



Electrohydraulic actuators for valves

SKD..SL..

with a 20 mm stroke

-
- **SKD32..SL** Operating voltage AC 230 V, 3-position control signal
 - **SKD82.50SL** Operating voltage AC 24 V, 3-position control signal
 - **SKD60SL** Operating voltage AC 24 V, control signal DC 0...10 V, 4...20 mA or 0...1000 Ω ; choice of flow characteristic, position feedback, stroke calibration, LED status indication, override control
 - **Positioning force 800 N**
 - **Actuator versions with or without spring-return function**
 - **For direct mounting on valves; no adjustments required**
 - **Manual adjuster and position indicator**
 - **Optional functions with auxiliary switches, potentiometer, stem heater and mechanical stroke inverter**

Use

For the operation of Siemens 2-port and 3-port valves, types VVF.., VVG.., VXF.. and VXG.. with a 20 mm stroke as control and safety shut-off valves in heating, ventilation and air conditioning systems.

Types

Type	Operating voltage	Positioning signal	Spring return		Positioning time	
			function	time	opening	closing
SKD32.50SL	AC 230 V	3-position			120 s	120 s
SKD32.21SL ¹⁾			yes	8 s	30 s	10 s
SKD82.50SL	AC 24 V	DC 0...10 V, 4...20 mA, or 0...1000 Ω			120 s	120 s
SKD60SL					30 s	15 s

¹⁾ Control devices MK..5.., MK..6.. and MK..5..G are TÜV tested as per DIN EN 14597 and can therefore be used as control devices with safety shut-off function for protection against excessive temperature and pressure.

TÜV tested as per DIN EN 14597

Product number	Stock number	Description	Data sheet
MK..5..	S55329-M1..	Control device PN 25 for safety function per DIN EN 14597, for water	N4387
MK..6..	S55329-M1..	Control device PN 40 for safety function per DIN EN 14597, for water, steam, brine and heat transfer oil	N4388
MK..5..G	S55329-M1..	Control device PN 25 for safety function per DIN EN 14597, for steam	N4389

Accessories

Type	Description	For actuator	Mounting location
ASC1.6	Auxiliary switch	SKD60SL	1 x ASC 1.6
ASC9.3	Dual auxiliary switches	SKD32..SL SKD82.50SL	1 x ASC9.3 or
ASZ7.3	Potentiometer 1000 Ω		1 x ASZ7.3 or
ASZ7.31	Potentiometer 135 Ω		1 x ASZ7.31 or
ASZ7.32	Potentiometer 200 Ω		1 x ASZ7.32
ASZ6.5	Stem heater AC 24 V	SKD..SL	1 x ASZ6.5
ASK50	Mechanical stroke inverter		1 x ASK50

Ordering

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

Example: 1 actuator, type SKD32.50SL and

1 potentiometer, 135 Ω, type ASZ7.31



Delivery

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

Spare parts

See overview, section «Replacement parts», page 15.

Equipment combinations

Valve type		DN	PN-class	k_{vs} [m ³ /h]	data sheet
 Two-port valves VV... (control valves or safety shut-off valves):					
VVF21..	Flange	25...80	6	1.9...100	4310
VVF31..	Flange	15...80	10	2.5...100	4320
VVF40..	Flange	15...80	16	1.9...100	4330
VVF53..	Flange	15...50	25	0.16...40	4404
VVG41..	Threaded	15...50	16	0.63...40	4363
 Three-port valves VX... (control valves for «mixing» and «diverting»):					
VXF21..	Flange	25...80	6	1.9...100	4410
VXF31..	Flange	15...80	10	2.5...100	4420
VXF40..	Flange	15...80	16	1.9...100	4430
VXF53..	Flange	15...50	25	1.6...40	4405
VXG41..	Threaded	15...50	16	1.6...40	4463

