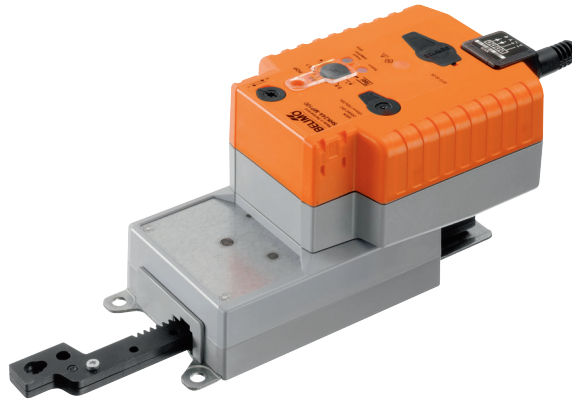


Communicative SuperCap linear actuator with emergency control function and extended functionalities for adjusting dampers and slide valves in technical building installations and in laboratories

- Air damper size up to approx. 1 m<sup>2</sup>
- Actuating force 150 N
- Nominal voltage AC/DC 24 V
- Control Modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Length of Stroke Max. 100 mm, adjustable in 20 mm increments
- Conversion of sensor signals
- Design life SuperCaps: 15 years
- Communication via Belimo MP-Bus


**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	7 W
	Power consumption in rest position	3 W
	Power consumption for wire sizing	14 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>
	Parallel operation	Yes (note the performance data)
	<b>Functional data</b>	Actuating force motor
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 retracted gear rod)
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
Direction of motion note		Y = 0 V: with switch 0 (retracted) / 1 (extended)
Direction of motion variable		Electronically reversible
Direction of motion emergency control function		Selectable with switch 0...100% (retracted 0 %)
Manual override		Gear disengagement with push-button
Length of Stroke		Max. 100 mm, adjustable in 20 mm increments
Stroke limitation	can be limited on both sides with mechanical end stops	
Running time motor	120 s / 100 mm	
Motor running time variable	60...120 s / 100 mm	
Running time emergency control position	35 s / 100 mm	
Running time emergency setting position note	<35 s @ 0...50° C	
Adaption setting range	manual	

## Technical data

<b>Functional data</b>	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	65 dB(A)
<b>Safety</b>	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
	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	3
	Ambient temperature	-30...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	95% r.h., non-condensing
Maintenance	Maintenance-free	
<b>Weight</b>	Weight	1.0 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.
- Outdoor application: only possible in case that no (sea)water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- 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 rotary supports and coupling pieces available as accessories must always be used if transverse forces are likely. In addition, the actuator must not be tightly bolted to the application. It must remain movable via the rotary support (refer to «Assembly notes»).
- If a rotary support and/or coupling piece is used, actuation force losses are to be expected.
- If the actuator is exposed to severely contaminated ambient air, appropriate precautions must be taken on the system side. Excessive deposits of dust, soot etc. can prevent the gear rod from being extended and retracted correctly.
- If not installed horizontally, the gear disengagement pushbutton may only be actuated when there is no pressure on the gear rod.
- To calculate the actuating force required for air dampers and slide valves, the specifications supplied by the damper manufacturers concerning the cross section, the design, the installation site and the ventilation conditions must be observed.
- Self adaptation is necessary when the system is commissioned or whenever the stroke limiting is adjusted (press the adaptation push-button).

**Safety notes**

- 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.

**Product features**

**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.

Conventional operation:

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.

Operation on the MP-Bus:

The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and drives to the position defined. Connection U serves as communication interface and does not supply an analogue measuring voltage.

