SIEMENS

4566

acvatix

Electro-hydraulic actuators for valves

SKB62... SKC62...
SKB60 SKC60

with a 20 mm or 40 mm stroke

- **SK...62...: Operating voltage AC 24 V, control signal DC 0…10 V, 4… 20 mA or 0 ... 1000 Ω , with spring-return function**
- **SK...60: as SK...62, but without spring-return function**
- **SK...62U: as SK...62, but UL-approved**
- **SK...62UA: as SK...62U, but with enhanced functions (stroke limit control, sequence control with adjustable start point and operating range, and choice of direction of operation)**
- **Choice of linear or equal-percentage flow characteristic**
- **Position feedback**
- **Stroke calibration**
- **LED status indication**
- **Override control**
- **Manual adjuster and position indicator**
- **Positioning force 2800 N**
- **For direct mounting on valves; no adjustments required**
- **Additional functions with auxiliary switch, stem heater and mechanical stroke inverter (SKB... only)**
- **SK...62U and SK...62UA are UL-approved**

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Application

For the operation of Siemens two-port and three-port valves, types VVF... and VXF... with a 20 mm or 40 mm stroke.

- Field of application in accordance with IEC 721-3-3 Class 3K5
- Ambient temperatures: −15 ... +55 °C
- Temperature of medium in the connected valve: −25 ... +220 °C
  >220 ... 350 °C: use special extension on valve
  <0 °C: type ASZ6.5 stem heater required

Functions

- Electro-hydraulic actuators; no maintenance required
- Pump, pressure cylinder and piston to open valve
- Return spring and bypass valve to close valve
- Manual adjuster and position indication
- SK...62... with spring-return function to DIN 32730
- Standard electronics:
  - Choice of control signal (DC 0 ... 10 V / 4 ... 20 mA / 0 ... 1000 Ω)
  - Choice of flow characteristic (equal-percentage / linear)
  - Position feedback
  - Stroke calibration
  - LED status indication
  - Override control via terminal Z
- SK...62UA enhanced functions:
  - Stroke limit control
  - Sequence control with adjustable starting position and operating range
  - Choice of direction of operation (direct acting / reverse acting)
- Mounting space for auxiliary switch
- Stem heater can be fitted if required
- Mechanical stroke inverter can be installed if required (SKB... only)
- SK...62U and SK...62UA actuators are UL-approved

Types

SKB... with 20 mm stroke

Type	Operating voltage	Control (Control signal)	Spring-return Function	Spring-return Time	Running time Opening	Running time Closing	Enhanced function
Versions with standard electronics							
SKB62 **SKB62U ***	AC 24 V	DC 0 ... 10 V, 4 ... 20 mA or 0 ... 1000 Ω	Yes	15 s	120 s	15 s	No
SKB60			No	--			
Version with enhanced electronics							
SKB62UA *	AC 24 V	DC 0 ... 10 V, 4 ... 20 mA or 0 ... 1000 Ω	Yes	15 s	120 s	15 s	Stroke limit control Sequence control Signal inversion

SKC... with 40 mm stroke

Type	Operating voltage	Control (Control signal)	Spring-return Function	Spring-return Time	Running time Opening	Running time Closing	Enhanced function
Versions with standard electronics							
SKC62 **SKC62U ***	AC 24 V	DC 0 ... 10 V, 4 ... 20 mA or 0 ... 1000 Ω	Yes	20 s	120 s	20 s	No
SKC60			No	--			
Version with enhanced electronics							
SKC62UA *	AC 24 V	DC 0 ... 10 V, 4 ... 20 mA or 0 ... 1000 Ω	Yes	20 s	120 s	20 s	Stroke limit control Sequence control Signal inversion

***** UL-approved versions

Accessories

Type	Description
ASC1.6	Auxiliary switch
ASZ6.5	Stem heater AC 24 V
ASK51	Mechanical stroke inverter (SKB... only)

Ordering

When ordering please specify the quantity, product name and type code.

Example: **1 actuator, type SKC62** and
1 auxiliary switch ASC1.6

Delivery

The actuator, valve and accessories are supplied in separate packaging and not assembled prior to delivery.

Compatibility

Controllers

The actuators can be driven by all control systems which have an AC 24 V SELV/PELV supply and operate with DC 0 ... 10 V or 4 ... 20 mA signals.

