / VXG44..	Valve & actuator combined	Valve & actuator & heat exchanger combined
lin				

	Actuator	Valve VVG55.. / VVG549..	Valve & actuator combined	Valve & actuator & heat exchanger combined
log				

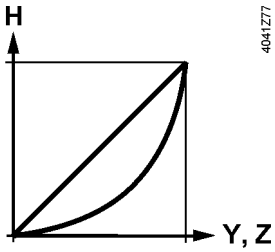
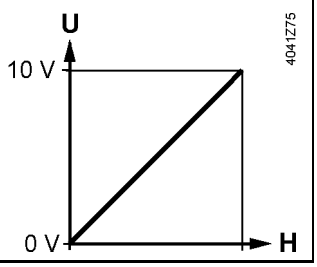
Y, Z Positioning signal
H Stroke
V̇ Volumetric flow
Q̇ Heat transfer capacity

4.2.2 Position feedback U

The position feedback U (DC 0...10 V) is always proportional to stroke H of the actuator's stem.

	Actuator Positioning signal Y, Z	Actuator Position feedback U
 lin = linear		
 log = equal-percentage		

Y, Z	Positioning signal
H	Stroke
U	Position feedback

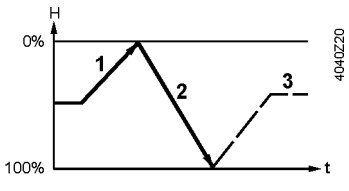
Actuator Positioning signal Y, Z	Actuator Position feedback U
	

4.2.3 Calibration

To match the actuator to production-related mechanical tolerances of the individual valves and to guarantee accurate positioning and position feedback, a calibration should be performed when the plant is commissioned (page 20). During commissioning, the actuator detects the valve's end positions and files the exact stroke in its internal memory.

Calibration takes place in the following phases:

- Actuator drives to the upper end position (1), valve closes. Detection of upper end position.
- Actuator drives to the lower end position (2), valve opens. Detection of lower end position.
- The detected values are stored (3). Then the actuator follows the positioning signal.



Note

Observe status indication (LED) during and after calibration (page 34).

4.2.4 Signal priorities

The actuators are controlled via different interlinked positioning signal paths (positioning signal “Y“, forced control input “Z“, manual adjuster). The signal paths are assigned the following priorities (1 = highest priority, 4 = lowest priority):

Actuator without fail safe function

Priority	Description	
1	The manual adjuster always has priority 1, thus overriding all signals active at “Z“ or “Y“, independent of whether or not power is applied.	
2	Only SA..61..: As soon as a valid positioning signal is active at input “Z“, the position is determined via positioning signal “Z“ (forced control). Prerequisite: The manual adjuster is not used.	**Z**
3	The position is determined via positioning signal “Y“ at Y, Y1 or Y2. The manual adjuster is not used and on “Z“ there is no active signal.	**Y**

Examples

Manual adjuster	Forced control (Z)	Positioning signal (Y)	Stroke actuator	Rotary actuator
Automatic mode	Not connected	**5 V**	Actuator’s stem travels to position (50%)	Actuator’s spindle travels to position (50%)
Automatic mode	**G**	3 V	Actuator’s stem extends	Actuator’s spindle turns in clockwise direction
Automatic mode	**G0**	3 V	Actuator’s stem retracts	Actuator’s spindle turns in counterclockwise direction
Operated (30%) and engaged	G	8 V	Actuator’s stem extends manual (to 30%)	Actuator’s spindle turns manually in counterclockwise direction (to 30%)

Bold printing = positioning signal currently active

Actuator with fail safe function

Priority	Description	
1	The fail safe function responds in the event of a power failure.	
2	The position is solely determined via positioning signal ”Z” (forced control), provided power is applied.	**Z**
3	The position is determined by positioning signal Y, provided power is applied and positioning signal ”Z” is not used.	**Y**
4	Upon actuation and slightly turning in counterclockwise direction, the manual adjuster remains engaged. **Power applied:** After 5 seconds, the manual adjuster disengages itself and positioning signal ”Y” or ”Z” determines the position. **No power applied:** The actuator maintains the position defined by the manual adjuster until power returns. Upon restoration of power, an automatic ClosedPosition-Synchronisation will be performed.	

Examples

Operating voltage (G/G0)	Manual adjuster	Forced control (Z)	Positioning signal (Y)	Stroke actuator
Applied	Automatic mode	Not connected	**5 V**	Actuator’s stem travels to position (50%)
Applied	Automatic mode	**G**	3 V	Actuator’s stem extends
Applied	Automatic mode	**G0**	3 V	Actuator’s stem retracts
Interrupted (fail safe function)	Automatic mode	G	6 V	Actuator’s stem retracts (until end position is reached)
Interrupted (fail safe function)	**Operated (30%)**and engaged	G	8 V	Actuator’s stem retracts (until end position is reached), then: Actuator’s stem extends manually (to 30%)

Bold printing = positioning signal currently active

4.2.5 Detection of valve seat

SAS..

The actuators feature force-dependent valve seat detection. After calibration, the exact valve stroke is filed in the actuator's memory.
If no force is built up in the calculated end position (e.g. in the event of temperature effects for instance), the actuator continues to operate at a reduced positioning speed until the nominal positioning force is restored. This ensures that the valve always fully closes.
After a power failure, valve seat identification is not active – the actuators without fail safe function define their stroke position on power resoration to be at 50%.
From now on, the actuator follows the positioning signal.
When the valve plug reaches its seat for the first time, the actuator readjusts its stroke model.