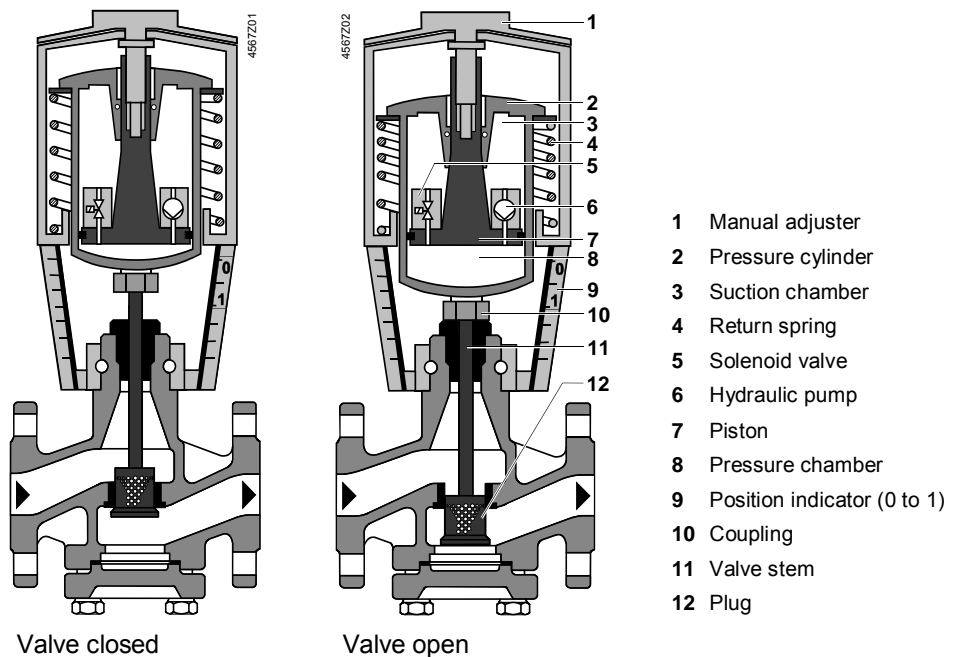
For admissible differential pressures Δp_{max} and closing pressures Δp_s , refer to the relevant valve data sheets.

Note Third-party valves with strokes between 6...20 mm can be motorized, provided they are «closed with the de-energized» fail-safe mechanism and provided that the necessary mechanical coupling is available. The Y1 signal must be routed via an additional freely-adjustable end switch (ASC9.3) to limit the stroke. We recommend that you contact your local Siemens office for the necessary information.

Rev. no. Overview table, see page 15.

Technology

Principle of electro-hydraulic actuators



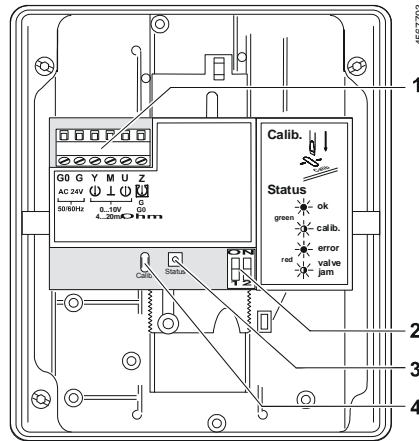
- 1 Manual adjuster
- 2 Pressure cylinder
- 3 Suction chamber
- 4 Return spring
- 5 Solenoid valve
- 6 Hydraulic pump
- 7 Piston
- 8 Pressure chamber
- 9 Position indicator (0 to 1)
- 10 Coupling
- 11 Valve stem
- 12 Plug

Opening the valve The hydraulic pump (6) forces oil from the suction chamber (3) to the pressure chamber (8) and thereby moving the pressure cylinder (2) downwards. The valve stem (11) retracts and the valve opens. Simultaneously the return spring (4) is compressed.

Closing the valve Activating the solenoid valve (5) allows the oil in the pressure chamber to flow back into the suction chamber. The compressed return spring moves the pressure cylinder upwards. The valve stem extends and the valve closes