Mounting on linear valves

The actuators are suitable for operation of the following Siemens two-port and three-port valves with a 20 mm or 40 mm stroke:

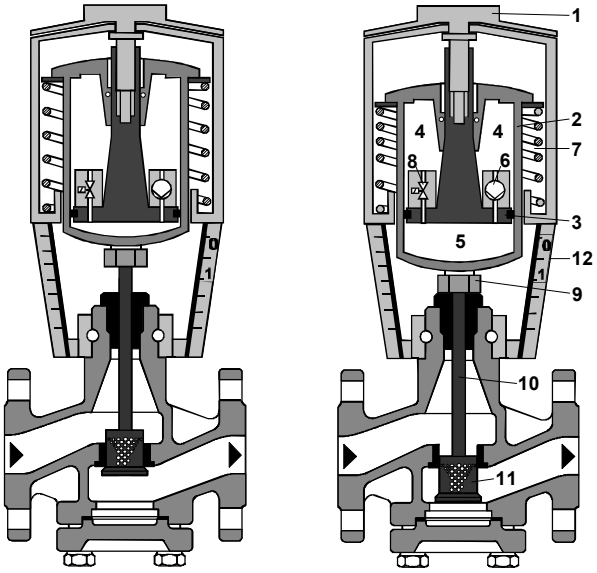
Valve	DN	PN	Data sheet
Two-port valves VV… (control valves or safety shut-off valves):			
VVF21... (Flange)	25 ... 100 mm	6 bar	4310
VVF31... (Flange)	25 ... 150 mm	10 bar	4320
VVF40... (Flange)	15 ... 150 mm	16 bar	4330
VVF41... (Flange)	50 ... 150 mm	16 bar	4340
VVF45... (Flange)	50 ... 150 mm	16 bar	4345
VVF52... (Flange)	15 ... 40 mm	25 bar	4373
VVF61... (Flange)	15 ... 150 mm	40 bar	4382
Three-port valves VX... (control valves for mixing and distribution)			
VXF21... (Flange)	25 ... 100 mm	6 bar	4410
VXF31... (Flange)	25 ... 150 mm	10 bar	4420
VXF40... (Flange)	15 ... 150 mm	16 bar	4430
VXF41... (Flange)	15 ... 150 mm	16 bar	4440
VXF61... (Flange)	15 und 25 mm	40 bar	4482

For admissible differential pressures Δp_{max} and closing pressures Δp_s, refer to the relevant valve data sheets.

Note

Third-party valves with strokes between 6 and 20 mm (SKB...) and 12 ... 40 mm (SKC...) can be motorized, provided they are «closed with the de-energized» fail-safe mechanism and provided that the necessary mechanical coupling is available.
We recommend that you contact local Siemens office for the necessary information.

Principles of electro-hydraulic actuators

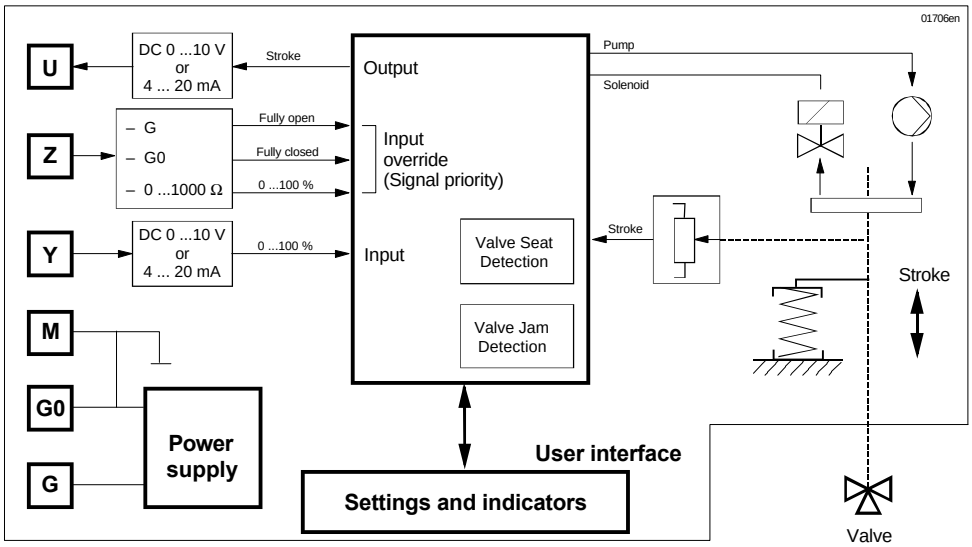


Valve closed Valve open

1	Manual adjuster
2	Pressure cylinder
3	Piston
4	Reservoir
5	Pressure chamber
6	Pump
7	Return spring
8	Bypass valve
9	Coupling
10	Valve stem
11	Inner valve
12	Position indicator (0 to 1)

- **Signal input Y increasing:** The pump (**6**) forces hydraulic oil from the reservoir (**4**) into the pressure chamber (**5**) thereby generating the stroke: the valve stem (**10**) is retracted and the valve plug opens (**11**).
- **Signal input Y decreasing:** The bypass valve (**8**) opens, allowing the hydraulic oil to flow back from the pressure chamber (**5**) into the reservoir (**4**) via the return spring (**7**). The valve stem (**10**) extends and the valve plug closes (**11**).
- **Signal input Y constant**: The actuator and valve hold the current stroke position.

