# BELIMO®

**Communicative rotary actuator with emergency control function for ball valves**

- Nominal torque 4 Nm
- Nominal voltage AC/DC 24 V
- Control Modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Communication via BELIMO MP-Bus
- Conversion of sensor signals
- Deenergised closed (NC)

MP⚡BUS®

## 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 | 6 W |
| | Power consumption in rest position | 2.5 W |
| | Power consumption for wire sizing | 10 VA |
| | Connection supply / control | Cable 1 m, 4 x 0.75 mm² |
| | Parallel operation | Yes (note the performance data) |
| **Functional data** | Torque motor | Min. 4 Nm |
| | Torque spring return | Min. 4 Nm |
| | Positioning signal Y | DC 0...10 V |
| | Positioning signal Y note | Input impedance 100 kΩ |
| | Control signal Y variable | Open-close<br>3-point (AC only)<br>Modulating (DC 0...32 V) |
| | Operating range Y | DC 2...10 V |
| | Operating range Y variable | Start point DC 0.5...30 V<br>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<br>End point DC 2.5...10 V |
| | Position accuracy | ±5% |
| | Direction of rotation motor | Y=0 (0V = A - AB = 0%) |
| | Direction of rotation spring-return | Deenergised NC, valve closed (A - AB = 0%) |
| | Manual override | No |
| | Angle of rotation | 95° |
| | Running time motor | 75 s / 90° |
| | Motor running time variable | 75...300 s |
| | Running time emergency control position | <20 s / 90° |
| | Adaption setting range | manual (automatic on first power-up) |
| | Adaption setting range variable | No action<br>Adaption when switched on<br>Adaption after using the rotation switch |
| | Override control | MAX (maximum position) = 100%<br>MIN (minimum position) = 0%<br>ZS (intermediate position, AC only) = 50% |
| | Override control variable | MAX = (MIN + 33%)...100%<br>MIN = 0%...(MAX – 33%)<br>ZS = MIN...MAX |
| | Sound power level motor | 45 dB(A) |
| | Position indication | Mechanical |
| | Service life | Min. 60,000 emergency positions |
| **Safety** | Protection class IEC/EN | III Safety extra-low voltage |
| | Degree of protection IEC/EN | IP54 |
| | EMC | CE according to 2004/108/EC |
| | Certification IEC/EN | IEC/EN 60730-1 and IEC/EN 60730-2-14 |
| | Mode of operation | Type 1 |
| | Rated impulse voltage supply / control | 0.8 kV |

## Technical data

| | | |
|---|---|---|
| **Safety** | Control pollution degree | 3 |
| | Ambient temperature | -30...50 °C |
| | Non-operating temperature | -40...80 °C |
| | Ambient humidity | 95% r.h., non-condensing |
| | Maintenance | Maintenance-free |
| **Weight** | Weight approx. | 1.5 kg |

## Safety notes

⚠️

- This device has been designed for use in stationary heating, ventilation and air conditioning systems and is not allowed to 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.
- 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 is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

## Product features

**Principle of operation**

Conventional operation:
The actuator is connected with a standard modulating signal DC 0...10 V. The actuator moves the valve to the operating position at the same time as tensioning the return spring. The valve is turned back to the emergency position by spring force when the supply voltage is interrupted.
Operation on the MP-Bus:
The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and travels 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. Input and output signals and other parameters can be altered with the PC-Tool MFT-P or with the Service tool ZTH EU.

**Simple direct mounting**

Simple direct mounting on the ball valve with only one screw. The mounting orientation in relation to the ball valve can be selected in 90° steps.

**High functional reliability**

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

**Home position**

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: R (counter-clockwise rotation).

