



ACVATIX™

## Control device PN25, safety function to DIN EN 14597 MK..5..G

Preassembled valve-actuator combinations for steam applications

- **MKB532..G** Operating voltage AC 230 V, 3-position control signal
- **MKB562..G** Operating voltage AC 24 V, control signal DC 0...10 V, 4...20 mA or 0...1000 Ω
- **MKB562..G** Choice of flow characteristic, position feedback, stroke calibration, LED status indication, override control
- Electrohydraulic actuators
- With safety function to DIN EN 14597
- With position indicator
- Optional functions with auxiliary switches and potentiometer
- Nodular cast iron EN-GJS-400-18-LT valve body
- DN 15...40
- $k_{vs}$  1.25...25 m<sup>3</sup>/h

### Use

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Control devices with safety shut-off function per DIN EN 14597 for protection against excessive temperature and pressure in district heating, heating, ventilation and air conditioning systems using steam as medium.  
For closed circuits.

## Type summary

Control device	MKB532..G		MKB562..G		2-port valve				
Operating voltage	Electrohydraulic actuator 2800 N, 120 s				$\Delta p_{\max}$ [kPa]	$\Delta p_s$ [kPa]	DN	$k_{vs}$ [m <sup>3</sup> /h]	$S_v$
	AC 230 V	AC 24 V							
Positioning signal	3-position		DC 0...10 V, DC 4...20 mA, 0...1000 $\Omega$						
	Product number	Stock number	Product number	Stock number					
	MKB532.15-1.2G	S55329-M123-A110	MKB562.15-1.2G	S55329-M123-A111	600 <sup>1)</sup>	600 <sup>1)</sup>	15	1.25	50 ... 100
	MKB532.15-1.6G	S55329-M124-A110	MKB562.15-1.6G	S55329-M124-A111				1.6	
	MKB532.15-2G	S55329-M125-A110	MKB562.15-2G	S55329-M125-A111				2	
	MKB532.15-2.5G	S55329-M126-A110	MKB562.15-2.5G	S55329-M126-A111				2.5	
	MKB532.15-3.2G	S55329-M127-A110	MKB562.15-3.2G	S55329-M127-A111				3.2	
	MKB532.15-4G	S55329-M128-A110	MKB562.15-4G	S55329-M128-A111				4	
	MKB532.25-5G	S55329-M129-A110	MKB562.25-5G	S55329-M129-A111			25	100 ... 200	5
	MKB532.25-6.3G	S55329-M130-A110	MKB562.25-6.3G	S55329-M130-A111					6.3
	MKB532.25-8G	S55329-M131-A110	MKB562.25-8G	S55329-M131-A111					8
	MKB532.25-10G	S55329-M132-A110	MKB562.25-10G	S55329-M132-A111					10
	MKB532.40-12G	S55329-M133-A110	MKB562.40-12G	S55329-M133-A111			40	100 ... 200	12.5
	MKB532.40-16G	S55329-M134-A110	MKB562.40-16G	S55329-M134-A111					16
	MKB532.40-20G	S55329-M135-A110	MKB562.40-20G	S55329-M135-A111					20
	MKB532.40-25G	S55329-M136-A110	MKB562.40-25G	S55329-M136-A111					25

<sup>1)</sup> Permissible working pressure and medium temperature refer to diagram page 7 and 10

DN = Nominal size

$k_{vs}$  = Nominal flow rate of cold water (5...30 °C) through the fully open valve ( $H_{100}$ ) by a differential pressure of 100 kPa (1 bar)

$S_v$  = Rangeability  $k_{vs}/k_{vr}$

$k_{vr}$  = Smallest  $k_v$  value, at which the flow characteristic tolerances can still be maintained, by a differential pressure of 100 kPa (1 bar)

## Accessories

Product number	Description	For control devices	Mounting location
ASC1.6	Auxiliary switch	MKB562..G	1 x ASC 1.6
ASC9.3	Dual auxiliary switches	MKB532..G	1 x ASC9.3 or
ASZ7.3	Potentiometer 1000 $\Omega$		1 x ASZ7.3 or
ASZ7.31	Potentiometer 135 $\Omega$		1 x ASZ7.31 or
ASZ7.32	Potentiometer 200 $\Omega$		1 x ASZ7.32

## Ordering

Product number	Stock number	Designation
MKB532.40-25G	S55329-M136-A110	Control device PN25, safety function to DIN EN 14597

## Delivery

Prior delivery valve and actuator are preassembled. The control device is preset to 50 % stroke. Accessories are packed and supplied separately

## Spare parts

No spare parts available. The control device has to be replaced as a whole unit else TÜV approval for the safety function to DIN EN 14597 ceases.

