

SuperCap rotary actuator with emergency setting function and extended functionalities for rotary valves with mounting flange

- Torque 40Nm
- Nominal voltage AC/DC 24V
- Control: Open-close
- Design lifeSuperCaps 15 years



Technical data

Electrical data	Nominal voltage	AC 24V, 50/60 Hz / DC 24V		
	Nominal voltage range	AC 19.2...28.8V / DC 21.6...28.8V		
	Power consumption	In operation	11W @ nominal torque	
		At rest	3W	
		For wire sizing	21VA (I _{max} 20A @ 5ms)	
	Connection	Cable 1m, 2 x 0.75mm ²		
	Parallel operation	Yes (note the performance data)		
Functional data	Torque	min. 40Nm @ nominal voltage		
	Emergency setting position (POP)	NC / NO		
	Position accuracy	±5%		
	Manual override	Gearing latch disengaged with push button		
	Running time	Motor	150s / 90°	
		Emergency setting function	35s @ 0...50°C	
	Sound power level	Motor	≤52dB(A) @ 150s	
		Emergency setting function	≤61dB(A)	
		Position indication	Mechanical	
	Safety	Protection class	III Safety extra-low voltage UL Class 2 Supply	
Degree of protection		IP54 NEMA 2, UL Enclosure Type 2		
EMC		CE according to 2004/108/EC		
Certification		Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14		
Principle of operation		Type 1.AA		
Rated impulse voltage		0.8kV		
Control pollution degree		3		
Ambient temperature		-30...+50°C		
Non-operating temperature		-40...+80°C		
Ambient humidity		95% r.h., non-condensing		
	Maintenance	Maintenance-free		
Mechanical data	Connection flange	GRK24A-5	F05	
		GRK24A-7	F07	
Dimensions / Weight	Dimensions	See «Dimensions»		
	Weight	Approx. 2.8kg		

Safety notes



- The actuator has been designed for use in stationary heating, ventilation and air conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during installation.
- The switch for changing the direction of rotation may only be operated by authorised personnel. The direction of rotation must not in particular be reversed in a frost protection circuit.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

Mode of operation

The actuator moves the valve to the desired operating position at the same time as the integrated capacitors are loaded. Interrupting the supply voltage causes the valve to be rotated back into the emergency setting position by means of stored electrical energy.

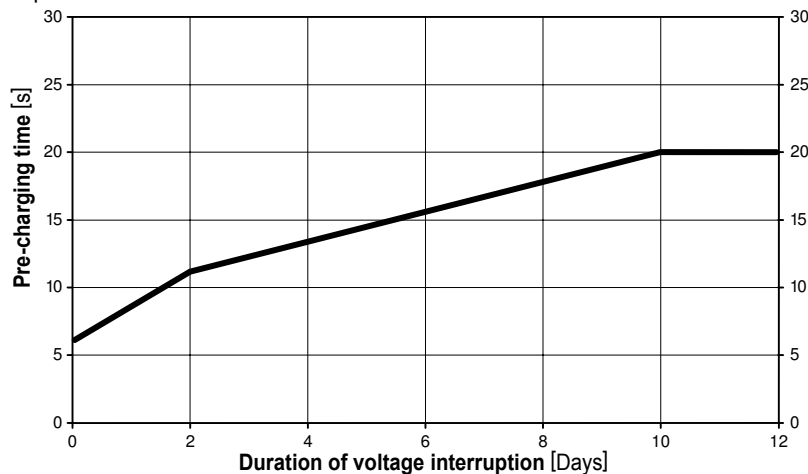
Pre-charging time (start up)

The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of an electricity interruption, the actuator can be moved at any time from its current position into the preset emergency setting position (POP).

The duration of the pre-charging time depends mainly on how long the power was interrupted.

Typical pre-charging times

Pre-charging time [s]	Duration of voltage interruption [Days]				
	0	1	2	7	≥10
	6	9	11	16	20



Delivery condition (capacitors)

The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.

Simple direct mounting

Simple direct mounting on the rotary valve with mounting flange. The mounting position in relation to the fitting can be selected in 90° steps.

Manual override

Manual override with push button possible (the gear is disengaged for as long as the button remains pressed down).