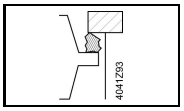
Example

The supposed position is 50%, Y = 2 V, the actuator travels 30% of the stored valve stroke in the direction of "Actuator's stem retracted".
If the actuator reaches the seat within this 30% travel, it interprets the position as "Valve fully closed" and shifts the position of the valve's stroke accordingly without changing the extent of travel.
From now on, the actuator follows the changed valve stroke position.
This means: New position 0%, Y = 2 V, actuator travels 20% of the stored valve stroke in the direction "Actuator's stem extended".

4.2.6 Detection of foreign bodies

The actuator detects when the valve is clogged and adjusts its operational behavior accordingly to prevent damage to itself or the valve.
If the actuator hits an obstacle within the calibrated stroke and is not able to overcome it with its nominal positioning force, it stores the position at which the obstacle was hit. Depending on the direction of travel, as …

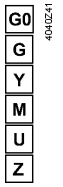
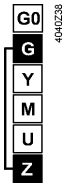
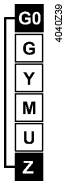
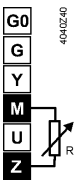
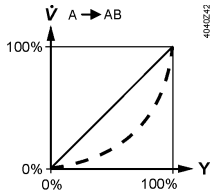
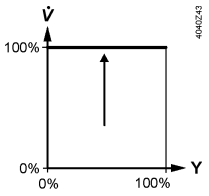
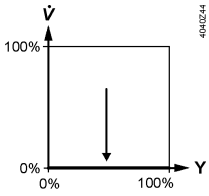
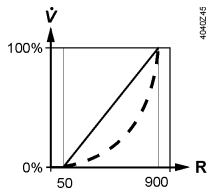
"Upper limit of valve clogging", if the clogging was detected when traveling in the direction of "Actuator's stem extending".



Now, the status LED blinks red and the actuator only follows the positioning signal between the positions "Actuator's stem retracted" and "Lower limit of valve clogging".
After detection of clogging, 3 attempts are made to overcome clogging by traveling about 15% in the opposite direction and then trying again to overcome the position of clogging. If the attempts made are unsuccessful, the actuator continues to follow the positioning signal within the restricted range only and the LED continues to blink red (see "Status indication " page 34).

4.2.7 Forced control Z

Forced control uses the following operating modes:

	Z mode			
	No function	Fully open	Fully closed	Overriding positioning signal "Y" by 0…1000 Ω
Connections				
Transmission				
	Equal-percentage or linear characteristic			Equal-percentage or linear characteristic
	Contact "Z" not connected, valve follows positioning signal "Y"	Contact "Z" is connected directly to "G", positiong signal "Y" has no impact	Contact "Z" is connected directly to "G0", positiong signal "Y" has no impact	Contact "Z" is connected to "M" via resistor "R", starting point at 50 Ω, end point at 900 Ω, positioning signal "Y" has no impact

4.3 Technical and mechanical design

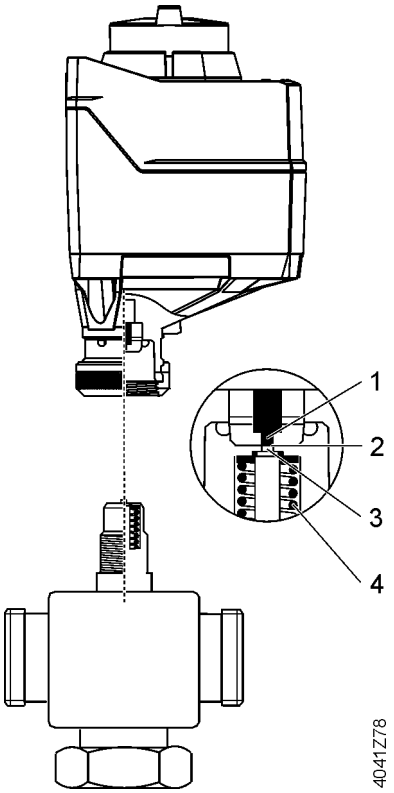
4.3.1 Transmission of power

Function principle

Incoming positioning signals are translated to positioning commands for the motor.

A gear train transmits the motor's positioning steps to the output stage. Here, the translation from rotary to stroke movement takes place. Attached to the gear train are the electrical and mechanical accessory items and the manual adjuster. With the stroke actuators with fail safe function, the gear train also accommodates the return spring.

In the case of the rotary actuators, the adjustment to the required torque is made in the output stage.

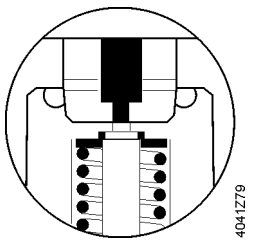


Power transmission of stroke actuator:

1 Actuator stem
2 Contact point actuator stem – valve stem
3 Valve stem
4 Valve spring

The transmission of power has no fix connection.
If the actuator stem extends, it presses on the valve stem and against the force of the spring in the valve.
If the actuator stem retracts, the valve stem follows the actuator stem due to the force of the valve spring.

4.3.2 Coupling

SAS.., SAT..

Actuator stem and valve stem run into each other. They are not permanently connected.