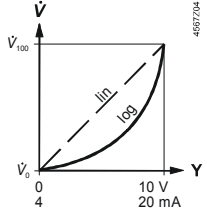
Manual operation mode	<p>Turning the manual adjuster (1) clockwise moves the pressure cylinder downwards and opens the valve. Simultaneously the return spring is compressed.</p> <p>In the manual operation mode the control signals Y and Z can further open the valve but not move to the «0%» stroke position of the valve. To retain the manually set position, switch off the power supply or disconnect the control signals Y and Z. The red indicator marked «MAN» is visible.</p>												
Note: Controller in manual operation	<p>When setting the controller for a longer time period to manual operation, we recommend adjusting the actuator with the manual adjuster to the desired position. This guarantees that the actuator remains in this position for that time period. Attention: Do not forget to switch back to automatic operation after the controller is set back to automatic control.</p>												
Automatic mode	<p>Turn the manual adjuster counterclockwise to the end stop. The pressure cylinder moves upward to the «0%» stroke position of the valve. The red indicator marked «MAN» is no longer visible.</p>												
Minimal volumetric flow	<p>The actuator can manually be adjusted to a stroke position > 0 % allowing its use in applications requiring constantly a minimal volumetric flow.</p>												
Spring-return facility	<p>The SKD32.21SL actuator, which features a spring-return function, incorporates an additional solenoid valve which opens if the control signal or power fails. The return spring causes the actuator to move to the «0 %» stroke position and closes the valve.</p>												
TÜV tested as per DIN EN 14597	<p>TÜV tested control devices per DIN EN 14597 can therefore be used as control devices with safety shut-off function for protection against excessive temperature and pressure.</p> <ul style="list-style-type: none"> ▪ Water: MK..5.., PN 25, see data sheet N4387 ▪ Steam: MK..5..G, PN 25, see data sheet N4389 ▪ Water, steam, brine and heat transfer oil: MK..6.., PN40, see data sheet N4388 												
SKD32../SKD82..SL 3-position control signal	<p>The valve is controlled by a 3-position signal either via terminals Y1 or Y2 and generates the desired stroke by means of above described principle of operation.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">• Voltage on Y1</td> <td style="width: 30%;">piston extends</td> <td style="width: 30%;">valve opens</td> </tr> <tr> <td>• Voltage on Y2</td> <td>piston retracts</td> <td>valve closes</td> </tr> <tr> <td>• No voltage on Y1 and Y2</td> <td colspan="2">piston / valve stem remain in the respective position</td> </tr> </table>	• Voltage on Y1	piston extends	valve opens	• Voltage on Y2	piston retracts	valve closes	• No voltage on Y1 and Y2	piston / valve stem remain in the respective position				
• Voltage on Y1	piston extends	valve opens											
• Voltage on Y2	piston retracts	valve closes											
• No voltage on Y1 and Y2	piston / valve stem remain in the respective position												
SKD60SL Y control signal DC 0...10 V and/or DC 4...20 mA, 0...1000 Ω	<p>The valve is either controlled via terminal Y or override control Z. The positioning signal Y generates the desired stroke by means of above described principle of operation.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 40%;">• Signal Y increasing:</td> <td style="width: 30%;">piston extends</td> <td style="width: 30%;">valve opens</td> </tr> <tr> <td>• Signal Y decreasing:</td> <td>piston retracts</td> <td>valve closes</td> </tr> <tr> <td>• Signal Y constant:</td> <td colspan="2">piston / valve stem remain in the respective position</td> </tr> <tr> <td>• Override control Z</td> <td colspan="2">see description of override control input, page 6</td> </tr> </table>	• Signal Y increasing:	piston extends	valve opens	• Signal Y decreasing:	piston retracts	valve closes	• Signal Y constant:	piston / valve stem remain in the respective position		• Override control Z	see description of override control input, page 6	
• Signal Y increasing:	piston extends	valve opens											
• Signal Y decreasing:	piston retracts	valve closes											
• Signal Y constant:	piston / valve stem remain in the respective position												
• Override control Z	see description of override control input, page 6												
Frost protection monitor Frost protection thermostat	<p>A frost protection thermostat can be connected to the SKD60SL actuator. The added signals from the QAF21.. and QAF61.. require the use of SKD62UA actuators.</p> <p>«Connection diagrams» for operation with frost protection thermostat or frost protection monitor refer to page 13.</p>												

Standard electronics
SKD60SL



- 1 Connection terminals
- 2 Mode DIL switches
- 3 LED status indication
- 4 Slot for calibration


DIL switches
SKD60SL

	Positioning signal Y Position feedback U	Flow characteristic
ON	 DC 4...20 mA	 lin = linear
OFF *)	 DC 0...10 V	 log = equal percentage
*) Factory setting: All switches OFF		Relationship between control signal Y and volumetric flow 

Calibration
SKD60SL

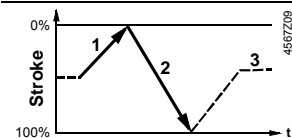
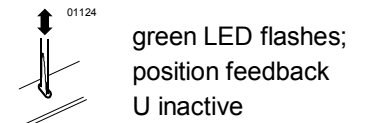
In order to determine the stroke positions 0 % and 100 % in the valve, calibration is required on initial commissioning:

Prerequisites

- Mechanical coupling of the actuator SKD60SL with a Siemens valve
-  **Actuator must be in «Automatic operation» enabling stroke calibration to capture the effective 0 % and 100 % values**
- AC 24 V power supply
- Housing cover removed

Calibration

1. Short-circuit contacts in calibration slot (e.g. with a screwdriver)
2. Actuator moves to «0 %» stroke position (1) (valve closed)
3. Actuator moves to «100 %» stroke position (2) (valve open)
4. Measured values are stored









Normal operation

- | | |
|--|---|
| 5. Actuator moves to the position (3) as indicated by signals Y or Z | green LED is lit permanently; position feedback U active, the values correspond to the actual positions |
|--|---|

A lit red LED indicates a calibration error.
The calibration can be repeated any number of times.