## Technical design

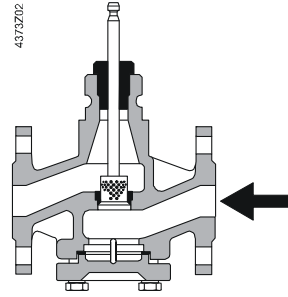
The functional principle and technical details are described in valve and actuator data sheets:

Product	Type	Data sheet
Electrohydraulic actuators	SKB..	N4564
2-port valves	VVF52..G	N4373

**Steam applications**

For applications with saturated steam, super-heated steam up to max. 600 kPa (6 bar) abs

Pay attention to the valve's flow direction.



**Spring return facility**

The return spring causes the actuator to move to the «0 %» stroke position and closes the valve.

**MKB532..G**  
3-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

**MKB562..G**  
DC 0...10 V,  
DC 4... 20 mA, 0...1000 Ω

- 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 5

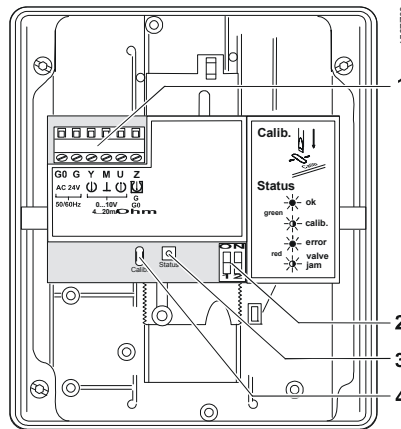
Frost protection thermostat

A frost protection thermostat or temperature detector can be connected to the MKB562..G control device.

The added signals from the QAF21.. and QAF61.. cannot be connected.





«Connection diagrams» for operation with frost protection thermostat or frost protection monitor refer to page 13.

**Standard electronics**  
MKB562..G



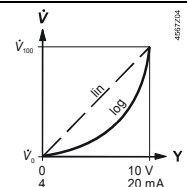
- 1 Connection terminals
- 2 Mode DIL switches
- 3 LED status indication
- 4 Slot for calibration

**DIL switches**  
MKB562..G

	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



**Stroke calibration**  
MKB562..G

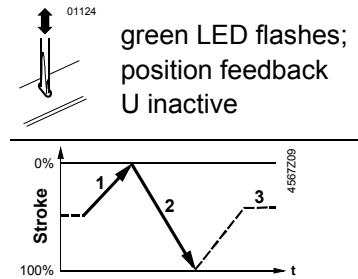
In order to determine the stroke positions 0 % and 100 % in the valve, calibration is required on initial commissioning:

**Prerequisites**

- Red safety clamp is removed, see “Commissioning notes”, page 9
- 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**  
MKB562..G

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

LED	Indication	Function	Remarks, troubleshooting
<b>Green</b>	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)
<b>Red</b>	Lit 	Faulty stroke calibration	Check mounting Restart stroke calibration (by short-circuiting calibration slot)
		Internal error	Replace electronics
	Flashing 	Inner valve jammed	Check valve
<b>Both</b>	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**  
MKB562..G

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

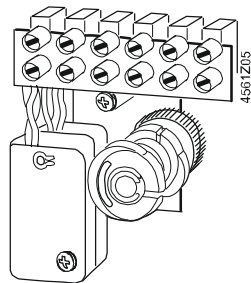
		<b>Z-mode</b>			
		no function	fully open	closed	override with 0...1000 Ω
<b>Connections</b>					
	<b>Transfer</b>				
		linear or equal-percentage			linear or equal-percentage
		<ul style="list-style-type: none"> <li>• Z-contact not connected</li> <li>• Valve stroke follows Y-input</li> </ul>	<ul style="list-style-type: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