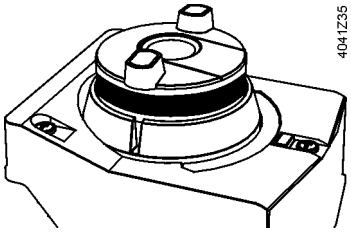
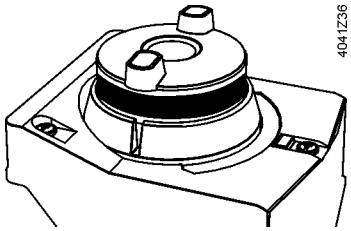
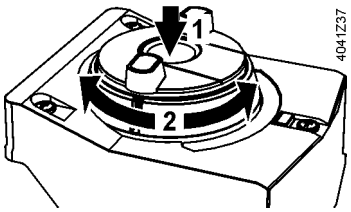
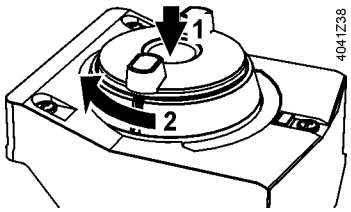
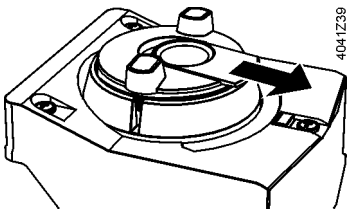
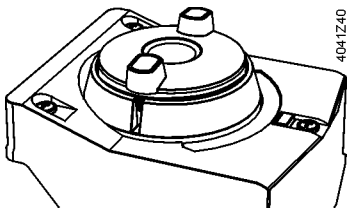
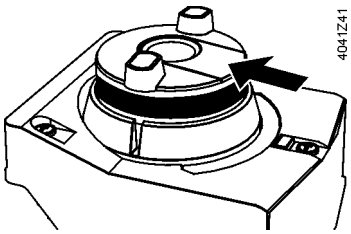
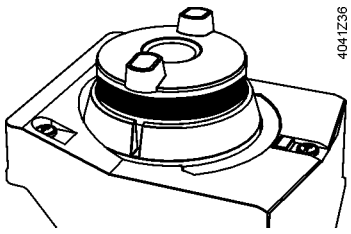
4.3.3 Fail safe function

The fail safe function works mechanically with a return spring and ensures the protection of the plant. It guarantees the safe operation in uncontrolled operating states.
In the event of a power failure, the actuator will return to its 0 % stroke position with the help of the return spring, closing the valve. The Y positioning signal is not valued.

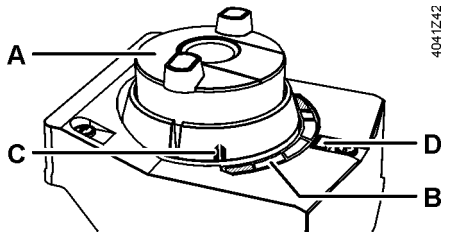
Fail safe function	Actuator	Valve		Spring return time	At positioning time
Active	Actuator's stem retracts	Spring in valve closes	Valve closes	<8 s [1)] <14 s [1)] <28 s [1)]	15 s 30 s 120 s

[1)] Spring return time increased slightly at low temperatures

4.3.4 Manual adjuster

	Without fail safe function	With fail safe function (SA..33..)
Automatic		
	When the motor drives the manual adjuster turns. Thus in automatic mode, the manual adjuster is used for indication of travel. If the manual adjuster is held firm in this mode, there is no transmission of power to the gear train.	
Manual operation		
	When pushing the manual adjuster down (1), it engages and the actuator can be manually operated.	
	Stroke actuator: When turning the manual adjuster in clockwise / counterclockwise direction (2), the actuator's stem extends / retracts. **Rotary actuator:** The actuator spindle turns in the same direction	When turning the manual adjuster in clockwise direction (2), the actuator's stem extends. **CAUTION:** Turning the manual adjuster in counterclockwise direction is not possible.
	An overload protection prevents damage to the manual adjuster.	
Fixing the position		
	Upon actuation and locking the slide switch, the manual adjuster remains engaged. When in this mode, do not turn the manual adjuster (manual adjuster locked).	After pushing and slightly turning the manual adjuster in counterclockwise direction, it remains engaged, provided no power is applied. If power is applied, refer to "Disengaging the fixing".
Disengaging the fixing		
	When resetting the slide switch, the manual adjuster returns to automatic mode.	Coupling disengages **automatically**… • after 5 seconds if power is applied, • when power returns; a restart is made (actuator's stem retracts), then, the actuator follows the active positioning signal. Coupling is disengaged **manually** by slightly turning the manual adjuster in clockwise direction.

4.3.5 Indicators



A	Indication of travel	
B	Scale	Position indication
C	Indicator	
D	LED Status indication	

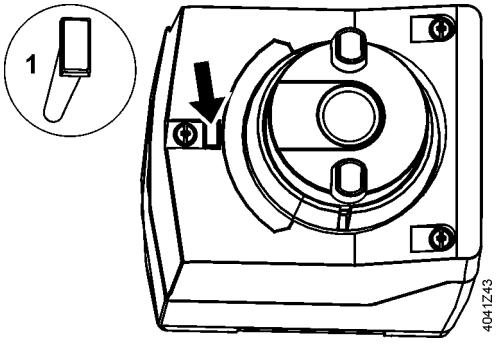
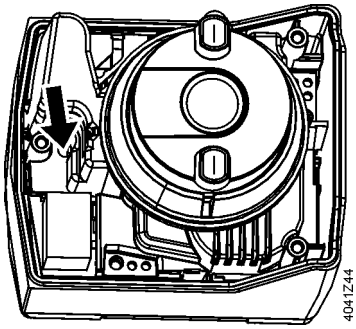
Operational status indication

In Automatic mode, the manual adjuster serves for the indication of travel.
See "Automatic" (page 33).

