MP↗BUS®

Communicative RobustLine damper actuator for adjusting dampers in industrial plants and in technical building installations

- Air damper size up to approx. 4 m²
- Nominal torque 20 Nm
- Nominal voltage AC/DC 24 V
- Control Modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Conversion of sensor signals
- Communication via Belimo MP-Bus
- Optimum protection against corrosion and chemical influences, UV radiation, damp and condensation

Technical data

Electrical data	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	3.5 W
	Power consumption in rest position	1.4 W
	Power consumption for wire sizing	6 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm² (halogen-free)
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	Min. 20 Nm
	Torque variable	25%, 50%, 75% reduced
	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
	Position accuracy	±5%
	Direction of motion motor	Selectable with switch 0 / 1
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Direction of motion variable	Electronically reversible
	Manual override	Gear disengagement with push-button, can be locked
	Angle of rotation	Max. 95°
	Angle of rotation note	can be limited on both sides with adjustable mechanical end stops
	Running time motor	150 s / 90°
	Motor running time variable	86...346 s
	Adaption setting range	manual
	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	45 dB(A)
	Spindle driver	Universal spindle clamp 14...20 mm
	Position indication	Mechanically, pluggable

Technical data

|		
Safety	Protection class IEC/EN	III Safety extra-low voltage
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP66 + IP67
	Degree of protection NEMA/UL	NEMA 4, UL Enclosure Type 4
	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
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	4
	Ambient temperature	-30...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	100% r.h.
	Maintenance	Maintenance-free
Weight	Weight approx.	2.1 kg

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.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Junction boxes must at least correspond with enclosure IP degree of protection!
- The cover of the protective housing may be opened for adjustment and servicing. When it is closed afterwards, the housing must seal tight (see installation instructions).
- The device may only be opened in the manufacturer's factory. It does not contain any parts that can be replaced or repaired by the user.
- The cables must not be removed from the device installed in the interior.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.
- 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 information on chemical resistance refers to laboratory tests with raw materials and finished products and to trials in the field in the areas of application indicated.
- The materials used may be subjected to external influences (temperature, pressure, constructional fixture, effect of chemical substances, etc.), which cannot be simulated in laboratory tests or field trials.
- The information regarding areas of application and resistance can therefore only serve as a guideline. 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. The chemical or mechanical resistance of the materials used is not alone sufficient for judging the suitability of a product. Regulations pertaining to combustible liquids such as solvents etc. must be taken into account with special reference to explosion protection.

Product features

Fields of application	The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions: - Wood drying - Animal breeding - Food processing - Agricultural - Swimming baths / bathrooms - Rooftop ventilation plant rooms - General outdoor applications - Changing atmosphere - Laboratories
Resistances	Noxious gas test EN 60068-2-60 (Fraunhofer Institut ICT / DE) Salt fog spray test EN 60068-2-52 (Fraunhofer Institut ICT / DE) Ammoniac test DIN 50916-2 (Fraunhofer Institut ICT / DE) Climate test IEC60068-2-30 (Trikon Solutions AG / CH) Disinfectant (animals) (Trikon Solutions AG / CH) UV Test (Solar radiation at ground level) EN 60068-2-5, EN 60068-2-63 (Quinel / Zug CH)
Used materials	Actuator housing polypropylene (PP) Cable glands / hollow shaft polyamide (PA) Connecting cable FRNC Clamp / screws in general Steel 1.4404 Seals EPDM Form fit insert aluminium anodised
Mode of operation	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. The measuring voltage U serves for the electrical display of the actuator 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.
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.
Simple direct mounting	Simple direct mounting on the damper spindle with an universal spindle clamp, supplied with an anti-rotation device to prevent the actuator from rotating.
Manual override	Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
Adjustable angle of rotation	Adjustable angle of rotation with mechanical end stops. Standard setting 0 ... 90°. The housing cover must be removed to set the angle of rotation.
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.
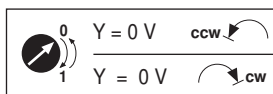
Product features

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)

Accessories

	Description	Type
Gateways	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

	Description	Type
Electrical accessories	Auxiliary switch, add-on, 2 x SPDT, grey	S2A GR
	Feedback potentiometer 140 Ohm, add-on, grey	P140A GR
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on, grey	P500A GR
	Feedback potentiometer 2.8 kOhm, add-on, grey	P2800A GR
	Feedback potentiometer 1 kOhm, add-on, grey	P1000A GR
	Feedback potentiometer 5 kOhm, add-on, grey	P5000A GR
	Feedback potentiometer 10 kOhm, add-on, grey	P10000A GR
	Signal converter voltage/current, supply AC/DC 24V	Z-UIC
	Digital position indicator for front-panel mounting, 0...99%, front mass 72 x 72 mm	ZAD24
	Range controller for wall mounting, adjustable electron. Min./max. angle of rotation limitation	SBG24
	Positioner for wall mounting, range 0...100%	SGA24
	Positioner in a conduit box, range 0...100%	SGE24
	Positioner for front-panel mounting, range 0...100%	SGF24
	Positioner for wall mounting, range 0...100%	CRP24-B1
	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

