BELIMO®

Rotary actuator for butterfly valves

- Torque motor 160 Nm
- Nominal voltage AC 24...240 V / DC 24...125 V
- Control modulating, communicative, hybrid
- with 2 integrated auxiliary switches
- Conversion of sensor signals
- Communication via BACnet MS/TP, Modbus RTU, Belimo-MP-Bus or conventional control

ASHRAE BACnet™
Modbus
MP⚡BUS®
NFC
RETRO⟳FIT®

Technical data

Electrical data	Nominal voltage	AC 24...240 V / DC 24...125 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...264 V / DC 19.2...137.5 V
	Power consumption in operation	20 W
	Power consumption in rest position	6 W
	Power consumption for wire sizing	with 24 V 20 VA / with 240 V 52 VA
	Auxiliary switch	2 x SPDT, 1 x 10° / 1 x 0...90° (default setting 85°)
	Switching capacity auxiliary switch	1 mA...3 A (0.5 A inductive), AC 250 V
	Connection supply	Terminals 2.5 mm²
	Connection protective earth	earth terminal
	Connection control	Terminals 1.5 mm²
	Connection auxiliary switch	Terminals 2.5 mm²
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	BACnet MS/TP Modbus RTU MP-Bus
	Number of nodes	BACnet / Modbus see interface description MP-Bus max. 8
Functional data	Torque motor	160 Nm
	Operating range Y	2...10 V
	Input Impedance	100 kΩ
	Operating range Y variable	0.5...10 V 4...20 mA
	Position feedback U	2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	0.5...10 V
	Position accuracy	±5%
	Manual override	hand lever
	Running time motor	35 s / 90°
	Running time motor variable	30...120 s
	Sound power level, motor	68 dB(A)
	Position indication	Mechanically (integrated)
Safety data	Protection class IEC/EN	I, protective earth (PE)
	Protection class UL	I, protective earth (PE)
	Degree of protection IEC/EN	IP66/67
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	EMC	CE according to 2014/30/EU

www.belimo.com
PRCA-BAC-S2-T • en-gb • 2022-03-08 • Subject to change
1 / 11

Safety data	Low voltage directive	CE according to 2014/35/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
		The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
	Mode of operation	Type 1
	Rated impulse voltage supply	4 kV
	Rated impulse voltage control	0.8 kV
	Rated impulse voltage auxiliary switch	2.5 kV
	Pollution degree	3
	Ambient temperature	-30...50°C
	Storage temperature	-40...80°C
	Ambient humidity	Max. 100% RH
	Servicing	maintenance-free
Mechanical data	Connection flange	F07 (F05/F10 only with accessory)
Weight	Weight	5.8 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.
- Caution: Power supply voltage!
- The device has a protective earthing. Incorrect connection of the protective earth can lead to hazards due to electrical shock.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Apart from the connection box, 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.
- The two switches integrated in the actuator are to be operated either on power supply voltage or at safety extra-low voltage. The combination power supply voltage/safety extra-low voltage is not permitted.

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
- Dirt / Dust
- Rain / Snow
- Air humidity

Converter for sensors

Connection option for two sensors (passive, active or switching contacts). In this way, the analogue sensor signal can be easily digitised and transferred to the bus systems BACnet or Modbus.

Parametrisable actuators

The factory settings cover the most common applications.

The Belimo Assistant App is required for parametrisation via Near Field Communication (NFC) and simplifies commissioning. Moreover, it provides a variety of diagnostic options.

The ZTH EU service tool provides a selection of both diagnostic and setting options.

Combination analogue - communicative (hybrid mode)

With conventional control by means of an analogue positioning signal, BACnet or Modbus can be used for the communicative position feedback

Simple direct mounting	Simple direct mounting on the butterfly valve. The mounting orientation in relation to the butterfly valve can be selected in 90° (angle) increments.
Manual override	The valve can be manually operated using a hand crank. Unlocking is carried out manually by removing the hand crank.
Internal heating	An internal heater prevents condensation buildup. Thanks to the integrated temperature and humidity sensor, the built-in heater automatically switches on/off.
High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
Flexible signalling	The actuator has one auxiliary switch with a fixed setting (10°) and one adjustable auxiliary switch (0...90°).

