

Communicative globe valve actuator with fail-safe for 2-way and 3-way globe valves

- Actuating force 1000 N
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Stroke 20 mm
- Conversion of sensor signals
- 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	2.5 W	
	Power consumption in rest position	1.5 W	
	Power consumption for wire sizing	6 VA	
	Connection supply / control	Terminals with cable 1 m, 4 x 0.75 mm <sup>2</sup> (Terminal 4 mm <sup>2</sup> )	
	Parallel operation	Yes (note the performance data)	
	<b>Functional data</b>	Actuating force motor	1000 N
		Communicative control	MP-Bus
Operating range Y		2...10 V	
Input Impedance		100 kΩ	
Options positioning signal		Open/close 3-point (AC only) Modulating (DC 0...32 V)	
Operating range Y variable		Start point 0.5...30 V End point 2.5...32 V	
Position feedback U		2...10 V	
Position feedback U note		Max. 0.5 mA	
Position feedback U variable		Start point 0.5...8 V End point 2.5...10 V	
Setting fail-safe position		Spindle 0...100%, adjustable (POP rotary knob)	
Bridging time (PF) variable		1...10 s	
Position accuracy		±5%	
Manual override		with push-button	
Stroke		20 mm	
Running time motor		150 s / 20 mm	
Running time motor variable		90...150 s	
Running time fail-safe		35 s / 20 mm	
Adaptation setting range		manual (automatic on first power-up)	
Adaptation setting range variable		No action Adaptation when switched on Adaptation 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 + 33%)...100% MIN = 0%...(MAX - 33%) ZS = MIN...MAX	
Sound power level, motor		56 dB(A)	
Sound power level, fail-safe		45 dB(A)	
Position indication	Mechanically, 5...20 mm stroke		
<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	IP54	
	Degree of protection NEMA/UL	NEMA 2	
	Enclosure	UL Enclosure Type 2	

**Technical data**

<b>Safety</b>	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 UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1:02
	Certification UL note	The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	0...50 °C
	Storage temperature	-40...80 °C
	Ambient humidity	Max. 95% r.H., non-condensing
Weight	Weight	1.4 kg
<b>Terms</b>	Abbreviations	POP = Power off position / fail-safe position CPO = Controlled power off / controlled fail-safe 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 must not be used outside the specified field of application, especially 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 switch for changing the direction of motion and so the closing point may be adjusted only by authorised specialists. The direction of motion is critical, particularly in connection with frost protection circuits.
- 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 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** Conventional operation:  
 The actuator is connected with a standard modulating signal of 0...10 V and moves to the position defined by the positioning signal at the same time as the integrated capacitors are loaded.  
 Interrupting the supply voltage causes the valve to be moved to the selected fail-safe position by means of stored electrical energy.  
 Operation on 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.

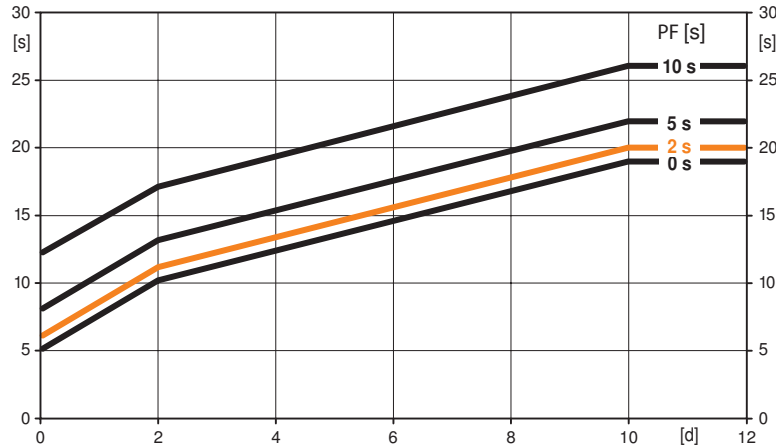
**Product features**

**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 a power failure, the actuator can move at any time from its current position into the preset fail-safe position.

The duration of the pre-charging time depends mainly on following factors:

- Duration of the power failure
- 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 5 s, the actuator requires a pre-charging time of 14 s 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]

**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.

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

**Simple direct mounting** Simple direct mounting on the globe valve by means of form-fit hollow clamping jaws. The actuator can be rotated by 360° on the valve neck.

**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. The stroke can be adjusted by using a hexagon socket screw key (4 mm), which is inserted into the top of the actuator. The stroke shaft extends when the key is rotated clockwise.

**High functional reliability** The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

**Combination valve/actuator** Refer to the valve documentation for suitable valves, their permitted fluid temperatures and closing pressures.