	Description	Type
Service Tools	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

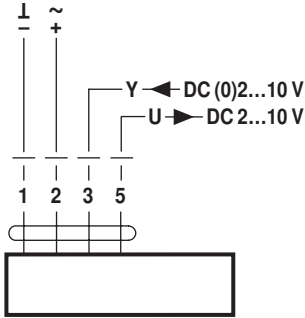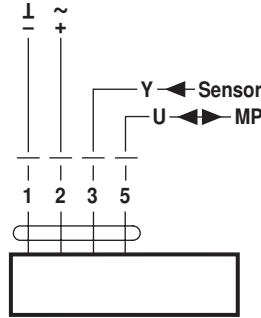| ⚠	**Notes**	• Connection via safety isolating transformer. • Parallel connection of other actuators possible. Observe the performance data.

Wiring diagrams

AC/DC 24 V, modulating

```
⊥ ~
│ │ +
│ │
│ │ ├─ Y ◄─ DC (0)2...10 V
│ │ │├─ U ─► DC 2...10 V
│ │ ││ │
1 2 3 5
```

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

Operation on the MP-Bus

```
⊥ ~
│ │ +
│ │
│ │ ├─ Y ◄─ Sensor
│ │ │├─ U ◄─► MP
│ │ ││ │
1 2 3 5
```

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

Functions

Functions when operated on MP-Bus

Connection on the MP-Bus


```
1 2 3 5
   Y  U
```
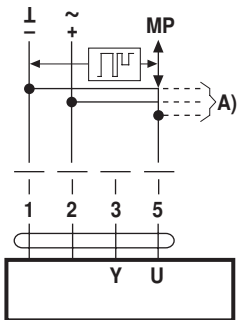
A) more actuators and sensors (max.8)

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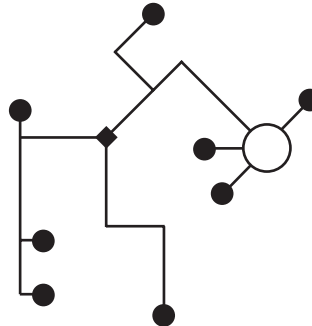
There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection of active sensors


```
1 2 3 5
   Y  U
```
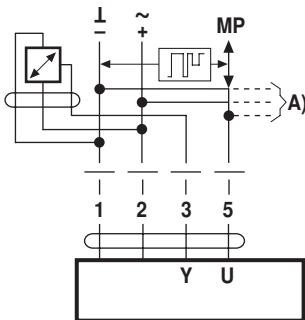
A) more actuators and sensors (max.8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V (max. DC 0...32 V)
• Resolution 30 mV

Connection of external switching contact


```
1 2 3 5
   Y  U
```
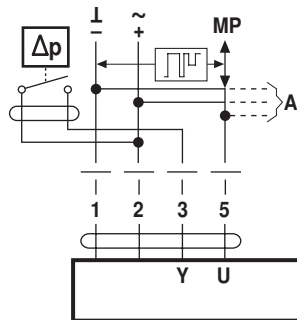
A) more actuators and sensors (max.8)
• Switching current 16 mA @ 24 V
• Start point of the operating range must be parameterised on the MP actuator as ≥ 0.5 V

Connection of passive sensors


```
1 2 3 5
   Y  U
```
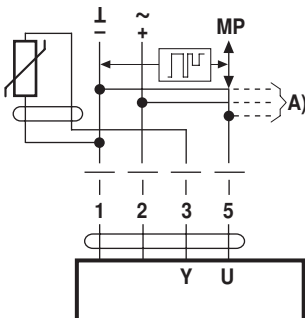
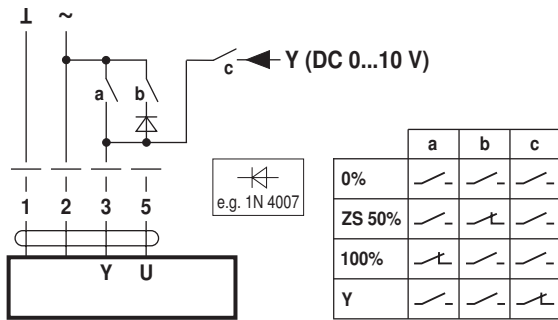| Ni1000 | −28...+98 °C | 850...1600 Ω [2] |
| PT1000 | −35...+155 °C | 850...1600 Ω [2] |
| NTC | −10...+160 °C [1] | 200 Ω...60 kΩ [2] |