Schematic diagram of the SKB… and SKC... actuator electronics

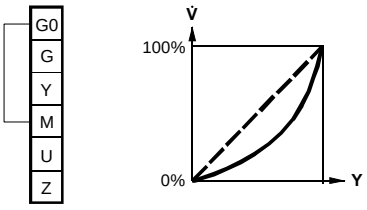
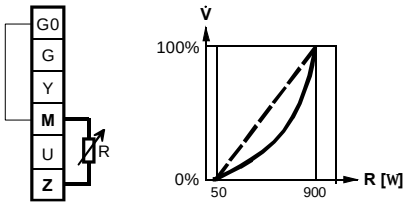
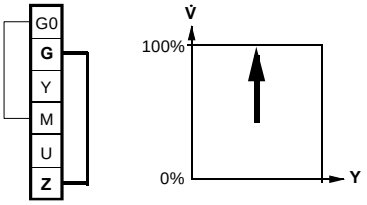
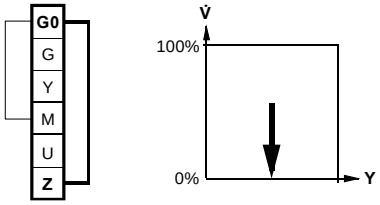


Spring-return function

All SK...62… actuators are factory-fitted with a spring-return function, so that if the control signal or power supply fails, the actuator will return to the «0%» stroke position. The SK...60 is without spring-return function. In case of a power failure the actuator remains in the current stroke position.

Override control

The override control input (Z) has three modes of operation:

No function	Override with 0 ... 1000 W
 – Z-contact not wired – Valve stroke follows control signal Y	 – Z-contact connected to M via resistor R – Linear or equal-percentage characteristic – Starting position at 50 Ω / end position at 900 Ω – Y-input has no effect
Valve fully opened	**Valve fully closed**
 – Z-contact connected directly to G – Y-input has no effect	 – Z-contact connected directly to G0 – Y-input has no effect

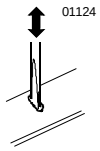
Note

The Z-modes shown assume the factory-setting «direct-acting».

Stroke calibration

To determine the stroke positions 0 and 100% in the valve, calibration is required when the valve/actuator are commissioned for the first time. For this purpose, the actuator must be mechanically connected to a Siemens valve (see «Compatibility») and must have a supply voltage of AC 24 V. The calibration procedure can be repeated as often as necessary.

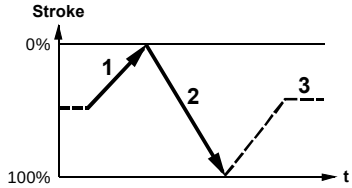
⚠ **Before starting calibration, ensure that the manual adjuster is set to «Automatic» in order to register the actual values.**



There is a slot on the printed circuit boards of the actuators. To initiate the calibration procedure, the contacts inside this slot must be short-circuited (e.g. with a screwdriver).

Automatic calibration proceeds as follows:

- Actuator runs to the «0 stroke» position (**1**), valve closes, green LED flashes.
- Actuator then runs to the «100 stroke» position (**2**), valve opens, green LED flashes.
- Measured values are stored.
  The calibration procedure is finish, and the green LED now glows steadily (normal operation).
- The actuator now moves to the position defined by control signal Y or Z (**3**).