Position indication

When turning the manual adjuster, the indicator also moves.
The scale indicates the stroke. When reaching the stops, the valve is either fully open or fully closed.

Status indication (LED), only with modulating control (only SA..61..)

Housing cover fitted	Housing cover removed
	
When the housing cover is fitted, the LED can be viewed through a light conductor.	When the housing cover is removed, the LED can be viewed through a hole.

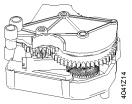
The status indication informs about the operational state of the actuator.

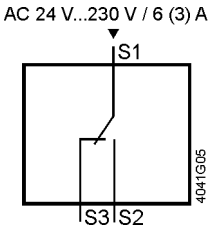
LED	Indication	Operating state	Remarks, troubleshooting
Green	On	Automatic mode	Normal operation
	Blinking	Calibration	Wait until calibration is finished (then green or red light)
		In manual mode	Manual adjuster in MAN position
Red	On	Calibration error	Start calibration again
		Undervoltage (AC 13 V)	Check operating voltage
	Blinking	Clogged valve, detection of foreign bodies	Check valve / actuator
Dark	Dark	No power or electronics faulty	Check operating voltage

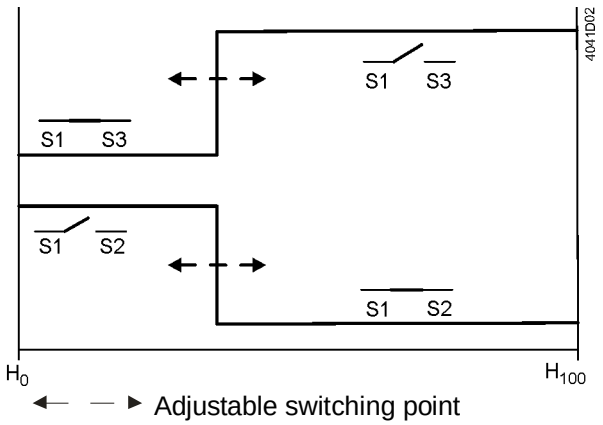
4.3.6 Electrical accessories

Auxiliary switch ASC10.51

The auxiliary switch ASC10.51 switches on or off when a certain position is reached. The switching point can be set between 0…100%.







Switching point for S1–S2 and S1–S3 cannot be set separately. If S1–S2 is open then S1–S3 is closed.

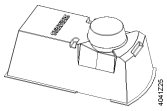
Application example:

When using an auxiliary switch, position feedback can trigger an automatic stop of the circulating pump in the end position "Fully closed".

4.3.7 Mechanical accessories

Weather shield ASK39.2

To protect the actuator from weather effects when used outdoors, the weather shield ASK39.2 must always be fitted. The housing protectionIP54 remains unchanged.



5 Technical data

				SAS..	SAT..
Power supply	**Operating voltage**		SA..31..	AC 230 V ± 15 %	
			SA..61..	AC 24 V ± 20 % / DC 24 V + 20 % / -15% or AC 24 V class 2 (US)	
			SA..81..	AC/DC 24 V ± 20 % or AC 24 V class 2 (US)	
	Frequency			45…65 Hz	
	External supply line protection (EU)			6 A...10 A slow or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 Power source with current limitation of max. 10 A	
	Power consumption at 50 Hz			Stem retracts / extends	Stem retracts / extends
	SAS31.00	SAT31.008		2.8 / 2.4 VA [1)]	5.0 / 2.5 VA [1)]
	SAS31.03	SAT31.51		3.5 / 2.9 VA [1)]	5.5 / 3.2 VA [1)]
	SAS31.50	SAT61.008		3.5 / 2.9 VA [1)]	7.1 / 4.6 VA [1)]
	SAS31.53	SAT61.51		5.5 / 3.8 VA [1)]	6.4 / 4.8 VA [1)]
	SAS61.03			5.3 / 4.5 VA [1)]	
	SAS61.03U			5.3 / 4.5 VA [1)]	
	SAS61.33			5.9 / 4.8 VA [1)]	
	SAS61.33U			5.9 / 4.8 VA [1)]	
	SAS61.53			5.8 / 5.0 VA [1)]	
	SAS81.00			2.2 / 2.0 VA [1)]	
	SAS81.00U			2.2 / 2.0 VA [1)]	
	SAS81.03			2.5 / 2.1 VA [1)]	
	SAS81.03U			2.5 / 2.1 VA [1)]	
	SAS81.33			3.4 / 2.4 VA [1)]	
	SAS81.33U			3.4 / 2.4 VA [1)]	
Function data	**Positioning times** with the specified nominal stroke / nominal angular rotation				
	SAS..0	SAT..008		120 s	8 s
	SAS..3/..3U	SAT..51		30 s	15 s
	Positioning force			400 N	300 N
	Nominal stroke			5.5 mm	5.5 mm
	Torque				
	Nominal angular rotation				
	Permissible medium temperature (valve fitted)			1...130 °C	1…130 °C
			briefly		150 °C
Signal inputs	**Y positioning signal**				
	SAS31..	SAT31.008		3-position	
	SAS81..	SAT31.51			
	SAS61..	SAT61.008		DC 0...10 V / DC 4...20 mA / 0...1000 Ω	
		SAT61.51			
			SA..61.. (DC 0...10 V) Current draw	≤ 0.1 mA	
			Input impedance	≥ 100 kΩ	
			SA..61.. (DC 4...20 mA) Current draw	DC 4...20 mA ± 1 %	
			Input impedance	≤ 500 Ω	
Parallel operation			SA..61..	≤ 10 (depending on controler output)	
Forced control	**Positioning signal Z**		SA..61..	R= 0…1000 Ω, G, G0	
			R = 0…1000 Ω	Stroke / rotation proportional to R	
			Z connected to G	Max. stroke 100 %	Max. stroke 100 %
			Z connected to G0	Min. stroke 0 %	Min. stroke 0 %
			Voltage	Max. AC 24 V ± 20 % / Max. DC 24 V + 20 % / -15%	
			Current draw	≤ 0.1 mA	
Position feedback	**U**		SA..61..	DC 0...10 V ± 1 %	
			Load impedance	> 10 kΩ res.	
			Load	Max. 1 mA	
Connecting cable	**Wire cross-sectional areas**			0.75…1.5 mm^2, AWG 20…16 [2)]	