**Adaption and synchronisation**

An adaption can be triggered manually by switching the direction of rotation switch from the left to the right twice within 5s or with the PC-Tool. Both mechanical end stops are detected during the adaption (entire setting range). Automatic synchronisation after actuating the direction of rotation switch once is programmed. The synchronisation is in the home position (0%).
A range of settings can be adapted using the PC-Tool (see MFT-P documentation)

## Accessories

|  | Description | Type |
|---|---|---|
| **Gateways** | Gateway MP for BACnet MS/TP, AC/DC 24 V | UK24BAC |
|  | Gateway MP to Modbus RTU, AC/DC 24 V | UK24MOD |
|  | Gateway MP for LonWorks®, AC/DC 24 V, LonMark-certified | UK24LON |
|  | Gateway MP to KNX/EIB, AC/DC 24 V, EIBA certified | UK24EIB |

|  | Description | Type |
|---|---|---|
| **Electrical accessories** | 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.<br>• 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

R
L
Y = 0
A – AB = 0%
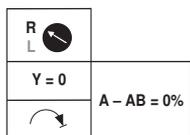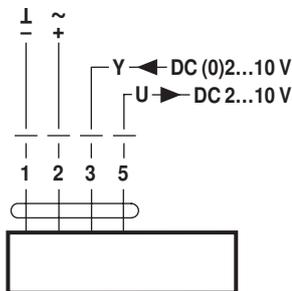
**Cable colours:**
1 = black
2 = red
3 = white
5 = white

Operation on the MP-Bus



Y ◄ Sensor
U ◄► MP

1 2 3 5

R
L
A – AB = 0%
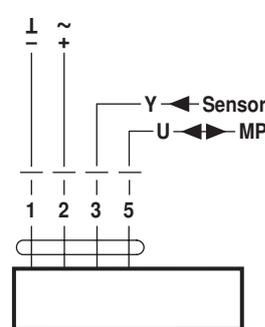
**Cable colours:**
1 = black
2 = red
3 = white
5 = white

## Functions

### Functions when operated on MP-Bus

Connection on the MP-Bus
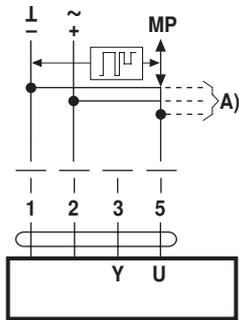
A) more actuators and sensors (max.8)

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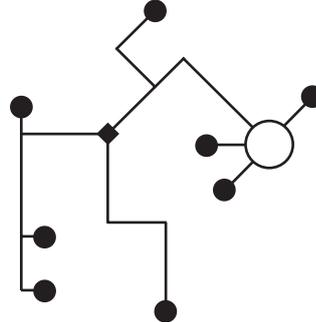
There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection of active sensors
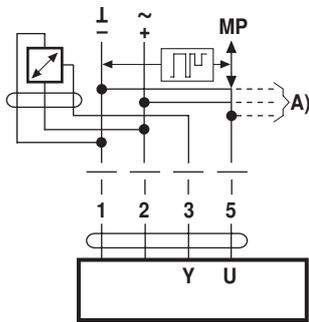
A) more actuators and sensors (max.8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V (max. DC 0...32 V)
• Resolution 30 mV

Connection of external switching contact
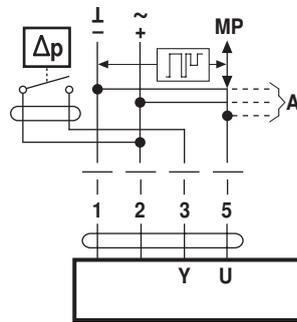
A) more actuators and sensors (max.8)
• Switching current 16 mA @ 24 V
• Start point of the operating range must be parameterised on the MP actuator as ≥ 0.5 V

