BELIMO

Technical data sheet PMCA-BAC-S2-T

Communicative damper actuator in IP66/67 protective housing for adjusting dampers in HVAC plants, comparable industrial plants and technical building installations

- **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**

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 19 VA / with 240 V 49 VA
	Auxiliary switch	2 x SPDT, 1 x 10° / 1 x 0...90°
	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
	Inhibiting torque static (voltage-free)	50 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%
	Direction of motion motor	electronically reversible
	Manual override	hand lever
	Angle of rotation	Max. 95°
	Angle of rotation note	can be limited on both sides with adjustable electrical end stops
	Running time motor	35 s / 90°
	Running time motor variable	30...120 s
	Sound power level, motor	68 dB(A)
	Mechanical interface	Form fit 17x17 mm
	Position indication	Scale plate 0...90
Safety data	Protection class IEC/EN	I, protective earth (PE)

Safety data	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
	Low voltage directive	CE according to 2014/35/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	UL Approval	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 humidity	Max. 100% RH
	Ambient temperature	-30...50°C [-22...122°F]
	Storage temperature	-40...80°C [-40...176°F]
	Servicing	maintenance-free
Weight	Weight	6.1 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.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Caution: Power supply voltage!
- The device has a protective earthing. Incorrect connection of the protective earth can lead to hazards due to electrical shock.
- 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.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation situation and the ventilation conditions must be observed.
- The materials used may be subject 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.
- If cables which are not authorised for UL (NEMA) Type 4X applications are used, then flexible metallic cable conduits or suitable threaded cable conduits of equal value are to be used.
- 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

Mode of operation

The actuator is equipped with a universal power supply module that can utilise supply voltages of AC 24...240 V and DC 24...125V.

Conventional operation:

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

Operation on Bus:

The actuator is fitted with an integrated interface for BACnet MS/TP, Modbus RTU and MP-Bus. It receives the digital control signal from the control system and returns the current status.

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 control signal, BACnet or Modbus can be used for the communicative position feedback

Simple direct mounting

Simple direct mounting on the damper shaft with form fit insert.

Manual override

The damper can be manually operated using a hand crank. Unlocking is carried out manually by removing the hand crank.

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

Gateways

Description	Type
Gateway MP zu BACnet MS/TP	UK24BAC
Gateway MP to Modbus RTU	UK24MOD

Electrical accessories

Description	Type
Signal converter voltage/current 100 kΩ 4...20 mA, Supply AC/DC 24 V	Z-UIC

Mechanical accessories

Description	Type
Retrofit adapter kit, F07/F10 (incl. screws F07), flat head/square, SW 17	ZPR05
Retrofit adapter kit, F07/F10 (incl. screws F07), square 45° offset, SW 14	ZPR06
Adapter kit with spacer ring, F07, square 45° offset, SW 17	ZPR08
Retrofit adapter kit, F07/F05/F10 (incl. screws F07), flat head/square, SW 14	ZPR09
Retrofit adapter kit, F05/F07/F10 (incl. screws F05), flat head/square, SW 14	ZPR10
Retrofit adapter kit, F07/F10 (incl. screws F07), square 45° offset, SW 18	ZPR11
Retrofit adapter kit, F07/F10 (incl. screws F07), flat head/square, SW 16	ZPR12
Hand crank for PR/PM actuator	ZPR20

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 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
	Duct sensor Humidity / Temperature active 140 mm x 19.5 mm	22DTH-11M
	Outdoor sensor with weather shield Humidity / Temperature	22UTH-11
	Differential pressure sensor Air -150...250 Pa, LCD	22ADP-18QB

Electrical installation

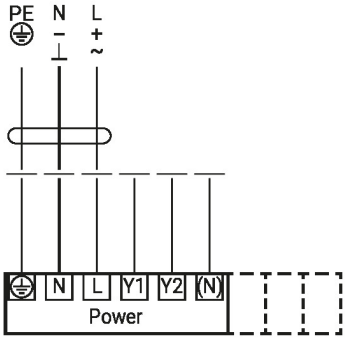
Caution: Power supply voltage!