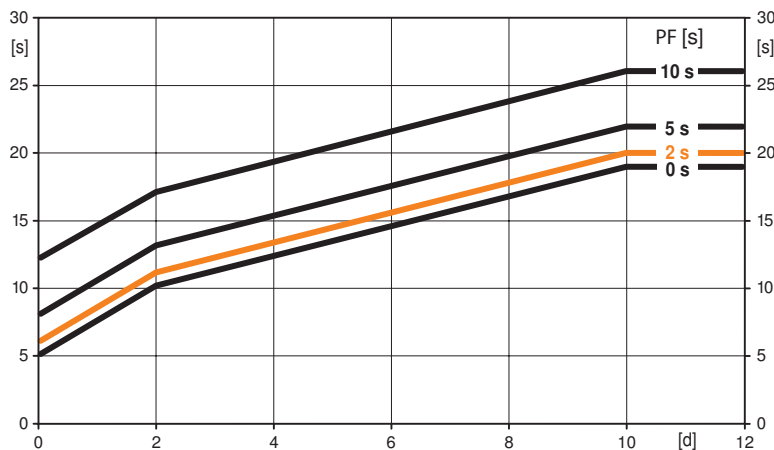
**Pre-charging time (start up)**

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).

**Delivery condition (capacitors)**

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.

**Converter for sensors**

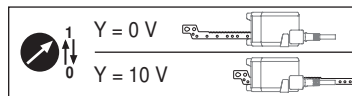
Connection option for a sensor (passive or active sensor or switching contact). The MP actuator serves as an analogue/digital converter for the transmission of the sensor signal via MP-Bus to the higher level system.

**Parameterisable actuators**

The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU.

## Product features

- Simple direct mounting** The actuator can be directly connected with the application using the enclosed screws. The head of the gear rod is connected to the moving part of the ventilating application individually on the mounting side or with the Z-KS2 coupling piece provided.
- 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.
- Adjustable stroke** If a stroke limitation will be adjusted, the mechanical operating range on this side of the gear rod can be used starting with an extension length of 20 mm and then can be limited respectively in increments of 20 mm by means of mechanical end stops Z-AS2.
- High functional reliability** The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
- Home position** 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.



- Direction of rotation switch** When actuated, the direction of stroke switch changes the running direction in normal operation. The direction of stroke 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)
- Emergency setting position (POP) rotary knob** The rotary knob «Emergency setting position» can be used to adjust the desired emergency setting position (POP) between 0 and 100% in 10% increments. The rotary knob only refers to the adapted stroke range between 30 and 100 mm. No set Min or Max values are observed. In the event of an electricity interruption, the actuator will move into the selected emergency setting position (POP), taking into account the bridging time which was 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.
- Bridging time** 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>Gateways</b>	Gateway MP to Modbus RTU, AC/DC 24 V	UK24MOD
	Gateway MP for BACnet MS/TP, AC/DC 24 V	UK24BAC
	Gateway MP to LonWorks, AC/DC 24 V, LonMark certified	UK24LON
	Gateway MP to KNX, AC/DC 24 V, EIBA certified	UK24EIB
<b>Electrical accessories</b>	Connecting 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
	MP-Bus power supply for MP actuators, AC 230/24V for local power supply	ZN230-24MP
	Connecting board MP bus suitable for wiring boxes EXT-WR-FP..-MP	ZFP2-MP
<b>Mechanical accessories</b>	End stop set for LH	Z-AS2
	Rotary support for compensation of transverse forces	Z-DS1
	Coupling piece M6 for LH, galvanised steel	Z-KS2
<b>Service Tools</b>	Service Tool, for MF/MP/Modbus/LonWorks actuators and VAV-Controller	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
	Adapter to Service-Tool ZTH	MFT-C

## Electrical installation

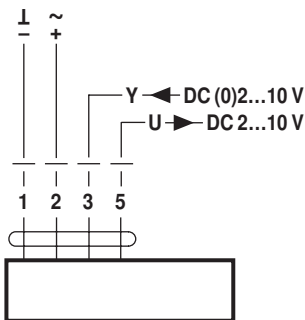


### Notes

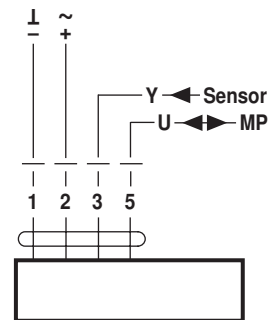
- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.