Indication of operating state
SKD60SL

The LED status indication indicates operational status with dual-colored LED and is visible with removed cover.

LED	Indication	Function	Remarks, troubleshooting
Green	Lit 	Normal operation	Automatic operation; everything o.k.
	Flashing 	Calibration in progress	Wait until calibration is finished (LED stops flashing, green or red LED will be lit)
Red	Lit 	Faulty stroke calibration	Check mounting Restart stroke calibration (by short-circuiting calibration slot)
	Flashing 	Internal error	Replace electronics
Both	Dark 	Inner valve jammed	Check valve
	Dark 	No power supply Electronics faulty	Check mains network, check wiring Replace electronics

As a general rule, the LED can assume only the states shown above (continuously red or green, flashing red or green, or off).

Override control input Z
SKD60SL

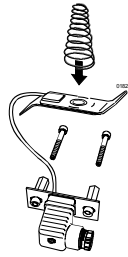
Override control input can be operated in following different modes of operation

		Z-mode				
		no function	fully open	closed	override with 0...1000 Ω	
Connections	Transfer					
		linear or equal-percentage			linear or equal-percentage	
		<ul style="list-style-type: none"> Z-contact not connected Valve stroke follows Y-input 	<ul style="list-style-type: none"> Z-contact connected directly to G Y-input has no effect 	<ul style="list-style-type: none"> Z-contact connected directly to G0 Y-input has no effect 	<ul style="list-style-type: none"> Z-contact connected to M via resistor R Starting position at 50 Ω / end position at 900 Ω Y-input has no effect 	

Note Shown operation modes are based on the factory setting «direct acting»
Y-input has no effect in Z-mode.

SKD..SL

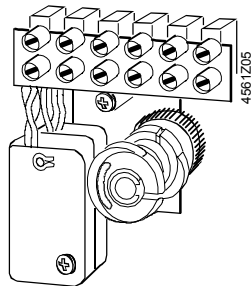
ASZ6.5
stem heater



for media below 0 °C; mount
between valve and actuator

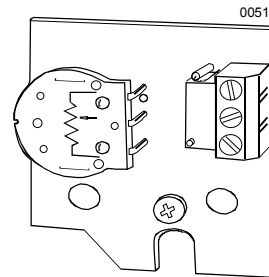
SKD32..SL, SKD82..SL

ASC9.3
double auxiliary switch



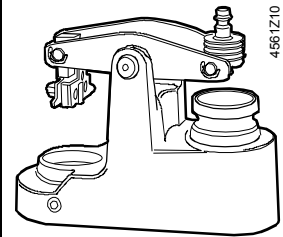
adjustable switching points

ASZ7.3..
potentiometer



ASZ7.3: 0...1000 Ω
ASZ7.31: 0...135 Ω
ASZ7.32: 0...200 Ω

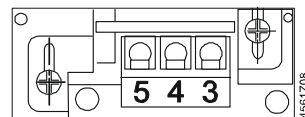
ASK50
stroke inverter



0 % actuator stroke corresponds
to 100 % valve stroke; mount
between valve and actuator

SKD60SL

ASC1.6
auxiliary switch



switching point 0...5 % stroke

See section «Technical data» on page 10 for more information.

Conduct the electrical connections in accordance with local regulations on electrical installations as well as the internal or connection diagrams.

Caution 

Safety regulations and restrictions designed to ensure the safety of people and property must be observed at all times!

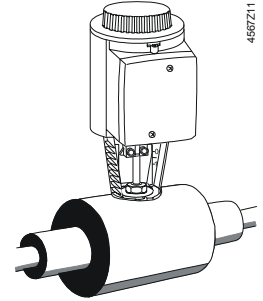
Caution 

For media below 0 °C the ASZ6.5 stem heater is required to keep the valve from freezing. For safety reasons the stem heater is designed for an operating voltage of AC 24 V / 30 W.

For this case, do not insulate the actuator bracket and the valve stem, as air circulation must be ensured. Do not touch the hot parts without prior protective measures to avoid burns.

Non-observance of the above may result in accidents and fires!

Recommendation: Above 140 °C insulating the valves is strictly recommended.