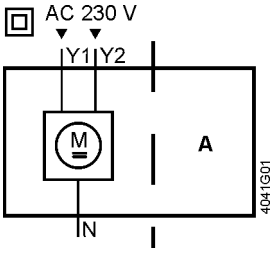
			SAS..	SAT..
	Cable entries	SA..	EU: 1 entry ∅ 16.4 mm (for M16) 1 entry ∅ 20.5 mm (for M20)	
		SA..U	US: 2 entries ∅ 21.5 mm for ½“ tube connection	
Degree of protection	**Housing protection**		IP 54 as per EN 60529 [3]	
	Mounting position		vertical	
	Insulation class		As per EN 60730	
	Actuators SA..31.. AC 230 V		II	
	Actuators SA..61.. AC / DC 24 V		III	
	Actuators SA..81.. AC / DC 24 V		III	
Environmental conditions	**Operation**		IEC 60721-3-3	
	Climatic conditions		Class 3K5	
	Mounting location		Indoors, outdoors [4]	
	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. h.	
	Storage		IEC 60721-3-1	
	Temperature		-15…55 °C	
	Humidity		5…95 % r. h.	
Directives and Standards	**Product standard**		EN60730-x	
	Electromagnetic compatibility (Application)		For residential, commercial and industrial environments	
	EU Conformity (CE)		CE1T4581xx [5]	
	RCM Conformity		CE1T4581en_C1 [5]	
	UL, cUL	AC / DC 24 V	UL 873 http://ul.com/database	
Environmental compatibility			The product environmental declaration CE1E4581 [5] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).	
Dimensions			See Dimensions (page 42)	
Weight	Excl. packaging		See Dimensions (page 42)	
Accessories [6]	**Auxiliary switch ASC10.51**	Switching capacity	AC 24…230 V, 6 (2) A, floating	
	External supply line protection		See section power supply	
	US installation, UL & cUL		AC 24 V class 2, 5 A general purpose	
Data sheet			N4581	N4584

[1] Second value: Power consumption in neutral position
[2] AWG = American wire gauge
Wire cross-sectional areas and fuses have to be well-matching, which is the responsibility of the planner / installer. Observe norm of protection measures - protection against overcurrent: IEC 60364-4-43:2008 resp. german adoption HD 60364-4-43:2010.
[3] Also with weather shield ASK39.2
[4] Outdoors always with weather shield ASK39.2, housing protection IP54 remains unchanged
[5] The documents can be downloaded from http://siemens.com/bt/download
[6] UL recognized component

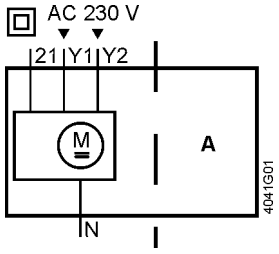
6 Connection diagrams and dimensions

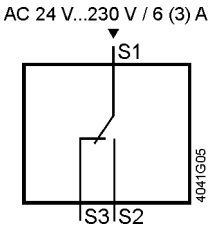
6.1 Internal diagrams

SA..31..

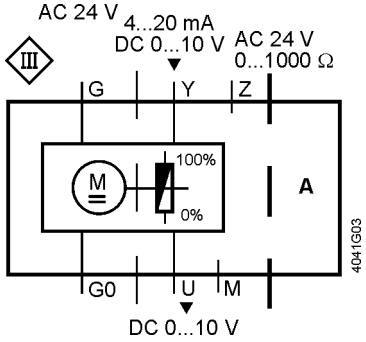


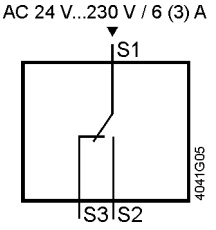
SA..31.5..



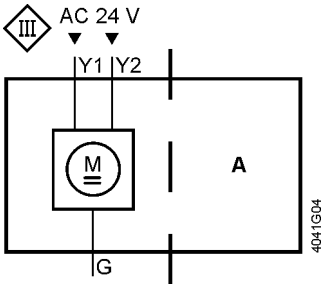
Accessory plug-in space A
1x ASC10.51
ASC10.51
AC 24 V...230 V / 6 (3) A 

SA..61..