Connection of passive sensors
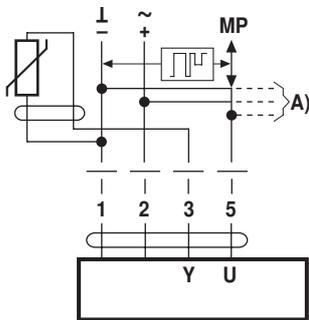
| | | |
|---|---|---|
| Ni1000 | −28...+98 °C | 850...1600 Ω [2] |
| PT1000 | −35...+155 °C | 850...1600 Ω [2] |
| NTC | −10...+160 °C [1] | 200 Ω...60 kΩ [2] |

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

### Functions 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 | | | |
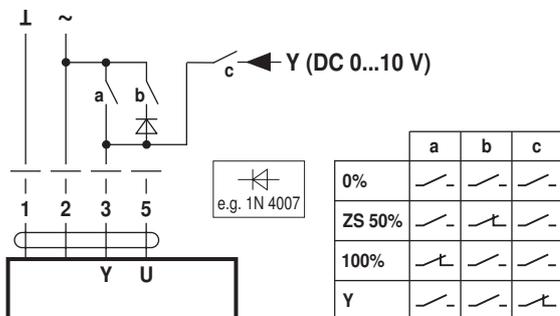
Override control with AC 24 V with rotary switch

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

e.g. 1N 4007

## Functions

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

Minimum limit with positioner SG..
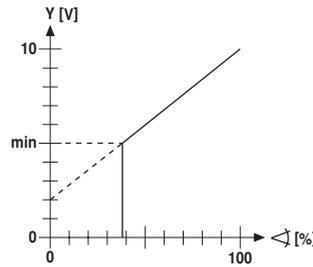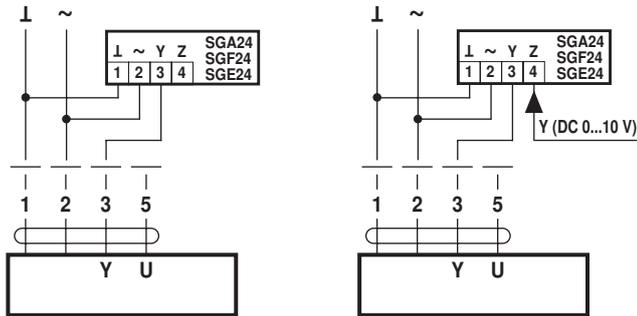
Follow-up control (position-dependent)

Position indication

(1) Adapting the direction of rotation
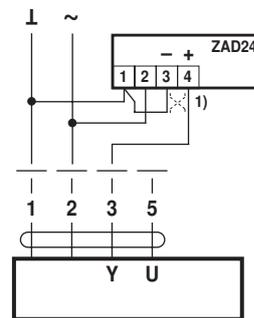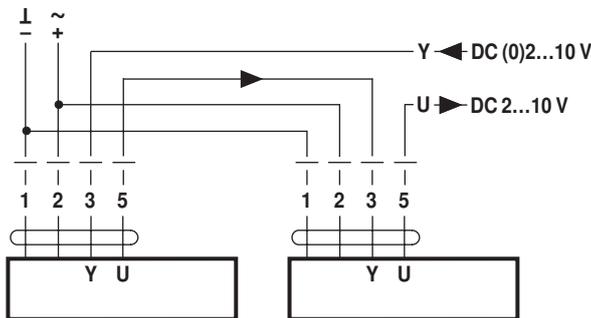
Control with 4...20 mA via external resistor
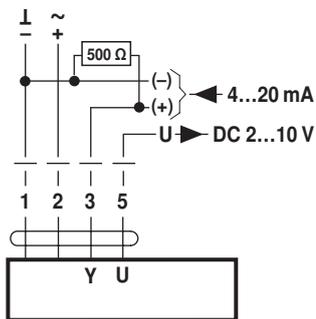
**Caution:**
The operating range must be set to
DC 2...10 V.
The 500 Ω resistor converts the
4...20 mA current signal to a voltage
signal DC 2...10 V

