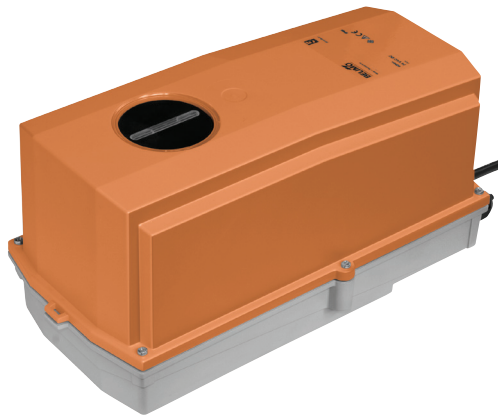


Parameterisable SuperCap damper actuator with emergency control function and extended functionalities in the IP66 protective housing for adjusting dampers in technical building installations and in laboratories

- Air damper size up to approx. 8 m<sup>2</sup>
- Nominal torque 40 Nm
- Nominal voltage AC/DC 24 V
- Control modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Design life SuperCaps: 15 years
- Optimum weather protection for use outdoors (for use in ambient temperatures up to -40°C, there is a separate actuator available with built-in heater ex works)


**Technical data**

<b>Electrical data</b>	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	11 W
	Power consumption in rest position	3 W
	Power consumption for wire sizing	21 VA
	Power consumption for wire sizing note	I <sub>max</sub> 20 A @ 5 ms
	Connection supply / control	Cable 1 m, 4 x 0.75 mm <sup>2</sup> (halogen-free)
Parallel operation	Yes (note the performance data)	
<b>Functional data</b>	Torque motor	Min. 40 Nm
	Positioning signal Y	DC 0...10 V
	Positioning signal Y note	Input impedance 100 kΩ
	Control signal Y variable	Open-close 3-point (AC only) Modulating (DC 0...32 V)
	Operating range Y	DC 2...10 V
	Operating range Y variable	Start point DC 0.5...30 V End point DC 2.5...32 V
	Position feedback U	DC 2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	Start point DC 0.5...8 V End point DC 2.5...10 V
	Setting emergency setting position (POP)	0...100%, adjustable in increments of 10% (POP rotary knob on 0 corresponds to left end stop)
	Setting emergency setting position (POP) variable	0...100%, adjustable
	Bridging time (PF)	2 s
	Bridging time (PF) variable	0...10 s
	Position accuracy	±5%
	Direction of motion motor	selectable with switch 0 / 1
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Direction of motion variable	electronically reversible
	Direction of motion emergency control function	selectable with switch 0...100%
	Manual override	with push-button (under protective housing)
	Angle of rotation	Max. 95°
	Angle of rotation note	can be limited on both sides with adjustable mechanical end stops
	Running time motor	150 s / 90°
Motor running time variable	90...150 s	
Running time emergency control position	35 s / 90°	
Running time emergency setting position note	<35 s @ 0...50°C	

## Technical data

<b>Functional data</b>	Adaption setting range	manual	
	Adaption setting range variable	No action Adaption when switched on Adaption after pushing the gear disengagement button	
	Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, AC only) = 50%	
	Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX - 32%) ZS = MIN...MAX	
	Sound power level motor	52 dB(A)	
	Sound power level emergency control position	61 dB(A)	
	Spindle driver	Universal spindle clamp 14...26.7 mm	
	Position indication	Mechanical	
	<b>Safety</b>	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
		Protection class UL	UL Class 2 Supply
Degree of protection IEC/EN		IP66	
Degree of protection NEMA/UL		NEMA 4, UL Enclosure Type 4	
EMC		CE according to 2014/30/EU	
Certification IEC/EN		IEC/EN 60730-1 and IEC/EN 60730-2-14	
Certification UL		cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1:02	
Mode of operation		Type 1.AA	
Rated impulse voltage supply / control		0.8 kV	
Control pollution degree		4	
Ambient temperature	-30...50 °C		
Ambient temperature note	-40...50 °C for actuator with integrated heating		
Non-operating temperature	-40...80 °C		
Ambient humidity	100% r.h.		
Maintenance	Maintenance-free		
<b>Weight</b>	Weight	4.5 kg	
<b>Terms</b>	Abbreviations	POP = Power off position / emergency setting position PF = Power fail delay time / bridging time	