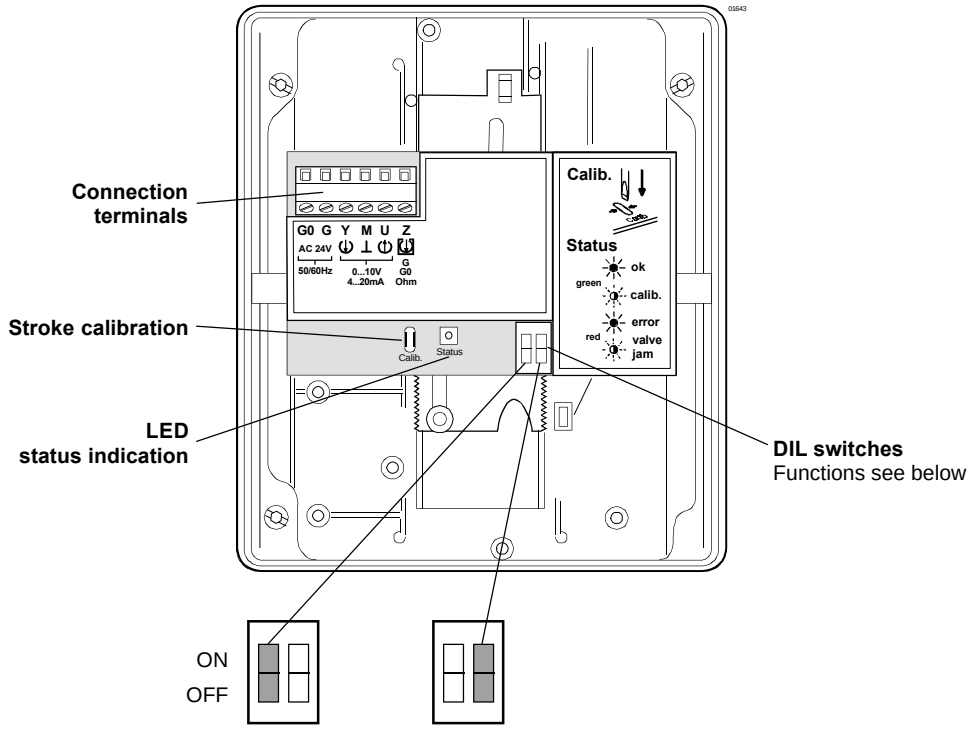
- Throughout this procedure, output U is inactive, i.e. the values only represent actual positions when the green LED stops flashing and remains on continuously.

LED status indication

LED	Display	Function	Action
Green	**On**	• Normal operation	Automatic operation, no problems
	Flashing	• Stroke calibration in progress	Wait until calibration is complete (LED stops flashing)
Red	**On**	• Faulty stroke calibration	Check mounting Re-start stroke calibration (by short-circuiting calibration slot)
		• Internal error	Replace electronics
	Flashing	• Inner valve jammed	Check the valve
	Off	• No power supply	Check mains
		• Faulty electronics	Replace electronics

Standard electronics

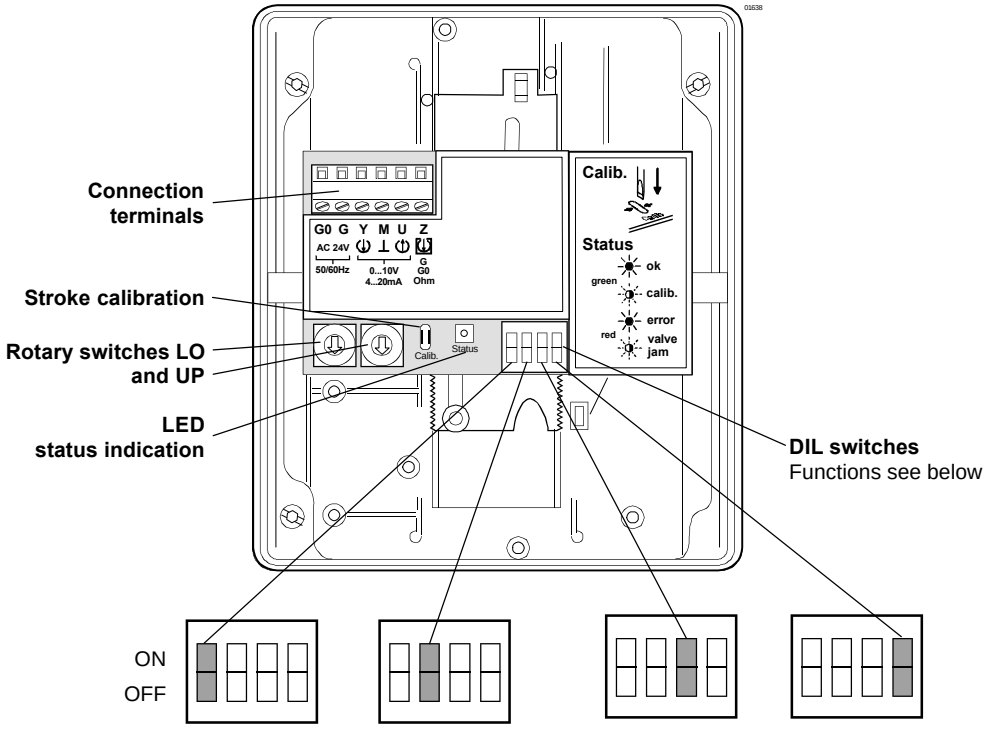
SKB62, SKC62
SKB60, SKC60
SKB62U, SKC62U



DIL switches	Selection of control signal	Selection of flow characteristic
ON	**DC 4 ... 20 mA**	**Linear**
* OFF	**DC 0 ...10 V**	**Equal percentage**

Enhanced electronics

SKB62UA, SKC62UA

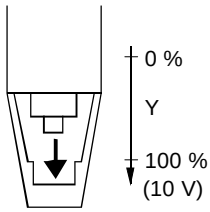
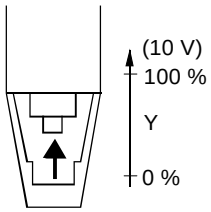