**Position indication** The stroke is indicated mechanically on the bracket with tabs. The stroke range adjusts itself automatically during operation.

**Home position** Factory setting: Actuator spindle is retracted. When valve-actuator combinations are shipped, the direction of motion is set in accordance with the closing point of the valve. 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.

**Product features**

<b>Setting direction of stroke</b>	When actuated, the stroke direction switch changes the running direction in normal operation. The stroke direction switch has no influence on the fail-safe position which has been set.
<b>Setting fail-safe position (POP)</b>	<p>The rotary knob fail-safe position can be used to adjust the desired fail-safe position 0...100% in 10% increments. The rotary knob refers to the adapted or programmed height of stroke. In the event of a power failure, the actuator will move into the selected fail-safe position, taking into account the bridging time (PF) of 2 s which was set ex-works.</p> <p>Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the fail-safe 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.</p>
<b>Bridging time</b>	<p>Electrical interruptions can be bridged up to a maximum of 10 s.</p> <p>In the event of a power failure, the actuator will remain stationary in accordance with the set bridging time. If the power failure is greater than the set bridging time, then the actuator will move into the selected fail-safe position.</p> <p>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.</p> <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.</p>
<b>Adaption and synchronisation</b>	<p>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).</p> <p>Automatic synchronisation after pressing the gearbox disengagement button is configured. The synchronisation is in the home position (0%).</p> <p>The actuator then moves into the position defined by the positioning signal.</p> <p>A range of settings can be adapted using the PC-Tool (see MFT-P documentation)</p>

**Accessories**

	Description	Type
<b>Gateways</b>	Gateway MP zu BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD
	Gateway MP to LonWorks	UK24LON
	Gateway MP to KNX	UK24EIB
<b>Electrical accessories</b>	<b>Description</b>	<b>Type</b>
	Auxiliary switch 2 x SPDT add-on	S2A-H
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin service socket for Belimo device	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN
	MP-Bus power supply for MP actuators	ZN230-24MP
	Connecting board MP-Bus for wiring boxes EXT-WR-FP...-MP	ZFP2-MP
<b>Service Tools</b>	<b>Description</b>	<b>Type</b>
	Service Tool, with ZIP-USB function	ZTH EU
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Adapter for Service-Tool ZTH	MFT-C

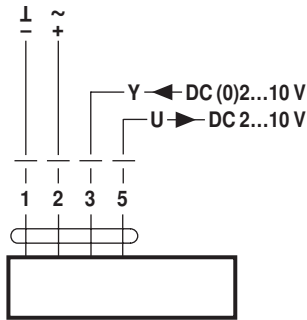
**Electrical installation**

	<b>Notes</b>	<ul style="list-style-type: none"> <li>• Connection via safety isolating transformer.</li> <li>• Parallel connection of other actuators possible. Observe the performance data.</li> <li>• Direction of stroke switch factory setting: Actuator spindle retracted (▲).</li> </ul>
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Electrical installation

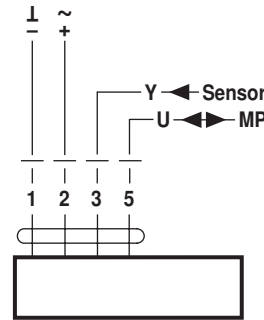
Wiring diagrams

AC/DC 24 V, modulating



**Cable colours:**  
 1 = black  
 2 = red  
 3 = white  
 5 = orange

Operation on the MP-Bus

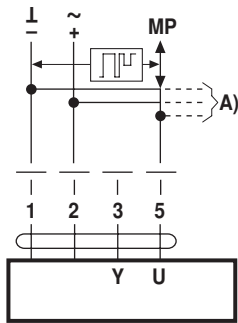


**Cable colours:**  
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Functions

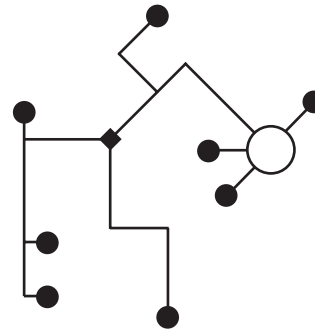
Functions when operated on MP-Bus

Connection on the MP-Bus



A) more actuators and sensors (max.8)