Accessories

Mechanical accessories

Description	Type
Position indicator and tappet shaft, F07, square 45° turned, SW 17, DN 125...300	ZPR01
Tappet shaft, F07, square 45° turned, SW 17	ZPR02
Position indicator and tappet shaft, F05, square 45° turned, SW 14, DN 80...100	ZPR03
Retrofit adapter kit, F07/F10, flat head/square, SW 17	ZPR05
Retrofit adapter kit, F07/F10, square 45° turned, SW 14	ZPR06
Adapter kit with spacer ring, F07, square 45° turned, SW 17	ZPR08
Retrofit adapter kit, F07/F10, flat head/square, SW 14	ZPR09
Retrofit adapter kit, F05, flat head/square, SW 14	ZPR10
Retrofit adapter kit, F07/F10, square 45° turned, SW 18	ZPR11
Retrofit adapter kit, F07/F10, flat head/square, SW 16	ZPR12
Retrofit adapter kit, F07/F10, flat head/square, SW 11	ZPR13
Retrofit adapter kit, F07/F10, flat head/square, SW 12.7	ZPR14
Retrofit adapter kit, F07/F10, square 45° turned, SW 11	ZPR15
Hand crank for PR/PM actuator	ZPR20

Service tools

Description	Type
Belimo Assistant App, Smartphone app for easy commissioning, parametrising and maintenance	Belimo Assistant App
Converter Bluetooth / NFC	ZIP-BT-NFC
Service Tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU
Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket	ZK1-GEN

Sensors

Description	Type
Duct/Immersion sensor Temperature 50 mm x 6 mm Pt1000	01DT-1BH
Duct/Immersion sensor Temperature 50 mm x 6 mm Ni1000	01DT-1CH
Duct/Immersion sensor Temperature 100 mm x 6 mm Pt1000	01DT-1BL
Duct/Immersion sensor Temperature 100 mm x 6 mm Ni1000	01DT-1CL
Duct/Immersion sensor Temperature 150 mm x 6 mm Pt1000	01DT-1BN
Duct/Immersion sensor Temperature 150 mm x 6 mm Ni1000	01DT-1CN
Duct/Immersion sensor Temperature 200 mm x 6 mm Pt1000	01DT-1BP
Duct/Immersion sensor Temperature 200 mm x 6 mm Ni1000	01DT-1CP
Duct/Immersion sensor Temperature 300 mm x 6 mm Pt1000	01DT-1BR
Duct/Immersion sensor Temperature 300 mm x 6 mm Ni1000	01DT-1CR
Duct/Immersion sensor Temperature 450 mm x 6 mm Pt1000	01DT-1BT
Duct/Immersion sensor Temperature 450 mm x 6 mm Ni1000	01DT-1CT

Electrical installation

⚠ Caution: Power supply voltage!