High functional reliability

The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.

Direction of rotation switch

When actuated, the direction of rotation switch changes the running direction in normal operation.

The direction of rotation switch has no influence on the emergency setting position (POP) which has been set.

In case of changing the emergency position from NC to NO, it is mandatory necessary to also change the direction of rotation switch.

Emergency setting position (POP) rotary button

The «Emergency setting position» rotary button can be used to adjust the desired emergency setting position (POP). The POP range is in reference to the maximum angle of rotation of the actuator.

In the event of a voltage interruption, the actuator will move into the selected emergency setting position, taking into account the bridging time (PF) of 2s which was set ex-works.

Combination valve/actuator

For valves with the following mechanical specifications in accordance with ISO 5211 F05:

- Square stem head SW = 14mm for form fit coupling of the rotary actuator.
- Hole circle d = 50mm

For valves with the following mechanical specifications in accordance with ISO 5211 F07:

- Square stem head SW = 17mm for form fit coupling of the rotary actuator.
- Hole circle d = 70mm


Accessories

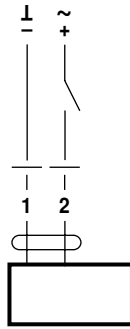
	Description	Type
Electrical accessories	Auxiliary switch, add-on, 1 x SPDT	S1A
	Auxiliary switch, add-on, 2 x SPDT	S2A
	Feedback potentiometer 140 Ohm, add-on	P140A
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on	P500A
	Feedback potentiometer 1 kOhm, add-on	P1000A
	Feedback potentiometer 2.8 kOhm, add-on	P2800A
	Feedback potentiometer 5 kOhm, add-on	P5000A
	Feedback potentiometer 10 kOhm, add-on	P10000A

Wiring diagram

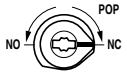
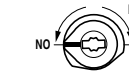
Wiring diagram

Notes

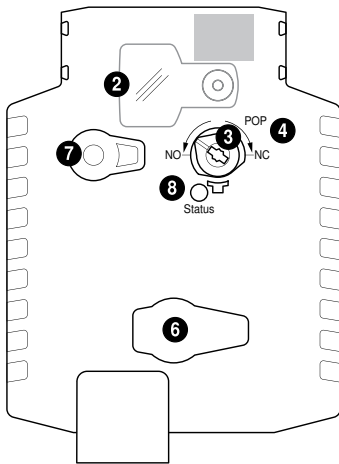
- Connection via safety isolation transformer. 
- Parallel connection of other actuators possible. Note the performance data.



Cable colours:
1 = black
2 = red

NC	NO
A - AB = 0%	A - AB = 100%
	

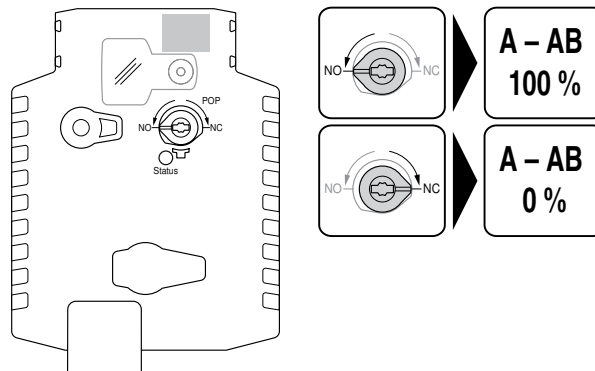
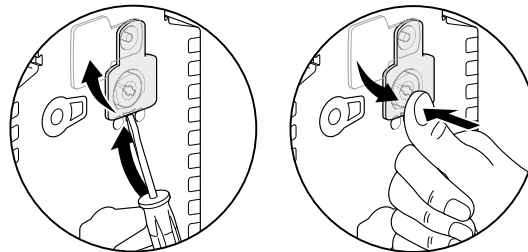
Operating controls and indicators



- 2 Cover, POP button
- 3 POP button
- 4 Scale for manual adjustment
- 6 (no function)
- 7 Disengagement button