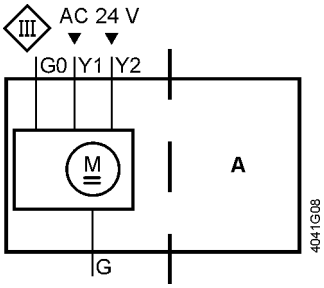


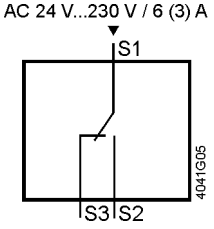
Accessory plug-in space A
1x ASC10.51
ASC10.51
AC 24 V...230 V / 6 (3) A 

SAS81..

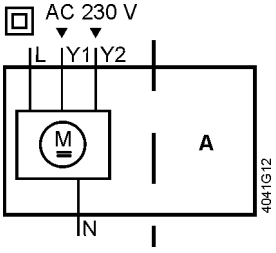


SAS81.33, SAS81.33U



Accessory plug-in space A
1x ASC10.51
ASC10.51
AC 24 V...230 V / 6 (3) A 

SAT31.008



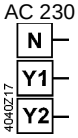
Accessory plug-in space A
-

6.2 Connection terminals

6.2.1 Actuators

SA..31..
(without SAT31.008)

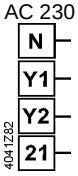
AC 230 V, 3-position



- N — System neutral (SN)
- Y1 — Positioning signal (actuator's stem extends / actuator's spindle turns clockwise)
- Y2 — Positioning signal (actuator's stem retracts / actuator's spindle turns counter-clockwise)

SA..31.5..

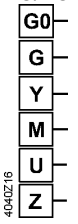
AC 230 V, 3-position



- N — System neutral (SN)
- Y1 — Positioning signal (actuator's stem extends / actuator's spindle turns clockwise)
- Y2 — Positioning signal (actuator's stem retracts / actuator's spindle turns counter-clockwise)
- 21 — Fail safe function

SA..61..

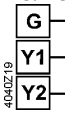
AC/DC 24 V, DC 0…10 V / 4…20 mA / 0…1000 Ω



- G0 — Sytem 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
- Z — Positioning signal forced control AC/DC ≤ 24 V, 0...1000 Ω

SA..81..

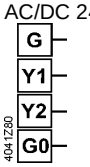
AC/DC 24 V, 3-position



- G — System potential (SP)
- Y1 — Positioning signal (actuator's stem extends / actuator's spindle turns clockwise)
- Y2 — Positioning signal (actuator's stem retracts / actuator's spindle turns counter-clockwise)

SAS81.33U

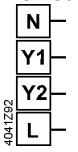
AC/DC 24 V, 3-position



- G — System potential (SP)
- Y1 — Positioning signal (actuator's stem extends / actuator's spindle turns clockwise)
- Y2 — Positioning signal (actuator's stem retracts / actuator's spindle turns counter-clockwise)
- G0 — System neutral (SN)

SAT31.008

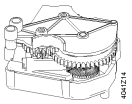
AC 230 V, 3-position



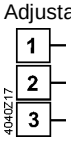
- N — System neutral (SN)
- Y1 — Positioning signal (actuator's stem extends / actuator's spindle turns clockwise)
- Y2 — Positioning signal (actuator's stem retracts / actuator's spindle turns counter-clockwise)
- L — System potential (SP)

6.2.2 Electrical accessories

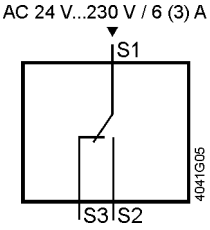
Auxiliary switch ASC10.51



Adjustable switching points, AC 24…230 V



1 System potential (SP)
2 Closing (actuator's stem extends / actuator's spindle turns clockwise)
3 Opening (actuator's stem extends / actuator's spindle turns clockwise)



6.2.3 Cable labeling

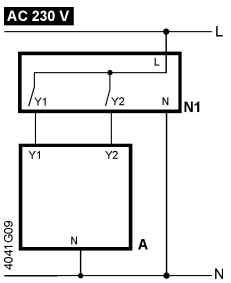
The wires are color coded and labeled.

Connection	Cable				Description
	Code	No.	Color	Abbreviation	
Actuators AC 230V	N	4	blue	BU	System neutral
	Y1	6	black	BK	Positioning signal
	Y2	7	white	WH	Positioning signal
	L		-		System potential
	21		-		Fail safe function
Actuators AC 24 V resp. AC/DC 24 V	G	1	red	RD	System potential
	G0	2	black	BK	System neutral
	Y1	6	violet	VT	Positioning signal
	Y2	7	orange	OG	Positioning signal
	Y	8	grey	GY	Positioning signal
	M		-	-	Measuring neutral
	U	9	pink	PK	Position feedback
	Z		-	-	Positioning signal forced control

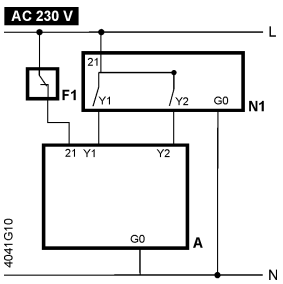
6.3 Connection diagrams

SA..31..

SA..31..



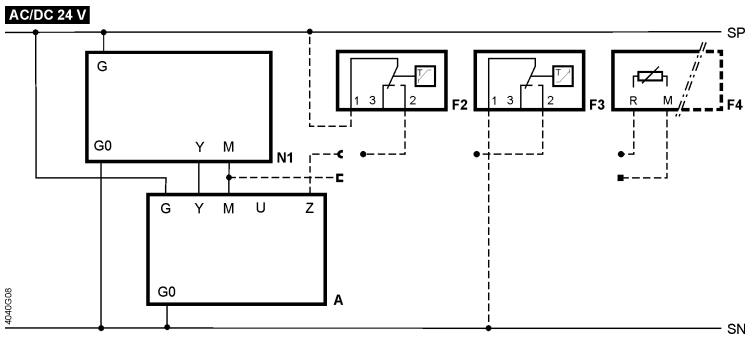
SA..31.5..