## Safety notes



- The device must not be used outside the specified field of application, especially not 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.
- Junction boxes must at least correspond with enclosure IP degree of protection!
- The cover of the protective housing may be opened for adjustment and servicing. When it is closed afterwards, the housing must seal tight (see installation instructions).
- The device may only be opened in the manufacturer's factory. It does not contain any parts that can be replaced or repaired by the user.
- The cables must not be removed from the device installed in the interior.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.
- The actuator is not designed for applications where chemical influences (gases, fluids) are present or for utilisation in corrosive environments in general.
- The actuator may not be used in plenary applications (e.g. suspended ceilings or raised floors).

**Safety notes**

- The materials used may be subjected to external influences (temperature, pressure, construction fastening, effect of chemical substances, etc.), which cannot be simulated in laboratory tests or field trials. In case of doubt, we definitely recommend that you carry out a test. This information does not imply any legal entitlement. Belimo will not be held liable and will provide no warranty.
- Self adaption is necessary when the system is commissioned and after each adjustment of the angle of rotation (press the adaption push-button once).
- If cables which are not authorised for UL (NEMA) Type 4 applications are guided out of the unit, then flexible metallic cable conduits or suitable threaded cable conduits of equal value are to be used.

**Product features**

**Fields of application** The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions:

- UV radiation
- rain / snow
- dirt / dust
- Humidity
- Changing atmosphere / frequent and severe temperature fluctuations

(recommendation: use the actuator with integrated factory-installed heating which can be ordered separately to prevent internal condensation)

**Mode of operation** The actuator moves the damper to the desired operating position at the same time as the integrated capacitors are charged. Interrupting the supply voltage causes the damper to be rotated back into the emergency setting position (POP) by means of stored electrical energy.

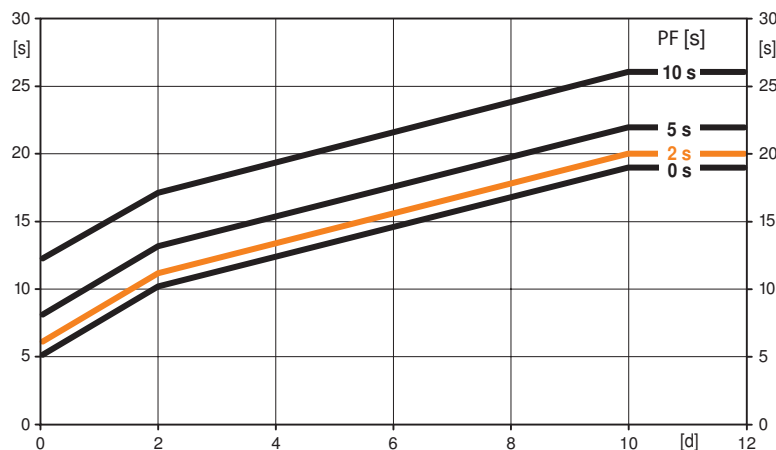
The actuator is connected with a standard modulating signal of DC 0...10V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the damper position 0...100% and as slave control signal for other actuators.

**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



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

[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 5 s, the actuator requires a pre-charging time of 14 s after the electricity has been reconnected (see graphic).

## Product features

<b>Delivery condition (capacitors)</b>	The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.
<b>Parameterisable actuators</b>	The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU.
<b>Simple direct mounting</b>	Simple direct mounting on the damper spindle with an universal spindle clamp, supplied with an anti-rotation device to prevent the actuator from rotating.
<b>Manual override</b>	Manual control with push-button possible - temporary. The gear is disengaged and the actuator decoupled for as long as the button is pressed. The housing cover must be removed for manual override.
<b>Adjustable angle of rotation</b>	Adjustable angle of rotation with mechanical end stops.
<b>High functional reliability</b>	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
<b>Home position</b>	The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out a synchronisation. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal.
<b>Direction of rotation switch</b>	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.
<b>Adaption and synchronisation</b>	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). A range of settings can be adapted using the PC-Tool (see MFT-P documentation)
<b>Emergency setting position (POP) rotary knob</b>	The «Emergency setting position» rotary knob can be used to adjust the desired emergency setting position (POP) between 0 and 100% in 10% increments. The rotary knob refers only to the adapted angle of rotation range between 30 and 95°. No set Min or Max values are observed. In the event of a electricity interruption, the actuator will move into the selected emergency setting position (POP), taking into account the bridging time that has been set. Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the emergency setting position (POP) 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.
<b>Bridging time</b>	Electricity interruptions can be bridged up to a maximum of 10 s. 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 2 s. 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! For retroactive adjustments of the bridging time with the Belimo service tool MFT-P or with the ZTH EU adjustment and diagnostic device only the values need to be entered.