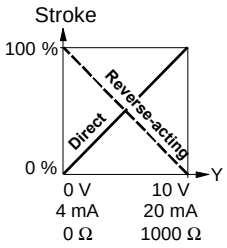
DIL switches	Select direction of operation	Sequence control or stroke limit control	Selection of control signal	Selection of flow characteristic
ON	**Reverse-acting**	**Sequence control**	**DC 4 ... 20 mA**	**Linear**
* OFF	**Direct-acting**	**Stroke limit control**	**DC 0 ...10 V**	**Equal percentage**

***** Factory settings all switches OFF

Selecting the direction of operation

- With normally-closed valves, «direct-acting» means that with a signal input of 0 V, the valve closes (applies to all Siemens valves listed under «Compatibility» on page 3)
- With normally-open valves, «direct-acting» means that with a signal input of 0 V, the valve is open.

Direct-acting	Reverse-acting
	
– Input DC 0 ... 10 V DC 4 ... 20 mA 0 ... 1000 Ω	– Input DC 10 ... 0 V DC 20 ... 4 mA 1000 ... 0 Ω

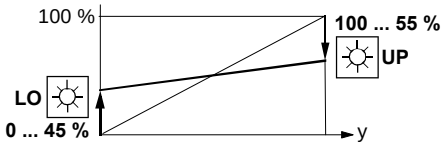


Note The mechanical spring-return function is not affected by the direction of operation selected.

Stroke limit control and sequence control

Setting the stroke limit control

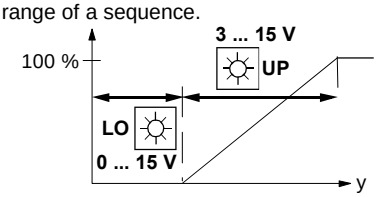
The rotary switches LO and UP can be used to apply an upper and lower limit to the stroke in increments of 3%, up to a maximum of 45%



Position of LO	Lower stroke limit	Position of UP	Upper stroke limit
0	0 %	**0**	100 %
1	3 %	**1**	97 %
2	6 %	**2**	94 %
3	9 %	**3**	91 %
4	12 %	**4**	88 %
5	15 %	**5**	85 %
6	18 %	**6**	82 %
7	21 %	**7**	79 %
8	24 %	**8**	76 %
9	27 %	**9**	73 %
A	30 %	**A**	70 %
B	33 %	**B**	67 %
C	36 %	**C**	64 %
D	39 %	**D**	61 %
E	42 %	**E**	58 %
F	45 %	**F**	55 %

Setting the sequence control

The rotary switches LO and UP can be used to determine the starting point or the operating range of a sequence.



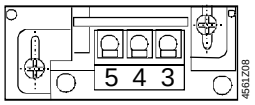
Position of LO	Starting point for sequence control	Position of UP	Operating range of sequence control
0	0 V	**0**	10 V
1	1 V	**1**	3 V *
2	2 V	**2**	3 V *
3	3 V	**3**	3 V *
4	4 V	**4**	4 V
5	5 V	**5**	5 V
6	6 V	**6**	6 V
7	7 V	**7**	7 V
8	8 V	**8**	8 V
9	9 V	**9**	9 V
A	10 V	**A**	10 V
B	11 V	**B**	11 V
C	12 V	**C**	12 V
D	13 V	**D**	13 V
E	14 V	**E**	14 V
F	15 V	**F**	15 V

***** The smallest adjustment is 3 V; control with 0…30 V is only possible via Y.

Accessories

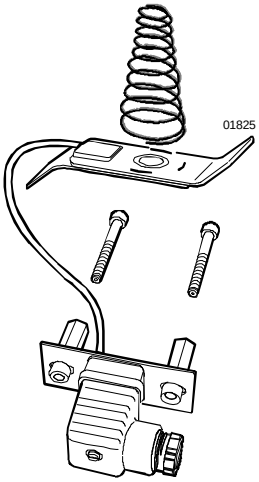
ASC1.6 auxiliary switch

– Switching point 0 … 5 % stroke



ASZ6.5 stem heater

– For media below 0°C
– Mount between valve and actuator



Engineering notes

The actuators must be electrically connected in accordance with local wiring regulations and with the wiring diagram on page 12.