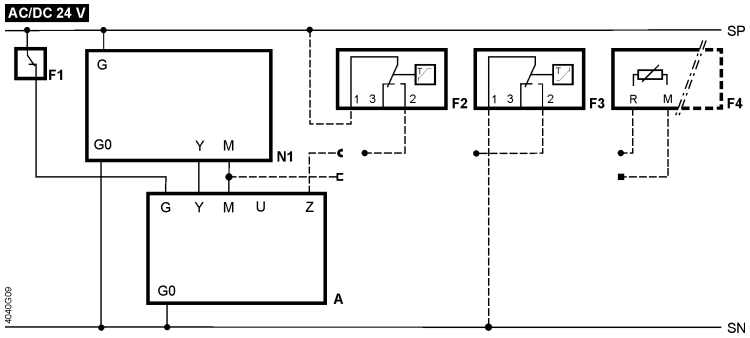
A	Actuator
L	Phase
N	Neutral
N1	Controller
Y1, Y2	Positioning signals
21	System potential

SA..61..

SA..61..



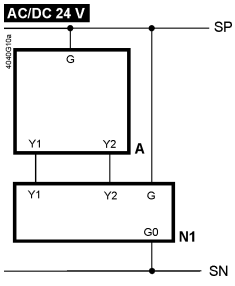
SAS61.33
SAS61.33U
SAS61.53



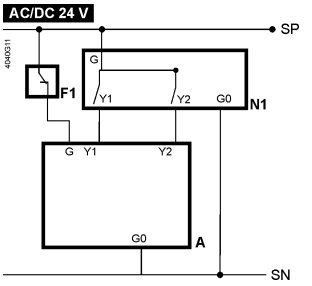
A	Actuator
F1	Temperature limiter
F2	Frost protection thermostat; terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) 1 – 3 normal operation
F3	Temperature detector
F4	Frost protection monitor with 0…1000 Ω signal output, does NOT support QAF21.. or QAF61..
M	Measuring neutral
N1	Controller
SN	System neutral
SP	System potential AC/DC 24 V
U	Position feedback
Y	Positioning signal
Z	Positioning signal forced control

SA..81..

SA..81..



SAS81.33, SAS81.33U



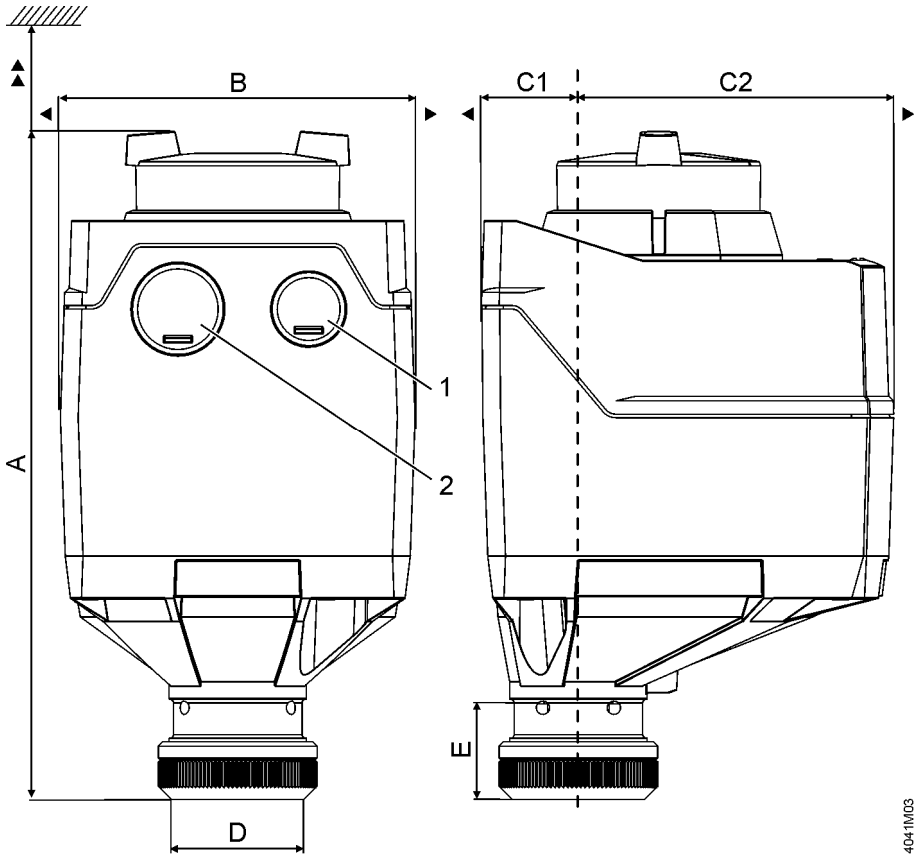
A	Actuator
F1	Temperature limiter
N1	Controller
SN	System neutral
SP	System potential AC/DC 24 V
Y1, Y2	Positioning signals