Parallel connection of other actuators possible. Observe the performance data.

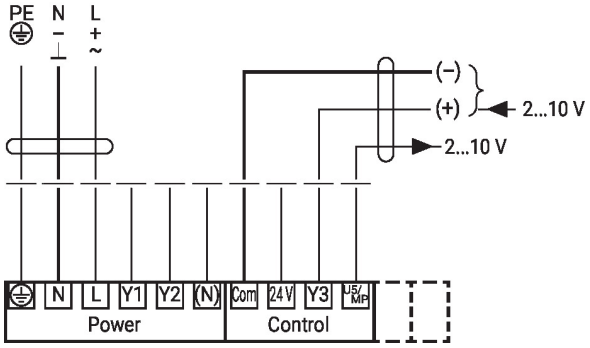
The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS-485 regulations.

Wiring diagrams

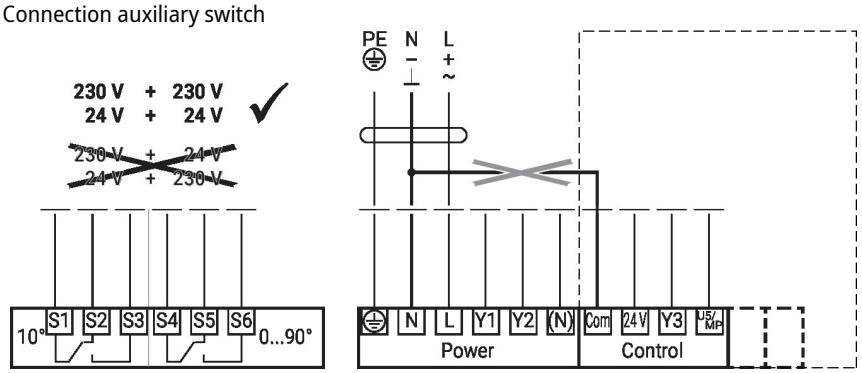
AC 24...240 V / DC 24...125 V



Modulating control

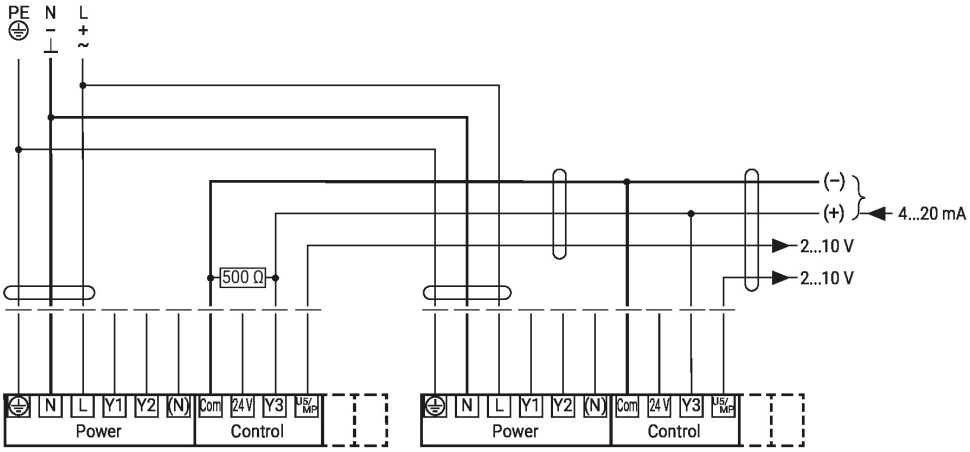


Connection auxiliary switch



Power supply must not be connected to the signal terminals!