Observe admissible temperatures, refer to «Use» on page 1 and «Technical data» on page 10.

If an auxiliary switch is required, its switching point should be indicated on the plant schematic.

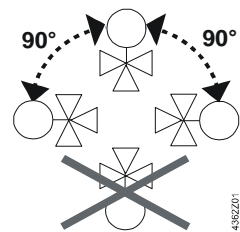
Every actuator must be driven by a dedicated controller (refer to «Connection diagrams», page 13).

Mounting instructions

Mounting Instruction 74 319 0325 0 for fitting the actuator to the valve are by packed in the actuator packaging. The instructions for accessories are enclosed with the accessories themselves.

Accessories	Installation instructions		Accessory	Mounting instructions	
ASC1.6	G4563.3	4 319 5544 0	ASZ6.5	M4563.7	4 319 5564 0
ASC9.3	G4561.3	4 319 5545 0	ASK50	M4561.5	4 319 5549 0
SKD..SL		74 319 0326 0	ASZ7.3...		74 319 0247 0
			SKD..SL	M3250	74 319 0325 0

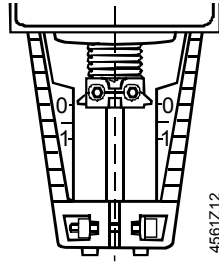
Orientation



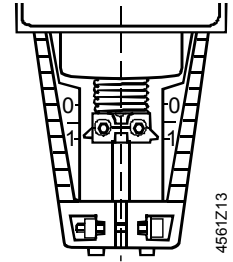
Commissioning notes

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

Coupling fully retracted
→ stroke = 0%

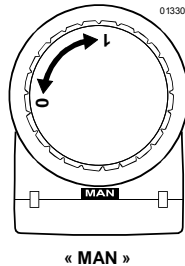


Coupling fully extended
→ stroke = 100 %

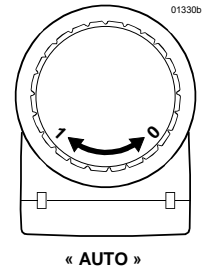


The manual adjuster must be rotated counterclockwise to the end stop, i.e. until the red indicator marked «MAN» is no longer visible. This causes the Siemens valves, types VVF.., VVG.., VXF.. and VXG.. to close (stroke = 0%).

Manual operation



Automatic operation



Maintenance notes



The SKD..SL actuators are maintenance-free.

When servicing the actuator:

- Switch off pump of the hydronic loop
- Interrupt the power supply to the actuator
- Close the main shutoff valves in the system
- Release pressure in the pipes and allow them to cool down completely
- If necessary, disconnect electrical connections from the terminals
- The actuator must be correctly fitted to the valve before recommissioning.

Recommendation SKD60SL: trigger stroke calibration.

Repair

«Replacement parts», see page 15.



A damaged housing or cover represents an injury risk

- **NEVER** uninstall an actuator from the valve
- **Uninstall the valve-actuator combination (actuating device) as a complete device**
- **Use only properly trained technicians to uninstall the unit**
- **Send the actuating device together with an error report to your local Siemens representative for analysis and disposal**
- **Properly mount the new actuating device (valve and actuator)**

Parts could fly ultimately resulting in injuries from uninstalling an actuator with a damaged valve housing due to the tensioned return spring.

Disposal



The device contains electrical and electronic components and must not be disposed of together with domestic waste. This applies in particular to the PCB.

Legislation may demand special handling of certain components, or it may be sensible from an ecological point of view.

Current local legislation must be observed.

Warranty

The technical data relating to specific applications are valid only in conjunction with the valves listed in this Data Sheet under «Equipment combinations», page 3.



The use of the actuators in conjunction with third-party valves invalidates all claims under Siemens Switzerland Ltd warranty.