6.4 Dimensions

6.4.1 Stroke actuators

Dimensions in mm, weights in kg

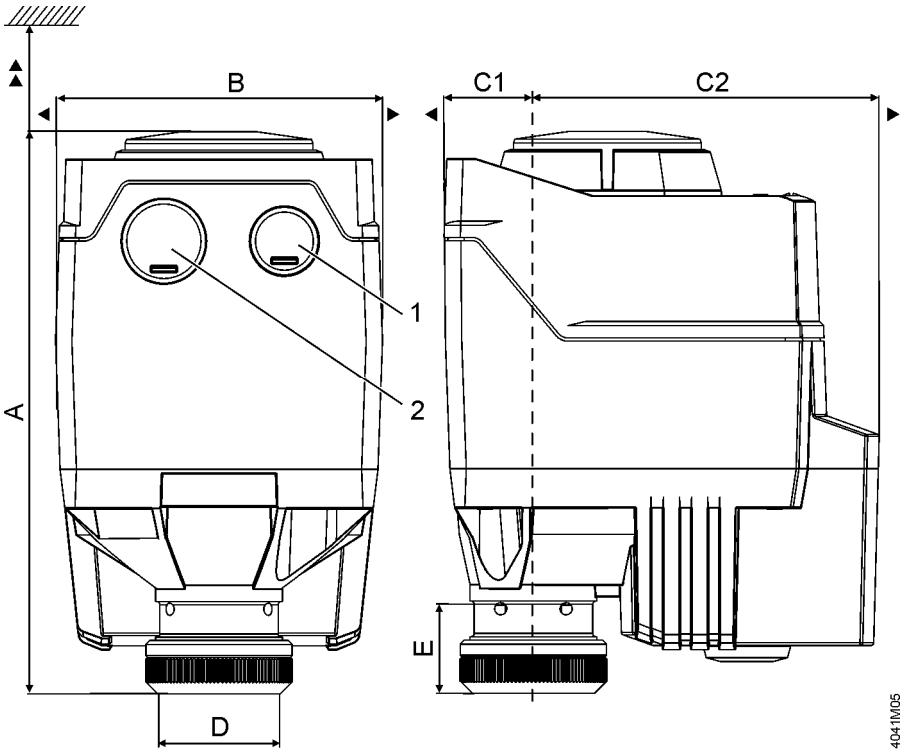
With manual adjuster



1 SA..: M16
SA..U: ½" (Ø 21.5 mm)
2 SA..: M20
SA..U: ½" (Ø 21.5 mm)

Product no.	A	B	C	C1	C2	D	E	►	►►	kg
SAS.. / SAT..	151	80	93	21.9	71.1	29.9	21.8	100	200	0.40
With ASK39.2	155	126	248	99	149	29.9	21.8	100	200	0.55

Without manual adjuster



1 SA..: M16

2 SA..: M20

Product no.	A	B	C	C1	C2	D	E	►	►►	kg
SAT.. / SAT..	137.6 [1)] 151 [2)]	80	106.5	21.9	84.6	29.9	21.8	100	200	0.68
With ASK39.2	155	126	248	99	149	29.9	21.8	100	200	0.83

[1)] Black cover

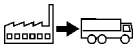
[2)] Blue manual adjuster

Revision numbers

Product no.	Valid from rev. no.	Product no.	Valid from rev. no.	Product no.	Valid from rev. no.
SAS31.00	..A	**SAT31.008**	..A		
SAS31.03	..A	**SAT31.51**	..A		
SAS31.50	..A	**SAT61.008**	..A		
SAS31.53	..A	**SAT61.51**	..A		
SAS61.03	..A				
SAS61.03U	..A				
SAS61.33	..A				
SAS61.33U	..A				
SAS61.53	..A				
SAS81.00	..A				
SAS81.00U	..A				
SAS81.03	..A				
SAS81.03U	..A				
SAS81.33	..A				
SAS81.33U	..A				

7 Glossary

7.1 Symbols

	Caution, general danger – read the notes!
	Caution, hot surface – read the notes!
	Condition as supplied to costumer
	Crosstip screwdriver (Pozidriv)
	Slotted screwdriver
	Screw wrench
	Allen key

7.2 Terms

ClosedPosition-Synchronisation	The Synchronisation of the mechanical position and the internal position control will be performed (after manual operation).
DIL switches	A DIL switch shows the switching choices in the form of a place value system (dual in line) in relation to basis 2 (on and off).
DN	Nominal size [mm]: Characteristic for matching parts of the piping system.
Fail safe function	The fail safe function ensures that the actuator is driven to a defined end position also in the event of a power failure. In normal situations, dampers are shut or valves closed, thus cutting off the medium flow.
kPa	Unit of pressure: 100 kPa = 1 bar = 10 mWS.
k_{vs}	Nominal flow rate: Nominal flow rate of cold water (5…30 °C) through the fully open valve (H_{100}) at a differential pressure of 100 kPa (1 bar).
LED	Light emitting diode.
Idle stroke	The actuator stem lifts off the valve stem slightly (0.2 mm), so that the valve closed securely. If the valve opens again, this idle stroke has to be overcome, before the valve really opens (valve characteristic has an effect).
PN	PN class [bar]: Characteristic relating to the combination of mechanical und dimensional properties of a component in the piping system.
Position feedback	Signal used to acquire the position, fed back via an input.
Forced control	Forced control serves for overriding automatic mode and is implemented in the structure.

Δp_{max} / Δp_{maxV}	Maximum permissible differential pressure across the valve's control path, valid for the entire actuating range of the motorized valve (V = diverting mode).
Δp_s	Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure).

Index

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