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

**Accessories**

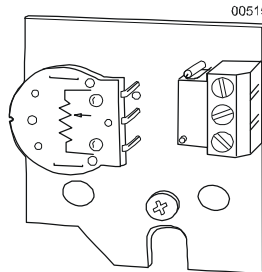
**MKB532..G**

**ASC9.3**  
double auxiliary switch



adjustable switching points

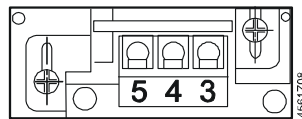
**ASZ7.3..**  
potentiometer



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

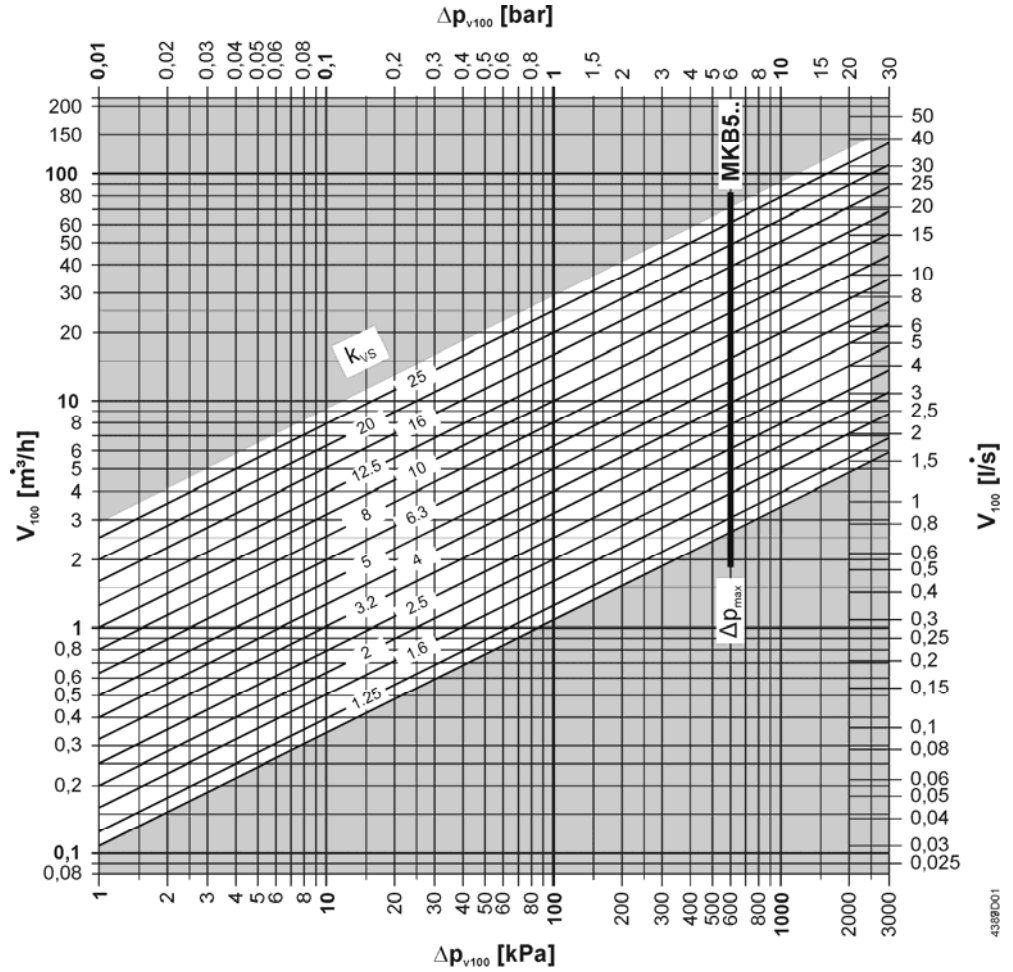
**MKB562..G**

**ASC1.6**  
Auxiliary switch



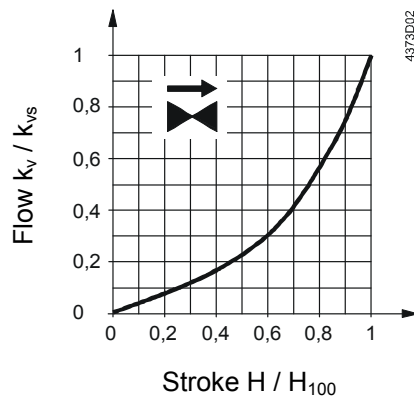
Switching point 0...5 % stroke

Flow diagram



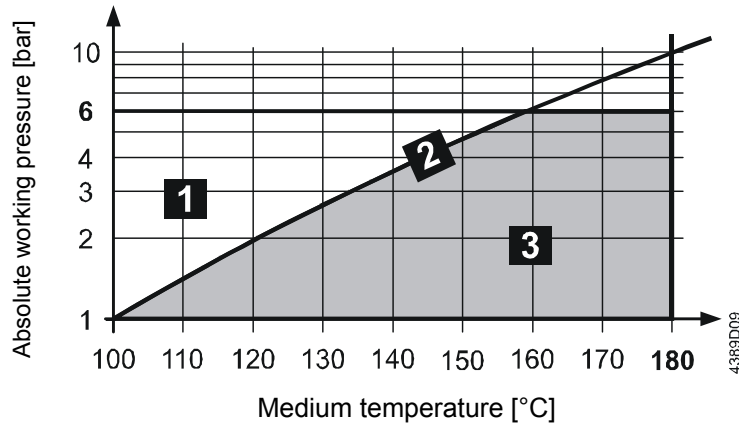
- $\Delta p_{max}$  = Maximum permissible differential pressure across the valve, valid for the entire actuating range of the motorized valve
- $\Delta p_{v100}$  = Differential pressure across the fully open valve and the valve's control path by a volume flow  $V_{100}$
- $V_{100}$  = Volume flow through the fully open valve ( $H_{100}$ )
- 100 kPa = 1 bar  $\approx$  10 mWC
- 1  $m^3/h$  = 0.278 l/s water at 20 °C

Valve flow characteristic



- 0...30 % → linear
- 30...100 % → equal percentage
- $n_{gl} = 3$  as per VDI / VDE 2173

**Working pressure and medium temperature**  
 Saturated steam  
 Superheated steam



<b>1</b>	wet steam	avoid
<b>2</b>	saturated steam	permissible range of use
<b>3</b>	superheated steam	

**Recommendation**

For saturated steam and superheated steam the differential pressure  $\Delta p_{max}$  across the valve should be close to the critical pressure ratio.

$$\text{Pressure ratio} = \frac{p_1 - p_3}{p_1} \cdot 100\%$$

$p_1$  = absolute pressure before valve in kPa  