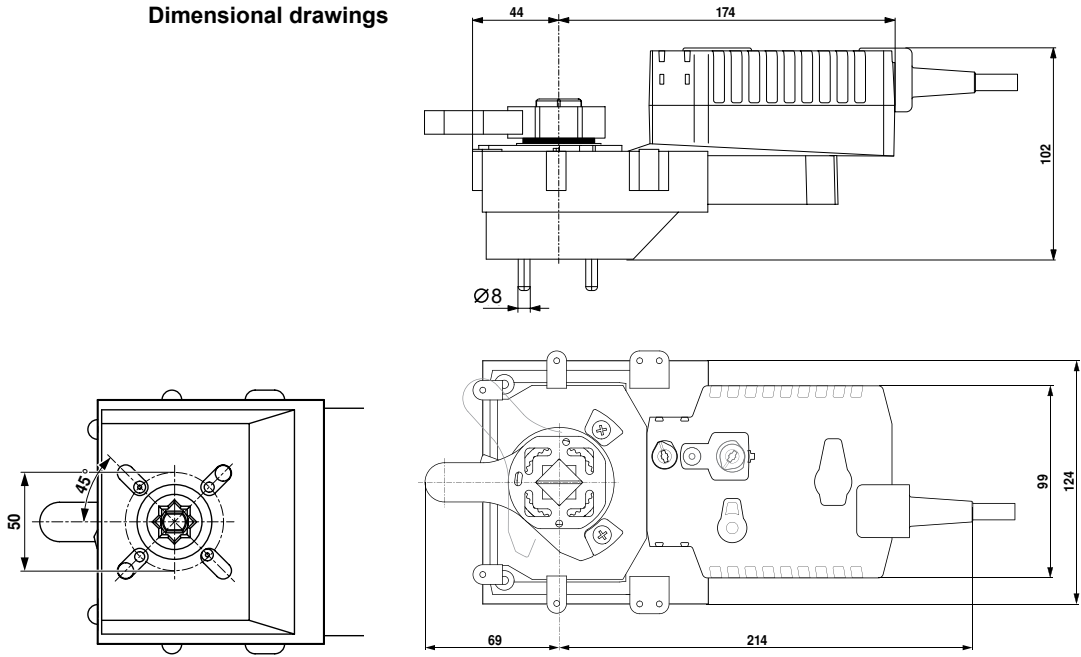
LED display	Meaning / function
8 green	
Illuminated	Operation OK / without fault
Blinking	POP function active
Off	- Not in operation - Pre-charging time SuperCap - Fault SuperCap

Setting the POP Power off position



Dimensions [mm]

Dimensional drawings



Modulating SuperCap rotary actuator with emergency control function and extended functionalities for rotary valves

- Nominal torque 40Nm
- Nominal voltage AC/DC 24V
- Control Modulating DC (0)2...10V
- Position feedback DC 2...10V
- Design life SuperCaps: 15 years


Technical data

Electrical data	Nominal voltage	AC/DC 24V	
	Nominal voltage frequency	50/60Hz	
	Nominal voltage range	AC 19.2...28.8V / DC 21.6...28.8V	
	Power consumption in operation	11W	
	Power consumption in rest position	3W	
	Power consumption for wire sizing	21VA	
	Power consumption for wire sizing note	I _{max} 20A @ 5ms	
	Connection supply / control	Cable 1m, 4 x 0.75mm ²	
	Parallel operation	Yes (note the performance data)	
	Functional data	Torque motor	Min. 40Nm
Positioning signal Y		DC 0...10V	
Positioning signal Y note		Input impedance 100kΩ	
Operating range Y		DC 2...10V	
Operating range Y variable		Start point DC 0.5...30V End point DC 2.5...32V	
Position feedback U		DC 2...10V	
Position feedback U note		Max. 0.5mA	
Position feedback U variable		Start point DC 0.5...8V End point DC 2.5...10V	
Setting emergency position (POP)		NC / NO or adjustable 0...100% (POP rotary button)	
Bridging time (PF) variable		1...10s	
Position accuracy		±5%	
Manual override		Gear disengagement with push-button	
Running time motor		150s / 90°	
Running time emergency control position		35s / 90°	
Adaption setting range		manual (automatic on first power-up)	
Sound power level motor		52dB(A)	
Sound power level emergency control position		61dB(A)	
Position indication		Mechanical	
Safety		Protection class IEC/EN	III Safety extra-low voltage
		Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54	
	Degree of protection NEMA/UL	NEMA 2, UL Enclosure Type 2	
	EMC	CE according to 2004/108/EC	
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14	
	Mode of operation	Type 1.AA	
	Rated impulse voltage supply / control	0.8kV	
	Control pollution degree	3	
	Ambient temperature	-30...50°C	
	Non-operating temperature	-40...80°C	
	Ambient humidity	95% r.h., non-condensing	
	Maintenance	Maintenance-free	
Mechanical data	Connection flange	GRK24A-MF-5 F05 GRK24A-MF-7 F07	
Weight	Weight	Approx. 2.9kg	
Terms	Abbreviations	POP = Power off position / emergency setting position CPO = Controlled power off / controlled emergency control function PF = Power fail delay time / bridging time	