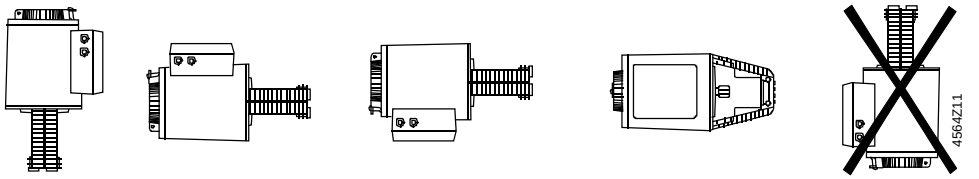
⚠ **Regulations and requirements designed to ensure the safety of people and property must be observed at all times.**

The ASZ6.5 stem heater has a heat output of 30 VA and is required to keep the valve stem free of ice in the cooling range 0 °C ... - 25 °C. In this case, in order to ensure adequate air circulation, the actuator bracket and the valve stem must not be insulated. Physical contact with unprotected hot components can cause burns. Failure to observe the above advice can result in accidents or fire.

The admissible temperatures (see «Application» and «Technical data») must be observed.

Mounting instructions

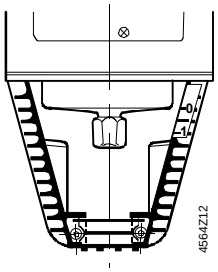
Orientation



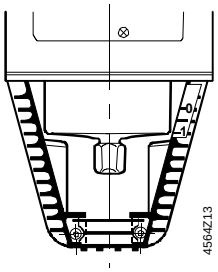
Permissible **Not permissible**

Instructions for fitting the actuator to the valve are bypacked in the actuator packaging. The instructions for accessories are enclosed with the accessories themselves.

When commissioning the system, check the wiring and functions, and set any auxiliary switches, potentiometers and stroke limit devices as necessary, or check the existing settings.



Cylinder with valve stem connector fully retracted
→ stroke = 0 %

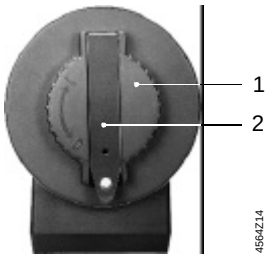


Cylinder with valve stem connector fully extended
→ stroke = 100 %

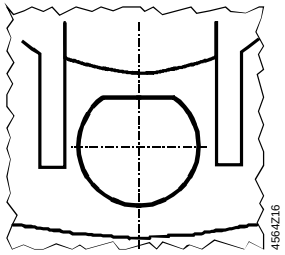
⚠ **The manual adjuster must be rotated counterclockwise to the end stop. This causes the Siemens valves, types VVF... and VXF... to close (stroke = 0%).**

Automatic operation

For automatic operation, the crank (**2**) on the manual adjustment knob (**1**) must be engaged. If not engaged, turn the crank counter-clockwise until the display window (**3**) neither shows the scale (**4**) nor the crank engagement bar.



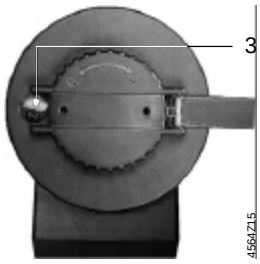
Engaged crank (**2**) on the manual adjustment knob (**1**)



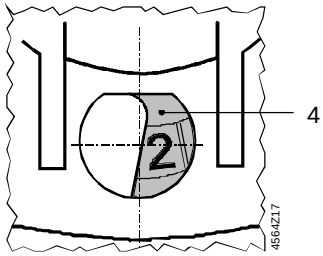
Display window with invisible scale dial and crank engagement bar

Manual operation

For manual operation, swing out the crank (**2**) so that the display window (**3**) becomes visible. By rotating the crank or the manual adjustment knob (**1**), the display window shows the engagement bar and/or the scale dial with stroke indication.



Swung-out crank, display window (**3**)



Display window with scale dial (**4**) and stroke indication

Maintenance

⚠ **When servicing the valve:**

- **Switch OFF the pump and power supply, close the main shut-off valves in the pipework, release pressure in the pipes and allow them to cool down completely. If necessary, disconnect electrical connections from terminals.**
- **The valve must be re-commissioned only with the actuator correctly assembled.**

Disposal

The actuator includes electrical and electronic components and must not be disposed of as domestic waste.
Current local legislation must be observed.

Warranty

The application-related technical data (Δp_{max}, Δp_s, leakage, noise levels and service life) is valid for the Siemens actuators only in conjunction with the Siemens valves listed in the section on «Compatibility».