 $p_3$  = absolute pressure after valve in kPa

**Calculation of the  $k_{vs}$  value for steam**

**Subcritical range**

$$\frac{p_1 - p_3}{p_1} \cdot 100\% < 42\%$$

Pressure ratio < 42% subcritical

$$k_{vs} = 4.4 \cdot \frac{\dot{m}}{\sqrt{p_3 \cdot (p_1 - p_3)}} \cdot k$$

**Supercritical range**

$$\frac{p_1 - p_3}{p_1} \cdot 100\% \geq 42\%$$

Pressure ratio  $\geq$  42% supercritical (not recommended)

$$k_{vs} = 8.8 \cdot \frac{\dot{m}}{p_1} \cdot k$$

$\dot{m}$  = steam quantity in kg/h  
 $k$  = factor for superheating of steam =  $1 + 0.0012 \cdot \Delta T$  ( $k = 1$  for saturated steam)  
 $\Delta T$  = temperature differential in K between saturated steam and superheated steam

**Example**

given saturated steam 151.8 °C  
 $p_1$  = 500 kPa (5 bar)  
 $\dot{m}$  = 460 kg/h  
 pressure ratio = 30 %

saturated steam 151.8 °C  
 $p_1$  = 500 kPa (5 bar)  
 $\dot{m}$  = 460 kg/h  
 pressure ratio = 42 %  
 (supercritical permitted)

required  $k_{vs}$ , valve type

$k_{vs}$ , valve type

procedure

$$p_3 = p_1 - \frac{30 \cdot p_1}{100}$$

$$p_3 = 500 - \frac{30 \cdot 500}{100} = 350 \text{ kPa (3.5bar)}$$

$$k_{vs} = 4.4 \cdot \frac{460}{\sqrt{350 \cdot (500 - 350)}} \cdot 1 = 8.83 \text{ m}^3/\text{h}$$

$$k_{vs} = 8.8 \cdot \frac{460}{500} \cdot 1 = 8.09 \text{ m}^3/\text{h}$$

selected  $k_{vs} = 10 \text{ m}^3/\text{h} \Rightarrow$  MKB532.25-10G

$k_{vs} = 8 \text{ m}^3/\text{h} \Rightarrow$  MKB532.25-8G

The use of these valves for steam is subject to specific parameters: Observe diagram for steam on page 7 and "Technical data" on page 10!