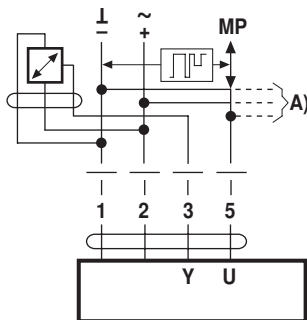
MP-Bus Network topology



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

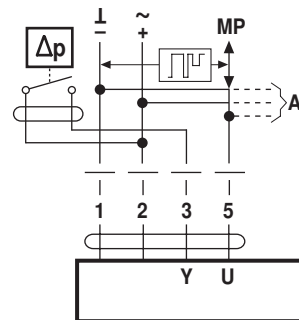
Connection of active sensors



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

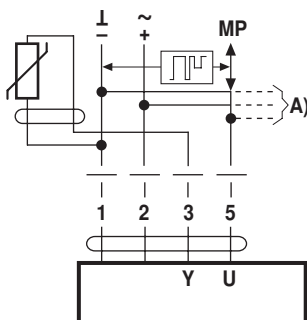
Connection of external switching contact



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>

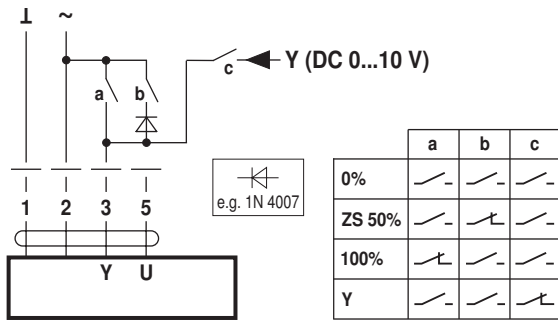
A) more actuators and sensors (max.8)

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

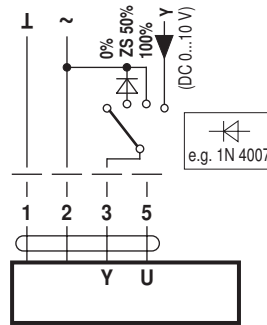
Functions

Functions with basic values (conventional mode)

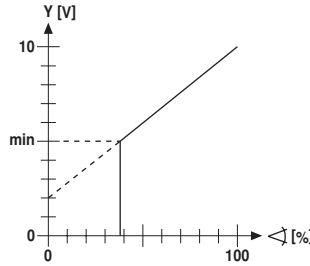
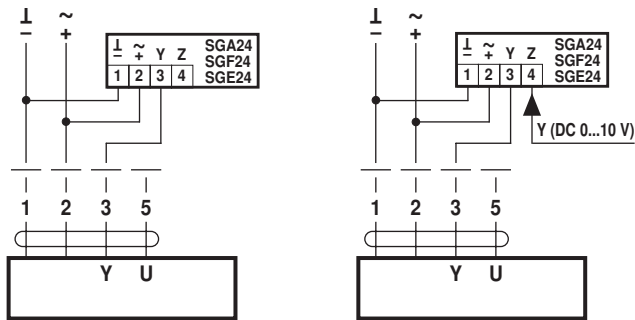
Override control with AC 24 V with relay contacts



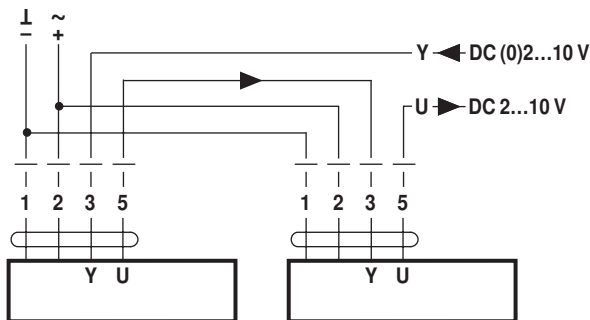
Override control with AC 24 V with rotary switch



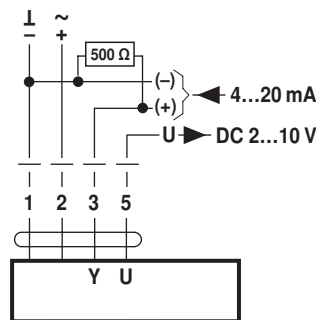
Control remotely 0...100% with positioner SG..  
 positioner SG..