Technical data

		SKD32..SL	SKD82.50SL	SKD60SL
Power supply	Operating voltage	AC 230 V	AC 24 V	AC 24 V
	Voltage tolerance	± 15 %	± 20 %	-20 % / +30 %
		SELV / PELV		
	Frequency	50 or 60 Hz		
	Max. Power consumption At 50 Hz	SKD32.21SL: 20 VA / 13 W SKD32.50SL: 16 VA / 11 W	13 VA / 8 W	17 VA / 12 W
	External supply cable fuse	min. 0.5 A, slow max. 6 A, slow	min. 1 A, slow max. 10 A, slow	
Signal inputs	Control signal	3-position		DC 0...10 V, DC 4...20 mA or 0...1000 Ω
	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			Resistor 1000 Ω Z not connected No function, priority 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 stroke proportional to R
	Override control			
Position feedback	Terminal U			voltage DC 0...9,8 V load impedance > 10 kΩ current DC 4...19,6 mA load impedance < 500 Ω
	Positioning time at 50 Hz			
Operating data	opening	SKD32.50SL 120 s SKD32.21SL 30 s	120 s	30 s
	Closing	SKD32.50SL 120 s SKD32.21SL 10 s	120 s	15 s
	Spring-return time (closing)	SKD32.21SL 8 s SKD32.50SL -	-	-
	Positioning force	800 N		
	Nominal stroke	20 mm		
	Max. permissible medium temperature	1...100 °C < 0 °C: requires stem heater ASZ6.5		
Electrical connections	Cable entry	4 x M20 (∅ 20.5 mm)		
Norms and standards	CE-conformity			
	EMC-directive	2004/108/EC		
	Immunity	EN 61000-6-2 Industrial		
	Emission	EN 61000-6-3 Residential		
	Low voltage directive	2006/95/EC		
	Electrical safety	EN 60730-1		

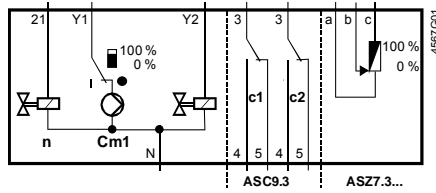
		SKD32..SL	SKD82.50SL	SKD60SL
Product standards for automatic electric controls		EN 60730-2-14		
Protection standard EN 60730		I	III	
Housing protection standard Upright to horizontal		IP54 to EN 60529		
Environmental compatibility		ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EG (RoHS)		
Dimensions / weight	Dimensions	refer to «Dimensions», page 14		
	Weight	SKD32.50SL 3.60 kg SKD32.21SL 3.65 kg	3.60 kg	3.60 kg
Materials	ASK50 stroke inverter	1.10 kg		
	Actuator housing, bracket	Die-cast aluminum		
	Housing box and manual adjuster	Plastic		

Accessories		SKD32..SL, SKD82.50SL	SKD60SL
ASC1.6 Auxiliary switch	Switching capacity		AC 24 V, 10 mA...4 A resistive, 2 A inductive
ASC9.3 double auxiliary switch	Switching capacity per auxiliary switch	AC 250 V, 6 A resistive, 2.5 A inductive	
ASZ7.3 Potentiometer	Change in overall resistance of potentiometer at nominal stroke	ASZ7.3 0...1000 Ω	
		ASZ7.31 0...135 Ω	
		ASZ7.32 0...200 Ω	
	min. current in sliding contact expected lifetime	0,05 mA 250'000 full lifts	
	max. current in sliding contact expected lifetime	2,5 mA 100'000 full lifts	
ASZ6.5 stem heater	Operating voltage	AC 24 V ± 20 %	
	Power consumption	30 VA	

General ambient conditions	Operation	Transport	Storage
	EN 60721-3-3	EN 60721-3-2	EN 60721-3-1
Environmental conditions	Class 3K5	Class 2K3	Class 1K3
Temperature	-15...+50 °C	-30...+65 °C	-15...+50 °C
Humidity	5...95 % r.h.	< 95 % r.h.	5...95 % r.h.

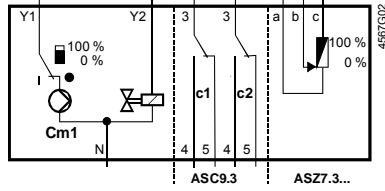
Internal diagrams

SKD32.21SL
AC 230 V, 3-Position

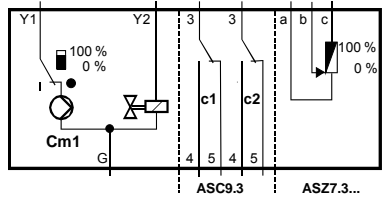


- Cm1** end switch
- n** solenoid valve for spring-return
- c1, c2** ASC9.3 double auxiliary switch
- a, b, c** ASZ7.. potentiometer
- Y1** Positioning signal «open»
- Y2** Positioning signal «close»
- 21** spring-return function
- N** neutral conductor

