

Configurable rotary actuator for ball valves

- Torque motor 20 Nm
- Nominal voltage AC/DC 24 V
- Control modulating 2...10 V variable
- Position feedback 2...10 V variable


**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	4 W
	Power consumption in rest position	1.25 W
	Power consumption for wire sizing	6 VA
	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>	Torque motor	20 Nm
	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
	Position accuracy	±5%
	Manual override	with push-button, can be locked
	Running time motor	90 s / 90°
	Running time motor variable	90...350 s
	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	45 dB(A)
Position indication	Mechanically, pluggable	
<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
	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	

## Technical data

<b>Safety</b>	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50 °C
	Storage temperature	-40...80 °C
	Ambient humidity	Max. 95% r.H., non-condensing
	Servicing	maintenance-free
<b>Weight</b>	Weight	0.90 kg

## 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 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 must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

## Product features

<b>Mode of operation</b>	The actuator is connected with a standard modulating signal of 0...10 V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the valve position 0.5...100% and as slave control signal for other actuators.
<b>Parametrisable 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>	Straightforward direct mounting on the ball valve with only one central screw. The assembly tool is integrated in the plug-in position indication. The mounting orientation in relation to the ball valve can be selected in 90° steps.
<b>Manual override</b>	Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
<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 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).
<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). 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)

Accessories

	Description	Type
<b>Electrical accessories</b>	Auxiliary switch 1 x SPDT add-on	S1A
	Auxiliary switch 2 x SPDT add-on	S2A
	Feedback potentiometer 140 Ω add-on	P140A
	Feedback potentiometer 200 Ω add-on	P200A
	Feedback potentiometer 500 Ω add-on	P500A
	Feedback potentiometer 1 kΩ add-on	P1000A
	Feedback potentiometer 2.8 kΩ add-on	P2800A
	Feedback potentiometer 5 kΩ add-on	P5000A
	Feedback potentiometer 10 kΩ add-on	P10000A
	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	
<b>Service Tools</b>	<b>Description</b>	<b>Type</b>
	Service Tool, Setting tool with ZIP-USB function	ZTH EU
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Adapter for Service-Tool ZTH	MFT-C

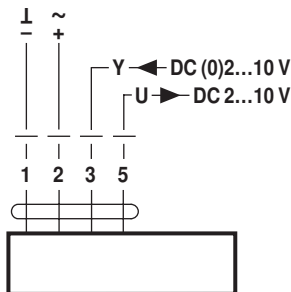
Electrical installation

**Notes**

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

Wiring diagrams

AC/DC 24 V, modulating

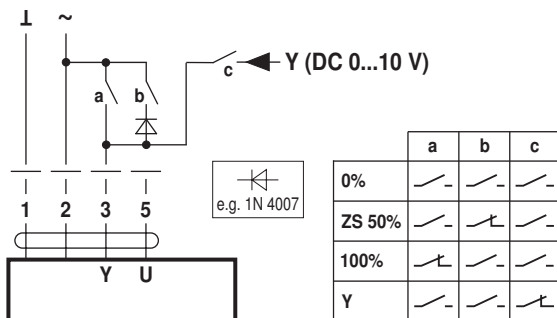


**Cable colours:**  
 1 = black  
 2 = red  
 3 = white  
 5 = orange

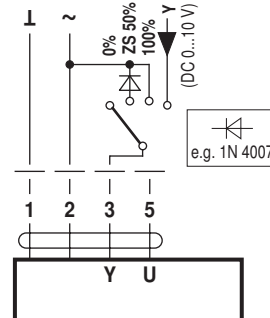
Functions

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

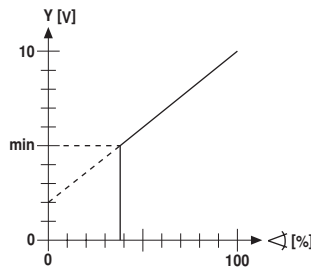
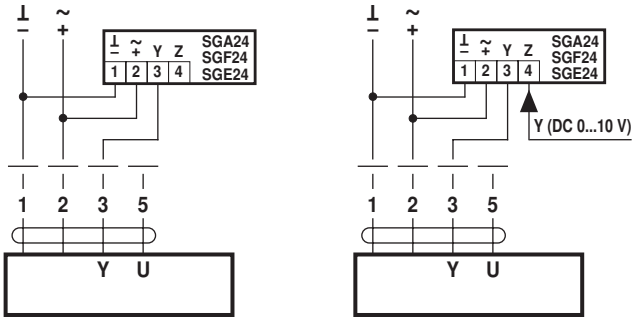