## Accessories

	Description	Type
<b>Electrical accessories</b>	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 140 Ohm, add-on, grey	P140A GR
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on	P500A
	Feedback potentiometer 500 Ohm, add-on, grey	P500A GR
	Feedback potentiometer 1 kOhm, add-on	P1000A
	Feedback potentiometer 1 kOhm, add-on, grey	P1000A GR
	Feedback potentiometer 2.8 kOhm, add-on	P2800A
	Feedback potentiometer 2.8 kOhm, add-on, grey	P2800A GR
	Feedback potentiometer 5 kOhm, add-on	P5000A
	Feedback potentiometer 5 kOhm, add-on, grey	P5000A GR
	Feedback potentiometer 10 kOhm, add-on	P10000A
	Feedback potentiometer 10 kOhm, add-on, grey	P10000A GR
	Adapter for auxiliary switch and feedback potentiometer	Z-SPA*
	Signal converter voltage/current, supply AC/DC 24V	Z-UIC
	Digital position indicator for front-panel mounting, 0...99%, front mass 72 x 72 mm	ZAD24
	Range controller for wall mounting, adjustable electron. Min./max. angle of rotation limitation	SBG24
	Positioner for wall mounting, range 0...100%	SGA24
	Positioner in a conduit box, range 0...100%	SGE24
	Positioner for front-panel mounting, range 0...100%	SGF24
	Positioner for wall mounting, range 0...100%	CRP24-B1
Connection cable 5 m, A+B: RJ12 6/6, To ZTH/ZIP-USB-MP	ZK1-GEN	
Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH/ZIP-USB-MP	ZK2-GEN	
<b>Mechanical accessories</b>	<b>Description</b>	<b>Type</b>
Cable gland, for cable diameter 4-10 mm	Z-KB-PG11	
<b>Service Tools</b>	<b>Description</b>	<b>Type</b>
	Service tool for parameterisable and communicative Belimo actuators / VAV controller and HVAC performance devices	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
Adapter to Service Tool ZTH	MFT-C	

## Electrical installation

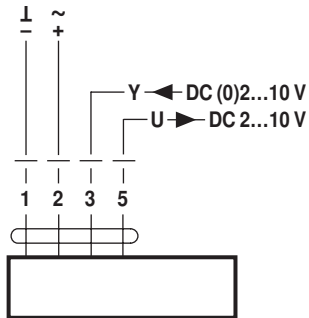
**Notes**

- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.

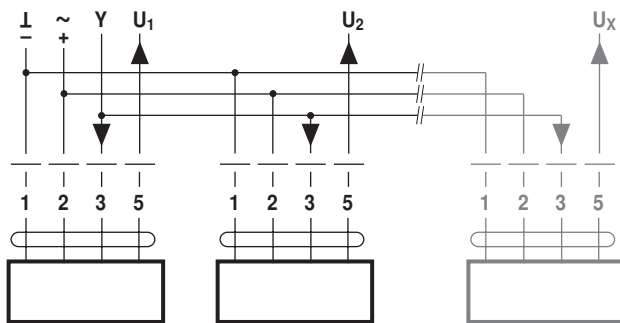
Electrical installation

Wiring diagrams

AC/DC 24 V, modulating



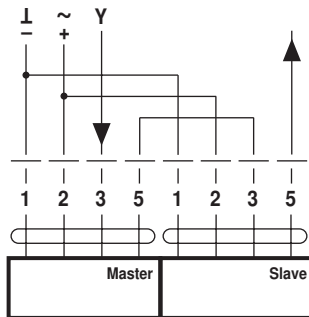
Parallel operation



Notes

- A maximum of eight actuators can be connected in parallel.
- Parallel operation is permitted only on non-connected axes.
- Do not fail to observe performance data with parallel operation.