⚠ **Before using these actuators with third-party valves, written approval must be obtained from Siemens Building Technologies. A failure to obtain this approval invalidates any guarantee.**

Technical data

Power supply	Operating voltage (SELV, PELV)	AC 24 V –20 % / +30 %	
	Frequency	50 or 60 Hz	
	Power consumption		
	SKB62...	17 VA / 12 W	
	SKB60	13 VA / 10 W	
	SKC62...	28 VA / 20 W	
	SKC60	24 VA / 18 W	
	External supply cable fuse		
	SKB...	Min. 1 A slow blow, max. 10 A slow blow	
	SKC...	Min. 1,6 A slow blow, max. 10 A slow blow	
Operating data	Type of control (proportional)	DC 0 ... 10 V, DC 4 ... 20 mA or 0 ... 1000 Ω	
	Running time at 50 Hz	*Opening*	*Closing*
	SKB...	120 s	15 s
	SKC...	120 s	20 s
	Spring-return time (closing)		
	SKB...	15 s	
	SKC...	20 s	
	Nominal stroke		
	SKB...	20 mm	
	SKC...	40 mm	
	Positioning force	2800 N	
	Flow characteristic	Linear / equal percentage can be selected *	

* in conjunction with valves listed under «Compatibility» on page 3

Signal inputs	Terminal Y	
	Voltage	DC 0 ... 10 V
	Input impedance	100 kΩ
	Current	DC 4 ... 20 mA
	Input impedance	240 Ω
	Signal resolution	<1 %
	Hysteresis	1 %
	Terminal Z	
	Resistance	0 ... 1000 Ω
	Override control functions	
	Z not connected	No function (priority at Terminal Y)
	Z connected directly to G	Max. stroke 100 %
	Z connected directly to G0	Min. stroke 0 %
	Z connected to M via 0 ... 1000 Ω	Linear / equal percentage
Signal outputs	Terminal U	
	Voltage	DC 0 ... 9.8 V ±2 %
	Load impedance	>500 Ω
	Current	DC 4 ... 19.6 mA ±2 %
	Load impedance	<500 Ω
General ambient conditions	Maximum admissible temperature of medium in the connected valve:	≤220 °C
	Operation	To IEC 721-3-3
	Environmental conditions	Class 3K5
	Temperature	–15 ... +50 °C
	Humidity	5 ... 95 % rh
	Transport	To IEC 721-3-2
	Environmental conditions	Class 2K3
	Temperature	–30 ... +65 °C
	Humidity	<95 % rh
	Storage	To IEC 721-3-1
	Environmental conditions	Class 1K3
	Temperature	–15 ... +50 °C
	Humidity	5 ... 95 % rh
Industry standards	Meets the requirements for **CE** marking in	
	EMC Directive	89/336/EEC
	Low Voltage Directive	73/23/EEC
	Electromagnetic compatibility	
	Emitted interference	EN 61000-6-3 Residential
	Interference immunity	EN 61000-6-2 Industrial
	Product standards for automatic electric controls	EN 60 730-2-14
	C-tick	N474
	Protection standard	IP54 to EN 60529
	Protection class	III to EN 60730
	UL approval	UL 873
Dimensions		See «Dimensions»
Weight	SKB...	8,60 kg (including packaging)
	SKC...	10,00 kg (including packaging)
	ASK51 stroke inverter	1,10 kg (including packaging)
Materials	Actuator housing and bracket	Die-cast aluminum
	Housing box and manual adjuster	Plastic
Cable glands	SK...62, SK...60	Pg 11 (4 x)
	SK...62U, SK...62UA	Pg 16 (4 x)

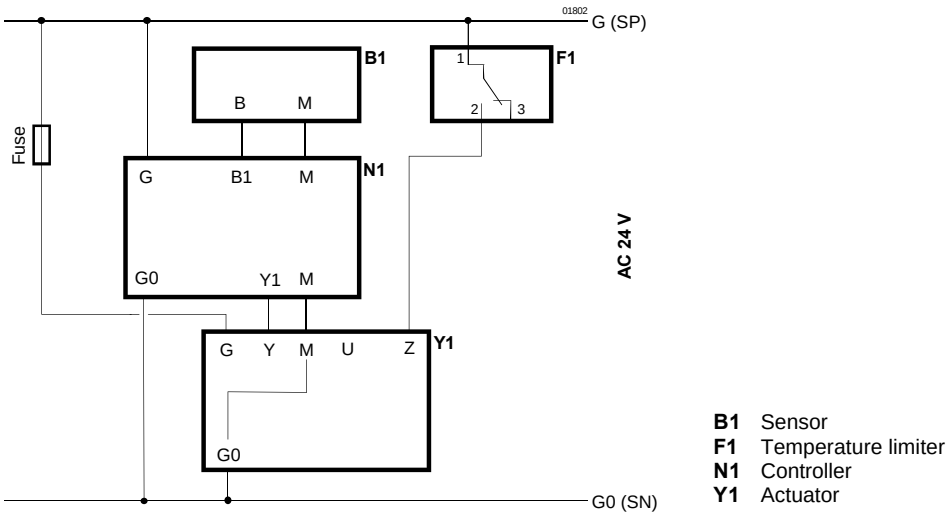
SK...62UA enhanced functions

Direction of operation	Direct acting / reverse acting	DC 0 ... 10 V / DC 10 ... 0 V DC 4 ... 20 mA / DC 20 ... 4 mA 0 ... 1000 Ω / 1000 ... 0 Ω
Stroke limit control	Range of lower limit	0 ... 45 % adjustable
	Range of upper limit	100 ... 55 % adjustable
Sequence control	Terminal Y	
	Starting point of sequence	0 ... 15 V adjustable
	Operating range of sequence	3 ... 15 V adjustable