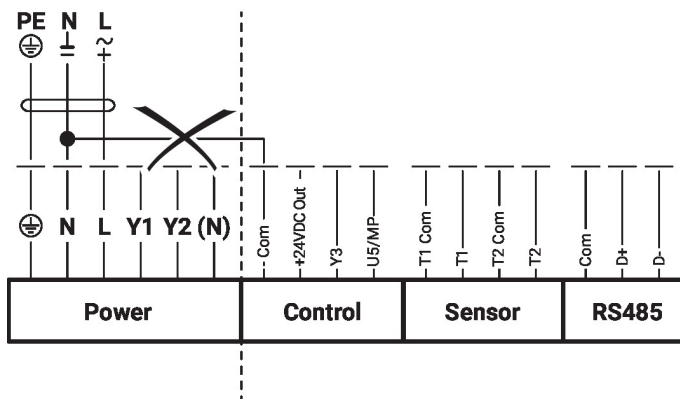Parallel connection of other actuators possible. Observe the performance data.
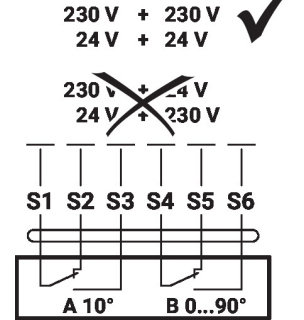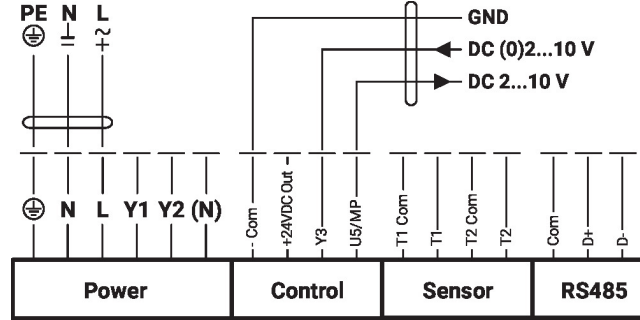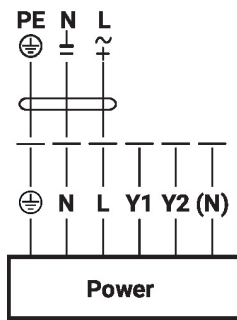
The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.
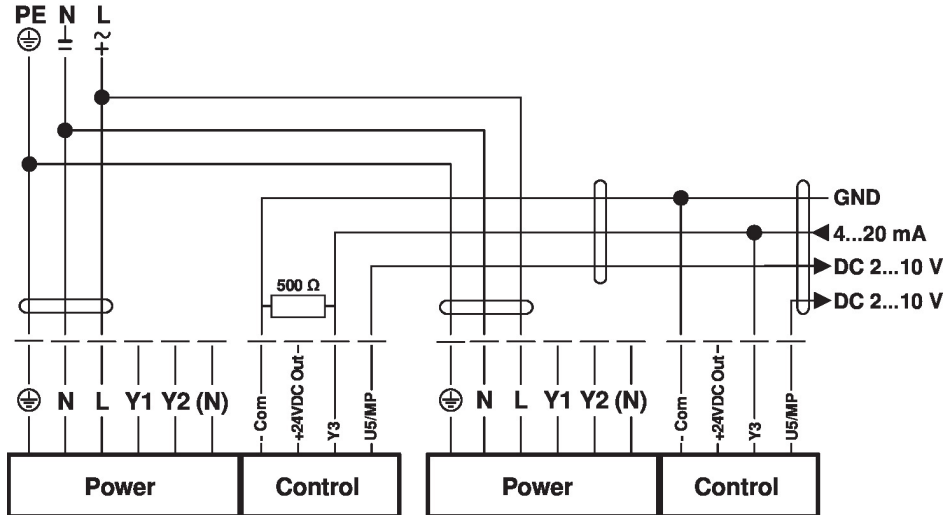
Wiring diagrams
AC 24...240 V / DC 24...125 V

Modulating control

Connection auxiliary switch

Parallel circuit

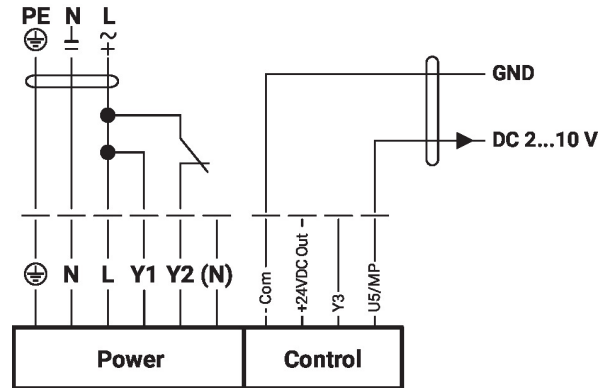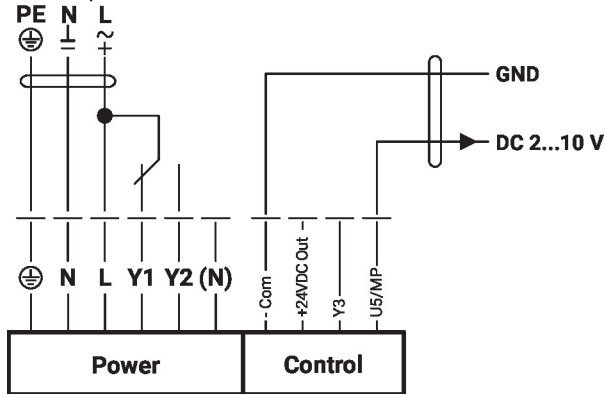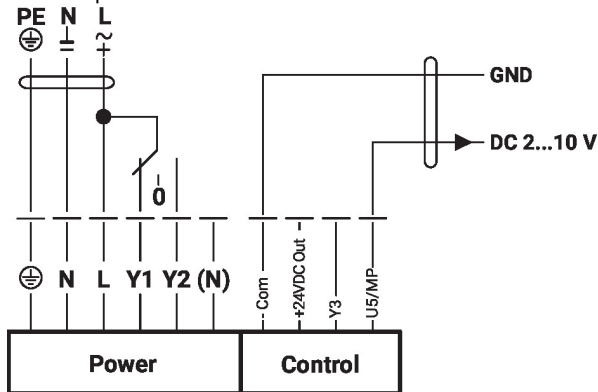Power supply must not be connected to the signal terminals!