## Wiring diagrams

AC/DC 24 V, modulating



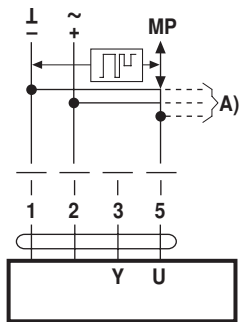
Operation on the MP-Bus



Functions

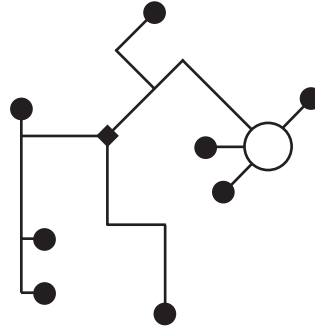
Functions when operated on MP-Bus

Connection on the MP-Bus



A) more actuators and sensors (max.8)

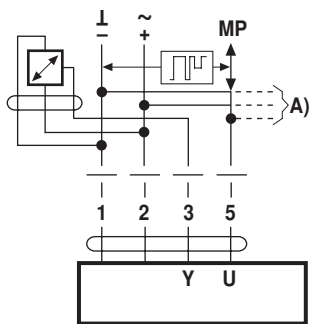
Network topology



There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).  
Supply and communication in one and the same 3-wire cable

- no shielding or twisting necessary
- no terminating resistors required

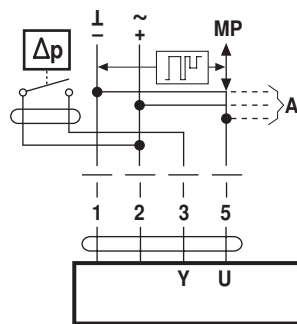
Connection of active sensors



A) more actuators and sensors (max.8)

- Supply AC/DC 24 V
- Output signal DC 0...10 V (max. DC 0...32 V)
- Resolution 30 mV

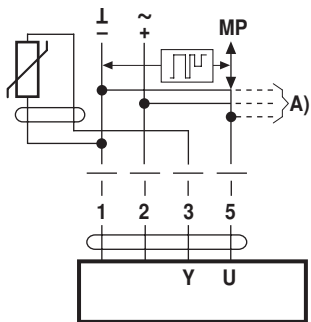
Connection of external switching contact



A) more actuators and sensors (max.8)

- Switching current 16 mA @ 24 V
- Start point of the operating range must be parameterised on the MP actuator as  $\geq 0.5$  V

Connection of passive sensors



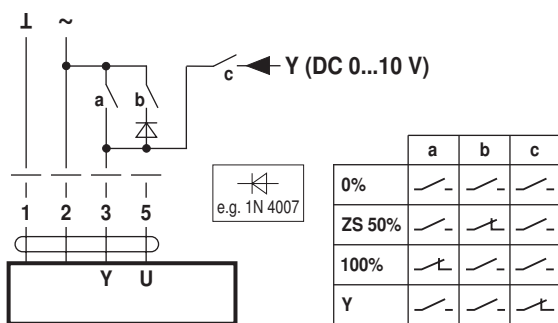
Ni1000	-28...+98°C	850...1600 Ω <sup>2)</sup>
PT1000	-35...+155°C	850...1600 Ω <sup>2)</sup>
NTC	-10...+160°C <sup>1)</sup>	200 Ω...60 kΩ <sup>2)</sup>

A) more actuators and sensors (max.8)

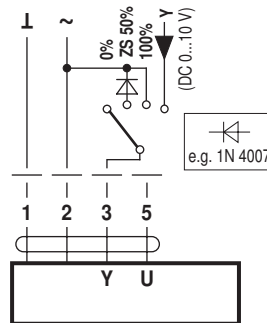
- 1) Depending on the type
- 2) Resolution 1 Ohm