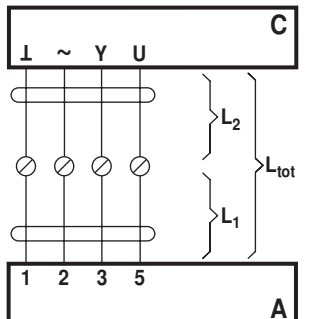
Wiring diagram piggyback operation (mechanically coupled actuators)



Notes

- A maximum of two actuators can be connected in Master-Slave operation.
- The Master-Slave operation is permitted only on one fixed spindle or on two mechanically coupled spindles.
- The programming of the Master actuator is adopted by the Slave actuator.

Signal cable lengths



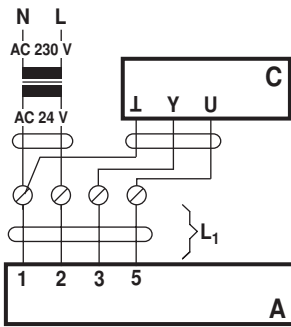
L <sub>2</sub> ┴ / ~	L <sub>tot</sub> = L <sub>1</sub> + L <sub>2</sub>	
	AC	DC
0.75 mm <sup>2</sup>	≤30 m	≤5 m
1.00 mm <sup>2</sup>	≤40 m	≤8 m
1.50 mm <sup>2</sup>	≤70 m	≤12 m
2.50 mm <sup>2</sup>	≤100 m	≤20 m

- A = actuator
- C = control unit
- L1 = actuator connecting cable
- L2 = customer cable
- Ltot = maximum signal cable length

Note:

In the event of several actuators switched in parallel, the maximum signal cable length is to be divided by the number of actuators.

Electrical installation



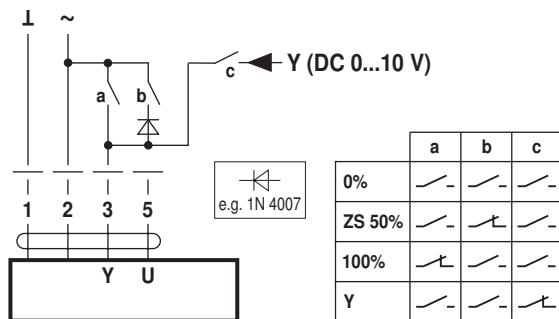
A = actuator  
C = control unit  
L1 = actuator connecting cable

**Note:**  
If supply and data line are handled separately, then no special limitations apply for the installation.

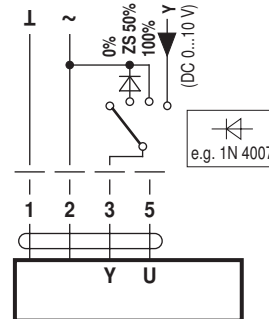
Functions

Functions with basic values (conventional mode)

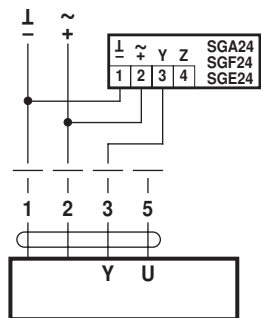
Override control with AC 24 V with relay contacts



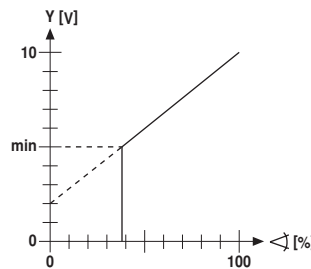
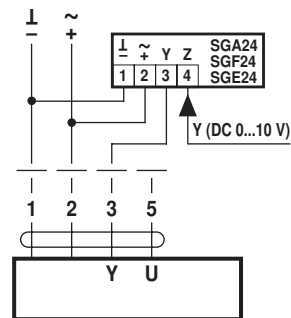
Override control with AC 24 V with rotary switch



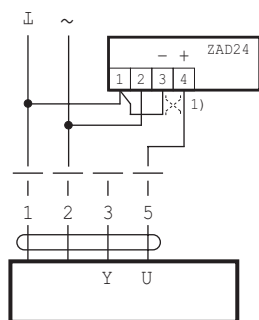
Remote control 0...100% with positioner SG..