A) more actuators and sensors (max.8)
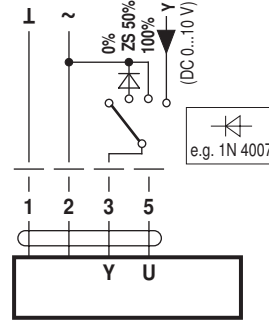1) Depending on the type
2) Resolution 1 Ohm

Functions
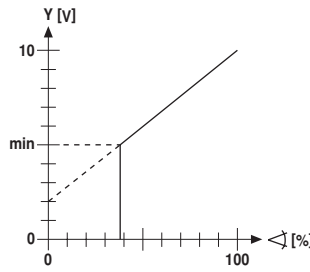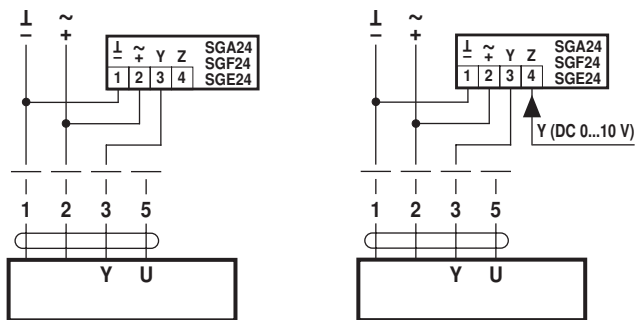
Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

Y (DC 0...10 V)

e.g. 1N 4007

	a	b	c
0%			
ZS 50%			
100%			
Y			

Override control with AC 24 V with rotary switch

0% ZS 50% 100%   Y (DC 0...10 V)

e.g. 1N 4007

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

SGA24 SGF24 SGE24

Minimum limit with positioner SG..

SGA24 SGF24 SGE24

Y (DC 0...10 V)

Follow-up control (position-dependent)

Y ◄ DC (0)2...10 V

U ► DC 2...10 V

Position indication

ZAD24

(1)
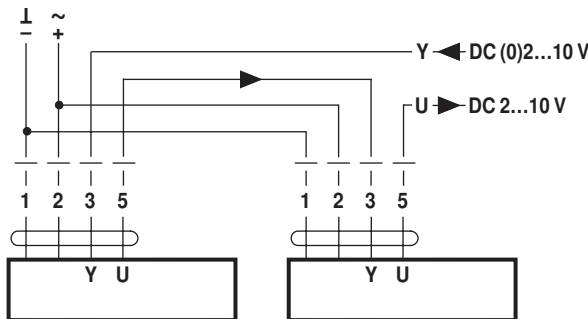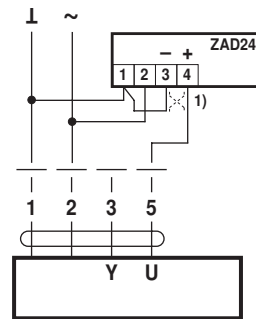
(1) Adapting the direction of rotation

Control with 4...20 mA via external resistor
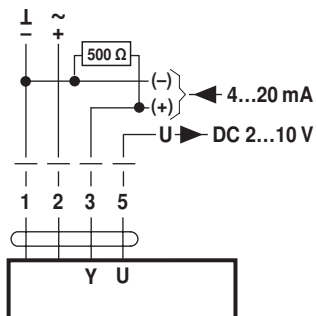
500 Ω

(−) (+) 4...20 mA

U ► DC 2...10 V

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
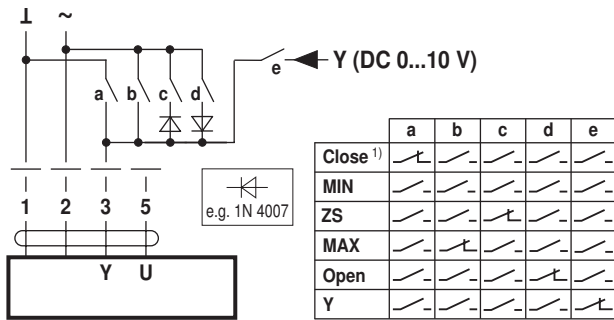
Functional check
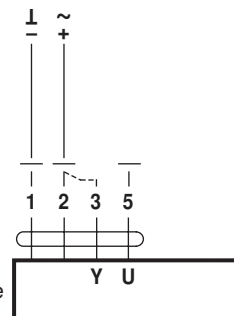
Procedure
1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
– with direction of rotation 0: Actuator rotates to the left
– with direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
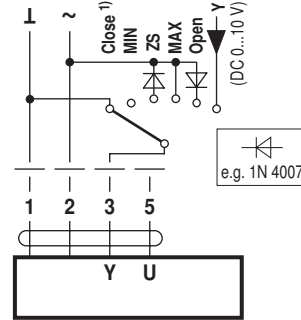– Actuator runs in opposite direction