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

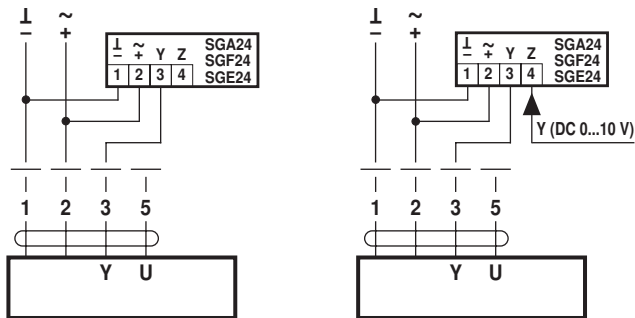


Override control with AC 24 V with rotary switch

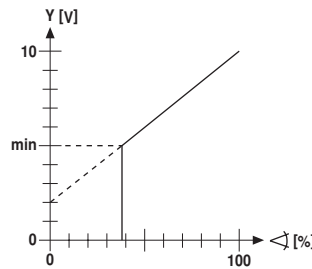


**Functions**

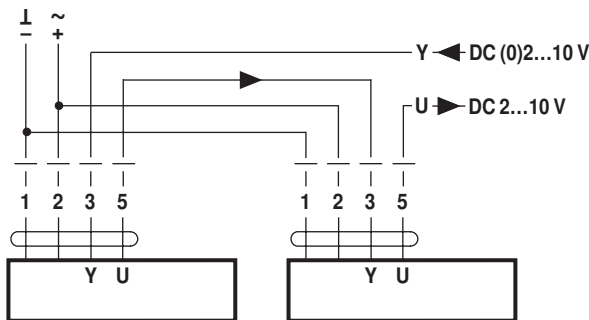
Remote control 0...100% with positioner SG.. Minimum limit with positioner SG..  
 positioner SG..



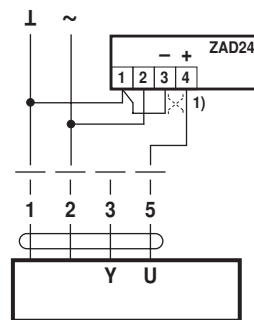
Follow-up control (position-dependent)



Position indication

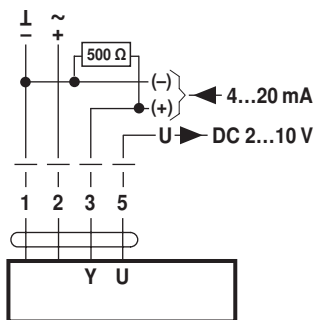


Control with 4...20 mA via external resistor

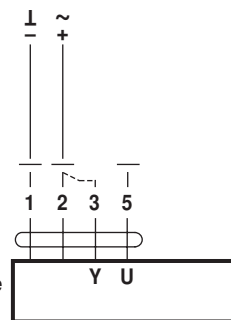


Functional check

1) Adapting the direction of stroke



**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



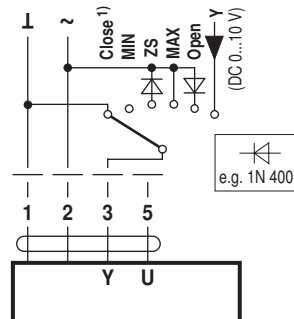
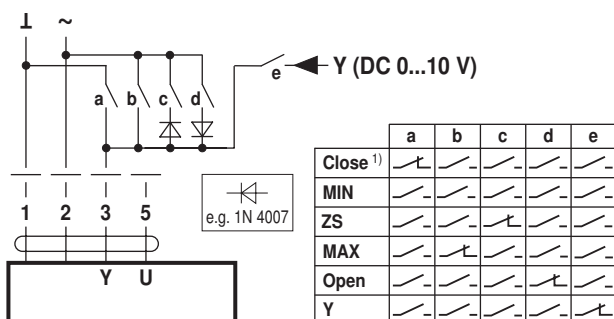
**Procedure**

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

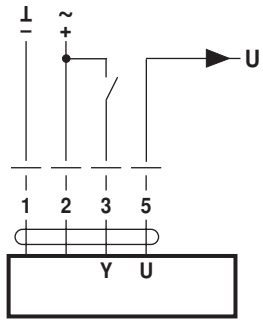
Override control and limiting with AC 24 V with rotary switch