Safety notes



- This device has been designed for use in stationary heating, ventilation and air conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The switch for changing the direction of rotation may only be operated by authorised specialists. The direction of rotation must not in particular be reversed in a frost protection circuit.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- Cables must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

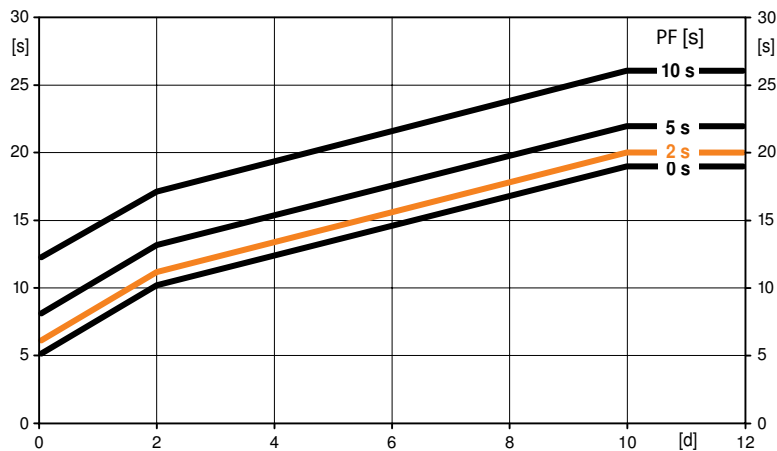
Mode of operation

The actuator moves the valve to the desired operating position at the same time as the integrated capacitors are loaded. Interrupting the supply voltage causes the valve to be moved to the selected emergency setting position (POP) by means of stored electrical energy.

Pre-charging time (start up)

The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of an electricity interruption, the actuator can move at any time from its current position into the preset emergency setting position (POP). The duration of the pre-charging time depends mainly on following factors:
 – Duration of the electricity interruption
 – PF delay time (bridging time)

Typical pre-charging time



[d] = Electricity interruption in days
 [s] = Pre-charging time in seconds
 PF[s] = Bridging time

Calculation example: Given an electricity interruption of 3 days and a bridging time (PF) set at 5s, the actuator requires a pre-charging time of 14s after the electricity has been reconnected (see graphic).

PF [s]	[d]				
	0	1	2	7	≥10
0	5	8	10	15	19
2	6	9	11	16	20
5	8	11	13	18	22
10	12	15	17	22	26

[s]