SKD32.50SL
AC 230 V, 3-Position

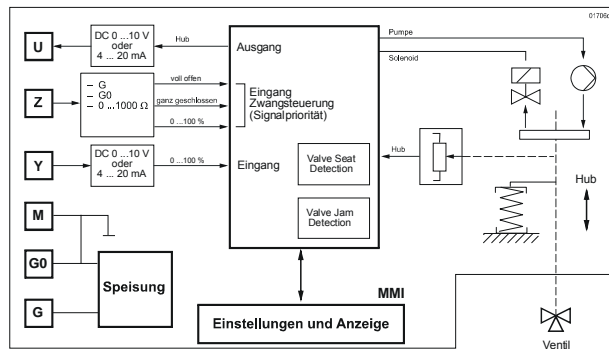


SKD82.50SL
AC 24 V, 3-Position



- Cm1** end switch
- n** solenoid valve for spring-return
- c1, c2** ASC9.3 double auxiliary switch
- a, b, c** ASZ7.. potentiometer
- Y1** Positioning signal «open»
- Y2** Positioning signal «close»
- 21** spring-return function
- G** System potential

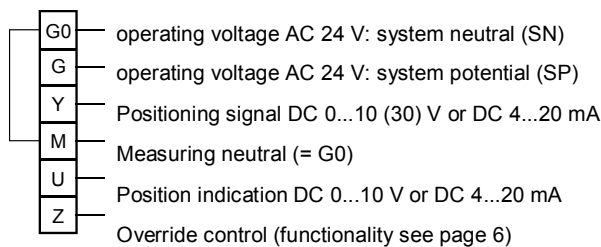
SKD60SL
AC 24 V, DC 0...10 V,
4...20 mA, 0...1000 Ω



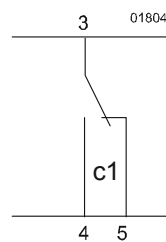
- U** position indication
- Z** override control
- Y** positioning signal
- M** measuring neutral
- G0** operating voltage AC 24 V: system neutral (SN)
- G** operating voltage AC 24 V: system potential (SP)

Connection terminals

SKD60SL



Auxiliary switch
ASC1.6

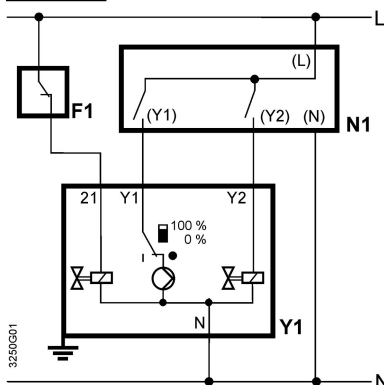


Connection diagrams

SKD32..SL
AC 230 V
3-Position

SKD32.21SL

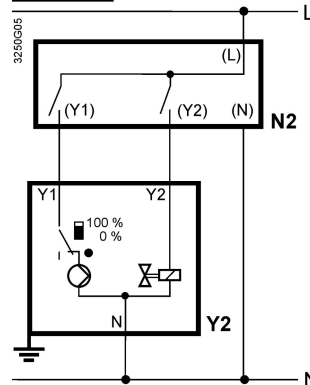
AC 230 V



F1 temperature limiter
N1, N2 controller
Y1, Y2 actuators
L Phase
N neutral

SKD32.50SL

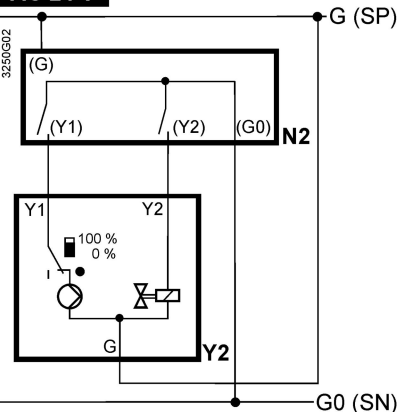
AC 230 V



Y1 Positioning signal «open»
Y2 Positioning signal «close»
21 Spring-return function

SKD82.50SL
AC 24 V
3-Position

AC 24 V

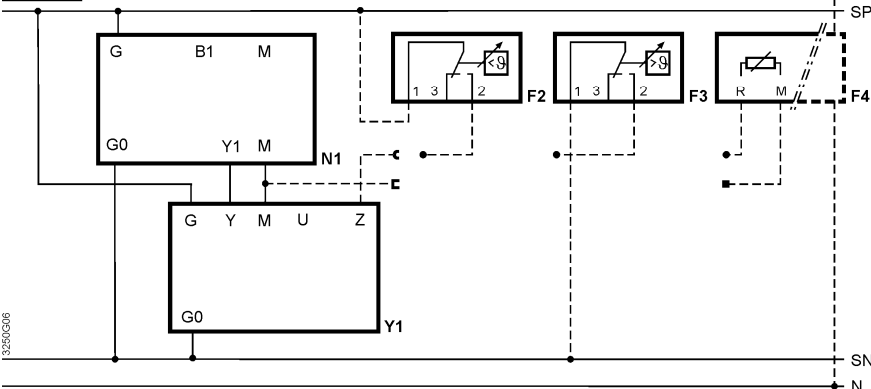


F1 temperature limiter
N1, N2 controller
Y1, Y2 actuators
SP Systempotential AC 24 V
SN System neutral
(Y1), (Y2) controller contacts
Y1 Positioning signal «open»
Y2 Positioning signal «close»
21 Spring-return function