Follow-up control (position-dependent)

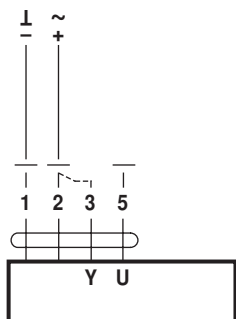


Control with 4...20 mA via external resistor



**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

Functional check



**Procedure**

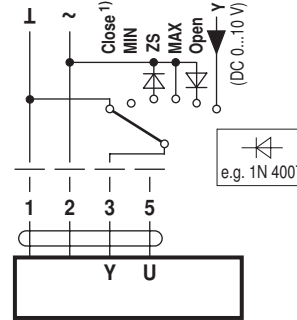
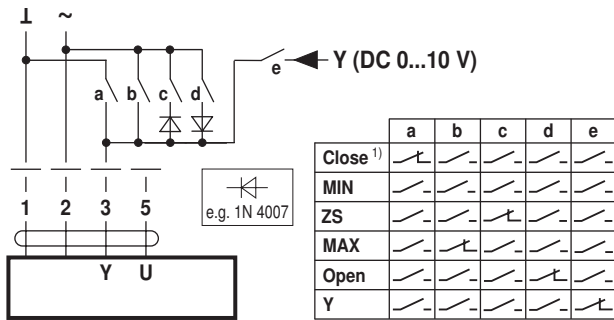
1. Apply 24 V to connection 1 and 2
2. Disconnect connection 3:
  - with upwards direction of motion: closing point at top
  - with downwards direction of motion: closing point at bottom
3. Short circuit connections 2 and 3:
  - Actuator runs in the opposite direction

Functions

Functions for devices with specific parameters (Parametrisation necessary)

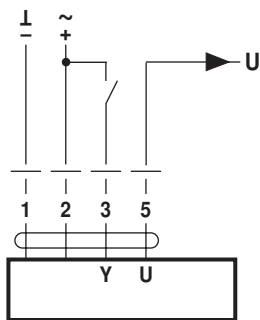
Override control and limiting with AC 24 V with relay contacts