Parallel circuit 4...20 mA

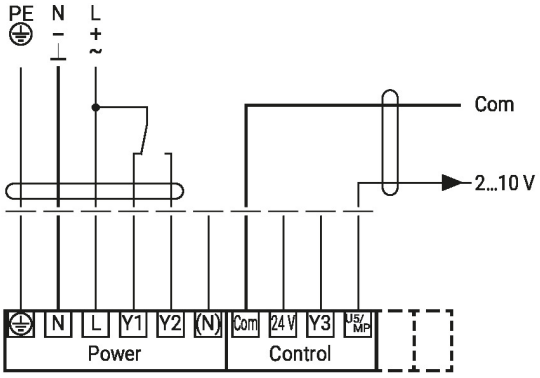


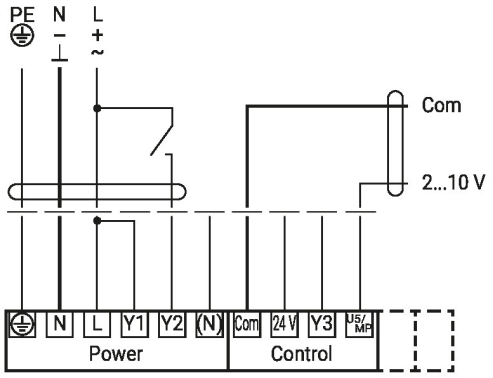
Setpoint 2...10 V

Functions

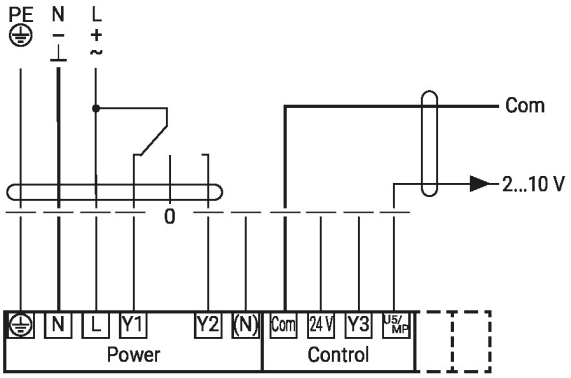
Functions with specific parameters (NFC)

Control open/close

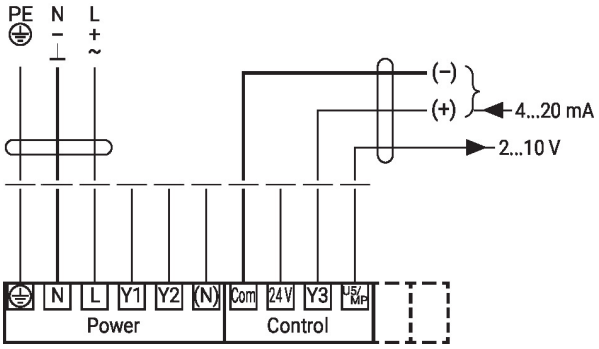




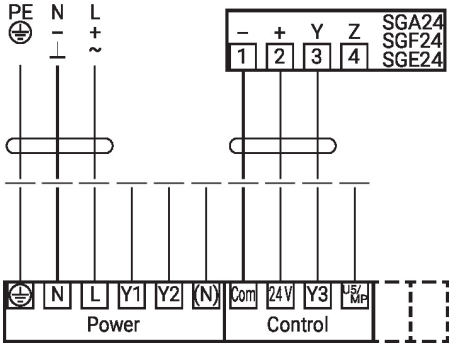
Control 3-point



Control 4...20 mA



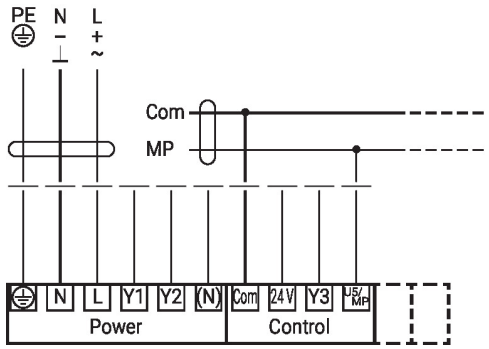
Positioner SG..