Functions

Functions for actuators with specific parameters (Parametrisation with PC-Tool necessary)

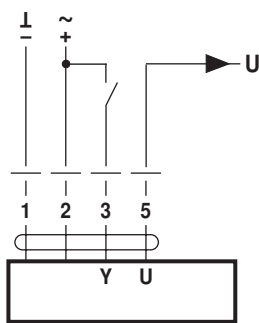Override control and limiting with AC 24 V with relay contacts

⊥ ~   e ◄— Y (DC 0...10 V)
     a   b   c   d

e.g. 1N 4007

1   2   3   5

Y   U

	a	b	c	d	e
Close [1]					
MIN					
ZS					
MAX					
Open					
Y					

Override control and limiting with AC 24 V with rotary switch

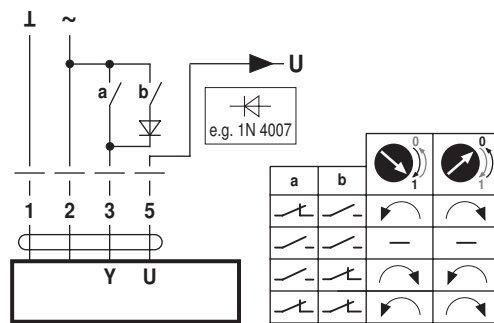⊥ ~ Close [1] MIN ZS MAX Open Y (DC 0...10 V)

e.g. 1N 4007

1   2   3   5

Y   U

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

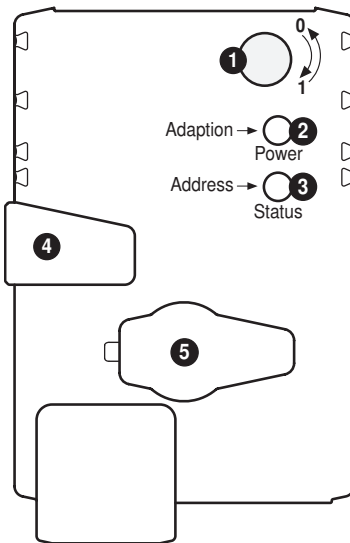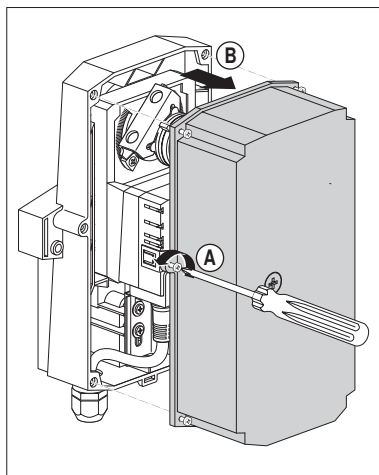Control open-close

⊥ ~   ►U
         +

1   2   3   5

Y   U

Control 3-point

⊥ ~   ►U
     a   b

e.g. 1N 4007

1   2   3   5

Y   U

a	b	0/1	0/1
		↶	↷
		—	—
		↷	↶
		↶	↷

Operating controls and indicators

0
1

Adaption → **2** Power

Address → **3** Status

4

5

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
Flickering: MP communication active
On: Adaptation or synchronising process active
Flashing: Request for addressing from MP master
Press button: Confirmation of the addressing