To ensure the reliability of the valve, we recommend the fitting of a strainer at the valve inlet even in closed circuits.

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!**

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 notes**

Valve and actuator are preassembled and must be mounted and installed as a whole unit.

The control device is preset to 50 % stroke for flushing and pressure testing of the plant.



**Attention:** When removing anti-tamper screws TÜV approval for the safety function to DIN EN 14597 ceases!

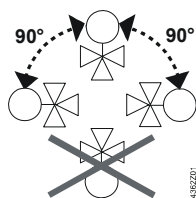
Mounting and installation instructions are by packed in the control device packing.

Control device	Installation instruction		Mounting instructions	
MKB..32..	-	-	M3240	4 319 0324 0
	-	-	M4300	74 319 0509 0
MKB562..G	-	4 319 0326 0	M3240	4 319 0324 0
	-	-	M4300	74 319 0509 0

The instructions for accessories are enclosed with the accessories themselves.

Accessories	Installation instructions		Accessories	Mounting instructions
ASC1.6	G4563.3	4 319 5544 0	ASZ7.3..	74 319 0247 0
ASC9.3	G4561.3	4 319 5545 0		

Orientation



Direction of flow

When mounting, pay attention to the valve's flow direction symbol →.

MK..5..G → Direction of action: closes against pressure



## Commissioning notes



**The manual adjuster must remain secured with anti-tamper screws as factory delivered.**

**When removing anti-tamper screws TÜV approval for the safety function to DIN EN 14597 ceases.**

Valve stem retracts: valve opens = increasing flow

Valve stem extends: valve closes = decreasing flow

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

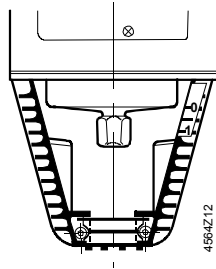
The actuator is driven to OPEN (valve open) until the red clamp, that fixes a stroke position of ca. 50 % can be easily removed. Voltage must be applied to either terminal 21 and Y1 to drive to OPEN, or voltage to G-G0 as well as Y > 70 %.



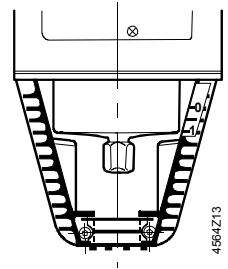
**The safety function is only enabled after the red safety clamp is removed.**

**MKB..**

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



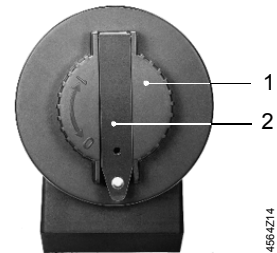
Cylinder with valve stem connector fully extended → stroke = 100%



**Automatic operation**

The control device can only be operated in automatic mode. The crank (2) on the manual adjustment knob (1) is engaged and secured with anti-tamper screws.

When removing anti-tamper screws TÜV approval for the safety function to DIN EN 14597 ceases.



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

## Maintenance notes



The MK..5..G control devices are maintenance-free

When servicing the control device:

- **Never disassemble valve and actuator for maintenance or servicing else TÜV approval for the safety function to DIN EN 14597 ceases.**
- **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**

Recommendation MKB562..G: Trigger stroke calibration after servicing or maintenance.

Repair

The control device has to be replaced as a whole unit else TÜV approval for the safety function to DIN EN 14597 ceases.

 **Warning**

**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.

**Sealing gland**

It is not permitted to replace the sealing glands. In case of leakages, the control device has to be replaced as a whole unit else TÜV approval for the safety function to DIN EN 14597 ceases.

**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.

Before disposal the valve must be dismantled and separated into its various constituent materials.

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 control devices listed in this data sheet under «Type summary», page 2.