Setpoint 2...10 V

Functions

Functions with specific parameters (NFC)

Control open/close

Control 3-point

Control 4...20 mA
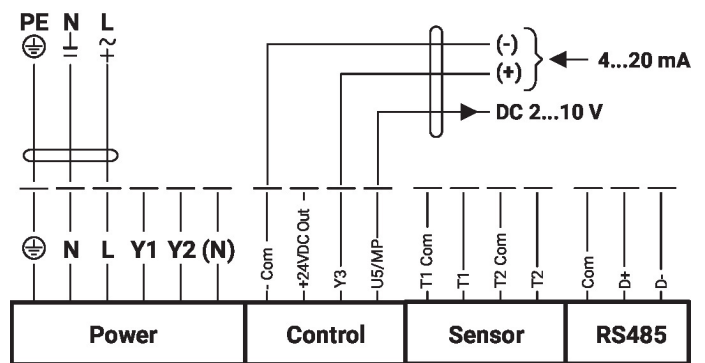
Positioner SG..
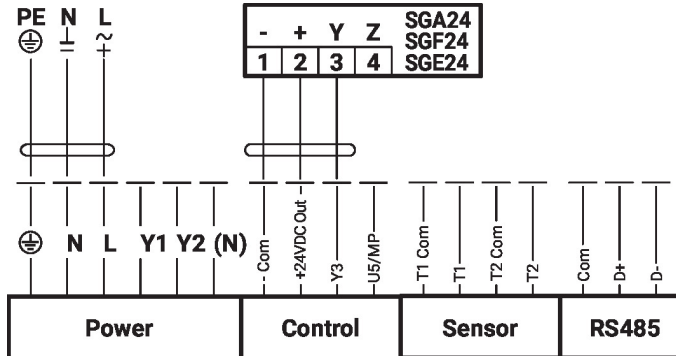
Note
Maximum output power «DC 24 V out» 1.2 W @ 50 mA!
A separate safety transformer must be used for higher performance!