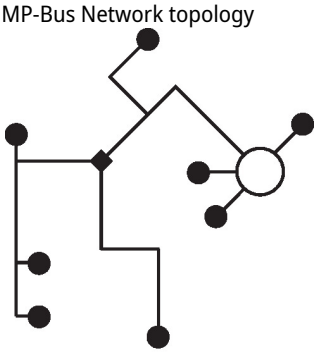
Note

Maximum output power «DC 24 V out» 1.2 W @ 50 mA!
A separate isolating transformer must be used for higher performance!

Connection on the MP-Bus

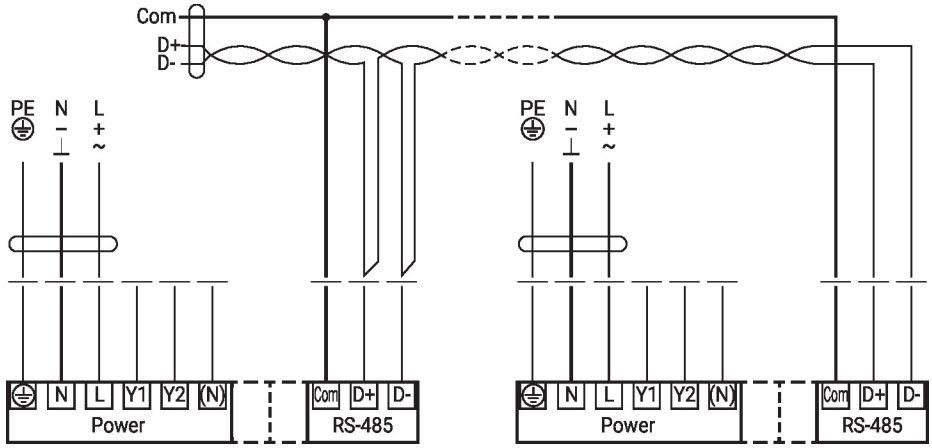


MP-Bus Network topology

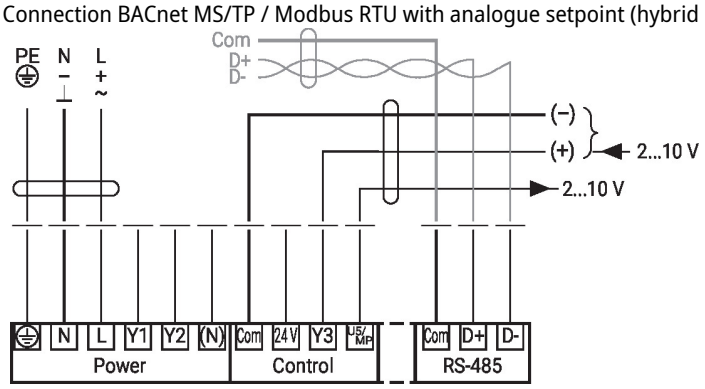


There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

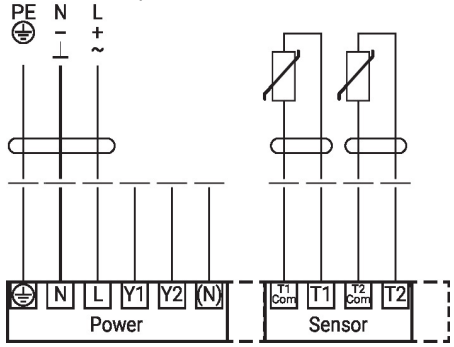
Connection BACnet MS/TP / Modbus RTU



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



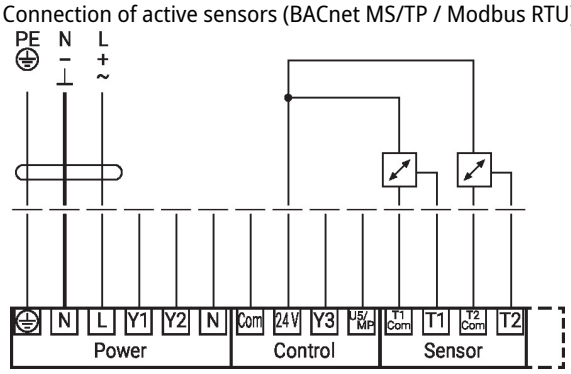
Connection of passive sensors (BACnet MS/TP / Modbus RTU)