**Approval as actuating device with safety function as per DIN EN 14597 applies to the entire actuator. Approval as actuating device with safety function as per DIN EN 14597 expires if the actuator is separated from the valve. This also voids any guarantees on the part of Siemens Switzerland Ltd.**

**Technical data**

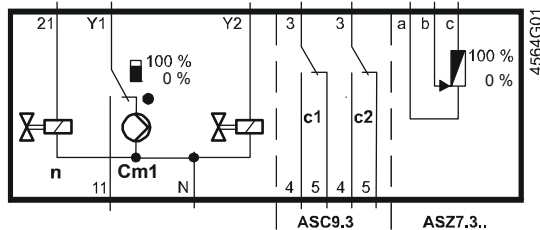
		<b>MKB532..G</b>	<b>MKB562..G</b>
<b>Valve</b>	PN class	PN 25 to ISO 7268	
	Working pressure	to ISO 7005 within the permissible "working pressure and medium temperature" according to the diagram on page 7	
	Flow characteristic		
	0...30 %	linear	
	30...100 %	equal percentage; $n_{gl} = 3$ to VDI / VDE 2173	
	Leakage rate	0...0.05 % of $k_{vs}$ value to DIN EN 1349	
	Permissible media	Saturated steam, super-heated steam; dryness at inlet minimum 0.98	
Media temperature	+1...180 °C ≤ 600 kPa (6 bar)		
Rangeability $S_v$	DN 15: 50...100 DN 25...40: 100...200		
<b>Materials</b>	Valve body	Nodular cast iron EN-GJS-400-18-LT	
	Stem	Stainless steel	
	Plug, seat	Stainless steel	
	Sealing gland	Stainless steel	
	Gland materials	PTFE sleeve	

		MKB532..G	MKB562..G
<b>Actuators</b>			
Power supply	Operating voltage	AC 230 V	AC 24 V
	Voltage tolerance	± 15 %	-20 % / +30 %
			SELV / PELV
	Frequency	50 or 60 Hz	
	Max. Power consumption at 50 Hz	15 VA / 13 W	17 VA / 12 W
Signal inputs	External supply cable fuse	min. 0.5 A, slow max. 6 A, slow	min. 1 A, slow max. 10 A, slow
	Control signal Y	3-position	DC 0...10 V, DC 4...20 mA or 0...1000 Ω
	Terminal Y	Voltage Input impedance Current Input impedance Signal resolution Hysteresis	DC 0...10 V 100 kΩ DC 4...20 mA 240 Ω < 1% 1 %
	Override control Z	Resistor Z not connected  Z connected directly to G Z connected directly to G0 Z connected to M via 0...1000 Ω	1000 Ω No function, priority terminal Y max. stroke 100 % min. stroke 0 % stroke proportional to R
	Signal outputs	Position feedback U	voltage load impedance current load impedance
Operational data	Positioning time at 50 Hz	opening	120 s
		closing	120 s
			10 s
	Spring-return time (closing)	5...25 s	
	Nominal stroke	20 mm	
Max. permissible medium temperature	+1...180 °C		
EI. Connections	Cable entry	4 x M20 (Ø 20.5 mm)	
Materials	Actuator housing, bracket	Die-cast aluminum	
	Housing box and manual adjuster	Plastic	
Dimensions	Dimensions	Refer to "Dimensions", page 14	
	Weights	Refer to "Dimensions", page 14	
Norms	CE-conformity		
	EMC-directive	2004/108/EC	
	Immunity	EN 61000-6-2 Industrial	
		EN 61000-6-3 Residential	
	Emission		
	Low voltage directive	2006/95/EC	
	Electrical safety	EN 60730-1	
	Product standards for automatic electric controls	EN 60730-2-14	
	Control device with safety function	DIN EN 14597 Temperature control devices and temperature limiters for heat generating systems; Actuator devices with safety functions in heat generating systems Registration no.: 1F137/10	
Protection standard EN 60730	I	III	
Housing protection standard Upright to horizontal	IP54 to EN 60529		

		MKB532..G	MKB562..G
Conform with C-tick			N474
Environmental compatibility		ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EG (RoHS)	
Pressure Equipment Directive		PED 97/23/EC	
Accessories with safety functions		As per article 3, section 1.4	
Fluid group 2		Category IV, with EC design examination module B, test authority number 0036	
Flange connections		to ISO 7005	
<b>Accessories</b>			
ASC1.6 Auxiliary switch	Switching capacity		AC 24 V, 10 mA...4 A ohm., 2 A ind.
ASC9.3 double auxiliary switch	Switching capacity per auxiliary switch	AC 250 V, 6 A ohm., 2.5 A ind.	
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	