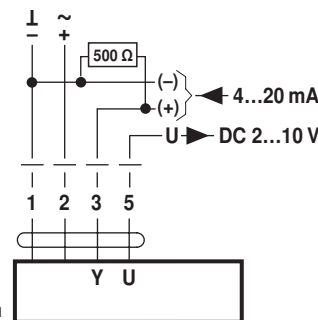
Minimum limit with positioner SG..



Position indication



Control with 4...20 mA via external resistor

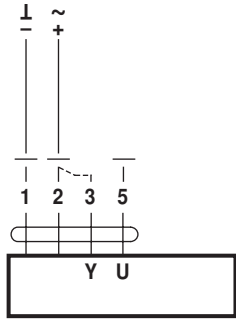


**Caution:**  
The operating range must be set to DC 2...10 V.  
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V

(1) Adapting the direction of rotation

**Functions**

Functional check

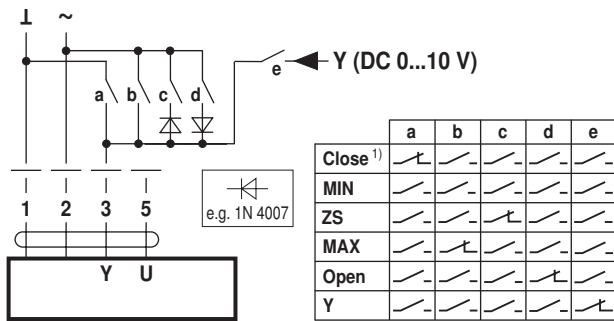


**Procedure**

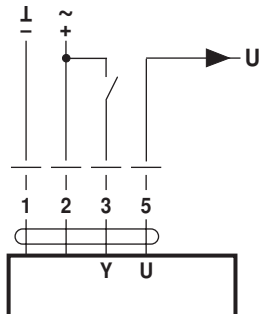
1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
  - with direction of rotation 0: Actuator rotates to the left
  - with direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
  - Actuator runs in opposite direction

**Functions for actuators with specific parameters (Parametrisation with PC-Tool necessary)**

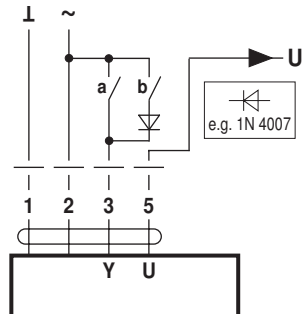
Override control and limiting with AC 24 V with relay contacts



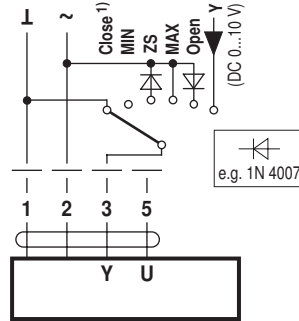
Control open-close



Control 3-point



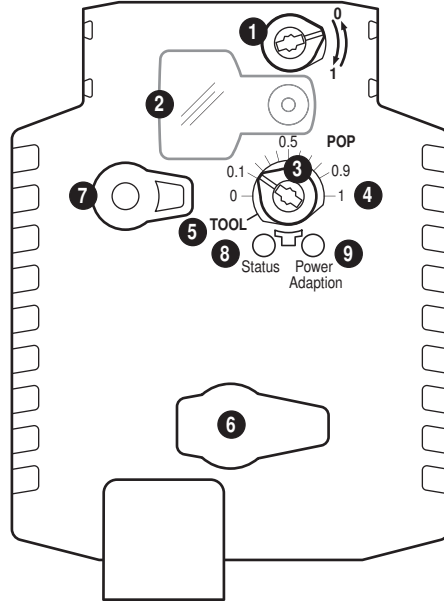
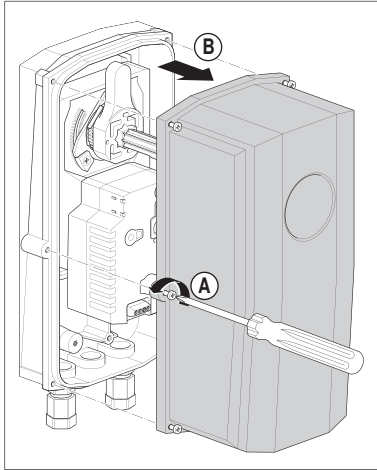
Override control and limiting with AC 24 V with rotary switch



1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.