Product features

Delivery condition (capacitors)	The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.
Parameterisable actuators	The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the PC-Tool MFT-P or with the Service tool ZTH AP.
Simple Direct mounting	Simple direct mounting on the rotary valve with mounting flange. The mounting position in relation to the fitting can be selected in 90° steps.
Manual override	Manual control with push-button possible - temporary. The gear is disengaged and the actuator decoupled for as long as the button is pressed.
High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
Adjustable angle of rotation	Adjustable angle of rotation with mechanical end stops.
Combination valve/actuator	For valves with the following mechanical specifications in accordance with ISO 5211 F05: - Square stem head SW = 14mm for form fit coupling of the rotary actuator. - Hole circle d = 50mm For valves with the following mechanical specifications in accordance with ISO 5211 F07: - Square stem head SW = 17mm for form fit coupling of the rotary actuator. - Hole circle d = 70mm
Home position	The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The actuator then moves into the position defined by the positioning signal. Factory setting: Y2 (counter-clockwise rotation).
Direction of rotation switch	When actuated, the direction of rotation switch changes the running direction in normal operation. The direction of rotation switch has no influence on the emergency setting position (POP) which has been set.
Adaption and synchronisation	An adaption can be triggered manually by pressing the „Adaption“ button or with the PC-Tool. Both mechanical end stops are detected during the adaption (entire setting range). Automatic synchronisation after pressing the gearbox disengagement button is configured. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal. A range of settings can be adapted using the PC-Tool (see MFT-P documentation)
Rotary knob emergency setting position	The «Emergency setting position» rotary knob can be used to adjust the desired emergency setting position (POP). In the event of an electricity interruption, the actuator will move into the selected emergency setting position, taking into account the bridging time (PF) of 2s which was set ex-works. Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the emergency setting position with the BELIMO service tool MFT-P. Once the rotary knob is set back to the range 0...100%, the manually set value will have positioning authority
Bridging time (PF)	Electricity interruptions can be bridged up to a maximum of 10s. In the event of an electricity interruption, the actuator will remain stationary in accordance with the set bridging time. If the electricity interruption is greater than the set bridging time, then the actuator will move into the selected emergency setting position (POP). The bridging time set ex-works is 2s. This can be modified on site in operation with the use of the BELIMO service tool MFT-P. Settings: The rotary knob must not be set to the «Tool» position! Only the values need to be entered for retroactive adjustments of the bridging time with the BELIMO service tool MFT-P.

Accessories

	Description	Type
Electrical accessories	Auxiliary switch, add-on, 1 x SPDT	S1A
	Auxiliary switch, add-on, 2 x SPDT	S2A
	Feedback potentiometer 140 Ohm, add-on	P140A
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on	P500A
	Feedback potentiometer 1 kOhm, add-on	P1000A
	Feedback potentiometer 2.8 kOhm, add-on	P2800A
	Feedback potentiometer 5 kOhm, add-on	P5000A
	Feedback potentiometer 10 kOhm, add-on	P10000A
Service Tools	Description	Type
	Service Tool, for MF/MP/Modbus/LonWorks actuators and VAV-Controller	ZTH AP
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P

Electrical installation

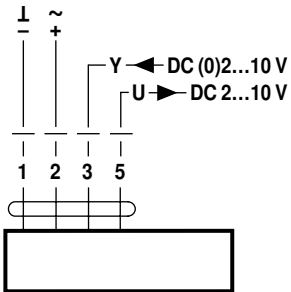


Notes

- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.
- Direction of rotation switch Factory setting: Direction of rotation Y2.

Wiring diagrams

AC/DC 24V, modulating



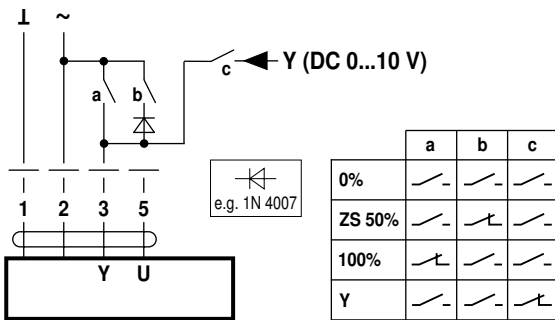
Cable colours:

- 1 = black
- 2 = red
- 3 = white
- 5 = orange

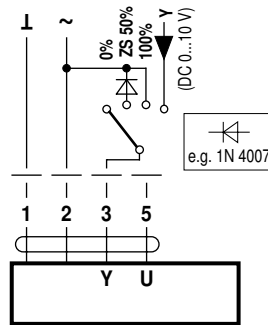
Functions

Functions with basic values (conventional mode)

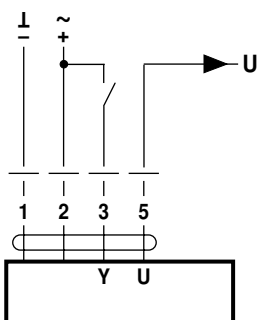
Override control with AC 24V with relay contacts