SKD60SL
AC 24 V
DC 0...10 V, 4...20 mA,
0...1000 Ω

AC 230 V

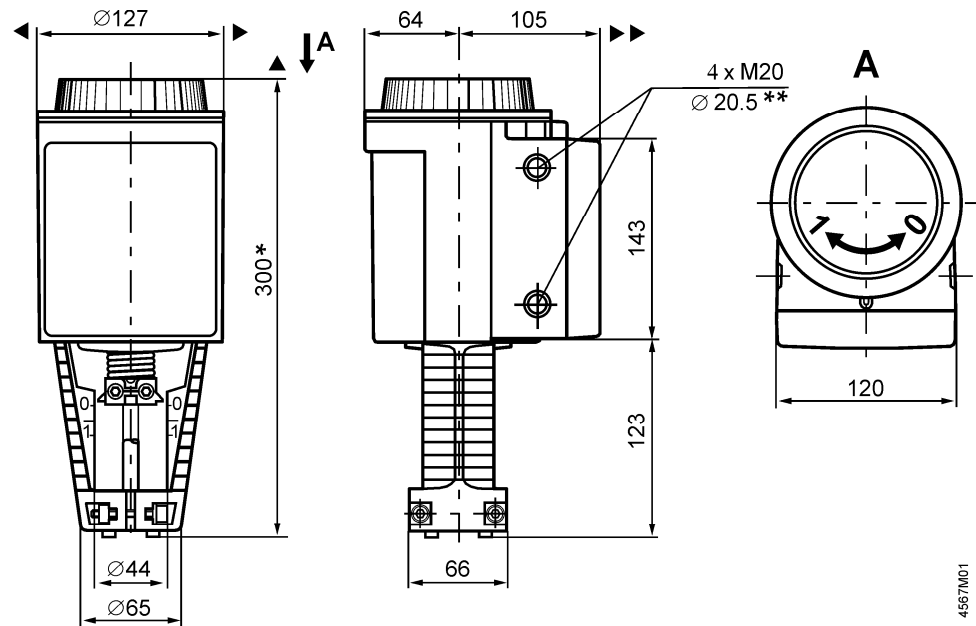
AC 24 V



Y1 actuator
N1 controller
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, e.g. QAF21.. or QAF61..
G (SP) System potential AC 24 V
G0 (SN) System neutral

Dimensions

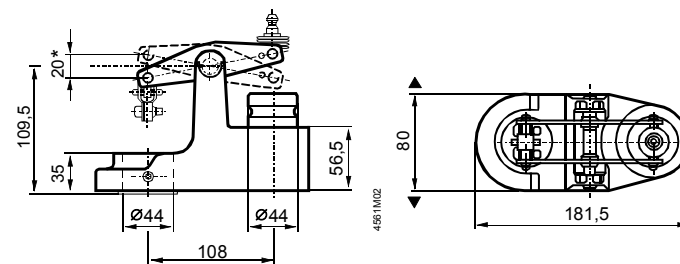
All dimensions in mm



4567M01

- * Height of actuator from valve plate without stroke inverter **ASK50 = 300 mm**
Height of actuator from plate with stroke inverter **ASK50 = 357 mm**
- ▶ = > 100 mm | Minimum clearance from ceiling or wall for mounting,
- ▶▶ = > 200 mm | connection, operation, maintenance etc.

ASK50 stroke inverter



* Maximum stroke = 20 mm

Replacement parts

Order numbers for replacement parts

	Cover	Hand control ¹⁾	Control unit
Actuator type			
SKD32.50SL	410456348	426855048	
SKD32.21SL	410456348	426855048	
SKD82.50SL	410456348	426855048	
SKD60SL	410456348	426855048	466857598

1) hand control, blue with mechanical parts

Revision numbers

Type reference	Valid from Rev.-No.
SKD32.50SL	..E
SKD32.21SL	..E
SKD82.50SL	..E
SKD60SL	..G