Connection on the MP-Bus
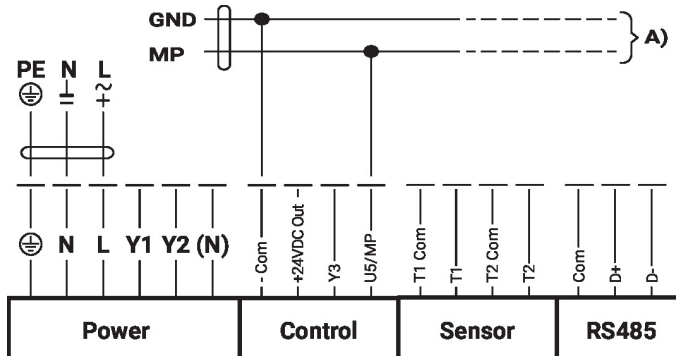
A) Additional actuators (max. 8)
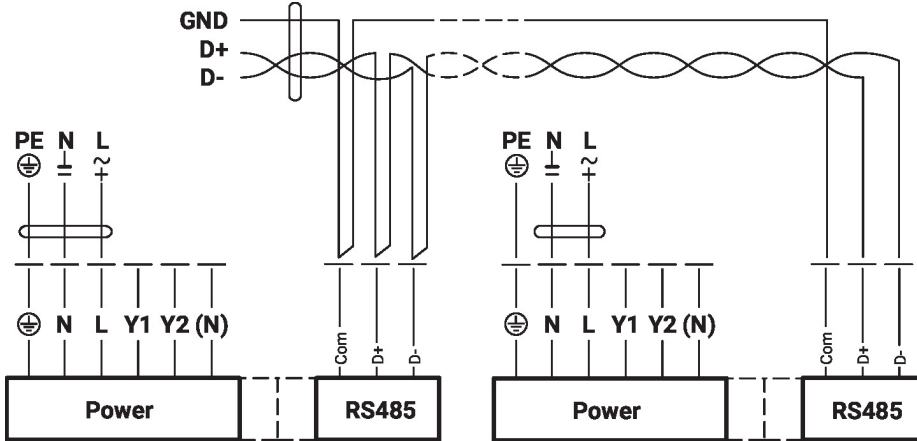
MP-Bus Network topology
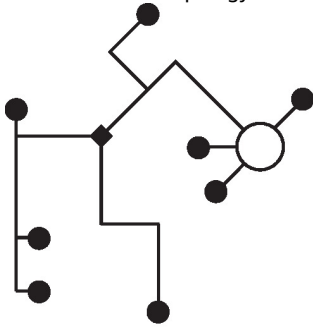
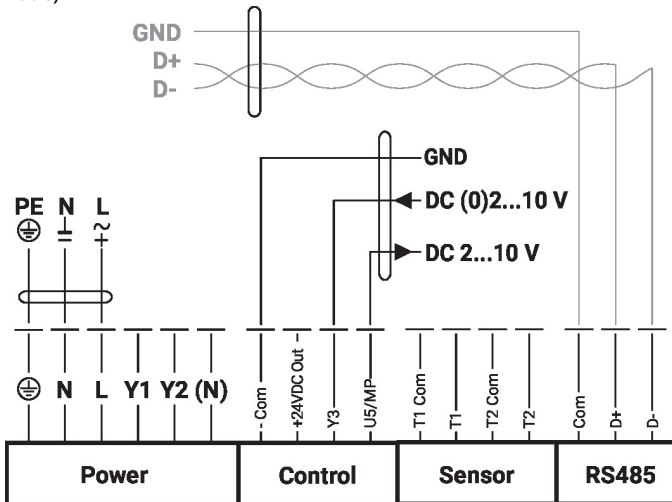There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
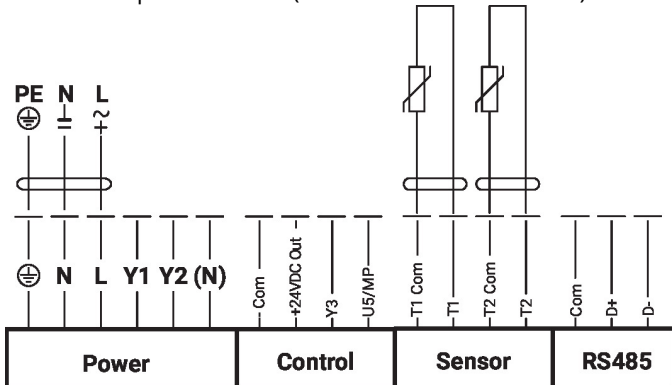• no terminating resistors required

Connection BACnet MS/TP / Modbus RTU

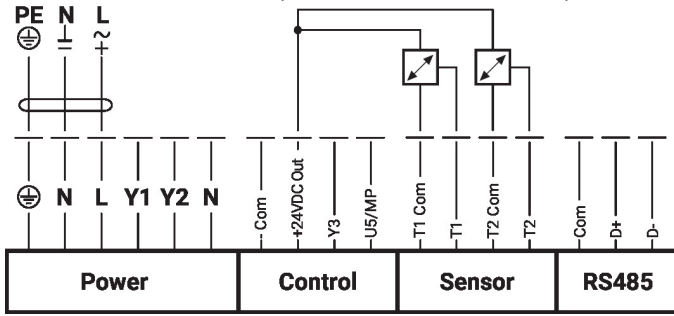Connection BACnet MS/TP / Modbus RTU with analog setpoint (hybrid mode)

Connection of passive sensors (BACnet MS/TP / Modbus RTU)

1)	2)
200 Ω…2 kΩ	0.1 Ω
2 kΩ…10 kΩ	1 Ω
10 kΩ…55 kΩ	10 Ω

1) Resistance range
2) Resolution
Compensation of the measured value is recommended
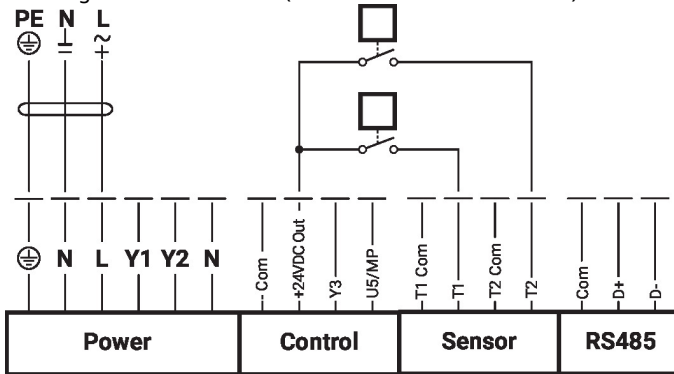- Suitable for Ni1000 and Pt1000
- Suitable Belimo types 01DT-..