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

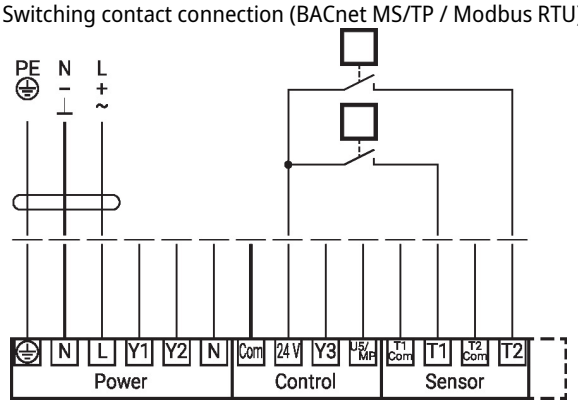
1) Resistance range
2) Resolution
Compensation of the measured value is recommended
- Suitable for Ni1000 and Pt1000
- Suitable Belimo types 01DT-..

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



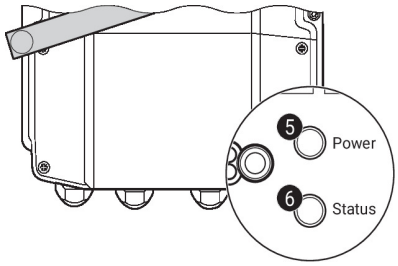
Possible input voltage range:
DC 0...10 V (resolution 5 mV)
To capture for example:
- Active temperature sensors
- Flow sensors
- Pressure / differential pressure sensors

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.
To capture for example:
- Flow monitors
- Operation / malfunction messages of chillers

Operating controls and indicators

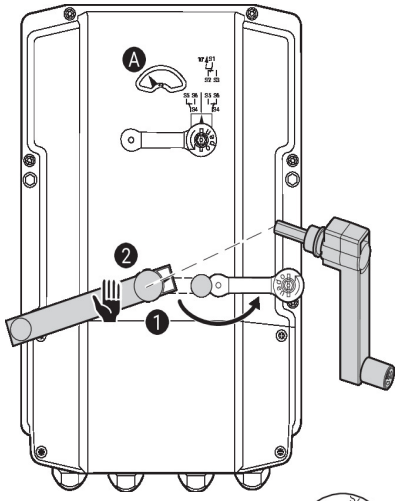


5 Push-button and LED display green

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



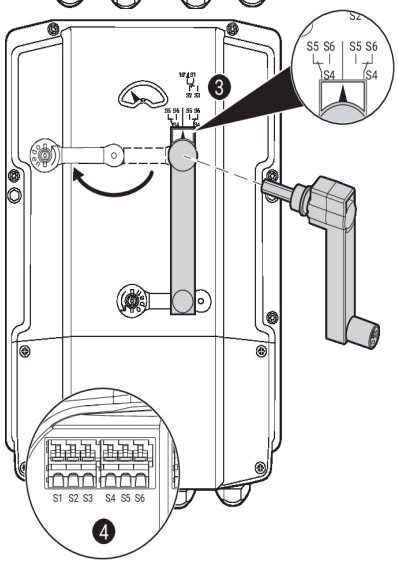
Auxiliary switch settings

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

For the auxiliary switch position settings, carry out points 1 to 4 successively.

1 Gear train disengagement
Opening the manual override cover and adjusting the hand crank.
Manual override is possible.

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



3 Auxiliary switch
For the auxiliary switch position settings, carry out points 1 to 4 successively.
Opening the auxiliary switch adjustment cover and adjusting the hand crank.
Turn the hand crank until the arrow points to the vertical line.