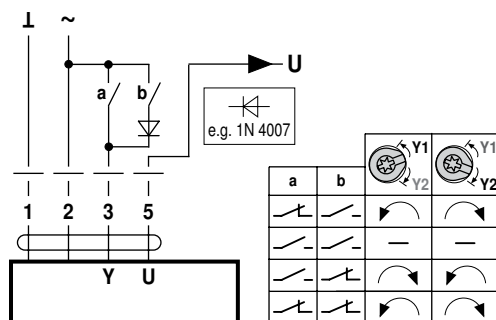
Override control with AC 24V with rotary switch



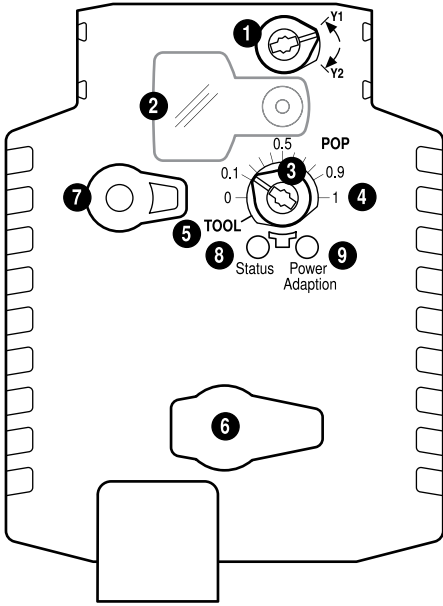
Control open-close



Control 3-point



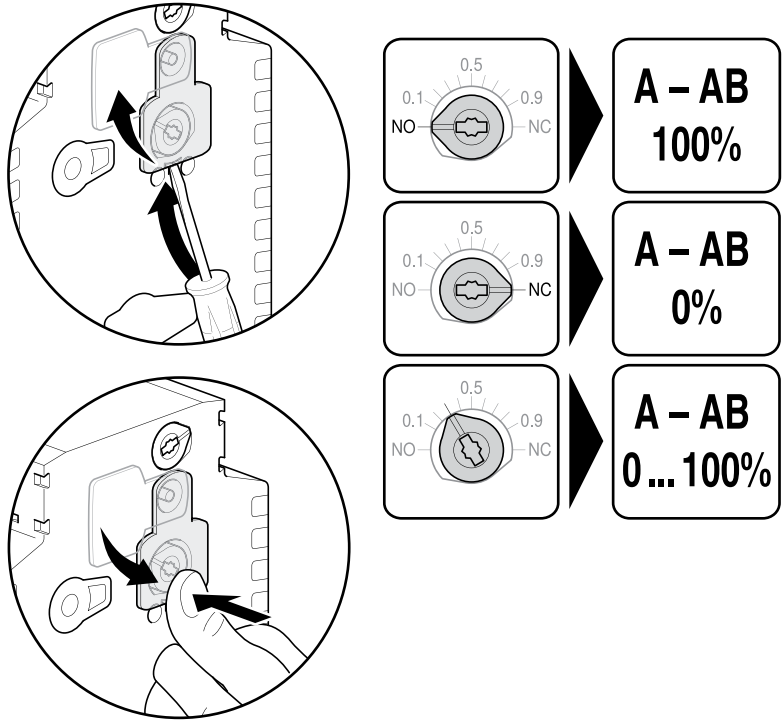
Operating controls and indicators



- ➊ Direction of rotation switch
- ➋ Cover, POP button
- ➌ POP button
- ➍ Scale for manual adjustment
- ➎ Position for adjustment with tool
- ➏ Tool socket
- ➐ Disengagement button

LED displays		Meaning / function
➏ yellow	➐ green	
Off	On	Operation OK / without fault
Off	Flashing	POP function active
On	Off	Fault
Off	Off	Not in operation
On	On	Adaptation procedure running
Flashing	On	Communication with programming tool

- ➑ **Press button:** Triggers angle of rotation adaption, followed by standard operation



Dimensions [mm]

Dimensional drawings