Override control and limiting with AC 24 V with rotary switch

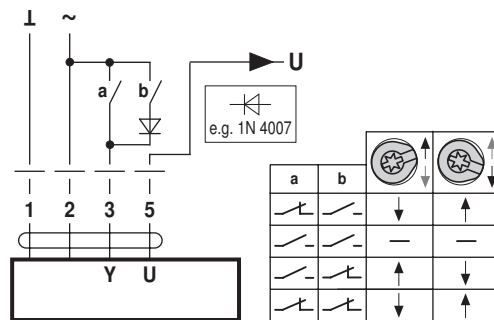


1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

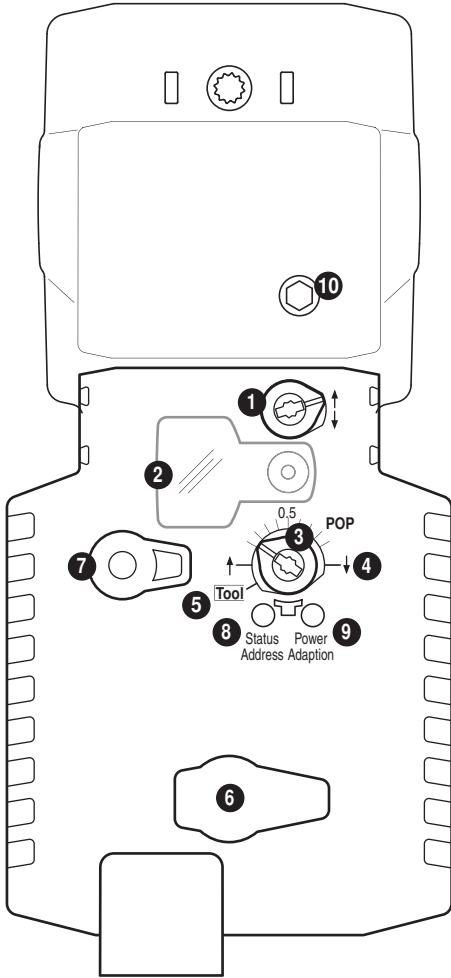
Control open/close



Control 3-point



Operating controls and indicators

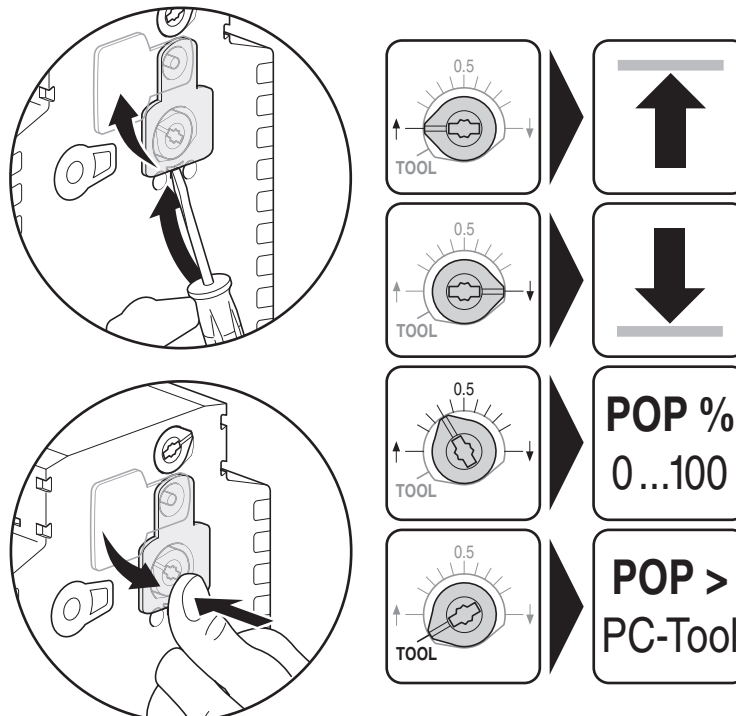


- 1 Direction of stroke switch**  
Switch over: Direction of stroke changes
- 2 Cover, POP button**
- 3 POP button**
- 4 Scale for manual adjustment**
- 5 Position for adjustment with tool**
- 6 Service plug**  
For connecting the parameterisation and service tools
- 7 Gear disengagement button**  
Press button: Gear disengaged, motor stops, manual override possible  
Release button: Gear engaged, standard mode

LED displays		Meaning / function
<b>8</b> yellow	<b>9</b> green	
Off	On	Operation OK
Off	Flashing	POP function active
On	Off	– Pre-charging time SuperCap – Fault SuperCap – Wiring error in supply
Off	Off	Not in operation
On	On	Adaptation process active
Flickering	On	Communication active

- 8 Push-button (LED yellow)**  
Press button: Confirmation of the addressing
- 9 Push-button (LED green)**  
Press button: Triggers stroke adaptation, followed by standard mode
- 10 Manual override**  
Clockwise: Actuator spindle extends  
Counterclockwise: Actuator spindle retracts

Setting emergency setting position (POP)

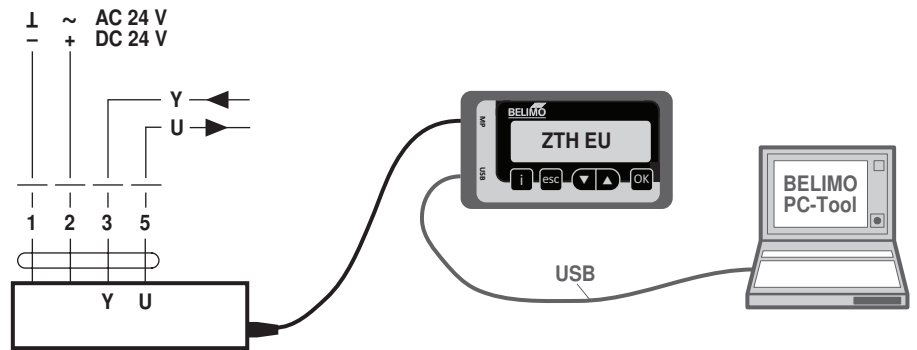




Service

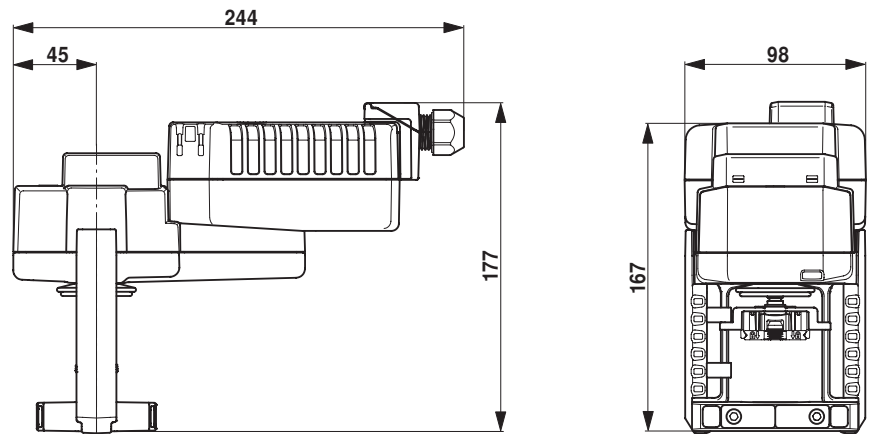
**Service Tools connection** The actuator can be parametrised by ZTH EU via the service socket. For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions [mm]

Dimensional drawings



Further documentation

- The complete product range for water applications
- Installation instructions for actuators and/or globe valves
- Data sheets for globe valves
- Notes for project planning 2-way and 3-way globe valves
- General notes for project planning
- Tool connections
- Introduction to MP-Bus Technology
- Overview MP Cooperation Partners