Accessories

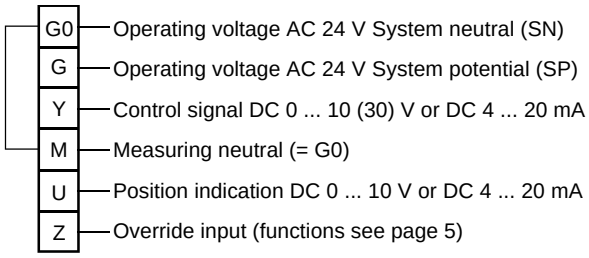
ASC1.6 auxiliary switch	Switching capacity of auxiliary switch	AC 24 V, 10 mA ... 4 (2) A
ASZ6.5 stem heater	Operating voltage	AC 24 V ±20 %
	Power consumption (heat output)	30 VA

Connection diagram

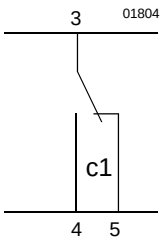


B1 Sensor
F1 Temperature limiter
N1 Controller
Y1 Actuator

Connection terminals

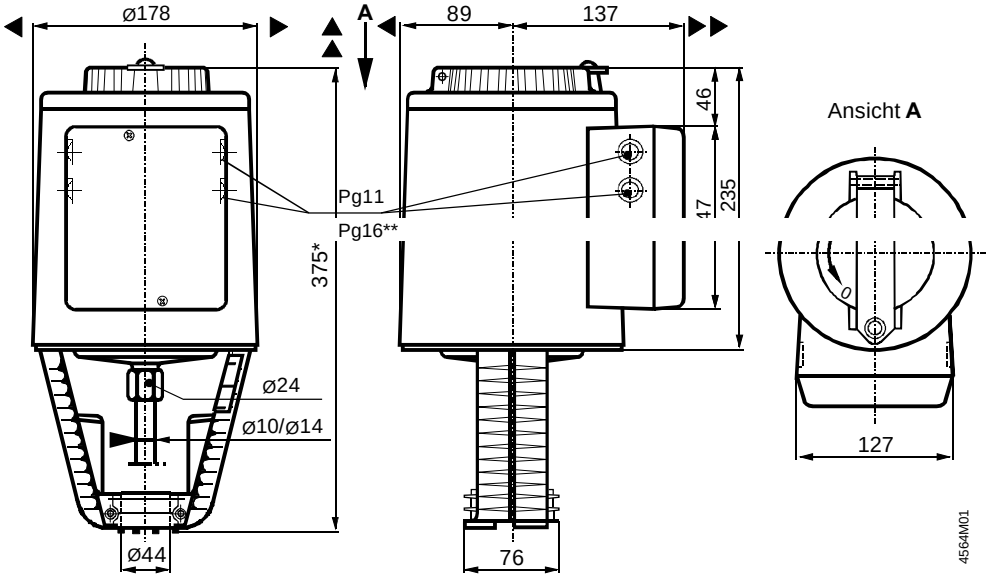


ASC1.6 auxiliary switch



Dimensions

All dimensions in mm



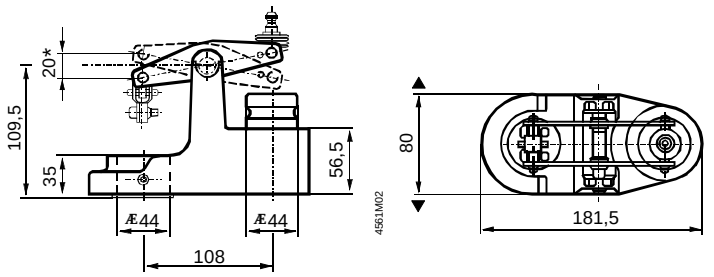
* Height of actuator from valve plate without stroke inverter **ASK51 = 300 mm**
Height of actuator from valve plate with stroke inverter **ASK51 = 357 mm**

** The hole diameter on the SK...62U... actuators corresponds to the Pg16 gland.

▲ = >100 mm ⌈ Minimum clearance from ceiling or wall for mounting,

▲▲ = >200 mm ⌊ connection, operation, maintenance etc.

ASK51 stroke inverter



* Maximum stroke = 20 mm