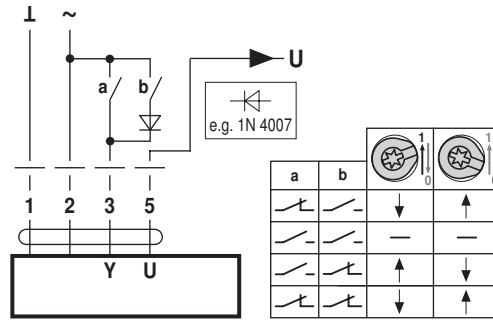
1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

**Functions**

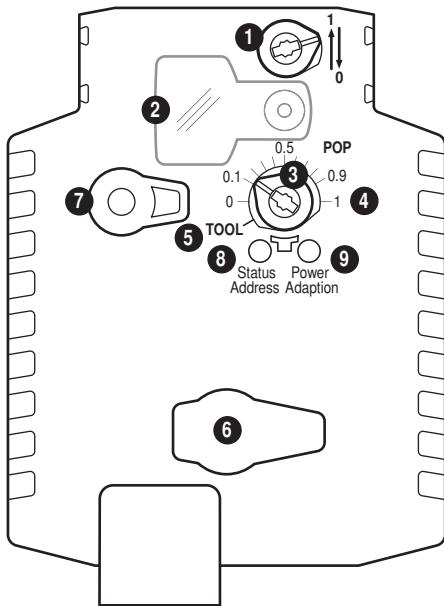
Control open-close



Control 3-point



**Operating controls and indicators**



- ❶ Direction of stroke switch
- ❷ Cover, POP button
- ❸ POP button
- ❹ Scale for manual adjustment
- ❺ Position for adjustment with tool
- ❻ Tool socket
- ❼ Disengagement button

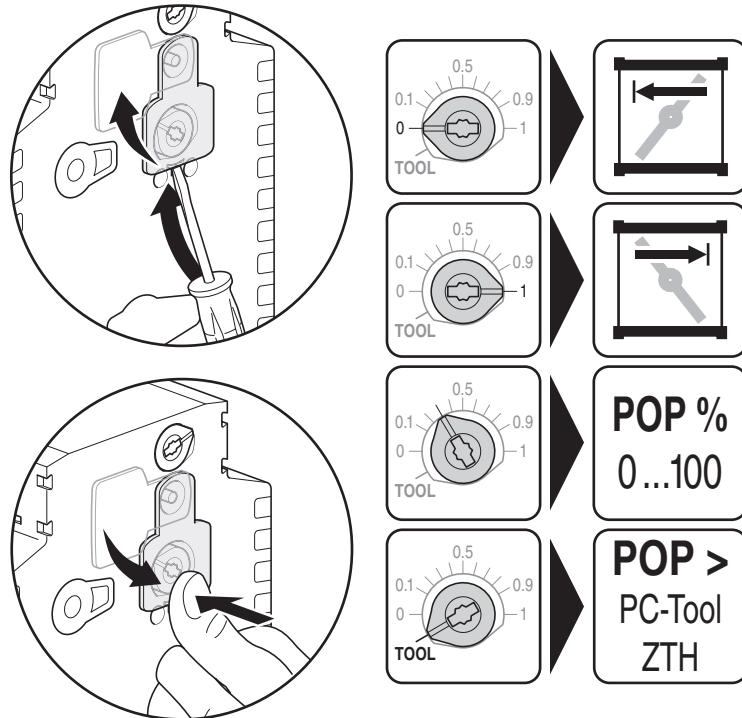
LED displays		Meaning / function
❸ yellow	❹ green	
Off	On	Operation OK / without fault
Off	Flashing	POP function active
On	Off	Fault
Off	Off	Not in operation
On	On	Adaptation procedure running
Flashing	On	Communication

- ❸ Press button: Acknowledgment of addressing
- ❹ Press button: Triggers stroke adaption, followed by standard operation



## Operating controls and indicators

### Setting emergency setting position (POP)



## Installation notes



### Notes

- If a rotary support and/or coupling piece is used, losses in the actuation force losses are to be expected.

### Applications without transverse force

The linear actuator is screwed directly to the housing at three points. Afterwards, the head of the gear rod is fastened to the moving part of the ventilation application (e.g. damper or slide valve).