Override control with AC 24 V with rotary switch



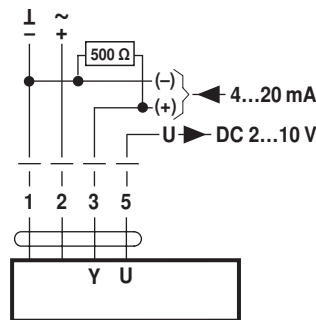
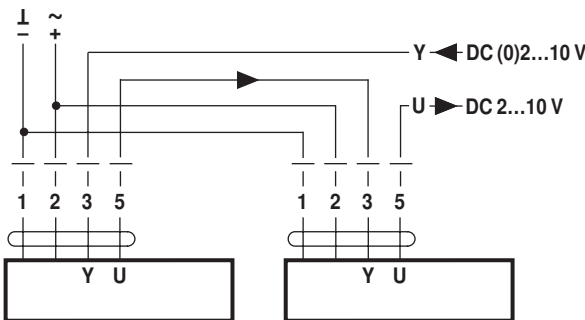
**Functions**

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



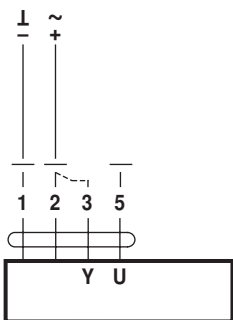
Follow-up control (position-dependent)

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



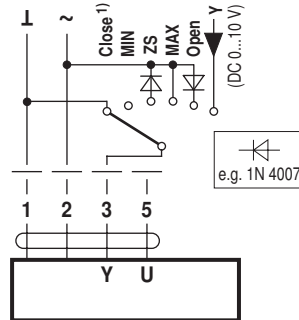
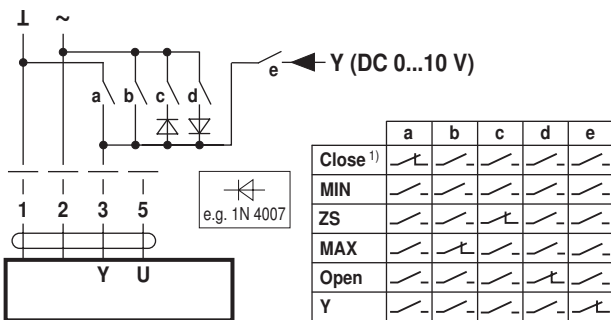
**Procedure**

1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
  - with direction of rotation Y1: Actuator rotates to the left
  - with direction of rotation Y2: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
  - Actuator runs in opposite direction

**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

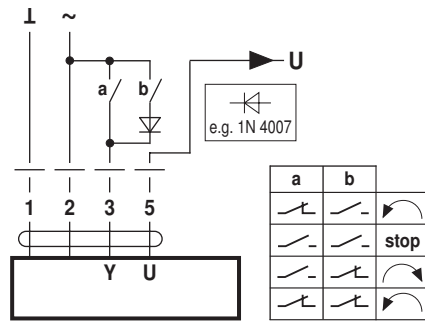
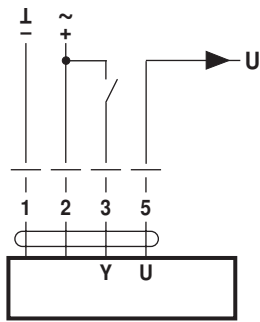


1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

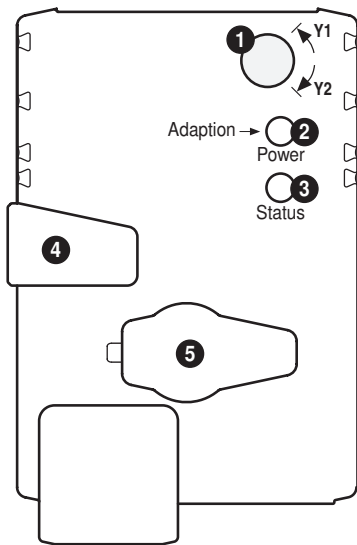
**Functions**

Control open/close

Control 3-point with AC 24 V



**Operating controls and indicators**



- 1 Direction of rotation switch**  
Switch over: Direction of rotation changes
- 2 Push-button and LED display green**  
Off: No power supply or malfunction  
On: In operation  
Press button: Triggers angle of rotation adaptation, followed by standard mode
- 3 Push-button and LED display yellow**  
Off: Standard mode  
On: Adaptation or synchronising process active  
Press button: No function
- 4 Gear disengagement button**  
Press button: Gear disengages, motor stops, manual override possible  
Release button: Gear engages, synchronisation starts, followed by standard mode
- 5 Service plug**  
For connecting parameterisation and service tools