Connection of active sensors (BACnet MS/TP / Modbus RTU)

Possible input voltage range:
DC 0...10 V (resolution 5 mV)
For example, to capture:
- Active temperature sensors
- Flow sensors
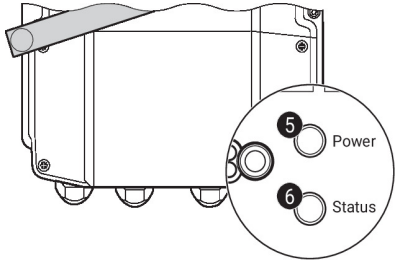- Pressure / differential pressure sensors

Switching contact connection (BACnet MS/TP / Modbus RTU)

Requirements for switching contact:
The switching contact must be able to accurately switch a current of 10 mA @ 24 V.
For example, to capture:
- Flow monitors
- Operation / malfunction messages of chillers

## Operating controls and indicators

5 **Push-button and LED display green**

Off:	No power supply or malfunction
On:	In operation
Press button:	Triggers test run, followed by standard mode

6 **Push-button and LED display yellow**

Off:	Standard mode
On:	Test run active
Flickering:	BACnet / Modbus communication active
Flashing:	Request for addressing from MP client
Press button:	Confirmation of the MP addressing
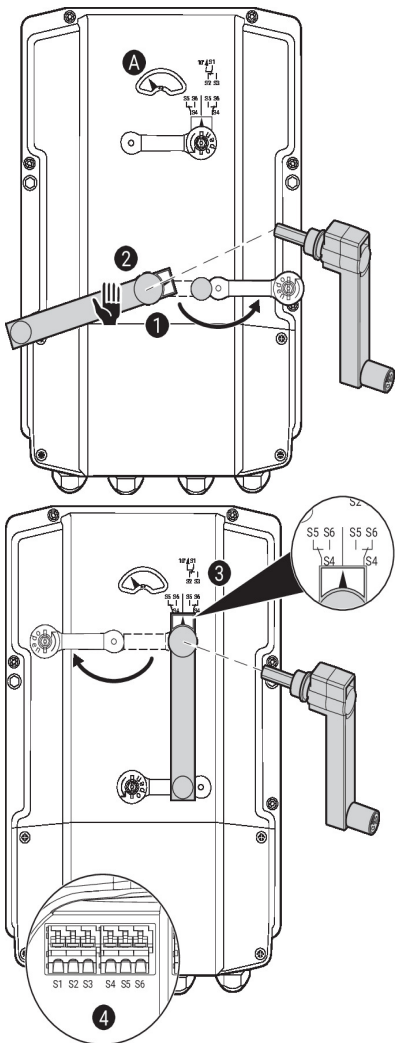
Auxiliary switch settings

⚠ **Note:** Perform settings on the actuator only in deenergised state.

For the auxiliary switch position settings, carry out points ❶ to ❹ successively.

❶ **Gear disengagement**
Opening the manual override cover and adjusting the hand crank.
Manual override is possible.

❷ **Manual override control**
Turn the hand crank until the desired switching position **A** is indicated and then remove the hand crank.

❸ **Auxiliary switch**
For the auxiliary switch position settings, carry out points ❶ to ❹ successively.
Opening the auxiliary switch adjustment cover and adjusting the hand crank.
Turn the hand crank until the arrow points to the vertical line.

❹ **Terminals**
Connect continuity tester to S4 + S5 or to S4 + S6.
If the auxiliary switch should switch in the opposite direction, rotate the hand crank by 180°.

Service

NFC connection

Belimo devices marked with the NFC logo can be operated with the Belimo Assistant App.