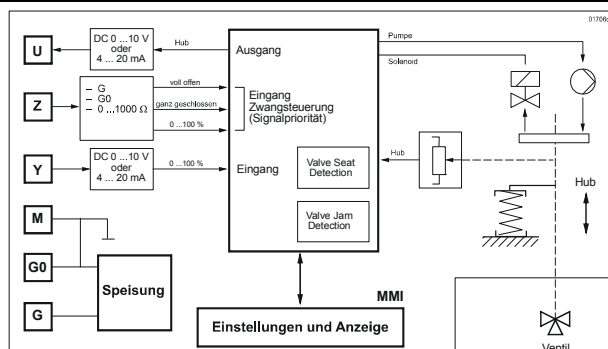
### Internal diagrams

#### MKB532..G 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

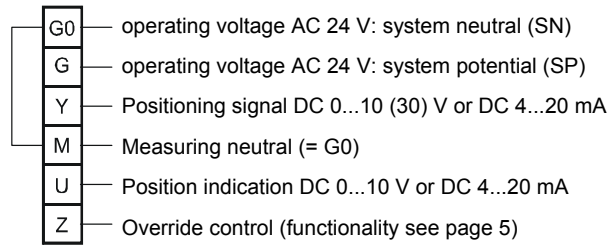
#### MKB562..G AC 24 V, DC 0...10 V, 4...20 mA, 0...1000 Ω



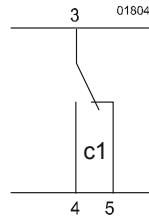
- U** position indication
- Z** override control
- Y** positioning signal
- M** measuring neutral
- GO** operating voltage AC 24 V:  
system neutral (SN)
- G** operating voltage AC 24 V:  
system potential (SP)