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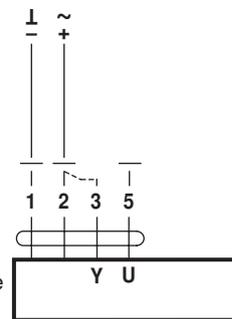
**Procedure**
1. Connect 24V to connections 1
and 2
2. Disconnect connection 3:
– with direction of rotation L:
Actuator rotates to the left
– with direction of rotation R:
Actuator rotates to the right
3. Short-circuit connections 2 and 3:
– Actuator runs in opposite direction

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

Override control and limiting with AC 24 V with relay contacts

Override control and limiting with AC 24 V with rotary switch

|          | a | b | c | d | e |
|----------|---|---|---|---|---|
| Close [1] |   |   |   |   |   |
| MIN      |   |   |   |   |   |
| ZS       |   |   |   |   |   |
| MAX      |   |   |   |   |   |
| Open     |   |   |   |   |   |
| Y        |   |   |   |   |   |
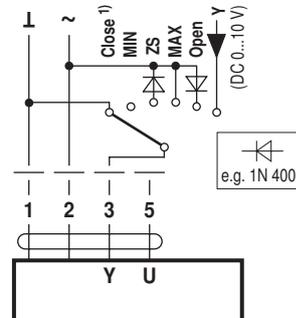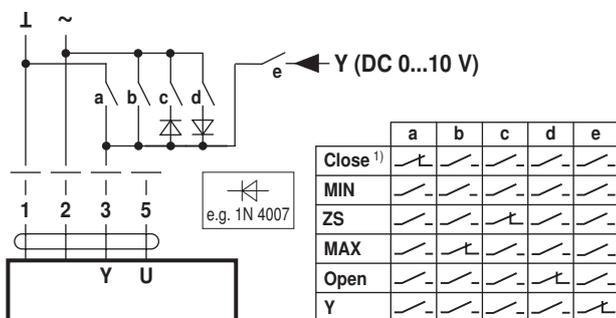
1) **Caution:** This function is only
guaranteed if the start point of the
operating range is defined as min.
0.5 V.

## Functions

Control open-close

Control 3-point

| a | b | |
|---|---|---|
| ⊥ | / | ▶ |
| / | / | stop |
| / | ⊥ | ↷ |
| ⊥ | ⊥ | ▶ |

e.g. 1N 4007
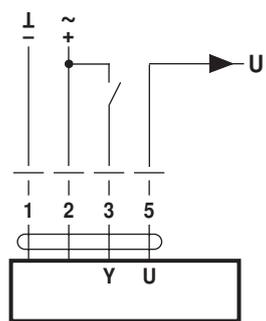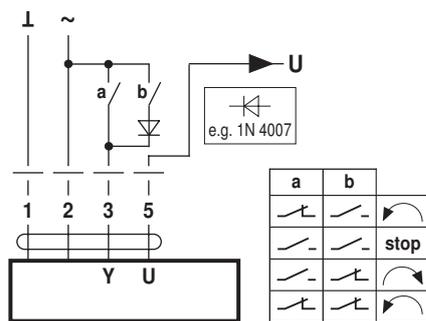
## Operating controls and indicators
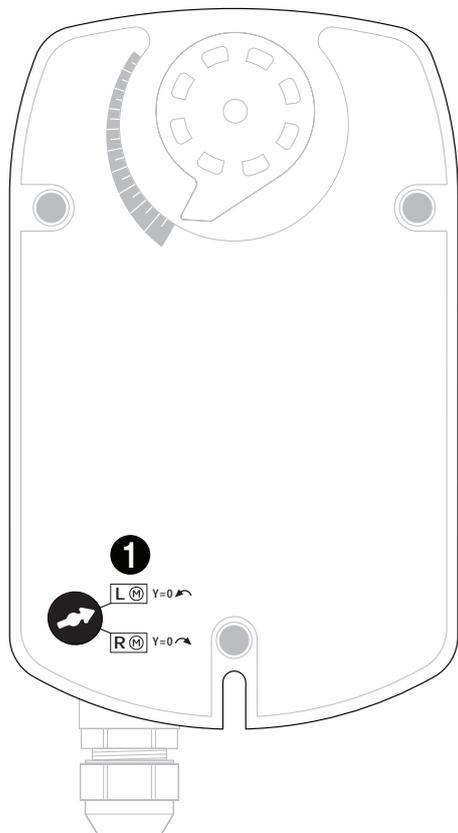
① **MP adressing**