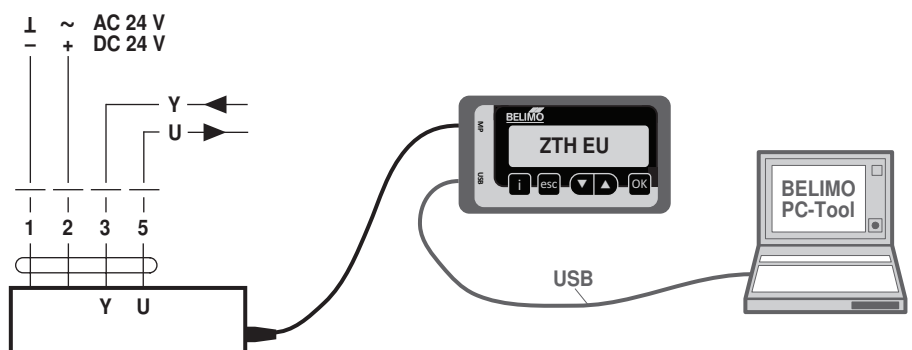
**Check power supply connection**

- 2** Off and **3** On Possible wiring error in power supply

**Service**

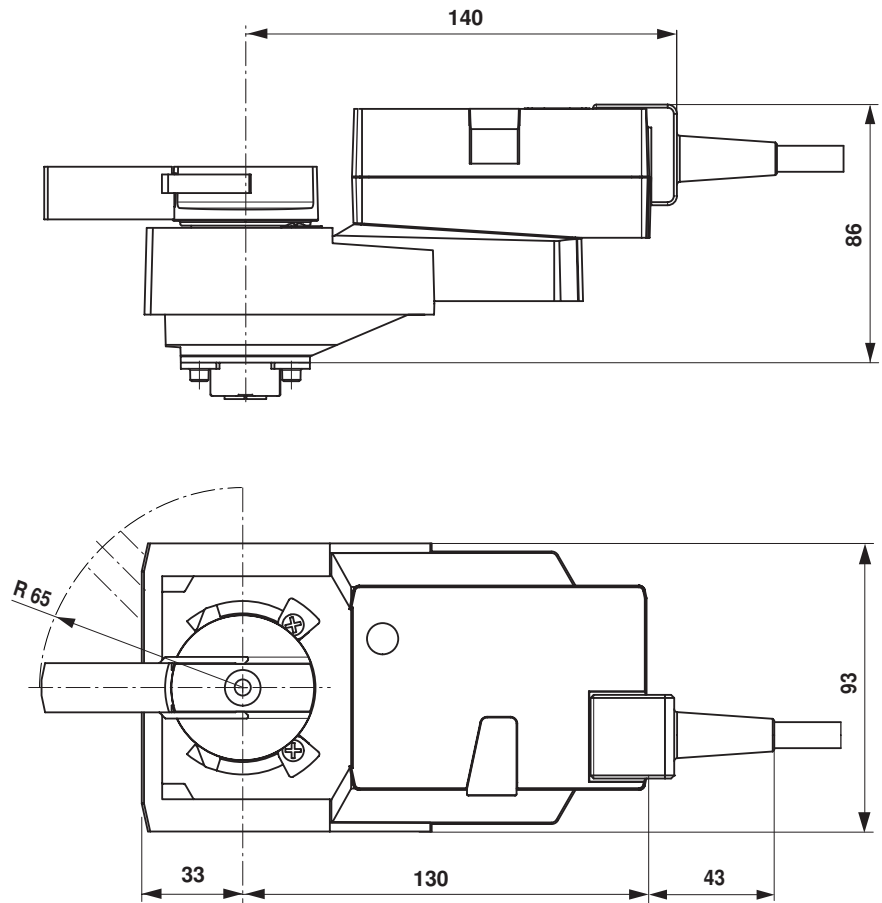
**Service Tools connection** The actuator can be parametrised by ZTH EU via the service socket. For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



## Dimensions [mm]

## Dimensional drawings



## Further documentation

- The complete product range for water applications
- Data sheets for ball valves
- Installation instructions for actuators and/or ball valves
- General notes for project planning