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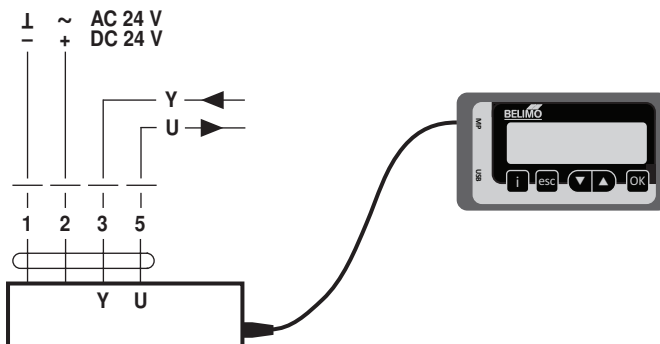**2** Off and **3** On   Possible wiring error in power supply
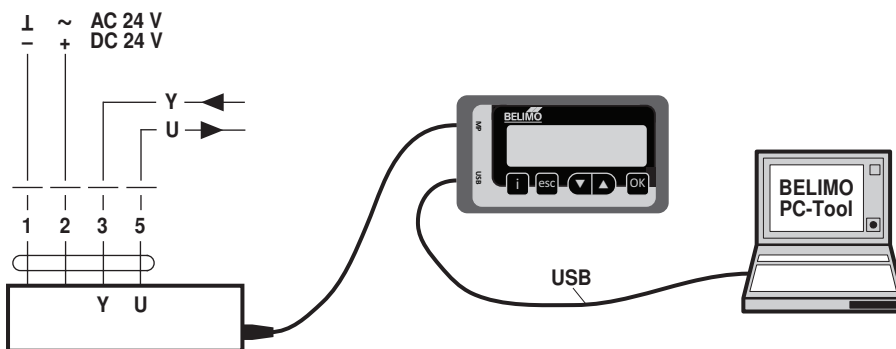
Service

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

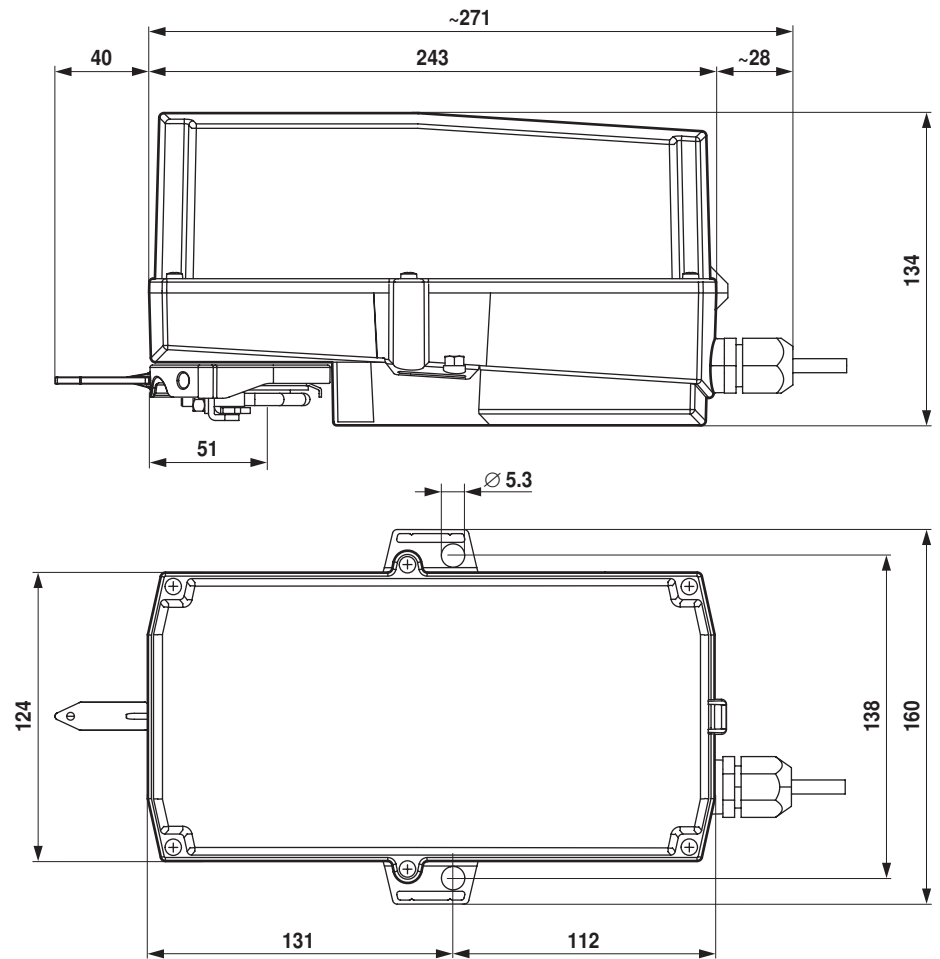**Service Tools connection**   ZTH EU connection

PC-Tool connection

BELIMO

Dimensions [mm]

Spindle length

	-
	20...58

Clamping range

⬤ ↕	⬛ ↕	◆ ↕
14...20	10...14	14...20

Dimensional drawings

Further documentation

- Overview MP Cooperation Partners
- Tool connections