### Applications with transverse forces

Connect the coupling piece with the internal thread (Z-KS2) to the head of the gear rod. Screw the rotary support (Z-DS1) to the ventilation application. Afterwards, the linear actuator is screwed to the previously mounted rotary support with the enclosed screw. Afterwards, the coupling piece, which is mounted to the head of the gear rod, is attached to the moving part of the ventilating application (e.g. damper or slide valve). The transverse forces can be compensated for to a certain limit with the rotary support and/or coupling piece. The maximum permissible swivel angle of the rotary support and coupling piece is 10°, laterally and upwards.

### Stroke limitation

If the stroke limitations are used on the gear rod, the mechanical operating range on this side of the gear rod can be used starting with an extension length of 20 mm.

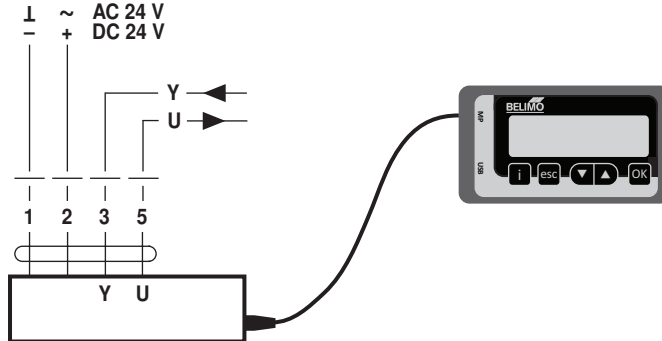
Service



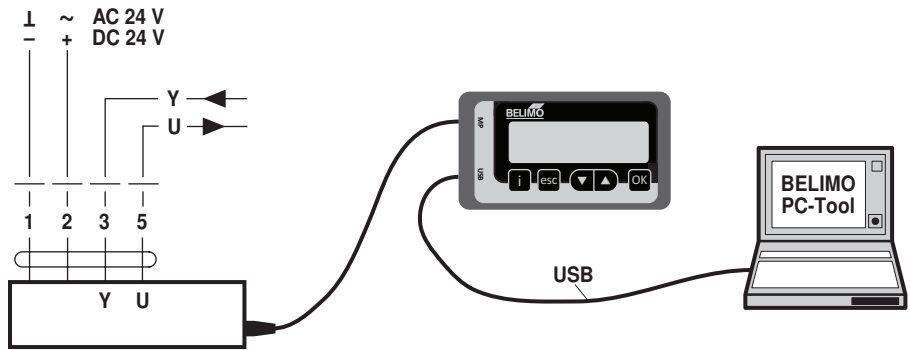
Notes

- The actuator can be parameterised by PC-Tool and ZTH EU via the service socket.

Service Tools connection ZTH EU connection

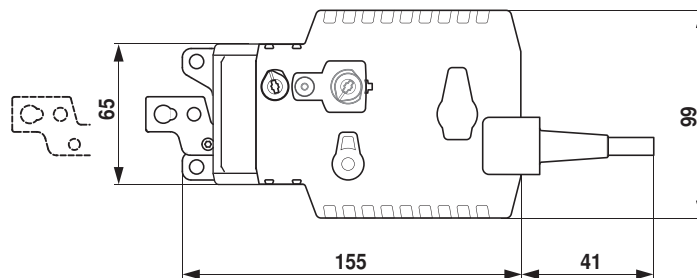
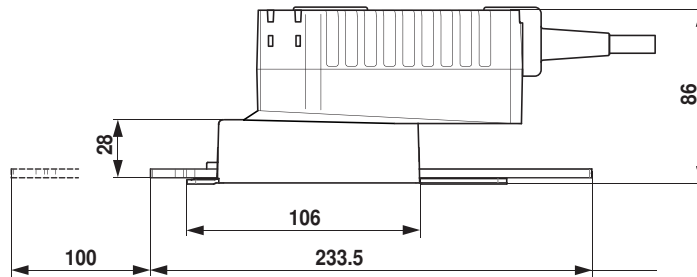


PC-Tool connection



Dimensions [mm]

Dimensional drawings



**Further documentation**

- Overview MP Cooperation Partners
- Tool connections