## Connection terminals

### MKB562..G



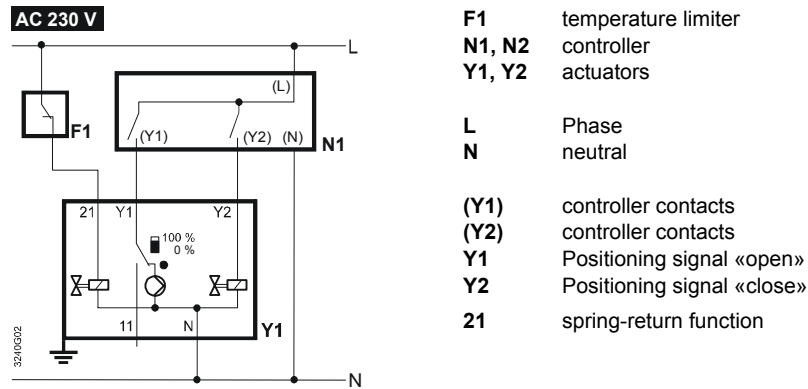
### Auxiliary switch ASC1.6



## Connection diagrams

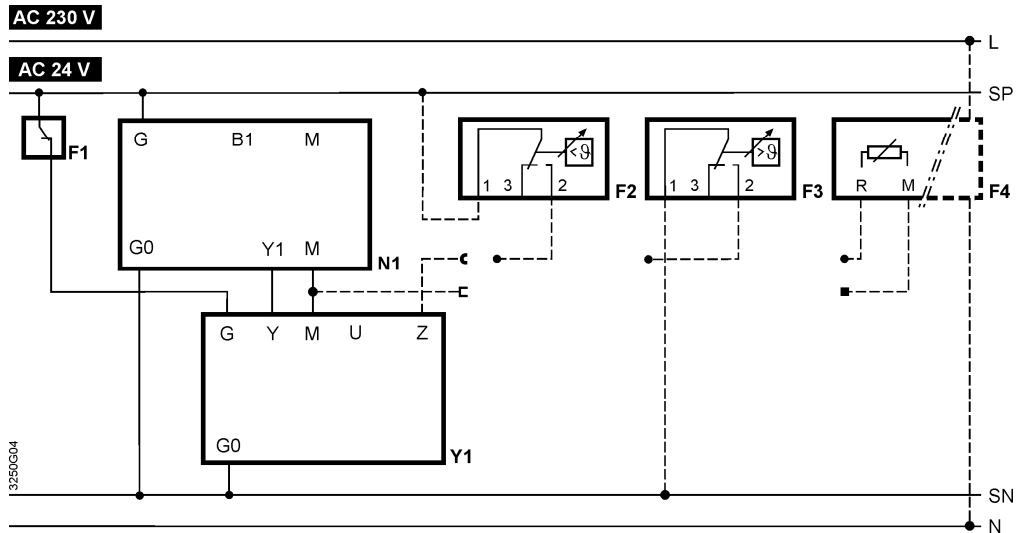
### MKB532..G

3-position



### MKB562..G

DC 0...10 V, 4...20 mA,  
0...1000 Ω

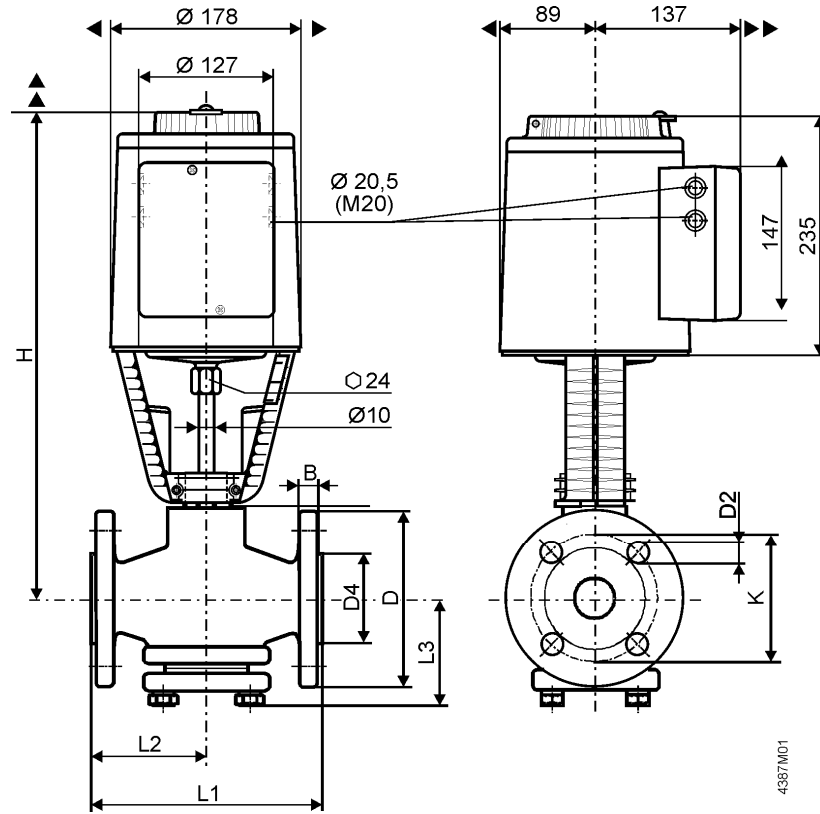


- |                |  |
|----------------|--|
| <b>Y1</b>      | actuator   |
| <b>N1</b>      | controller   |
| <b>F1</b>      | temperature limiter  |
| <b>F2</b>      | frost protection thermostat  |
|                | terminals: 1 – 2 frost hazard / sensor is interrupted (thermostat closes with frost) |
|                | 1 – 3 normal operation   |
| <b>F3</b>      | temperature detector   |
| <b>F4</b>      | frost protection monitor with 0...1000 Ω signal output *                             |
| <b>G (SP)</b>  | System potential AC 24 V   |
| <b>G0 (SN)</b> | System neutral   |

\* QAF21.. and QAF61.. frost protection monitor cannot be connected with control devices MK..5..G.

# Dimensions

All dimensions in mm



Minimum clearance from ceiling or wall for mounting, connection, operation, maintenance etc.

- ▶ => 100 mm
- ▶▶ => 200 mm

DN	B	D	D2	D4	K	L1	L2	L3	H	kg
		Ø	Ø	Ø	Ø					
15	16	95	14 (4x)	46	65	130	65	69	439	12
25	18	115		65	85	160	80	73		14.7
40	20	150	19 (4x)	84	110	200	100	97.5	432	17.8

DN = Nominal size

## Revision numbers for control devices MK..5..G

Type	Valid from Rev.-No.	
MKB532..G	<b>Actuator</b> , refer to data sheet N4564: SKB32.51	<b>Valve</b> , refer to data sheet N4373: VVF52..
MKB562..G	<b>Actuator</b> , refer to data sheet N4564: SKB62	<b>Valve</b> , refer to data sheet N4373: VVF52..