Operating controls and indicators

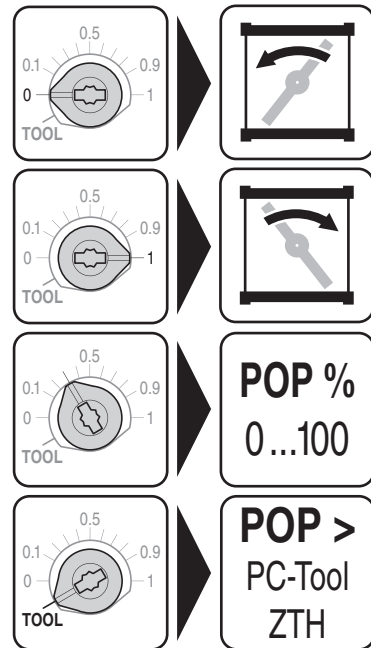
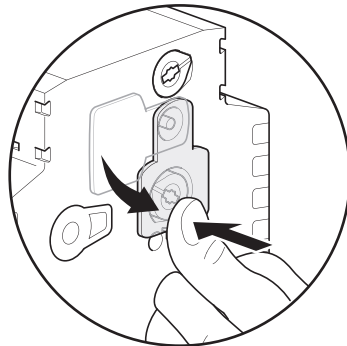
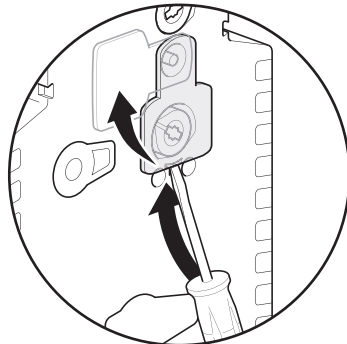


- 1 Direction of rotation switch
- 2 Cover, POP button
- 3 POP button
- 4 Scale for manual adjustment
- 5 Position for adjustment with tool
- 6 Tool socket
- 7 Disengagement button

LED displays		Meaning / function
8 yellow	9 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

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

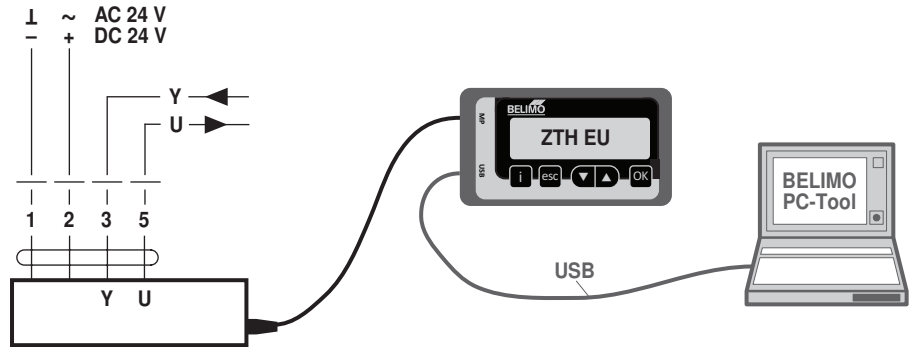
Setting emergency setting position (POP)



Service

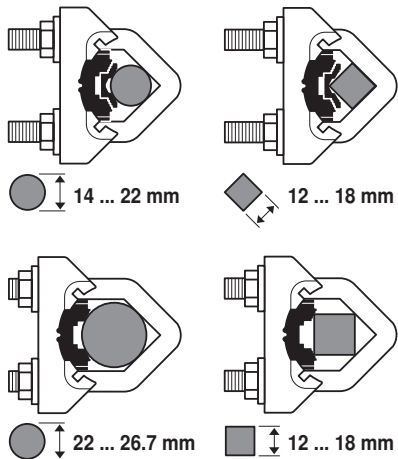
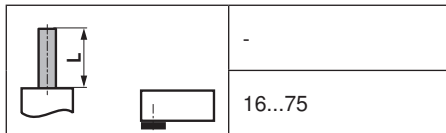
**Service Tools connection** The actuator can be parameterised by ZTH EU via the service socket. For an extended parameterisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions [mm]

Spindle length



Dimensional drawings