Move direction of rotation switch in opposite position und backwards (within 4 sec.)

L Ⓜ Y=0
R Ⓜ Y=0

## Service

| | | |
|---|---|---|
| ⚠ | **Notes** | • The actuator can be parameterised by PC-Tool and ZTH EU via cable connection. |

ZTH EU connection
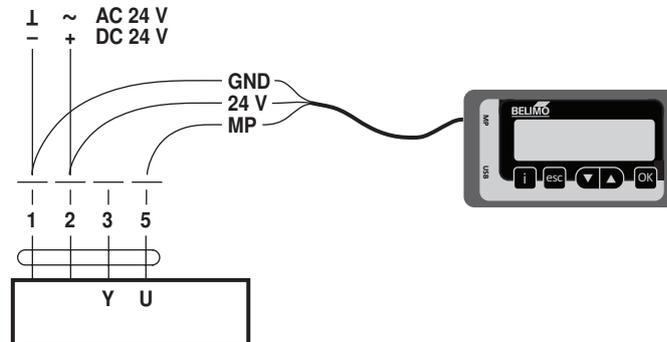


PC-Tool connection
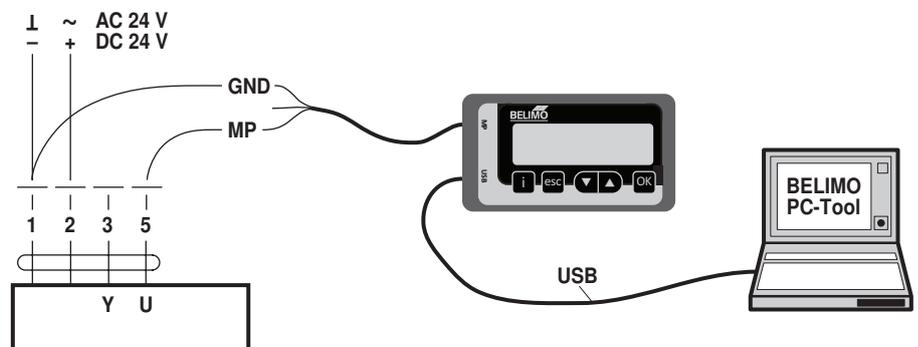


## Dimensions [mm]

**Dimensional drawings**
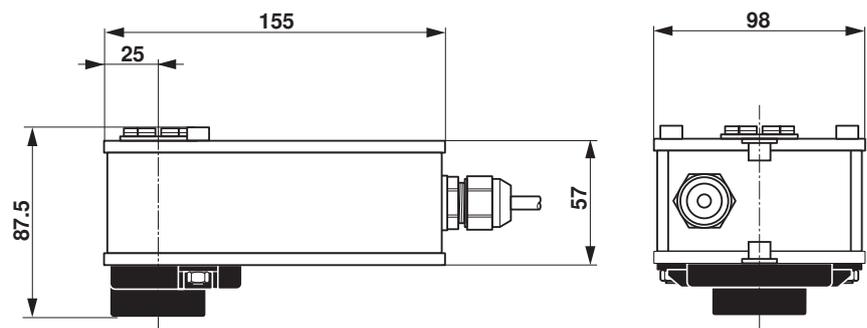


## Further documentation

- Overview Valve-actuator combinations
- Data sheets for ball valves
- Installation instructions for actuators and/or ball valves
- General notes for project planning