4 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°.

NFC connection

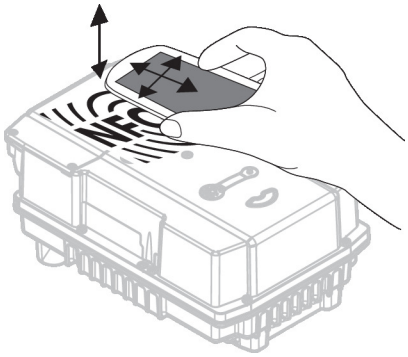
Belimo devices marked with the NFC logo can be operated with the Belimo Assistant App.

Requirement:

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

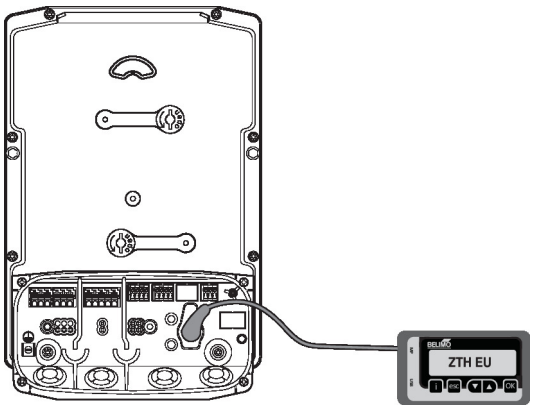
Align NFC-capable smartphone on the device so that both NFC antennas are superposed.

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.



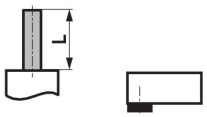
Tools connection

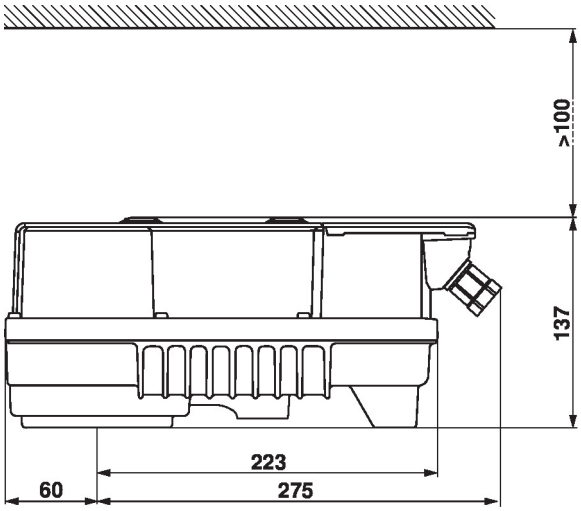
The actuator can be configured by the ZTH EU via the service socket.

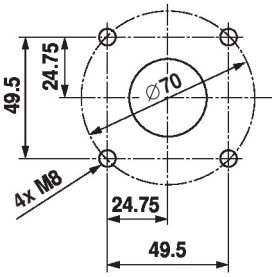


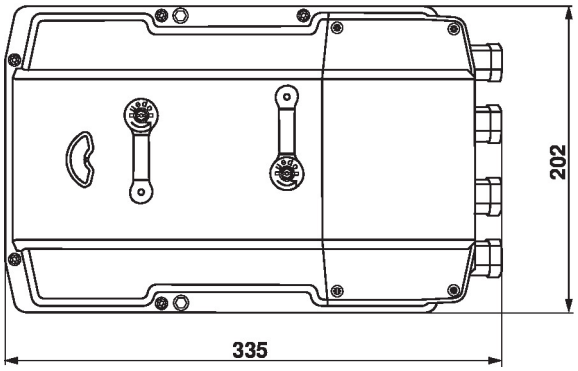
Dimensions

Spindle length

	-
	22.5...33







Further documentation

- Tool connections
- BACnet Interface description
- Modbus Interface description
- Overview MP Cooperation Partners
- Introduction to MP-Bus Technology
- MP Glossary
- Installation instructions for actuators