Requirement:

- NFC- or Bluetooth-capable smartphone
- Belimo Assistant App (Google Play & Apple AppStore)

Align NFC-capable smartphone on the device so that both NFC antennas are superposed.

Connect Bluetooth-enabled smartphone via the Bluetooth-to-NFC Converter ZIP-BT-NFC to the device. Technical data and operation instructions are shown in the ZIP-BT-NFC data sheet.
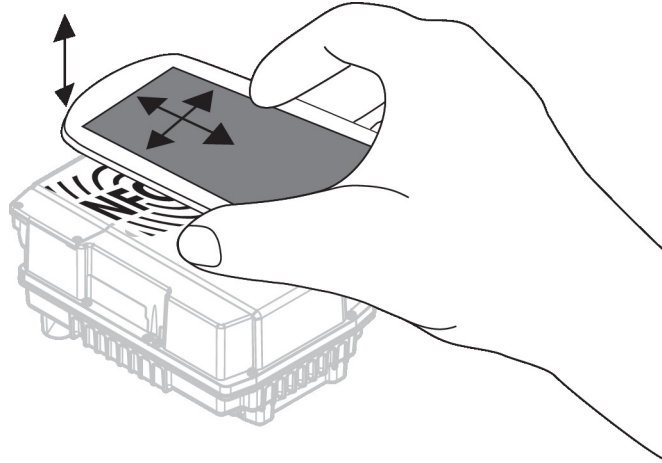
Service tools connection

The actuator can be configured by the ZTH EU via the service socket.
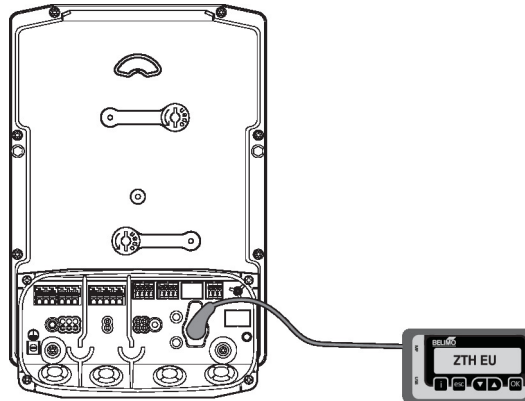
Dimensions
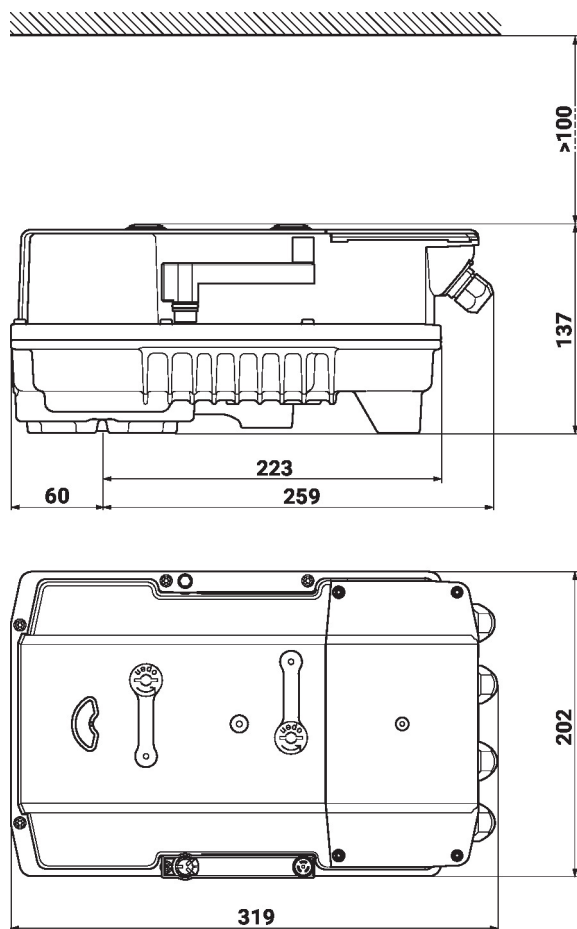
Further documentation

- Tool connections
- Description Protocol Implementation Conformance Statement PICS
- Description Modbus register
- Overview MP Cooperation Partners
- Introduction to MP-Bus Technology
- MP Glossary
- The complete product range for water applications
- Data sheets for butterfly valves
- Installation instructions for actuators and/or butterfly valves
- General notes for project planning